System Manual



SMA STORAGE XL PACKAGE

CSS-89-IN-30-30 / CSS-89-IN-50-30 / CSS-197-IN-50-30 / CSS-107-OUT-30-30 / CSS-107-OUT-50-30 / CSS-197-OUT-50-30

ENGLISH

CSSX-30-SH-en-11 | Version 1.1

Legal Provisions

The information contained in these documents is the property of SMA Solar Technology AG. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, be it electronic, mechanical, photographic, magnetic or otherwise, without the prior written permission of SMA Solar Technology AG. Internal reproduction used solely for the purpose of product evaluation or other proper use is allowed and does not require prior approval.

SMA Solar Technology AG makes no representations or warranties, express or implied, with respect to this documentation or any of the equipment and/or software it may describe, including (with no limitation) any implied warranties of utility, merchantability, or fitness for any particular purpose. All such representations or warranties are expressly disclaimed. Neither SMA Solar Technology AG nor its distributors or dealers shall be liable for any indirect, incidental, or consequential damages under any circumstances.

The exclusion of implied warranties may not apply in all cases under some statutes, and thus the above exclusion may not apply.

Specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Readers are cautioned, however, that product improvements and field usage experience may cause SMA Solar Technology AG to make changes to these specifications without advance notice or per contract provisions. SMA Solar Technology AG shall not be responsible for any damages, including indirect, incidental or consequential damages, caused by reliance on the material presented, including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the content material.

SMA Warranty

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

SOFTWARE LICENSES

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

Trademarks

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

SMA Solar Technology AG

Sonnenallee 1

34266 Niestetal

Germany

Tel. +49 561 9522-0

www.SMA.de

E-mail: info@SMA.de

Status: Friday, July 3, 2026

Copyright © 2026 SMA Solar Technology AG. All rights reserved.

Table of Contents

1 Information on this Document 8
1.1 Validity 8
1.2 Target Group 8
1.3 Content and Structure of this Document 8
1.4 Levels of Warning Messages 8
1.5 Symbols in the Document 9
1.6 Typographies in the document 9
1.7 Designations in the Document 9
1.8 Explanation of Used Terms 10
1.9 Additional Information 10

2 Safety 12
2.1 Intended Use 12
2.2 IMPORTANT SAFETY INSTRUCTIONS 13

3 Scope of Delivery 21
3.1 Overview of the Scope of Delivery 21
3.2 Scope of Delivery of the Inverter 21
3.3 Scope of Delivery of the Indoor Version of the Battery Cabinet 23
3.4 Scope of Delivery of the Outdoor Version of the Battery Cabinet 24
3.5 Accessory Kit for the Battery Cabinet 25

4 Additionally Required Materials and Equipment 27

5 Product overview 29
5.1 System Components 29
5.2 Device function 30
5.3 System overview 31
5.3.1 Sunny Tripower Storage X as System Manager 31
5.3.2 Sunny Tripower Storage X with SMA Data Manager M 32
5.4 Design of the Inverter 32
5.5 Interfaces and Functions of the Inverter 33
5.5.1 User Interface 33
5.5.2 SMA Speedwire 33
5.5.3 Wi-Fi connection to SMA 360° app and SMA Energy app 33
5.5.4 Device Key (DEV KEY) 33
5.5.5 Modbus 33
5.5.6 Grid Management Services 34
5.5.7 Integrated Plant Control 34
5.5.8 Increased self-consumption 34
5.5.9 Peak load shaving 34
5.5.10 Multiuse 34
5.5.11 Module slot 35
5.5.12 SMA I/O modules 35
5.5.13 Grid and PV system protection in accordance with VDE-AR-N 4105 35
5.5.14 Ripple control receiver 35
5.6 Battery Interfaces and Functions 35
5.6.1 Fire Suppression System 35
5.6.2 Leakage sensor 36
5.6.3 Door sensor 36
5.6.4 Interfaces for signals 36
5.7 Battery Use by the Inverter 36

5.8 LED Signals of the Inverter ... 37
5.9 Symbols on the Inverter ... 38
5.10 Design of the Indoor Version of the Battery Cabinet ... 40
5.11 Design of the Outdoor Version of the Battery Cabinet ... 41
5.12 Modular Extension of the Battery Cabinet ... 42
5.13 Battery Cabinet LED Signals ... 42
5.14 Symbols on the battery cabinet ... 43
5.15 Information on the Battery Cabinet ... 44
5.16 Information on the High-Voltage Box ... 45
5.17 Information on the Battery Module ... 45

6 Transport of the battery cabinet ... 46

7 Mounting and Preparing the Connection ... 47
7.1 Requirements for Mounting ... 47
7.1.1 Product Mechanical Data ... 47
7.1.2 Installation Plans for the Indoor Version of the Battery Cabinet ... 47
7.1.3 Installation Plans for the Outdoor Version of the Battery Cabinet ... 50
7.1.4 Requirements for the mounting location of the inverter ... 51
7.1.5 Permitted and Prohibited Inverter Mounting Positions ... 52
7.1.6 Inverter Mounting Dimensions ... 52
7.1.7 Recommended Inverter Mounting Clearances ... 53
7.1.8 Requirements on the Installation Site of the Battery Cabinet ... 53
7.1.9 Installation Dimensions for the Indoor Version of the Battery Cabinet ... 54
7.1.10 Requirements on the Foundation for the Outdoor Version of the Battery Cabinet ... 55
7.1.11 Design of the Foundation for the Outdoor Version of the Battery Cabinet ... 56
7.2 Inverter Connecting Plate ... 57
7.3 Inverter Center of Gravity ... 57
7.4 Mounting Procedure ... 57
7.5 Mounting the Inverter ... 58
7.5.1 Preparing for mounting and connection ... 58
7.5.2 Mounting the Inverter ... 59
7.6 Mounting the Battery ... 62
7.6.1 Unpack the battery cabinet ... 62
7.6.2 Positioning the Outdoor Version of the Battery Cabinet ... 63
7.6.3 Installing a Roof for the Outdoor Version of the Battery Cabinet ... 64
7.6.4 Positioning the Indoor Version of the Battery Cabinet ... 65
7.6.5 Mounting the Panels of the Outdoor Version ... 66
7.7 Mounting the DC Distributor ... 68

8 Electrical Connection ... 69
8.1 Wiring Overview with One Battery Inverter ... 69
8.2 Connecting the Battery via a DC Distributor ... 70
8.3 Requirements for the electrical connection ... 70
8.3.1 Residual-current monitoring unit (RCMU) ... 70
8.3.2 Overvoltage category ... 71
8.3.3 Load-break switch and cable protection ... 71
8.3.4 Equipotential Bonding ... 71
8.3.5 Requirements on the AC cable for the inverter ... 71
8.3.6 Requirements on the AC cable for the battery cabinet ... 71
8.3.7 Requirements for the Cable Connection with Terminal Lugs ... 72
8.3.8 Network cable requirements ... 72
8.3.9 Battery data cable requirements ... 72
8.3.10 Laying plan for network and battery data cables ... 73

8.3.11 Ripple control receiver and external I/O system ... 73
8.3.12 DC cable requirements ... 73
8.4 Electrical Connection Procedure with a Single Battery Cabinet ... 74
8.5 Electrical Connection Procedure with Multiple Parallel-Connected Battery Cabinets ... 74
8.6 Connecting the Inverter ... 76
8.6.1 Overview of the Connection Area ... 76
8.6.2 DC connection overview ... 77
8.6.3 Connecting the AC Cable ... 77
8.6.4 Connecting the Network Cables ... 78
8.6.5 Connecting the battery communication cable for CAN ... 81
8.6.6 Connecting the DC Cables ... 83
8.6.7 Crimping of Ring Terminal Lug ... 85
8.7 Connecting the Battery Cabinet ... 86
8.7.1 Overview of the Cable Routing with the Indoor Version of the Battery Cabinet ... 86
8.7.2 Earthing the battery cabinet ... 86
8.7.3 Connection Area of the High-Voltage Box ... 87
8.7.4 Connection area of the outdoor battery cabinet ... 88
8.7.5 AC Connection ... 89
8.7.5.1 Connecting the AC Cable of the Indoor Version of the Battery Cabinet ... 89
8.7.5.2 Connecting the AC Cable of the Outdoor Version of the Battery Cabinet ... 90
8.7.6 Connecting the DC Cables ... 91
8.7.6.1 Safety when Connecting the DC Cables ... 91
8.7.6.2 Overview of the DC Cables on the Outdoor Version ... 92
8.7.6.3 Connecting the DC cables to the inverter or to the DC Combiner Box on the indoor version ... 92
8.7.6.4 Connecting the DC cables to the inverter or to additional battery cabinets of the outdoor version ... 93
8.7.7 Communication Connection ... 94
8.7.7.1 Connecting the battery communication system of the indoor version to the inverter ... 94
8.7.7.2 Connecting the battery communication system of the outdoor version to the inverter ... 95
8.7.7.3 Overview of the CAN Communication System ... 96
8.7.7.4 Connecting the CAN communication between the battery cabinets of the indoor version ... 96
8.7.7.5 Connecting the CAN communication between the battery cabinets of the outdoor version ... 98
8.7.8 Connecting the DC Distributor ... 100
8.7.8.1 Connection Area of the DC Distributor ... 100
8.7.8.2 Connecting the DC Distributor ... 100

9 Commissioning ... 102
9.1 Procedure for commissioning as System Manager ... 102
9.2 Procedure for commissioning as a subordinate device ... 103
9.3 Commissioning the Battery ... 104
9.3.1 Safety when Commissioning the Battery ... 104
9.3.2 Commissioning procedure for a single battery cabinet ... 104
9.3.3 Commissioning procedure for multiple battery cabinets ... 105
9.3.4 Switching the battery cabinet on ... 106
9.3.5 CMV Measurement ... 107
9.3.6 Commissioning an Individual Battery Cabinet ... 108
9.3.7 Setting options for the parallel operation of multiple battery cabinets ... 108
9.3.8 Configuring secondary battery cabinets ... 109
9.3.9 Configuring the primary battery cabinet with multiple battery cabinets ... 110
9.3.10 Commissioning multiple battery cabinets ... 112
9.4 Checking the Mounting and Connection Work ... 113
9.5 Switching the Inverter On ... 114

10 Operation ... 116
10.1 Control Elements ... 116
10.2 Use of the user interface powered by ennexOS ... 116

11 Disconnecting from voltage sources 118
11.1 Disconnecting the Inverter from Voltage Sources 118
11.2 Disconnecting the Indoor Version Battery from Voltage Sources 120
11.3 Disconnecting the Outdoor Version Battery from Voltage Sources 122
12 Cleaning and Maintenance 124
12.1 Safety Information for Cleaning and Maintenance 124
12.2 Maintenance Intervals 124
12.3 Cleaning and Maintenance Materials 125
12.4 Torques 125
12.5 Checking the Start/Stop Function on the Battery Cabinet 125
12.6 Cleaning the Outdoor Version of the Battery Cabinet 126
12.7 Checking the Volume of the Outdoor Version of the Battery Cabinet 126
12.8 Checking the battery control panel 126
12.9 Checking the Outdoor Version of the Battery Cabinet for Damage 126
12.10 Checking Electrical Connections 127
12.11 Checking the Air Conditioner of the Outdoor Version of the Battery Cabinet 127
12.12 Checking the Storz Coupling of the Outdoor Version of the Battery Cabinet 128
12.13 Checking the Heat and Smoke Detector of the Outdoor Version of the Battery Cabinet 128
12.14 Documenting the System Status 129
12.15 Cleaning the fans of the inverter 129
12.16 Checking the fans of the inverter 130
13 Troubleshooting 132
13.1 Displaying Event Messages 132
13.2 Inverter Event Messages 132
13.3 Battery Event Messages 151
13.4 Battery end of life 189
13.5 Replacing the Surge Arrester 190
14 Decommissioning 191
14.1 Disconnect the terminals on the inverter 191
14.2 Disconnecting the Connections on the Battery 193
14.3 Disassembling the Inverter 193
14.4 Disassembling the Battery 195
15 Replace the inverter with a replacement device 197
16 Extension of the Battery 200
16.1 Safety when Extending the Battery 200
16.2 Installing an Additional Battery Cabinet 200
17 Storage 201
17.1 Specifications for Battery Storage 201
17.2 Climatic Requirements for the Storage Location 201
17.3 Storing the Battery 201
17.4 Requesting Recyclization of a Battery 202
17.5 Procedure in case of fire 202
18 Disposal 203
18.1 Disposing of the Inverter 203

18.2 Providers for the disposal of batteries 203
18.3 Specifications for Battery Disposal 203
18.4 Reporting damaged battery 204
18.5 Disposing of the Battery 204

19 Technical Data 205

19.1 Technical Data for Inverter 205
19.1.1 General Data 205
19.1.2 DC Input 206
19.1.3 AC Output 206
19.1.4 Efficiency 207
19.1.5 Protective Devices 207
19.1.6 Climatic Conditions 207
19.1.7 Torques 208
19.1.8 System Limits 208
19.2 Technical Data for Battery 208
19.2.1 General Data for Battery 208
19.2.2 DC Connection 209
19.2.3 Commissioning deadlines 210
19.2.4 Efficiency 210
19.2.5 Climatic Conditions 210
19.2.6 Battery extendability 210

20 Accessories 211

21 EU Declaration of Conformity 212

22 Contact 213

1 Information on this Document

1.1 Validity

This document is valid for:

- CSS-89-IN-30-30
- CSS-89-IN-50-30
- CSS-197-IN-50-30
- CSS-107-OUT-30-30
- CSS-107-OUT-50-30
- CSS-197-OUT-50-30

1.2 Target Group

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

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

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.

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

Depending on the functions and selected options, individual sections may be irrelevant for installation and operation.

1.4 Levels of Warning Messages

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

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

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

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

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

1.5 Symbols in the Document

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

1.6 Typographies in the document

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

1.7 Designations in the Document

Complete designation	Designation in this document
SMA Storage XL package	Storage XL Package, system, product
SMA Storage XL	Battery cabinet, battery
Sunny Tripower Storage X	Sunny Tripower Storage, battery inverter, inverter
Sunny Island X	Sunny Island, battery inverter, inverter
SMA Data Manager M (EDMM-20)	Data Manager M
SMA Battery Storage Combiner	Battery fuse protection, DC distributor, DC Combiner Box

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 an integrated high-voltage box and a number of battery modules. Depending on the system configuration, up to four battery cabinets can be wired to form a battery.
High-voltage box	Assembly with controller (BCMU) and connections for battery modules and further components
BCMU (Battery Control Management Unit)	Central Battery Management System of a battery cabinet, installed in the high-voltage box.
LCU (Local Control Unit)	Control panel and control unit
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. Battery limit conditions, at which the system stops charging and discharging, are defined.
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 error, 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.

"PUBLIC CYBER SECURITY - Guidelines for a Secure 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
"SunSpec Modbus ®-interface - ennexOS" Information about the SunSpec Modbus interface and supported information models	Technical Information
"Parameters and Measured Values" Device-specific overview of all parameters and measured values and their setting options Information about the SMA Modbus registers	Technical Information

"SMA SPEEDWIRE FIELDBUS"	Technical information
"SMA DATA MANAGER M (EDMM-20)"	Operating manual
"SMA Commercial Energy Meter 600 A / SMA Commercial Energy Meter 200 A" Replacing the Energy Meter and Updating the Firmware	Replacement Manual
SMA Commercial Energy Meter Mounting, Installing, and Commissioning the Energy Meter	Installation Manual
SMA I/O Module (MD.IO-41) Mounting, Installing, and Commissioning the SMA I/O Module	Installation Manual
"Operation of the user interface of products powered by ennexOS"	Technical Information
"Sunny Tripower Storage X 30 / 50 Approved batteries and information on connecting batteries"	Technical Information
"Sunny Island X 30 / 50 Approved batteries and information on connecting batteries"	Technical Information

2 Safety

2.1 Intended Use

The SMA Storage XL Package is battery storage system with integrated energy management for commercial purposes, e.g., increased self-consumption and peak load shaving.

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

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

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

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

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

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

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

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

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

Intended use of the system

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 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 lines to prevent interference due to electromagnetic coupling 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.

Intended use of the battery inverter

The approved battery inverters convert the direct current supplied by a battery into grid-compliant three-phase 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 length of the DC lines of the positive and negative terminal must not exceed 15 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 1 battery cabinet for the indoor version, the DC Combiner Box must be installed as an additional fuse protection. For the outdoor version, a fuse protection is already integrated in the battery cabinet and thus a DC Combiner Box is not required.

Intended use of the battery

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

The SMA Storage XL is delivered fully assembled, tested and ready for use. Disassembly or partial dismantling of the SMA Storage XL, or any other interference with its mechanical or electrical structure, is not permitted. Any deviation from this will void all warranty and guarantee claims. This applies in particular to interference with safety-critical components, electrical connections, enclosure parts and preassembled assemblies.

The technical documentation must be complied with during installation, transport and maintenance work. If you have any questions or special requirements, please contact SMA Service in advance.

The battery meets the requirements of IEC 62619, IEC 60730, IEC 61000, IEC 60529, VDE 2510 (EU)2023/1542 BattVo.

The battery is designed for use at altitudes of up to 3000 m above mean sea level. Electrical safety cannot be guaranteed at altitudes above 3000 m.

The indoor version of the battery is intended for indoor use only. The outdoor version can also be used outdoors. The outdoor version must not be operated in an enclosed space.

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 of the indoor version 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.

Fire protection measures for battery operation must be implemented in coordination with the responsible construction supervision authority on-site, in accordance with the locally applicable standards, guidelines and laws. Specifications can be found in the national and regional building codes.

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 lines may be energized. 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 into a fire.
- Store the battery modules dry and within the specified temperature range.
- If a fire starts from the battery, contact the fire department. Extinguishing is a high risk due to toxic gases, risk of explosion and rapid spread.
- 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. The direct voltages of the individual battery modules in the battery cabinet 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

Danger to life due to fire and deflagration

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

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

⚠ WARNING

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

In rare cases, 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 tightening torque specifications on live bolted connections

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

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

⚠ WARNING

Danger to life due to 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 cabinet

Improper transport or incorrect installation may result in injury.

- Take the weight and dimensions of the battery cabinet into account.
- Transport the battery cabinet using appropriate equipment (e.g., forklift, pallet truck).
- 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 deeply discharged

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

- Put the battery into operation within the specified time limits.
- If the battery is not put into operation within the specified time limits, contact Service to request recyclization of the battery-storage system.
- Before commissioning the system, verify that the battery is not deeply discharged.
- Do not commission the system if the battery is deeply discharged.
- If the battery is deeply 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 products of the system and impair its 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 in accordance with the specifications in this manual only.
- Make all electrical connections on the battery in accordance with the specifications in this manual only.

NOTICE

Damage to the battery due to short circuit

Incorrect connection of the DC lines 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 connect the two DC lines between the battery management system and battery modules first.
- 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

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.

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 your distributor if the scope of delivery is incomplete or damaged. Never commission the battery cabinet if components are damaged

Quantity	Designation
1	Inverter (STPS30-20 or STPS50-20)[1)]
1	For the indoor version of the battery cabinet, choose one of the following types[1)]: • For STPS30-20: Battery cabinet CS-89-IN-30-30 • For STPS50-20: Battery cabinet CS-89-IN-50-30 or CS-197-IN-50-30 For the outdoor version of the battery cabinet, choose one of the following types[1)]: • For STPS30-20: Battery cabinet CS-107-OUT-30-30 • For STPS-50-20: Battery cabinet CS-107-OUT-50-30 or CS-197-OUT-50-30
1	Accessory kit for the battery cabinet[1)]
Optional (not included in the scope of delivery)	Commercial Energy Meter[2)]: • COM-EMETER-A-20 • COM-EMETER-B-20 • JANITZA-SP

Also see:

- Scope of Delivery of the Indoor Version of the Battery Cabinet ⇒ page 23
- Scope of Delivery of the Outdoor Version of the Battery Cabinet ⇒ page 24
- Accessory Kit for the Battery Cabinet ⇒ page 25
- Scope of Delivery of the Inverter ⇒ page 21

3.2 Scope of Delivery of the Inverter

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

[1)] Depending on order option

[2)] Required for operation. Must be ordered separately.

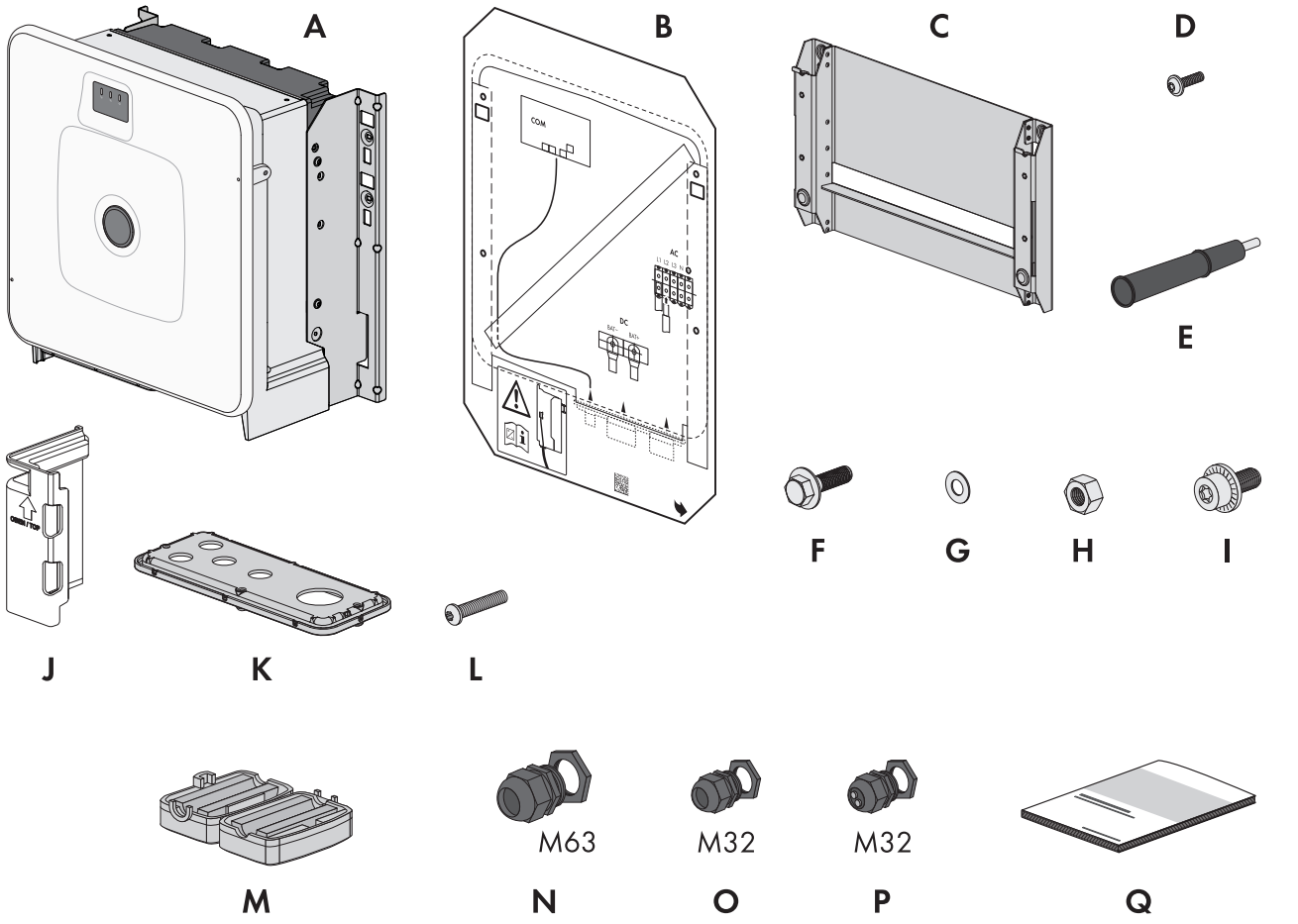


Figure 1: Components included in scope of delivery

Position	Quantity	Designation
1.	1	Inverter
2.	1	Mounting template
3.	1	Wall mounting bracket
4.	4	Button screw M8x25
5.	4	Carrying handle
6.	2	M10x40 combination hexagon head screw
7.	2	Washer M10
8.	2	Hex nut M10
9.	2	M6x16 screw and washer assembly
10.	4	Touch protection element for DC connection
11.	1	Connecting plate
12.	3	Button screw M8x70
13.	3	Ferrite
14.	1	Cable gland and counter nut M63x1.5

Position	Quantity	Designation
15.	2	Cable gland and counter nut M32x1.5
16.	2	M32x1.5 cable gland and counter nut with two-hole seal insert and two sealing plugs
17.	1	Documentation package consists of: • Booklet containing safety-related information including illustrated instructions for initial installation and commissioning • Supplementary sheet with password label contains the following information: – PIC (Product Identification Code) identification key for registering the system in Sunny Portal – RID (Registration Identifier) registration ID for registering the system in Sunny Portal – Wi-Fi password WPA2-PSK (WiFi Protected Access 2 - Preshared Key) for direct connection to the product via Wi-Fi – Device Key (DEV KEY) for resetting the administrator password

3.3 Scope of Delivery of the Indoor Version of the Battery Cabinet

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

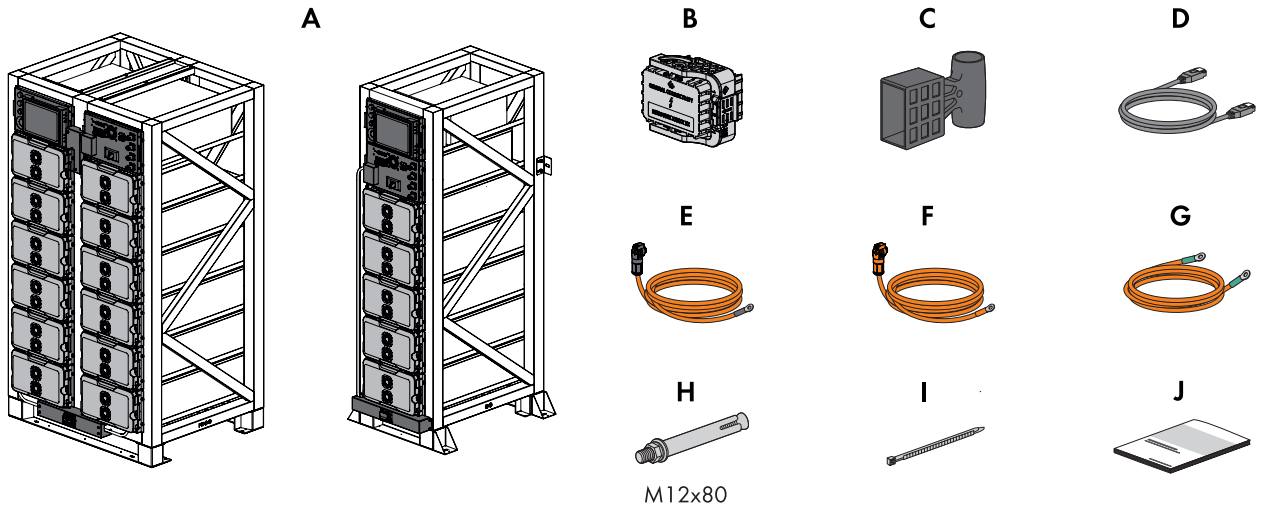


Figure 2: Components included in scope of delivery

Position	Quantity	Designation
A	1	Indoor battery cabinet
B	1	Maintenance circuit breaker as DC disconnector
C	1	Switch extension for operating the QF circuit breaker
D	1	Communication cable for connecting the battery cabinet to the inverter
E	1	DC cable with black connector for connecting the battery cabinet to the inverter

Position	Quantity	Designation
F	1	DC cable with orange connector for connecting the battery cabinet to the inverter
G	1	Grounding cable
H	8	Sleeve anchor M12x80
I	10	Cable tie
J	1	Documentation package consists of: • Safety information booklet • Quick reference guide poster with illustrated instructions for initial installation and commissioning

3.4 Scope of Delivery of the Outdoor Version of the Battery Cabinet

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

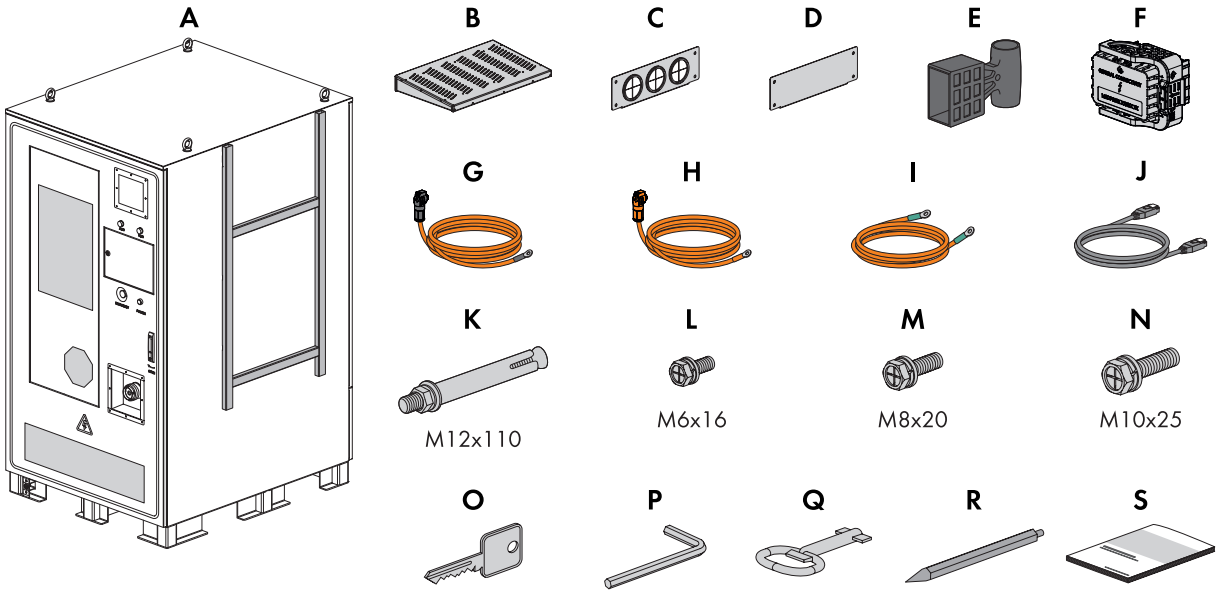


Figure 3: Components included in scope of delivery

Position	Quantity	Designation
A	1	Outdoor battery cabinet
B	1	Sun protection for the inverter. Information: The sun protection system is delivered on a separate Euro pallet.
C	1	Panel with holes for cables for closing openings on the mounting frame
D	7	Panel for closing openings on the mounting frame
E	1	Switch extension for operating the QF circuit breaker
F	1	Maintenance circuit breaker as DC disconnector

Position	Quantity	Designation
G	1	DC cable with black connector for connecting the battery cabinet to the inverter
H	1	DC cable with orange connector for connecting the battery cabinet to the inverter
I	1	Grounding cable
J	1	Communication cable for connecting the battery cabinet to the inverter
K	8	Sleeve anchor M12x110
L	36	M6x16 combination hexagon head screw
M	4	M8x20 combination hexagon head screw
N	4	M10x25 combination hexagon head screw
O	1	Key for cabinet door
P	1	L-shaped wrench for opening the gas detector panel
Q	1	Control panel key
R	1	Magnetic pin for operating the gas detector display
S	1	Documentation package consists of: • Safety information booklet • Quick reference guide poster with illustrated instructions for initial installation and commissioning

3.5 Accessory Kit for the Battery Cabinet

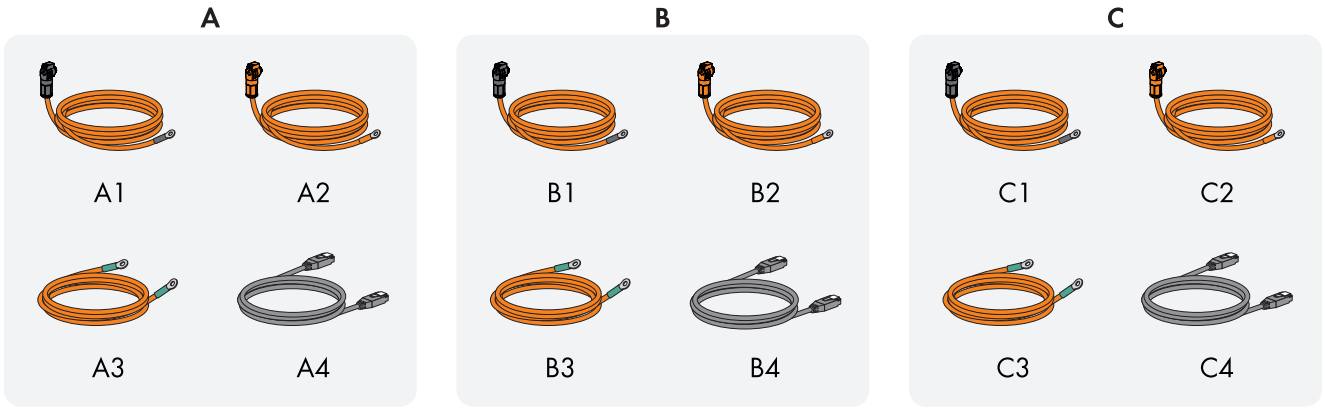


Figure 4: Components included with accessory kit

Position	Designation	SMA order number
A	Cable set with 10 m cables	CS-CON-10-30
B	Cable set with 15 m cables	CS-CON-15-30
C	Cable set for parallel connection with 5 m cables	CS-BEXT-5-30

CS-CON-10-30 cable set with 10 m cables

Position	Designation
A1	DC cable with black connector for connecting the battery cabinet to the inverter
A2	DC cable with orange connector for connecting the battery cabinet to the inverter
A3	Grounding cable
A4	10 m CAN communication cable

CS-CON-15-30 cable set with 15 m cables

Position	Designation
B1	DC cable with black connector for connecting the battery cabinet to the inverter
B2	DC cable with orange connector for connecting the battery cabinet to the inverter
B3	Grounding cable
B4	20 m CAN communication cable

CS-BEXT-5-30 cable set with 5 m long cables for parallel connection

Position	Designation
C1	DC cable with black connector for connecting the battery cabinet to further battery cabinets or to the superordinate DC Combiner Box
C2	DC cable with orange connector for connecting the battery cabinet to further battery cabinets or to the superordinate DC Combiner Box
C3	Grounding cable
C4	Communication cable for connecting the battery cabinet to further battery cabinets

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
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., forklift with a lifting capacity of less than 3 t)	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
Lifting gear	1	Only required if the inverter is to be transported with a hoist
Utility knife	1	Used to unpack the product
1 Torx screwdriver (TX25)	1	Used to attach and remove carrying handles on the inverter and 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
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
Current clamp	1	For verifying that no voltage is present
Laser thermometer	1	For measuring the surface temperature of the battery modules

Material or equipment	Quantity	Explanation
Press tool	1	Used to attach terminal lugs/bootlace ferrules to the DC lines
Clean cloth	1	For cleaning terminal lugs
Ethanol cleaning agent	1	For cleaning 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 and no I/O Module is to be used
Laptop with two patch cables and one USB Ethernet adapter	1	Used for commissioning
Energy meter: COM-EMETER-A-20, COM-EMETER-B-20, or JANITZA-SP	1	Requirements in accordance with
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
Only when using a DC distributor: insulated bootlace ferrule (50 mm^2)	2	For connecting the DC lines from the battery inverter to the DC distributor

5 Product overview

5.1 System Components

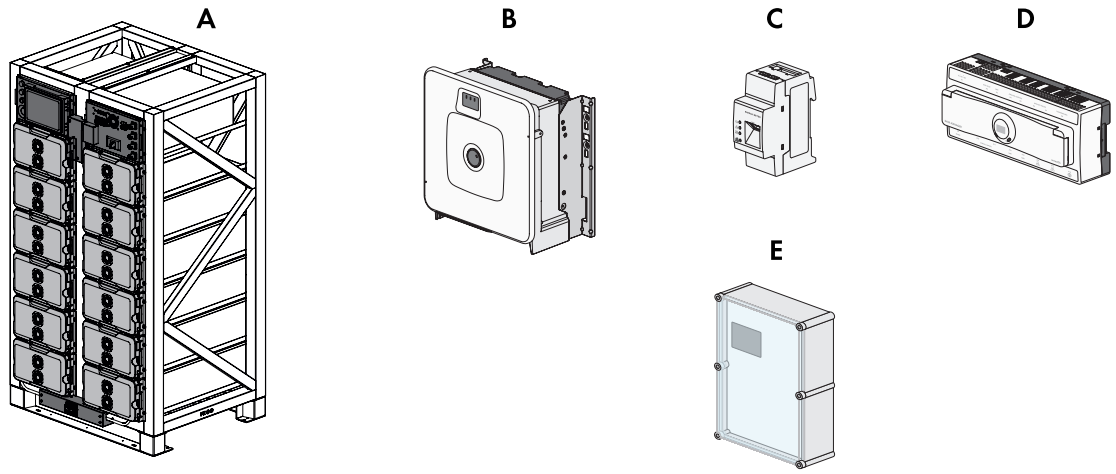


Figure 5: Product overview – indoor version

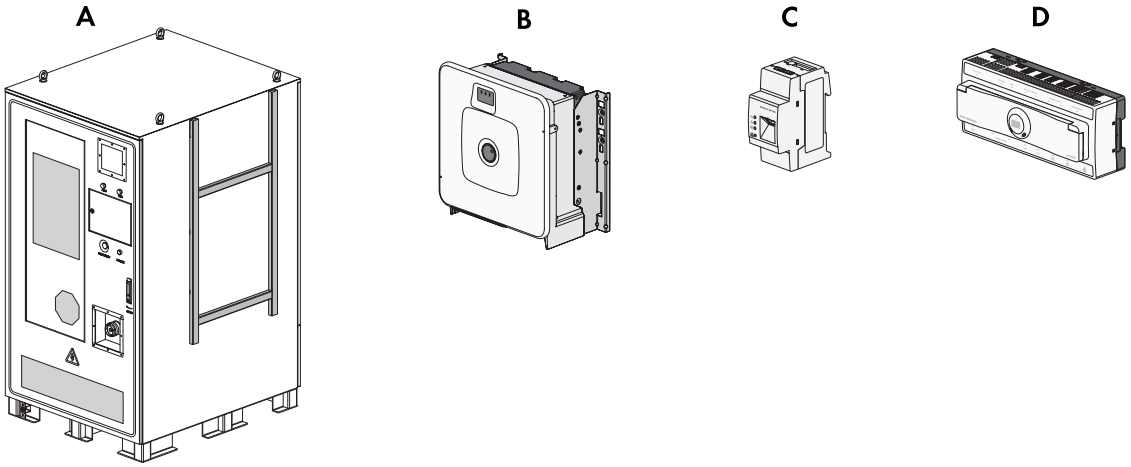


Figure 6: Product overview – outdoor version

Position	Designation
A	Indoor or outdoor version of the battery cabinet High-voltage box (including Battery Management System), control panel and battery modules are already installed.

Position	Designation
B	Sunny Tripower Storage X 30 (STPS30-20) / Sunny Tripower Storage X 50 (STPS50-20) Battery inverter for parallel grid operation that converts the direct current supplied by a battery into grid-compliant three-phase current. When used as System Manager, the battery inverter in conjunction with an energy meter (Energy Meter or Power Quality Analyser) 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.
C	Optional: Commercial Energy Meter *required for operation. Must be ordered separately.[3]: • COM-EMETER-A-20 • COM-EMETER-B-20 • JANITZA-SP The energy meter determines electric measured values at the grid connection point and transmits the measured data to the System Manager.
D	Optional: SMA Data Manager M (EDMM-20) Data logger for monitoring and controlling the system. In systems with more than ten devices, the SMA Data Manager M performs the role of the System Manager.
E	Only in systems with indoor version with more than one battery cabinet: DC Combiner Box including circuit breaker as fuse protection for the battery system The DC Combiner Box allows up to four battery cabinets to be connected to a battery inverter. The DC Combiner Box contains the necessary fuse protection for the battery if there is more than one battery cabinet. With the outdoor version, fuse protection is integrated in the battery cabinet.

5.2 Device function

It is possible to use and configure the Sunny Tripower Storage X either as a system manager or as a subordinate inverter.

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

You carry out the device configuration via the commissioning wizard.

Inverter as System Manager

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

Subordinate device

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

[3] Required for operation. Must be ordered separately.

Currently, only the EDMM-20 (SMA Data Manager M) supports the Sunny Tripower Storage X as a subordinate device.

5.3 System overview

5.3.1 Sunny Tripower Storage X as System Manager

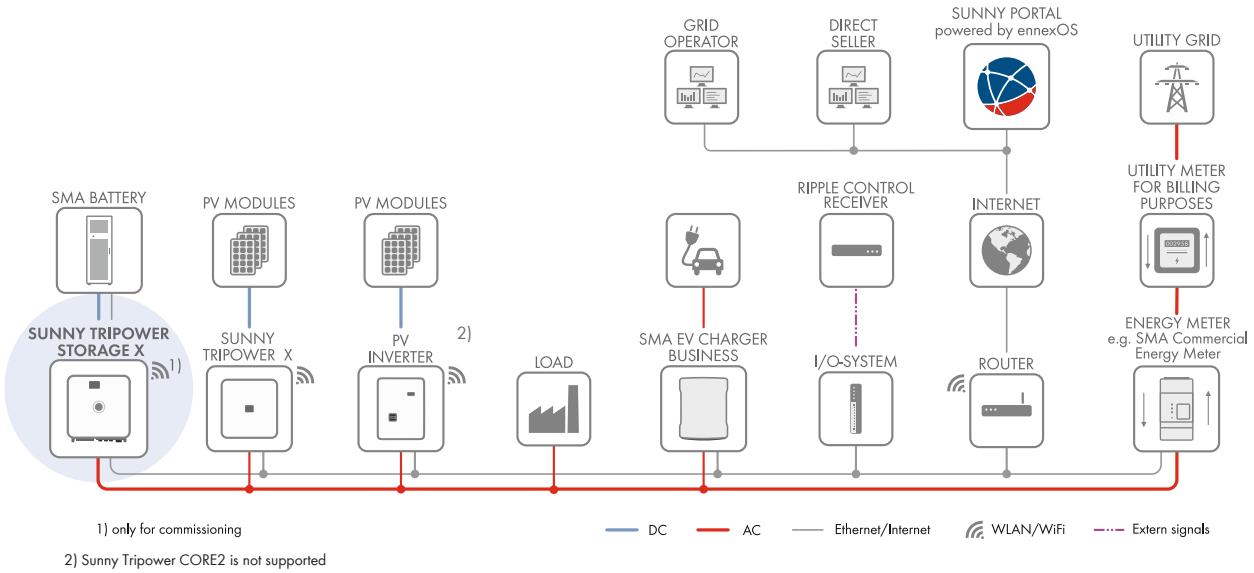


Figure 7: Sunny Tripower Storage X as system manager (example)

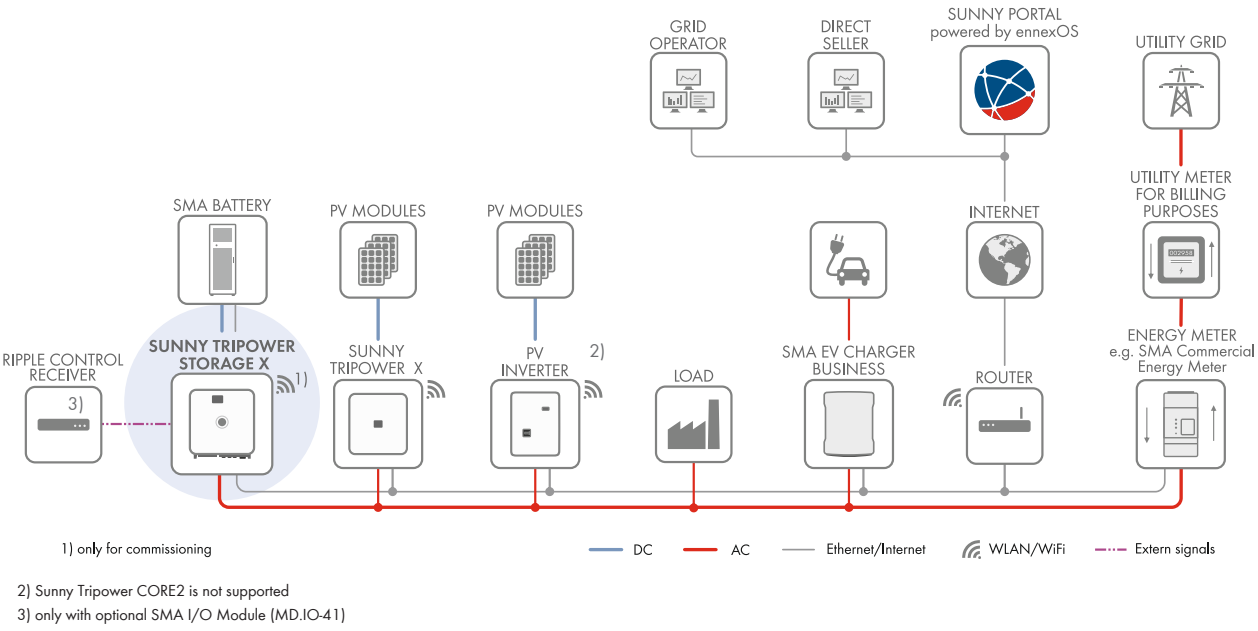


Figure 8: Sunny Tripower Storage X as the System Manager (example with connection of the ripple control receiver to the inverter)

5.3.2 Sunny Tripower Storage X with SMA Data Manager M

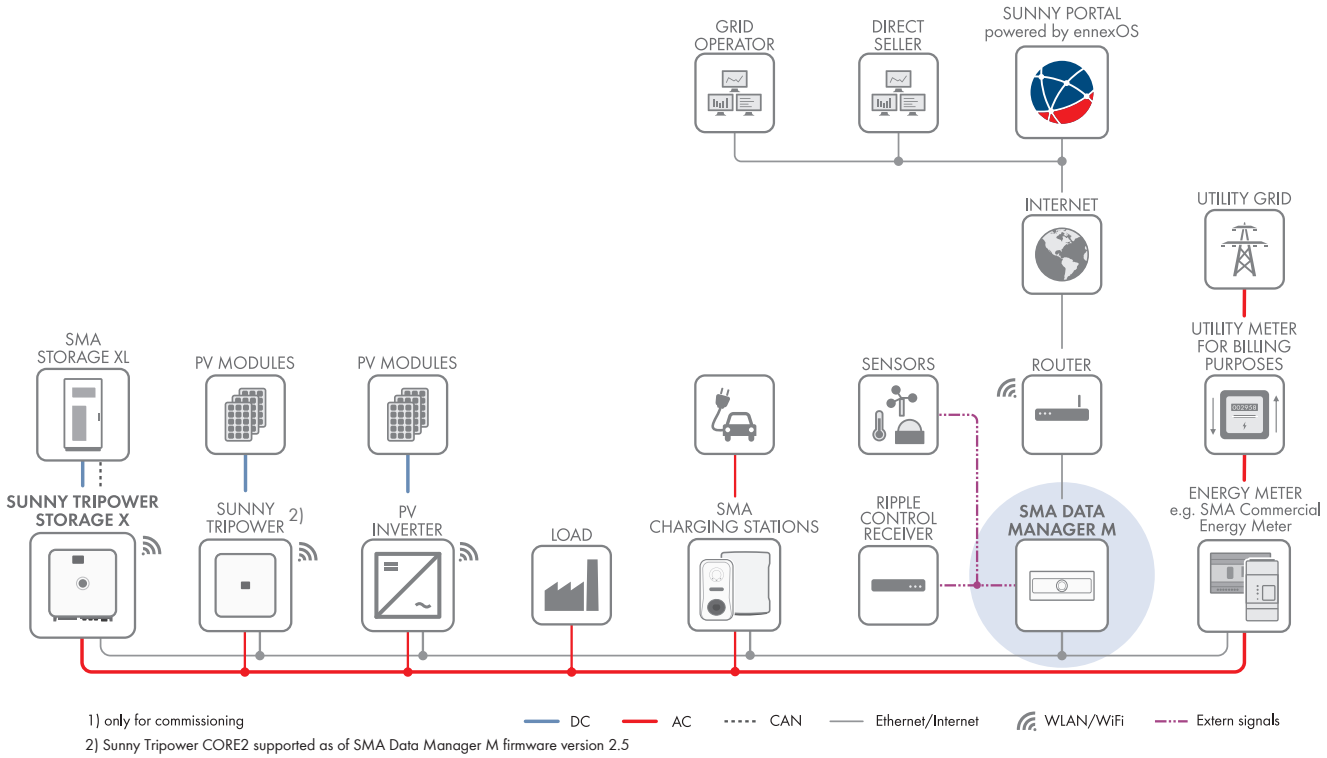


Figure 9: Sunny Tripower Storage X with SMA Data Manager M as System Manager (example)

5.4 Design of the Inverter

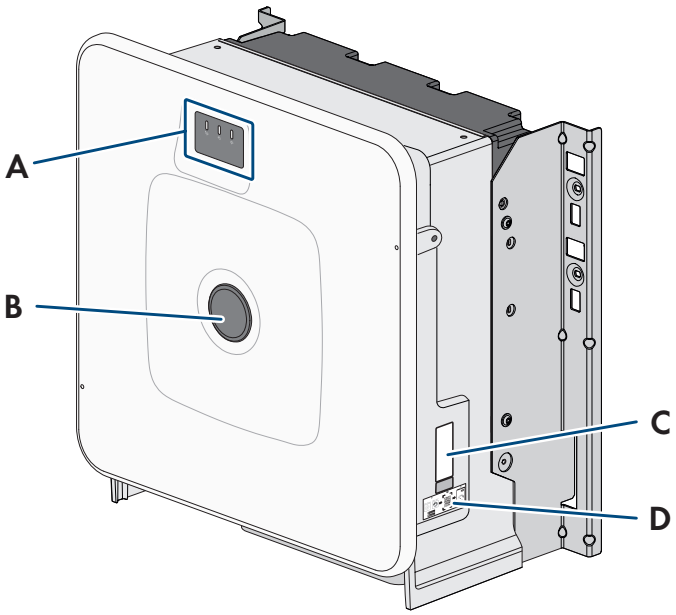


Figure 10: Design of the inverter

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	Type label The type label clearly identifies the product. The type label must be permanently attached to the inverter. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Device-specific characteristics
D	Label with QR Code for scanning via the SMA 360° App and easy connection to the inverter's user interface via WLAN

5.5 Interfaces and Functions of the Inverter

5.5.1 User Interface

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

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

5.5.2 SMA Speedwire

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

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

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

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

5.5.4 Device Key (DEV KEY)

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

5.5.5 Modbus

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

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

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

- Controlling the battery
- Transmission of the control inputs of a ripple control receiver

5.5.6 Grid Management Services

The product is equipped with service functions for grid management.

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

5.5.7 Integrated Plant Control

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

5.5.8 Increased self-consumption

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

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

5.5.9 Peak load shaving

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

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

Information: Firmware version 3.06.18.R with SIxx-20 and STPSxx-20
In very rare cases, the threshold for peak load shaving may not be met. This only occurs if the sum of the battery and PV inverter power of the devices registered in the system is lower than the peak load and if no grid services have been activated.
The reason for this is the system parameter Parameter.Inverter.WMaxIn. This parameter limits the maximum input power of the inverter. If this value is lower than the set limit for peak load shaving, the battery cannot discharge any further.

5.5.10 Multiuse

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

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

Also see:

- Increased self-consumption ⇒ page 34
- Peak load shaving ⇒ page 34

5.5.11 Module slot

The inverter is equipped as standard with a module slot for installing an additional module.

From firmware version 3.02.xx.R, the inverter is compatible with the SMA I/O Module (MD.IO-41).

5.5.12 SMA I/O modules

The SMA I/O Module enables the inverter to perform grid management services. Information on installation, connection and configuration can be found in the manual for the SMA I/O Module.

The SMA I/O Module can be retrofitted from firmware version 3.02.xx.R of the inverter.

Also see:

- Grid and PV system protection in accordance with VDE-AR-N 4105 ⇒ page 35
- Ripple control receiver ⇒ page 35

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

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

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

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

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

5.5.14 Ripple control receiver

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

5.6 Battery Interfaces and Functions

5.6.1 Fire Suppression System

For fire protection, the outdoor version of the battery cabinet is equipped with an optical smoke detector, a temperature sensor and an aerosol fire suppression system. When the fire alarm system detects both signals, it activates the aerosol fire suppression system.

A thermal conductivity detector is also installed. When the thermal conductivity detector detects a corresponding signal, it activates the aerosol fire suppression system.

When the aerosol fire suppression system is activated, the LCU is alerted and the battery is switched off.

An integrated gas detector detects flammable gases. If the gas concentration exceeds a low threshold, a fan is switched on. If the gas concentration exceeds a higher threshold, the battery signals a disturbance and switches itself off.

5.6.2 Leakage sensor

The outdoor version of the battery cabinet is fitted with a leakage sensor on the enclosure floor. If a leakage or the presence of water is detected, the battery is disconnected immediately for safety reasons.

5.6.3 Door sensor

The outdoor version of the battery cabinet is equipped with a door sensor that detects the opening and closing of the cabinet door and issues a corresponding signal. When the door is opened, the internal lighting is activated automatically.

5.6.4 Interfaces for signals

The outdoor version of the battery cabinet has interfaces for connecting signals from and to external monitoring systems.

Signal input: Emergency switch contact
The input is equipped with a bridge as standard. If a 2-wire signal cable is connected, the following states are transmitted:

- Contact closed = normal
- Contact open = emergency switch

Signal output: Emergency switch contact
The output transmits the status of the emergency switch alarm:

- Contact closed = normal
- Contact open = alarm

Signal output: Temperature and smoke detector
The output transmits the status of the fire suppression system:

- Contact closed = alarm
- Contact open = normal

5.7 Battery Use by the Inverter

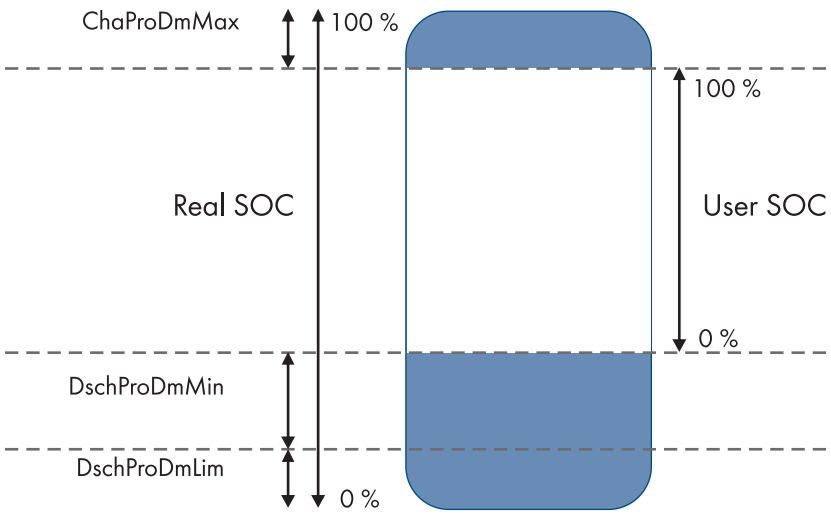


Figure 11: State of charge ranges of the battery

Range	Parameter	Inverter behavior
ChaProDMMax	**End-of-charge range**	In this range, the inverter operates in protected mode to protect the battery from overcharging (charge stop mode).

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

5.8 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	Charge 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 is applied.
The red LED is glowing	Error Inverter operation has been stopped. In addition, a distinct event message and the corresponding event number are displayed on the user interface of the inverter or System Manager (e.g., SMA Data Manager M). **Only when used as System Manager**: A fault in the lower-level PV inverter (e.g., Sunny Tripower X) can also be indicated by the red LED lighting up. In this case, a specific event message and the associated event number are displayed on the user interface of the PV inverter or System Manager .

LED signal	Explanation
Red LED is flashing (0.25 s on, 0.25 s off, 0.25 s on, 1.25 s off)	Warning Communication with the System Manager failed. The inverter continues to operate with restricted function (e.g., with set fallback level). In addition, a distinct event message and the corresponding event number are displayed on the user interface of the inverter or System Manager (e.g., SMA Data Manager M).
The blue LED is flashing slowly (2 seconds on and 2 seconds off)	Communication connection is being established. The inverter is establishing a connection to a local network (Ethernet/Wi-Fi) or is establishing a direct connection (Ethernet/Wi-Fi) to an end device (e.g., computer, tablet PC or smartphone).
The blue LED is flashing fast (0.25 s on and 0.25 s off)	A communication product requests identification of the inverter.
The blue LED is glowing	There is an active connection with a local network (Ethernet/Wi-Fi) or a direct connection (Ethernet/Wi-Fi) with an end device (e.g., computer, tablet PC or smartphone).
Blue LED is off	There is no active connection.
All 3 LEDs are on	Inverter update or booting procedure

Also see:

- Inverter Event Messages ⇒ page 132

5.9 Symbols on the Inverter

Symbol	Explanation
	Beware of a danger zone This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	Beware of electrical voltage The product operates at high voltages.
	Beware of hot surface The product can get hot during operation.
	Danger to life due to high voltages in the inverter; observe a waiting time of 5 minutes. High voltages that can cause lethal electric shocks are present in the live components of the inverter. Before carrying out any work on the inverter, always de-energize the inverter as described in this document and secure it against reconnection.
	Observe the documentation Observe all documentations supplied with the product.

Symbol	Explanation
	Inverter Together with the green LED, this symbol indicates the operating state of the inverter.
	Observe the documentation Together with the red LED, this symbol indicates an error.
	Data transmission Together with the blue LED, this symbol indicates the status of the network connection.
	Grounding conductor This symbol indicates the position for connecting a grounding conductor.
	Three-phase alternating current with neutral conductor
	Direct current
	The product has no galvanic isolation.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	The product is suitable for outdoor installation.
IP65	Degree of protection IP65 The product is protected against the penetration of dust and water that is directed as a jet against the enclosure from all directions.
CE	CE marking The product complies with the requirements of the applicable EU directives.
RoHS	RoHS labeling The product complies with the requirements of the applicable EU directives.

5.10 Design of the Indoor Version of the Battery Cabinet

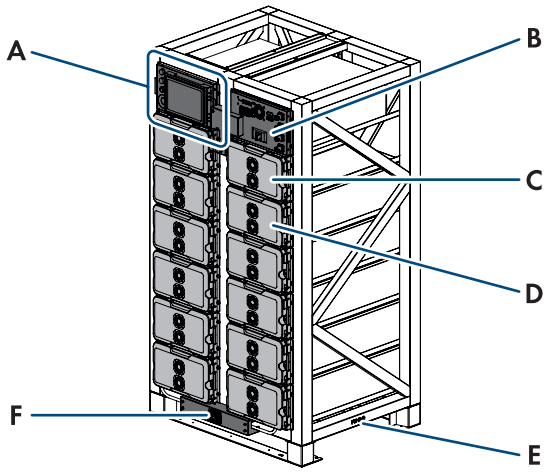


Figure 12: Design of the Indoor Version of the Battery Cabinet

Position	Designation
A	Control panel (LCU = Local Control Unit) surrounded by the following control elements: • LEDs • On/off button • Emergency switch • Touch display Connections for the AC cable for the electricity supply and for CAN communication to the inverter are positioned behind the control panel.
B	High-voltage box (including Battery Management System) • Circuit breaker • Connection area for DC cables
C	Cover without battery module Depending on the order option, a few compartments may be empty. Empty compartments are only equipped with a cover.
D	Battery module
E	Grounding points on the left-and right-hand sides
F	DC circuit breaker

5.11 Design of the Outdoor Version of the Battery Cabinet

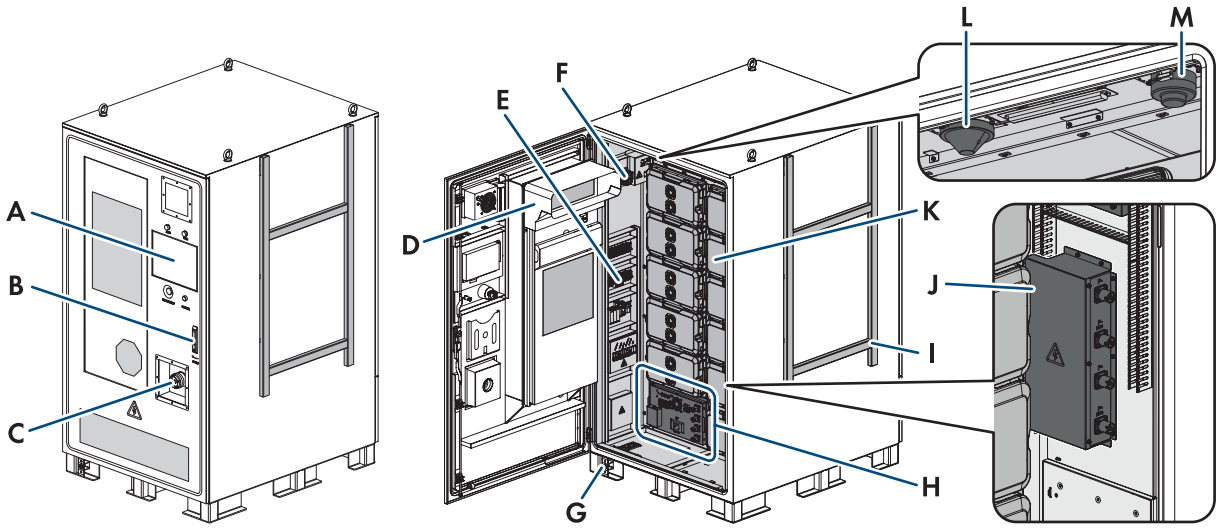


Figure 13: Design of the outdoor version of the battery cabinet

Position	Designation
A	Control panel (LCU = Local Control Unit) surrounded by the following control elements: • LEDs • On/off button • Emergency switch • Touch display
B	Door latch
C	Storz coupling for fire hose connection
D	Air conditioner
E	Connection area and circuit breaker on the left-hand enclosure wall (see Section 8.7.4 "Connection area of the outdoor battery cabinet", page 88).
F	DC-Trennschalter
G	Grounding point
H	High-voltage box (including Battery Management System)
I	Mounting rail for inverter and roof
J	Connection area for DC cables
K	Battery module Depending on the order option, a few compartments may be empty. Empty compartments are only equipped with a cover.
L	Smoke detectors
M	Heat detector

5.12 Modular Extension of the Battery Cabinet

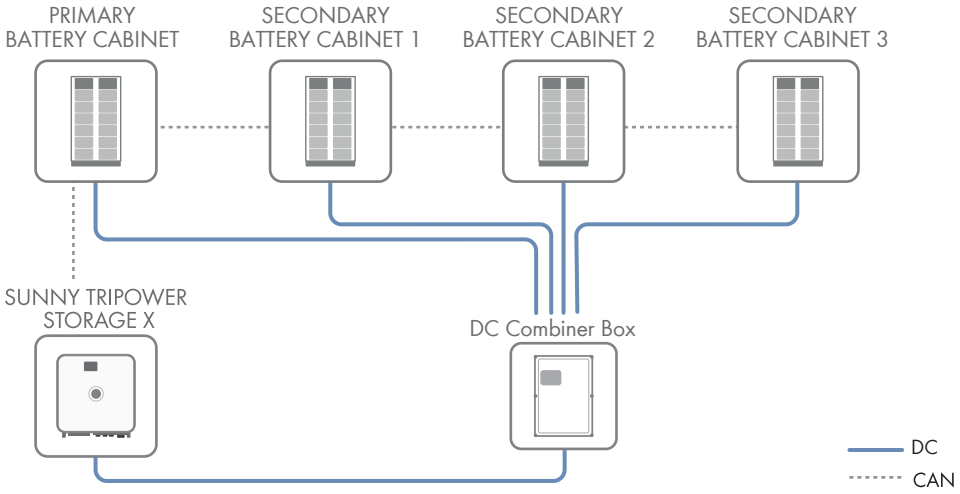


Figure 14: Modular design of the battery of the indoor version

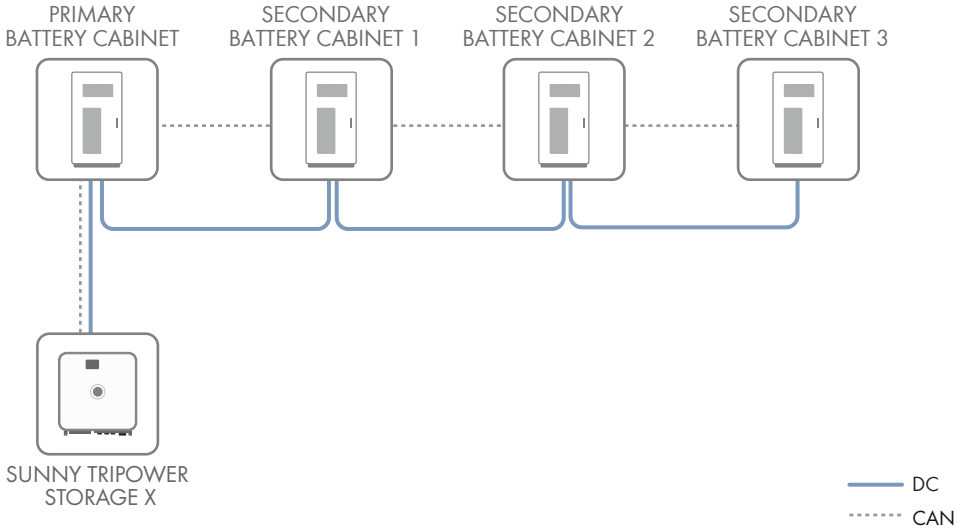


Figure 15: Modular design of the battery of the outdoor version

The energy content of the indoor version can be extended by operating up to four battery cabinets via a common DC Combiner Box and connecting them to the inverter. With the outdoor version, up to four battery cabinets can be connected in series to one inverter. The Battery Management System in the high-voltage box of one battery cabinet controls and monitors the entire battery system and thus acts as the primary battery cabinet. The inverter is connected to 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.

The battery 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. One inverter can be operated on one battery system (up to four battery cabinets).

Also see:

- System Limits ⇒ page 208

5.13 Battery Cabinet LED Signals

The LEDs on the high-voltage box signalize the operating state of the battery.

LED signal	Explanation
The green LED is glowing	Normal battery operation.

LED signal	Explanation
Green LED is flashing	The battery is initializing or is in standby.
The red LED is glowing	The battery has a disturbance. No DC voltage registered.
Both LEDs off	The battery is off.

The LEDs on the control panel signalize the operating state of the system.

LED signal	Explanation
The green LED is glowing	Normal battery operation.
The red LED is glowing	The battery has a disturbance and is not in operation.
Green and red LED flashing	The battery is initializing.
Both LEDs off	The battery is off.

5.14 Symbols on the battery cabinet

Symbol	Explanation
	Beware of a danger zone This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	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. Before carrying out any work on the inverter, always de-energize the inverter as described in this document and secure it against reconnection.
	Observe the documentations Observe all documentations supplied with the product.

Symbol	Explanation
	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.
	Eye rinsing 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.
	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.
	Recycle the entire battery system including all components.
	Recycling lithium-ion batteries Never dispose of the battery modules as household water – recycle them.
CE	CE marking The product complies with the requirements of the applicable EU directives.

5.15 Information on the Battery Cabinet

This section describes the information on the battery cabinet.

Information	Explanation
Serial Number	The **Serial Number** summarizes the following information: • Material number: **CS-xxx-OUT-30** or **CS-xxx-IN-30** • The date of manufacture is a 4-digit numerical code that indicates the week and year of manufacture. Example: The specification **+1124+** gives the date of manufacture as the 11th week of 2024. • The serial number of the battery cabinet is an 11-digit numerical code. The **serial number** of the battery cabinet is located on the battery cabinet enclosure.
Manufacturing Date	The manufacturing date of the battery cabinet is located on the battery cabinet enclosure.

5.16 Information on the High-Voltage Box

This section describes the information on the high-voltage box.

Information	Explanation
Serial Number	The **Serial Number** summarizes the following information: • Material number: **CS-BMS-30-1-SP** • The date of manufacture is in and below the QR code. • The serial number of the high-voltage box is an 11-digit numerical code. The **serial number** of the high-voltage box is located on the high-voltage box enclosure.
Manufacturing Date	The manufacturing date of the high-voltage box is located on the high-voltage box enclosure.

5.17 Information on the Battery Module

The battery must be commissioned no longer than 18 months after manufacture or the last cyclization. If the battery cannot be commissioned within 18 months of manufacture or cyclization, recyclization of the battery storage system is required. This section describes the information on the battery module that is required for cyclization.

Information	Explanation
Serial Number	The **Serial Number** summarizes the following information: • Material number: **CS-MOD17-30-1SP** • The date of manufacture is a 4-digit numerical code that indicates the week and year of manufacture. Example: The specification **+1124+** gives the date of manufacture as the 11th week of 2024. • The serial number of the battery module is a 10-digit numerical code. The **serial number** of the battery module is located on the packaging box and on the front of the battery module.
Manufacturing Date	The manufacturing date of the battery module can be found on the battery module enclosure and packaging box.
Best Before Date	The last possible date for commissioning the battery module (best before date) located on the battery module enclosure. If the battery module has not been commissioned by this date, recyclization is required. Recyclization can be requested from Service. The **best before date** is renewed upon recyclization. Commissioning the battery module after the **Best Before Date** without performing a recyclization will invalidate any warranty claims (warranty conditions can be found at www.SMA-Solar.com).

6 Transport of the battery cabinet

⚠ QUALIFIED PERSON

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

⚠ CAUTION

Risk of injury due to inappropriate transport in a vehicle

Inappropriate transport or insufficient use of transport in a vehicle securing devices can cause the battery to slip or tip over. The battery can cause injuries if it slips or tips over.

- Transport and lift the battery carefully. Take the weight of the battery into account.
- Position the battery in the vehicle in such a way as to prevent it from slipping.
- Secure the battery against slipping and tipping over with restraining straps, for example.
- Wear suitable personal protective equipment for all work on the battery.

The SMA Storage XL battery cabinets are classified as dangerous goods: UN 3480 lithium-ion battery, class 9 (dangerous goods designation UN 3480, dangerous goods class 9). The safety information of the battery cabinet must be observed.

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 instructions must be documented and repeated.

☐ Smoking is not permitted in the vehicle during the journey.

☐ Smoking is not permitted in the vehicle or in the immediate vicinity during loading and unloading.

☐ Two tested fire class D metal fire extinguishers (minimum capacity 2 kg (4.4 lb)) and one set of hazardous goods equipment in accordance with the Convention on the International Carriage of Dangerous Goods by Road must be available.

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

Requirements for forklift loading

- Load-bearing capacity sufficient for the weight
- Minimum support surface length of 210 cm

Requirements for pallet truck loading

- Load-bearing capacity sufficient for the weight
- Minimum support surface length of 150 cm
- Minimum support surface width of 70 cm

Crane loading requirements

Once the transport crate has been removed, the outdoor unit can be lifted by crane.

- Use the four eye bolts on the top.
- Tilt angle < 30°
- Spread angle ≤ 90°

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	770 mm x 837.8 mm x 443.8 mm	97 kg[4] 104 kg[5]	-25°C to +60°C
Inverter: STPS50-20	770 mm x 837.8 mm x 443.8 mm	97 kg[4] 104 kg[4]	-25°C to +60°C
Indoor battery cabinet: CS-89-IN-30	780 mm x 2058 mm x 960 mm	941 kg	0°C to 55°C
Indoor battery cabinet: CS-197-IN-30	1147 mm x 2058 mm x 994 mm	1797 kg	0°C to 55°C
Outdoor battery cabinet: CS-107-OUT-30	1150 mm x 2120 mm x 1375 mm	1515 kg	-25°C to 55°C
Outdoor battery cabinet: CS-197-OUT-30	1150 mm x 2120 mm x 1375 mm	2200 kg	-25°C to 55°C
Energy meter: COM-EMETER-A-20[6]	88 mm x 35 mm x 65 mm	< 0.2 kg	-25°C to 55°C
Energy meter: COM-EMETER-B-20[6]	88 mm x 35 mm x 65 mm	< 0.2 kg	-25°C to 55°C
Energy meter: JANITZA-SP[6]	107.5 mm x 90 mm x 82 mm	0.35 kg	-10°C to 55°C
DC distributor: SMA Battery Storage Combiner (only if there is more than one battery cabinet)	360 mm x 540 mm x 171 mm	approx. 4.5 kg	-25°C to +40°C

7.1.2 Installation Plans for the Indoor Version of the Battery Cabinet

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] One of the energy meters must be ordered for installation.

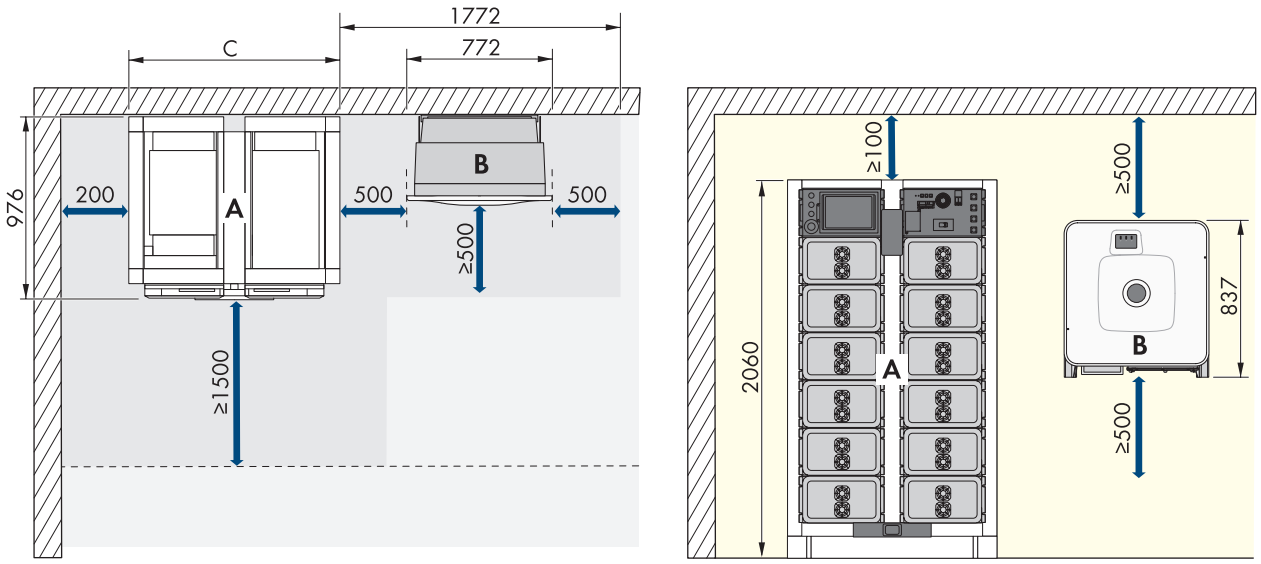


Figure 16: Example for installation of a system with one battery cabinet (dimensions in mm)

The standard system configuration uses cable lengths of 5 m.

Position	
A	Battery Cabinet
B	Battery inverter
C	Width of the battery cabinet • CS-89-IN-30: 780 mm • CS-197-IN-30: 1160 mm

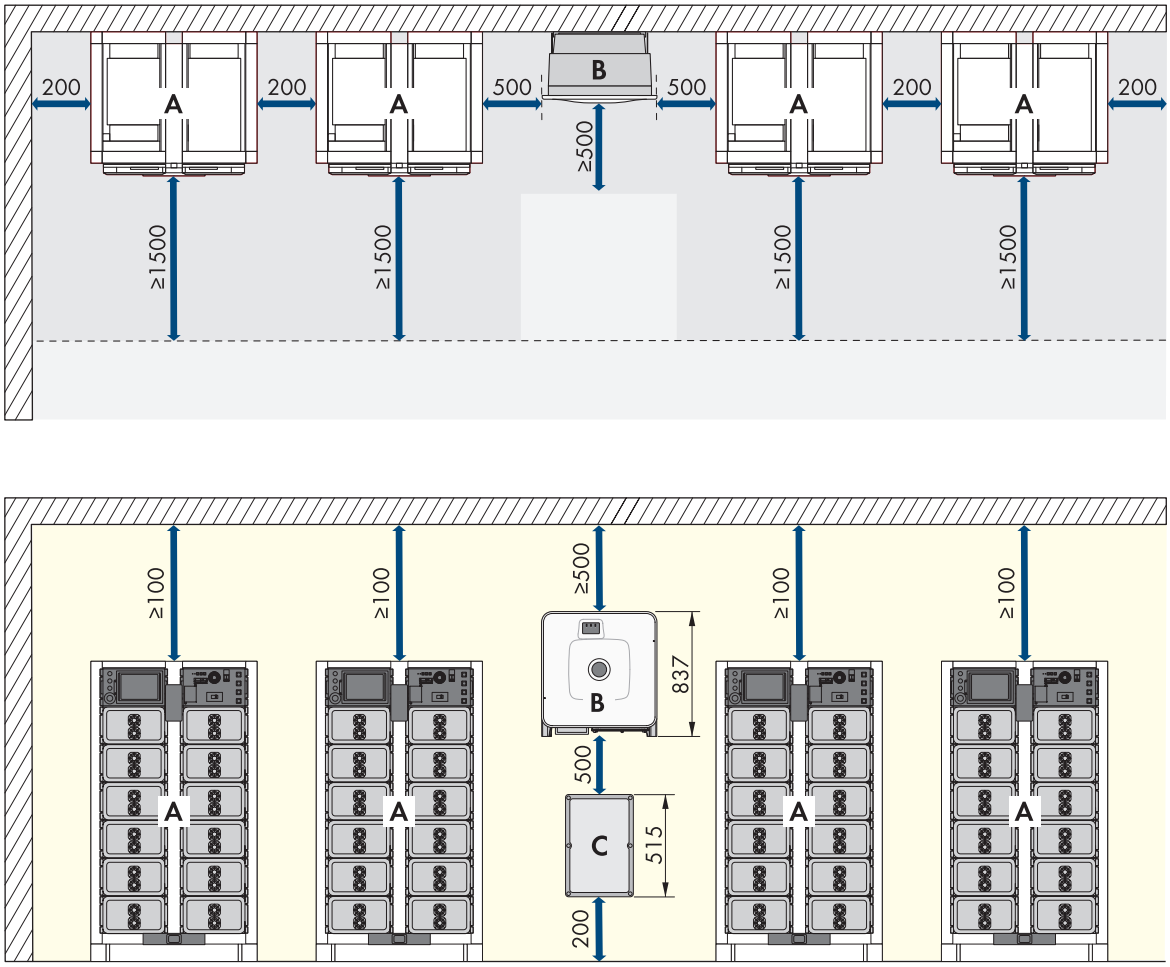


Figure 17: Example for installation of a system with four battery cabinets (dimensions in mm)

Position	
A	Battery Cabinet
B	Battery inverter
C	DC Combiner Box

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

7.1.3 Installation Plans for the Outdoor Version of the Battery Cabinet

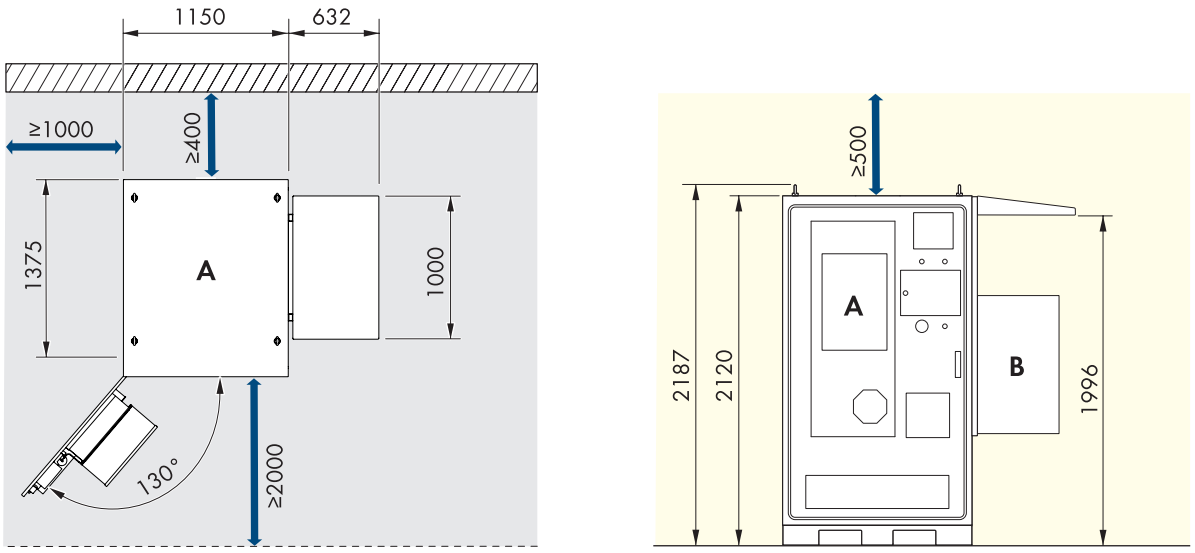


Figure 18: Example for installation of a system with one battery cabinet (dimensions in mm)

The standard system configuration uses cable lengths of 3 m.

Position	
A	Battery Cabinet
B	Battery inverter

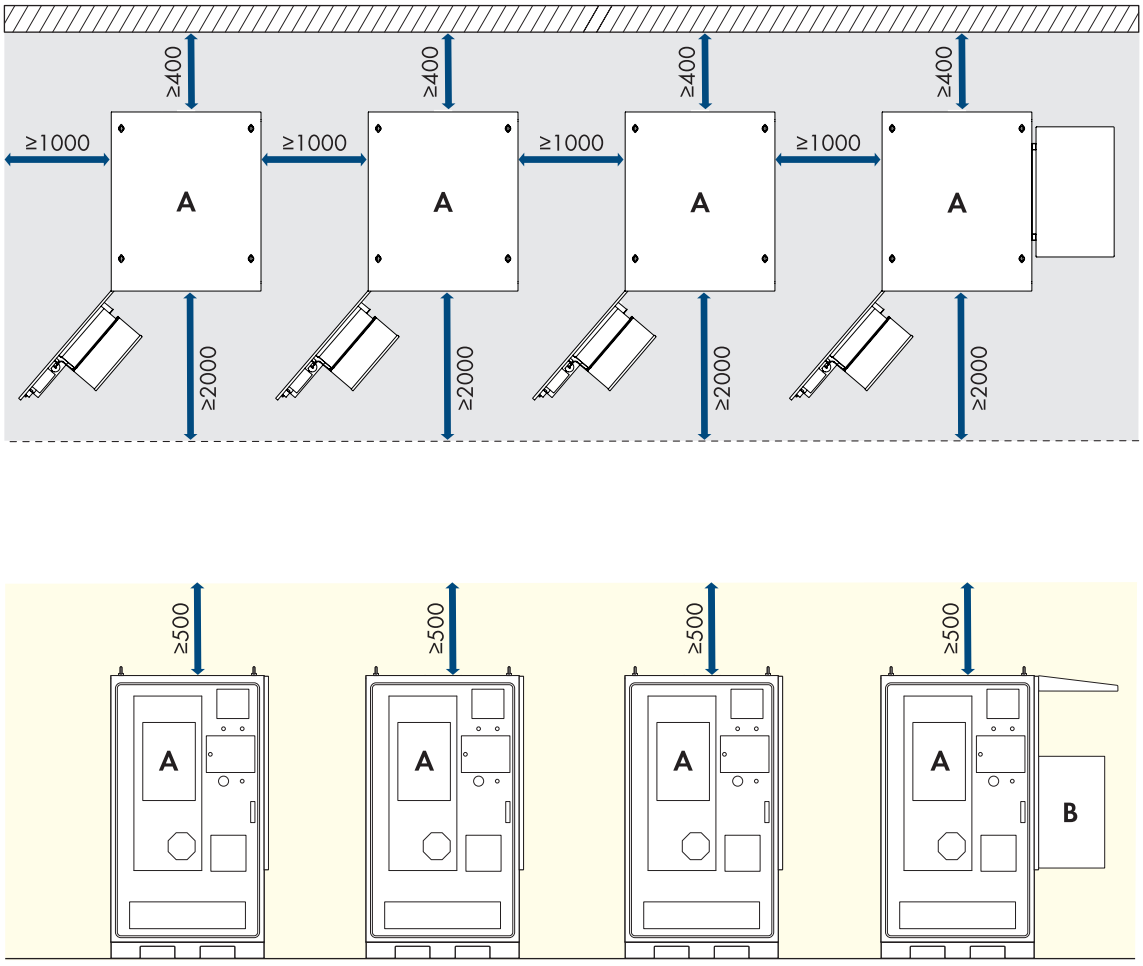


Figure 19: Example for installation of a system with four battery cabinets (dimensions in mm)

Position	
A	Battery Cabinet
B	Battery inverter

When setting up systems with multiple battery cabinets, the length of the supplied DC cables must be taken into account.

7.1.4 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.

7.1.5 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.

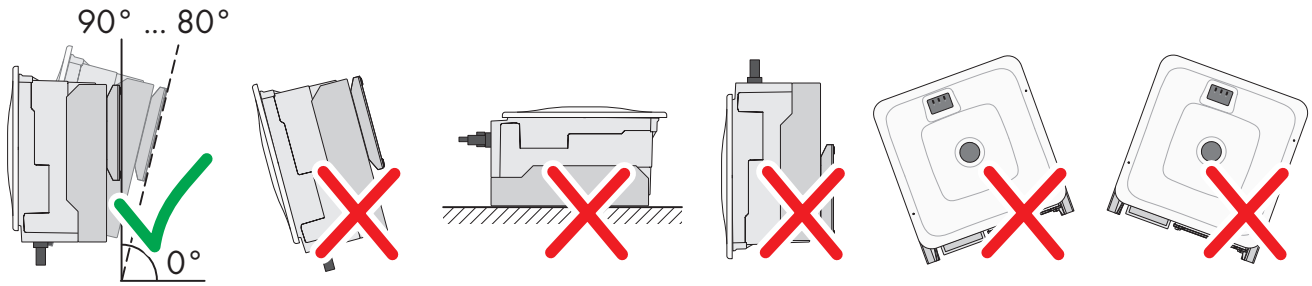


Figure 20: Permitted and prohibited mounting positions

7.1.6 Inverter Mounting Dimensions

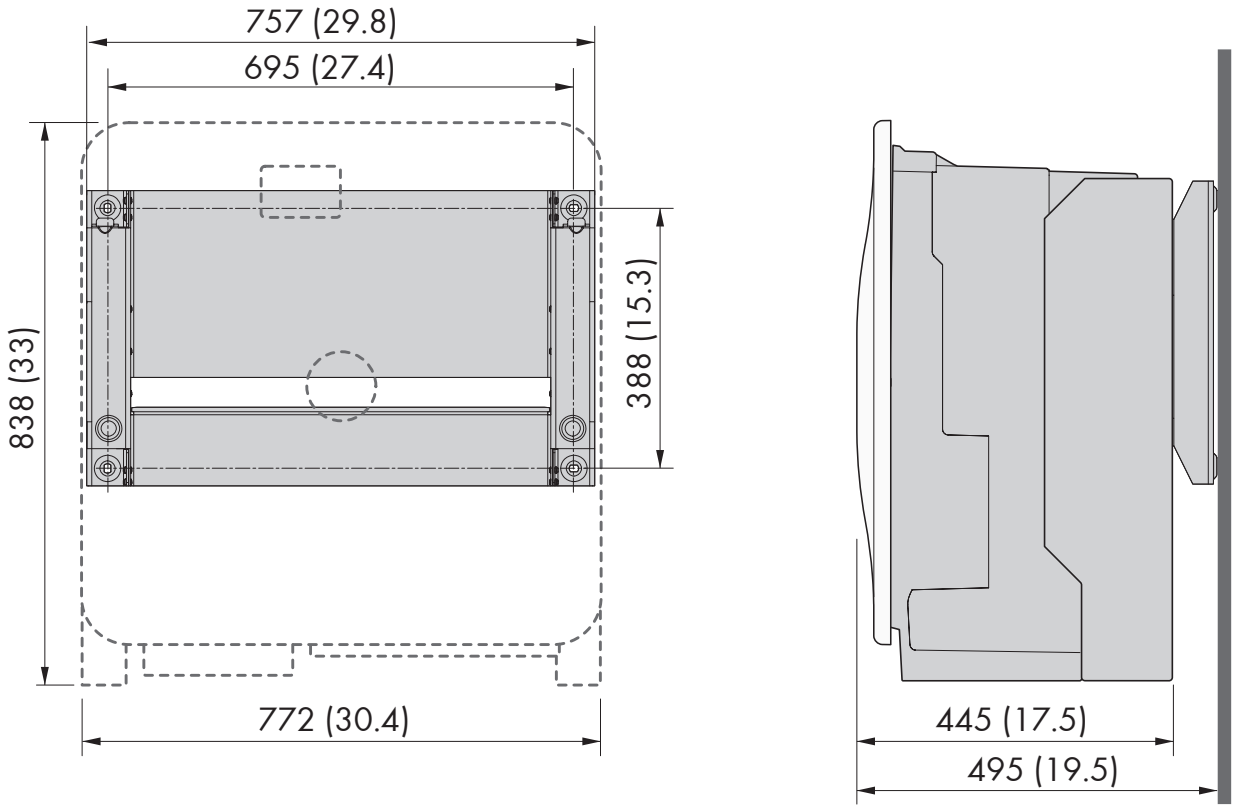


Figure 21: Position of the anchoring points (dimensions in mm (in))

7.1.7 Recommended Inverter Mounting Clearances

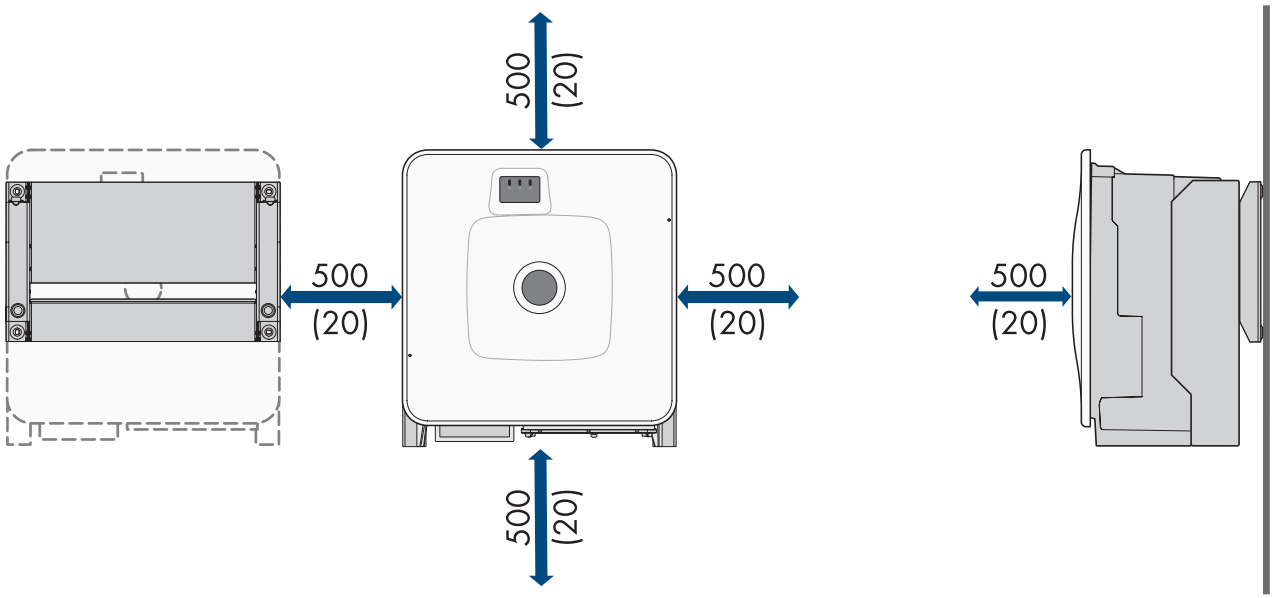


Figure 22: Recommended clearances (dimensions in mm (in))

7.1.8 Requirements on the Installation Site of the Battery Cabinet

⚠ 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.

General requirements

- The installation site must be suitable for the weight, dimensions and minimum clearances of the product.
- It must be possible to reach the installation site with suitable means of transport.
- The surface at the installation site must be sufficiently dry, horizontal and flat.
- Protect the product from direct sunlight, snow, and water as much as possible.
- There must be no heat sources in the immediate vicinity of the installation site.
- All ambient conditions must be met.
- The installation site must be less than 3000 m above mean sea level. If you would like to use the battery at altitudes above 3000 m, contact Service.
- 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.
- The room height or the height of a roof must be greater than the tilt dimension of the battery cabinet.

Requirements for the Outdoor Version of the Battery Cabinet

- A suitable foundation must be prepared.
- Do not place the battery cabinet in ground depressions to prevent ingress of water.
- In regions subject to heavy rainfall, the installation site must always be protected from contact with water.

- The condensation drain must be designed such that neither icing nor water accumulation can occur on the battery cabinet.
- If the inverter is mounted on the battery cabinet, the requirements on the inverter must also be taken into account for the installation site of the battery cabinet. Among other requirements, the inverter may not be exposed to direct irradiation.

Requirements for the Indoor Version of the Battery Cabinet

- The floor at the installation site must be level and its load-bearing capacity must be sufficient for the entire system. The permissible floor surface load must be verified and ensured on-site.
- A homogeneous temperature distribution within the battery room must be guaranteed. The optimum temperature in the battery room is 22 to 25°C.
- 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 with at least class T60 fire doors and class F60 fire protection walls.
- Fire protection measures for battery operation must be implemented in coordination with the responsible construction supervision authority on-site, in accordance with the locally applicable standards, guidelines and laws. Specifications can be found in the national and regional building codes.

7.1.9 Installation Dimensions for the Indoor Version of the Battery Cabinet

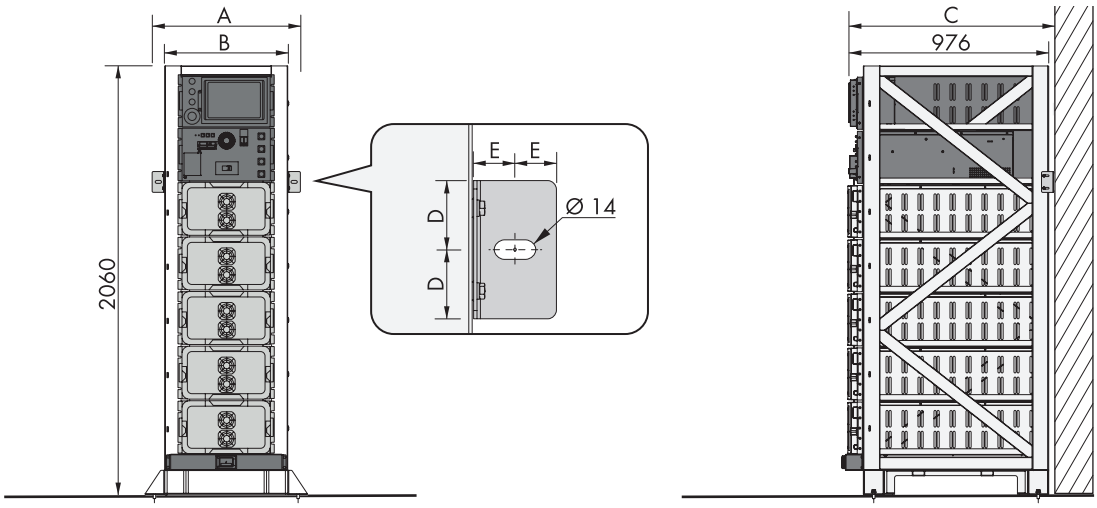


Figure 23: Installation dimensions for the indoor version of the battery cabinet (dimensions in mm)

Position	CS-89-IN-30 dimensions	CS-197-IN-30 dimensions
A	780 mm	1160 mm
B	590 mm	1160 mm
C	≤ 992 mm	-
D	50 mm	-
E	30 mm	-

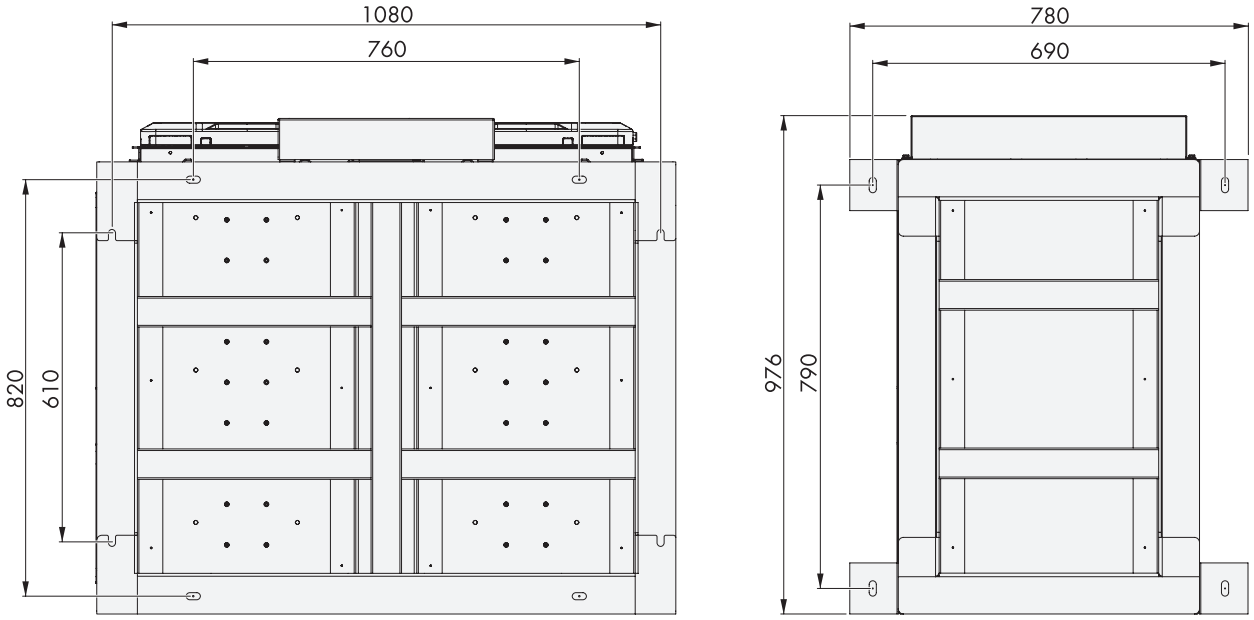


Figure 24: Mounting dimensions on the floor (view from below), left CS-197-IN-30, right CS-89-IN-30 (dimensions in mm)

7.1.10 Requirements on the Foundation for the Outdoor Version of the Battery Cabinet

The design (e.g. static calculations) and laying (e.g. by pouring concrete) of the foundation is the responsibility of the customer.

The foundation must have the following properties:

- The foundation must be suitable for the weight and dimensions of the product.
- The foundation must be mounted on solid ground.
- The burial depth of the foundation must satisfy the structural requirements.
- The foundation must have sound insulation to prevent loud vibrations.
- The foundation must be designed such that the insertion of the cables and the condensation drain is not hindered.
- Rainwater and water from the condensate drain must be able to seep away such that water does not collect on the foundation.

7.1.11 Design of the Foundation for the Outdoor Version of the Battery Cabinet

When designing the foundation, how the cable and the condensate hose is laid must be taken into consideration. If required, prepare cable conduits to enable cable routing after installation.

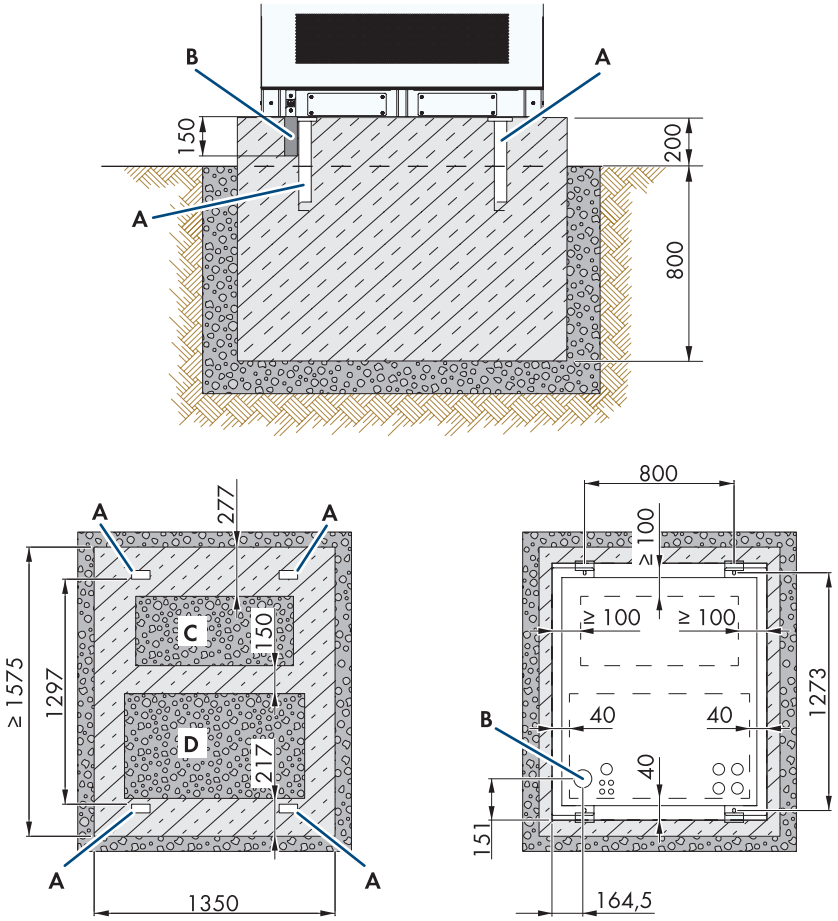


Figure 25: Design of the foundation for the outdoor version: The top figure shows a cross-section from the front; the bottom figure shows a top view of the foundation with and without the battery cabinet (dimensions in mm)

Position	Designation	Dimension
A	Anchoring points for the sleeve anchors included in the scope of delivery	-
B	Protruding condensate hose Adequate drainage via canalization or a gravel bed must be planned for.	Length of the protruding condensate hose approx. 15 cm, Ø 20 mm
C	Rear area without foundation	≤800 mm x 371 mm
D	Front area without foundation	≤964 mm x 560 mm

7.2 Inverter Connecting Plate

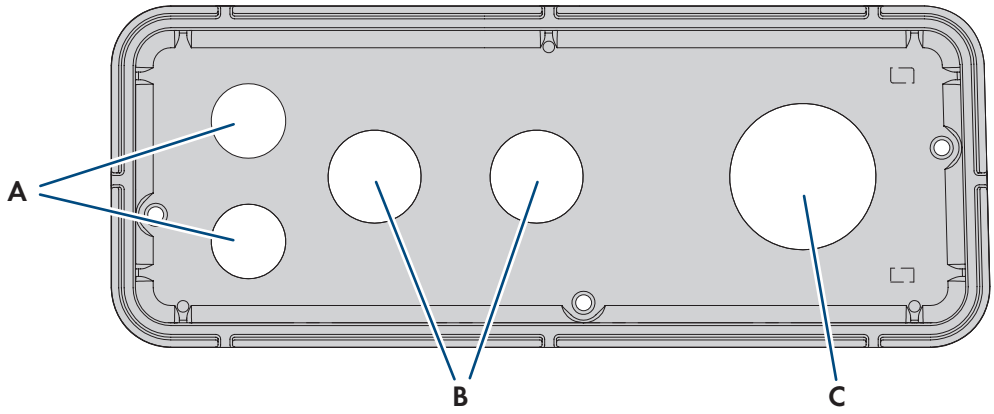


Figure 26: Position of enclosure openings

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

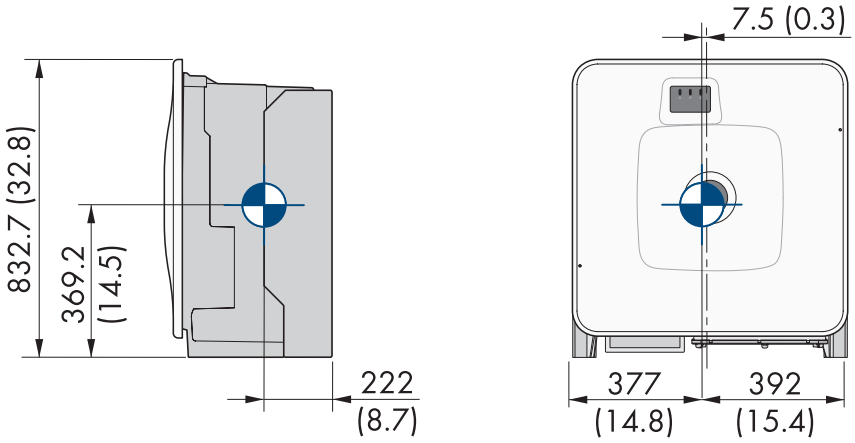


Figure 27: Dimensions of the center of gravity of the product (dimensions in mm (in))

7.4 Mounting Procedure

This section describes the procedure for mounting the components of an SMA Storage XL Package.

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

Procedure		See
1.	Preparing for inverter installation and connection	Section 7.5.1, page 58
2.	Mounting the Inverter	Section 7.5.2, page 59
3.	Unpack the battery cabinet near the installation site	Section 7.6.1, page 62
4.	Install the battery cabinet	Positioning the battery cabinet

Procedure		See
5.	Mount the energy meter (not included in the scope of delivery)	See manual for the energy meter
6.	If a DC distributor (DC Combiner Box) is present, mount the DC distributor	Section 7.7, page 68

Also see:

- Configuring secondary battery cabinets ⇒ page 109

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.

It can be mounted on the wall or on a mounting frame (e.g. primary battery cabinet).

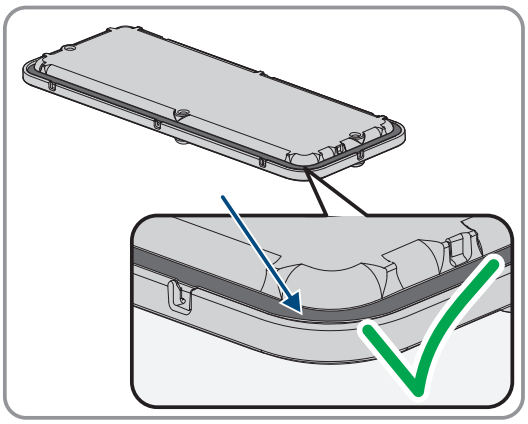
Additionally required mounting material (not included in the scope of delivery):

- At least four 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.

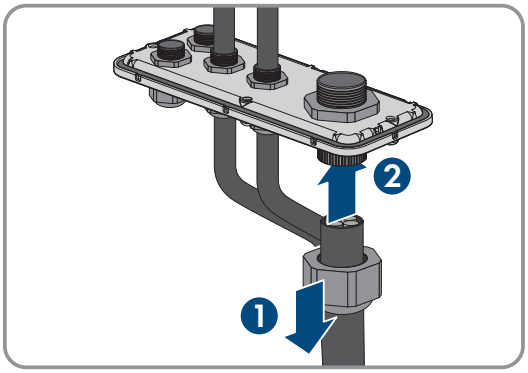
Procedure:

1. When mounting on the wall: Mark the position of the drill holes using the wall mounting bracket.
2. When mounting on the wall: Drill the holes and insert the screw anchors.
3. When mounting on a mounting frame: Determine a good position on the mounting frame.
4. Secure the wall mounting bracket horizontally on the wall using screws and washers.
5. Hang the mounting template in the wall mounting bracket.

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



7. Thread the swivel nuts of the cable glands over the cables.
8. Attach the cable glands to the connecting plate.
9. Remove the mounting template.
10. Mount the product (see Section 7.5.2 "Mounting the Inverter", page 59).



Also see:

- Requirements for the mounting location of the inverter ⇒ page 51
- Permitted and Prohibited Inverter Mounting Positions ⇒ page 52
- Inverter Mounting Dimensions ⇒ page 52
- Recommended Inverter Mounting Clearances ⇒ page 53
- Inverter Center of Gravity ⇒ page 57

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.

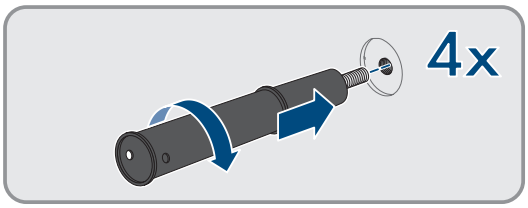
- Transport and lift the inverter carefully. In doing so, keep in mind the weight of the inverter.
- Wear suitable personal protective equipment for all work on the product.
- Transport the inverter using the carrying handles or hoist. In doing so, keep in mind the weight of the inverter.
- Use all carrying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

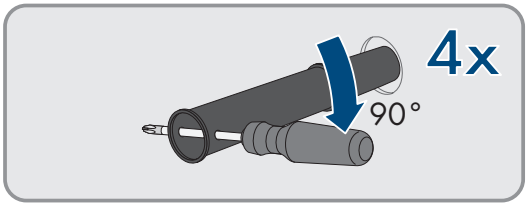
- Mounting and connection are prepared.

Procedure:

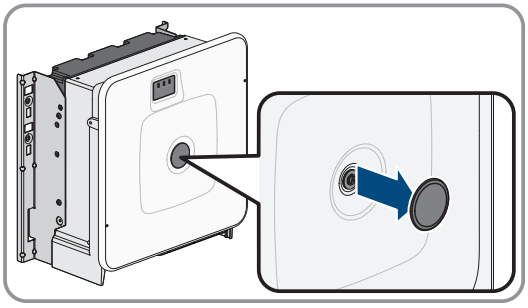
1. Screw the transport handles as far as they will go into the tapped holes on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the carrying handles are not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



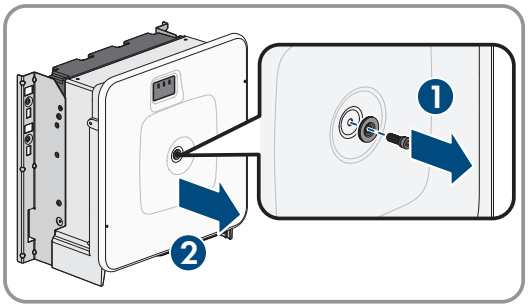
2. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90°. This ensures that the transport handles are securely tightened.
3. If the inverter is to be hooked into the wall mounting bracket by means of a hoist: screw the eye bolts into the threads on the top of the inverter and attach the hoist to them. The lifting gear must be suitable to take the weight of the inverter.



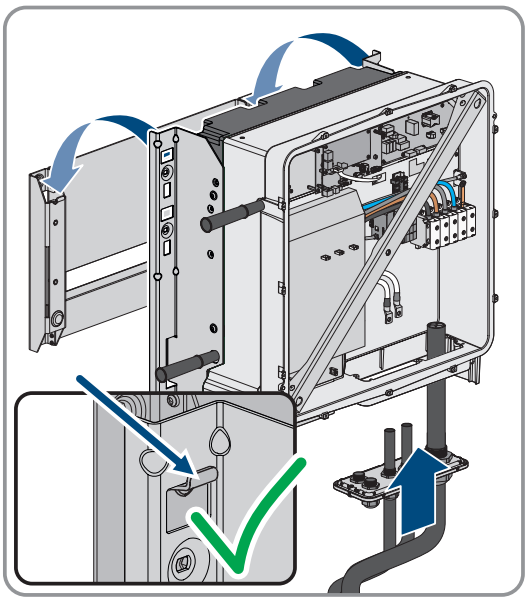
4. Remove the cover from the enclosure lid.



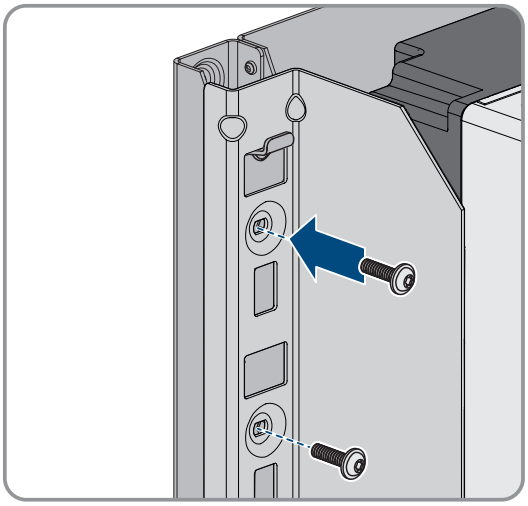
5. Unscrew the screw on the enclosure lid (hex socket, AF8) and remove the enclosure lid.
6. Set the cover, screw with seal, washer with seal and enclosure lid aside and store safely.



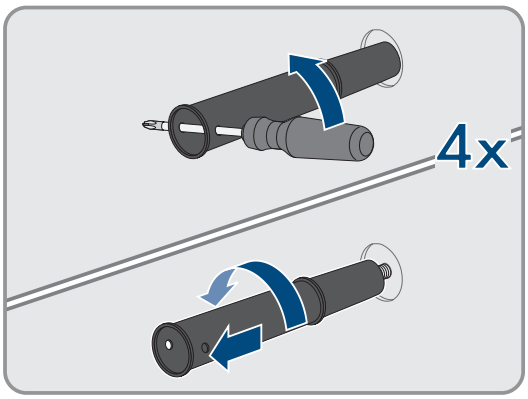
7. Hook the product into the wall mounting bracket. To do this, guide the product over the cables and the connecting plate so that the cables protrude through the opening into the product and the connecting plate sits under the opening. The bracket must protrude through the upper opening.



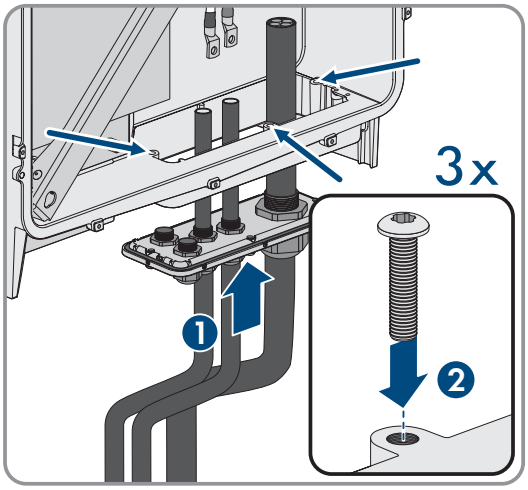
8. Secure the product with 2 screws each on the right and left on the wall mounting bracket (M8x25, TX40, 12 Nm ± 2 Nm).



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 Nm ± 0.5 Nm).



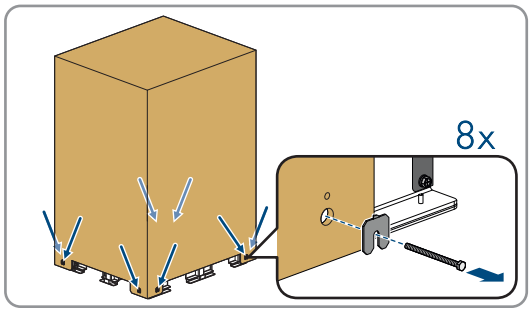
Also see:

- Preparing for mounting and connection ⇒ page 58
- Inverter Center of Gravity ⇒ page 57

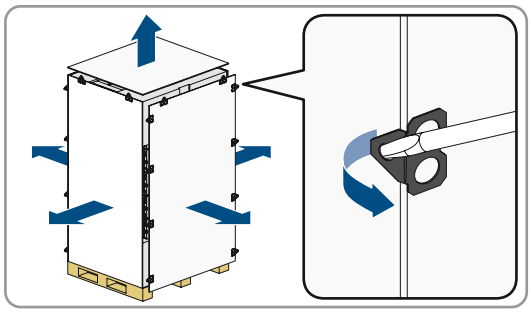
7.6 Mounting the Battery

7.6.1 Unpack the battery cabinet

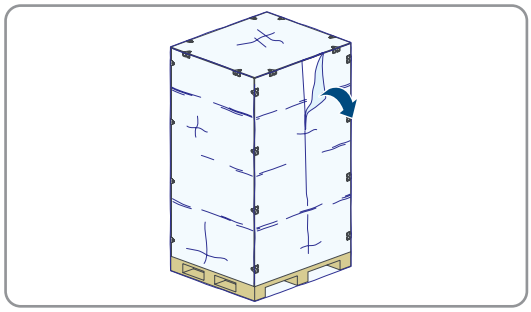
1. Remove the locking mechanisms on the transport crate.



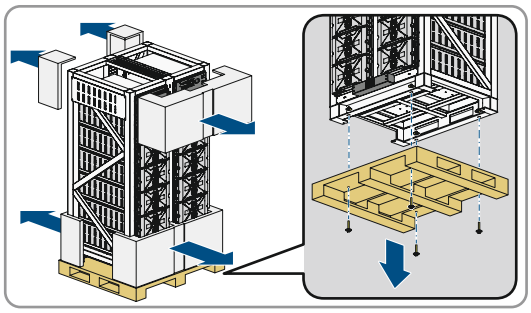
2. Pry open the retaining clips on the edges of the transport crate using a tool and remove the panels of the transport crate one by one. When doing so, begin with the top panel.



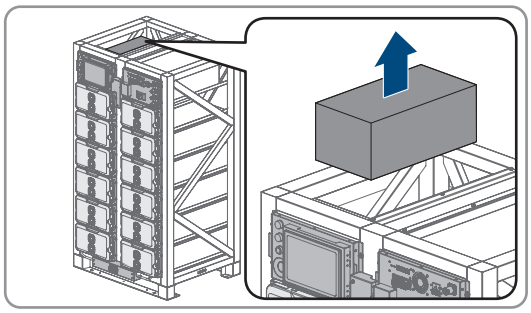
3. Remove the packaging foil.



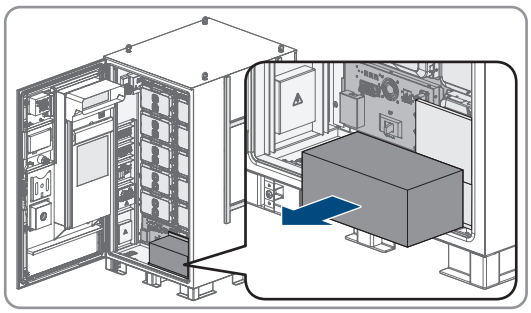
4. Remove the packaging material from the battery cabinet.
5. Loosen the screws on the Euro pallet.



6. Indoor version: Remove the accessory kit from the top of the battery cabinet.
   Information: The accessory kit should be removed before the product is moved into the installation space. The accessory kit has a height of 200 mm. It may be that if the room height is too low, it is no longer possible to take it out.



7. Outdoor version: Remove the accessory kit from the battery cabinet.



7.6.2 Positioning the Outdoor Version of the Battery Cabinet

⚠ QUALIFIED PERSON

Requirements:

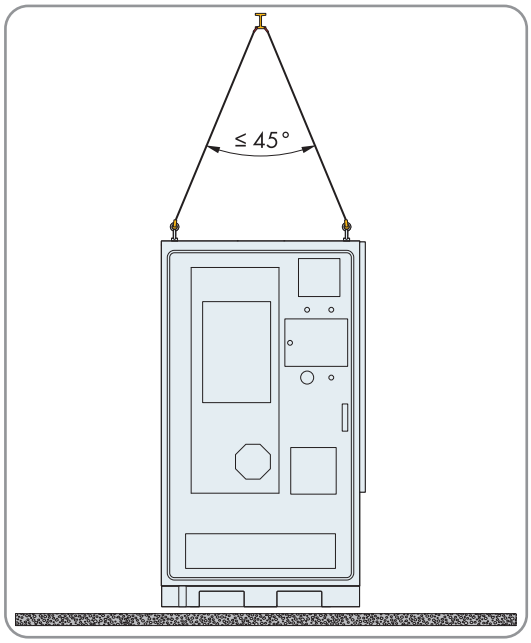
☐ A sound-insulated foundation must have been prepared.

☐ The requirements on the installation site and on the foundation must have been complied with.

Procedure:

1. On the prepared foundation, pre-drill and clean holes for the sleeve anchors included in the scope of delivery.
2. Insert the sleeve anchors and drive in the expansion sleeves.

3. If necessary, use a crane to transport the battery cabinet to the installation site. When doing so, use the available eye bolts and ensure that the lifting gear is correctly attached.
4. Position the battery cabinet over the sleeve anchors such that it sits on the holes in the frame.
5. Attach the battery cabinet to the sleeve anchors on the foundation.

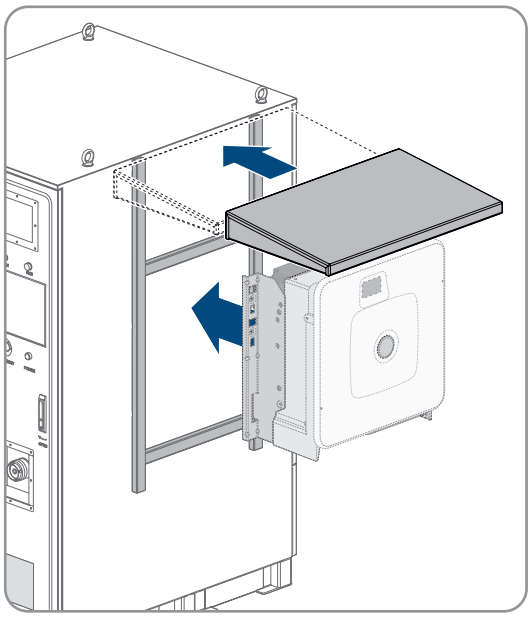


7.6.3 Installing a Roof for the Outdoor Version of the Battery Cabinet

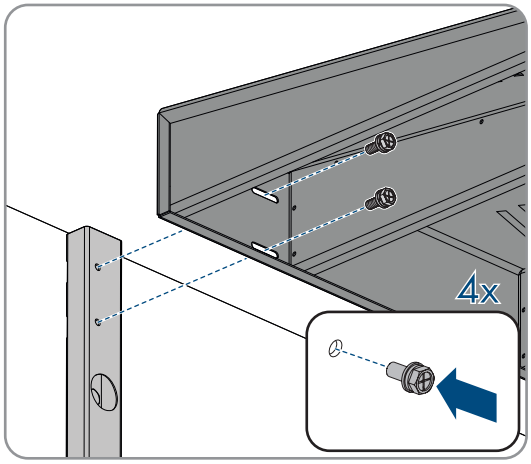
The outdoor version of the battery cabinet includes a mounting rail for attaching an inverter. If the inverter is to be mounted on the battery cabinet, a roof must also be installed. If there are multiple battery cabinets, the roof should be installed above the primary battery cabinet.

Procedure:

1. If the inverter has not yet been mounted, mount the inverter first (see Section 7.5 "Mounting the Inverter", page 58).



2. Attach the roof to mounting rail at the top using 4 combi hexagon head bolts (M6x16, tightening torque 2.5 Nm).



7.6.4 Positioning the Indoor Version of the Battery Cabinet

⚠ QUALIFIED PERSON

Requirements:

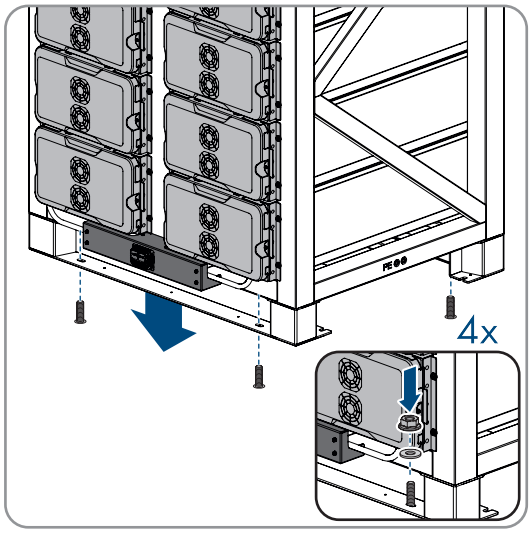
☐ The requirements on the installation site must have been complied with.

☐ Take the installation dimensions of the battery cabinet into account (see Section 7.1.9 "Installation Dimensions for the Indoor Version of the Battery Cabinet", page 54).

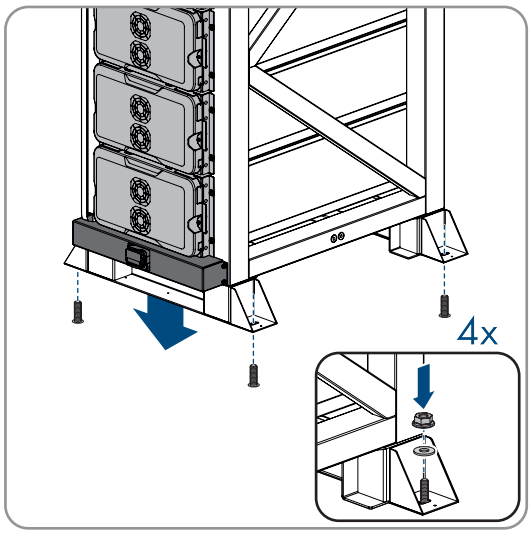
Procedure:

1. At the chosen installation site, pre-drill and clean holes for the sleeve anchors included in the scope of delivery.
2. Insert the sleeve anchors and drive in the expansion sleeves.
3. Transport the battery cabinet to the installation site.

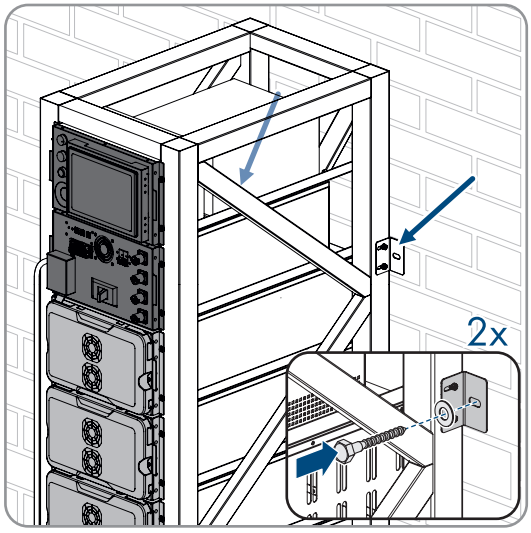
4. Wide battery cabinet: Position the battery cabinet over the sleeve anchors such that it sits on the holes in the frame.



5. Narrow battery cabinet: Position the battery cabinet over the sleeve anchors such that it sits on the holes in the frame.
6. Attach the battery cabinet to the sleeve anchors on the floor.



7. If wall brackets are present on the battery cabinet, secure the battery cabinet to the wall using the wall brackets and suitable bolts.



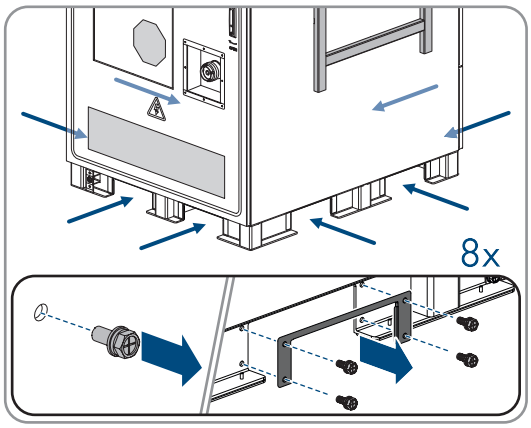
7.6.5 Mounting the Panels of the Outdoor Version

Requirements:

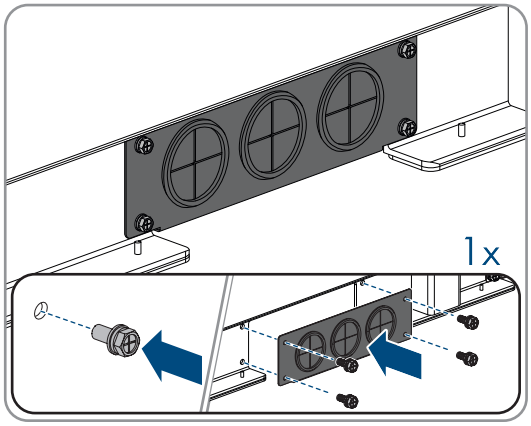
☐ The battery cabinet has been positioned and fixed in place.

Procedure:

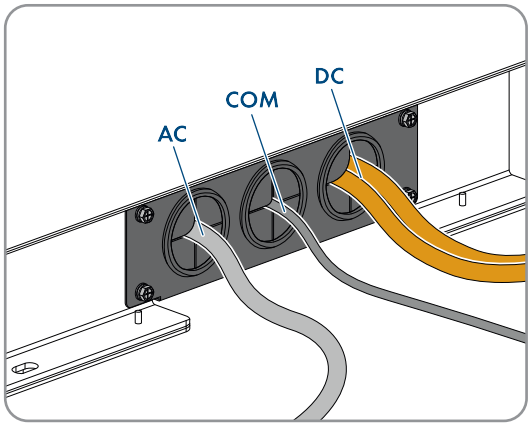
1. Remove all transport panels from the mounting frame.



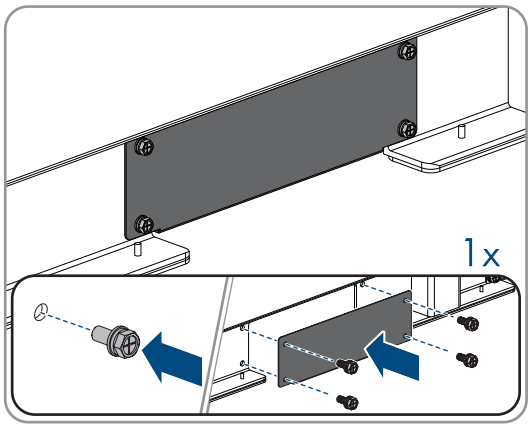
2. Attach the cable panel from the scope of delivery to the mounting frame using 4 combi hexagon head bolts M6 (tightening torque 2.5 Nm).



3. Route the cables through the cable panel into the battery cabinet. When doing so, route the DC cables separately from the other cables.



4. Attach all other panels from the scope of delivery using 4 combi hexagon head bolts M6 (tightening torque 2.5 Nm) each.



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.

8 Electrical Connection

8.1 Wiring Overview with One Battery Inverter

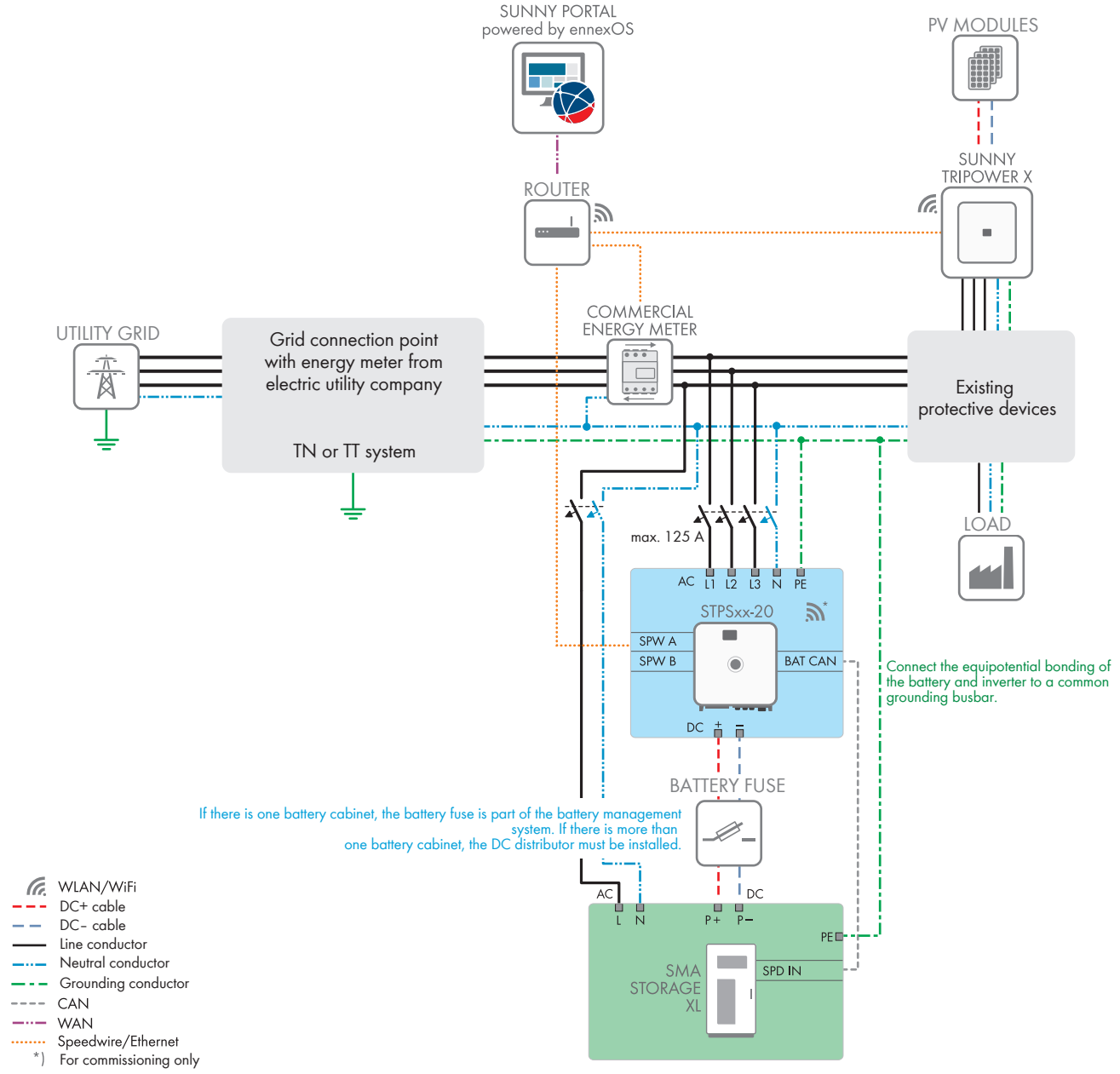


Figure 28: SMA Storage XL Package with one battery inverter and one outdoor-version battery cabinet (example)

8.2 Connecting the Battery via a DC Distributor

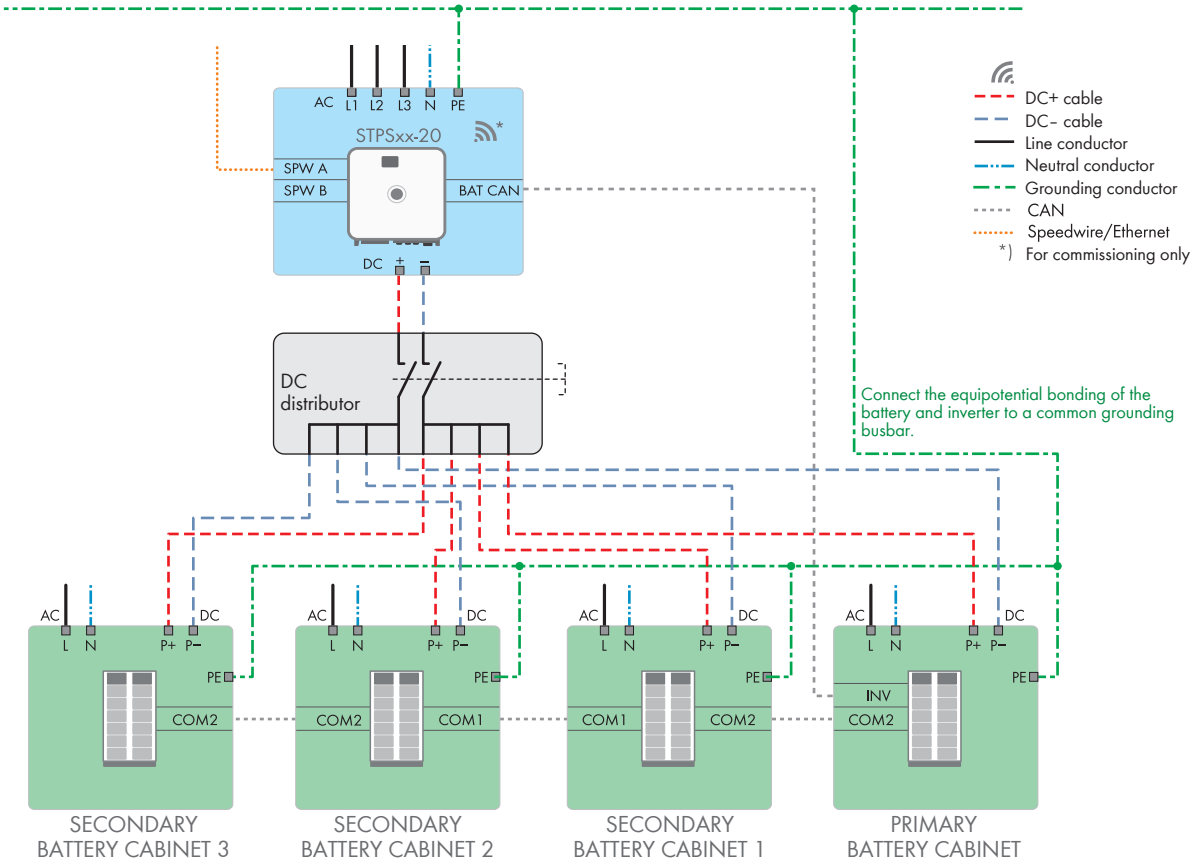


Figure 29: Connecting the battery to the battery inverter via a DC distributor with four indoor-version battery cabinets (example)

Also see:

- Connection Area of the DC Distributor ⇒ page 100

8.3 Requirements for the electrical connection

8.3.1 Residual-current monitoring unit (RCMU)

The inverter 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. It disconnects the inverter redundantly from the utility grid in the event of residual current jumps of > 30 mA. If the residual current monitoring unit malfunctions, the inverter is immediately disconnected from the utility grid at all poles. If the protection by automatic disconnection of the power supply according to DIN VDE 0100-410 is fulfilled by an appropriate overcurrent protective device, the inverter does not require an external residual-current device for safe operation. If local regulations require the use of a residual-current device, the following must be observed:

- The inverter 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 the Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com). Each inverter in the system must be connected to the utility grid via a separate residual-current device.
- A suitable residual-current device must be procured and installed for the battery. The rated residual current must be determined based on the technical data of the product version.
- 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.

8.3.2 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).

8.3.3 Load-break switch and cable protection

NOTICE

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

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

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

- In PV systems with multiple inverters, protect each inverter with a separate all-pole circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 19 "Technical Data", page 205). This will prevent residual voltage from being present at the corresponding cable after disconnection.
- Loads installed between the inverter and the circuit breaker must be fused separately.

8.3.4 Equipotential Bonding

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

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

8.3.5 Requirements on the AC cable for the inverter

- ☐ Conductor type: aluminum or copper wire
- ☐ The conductors must be solid, stranded or fine-stranded. When using fine-stranded wires, bootlace ferrules must be used.
- ☐ Conductor cross-section: 16 mm^2 to 95 mm^2
- ☐ Outer diameter: 35 mm to 48 mm
- ☐ Insulation stripping length: 30 mm
- ☐ Sheath stripping length: ≤ 375 mm
- ☐ The cable and conductor cross-sections must always be dimensioned according to the local and national directives and within the range specified by the manufacturer (SMA Solar Technology AG)." If the manufacturer (SMA Solar Technology AG) requires a higher conductor cross-section than the standard, the range of the manufacturer must be observed. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

8.3.6 Requirements on the AC cable for the battery cabinet

- ☐ Conductor type: aluminum or copper wire
- ☐ The conductors must be solid, stranded or fine-stranded. When using fine-stranded wires, bootlace ferrules must be used.
- ☐ Conductor cross-section: at least 4 mm^2
- ☐ Outer diameter: at least 2.25 mm

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

8.3.7 Requirements for the Cable Connection with Terminal Lugs

- ☐ All terminal lugs used must be suitable for temperatures of up to 90°C and must be in accordance with the national standards and directives.
- ☐ The maximum material thickness of the terminal lugs must be observed:
  - When connecting with 1 terminal lug: 22 mm
  - When connecting with 2 terminal lugs: 11.25 mm
- ☐ The width of the terminal lugs must exceed the washer diameter. This will ensure that the specified tightening torques are effective over the whole surface.
- ☐ Use only tin-plated terminal lugs made from copper or aluminum.
- ☐ The specified tightening torques must always be complied with.

8.3.8 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 mm^2
- ☐ Maximum cable length between two nodes when using patch cables: 50 m
- ☐ Maximum cable length between two nodes when using installation cables: 100 m
- ☐ UV-resistant if installed outdoors.

8.3.9 Battery data cable requirements

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

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

Also see:

- Connecting the battery communication cable for CAN ⇒ page 81

8.3.10 Laying plan for network and battery data cables

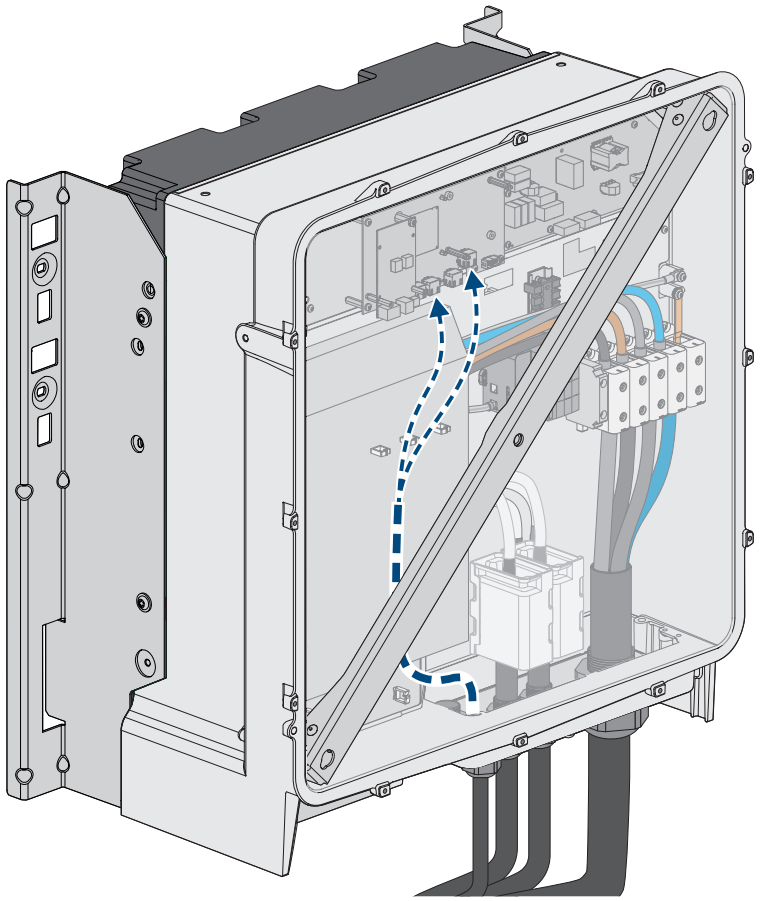


Figure 30: Interior view of the inverter with laying plan for network cables / battery data cables

Also see:

- Overview of the Connection Area ⇒ page 76

8.3.11 Ripple control receiver and external I/O system

This external I/O system supports the connection of a ripple control receiver with the inverter via the local network:

- MD.IO-41

Also see:

- Connecting the Network Cables ⇒ page 78
- Network cable requirements ⇒ page 72

8.3.12 DC cable requirements

☐ Aluminum or copper wires must be used.

☐ The DC cables must be rated for the maximum battery voltage and the maximum battery current.

☐ The conductor cross-section must be at least 50 mm² with an outer diameter of 11 mm.

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

Also see:

- Connecting the DC Cables ⇒ page 83

- DC connection overview ⇒ page 77

8.4 Electrical Connection Procedure with a Single Battery Cabinet

This section describes the procedure for the electrical connection of the product when there is just one battery cabinet in the system. 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 8.3, page 70
2.	Ground the battery cabinet.	Section 8.7.2, page 86
3.	Connect the AC cables to the inverter.	Section 8.6.3, page 77
4.	Connect the network cables to the inverter.	Section 8.6.4, page 78
5.	Connect the battery communication cables for CAN to the inverter.	Section 8.6.5, page 81
6.	Connect the DC lines to the inverter. Record the device type and serial number of the inverter in the commissioning report.	Section 8.6.6, page 83
7.	Connect the AC cable to the battery cabinet.	Section 8.7.5, page 89
8.	Connect the DC cables to the battery cabinet.	Section 8.7.6, page 91
9.	Connect the battery communication system to the inverter.	Section 8.7.7, page 94
10.	Connect the energy meter (Energy Meter or Power Quality Analyzer).	See manual for the energy meter
11.	Optional: Connect the SMA Data Manager M.	See manual for the SMA Data Manager M

Also see:

- Configuring secondary battery cabinets ⇒ page 109
- Connecting the CAN communication between the battery cabinets of the indoor version ⇒ page 96
- Commissioning multiple battery cabinets ⇒ page 112
- Commissioning an Individual Battery Cabinet ⇒ page 108
- Commissioning an Individual Battery Cabinet ⇒ page 108

8.5 Electrical Connection Procedure with Multiple Parallel-Connected Battery Cabinets

This section describes the procedure for the electrical connection of the product when multiple battery cabinets are used in a system. It gives an overview of the steps, which must always be performed in the prescribed sequence.

Procedure		See
1.	Ensure that the requirements for the electrical connection are fulfilled.	Section 8.3, page 70
2.	Ground the battery cabinets.	Section 8.7.2, page 86

Procedure		See
3.	Configure all secondary battery cabinets before making further connections.	Section 9.3.8, page 109
4.	Configure the primary battery cabinet before making further connections.	Section 9.3.9, page 110
5.	Connect the AC cables to the inverter.	Section 8.6.3, page 77
6.	Connect the network cables to the inverter.	Section 8.6.4, page 78
7.	Connect the battery communication cables for CAN to the inverter.	Section 8.6.5, page 81
8.	Connect the DC lines to the inverter. Record the device type and serial number of the inverter in the commissioning report.	Section 8.6.6, page 83
9.	Connect the AC cable to the battery cabinets.	Section 8.7.5, page 89
10.	Connect the DC cables to the battery cabinets. With the indoor version, connect all battery cabinets to the DC Combiner. With the outdoor version, connect all battery cabinets together in parallel.	Section 8.7.6, page 91
11.	Connect the battery communication system between the battery cabinets.	Section 8.7.7.4, page 96
12.	Connect the battery communication system to the inverter.	Section 8.7.7, page 94
13.	Connect the energy meter (Energy Meter or Power Quality Analyzer).	See manual for the energy meter
14.	Optional: Connect the SMA Data Manager M.	See manual for the SMA Data Manager M

Also see:

- Commissioning multiple battery cabinets ⇒ page 112

8.6 Connecting the Inverter

8.6.1 Overview of the Connection Area

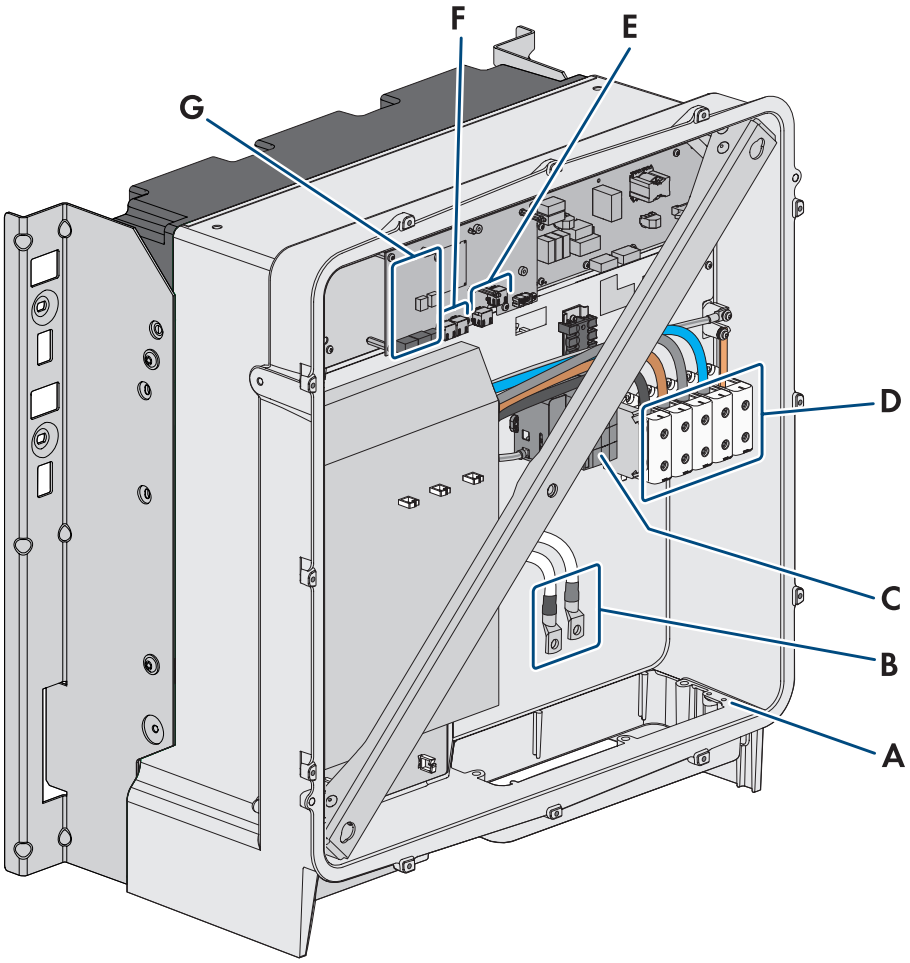
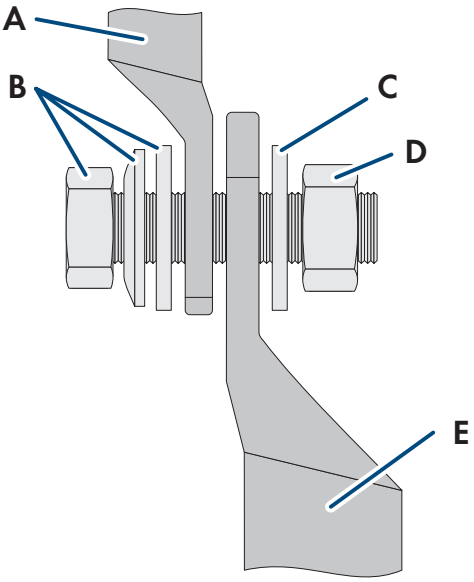


Figure 31: Connection areas in the interior of the product

Position	Designation
A	Optional connection for grounding the enclosure. The optional grounding cannot replace the AC grid grounding. The two bolt and washer assemblies M6x16 supplied are provided for this connection.
B	Cable for DC connection with tin-plated copper terminal lugs
C	AC overvoltage protection elements
D	Terminal blocks for AC connection
E	Sockets for battery communication connection
F	Sockets for network connection
G	Module slot

8.6.2 DC connection overview

1 DC cable



2 DC cable

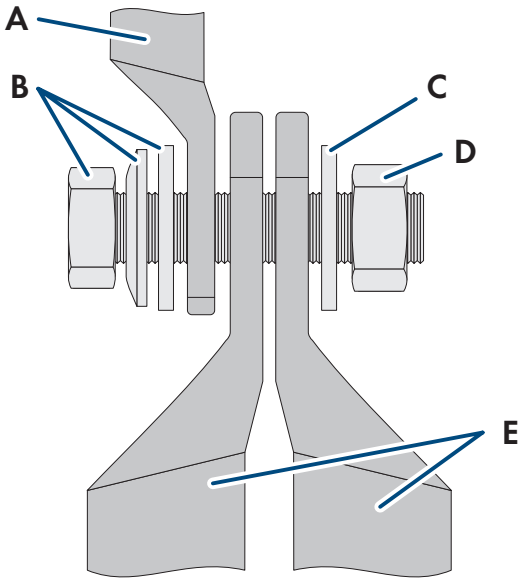


Figure 32: DC connection overview

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.

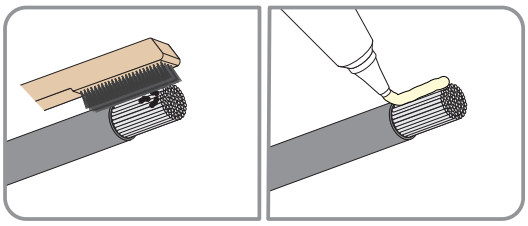
Additionally required material (not included in the scope of delivery):

- Protective grease (only for conductors made of aluminum)

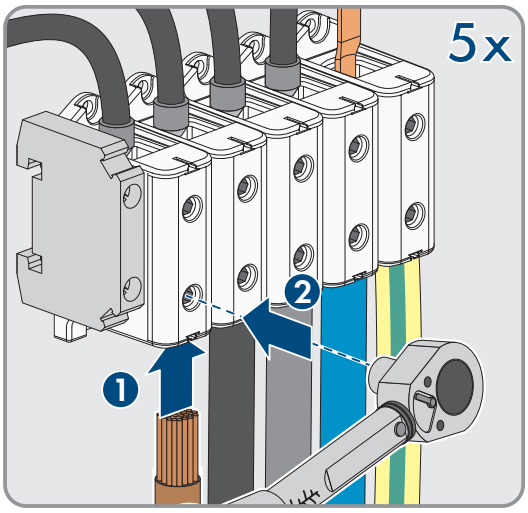
Procedure:

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:

- Load-break switch and cable protection ⇒ page 71
- Overvoltage category ⇒ page 71

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.

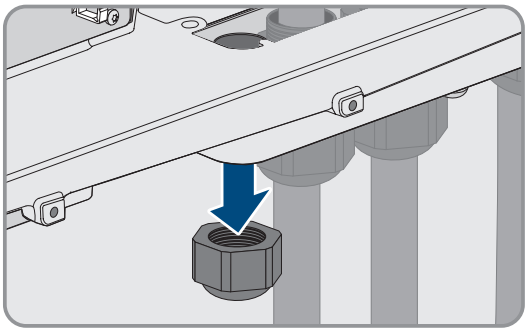
Additionally required material (not included in the scope of delivery):

☐ Network cables(see Section 8.3.8 "Network cable requirements", page 72)

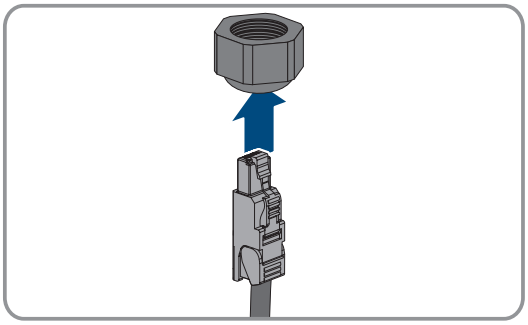
☐ Where required: Field-assembly RJ45 connector with metal enclosure

Procedure:

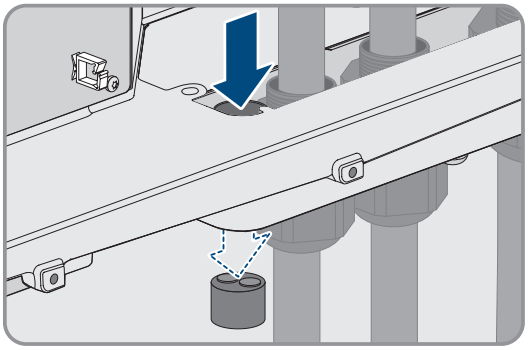
1. Disconnect the product from voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. Unscrew the swivel nut from the cable gland.



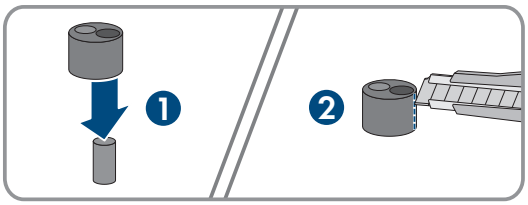
3. Thread a swivel nut over each network cable.



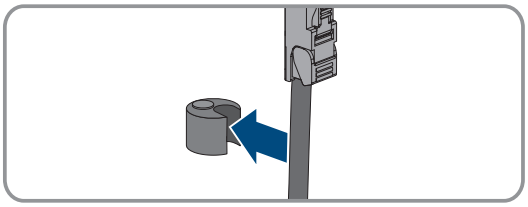
4. Remove the two-hole cable support sleeve from the cable gland.



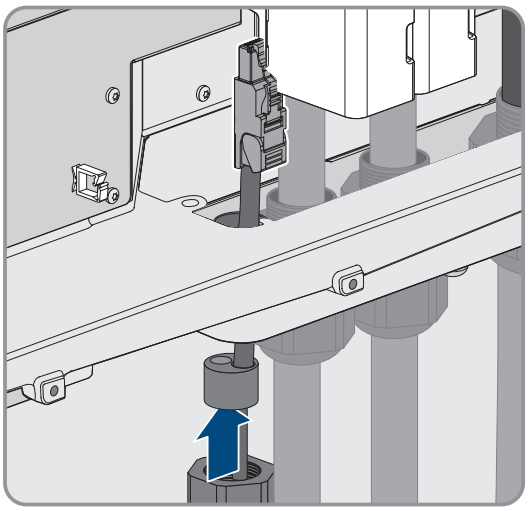
5. For each network cable, remove one of the plugs from the enclosure openings and for each network cable cut an enclosure opening with a utility knife.



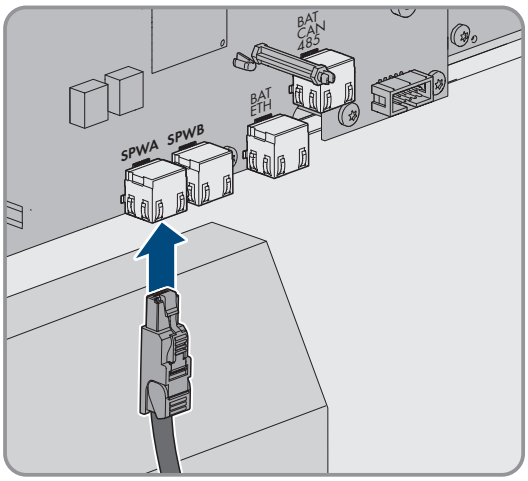
6. Insert each network cable into a 2-hole cable support sleeve.



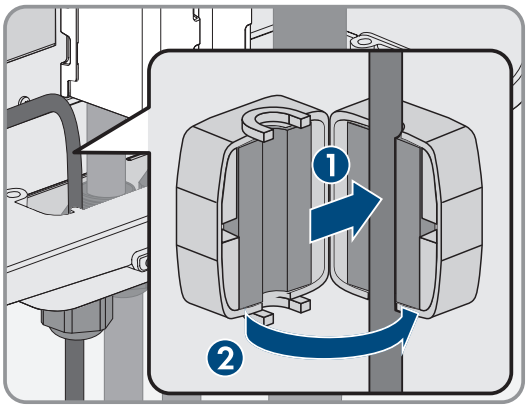
7. Press the 2-hole cable support sleeve into the cable gland and guide each network cable to the network port. Lay each cable according to the installation plan and attach it to the brackets.
8. When using self-assembly cables, assemble the RJ45 connectors and connect them to the cable (refer to the documentation of the connector).



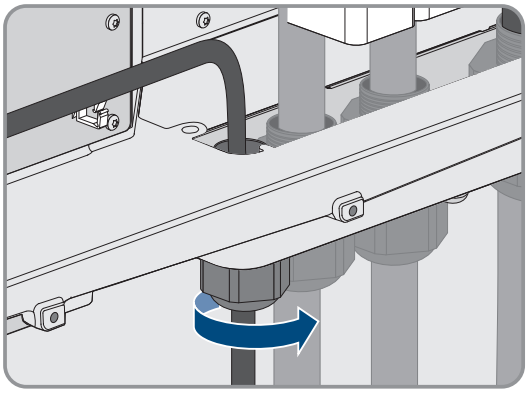
9. Plug the RJ45 connector of the network cable into the socket **SPWA** or **SPWB** of the communication assembly.



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 73

8.6.5 Connecting the battery communication cable for CAN

⚠ DANGER

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

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

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

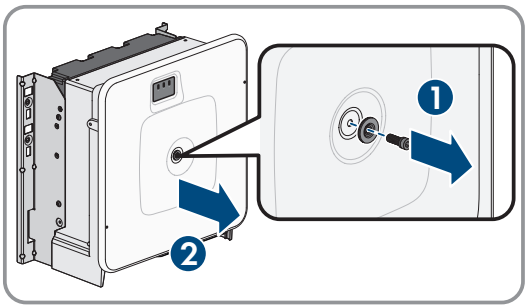
Additionally required material (not included in the scope of delivery):

☐ Battery data cable(s)

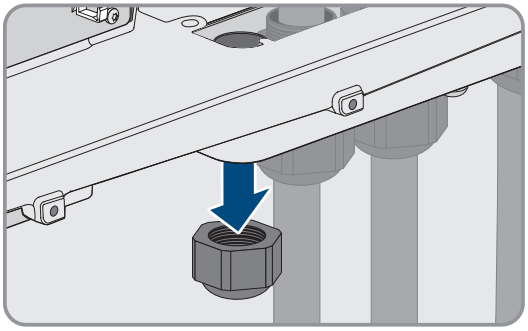
☐ Where required: Field-assembly RJ45 connector with metal enclosure

Procedure:

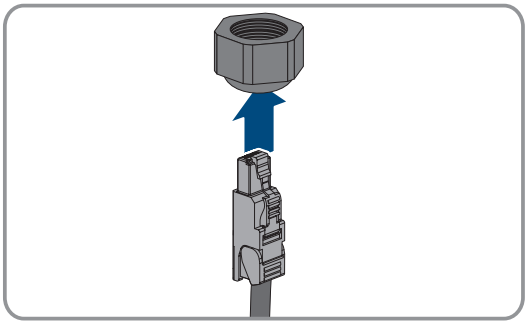
1. Disconnect the product from voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. When cover of the enclosure is closed: unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.



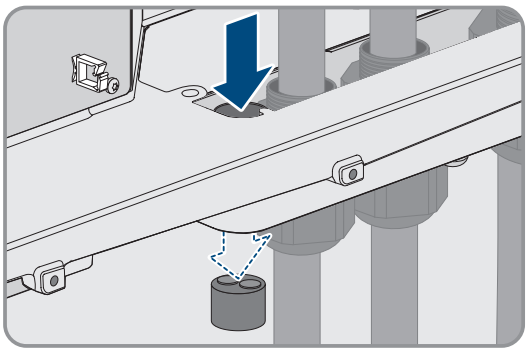
3. Unscrew the swivel nut from the cable gland.



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



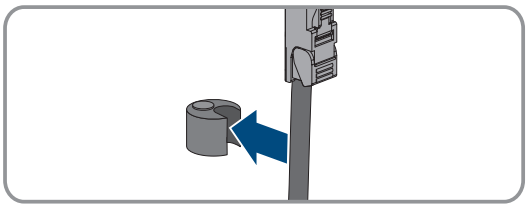
5. Remove the two-hole cable support sleeve from the cable gland.



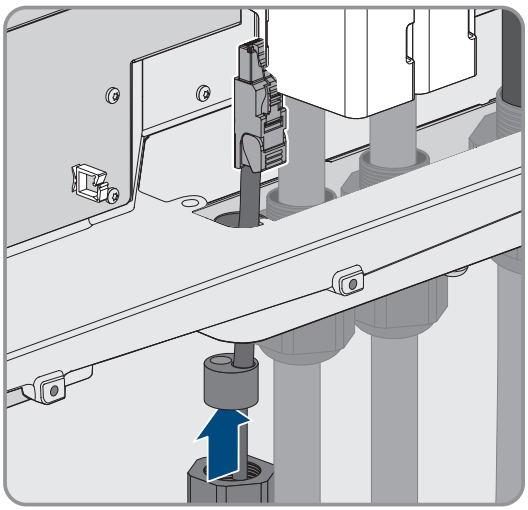
6. For the battery data cable, remove a plug from one of the enclosure openings and for the battery data cable cut an enclosure opening with a utility knife.



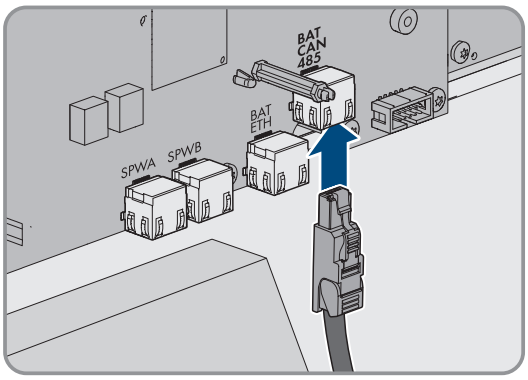
7. Insert the battery data cable into an enclosure opening.



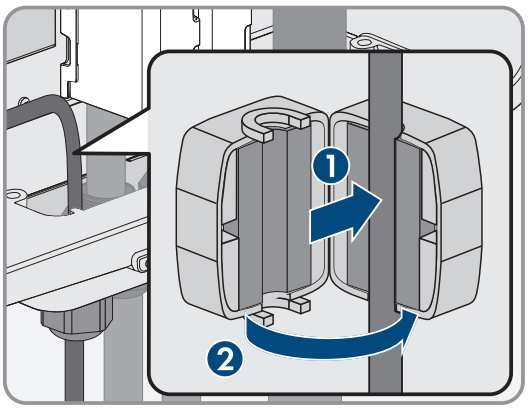
8. Press the two-hole cable support sleeve into the cable gland and guide the battery communication cable to the socket **BAT CAN**. Lay the battery data cable according to the installation plan and attach it to the brackets.
9. When using self-assembly cables: Assemble the RJ45 connectors according to the specified pin assignment and connect them to the cable.



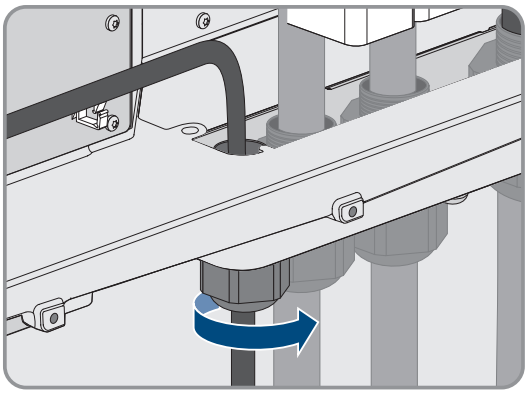
10. Plug the RJ45 connector of the battery communication cable into the socket **BAT CAN** of the communication assembly.
11. Firmly tighten the swivel nut on the cable gland.
12. Ensure that the battery data cable is securely in place by pulling slightly on it.



13. Attach one ferrite included in the scope of delivery to each battery communication cable.



14. Tighten the swivel nut on the cable gland hand-tight. This will secure the battery data cables.
15. If the product is installed outdoors, install overvoltage protection for all components in the network.
16. Connect the other end of the battery data cable to the battery.



Also see:

- Laying plan for network and battery data cables ⇒ page 73
- Battery data cable requirements ⇒ page 72

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):

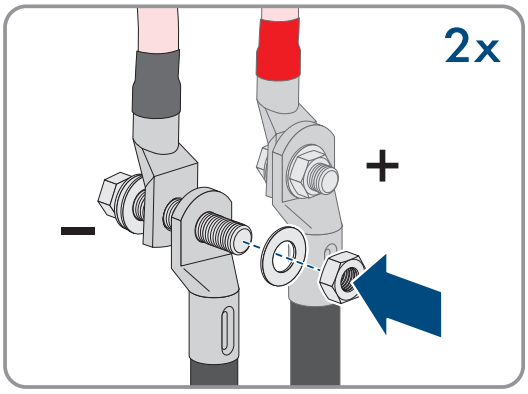
☐ Clean cloth

☐ Ethanol cleaning agent

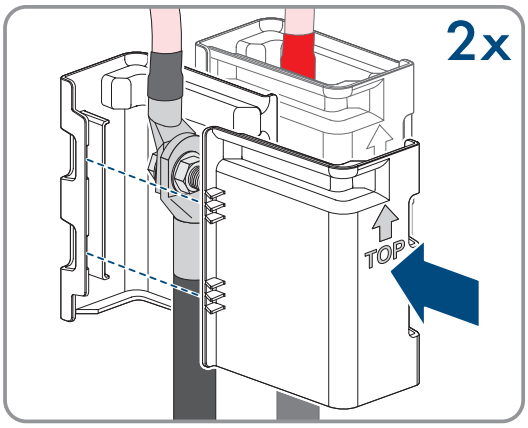
☐ Press tool

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 and crimp the ring terminal lug (see Section 8.6.7 "Crimping of Ring Terminal Lug", page 85). The heat-shrink tubing must be below the stripped conductor section.
4. Pull the supplied red heat-shrink tubing onto the DC+ cable and crimp the ring terminal lug (see Section 8.6.7 "Crimping of Ring Terminal Lug", page 85). The heat-shrink tubing must be below the stripped conductor section.
5. Remove any cable remnants from the product.
6. Remove the fixing of the pre-harnessed DC cables from the product.
7. 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.
8. Connect the DC cables with each other. To do this, insert the screw and washer assembly (M10x40) from the back through the round holes of the terminal lugs and from the front tighten with the washer (M10) and the hex nut (AF16, tightening torque: 24 Nm ± 2 Nm). Ensure correct polarity.



9. Place the touch protection elements around the terminal lugs and plug together until they audibly click into place.
10. Firmly tighten the swivel nuts of the cable glands.



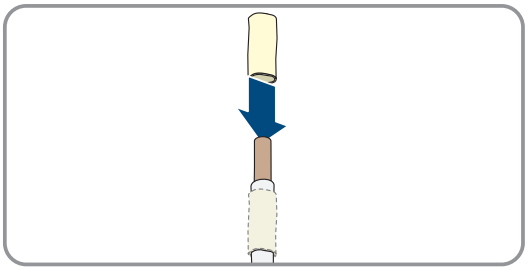
Also see:

- DC connection overview ⇒ page 77

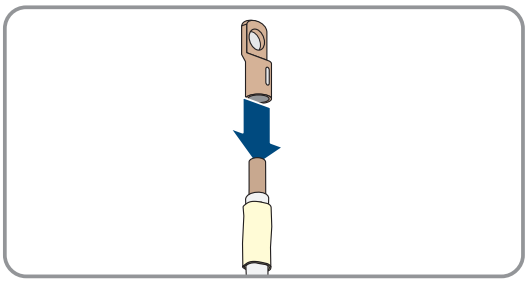
8.6.7 Crimping of Ring Terminal Lug

⚠ QUALIFIED PERSON

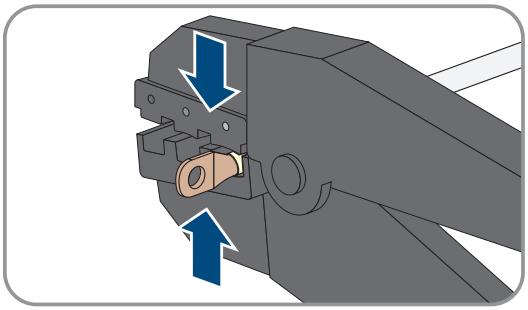
1. Pull the heat-shrink tubing over the conductor. The heat-shrink tubing must be below the stripped conductor section.



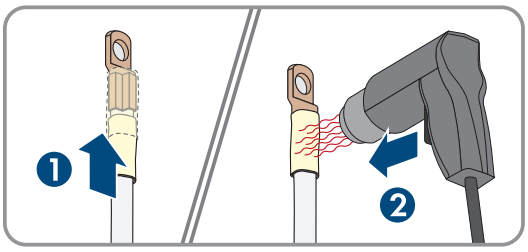
2. Plug the terminal lug onto the conductor.



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



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



8.7 Connecting the Battery Cabinet

8.7.1 Overview of the Cable Routing with the Indoor Version of the Battery Cabinet

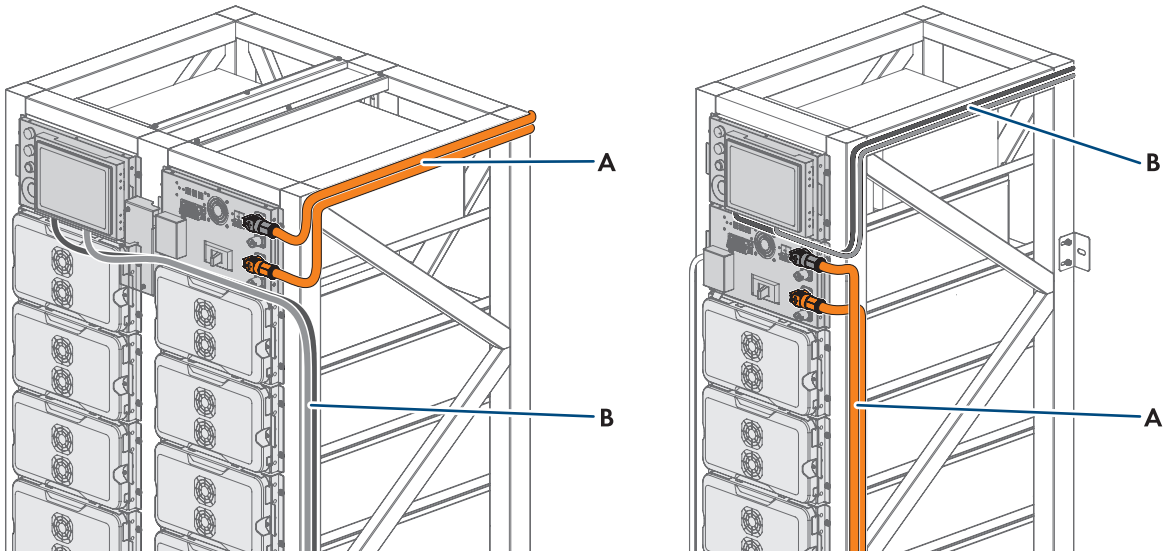


Figure 33: Example of the separated cable routing with the indoor version

Position	Designation
A	DC cables affixed to the battery frame with cable ties
B	AC cable and communication cable affixed to the battery frame with cable ties

8.7.2 Earthing the battery cabinet

⚠ QUALIFIED PERSON

⚠ DANGER

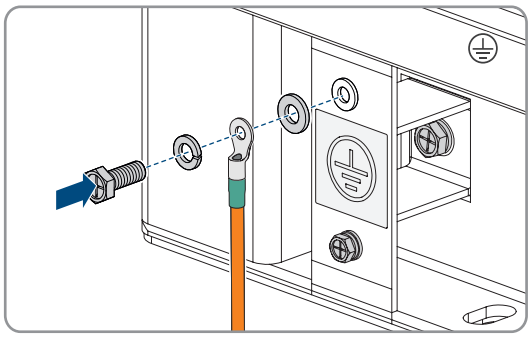
Danger to life due to electric shock due to touching live components or cables with insufficient or no grounding

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.

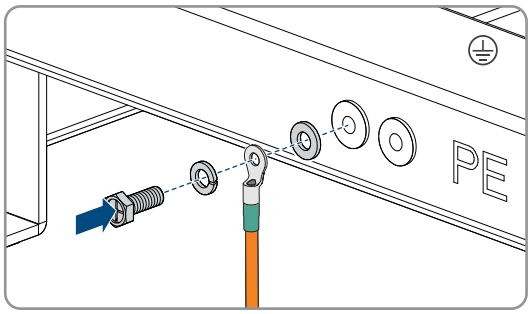
- Earth the battery cabinet.

Procedure:

1. Outdoor version: Connect the supplied grounding cable to the battery cabinet grounding point (hexagon socket, AF13, tightening torque: 8 Nm). The grounding point is located on the lower battery frame.



2. Indoor version: Connect the supplied grounding cable to the battery cabinet grounding point (hexagon socket, AF13, tightening torque: 8 Nm). The grounding point is located on the lower battery frame.



8.7.3 Connection Area of the High-Voltage Box

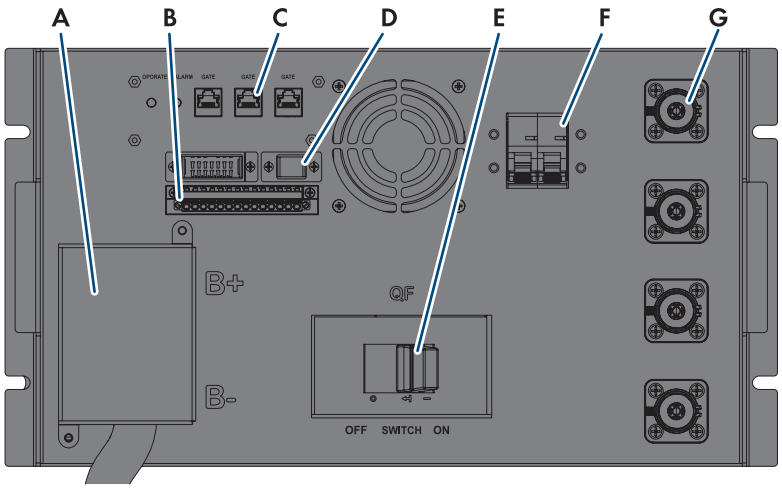


Figure 34: Connections on the high-voltage box

Position	Designation
A	**B -**: DC connection of the battery modules, negative pole (black) **B +**:DC connection of the battery modules, positive pole (red)
B	no function

Position	Designation
C	Outdoor version: no function Indoor version: • **COM0, LAN**: no function • **COM1**: A terminator is preinstalled. If there are at least two secondary battery cabinets, the terminator on the first and second secondary battery cabinets must be replaced by a CAN connection. • The CAN communication between multiple battery cabinets is connected in part behind the control panel (**COM2**). • The CAN communication to the inverter is connected behind the control panel (**INV**).
D	no function
E	**QF**: High-voltage box ON/OFF switch
F	**QFx**: Circuit breaker
G	Indoor version: • **P1 +**: DC connection to the inverter or to the DC Combiner Box for the positive pole (red) • **P1 -**: DC connection to the inverter or to the DC Combiner Box for the negative pole (black) Outdoor version: Not relevant for the installation

8.7.4 Connection area of the outdoor battery cabinet

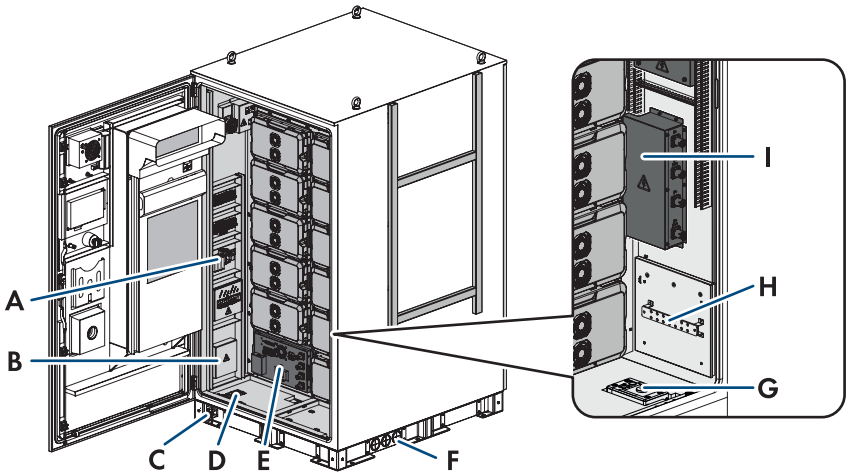


Figure 35: Connection area of the battery cabinet

Position	Designation
A	**SPD1 (IN)**: CAN communication of the battery cabinet to the inverter **SPD2 (IN)**: A terminator is preinstalled. When using secondary battery cabinets, the terminator is replaced by the CAN communication to the preceding battery cabinet. The terminator remains on the primary battery cabinet. **SPD3 (IN)**: CAN communication of the battery cabinet to the next battery cabinet. When using multiple battery cabinets, the a terminator must be plugged into the last secondary battery cabinet.

Position	Designation
B	**L, N**: Electricity supply
C	Grounding point
D	Openings with cable glands in the base of the battery cabinet, AC side and for condensate hose
E	Panel for the enclosure opening in the mounting frame of the battery cabinet
F	Openings with cable glands in the base of the battery cabinet, DC side
G	Cable support rail
H	**P +**: DC connection for the positive pole of the inverter or additional battery cabinets **P -**: DC connection for the negative pole of the inverter or additional battery cabinets
	High-voltage box (see Section 8.7.3 "Connection Area of the High-Voltage Box", page 87)

8.7.5 AC Connection

8.7.5.1 Connecting the AC Cable of the Indoor Version of the Battery Cabinet

⚠ QUALIFIED PERSON

Requirements:

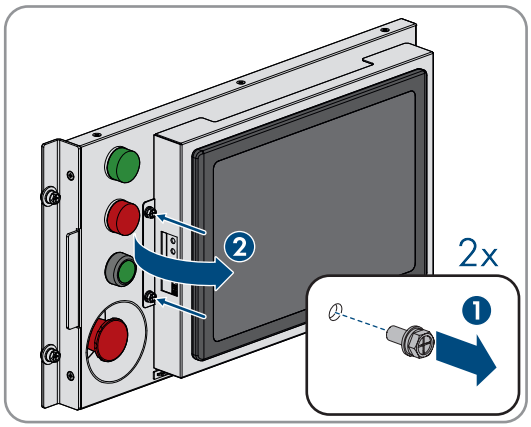
☐ The AC and DC cables must be laid separately.

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

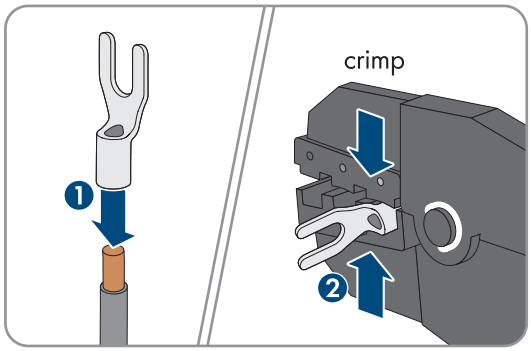
☐ AC cable and spade terminals in accordance with the cable requirements.

Procedure:

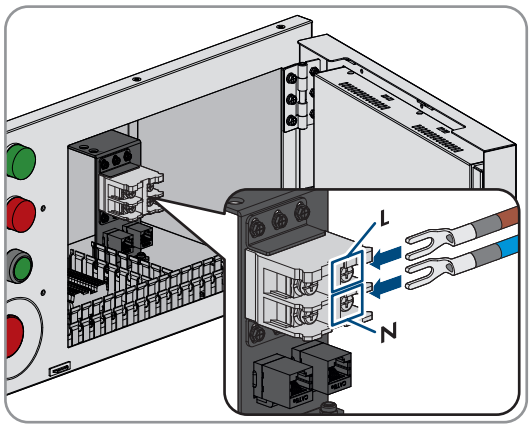
1. Ensure that the AC miniature circuit breaker is switched off and that it cannot be reconnected.
2. Remove the two screws (PH3) on the left-hand side of the control panel and open the display to the right.
3. Route the cable along the cable lugs on the battery cabinet up to the control panel.
4. Shorten the cable if necessary.
5. Dismantle the cable.
6. Strip 30 mm of the insulation off of L and N.
7. Remove any cable remnants.



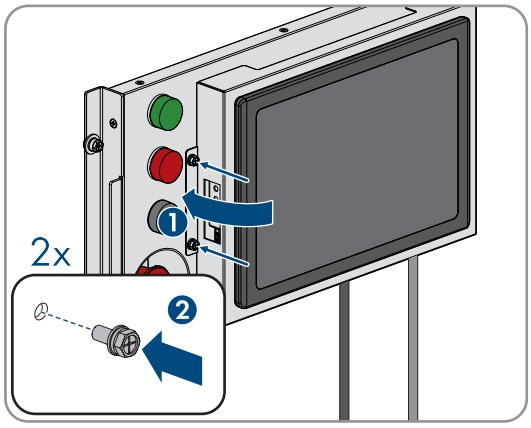
8. Crimp the AC cable with a spade terminal.



9. Connect N and L to the terminal in the control panel as labeled. To do so, position each conductor as far as they will go into the corresponding terminal and tighten the screw on the terminal (PH3, tightening torque 6 Nm).
10. Ensure that the correct conductors are assigned to the terminals.
11. Ensure that all conductors are securely in place.
12. Close the display. When doing so, route the cable through the slot at the bottom of the display.



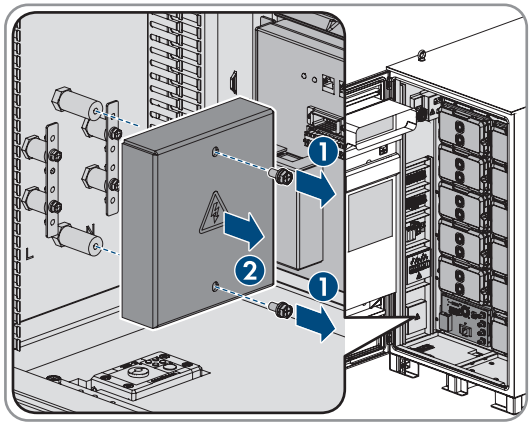
13. Attach the display using the 2 screws (tightening torque 2.5 Nm).



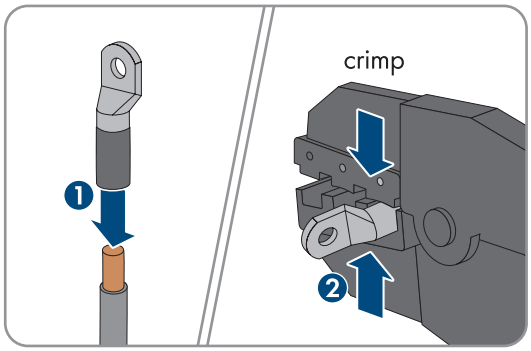
8.7.5.2 Connecting the AC Cable of the Outdoor Version of the Battery Cabinet

⚠ QUALIFIED PERSON

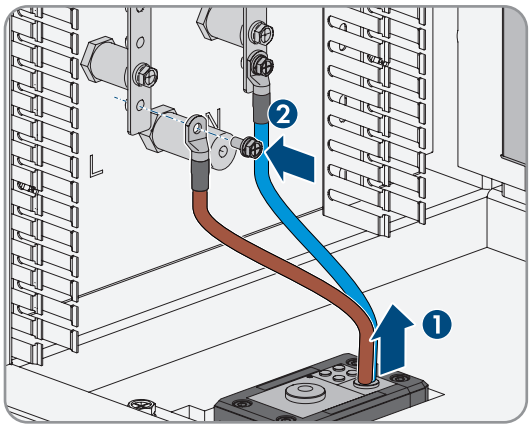
1. Ensure that the AC miniature circuit breaker is switched off and that it cannot be reconnected.
2. Remove the cover of the AC connection area.
3. Route the AC cables through the cable gland at the bottom into the battery cabinet. To do this, it may be necessary to loosen the cable gland.
4. Dismantle the AC cables.



5. Crimp the AC cables with ring terminal lugs (see Section 8.6.7 "Crimping of Ring Terminal Lug", page 85).
6. Remove any cable remnants from the product.
7. 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.



8. Attach L and N to the connection rails in accordance with the labeling using M6 hexagon head bolts (tightening torque 5 Nm).
9. Ensure that all conductors are securely in place.
10. Reattach the cover of the AC connection area.



8.7.6 Connecting the DC Cables

8.7.6.1 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. The direct voltages of the individual battery modules in the battery cabinet 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 connection of the DC lines 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 lines into account. Do not use force when connecting the DC lines.
- Always connect red DC lines to the red DC terminals.
- Always connect black DC lines to the black DC terminals.
- Do not operate damaged battery cabinets. Contact SMA Service immediately.

Securing the DC connections via locking mechanism

The DC cables for connection to the battery cabinet are fitted with connectors with a locking mechanism.

- The connectors must always audibly lock into the sockets of the DC connections.

Also see:

- Connecting the DC cables to the inverter or to the DC Combiner Box on the indoor version ⇒ page 92

8.7.6.2 Overview of the DC Cables on the Outdoor Version

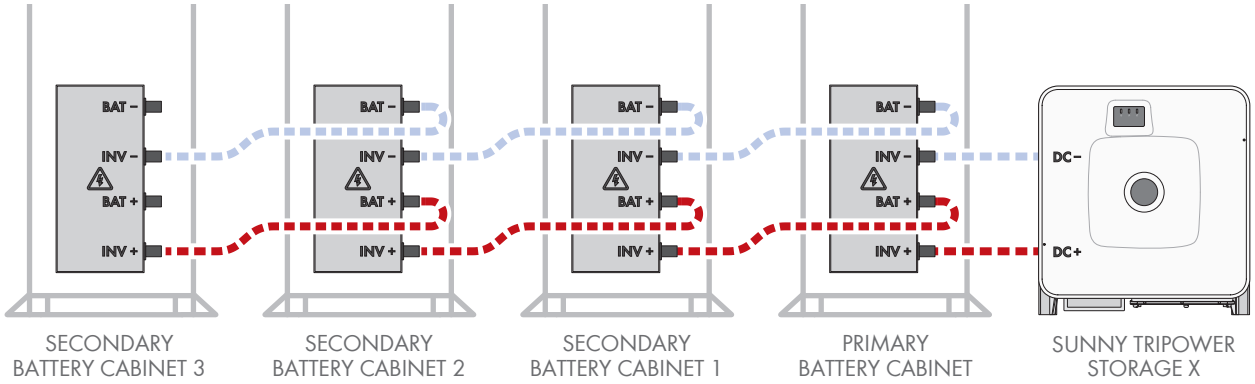


Figure 36: Connection of the DC cables using the example of a system with one primary battery cabinet and three secondary battery cabinets

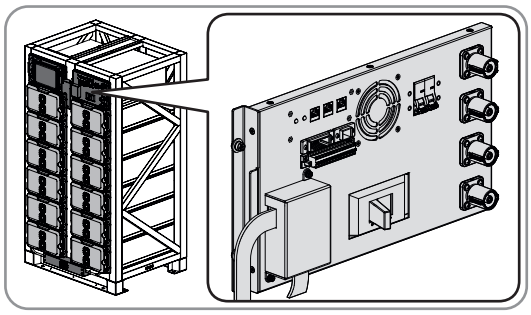
8.7.6.3 Connecting the DC cables to the inverter or to the DC Combiner Box on the indoor version

⚠ QUALIFIED PERSON

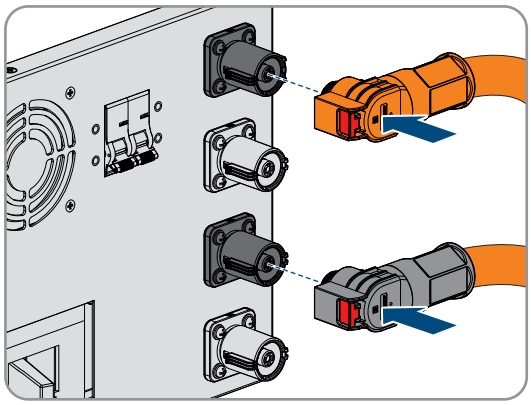
Use the cables included in the delivery. Secure the connectors on every connection via the locking mechanism. Route the DC cables separately from other cables.

Procedure:

1. Route the DC cables along the frame of the battery cabinet to the high-voltage box and secure them to the frame using the cable ties included in the scope of delivery.



2. Connect the DC cable with orange connector to **P1+** (inverter) or **P2+** (DC Combiner Box) of the battery cabinet.
3. Connect the DC cable with black connector to **P1-** (inverter) or **P2-** (DC Combiner Box) of the battery cabinet.



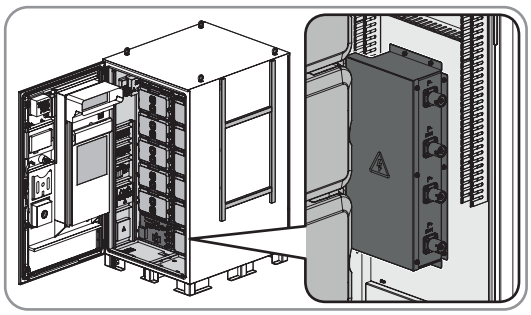
8.7.6.4 Connecting the DC cables to the inverter or to additional battery cabinets of the outdoor version

⚠ QUALIFIED PERSON

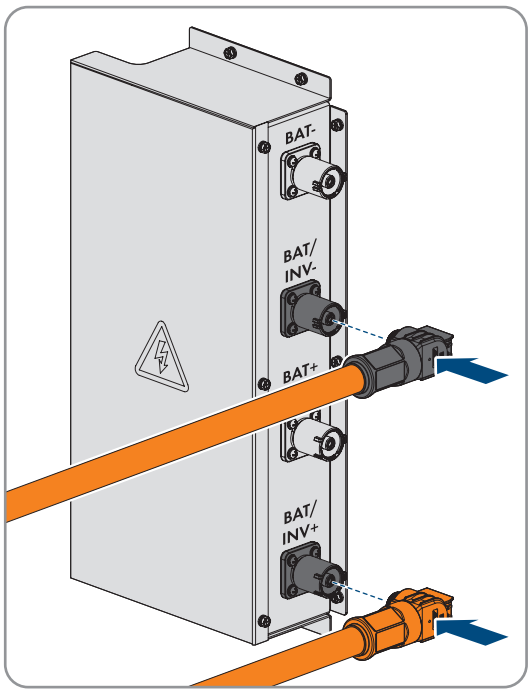
Use the cables included in the delivery. Secure the connectors on every connection via the locking mechanism. Route the DC cables separately from other cables. Connect the battery cabinets in series.

Procedure:

1. Ensure that the battery is de-energized.
2. Route the DC cables through the panel and through the right-hand cable gland into the battery cabinet.
3. In the battery cabinet, route the cables to the connection sockets. When doing so, secure the cables using the cable clips present.



4. On the primary battery cabinet, connect the DC line to the **BAT/ INV+** terminal on the inverter using the orange connector.
5. On the primary battery cabinet, connect the DC line to the **BAT/ INV-** terminal on the inverter using the black connector.
6. With multiple battery cabinets: Connect the DC cable to **BAT+** facing the direction of next battery cabinet using the orange connector. Connect the DC cable to **INV+** on the next secondary battery cabinet.
7. With multiple battery cabinets: Connect the DC cable to **BAT-** facing the direction of the next battery cabinet using the black connector. Connect the DC cable to **INV-** on the next secondary battery cabinet.
8. With multiple battery cabinets: Repeat the above steps for all secondary battery cabinets.

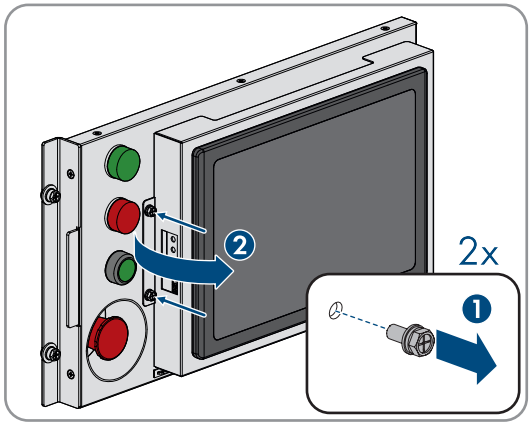


8.7.7 Communication Connection

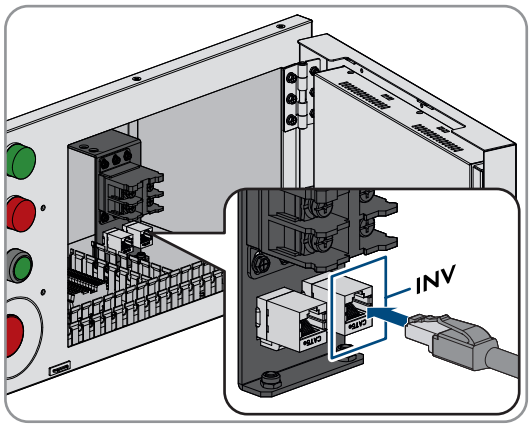
8.7.7.1 Connecting the battery communication system of the indoor version to the inverter

⚠ QUALIFIED PERSON

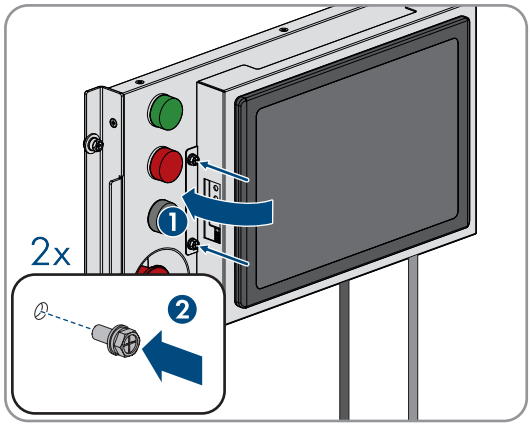
1. Remove the two screws on the left-hand side of the control panel and open the display to the right.
2. Route the communication cable along the frame of the primary battery cabinet and secure it to the frame using the cable ties included in the scope of delivery. Here, it must be possible to route the cable through the slot at the bottom of the display.



3. Plug the cable into the CAN connection **INV**.
4. Close the display. When doing so, make sure that each cable is in the slot at the bottom of the display and is not pinched.



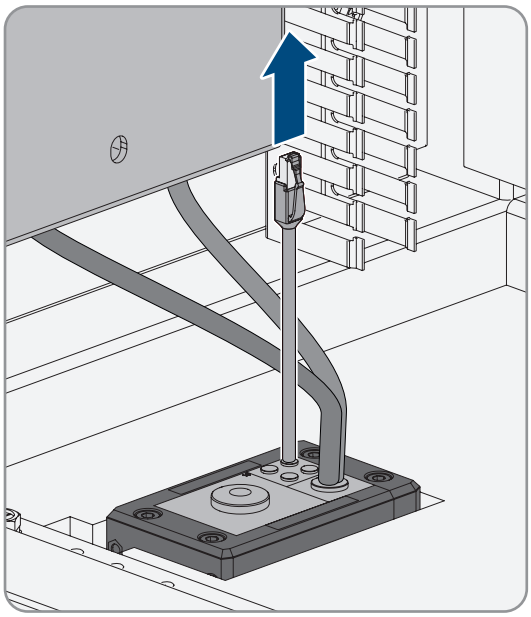
5. Attach the display using the 2 screws (tightening torque 2.5 Nm).



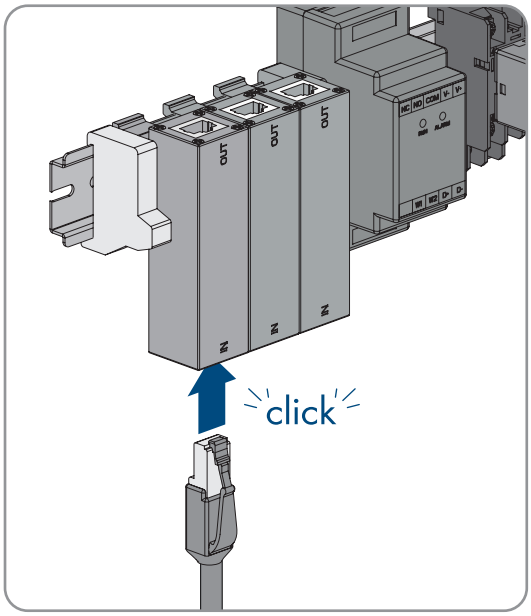
8.7.7.2 Connecting the battery communication system of the outdoor version to the inverter

⚠ QUALIFIED PERSON

1. Rout the CAN communication cable from the inverter through the cable panel on the mounting frame and through the left-hand cable gland into the battery cabinet.



2. Connect the CAN communication cable to the **SPD1 IN** socket in the battery cabinet. In systems with more than one battery cabinet, always use the connection in the primary battery cabinet.



8.7.7.3 Overview of the CAN Communication System

In addition to the connections shown here, further steps must be observed when connecting the CAN communication.

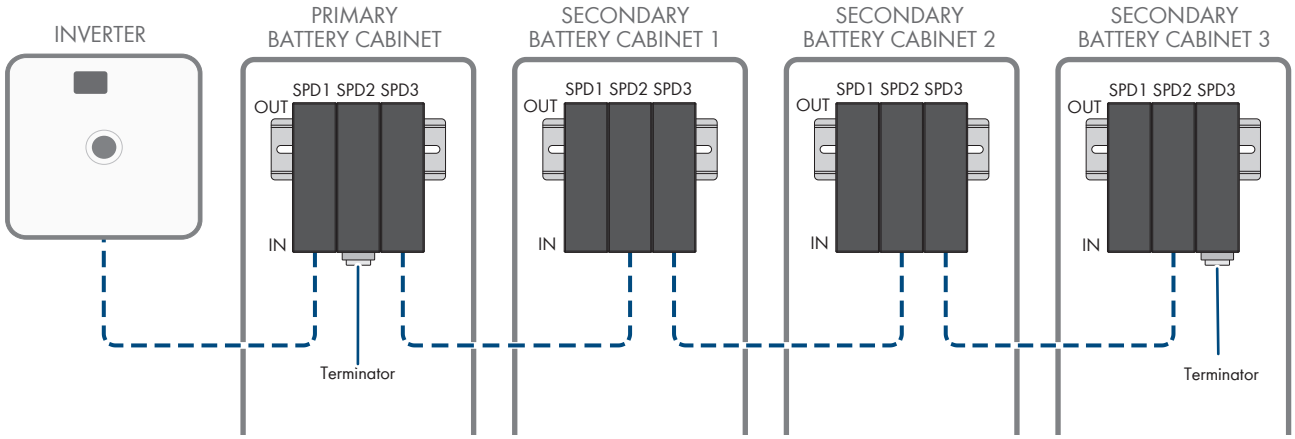


Figure 37: Design of the CAN communication system of the outdoor version using the example of a system with one primary battery cabinet and three secondary battery cabinets

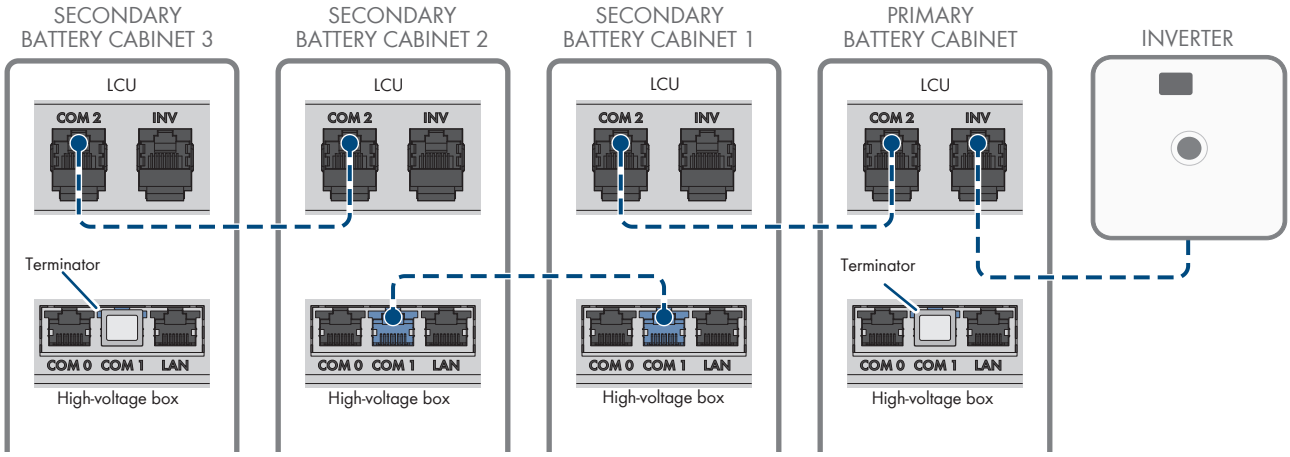


Figure 38: Design of the CAN communication system of the indoor version using the example of a system with one primary battery cabinet and three secondary battery cabinets

Also see:

- Connecting the CAN communication between the battery cabinets of the indoor version ⇒ page 96
- Connecting the CAN communication between the battery cabinets of the outdoor version ⇒ page 98

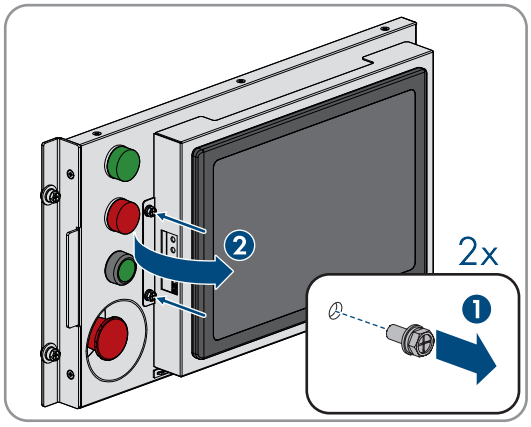
8.7.7.4 Connecting the CAN communication between the battery cabinets of the indoor version

⚠ QUALIFIED PERSON

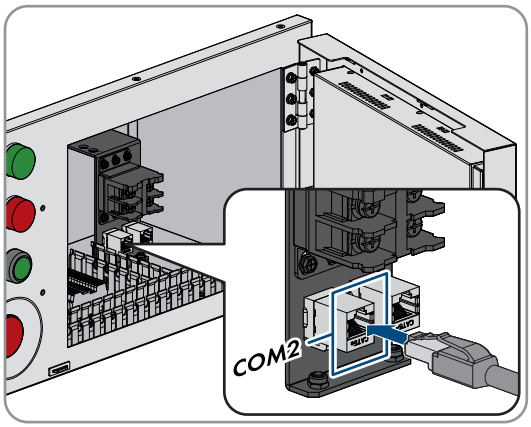
One inverter can have up to four battery cabinets connected to it. For systems with more than one battery cabinet, the battery cabinets must be connected to each other in series via a CAN communication bus.

Procedure:

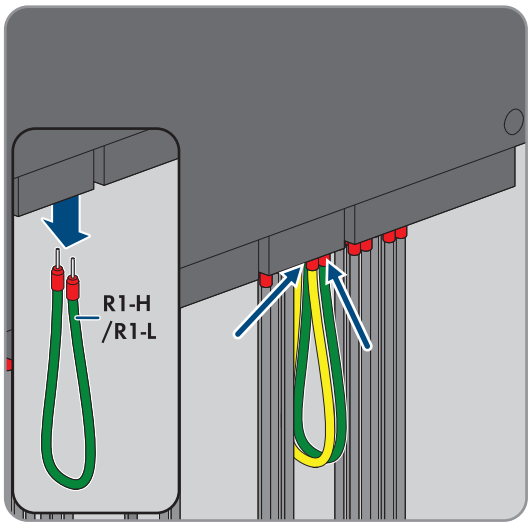
1. Check that the preinstalled terminator is plugged into **COM1** on the primary battery cabinet.
2. To access the connections behind the control panel in the following steps, loosen the two screws on the respective control panel and swing open the display to the right.



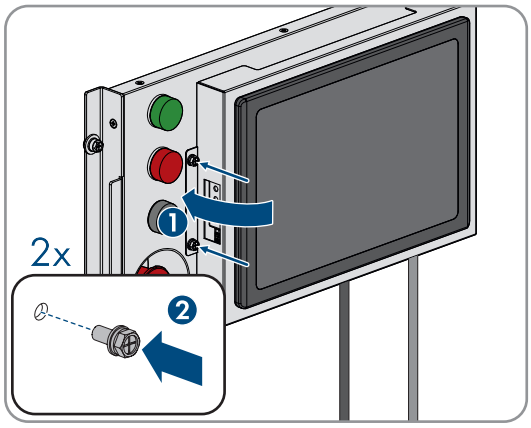
3. Connect the primary battery cabinet and the first secondary battery cabinet via the **COM2** terminal behind the control panel using a communication cable.
4. Connect the first and second secondary battery cabinets via the **COM1** terminal on the high-voltage box using a communication cable (see Section 8.7.3 "Connection Area of the High-Voltage Box", page 87). Remove the terminators present.
5. Connect the second and third secondary battery cabinet via the **COM2** terminal behind the control panel using a communication cable.
6. Plug a terminator into the last secondary battery cabinet.
   - ☑ With two secondary battery cabinets: Terminator in **COM2** behind the control panel.
   - ☑ With one or three secondary battery cabinets: Terminator in **COM1** on the high-voltage box.



7. Disconnect the insulated conductors **R1-H** and **R1-L** behind the display of each battery cabinet and remove the cable.



8. Close the open displays. When doing so, make sure that the cables are in the slot on the display and are not pinched. Lay the communication cables separately from the DC lines.
9. Attach the displays using 2 screws for each (tightening torque: 2.5 Nm).



Also see:

- Overview of the CAN Communication System ⇒ page 96

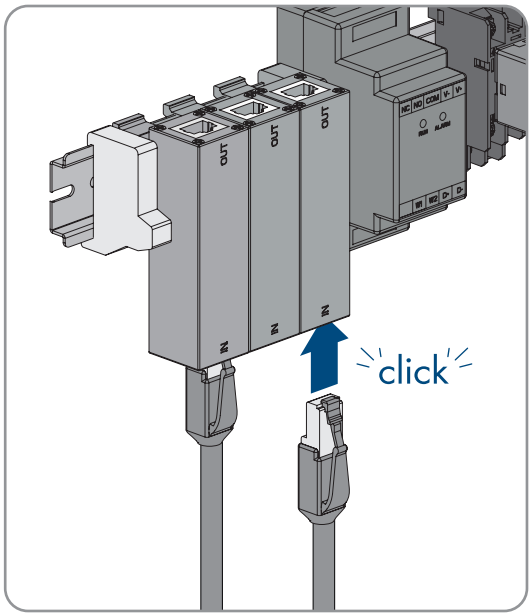
8.7.7.5 Connecting the CAN communication between the battery cabinets of the outdoor version

⚠ QUALIFIED PERSON

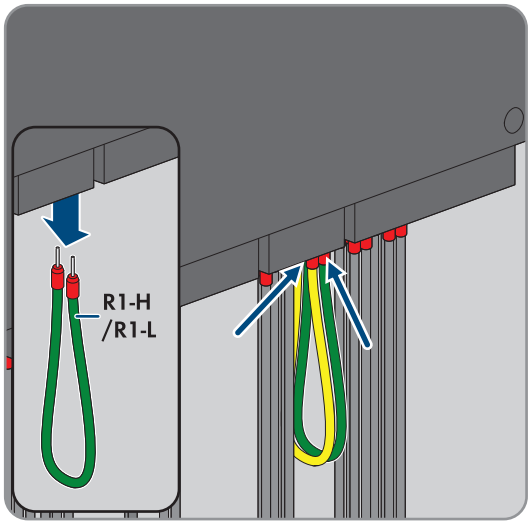
One inverter can have up to four battery cabinets connected to it. For systems with more than one battery cabinet, the battery cabinets must be connected to each other in series via a CAN communication bus.

Procedure:

1. Check that the preinstalled terminator is plugged into **SPD2 (IN)** on the primary battery cabinet.
2. Plug one end of the communication cable into **SPD3 (IN)** on the primary battery cabinet.
3. Plug the other end of the communication cable into **SPD2 (IN)** on the first secondary battery cabinet.
4. Connect the remaining battery cabinets from **SPD3 (IN)** to **SPD2 (IN)** using a communication cable.
   - ☑ **SPD3 (IN):** Connection to the next battery cabinet
   - ☑ **SPD2 (IN):** Connection to the preceding battery cabinet



5. Plug a terminator into **SPD3 (IN)** on the last secondary battery cabinet.
6. Disconnect the insulated conductors **R1-H** and **R1-L** behind the display of each battery cabinet and remove the cable.



Also see:

- Overview of the CAN Communication System ⇒ page 96

8.7.8 Connecting the DC Distributor

8.7.8.1 Connection Area of the DC Distributor

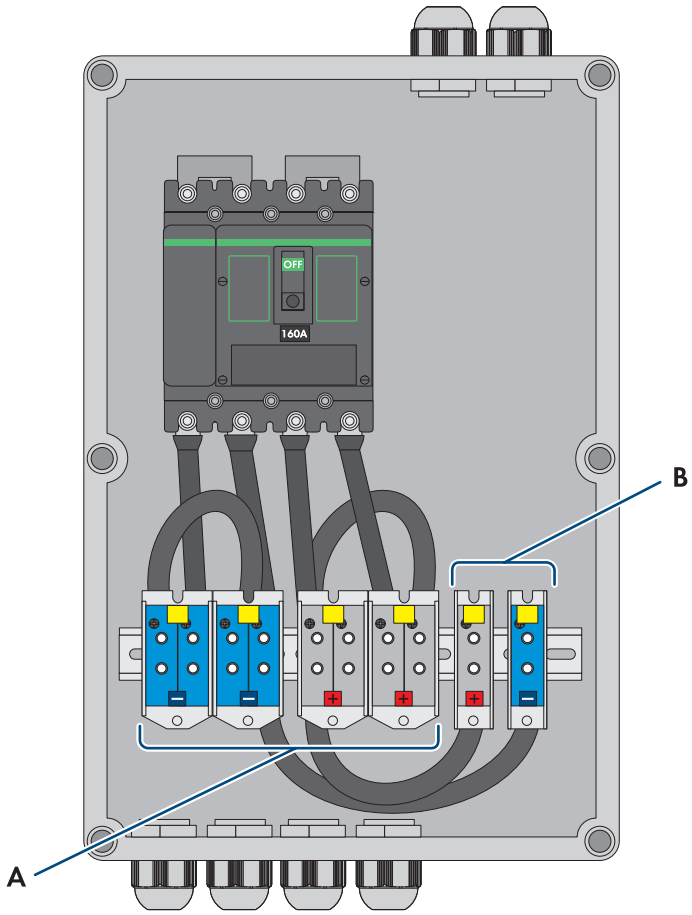


Figure 39: Overview of the connection area

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+

8.7.8.2 Connecting the DC Distributor

The DC distributor including circuit breaker acts as fuse protection for the battery system only in systems with more than one battery cabinet. The DC distributor and the required connection cables must be ordered separately.

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

- 2 insulated bootlace ferrules (50 mm²)

Procedure:

1. Disconnect the inverter from voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. Disconnect the battery from voltage sources (see Section 11 "Disconnecting from voltage sources", page 118).

3. Thread the supplied DC lines from the battery cabinets and the DC lines from the battery inverter through the cable glands provided on the bottom of the DC distributor.
4. If the DC lines are too long, shorten them. When doing so, ensure that the DC cables to all battery cabinets are the same length.
5. Dismantle the DC lines and strip off the insulation.
6. Fit the DC conductors with bootlace ferrules.
7. Remove any cable remnants from the DC distributor.
8. Connect the DC lines from the battery cabinets to screw terminals X3 and X4. Ensure correct polarity.
9. Connect the DC lines from the battery inverter to screw terminals X5 and X6. Ensure correct polarity.
10. Tighten the cable glands of all DC lines (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:

- Connection Area of the DC Distributor ⇒ page 100

9 Commissioning

9.1 Procedure for commissioning as System Manager

This section describes the procedure for commissioning the SMA Storage XL Package with a Sunny Tripower Storage X as System 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.	CMV Measurement
2.	Check that all installed components have been correctly mounted and connected.	Checking the Mounting and Connection Work
3.	Commission all SMA Speedwire devices that are to be subordinate to the System Manager (e.g., energy meters, inverters).	Manuals for the devices
4.	Commission the battery. Here, a distinction is made between a single battery cabinet and multiple battery cabinets.	Section 9.3, page 104
5.	Commission the inverter that is to be configured as the System Manager.	Section 9.5, page 114
6.	Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: • Connection in the local network • Connection via Wi-Fi	Connecting to the Inverter User Interface
7.	If required, change the network configuration on the welcome page.	Commissioning wizard
8.	Carry out the configuration using the commissioning wizard. Select inverter as **System Manager** in the device configuration.	Commissioning Assistant
9.	Make further settings if necessary: • Administrator registration • Device configuration (device name, device function) • Adding devices (e.g., energy meter, PV inverter) • Country standard • Meter at the point of interconnection • Battery configuration • Energy management • grid management services • Digital input	Section 10, page 116
10.	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

Also see:

- Commissioning an Individual Battery Cabinet ⇒ page 108

9.2 Procedure for commissioning as a subordinate device

This section describes the procedure for commissioning the SMA Storage XL Package with a Sunny Tripower Storage X as a subordinate device.

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.	CMV Measurement
2.	Check that all installed components have been correctly mounted and connected.	Checking the Mounting and Connection Work
3.	Commission the battery. Here, a distinction is made between a single battery cabinet and multiple battery cabinets.	Section 9.3, page 104
4.	Commission the inverter.	Section 9.5, page 114
5.	Establish a connection to the user interface of the inverter. There are various connection options to choose from for this: • Connection in the local network • Connection via Wi-Fi	Connecting to the Inverter User Interface
6.	If required, change the network configuration on the welcome page.	Commissioning Assistant
7.	Carry out the configuration using the commissioning wizard. When doing so, select inverter as **Subordinate device** in the device configuration.	Commissioning Assistant
8.	Register the inverter as an SMA Speedwire device in the System Manager.	Commissioning Assistant of the System Manager
9.	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

Also see:

- Commissioning an Individual Battery Cabinet ⇒ page 108

9.3 Commissioning the Battery

9.3.1 Safety when Commissioning the Battery

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

⚠ WARNING

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

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

- Put the battery into operation within the specified time limits.
- If the battery is not put into operation within the specified time limits, contact Service to request recyclization of the battery-storage system.
- Before commissioning the system, verify that the battery is not deeply discharged.
- Do not commission the system if the battery is deeply discharged.
- If the battery is deeply discharged, contact Service.

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 in accordance with the specifications in this manual only.
- Make all electrical connections on the battery 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.

9.3.2 Commissioning procedure for a single battery cabinet

This section describes the procedure for commissioning the SMA Storage XL with one battery cabinet. It provides an overview of the steps, which must be performed in the prescribed sequence.

Procedure		See
1.	Check that the installation and electrical connection work have been completed.	Section 9.4, page 113
2.	Commission the battery.	Section 9.3.6, page 108

9.3.3 Commissioning procedure for multiple battery cabinets

This section describes the procedure for commissioning the SMA Storage XL with multiple battery cabinets. It provides an overview of the steps, which must be performed in the prescribed sequence.

Procedure		See
1.	Check that only the installation and grounding of the battery cabinet has been completed so far: • The battery cabinet is installed. • The grounding is connected. • No other electrical connections (AC, DC, CAN) have been established. Otherwise, disconnect all connections apart from the grounding.	Section 9.4, page 113
2.	Configure all secondary battery cabinets.	Section 9.3.8, page 109
3.	Configure the primary battery cabinet.	Section 9.3.9, page 110
4.	Establish all electrical connections.	Section 8, page 69
5.	Commission the battery.	Section 9.3.10, page 112

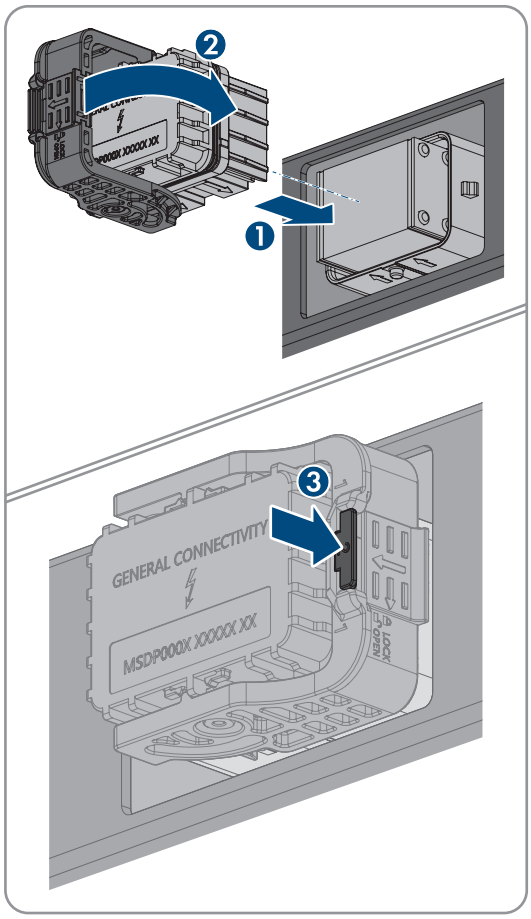
Also see:

- Communication Connection ⇒ page 94

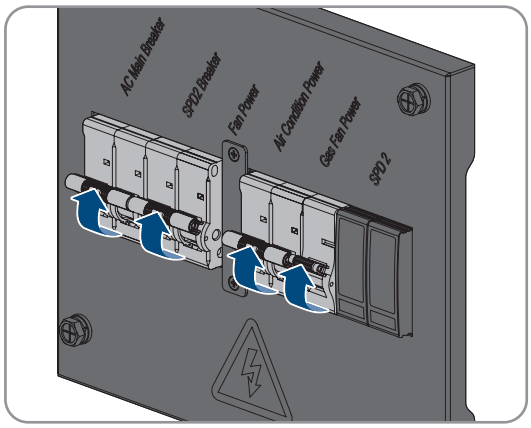
9.3.4 Switching the battery cabinet on

⚠ QUALIFIED PERSON

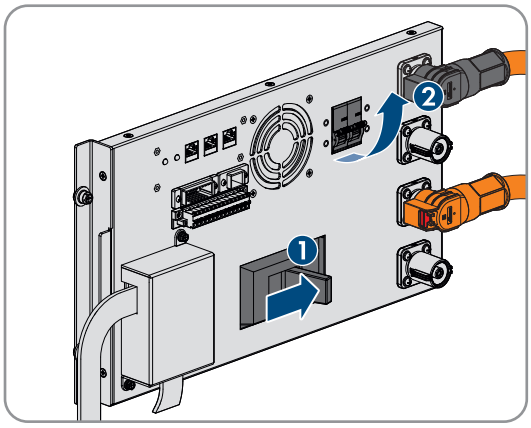
1. Insert the DC circuit breaker from the scope of delivery into the designated base. When doing so, ensure that the handle of the DC circuit breaker is in the open position.
2. Close the handle until it snaps securely into place.
3. Press the locking mechanism on the handle downward until it clicks into place.



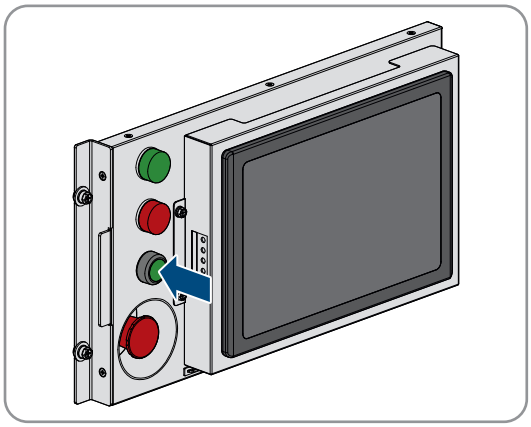
4. Outdoor version: Switch on the circuit breakers on the inside left (**AC Main Breaker**, **SPD2 Breaker**, **Air Condition Power**, **Gas Fan Power**).



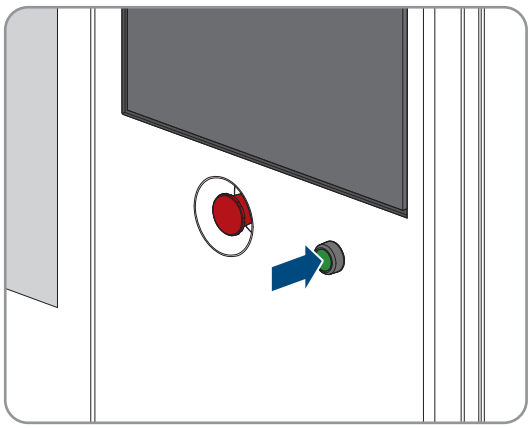
5. Switch on the **QF**, **QF1** and **QF2** circuit breakers on the high-voltage box. The switch extension included in the scope of delivery can be used for operating **QF** more easily.



6. Indoor version: Press and hold the On/Off button to the left of the display for 3 seconds.



7. Outdoor version: Press and hold the On/Off button below the display for 3 seconds.



Also see:

- Switching the Inverter On ⇒ page 114

9.3.5 CMV Measurement

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

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 Storage XL Package battery systems with more than four Sunny Tripower Storage X inverters are to be commissioned.

9.3.6 Commissioning an Individual Battery Cabinet

⚠ QUALIFIED PERSON

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 energy meter has been correctly mounted and connected (see manual for the energy meter).

Procedure:

1. If the battery is not commissioned within 18 months of manufacture or cyclization, request recyclization of the battery storage system. Contact the Service.
2. If a SMA Data Manager is available, activate the SMA Data Manager (see manual for the SMA Data Manager).
3. Switch the battery cabinet on (see Section 9.3.4 "Switching the battery cabinet on", page 106).
4. Outdoor version: Close the battery cabinet.
5. Check the status in the control panel.

Also see:

- Communication Connection ⇒ page 94
- Switching the Inverter On ⇒ page 114

9.3.7 Setting options for the parallel operation of multiple battery cabinets

Up to four battery cabinets can be connected to one inverter. For systems with more than 1 battery cabinet, use as a secondary battery cabinet (server) must be set on the control panel for each battery cabinet. In the default setting, all battery cabinets are set as the primary battery cabinet (client). The server/client setting is located on the battery cabinet's control panel in the menu **SMA Storage XL** > **Communication** > **bsmu**:

- Primary battery cabinet (client): **Status** = **Enabled**
- Secondary battery cabinet (server): **Status** = **Disabled**

The address must be set on each secondary battery cabinet. The addresses must be unique and consecutive. Address 80 is set as standard, which is used for the primary battery cabinet. This means that addresses for further battery cabinets are:

- 81: first secondary battery cabinet
- 82: second secondary battery cabinet
- 83: third secondary battery cabinet

The address setting is located in the menu **SMA Storage XL** > **Communication** > **bcmu**. Under the parameter **prot change**, click on **Modify** and enter the address under **slave_id**.

The number of battery cabinets must be set on the primary battery cabinet. This setting is located in the menu **Home** > **Battery Status Overview** > **Setting**. The number of battery cabinets (2 to 4) must be set in the parameter **Cluster Num.**. The number takes all battery cabinets into account. If there are three secondary battery cabinets, the number 4 must be selected as the quantity together with the primary battery cabinet.

9.3.8 Configuring secondary battery cabinets

⚠ QUALIFIED PERSON

First set all battery cabinets individually

Connecting the AC cables, DC cables, and CAN communication can lead to unforeseen disturbances if the battery cabinets have not yet been configured correctly.

- Only the grounding connection should be connected before configuring the secondary battery cabinets.
- Switch on, set, and then immediately switch off each battery cabinet individually as described here.
- Only then should you proceed with the electrical connection.

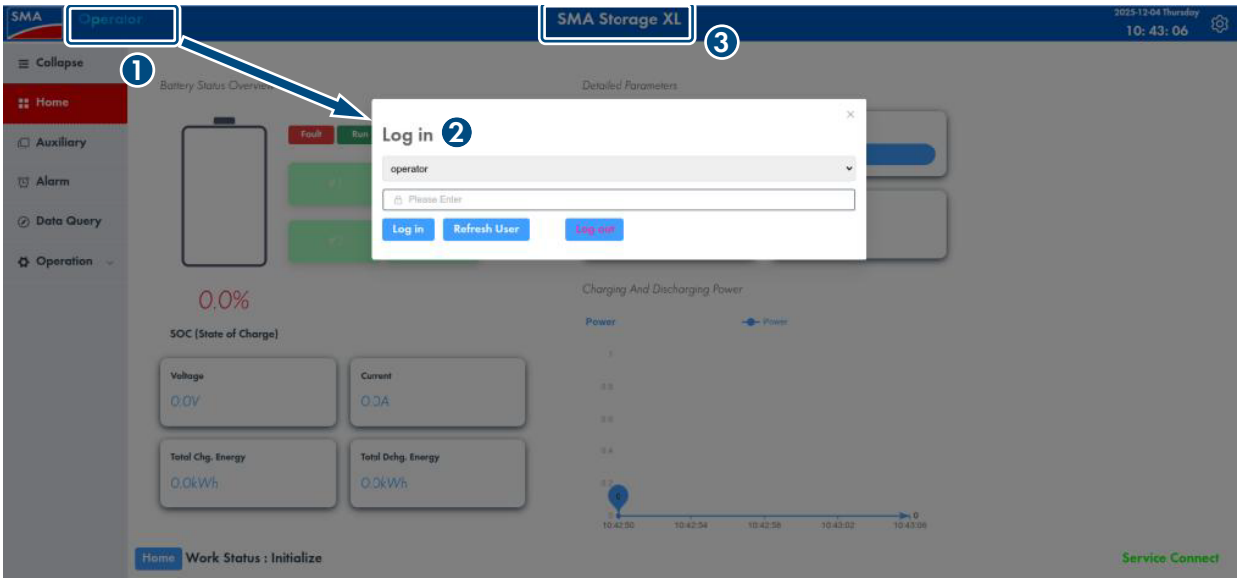
Requirements:

☐ All battery cabinets are switched off.

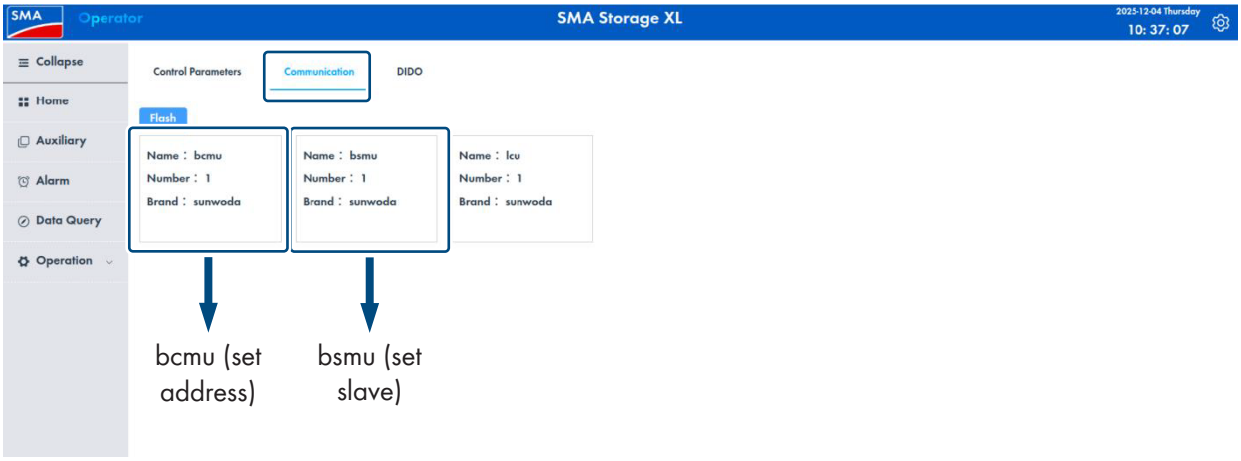
☐ No electrical connections have yet been made on the battery cabinets.

Procedure:

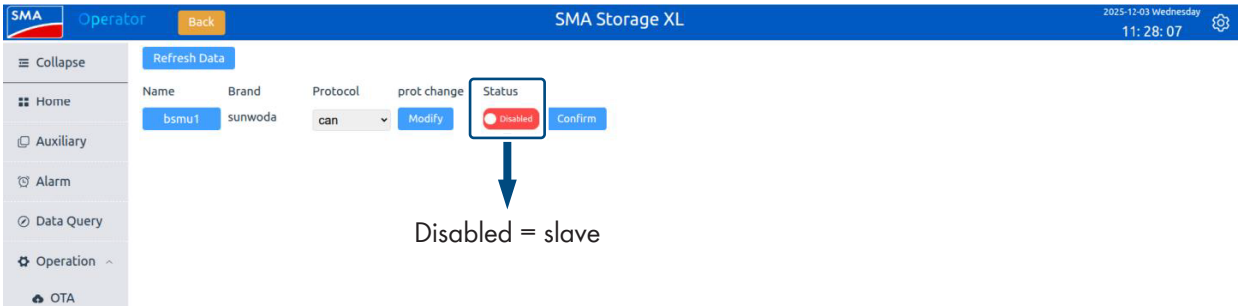
1. Connect the grounding of the secondary battery cabinet.
2. Switch the secondary battery cabinet on (see Section 9.3.4 "Switching the battery cabinet on", page 106).
3. Log into the battery cabinet control panel as **Operator**. Log in is performed by clicking on the username at top left. You will obtain the password from SMA.



4. Click on **SMA Storage XL** at the top of the screen.
5. Navigate to the **Communication** menu.



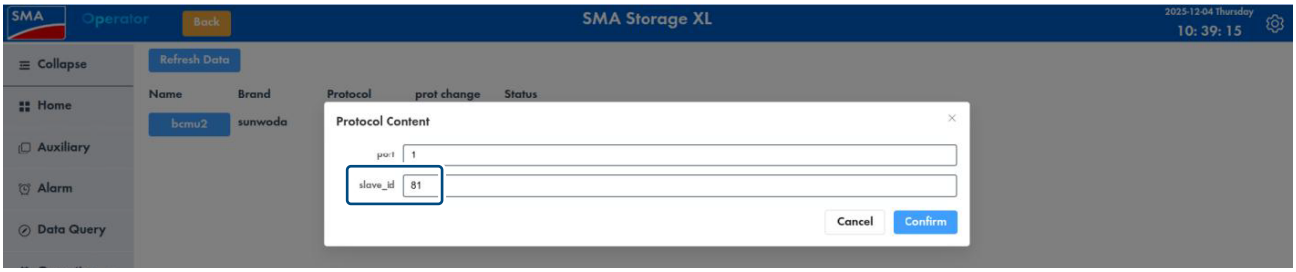
6. Select the **bsmu** button.
7. Set the **Status** parameter to the value **Disabled**.



8. Navigate back to the menu **SMA Storage XL** > **Communication**.
9. Select the **bcmu** button.
10. Under the parameter **prot change**, click on **Modify**.



11. In the new dialog, enter the address of the battery cabinet in the **slave_id** field. The addresses must be unique and consecutive. As standard, the address of the primary battery cabinet is set to 80. This means that the address of the first secondary battery cabinet is 81, that of the second is 82, and that of the third is 83.



12. Confirm the setting.
13. Switch off the battery cabinet.
14. Repeat the procedure for each secondary battery cabinet.

Also see:

- Switching the Inverter On ⇒ page 114
- Commissioning an Individual Battery Cabinet ⇒ page 108

9.3.9 Configuring the primary battery cabinet with multiple battery cabinets

⚠ QUALIFIED PERSON

First set all battery cabinets individually

Connecting the AC cables, DC cables, and CAN communication can lead to unforeseen disturbances if the battery cabinets have not yet been configured correctly.

- Only the grounding connection should be connected before configuring the secondary battery cabinets.
- Switch on, set, and then immediately switch off each battery cabinet individually as described here.
- Only then should you proceed with the electrical connection.

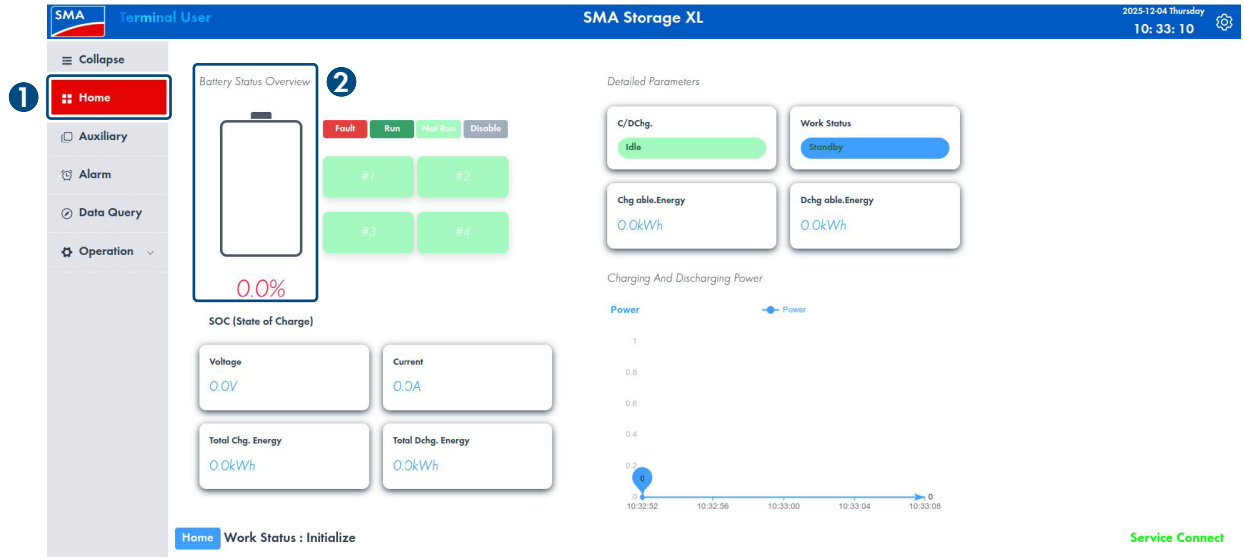
Requirements:

☐ All battery cabinets are switched off.

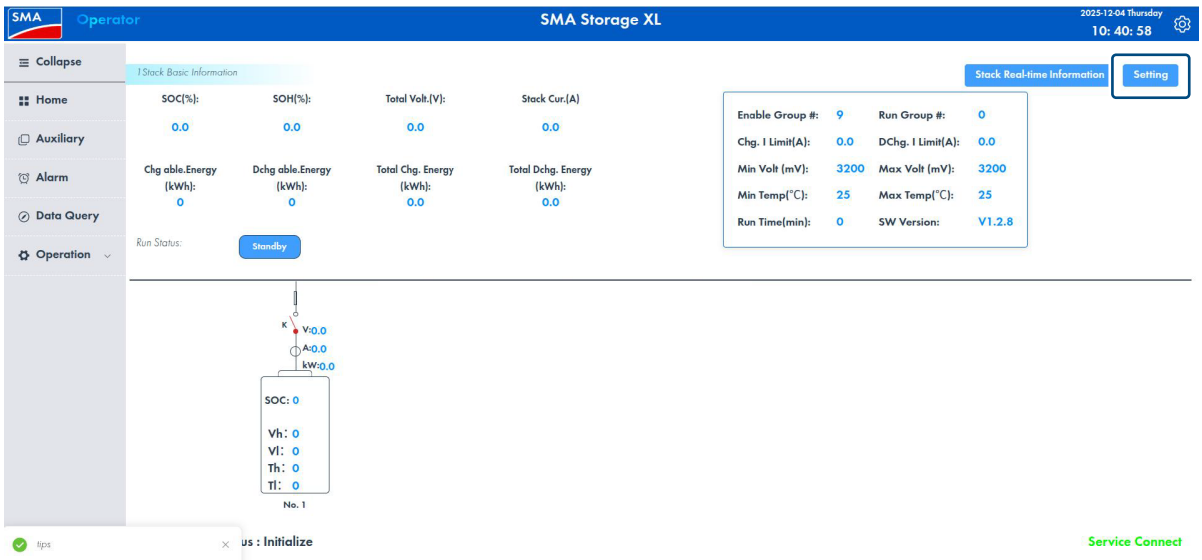
☐ No electrical connections have yet been made on the battery cabinets.

Procedure:

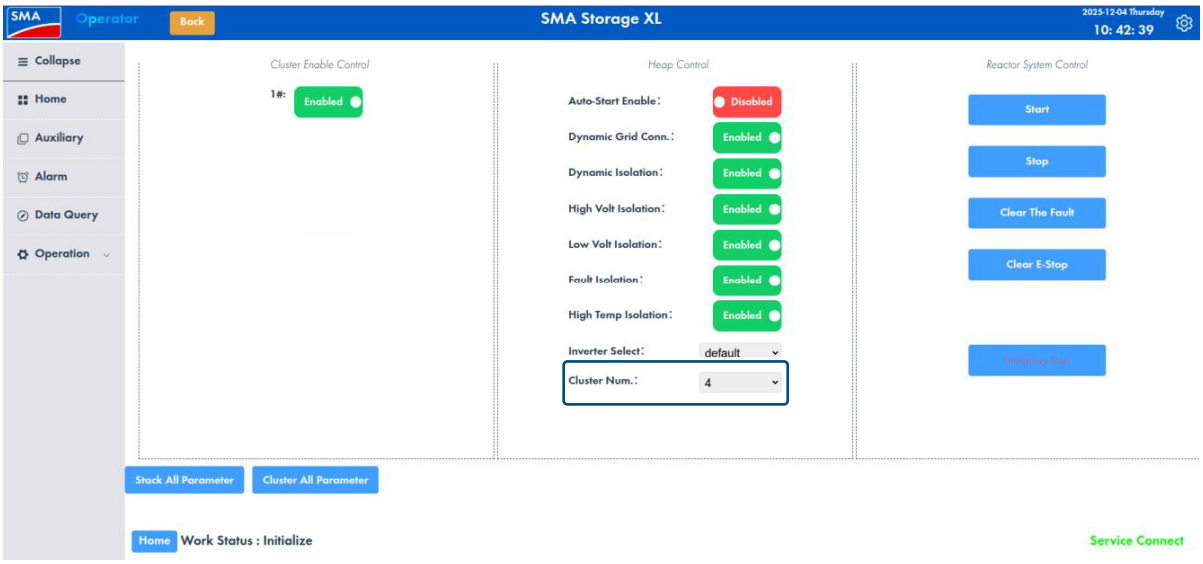
1. Connect the grounding of the primary battery cabinet.
2. Switch on the primary battery cabinet (see Section 9.3.4 "Switching the battery cabinet on", page 106).
3. Outdoor version: Connect the battery cabinets.
4. Log into the primary battery cabinet control panel as **Operator**. Log in is performed by clicking on the username at top left. You will obtain the password from SMA.
5. Select **Home** to the left in the menu ribbon.
6. Click on the image under **Battery Status Overview**.



7. Select the button **Setting**.



8. Select the number of battery cabinets in the parameter **Cluster Num.**.



9. Switch off the primary battery cabinet.

Also see:

- Switching the Inverter On ⇒ page 114
- Commissioning an Individual Battery Cabinet ⇒ page 108
- Communication Connection ⇒ page 94

9.3.10 Commissioning multiple battery cabinets

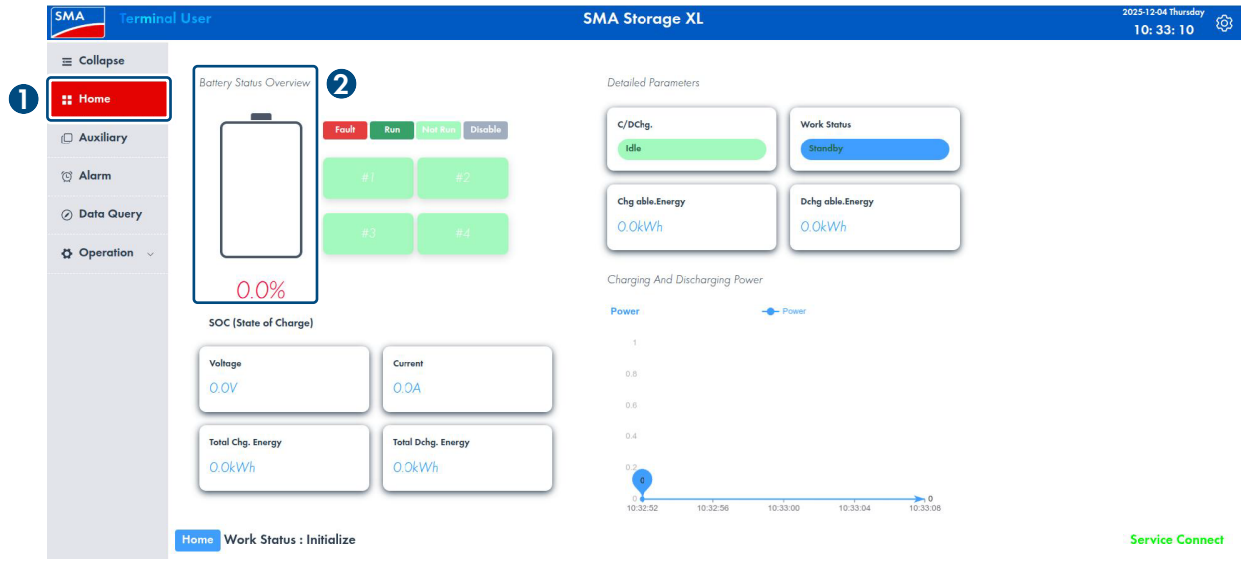
⚠ QUALIFIED PERSON

Requirements:

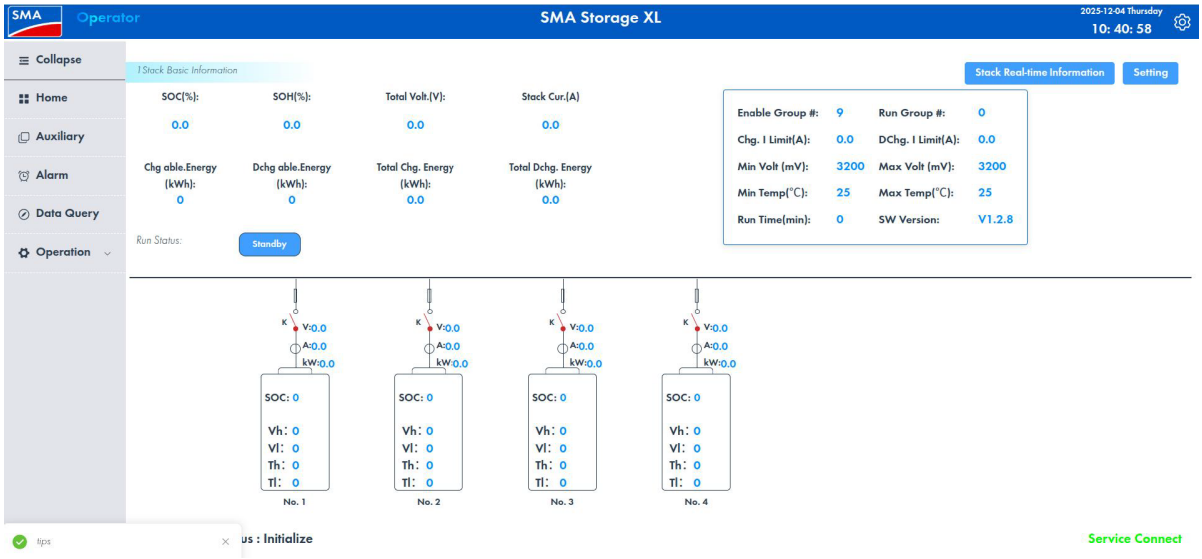
- ☐ The inverter has been correctly mounted and connected.
- ☐ The inverter enclosure cover is securely closed.
- ☐ The battery has been mounted correctly.
- ☐ All secondary battery cabinets have been configured Configuring secondary battery cabinets.
- ☐ The primary battery cabinet has already been configured (see Section 9.3.9 "Configuring the primary battery cabinet with multiple battery cabinets", page 110).
- ☐ The battery has been connected correctly.
- ☐ The inverter has not yet been commissioned.
- ☐ The energy meter has been correctly mounted and connected (see manual for the energy meter).

Procedure:

1. Switch on all battery cabinets (see Section 9.3.4 "Switching the battery cabinet on", page 106).
2. Outdoor version: Close the battery cabinet door.
3. Log into the primary battery cabinet control panel as **Operator**. Log in is performed by clicking on the username at top left. You will receive the password following participation in the certification training.
4. Select **Home** to the left in the menu ribbon.
5. Click on the image under **Battery Status Overview**.



6. Check that all battery cabinets are connected.



7. Once all battery cabinets have been connected, commission the inverter.

Also see:

- Switching the Inverter On ⇒ page 114
- Commissioning an Individual Battery Cabinet ⇒ page 108
- Communication Connection ⇒ page 94

9.4 Checking the Mounting and Connection Work

⚠ QUALIFIED PERSON

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 a DC distributor present: Ensure that the DC distributor has been correctly mounted and connected.

4. Ensure that all battery cabinets have been mounted correctly.
5. With a single battery cabinet: Ensure that all electrical connections on the battery cabinet have been established.
6. With multiple battery cabinets: Ensure that only the grounding is connected on the battery cabinets, and that no other electrical connections have been made. The connections will first be made during the commissioning process.
7. Ensure that the energy meter has been correctly mounted and connected (see manual for the energy meter).
8. Measure the ground resistance and continuity of the grounding conductor.
9. Measure the insulation resistance.
10. Check the polarity between the inverter and battery.
11. With a DC distributor present: Ensure that the circuit breaker of the DC distributor is switched on.

Also see:

- Connecting the Inverter ⇒ page 76

9.5 Switching the Inverter On

⚠ QUALIFIED PERSON

Requirements:

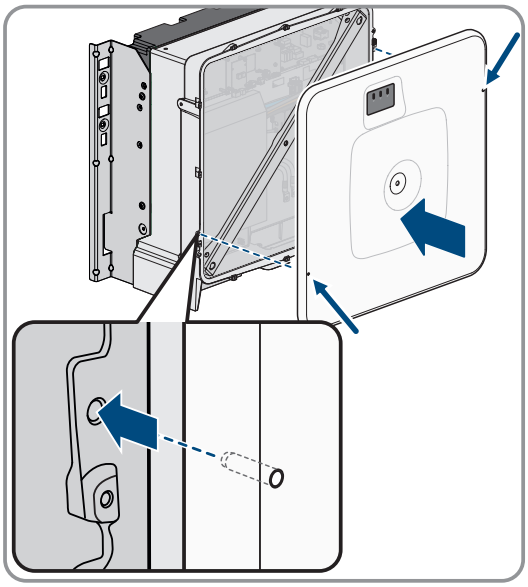
☐ The AC circuit breaker must be correctly rated and mounted.

☐ The inverter must be correctly mounted.

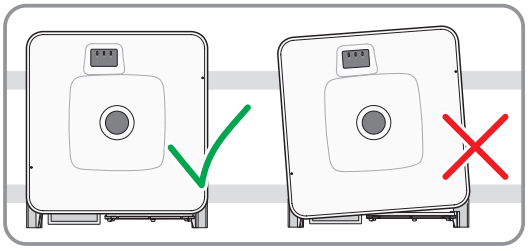
☐ All cables must be correctly connected.

Procedure:

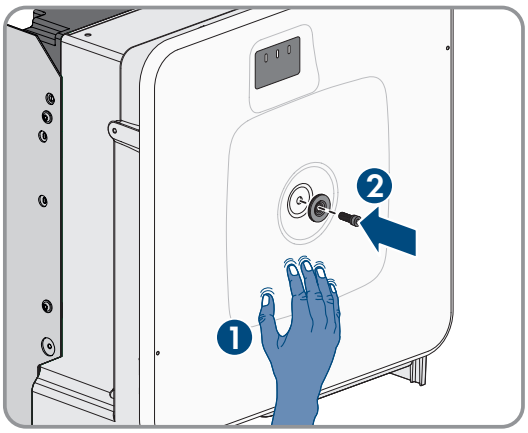
1. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure.



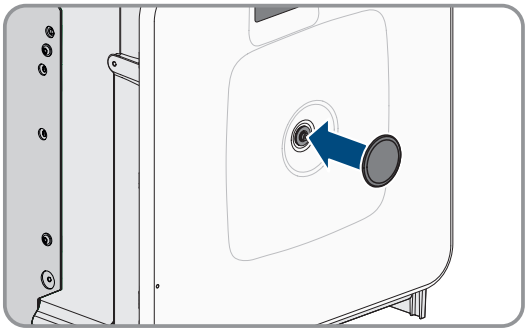
2. Ensure that the cover sits straight on the enclosure.



3. Hold the enclosure lid pressed against the enclosure and screw it tight. (Hex socket, AF 8, torque: 18 Nm).



4. Place the cover on the screw in the enclosure lid.
5. Connect the battery via the external DC switch.
6. Switch on the AC circuit breaker.
7. If the green and red LEDs flash simultaneously during initial commissioning, operation is stopped because no country data set has been set yet. For the inverter to begin operation, the configuration must be completed and a country data set must be set.



8. If the green LED is still flashing, the conditions for the discharge and charge mode are not yet met. As soon as the conditions for the discharge and charge mode are met, the inverter will start charging and discharging. Depending on the available power, the green LED is continuously illuminated or pulses.
9. If the red LED lights up, an event has occurred. Find out which event has occurred and, if necessary, initiate countermeasures.

10 Operation

10.1 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 M	If an SMA Data Manager M installed, the SMA Data Manager M 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.
LED displays on the control panel and on the battery high-voltage box	The LEDs indicate the operating state of the battery.
Display on the battery control panel	The display is used to make some default settings during commissioning of the battery. The display also shows the event messages for the battery.
On/Off button on the battery control panel	The On/Off button is used during commissioning and when enabling the battery.
Emergency switch on the battery control panel	The emergency switch is used in emergency situations to quickly switch off the battery.
Battery cabinet DC circuit breaker	The DC circuit breaker is used during commissioning and when enabling the battery. The position depends on the version: • Outdoor version: Inside the enclosure, on the left • Indoor version: Below, above the mounting frame
QF, **QF1** and **QF2** circuit breakers on the high-voltage box	The circuit breakers are used during commissioning and when disconnecting the battery.
Outdoor version: Switch on the circuit breakers on the inside left on the enclosure (**AC Main Breaker**, **SPD2 Breaker**, **Air Condition Power**, **Gas Fan Power**)	The circuit breakers are used during commissioning and when disconnecting the battery.

Also see:

- LED Signals of the Inverter ⇒ page 37
- Inverter Event Messages ⇒ page 132

10.2 Use of the user interface powered by ennexOS

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

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

QR code:



https://go.sma.de/ennexOS

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

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 the inverter from all voltage sources as described in this section. Always adhere to the prescribed sequence.

⚠ WARNING

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

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

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

NOTICE

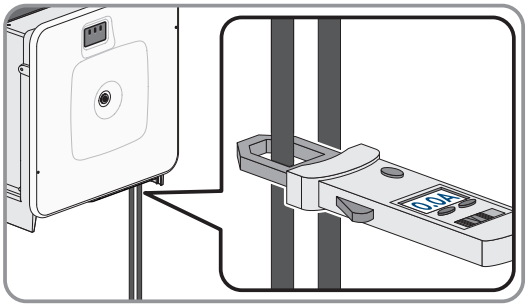
Damage to the inverter due to switching operations on the transformer

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.

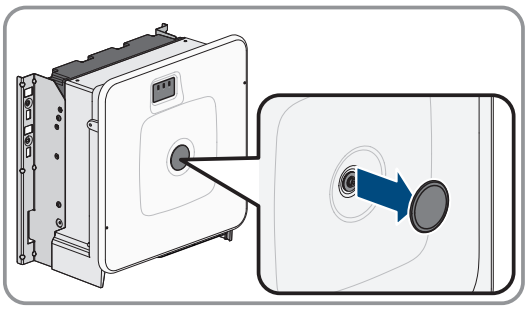
- Disconnect the inverter from voltage sources before performing any switching operations on the transformer.

Procedure:

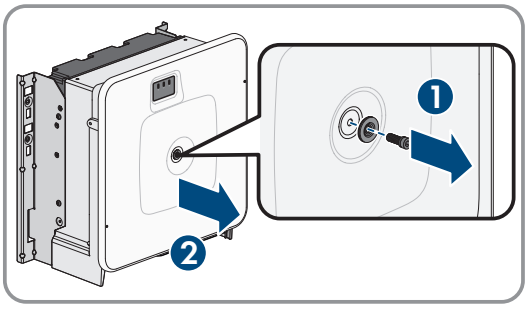
1. Reduce the AC output power of the inverter to 0 W. To do this, stop the inverter.
2. Disconnect the AC miniature circuit breaker and secure against reconnection.
3. Optional: Shut off the transformer.
4. Disconnect the DC connection of the inverter via the load-break switch of the battery or the external DC switch and secure against reconnection.
5. Wait 5 minutes.
6. Wait until the LEDs have gone out.
7. Use a current clamp to ensure that no current is present in the DC cables. As a result, a possible residual current can be detected.



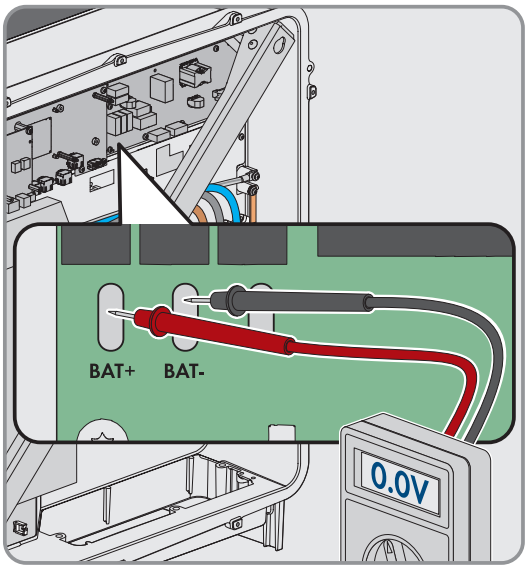
8. Remove the cover from the enclosure lid.



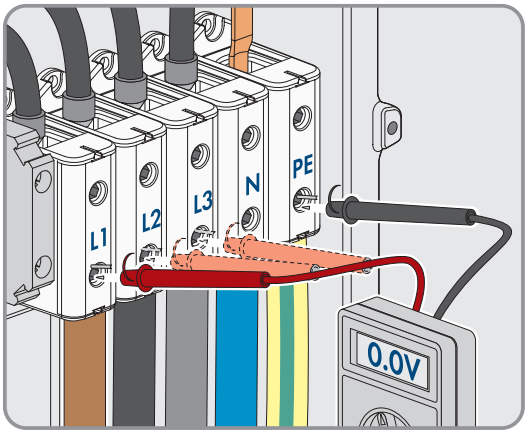
9. Unscrew the screw on the enclosure lid (hex socket, AF8) and remove the enclosure lid.
10. Set the screw, cover and cover of the enclosure aside and store safely.



11. Ensure that no voltage is present on the DC voltage measuring points of the pre-charge unit: between **BAT+** and **BAT-**, **BAT+** and **DST-** as well as **BAT-** and **DST-**.



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



11.2 Disconnecting the Indoor Version Battery from Voltage Sources

⚠ QUALIFIED PERSON

⚠ DANGER

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

The DC lines may be energized. 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

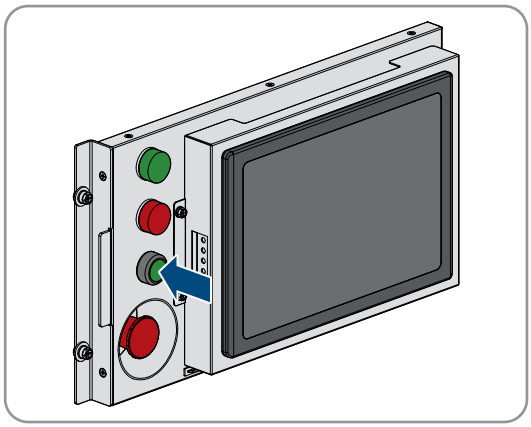
Risk of injury due to electric shock after decommissioning.

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.

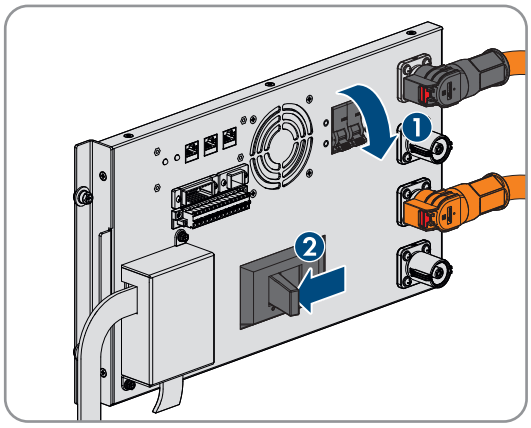
- Do not touch any live components in the DC intermediate circuit.

Procedure:

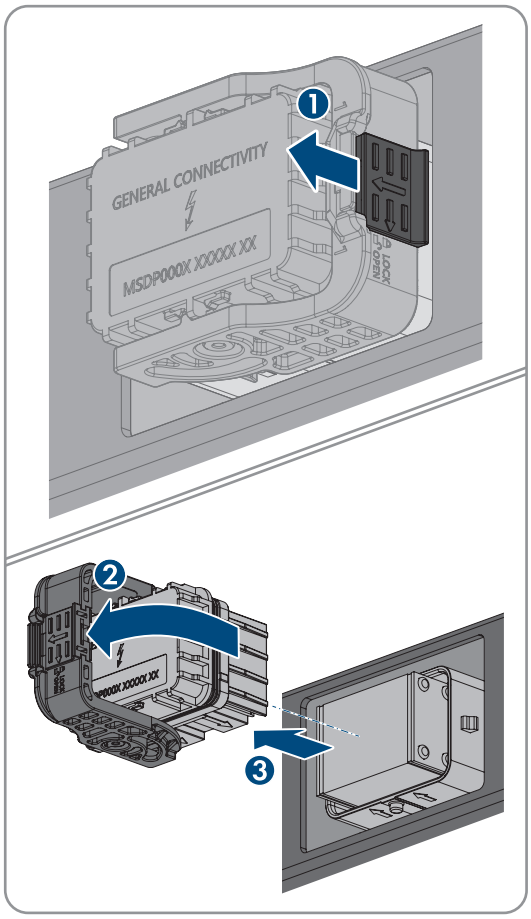
1. Switch off the battery via the display.
2. Disconnect the inverter from all voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
3. Press and hold the On/Off button on the control panel for 3 seconds.



4. Switch off the **QF**, **QF1** und **QF2** circuit breakers on the high-voltage box. The switch extension included in the scope of delivery can be used for operating **QF** more easily.



5. Switch off the DC circuit breaker at the bottom of the battery cabinet.
6. Disconnect the DC cables at the **P1+** and **P1-** connections on the high-voltage box.
7. Ensure that no voltage is present on the **P1+** and **P1-** connections using a suitable measuring device.



11.3 Disconnecting the Outdoor Version Battery from Voltage Sources

⚠ QUALIFIED PERSON

⚠ DANGER

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

The DC lines may be energized. 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

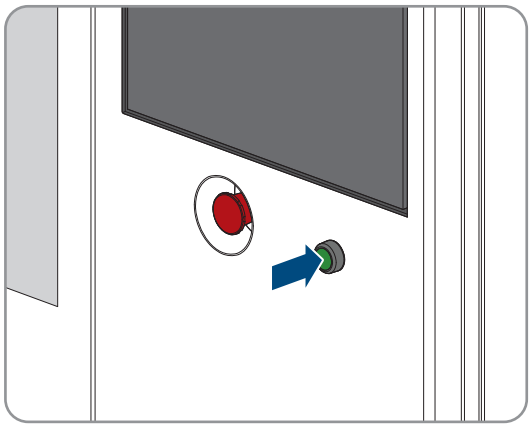
Risk of injury due to electric shock after decommissioning.

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.

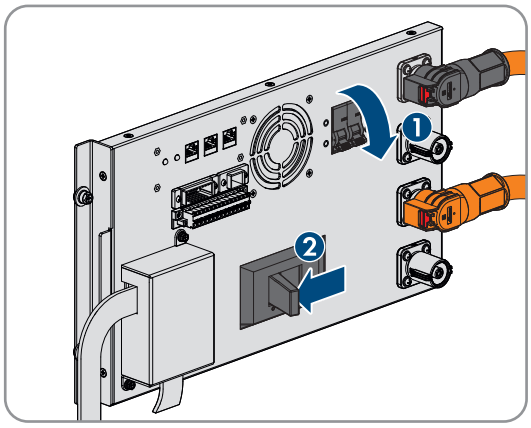
- Do not touch any live components in the DC intermediate circuit.

Procedure:

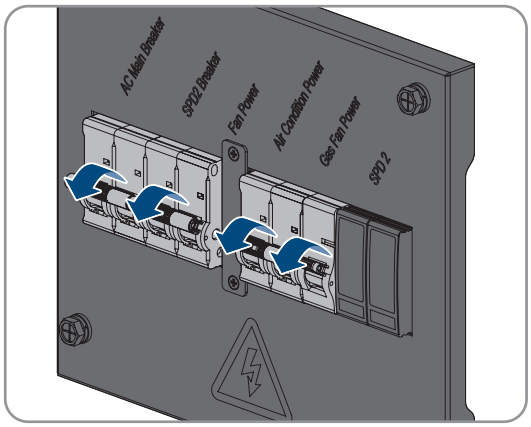
1. Switch off the battery via the display.
2. Disconnect the inverter from all voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
3. Press and hold the On/Off button on the control panel for 3 seconds.



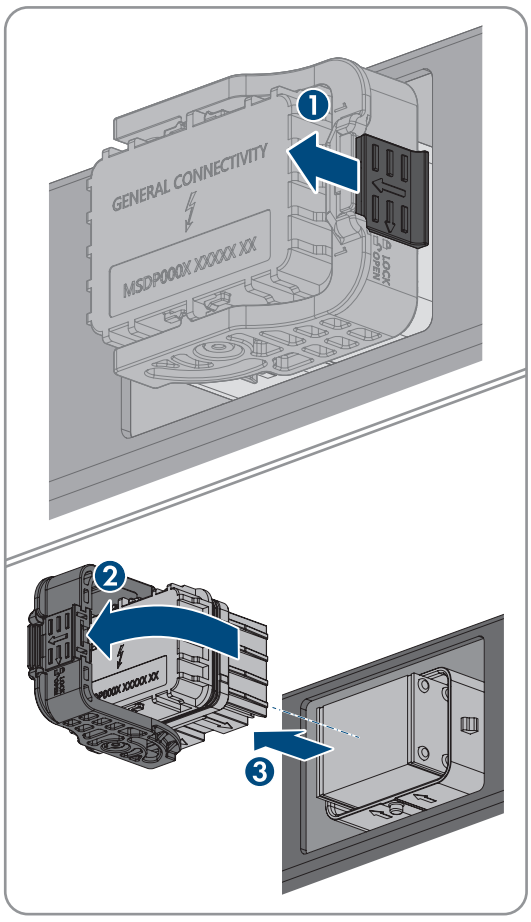
4. Switch off the **QF**, **QF1** und **QF2** circuit breakers on the high-voltage box. The switch extension included in the scope of delivery can be used for operating **QF** more easily.



5. Switch off the circuit breakers on the inside left (**AC Main Breaker**, **SPD2 Breaker**, **Air Condition Power**, **Gas Fan Power**).



6. Switch off the DC circuit breaker on the inner left of the battery cabinet.
7. Disconnect the DC cables at the **P1+** and **P1-** connections on the high-voltage box.
8. Ensure that no voltage is present on the **P+** and **P-** connections using a suitable measuring device.



12 Cleaning and Maintenance

12.1 Safety Information for Cleaning and Maintenance

⚠ DANGER

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

The DC lines may be energized. 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.

12.2 Maintenance Intervals

i Adverse ambient conditions reduce maintenance intervals

Location and ambient conditions influence the maintenance intervals. In particular, cleaning and corrosion protection work may be required more frequently depending on the conditions at the installation site. Examples of adverse ambient conditions include storms, flooding, coastal location, or a site with high dust pollution levels.

- 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.

i Testing the fire protection components in the installation room

With the indoor version, fire protection measures must be taken on-site in the installation room. The fire protection measures in the room must be tested regularly in accordance with statutory regulations.

Task	Maintenance Interval	See
Test the start/stop function on the battery cabinet display.	6 months	Section 12.5, page 125
Battery cabinet of the outdoor version: Check the fan on the door and the roof for dirt and dust, and clean them.	6 months	Section 12.6, page 126
Battery cabinet of the outdoor version: Check the air conditioner for abnormal noise or sounds.	6 months	Section 12.7, page 126
Check the battery cabinet display for display problems.	12 months	Section 12.8, page 126

Task	Maintenance Interval	See
Check the battery cabinet of the outdoor version for rust, flaking paint, and other surface damage.	12 months	Section 12.9, page 126
Check electrical connections.	12 months	Section 12.10, page 127
Battery cabinet of the outdoor version: Check the air conditioner for dirty grilles and clean them.	12 months	Section 12.11, page 127
Battery cabinet of the outdoor version: Check the Storz coupling for fire hose connection for rust.	12 months	Section 12.12, page 128
Battery cabinet of the outdoor version: Check that the smoke detector and heat detector are functioning correctly.	24 months	Section 12.13, page 128
Clean the inverter fans and then check for function.	When the fan power drops.	Section 12.15, page 129 Section 12.16, page 130

Also see:

- Checking the Start/Stop Function on the Battery Cabinet ⇒ page 125

12.3 Cleaning and Maintenance Materials

- Torque wrench
- Brush or broom for cleaning the interspaces
- Clean cloth (dry)
- Water-free lubricant suitable for spraying
- Vacuum cleaner

12.4 Torques

Bolted connection	Tools	Torque
Central grounding point on the battery cabinet	Hexagon socket, AF13	8 Nm
Connecting DC cables in inverter	Hexagon socket, AF16	24 Nm ± 2 Nm
Connecting the DC cables to the DC distributor	Hexagon socket, AF16	20 Nm ± 2 Nm

12.5 Checking the Start/Stop Function on the Battery Cabinet

1. Log into the battery cabinet display as **Operator**.
2. Navigate to the **Parameter** menu.
3. Deactivate the function **Auto-Start Enable**.
   ☑ The button alongside the function name is red (**Disabled**).
4. Press the **Stop** button.
5. Check that no problems occur during the stop.
6. Reactivate the function **Auto-Start Enable**.
   ☑ The button alongside the function name is green (**Enabled**).
7. Check that no problems occur during the automatic start.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.6 Cleaning the Outdoor Version of the Battery Cabinet

1. Disconnect the battery from voltage sources.
2. Check the top of the battery cabinet for dirt deposits and clean it.
3. Open the door and remove dust from the fan in the corner of the door using a vacuum cleaner.
4. Recommission the battery and close.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.7 Checking the Volume of the Outdoor Version of the Battery Cabinet

1. Measure the sound pressure level at a distance of approximately 50 cm from the air conditioner. The volume should be less than 73 dB with a tolerance of 3 dB. The air inlets/outlets should be cleaned prior to measuring.
2. If the sound pressure level is too high, contact Service.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.8 Checking the battery control panel

1. Check whether the display is readable.
2. If the display appears blurred or otherwise faulty, disconnect the battery from voltage sources.
3. Put on insulated gloves and check the electrical wiring behind the display for loose cables.
4. Switch the battery back on and check the display again.
5. If the problem persists, contact Service.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.9 Checking the Outdoor Version of the Battery Cabinet for Damage

1. Check the battery cabinet for rust, flaking paint, and other surface damage.
2. Use touch-up stick in the appropriate RAL color to repair small-area surface damage. Observe the relevant instructions of the paint manufacturer.
3. Contact Service in the event of serious damage.

RAL color	Color
RAL 9003	Signal white
RAL 9004	Signal black

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.10 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.

Procedure:

1. Disconnect the inverter from voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. Disconnect the battery from voltage sources Disconnecting the Battery from Voltage Sources.
3. Check and resecure the connectors on the high-voltage box.
4. Outdoor version: Check and resecure the cables connected to the enclosure and display.
5. Check all cables for visible damage.
6. Check all connection points and connectors for corrosion.

12.11 Checking the Air Conditioner of the Outdoor Version of the Battery Cabinet

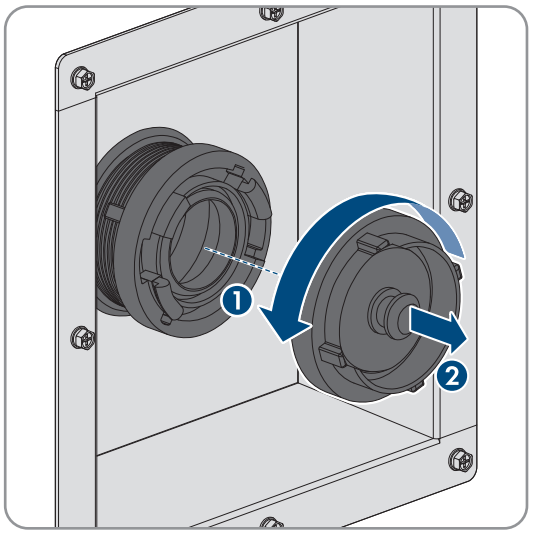
1. Disconnect the battery from voltage sources.
2. Check the air inlets/outlets on the air conditioner for dirt and clean them using a vacuum cleaner.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.12 Checking the Storz Coupling of the Outdoor Version of the Battery Cabinet

1. Check the Storz coupling for the fire hose connection for rust and other damage. When doing so, take both sides of the door into consideration.
2. If rust or damage is visible, remove the Storz coupling cover using a Storz coupling wrench. When doing so, hold the protective cap firmly until the cover is released.
3. Remove rust from the cover and Storz coupling or replace them if necessary.



Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.13 Checking the Heat and Smoke Detector of the Outdoor Version of the Battery Cabinet

NOTICE

Unintentional activation of the aerosol fire suppression system

If the heat detector and smoke detector trigger simultaneously, the aerosol fire suppression system will be activated. This discharges the extinguisher cartridge in the battery cabinet.

- Do not trigger the detectors simultaneously.
- In the event of a detector triggering, restart the battery cabinet to reset the alert message.
- If the aerosol fire suppression system is triggered unintentionally, switch off the battery cabinet and contact Service.

1. Open the battery cabinet.
2. Trigger the smoke detector (top left) using a test spray for smoke detectors.
   ☑ The LED on the smoke detector lights up red.
3. Restart the battery cabinet to reset the alert message.
4. Trigger the heat detector (top left) using a hot-air gun (110°C from a distance of approximately 10 cm).
   ☑ The LED on the heat detector lights up red.
5. Restart the battery cabinet to reset the alert message.
6. If a detector does not trigger, contact Service to arrange a replacement.

Also see:

- Safety Information for Cleaning and Maintenance ⇒ page 124

12.14 Documenting the System Status

⚠ QUALIFIED PERSON

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

Procedure:

1. Read the current measured values on the energy meters.
2. Document the charge capacity and discharge capacity.
3. Document the current state of charge, state of health, cell voltage, and temperature.
4. If the current state of charge, state of health, cell voltage, or temperature are not as expected, decommission the system and contact Service.
5. Document the battery event messages.

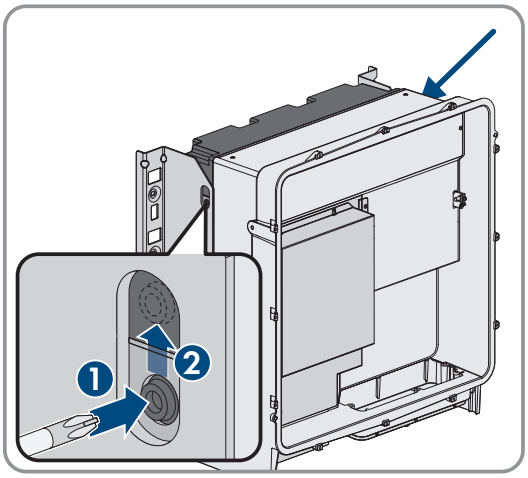
12.15 Cleaning the fans of the inverter

⚠ QUALIFIED PERSON

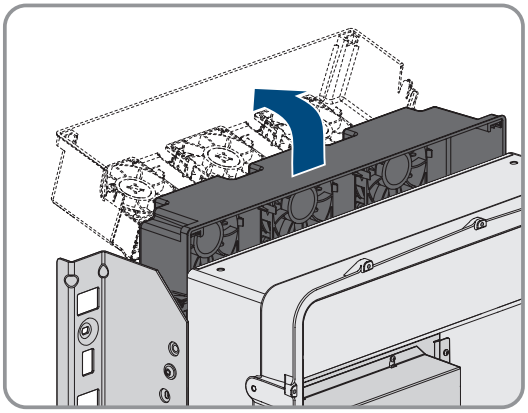
If the performance of the fans is decreasing, it can be restored by cleaning the fans. Indications of a reduction in fan performance are e.g., unusual fan noise or unusual derating behavior.

Procedure:

1. Disconnect the inverter from all voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. Unlock the fan bracket on the right and left of the product. To do so, press in the locking tabs and push them upwards.



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

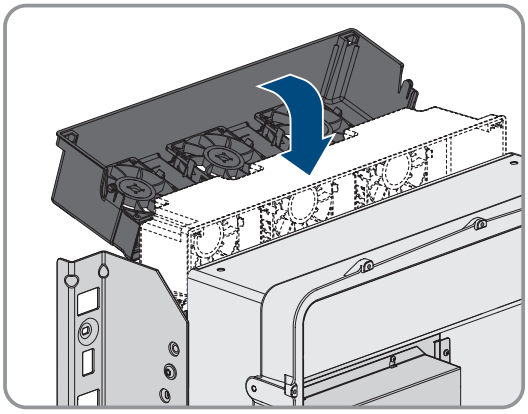


NOTICE

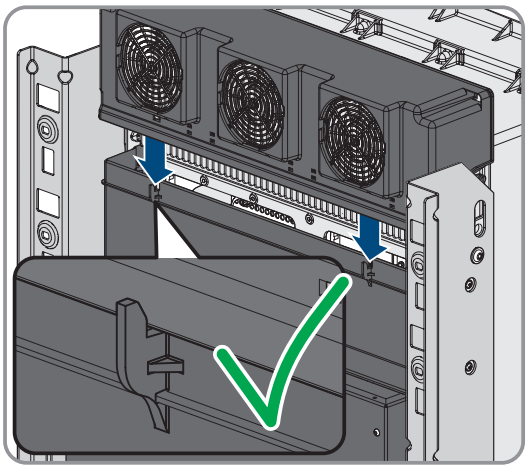
Damage to the fans due to compressed air

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

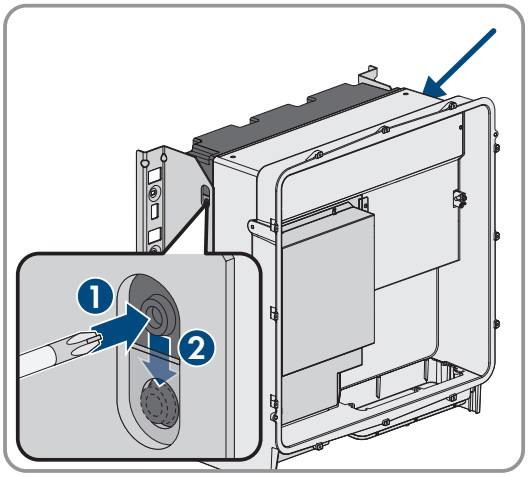
4. If the cooling fins are dirty, clean them using a soft brush.
5. Insert the locking tabs on the left and right of the fan bracket into the recesses and the top into the suspensions.



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



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



Also see:

- Switching the Inverter On ⇒ page 114

12.16 Checking the fans of the inverter

⚠ QUALIFIED PERSON

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

Requirement:

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

Procedure:

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

13 Troubleshooting

13.1 Displaying Event Messages

Type of event messages	Indication
Battery Event Messages	Battery event messages are shown on the control panel display. Operational limitations will also be indicated by the battery's LEDs. Information: Only the event, e.g., E001, will be displayed. The full event message, e.g., Battery Stack Autonomous Protection, will not be displayed on the control panel.
Inverter event messages	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.

Also see:

- LED Signals of the Inverter ⇒ page 37
- Inverter Event Messages ⇒ page 132

13.2 Inverter Event Messages

13.2.1 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.

13.2.2 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.

13.2.3 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.

13.2.4 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.

13.2.5 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 data set has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

13.2.6 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 data set has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

13.2.7 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 data set has been configured correctly.
- Check whether the grid voltage at the connection point of the inverter is permanently in the permissible range.

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

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

13.2.8 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.

13.2.9 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.

13.2.10 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.

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

13.2.12 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.

13.2.13 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 wiring from the inverter to the feed-in meter.

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

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

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

13.2.14 Event 1302

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

Either L or N is not connected, or the utility grid has failed.

Corrective measures:

- Ensure that there is no utility grid failure.
- 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.

13.2.15 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.

13.2.16 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.

13.2.17 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.

13.2.18 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.

13.2.19 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.

13.2.20 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.

13.2.21 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.

13.2.22 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.

13.2.23 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.

13.2.24 Event 6001-6499

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.25 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.

13.2.26 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.

13.2.27 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.

13.2.28 Event 6511

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

An overtemperature has been detected in the choke area.

Corrective measures:

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

13.2.29 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.

13.2.30 Event 6602

⚠ QUALIFIED PERSON

Event message:

- **Overvoltage grid (SW)**

Explanation:

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

Corrective measures:

- Check the grid voltage and connection on the inverter.

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

13.2.31 Event 6603

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.32 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.

13.2.33 Event 6804

Event message:

- Self-diagnosis > Device disturbance

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

13.2.34 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.

13.2.35 Event 7702

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.36 Event 7703

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.37 Event 7727

⚠ QUALIFIED PERSON

Event message:

- DC relay opened unintentionally

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact the Service.

13.2.38 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.

13.2.39 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.

13.2.40 Event 8003

⚠ QUALIFIED PERSON

Event message:

- **Temperature derating**

Explanation:

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

Corrective measures:

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

13.2.41 Event 8104

⚠ QUALIFIED PERSON

Event message:

- Communication impaired

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.42 Event 9002

⚠ QUALIFIED PERSON

Event message:

- **Installer code invalid**

Explanation:

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

Corrective measures:

- Enter the correct SMA Grid Guard code.

13.2.43 Event 9003

⚠ QUALIFIED PERSON

Event message:

- **Grid parameter locked**

Explanation:

Changes to the grid parameters are now blocked.

Corrective measures:

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

13.2.44 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 Service.

13.2.45 Event 9102

⚠ QUALIFIED PERSON

Event message:

- Permanent operation inhibition

Explanation:

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

Corrective measures:

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

13.2.46 Event 9107

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.47 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.

13.2.48 Event 9307

⚠ QUALIFIED PERSON

Event message:

- Defective battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.49 Event 9308

⚠ QUALIFIED PERSON

Event message:

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

Explanation:

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

-

Corrective measures:

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

13.2.50 Event 9311

⚠ QUALIFIED PERSON

Event message:

- Battery cell overvoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.51 Event 9312

⚠ QUALIFIED PERSON

Event message:

- Battery cell undervoltage fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.52 Event 9313

⚠ QUALIFIED PERSON

Event message:

- Battery overtemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.53 Event 9314

⚠ QUALIFIED PERSON

Event message:

- Battery undertemperature

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.54 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 Service.

13.2.55 Event 9316

⚠ QUALIFIED PERSON

Event message:

- Internal battery hardware fault

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.56 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.
- Ensure that the battery communication cable is correctly assembled and connected.

13.2.57 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 Service.

13.2.58 Event 9352

⚠ QUALIFIED PERSON

Event message:

- Battery system short circuit

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.59 Event 9353

⚠ QUALIFIED PERSON

Event message:

- Thermal management of battery system

Explanation:

Thermal management of battery system is defective.

Corrective measures:

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

13.2.60 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.

13.2.61 Event 9392

⚠ QUALIFIED PERSON

Event message:

- Overcurrent battery charging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.62 Event 9393

⚠ QUALIFIED PERSON

Event message:

- Overcurrent battery discharging

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.63 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.

13.2.64 Event 9395

Event message:

- Battery separated externally

Explanation:

The DC power connection to the battery was disconnected.

Corrective measures:

- Contact Service.

13.2.65 Event 10816

⚠ QUALIFIED PERSON

Event message:

- Communication error within the battery system

Explanation:

The cause must be determined by the Service.

Corrective measures:

- Contact Service.

13.2.66 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.

13.2.67 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.

13.2.68 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.

13.3 Battery Event Messages

13.3.1 Event E001

⚠ QUALIFIED PERSON

Event message:

- Battery Stack Autonomous Protection

Explanation:

The system has detected an error in the battery (e.g., overvoltage, undervoltage, or overcurrent). To ensure the safety of the devices, it automatically executes a protection strategy and disconnects all DC contactors. The system supports the setting of specific protection trigger delays based on the severity and extent of the error.

Corrective measures:

- Check the main control interface for other specific errors that occurred at the same time as this error (e.g., severe overvoltage). This error is the direct cause that triggered the protection.
- Use the specific error information obtained to perform targeted troubleshooting and repair work.
- Once all underlying errors that triggered the protection have been fully resolved, the system will automatically exit the protection state and return to normal operation.

13.3.2 Event E002

⚠ QUALIFIED PERSON

Event message:

- Restricted Battery Stack Startup

Explanation:

The system has entered an error state and has been blocked due to multiple consecutive automatic startup errors. During the procedure, the system may output multiple error messages related to event E070. To protect the devices, automatic starts will not be attempted. Manual intervention is required for troubleshooting and to resolve this condition.

Corrective measures:

Startup errors are normally caused by the following:

- The voltage difference between P+ and B+ did not reach the set target value during the pre-charging phase.
- The main contactor or the pre-charging contactor not engage properly or gave a different feedback signal.

- Troubleshooting should be carried out according to the specific cause. Once internal problems have been resolved, a manual restart is required to fix the error and enable automatic system startup again.

13.3.3 Event E003

⚠ QUALIFIED PERSON

Event message:

- Reading Anomaly in Battery Stack Parameter

Explanation:

During the self-test at system startup, a deviation was detected in the battery configuration parameters (e.g., battery specifications, protection thresholds, alarm delays). This deviation could impair system operation, which is why the system has automatically switched to safe mode to prevent a start.

Corrective measures:

- This error affects the core system parameter settings. To ensure the safety and proper operation of the devices, it is strictly forbidden for non-qualified personnel to operate or change these parameters.
- Contact Service to check the specific parameters.

13.3.4 Event E004

⚠ QUALIFIED PERSON

Event message:

- External Fault

Explanation:

The system detected an alarm signal from external protective devices (e.g., emergency switch, fire protection) and immediately implemented a safety measure: The system entered an error state, stopped operation, and switched off the AC-side circuit breaker.
The message is a general warning.

Corrective measures:

- Immediately check the system interface to locate and record any specific warnings from external devices that are reported at the same time (e.g., "Emergency Stop Signal" or "Water Ingression Alarm").
- Based on the reported specific device warning, check the location and eliminate the cause of the external device alarm (e.g., reset the emergency switch, fix the water leak).
- After verifying that all alarms from external devices have been cleared and the location is secure, you must manually perform the **Clear errors** operation in the battery pack control system interface to restore normal operation.

13.3.5 Event E005

⚠ QUALIFIED PERSON

Event message:

- Maintenance switch pulled out

Explanation:

The system has detected that the maintenance switch has been pulled out.
This means that maintenance personnel are carrying out an inspection or maintenance work on site. The system has automatically activated a safety lockout state, preventing all charging and discharging operations to ensure the safety of personnel.

Corrective measures:

- Once all on-site maintenance work has been completed and the personnel and tools have been removed, the maintenance personnel should return the maintenance switch to its original position.
- Once the maintenance switch is reinserted, you must manually perform the **Clear errors** or **Confirm restoration** operation in the interface of the battery pack control system.
- Once the error has been cleared manually, the system exits the safety lock state and returns to normal operation.

13.3.6 Event E006

⚠ QUALIFIED PERSON

Event message:

- Smoke&Temperature Detector Alarm

Explanation:

The system has received a combined alarm signal from the smoke and temperature sensors, indicating a possible fire or overheating.
The system immediately entered the highest error state and tripped the AC circuit breaker to disconnect from the utility grid and prevent further escalation of the incident.

Corrective measures:

- Go to the scene immediately and check whether there is an actual risk of fire or overheating. If it is a false alarm, check whether the sensors are dusty, defective, or damaged.
- Make sure that all safety risks in the environment have been completely eliminated and that the environmental parameters (smoke, temperature) are back to normal.
- After eliminating the safety risk, you must manually perform the **Clear Errors** process in the battery pack control system interface so that the system functions normally again.

13.3.7 Event E007

⚠ QUALIFIED PERSON

Event message:

- Fire Protection System Anomaly

Explanation:

The system has received a fire alarm signal from the fire protection sensor.
The system immediately triggered the highest safety level: It entered a error state and shut down the AC circuit breaker as an emergency to disconnect the connection to the utility grid and prevent further escalation of the incident.

Corrective measures:

- Check if there is actually a fire. If a fire is confirmed, immediately initiate the emergency plan and notify the fire department.

- In the event of an actual fire:

  Do not proceed with further measures until the fire is completely extinguished and all safety risks on site have been completely eliminated.
- In the event of a false alarm or sensor malfunction:

  Check if the fire alarm has been falsely triggered, is dusty, or damaged.
- After ensuring that all safety risks have been eliminated, you must manually perform the **Clear Errors** operation in the interface of the battery pack control system to return the system to normal operation.

13.3.8 Event E008

⚠ QUALIFIED PERSON

Event message:

- Water Ingression Alarm

Explanation:

The system has detected that the water leak sensor has been triggered, indicating a possible accumulation of water in or around the device.
The system has entered an error state and switched off the AC circuit breaker to prevent short circuits, equipment damage, and other consequential accidents.

Corrective measures:

- Go to the site immediately to assess the water accumulation and locate and stop the water source (e.g., leaks, ingress).
- If a water leak is confirmed:

  Remove the water and ensure that all critical electrical components – such as devices, cables and switches – are completely dry and properly insulated.
- Once the location is dry and there is no water present:

  Check if the water leak sensor has been triggered incorrectly (e.g., due to a sensor fault, a short circuit, or incorrect installation).
- After ensuring that all water has been removed and electrical safety is guaranteed, you must manually perform the **Clear Errors** operation in the interface of the battery pack control system to return the system to normal operation.

13.3.9 Event E009

⚠ QUALIFIED PERSON

Event message:

- Lightning Arrester Alarm

Explanation:

The system has detected a fault indication signal from the surge protection device (SPD), which suggests that it may have been damaged by a flash of lightning or overvoltage and its protective function is no longer guaranteed.
The system has entered an error state and shut off the AC circuit breaker to prevent subsequent overvoltages from endangering the safety of the devices.

Corrective measures:

- Immediately check the status window or indicator light of the surge protection device for alarm signals.

- If the surge protection device has been confirmed as damaged:

  A specialist must replace it with a new module. Do not continue using a surge protection device that has triggered an alarm.
- If the appearance of the surge protection device and its indicator light are normal:

  Check if the alarm signal wiring has any short circuits, breaks, or incorrect connections.
- After replacing the module or fixing wiring problems, you must manually perform the **Clear Errors** operation in the battery pack control system interface for the system to function normally again.

13.3.10 Event E010

⚠ QUALIFIED PERSON

Event message:

- Emergency Stop Signal

Explanation:

The system has received a signal indicating that the emergency switch has been activated, suggesting a possible emergency situation on site.
The system immediately activated the highest level of protection: it has stopped all operations and tripped the AC circuit breaker to disconnect the utility grid and prevent further escalation.

Corrective measures:

- Check the location to determine the cause of the emergency stop (e.g., device malfunction, danger to personal safety) and eliminate the danger completely.
- After ensuring that all safety risks have been eliminated, turn the emergency switch in the direction of the arrow to unlock and reset it.
- Once the emergency switch has been reset, you must manually perform the **Clear Error** or **Confirm Restoration** operation in the interface of the battery pack control system for the system to return to normal operation.

13.3.11 Event E011

⚠ QUALIFIED PERSON

Event message:

- High Flammable Gas Concentration

Explanation:

The system has detected that the concentration of flammable gases (e.g., hydrogen, methane) in the vicinity of the system exceeds the safety limit and therefore there is a danger of explosion. The system immediately entered an error state and automatically activated the exhaust fan for forced ventilation to reduce the concentration and ensure safety.

Corrective measures:

- The system automatically activated the ventilation system. Do not switch the device off immediately and do not restart it. Protective clothing must be worn when entering the site, the source of the flammable gas leak must be located, and immediate action must be taken.
- Continue ventilation and ensure that the concentration of flammable gas remains constantly below the safety alarm threshold. We recommend that this is checked with a portable gas detector.
- After ensuring that the leak has been eliminated and the environment is safe, you must manually perform the **Clear Error** operation in the interface of the battery pack control system to return the system to normal operation.

13.3.12 Event E012

⚠ QUALIFIED PERSON

Event message:

- No Available Battery Packs in Battery Stack

Explanation:

The system has detected that all activated battery modules have failed to start up due to error messages (all DC contactors are open), preventing the battery set from functioning normally. As a result, the system triggered an error and entered a shutdown state.

Corrective measures:

- This error is a consequence; the underlying causes that led to the failure of the individual battery modules must be rectified.
- Access the system error warning interface and review the detailed error or warning information for each battery module to identify any specific problems that may have led to its isolation.
- Based on the identified specific errors or warnings, correct the anomalies of each individual battery module one at a time.
- Once the error in a battery module is rectified and it automatically resumes operation (DC contactor closes), this error is automatically cleared.

13.3.13 Event E013

⚠ QUALIFIED PERSON

Event message:

- Detected Abnormal Battery Group Contactor Variation in Battery Stack

Explanation:

The system has detected that a battery module in the battery pack has reported an error due to an irregularity in the contactor status. This alarm is a system-level summary indicating that the actual state of a contactor does not match the system command. The system subsequently entered an error protection state.

Corrective measures:

- Using the event list, determine which battery module triggered the event message.
- Perform trouble shooting on the battery module identified for the respective contactor error code (e.g. E129) in accordance with the manual. This generally includes checking the contactor's feedback contacts, the control circuit, and the mechanical condition of the module.
- Once the issue regarding the battery module contactor status discrepancy is resolved, its specific sub-error (e.g., E129) will be reset. Once the contactor status for all battery modules returns to normal (i.e., matches the commands), this system-level collective alarm will be automatically reset.

13.3.14 Event E014

⚠ QUALIFIED PERSON

Event message:

- Battery Stack-UCC CAN Communication Disconnection

Explanation:

The system has not received any valid CAN messages from the Unit Control Controller (UCC) within the specified time period and interprets this as an interruption of the communication connection. This error causes the system to be unable to receive superordinate control commands and to enter an error state.

Corrective measures:

- Check the CAN communication cables between the battery stack and the UCC for secure connections (cables A and B). Make sure that the interface connections are not loose, disconnected, or damaged.
- Access the backend of both the BMS and UCC devices to ensure that their CAN communication parameters (e.g., baud rate, port number, CAN ID) are configured consistently and correctly.
- Ensure that the electricity supply to the UCC controller is normal and that its operating state is stable.
- Optional: If no UCC device is configured on site, disable the "UCC communication detection" function in the BMS system settings (set to "Do not detect") to avoid false alarms.
- Once the cabling has been repaired or the parameters adjusted, communication is automatically resumed and the error alarm is cleared. If detection is disabled, the alarm will disappear automatically after the settings have been saved.

13.3.15 Event E015

⚠ QUALIFIED PERSON

Event message:

- Disconnected Battery Group Power Line Detection in Battery Stack

Explanation:

The system has detected a faulty power cable connection (e.g., abnormal voltage measurement, sudden change in loop impedance) between a specific battery cluster in the battery stack and the power conversion system (PCS). The energy of this cluster cannot be transferred normally. As a result, the system has entered an error state to ensure the safety of the devices.

Corrective measures:

- Perform a system shutdown to ensure the device is switched off. **Never perform work on live electrical circuits.**
- Check all cable connections between the battery cluster and the DC Combiner Box, as well as between the DC Combiner Box and the PCS, one after the other. Make sure they are securely in place and show no signs of loosening or burning.
- Inspect the entire power cable for obvious physical damage, crushing, breaks, and damage to the insulation layer.
- Tighten any loose connections and replace damaged cables to ensure all connections are secure and reliable.
- Restart the system after completing the repairs and checks. The error will be cleared automatically.

13.3.16 Event E016

⚠ QUALIFIED PERSON

Event message:

- Software Emergency Stop Trigger

Explanation:

The system has received a software emergency stop command from the stack control interface. This command has the same highest priority as a hardware emergency stop. The system immediately performed an emergency shutdown and entered an error-locked state (without tripping the AC circuit breaker).

Corrective measures:

- Conduct an on-site inspection to check for any safety risks that might require an emergency shutdown (e.g., device malfunctions, dangers to people). If such risks are identified, they must be completely eliminated.
- After ensuring that the location is absolutely safe, an authorized operator must locate the "Cancel Emergency Stop" button on the same user interface where the software emergency stop was triggered and manually perform the confirmation to cancel it.
- After manual reactivation, the system's emergency state is lifted and normal operation can resume.

13.3.17 Event E017

⚠ QUALIFIED PERSON

Event message:

- BCMU Sleep

Explanation:

The Battery Control Management Unit (BCMU) has been put into energy-saving mode manual by the "Power" button being pressed down and held. This device will cease operation, thereby switching off the battery cluster it manages from the system. As a result, the system has entered an error state.

Corrective measures:

- Locate the “Power” button on the respective battery cluster and press and hold it down for more than three seconds to attempt to wake the BCMU and exit sleep mode.
- Backup solution: If the method described above fails, disconnect and reconnect the DC circuit breaker of the battery cluster. Completely switching the device off and on again forces the BCMU to initialize and resume normal operation.
- Once the BCMU has been successfully woken up or restarted, it automatically exits sleep mode and the system error alarm is cleared accordingly.

13.3.18 Event E018

⚠ QUALIFIED PERSON

Event message:

- PCS Offline

Explanation:

The system has not received any communication data from the power conversion system (PCS) within the specified time period and interprets this as a connection interruption to the PCS. This error prevents the system from cooperating with the PCS to perform charging/discharging operations and has triggered an error protection state.

Corrective measures:

- Check the communication cables (e.g. CAN bus, Ethernet, RS485) between the device and the PCS. Make sure all connections are secure and check for loose, disconnected, or damaged interfaces.
- Access the backend of both the system and the PCS device to ensure that the communication parameters (e.g., baud rate, device address, protocol version) are configured consistently.
- Make sure that the PCS device is functioning normally and that its communication functions are intact.
- After the physical connections have been repaired or the communication parameters adjusted, the communication connection is automatically restored and the error is resolved.

13.3.19 Event E019

⚠ QUALIFIED PERSON

Event message:

- Isolator Not Closed

Explanation:

Insulator not closed.
The circuit breaker has tripped or the high voltage measurement line is loose. This message can also be issued as a result of other events (e.g. E039 or E042) for which the protective measure is to trip the circuit breaker.

Corrective measures:

- Close the circuit breaker.
- Check the B+ measurement line in the main distribution box.
- Restart the battery.

13.3.20 Event E020

⚠ QUALIFIED PERSON

Event message:

- Abnormal High-Voltage Terminal Voltage Sampling

Explanation:

Faulty high voltage terminal voltage sampling.
The measured B+ voltage is below 30 V. This message can also be issued as a result of other events (e.g. E019 or E042) for which the protective measure is to trip the circuit breaker.

Corrective measures:

- Close the circuit breaker.
- Check the B+ measurement line in the main distribution box.
- Restart the battery.

13.3.21 Event E021

⚠ QUALIFIED PERSON

Event message:

- Abnormal Temperature Sampling in Main Control Box

Explanation:

Faulty temperature measurement in the main control box

Corrective measures:

- Check the NTC thermistor sampling wiring in the main control box.

13.3.22 Event E022

⚠ QUALIFIED PERSON

Event message:

- Battery Group Leakage Detection Failure

Explanation:

Battery group leak detection error

Corrective measures:

- Check the cabling of the B+ sampling and the isolation sampling of the Battery Control Management Unit (BCMU).

13.3.23 Event E023

⚠ QUALIFIED PERSON

Event message:

- Pre-Charge at High Temperature

Explanation:

Pre-charging at high temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.24 Event E024

⚠ QUALIFIED PERSON

Event message:

- Contactor at High Temperature

Explanation:

Contactor with high temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.25 Event E025

⚠ QUALIFIED PERSON

Event message:

- Battery Group Self-Protection

Explanation:

Battery group self-protection.
This system error is issued together with other error codes.

Corrective measures:

- Restart the battery.
- If the message remains, contact Service.

13.3.26 Event E026

⚠ QUALIFIED PERSON

Event message:

- Abnormal Communication with High-Voltage Detection Module

Explanation:

Irregular communication with the high-voltage detection module

Corrective measures:

- Restart or replace the Battery Control Management Unit (BCMU).

13.3.27 Event E027

⚠ QUALIFIED PERSON

Event message:

- System Loop Abnormality

Explanation:

System loop anomaly

Corrective measures:

- Check the shunt cabling in the main control box.

13.3.28 Event E028

⚠ QUALIFIED PERSON

Event message:

- Abnormal Power Supply to BCMU Module

Explanation:

The electricity supply to the Battery Control Management Unit (BCMU) is outside the normal operating range.

Corrective measures:

- Check the 24-volt power supply cables in the main control box.

13.3.29 Event E029

⚠ QUALIFIED PERSON

Event message:

- Large Error Between Total and Cumulative Voltages

Explanation:

The threshold between the total and cumulative voltage has been exceeded.
This message can also be issued as a result of other events (e.g. E019 or E042) for which the protective measure is to trip the circuit breaker.

Corrective measures:

- Close the circuit breaker and check the B+ measurement line in the main control box.

13.3.30 Event E030

⚠ QUALIFIED PERSON

Event message:

- Abnormal BCMU Parameters

Explanation:

Deviating Battery Control Management Unit (BCMU) parameters.

Corrective measures:

- Reconfigure the parameters.
- Restart the battery.
- If the message remains, contact Service.

13.3.31 Event E031

⚠ QUALIFIED PERSON

Event message:

- Connector Temperature Extremely High

Explanation:

The connector temperature is above the threshold.

Corrective measures:

- Wait until the temperature is back to normal.

13.3.32 Event E032

⚠ QUALIFIED PERSON

Event message:

- Current Sampling Disconnection Fault

Explanation:

Error during current sampling

Corrective measures:

- Check the shunt cabling in the main control box.

13.3.33 Event E033

⚠ QUALIFIED PERSON

Event message:

- Fuse Over-temperature

Explanation:

Fuse overtemperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.34 Event E034

⚠ QUALIFIED PERSON

Event message:

- Charge Severe Overcurrent

Explanation:

The charging current has exceeded the limit

Corrective measures:

- Reduce the current.

13.3.35 Event E035

⚠ QUALIFIED PERSON

Event message:

- Discharge Severe Overcurrent

Explanation:

The discharging current has exceeded the limit.

Corrective measures:

- Reduce the current.

13.3.36 Event E036

⚠ QUALIFIED PERSON

Event message:

- Severe Overvoltage

Explanation:

Overvoltage

Corrective measures:

- Restart, discharge, or wait for voltage to be normalized.

13.3.37 Event E037

⚠ QUALIFIED PERSON

Event message:

- Severe Undervoltage

Explanation:

Undervoltage

Corrective measures:

- Charge within 200 seconds of restarting.

13.3.38 Event E038

⚠ QUALIFIED PERSON

Event message:

- Charge at Extreme Low Temperature

Explanation:

Charging at extremely low temperatures

Corrective measures:

- Wait until the temperature is back to normal.

13.3.39 Event E039

⚠ QUALIFIED PERSON

Event message:

- Isolating switch tripping

Explanation:

Circuit breaker tripped.
Temperature above 75°C at an electrical current of 2 A or maximum cell voltage above the threshold. If alternating current is present after tripping, this can lead to further events (E019, E020 or E029).

Corrective measures:

- Upon checking, switch the miniature circuit breaker back on.
- Restart the battery.

13.3.40 Event E040

⚠ QUALIFIED PERSON

Event message:

- Discharge at Extreme Low Temperature

Explanation:

Discharging at extremely low temperatures

Corrective measures:

- Wait until the temperature is back to normal.

13.3.41 Event E041

⚠ QUALIFIED PERSON

Event message:

- System Lock

Explanation:

The system has been locked.

Corrective measures:

- Send unlock command via the host computer.

13.3.42 Event E042

⚠ QUALIFIED PERSON

Event message:

- Undervoltage Shutdown

Explanation:

Undervoltage shutdown
The minimum voltage is below the threshold. If alternating current remains present after disconnection, this can lead to further events (E019, E020 or E029).

Corrective measures:

- Charge within 200 seconds of restarting.

13.3.43 Event E043

⚠ QUALIFIED PERSON

Event message:

- Abnormal BMU Sampling Circuit

Explanation:

Unusual BMU sampling circuit.
The BMU has issued an alarm due to a disturbance in the measurement circuit. This can also be issued as a result of the following events: E044, E059 or E060.

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.44 Event E044

⚠ QUALIFIED PERSON

Event message:

- BMU Sampling Wire Disconnection

Explanation:

BMU sampling cable interrupted.
A voltage measurement line in the BMU has been interrupted, or three or more temperature measurement lines have been interrupted. This message can lead to event E043.
Event E044 can also be issued as a result of events E059 or E060.

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.45 Event E045

⚠ QUALIFIED PERSON

Event message:

- Internal BMU Communication Failure

Explanation:

Internal BMU communication error

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.
- Check the communication cabling from the PACK to the main control box.

13.3.46 Event E046

⚠ QUALIFIED PERSON

Event message:

- External Communication CAN Disconnection with BSMU

Explanation:

External communication – CAN connection to the BSMU interrupted

Corrective measures:

- Check the communication cable from the main control box to the BSMU.
- Restart the battery.

13.3.47 Event E047

⚠ QUALIFIED PERSON

Event message:

- Abnormal Current Sampling Circuit

Explanation:

Abnormal current sampling circuit

Corrective measures:

- Check the shunt cabling in the main control box.

13.3.48 Event E048

⚠ QUALIFIED PERSON

Event message:

- Abnormal Contactor Feedback Circuit

Explanation:

Faulty contactor feedback circuit.
The control signal and feedback signal do not match. This can also be issued as a result of the following events: E055, E056 or E057.

Corrective measures:

- Check the contactor controller and the feedback wiring.

13.3.49 Event E049

⚠ QUALIFIED PERSON

Event message:

- Fuse Blown

Explanation:

Fuse blown

Corrective measures:

- Replace the fuse.

13.3.50 Event E050

⚠ QUALIFIED PERSON

Event message:

- General Leakage in Battery Group

Explanation:

General leakage in the battery group

Corrective measures:

- Restart the battery.
- If the message remains, contact Service.

13.3.51 Event E051

⚠ QUALIFIED PERSON

Event message:

- Battery Charge at Extreme High Temperature

Explanation:

Battery charging at extremely high temperatures

Corrective measures:

- Wait until the temperature is back to normal.

13.3.52 Event E052

⚠ QUALIFIED PERSON

Event message:

- Battery Cell Failure

Explanation:

Battery cell failure

Corrective measures:

- Restart or replace the PACK.

13.3.53 Event E053

⚠ QUALIFIED PERSON

Event message:

- Battery Discharge at Extreme High Temperature

Explanation:

Discharging of the battery at extremely high temperatures

Corrective measures:

- Wait until the temperature is back to normal.

13.3.54 Event E054

⚠ QUALIFIED PERSON

Event message:

- Severe Leakage in Battery Group

Explanation:

Serious leak in the battery group

Corrective measures:

- Restart the battery.
- If the message remains, contact Service.

13.3.55 Event E055

⚠ QUALIFIED PERSON

Event message:

- Abnormal Feedback from Negative Contactor

Explanation:

Abnormal feedback from the negative contactor.
The control signal and feedback signal do not match. This can lead to event E048.

Corrective measures:

- Check the contactor controller and the feedback cabling.

13.3.56 Event E056

⚠ QUALIFIED PERSON

Event message:

- Main Contactor Feedback Abnormality

Explanation:

Abnormal feedback from the main contactor.
The control signal and feedback signal do not match. This can lead to event E048.

Corrective measures:

- Check the contactor controller and the feedback cabling.

13.3.57 Event E057

⚠ QUALIFIED PERSON

Event message:

- Abnormal Pre-Charge Contactor Feedback

Explanation:

Abnormal feedback from the pre-charge contactor.
The control signal and feedback signal do not match. This can lead to event E048.

Corrective measures:

- Check the contactor controller and the feedback cabling.

13.3.58 Event E058

⚠ QUALIFIED PERSON

Event message:

- Abnormal Internal Sampling Circuit in BMU

Explanation:

Abnormal internal sampling circuit in the BMU.
The BMU has issued an alarm due to a disturbance in the internal measurement circuit. This can also be issued as a result of events E059 and E060.
Message E058 could lead to event E043 and E044.

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.59 Event E059

⚠ QUALIFIED PERSON

Event message:

- Internal Voltage Sampling Disconnection in BMU

Explanation:

Internal voltage sampling interruption in the BMU.
The voltage of one cell is above 3800 mV, that of another below 2600 mV. This could lead to events E043, E044 or E058.

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.60 Event E060

⚠ QUALIFIED PERSON

Event message:

- Multiple Internal Temperature Sampling Disconnection in BMU

Explanation:

Multiple internal temperature sampling disconnection in the BMU.
The temperature of three or more batteries or connections is above 126°C or at -40°C. This can lead to events E043, E044 or E058.

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.61 Event E061

⚠ QUALIFIED PERSON

Event message:

- BMU Data Not Ready

Explanation:

BMU data not ready

Corrective measures:

- Wait until the data has fully uploaded or restart the battery.
- If the message remains, contact Service.

13.3.62 Event E062

⚠ QUALIFIED PERSON

Event message:

- High-Voltage Data Not Ready

Explanation:

High-voltage data not ready

Corrective measures:

- Wait until the data has fully uploaded or restart the battery.
- If the message remains, contact Service.

13.3.63 Event E063

⚠ QUALIFIED PERSON

Event message:

- Excessive Inter-Group Voltage Difference

Explanation:

The system has detected a discrepancy in the overall voltage between the battery modules, with the voltage difference between the module with the highest and the module with the lowest voltage exceeding the permissible range.

Corrective measures:

- During grid-linked charging and discharging, the system automatically adjusts the current of each battery module to reduce voltage differences and achieve automatic balancing. If the voltage difference is too large and automatic compensation is ineffective, it is recommended, while ensuring safety, to perform individual low-power charging or discharging operations on the affected modules to quickly reduce the voltage difference.

13.3.64 Event E064

⚠ QUALIFIED PERSON

Event message:

- Communication Anomaly in Gas Detector

Explanation:

The data connection between the system and the gas detector has been interrupted.
Currently, this is only a status message and has no impact on other system functions; however, it will deactivate the gas monitoring function, so action must be taken promptly.

Corrective measures:

- Check the communication cables of the gas detector (e.g., RS485) to ensure that they are securely connected and have no looseness, breaks, or physical damage. Make sure the cable is connected to the correct port.

- Log in to the system backend and check that the communication parameters of the gas detector (e.g., port number, device address, baud rate) match the information on the device's type label and the project configuration requirements.
- Make sure the gas detector is supplied with electric current correctly and that it is functioning normally.
- After completing the above checks, restart both the gas detector and the system controller to restore communication.

13.3.65 Event E065

⚠ QUALIFIED PERSON

Event message:

- AC circuit breaker disconnected

Explanation:

The system has detected that the AC miniature circuit breaker is in the open (tripped) state. If a charging or discharging process is currently in progress, it will be stopped.

Corrective measures:

- Make sure the miniature circuit breaker is in the "OFF" position.
- Check if the circuit breaker was switched off by maintenance personnel intentionally.
- Check if a signal from another DI error has caused the circuit breaker to open.
- After ensuring that there are no electrical short circuits, insulation errors or other errors on site, manually switch the circuit breaker to the "ON" position. The warning message will be cleared automatically.

13.3.66 Event E066

⚠ QUALIFIED PERSON

Event message:

- Cabinet door opened

Explanation:

The system has detected that the battery cabinet door is not closed.
This warning is for status notification purposes only and does not affect the core functions of the system. However, a timely response is necessary to ensure the safety of the device and to prevent the ingress of foreign objects.

Corrective measures:

- Check if the battery cabinet door is open due to a routine inspection or maintenance work being performed by on-site personnel.
- During normal operation: Close the cabinet door after completing the work.
- In the event of abnormal opening: Check that the lock and hinges of the cabinet door are working properly.
- If the door is closed, but the warning message is still displayed:

  The door's magnetic sensor or its cabling may be misaligned, defective, or not working properly.
- Close and lock the cabinet door completely; the alarm will be cleared automatically.

13.3.67 Event E067

⚠ QUALIFIED PERSON

Event message:

- Battery Group Enable but Inactive

Explanation:

The system has detected that a specific battery module in the pack is in the "Ready" state, but is not in operation. For safety reasons, the module's DC contactor did not close, thus isolating it from the system and preventing it from participating in the charging or discharging process.
This warning is for status notification purposes only and is intended to alert maintenance personnel to be aware of the faulty module.

Corrective measures:

- Check the system warning interface or the battery module monitoring page to see which specific module (module number) is reporting this status.
- Check the system warning interface or the battery module monitoring page to identify the specific, direct cause of the error that led to the module's isolation (e.g., contactor overheating).
- Based on the specific error information obtained, perform a targeted inspection and repair.
- Once the underlying error is rectified, the module automatically exits the isolation state, its DC contactor closes, and this alarm is automatically cleared.

13.3.68 Event E068

⚠ QUALIFIED PERSON

Event message:

- Battery Group Fault Isolation

Explanation:

The system detected that a specific battery module in the pack had a error (e.g., severe overtemperature, overcurrent, overvoltage) and was isolated to protect it by opening its DC contactor to take it out of service.
This warning is a resulting status message and is reported simultaneously with the specific error that caused the isolation.

Corrective measures:

- Check the system warning interface for the specific battery module number that has been isolated.
- Check the specific error message that appeared at the same time as the battery module isolation (e.g., Module XX severe overheating), which is the direct cause behind the isolation.
- Ignore this warning and focus on troubleshooting and resolving the specific error that was reported at the same time.
- Once the underlying serious error of the battery module has been fully rectified, the system will automatically exit the isolation state, the module will resume operation, and this warning will be automatically cleared.

13.3.69 Event E069

⚠ QUALIFIED PERSON

Event message:

- Battery Group1 Alarm Isolation

Explanation:

The system has detected a specific alarm in a battery module (e.g., slight overtemperature, overcurrent, overvoltage) and, if the corresponding alarm isolation switch function is activated, has automatically isolated the module (opened its DC contactor) to take it out of service.
This alarm is a status message and appears simultaneously with the original alarm that triggered the isolation.

Corrective measures:

- Check the system warning interface for the battery module number that has been isolated.
- Check the original warning that was reported at the same time as the battery module warning isolation (e.g., Module XX slight overtemperature), which is the direct cause behind the isolation.
- Investigate and resolve the relevant disturbance using the original alarm information.
- Once the underlying disturbance is resolved, the module automatically exits the isolation state, resumes operation, and this alarm is automatically cleared.

13.3.70 Event E070

⚠ QUALIFIED PERSON

Event message:

- Battery Stack Startup Failure

Explanation:

During the start-up process, the system may fail to complete the start-up process for reasons such as a pre-charging error, a contactor malfunction, or a battery condition that does not meet requirements, resulting in the battery stack not functioning properly. As a result, the system temporarily enters an error state, which is automatically cleared once the system has stabilized. If multiple errors occur in succession, the error is upgraded to a "Battery stack start restricted" error.

Corrective measures:

- Access the system's historical events interface to review the specific error codes or direct causes recorded during this startup error (e.g., "Pre-charge timeout", "XX contactor controller error").
- Investigate and resolve the problem based on the exact cause specified in the logs.
- If the system transitions from a startup state to an error state, this error can be automatically corrected.

13.3.71 Event E071

⚠ QUALIFIED PERSON

Event message:

- Battery Stack Shutdown Failure

Explanation:

During the shutdown process, the system may fail to complete the shutdown process for reasons such as excessive power consumption or a failure of the contactor controller. As a result, the system temporarily enters an error state, which is automatically cleared once the system has stabilized.

Corrective measures:

- Access the system's historical events interface to review the specific error codes or direct causes recorded during this stop failure (e.g., "Excessive current", "XX contactor controller error").
- Investigate and resolve the problem based on the exact cause specified in the logs.
- If the system transitions from a shutdown state to an error state, this error can be automatically corrected.

13.3.72 Event E072

⚠ QUALIFIED PERSON

Event message:

- Failure of Control Contactor in Battery Stack

Explanation:

The system has detected that a battery module in the battery pack has reported a contactor controller error. This alarm is a system-level summary indicating a disturbance where a contactor is not functioning normally, and the system has entered an error protection state.

Corrective measures:

- Using the event list, determine which battery module triggered the event message.
- Perform trouble shooting on the battery module identified for the respective contactor error code (e.g. E128) in accordance with the manual. This generally includes checking the contactor's feedback contacts, the control circuit, and the mechanical condition of the module.
- Once the issue regarding the battery module contactor status discrepancy is resolved, its specific sub-error (e.g., E128) will be reset. Once the contactor status for all battery modules returns to normal (i.e., matches the commands), this system-level collective alarm will be automatically reset.

13.3.73 Event E073

⚠ QUALIFIED PERSON

Event message:

- SD Card Ejection

Explanation:

The system has detected that the device's SD memory card storage medium is no longer present. This alarm serves only as a status message and has no impact on the core operation of the system. After removing the SD memory card, access to historical data is limited. Newly generated operating data is automatically and temporarily stored in the device's internal memory and transferred to the SD memory card after it is reinserted.

Corrective measures:

- Check if the SD memory card was removed manually. If this is the case, reinsert it.
- If the SD memory card remains in the slot, remove it completely, clean the contacts with a water-free alcohol wipe, check the slot for foreign objects, and then firmly reinsert the card.
- This message will be automatically deleted as soon as the SD memory card is recognized by the system again. You can check the status in the data query interface.
- If the message persists after repeated insertion attempts, the SD memory card or the card slot hardware may be damaged. In this case, contact Service.

13.3.74 Event E074

⚠ QUALIFIED PERSON

Event message:

- Charge Overcurrent

Explanation:

Overcurrent

Corrective measures:

- Reduce the current.

13.3.75 Event E075

⚠ QUALIFIED PERSON

Event message:

- Discharge Overcurrent

Explanation:

Discharge overcurrent

Corrective measures:

- Reduce the current.

13.3.76 Event E076

⚠ QUALIFIED PERSON

Event message:

- Battery Overvoltage

Explanation:

Battery overvoltage

Corrective measures:

- Discharge or wait until the voltage has increased again.

13.3.77 Event E077

⚠ QUALIFIED PERSON

Event message:

- Battery Undervoltage

Explanation:

Battery undervoltage

Corrective measures:

- Charge

13.3.78 Event E078

⚠ QUALIFIED PERSON

Event message:

- Battery Charge at High Temperature

Explanation:

Battery charging at high temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.79 Event E079

⚠ QUALIFIED PERSON

Event message:

- Battery Charge at Low Temperature

Explanation:

Battery charging at low temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.80 Event E080

⚠ QUALIFIED PERSON

Event message:

- Total Voltage Too High

Explanation:

Total voltage too high

Corrective measures:

- Discharge or wait until the voltage has normalized again.

13.3.81 Event E081

⚠ QUALIFIED PERSON

Event message:

- Total Voltage Too Low

Explanation:

Total voltage too low

Corrective measures:

- Charge

13.3.82 Event E082

⚠ QUALIFIED PERSON

Event message:

- Connector Temperature Too High

Explanation:

Connector temperature too high

Corrective measures:

- Wait until the temperature is back to normal.

13.3.83 Event E083

⚠ QUALIFIED PERSON

Event message:

- Access Control Alarm Signal

Explanation:

Access control alarm signal

Corrective measures:

- Close the battery cabinet door.

13.3.84 Event E084

⚠ QUALIFIED PERSON

Event message:

- Decreased Voltage Consistency

Explanation:

Decreased voltage consistency

Corrective measures:

- Contact the Service.

13.3.85 Event E085

⚠ QUALIFIED PERSON

Event message:

- Uneven Temperature Field Distribution

Explanation:

Uneven temperature field distribution

Corrective measures:

- Wait until the temperature is back to normal.

13.3.86 Event E086

⚠ QUALIFIED PERSON

Event message:

- Abnormal Capacity Fade

Explanation:

Abnormal capacity fade

Corrective measures:

- Perform a complete charge-discharge calibration.

13.3.87 Event E087

⚠ QUALIFIED PERSON

Event message:

- BMU Internal Temperature Sampling Disconnected Alarm

Explanation:

Interrupted BMU indoor temperature recording

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.

13.3.88 Event E088

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Communication Exception

Explanation:

Air conditioner communication error

Corrective measures:

- Check the AC cabling.

13.3.89 Event E089

⚠ QUALIFIED PERSON

Event message:

- Abnormal Balancing Feedback Circuit in BMU

Explanation:

Abnormal balancing feedback circuit in the BMU

Corrective measures:

- Restart the battery.
- If the message remains, contact Service.

13.3.90 Event E090

⚠ QUALIFIED PERSON

Event message:

- BMU Balancing Control Circuit Malfunction

Explanation:

BMU balancing control circuit malfunction

Corrective measures:

- Restart the battery.
- If the message remains, contact Service.

13.3.91 Event E091

⚠ QUALIFIED PERSON

Event message:

- High Voltage Pre-Alarm

Explanation:

The maximum cell voltage exceeds the threshold.

Corrective measures:

- Discharge or wait until the voltage has increased again.

13.3.92 Event E092

⚠ QUALIFIED PERSON

Event message:

- Low Voltage Pre-Alarm

Explanation:

The minimum cell voltage is below the threshold.

Corrective measures:

- Charging

13.3.93 Event E093

⚠ QUALIFIED PERSON

Event message:

- Battery Discharge at High Temperature

Explanation:

Battery discharge at high temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.94 Event E094

⚠ QUALIFIED PERSON

Event message:

- Battery Discharge at Low Temperature

Explanation:

Battery discharge at low temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.95 Event E095

⚠ QUALIFIED PERSON

Event message:

- Instantaneous Charge Overcurrent Protection

Explanation:

The charging current of the system exceeds the threshold.

Corrective measures:

- Reduce the current.

13.3.96 Event E096

⚠ QUALIFIED PERSON

Event message:

- Discharge Short-Circuit Protection

Explanation:

The discharging current of the system exceeds the threshold.

Corrective measures:

- Reduce the current.

13.3.97 Event E097

⚠ QUALIFIED PERSON

Event message:

- BMU Cell Voltage Data Error

Explanation:

BMU cell voltage data error

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.
- Check the communication cabling from the PACK to the main control box.

13.3.98 Event E098

⚠ QUALIFIED PERSON

Event message:

- BMU Cell Temperature Data Error

Explanation:

BMU cell temperature data error

Corrective measures:

- Check if the sampling board in the corresponding PACK is faulty.
- Check the communication cabling from the PACK to the main control box.

13.3.99 Event E099

⚠ QUALIFIED PERSON

Event message:

- Charge Temperature High Pre-alarm

Explanation:

Pre-warning at high charging temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.100 Event E100

⚠ QUALIFIED PERSON

Event message:

- Charge Temperature Low Pre-alarm

Explanation:

Pre-warning at low charging temperature

Corrective measures:

- Wait until the temperature is back to normal.

13.3.101 Event E101

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner High Temperature Alarm

Explanation:

Warning due to high temperature of the air conditioner.

Corrective measures:

- Contact the Service.

13.3.102 Event E102

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner High Humidity Alarm

Explanation:

Warning at high humidity of the air conditioner.

Corrective measures:

- Contact the Service.

13.3.103 Event E103

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Coil Freeze Protection

Explanation:

Frost protection for air conditioner heat exchanger

Corrective measures:

- Contact the Service.

13.3.104 Event E104

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Coil Temperature Sensor Failure

Explanation:

Air conditioner heat exchanger temperature sensor failure

Corrective measures:

- Contact the Service.

13.3.105 Event E105

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Condensate Temperature Sensor Failure

Explanation:

Air conditioner condensate temperature sensor failure

Corrective measures:

- Contact the Service.

13.3.106 Event E106

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Indoor Temperature Sensor Failure

Explanation:

Air conditioner indoor temperature sensor failure

Corrective measures:

- Contact the Service.

13.3.107 Event E107

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner Humidity Sensor Failure

Explanation:

Air conditioner humidity sensor failure

Corrective measures:

- Contact the Service.

13.3.108 Event E108

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner High Pressure Alarm

Explanation:

Warning signal for high pressure in the air conditioner

Corrective measures:

- Contact the Service.

13.3.109 Event E109

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner High Pressure Lockout

Explanation:

Air conditioner high pressure block

Corrective measures:

- Contact the Service.

13.3.110 Event E110

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner AC Over-voltage

Explanation:

Air conditioner AC overvoltage

Corrective measures:

- Contact the Service.

13.3.111 Event E111

⚠ QUALIFIED PERSON

Event message:

- Air Conditioner AC Under-voltage

Explanation:

Air conditioner AC undervoltage

Corrective measures:

- Contact the Service.

13.3.112 Event E112

⚠ QUALIFIED PERSON

Event message:

- Charging overcurrent limit exceeded

Explanation:

The limit for charging overcurrent has been exceeded.

Corrective measures:

- Contact the Service.

13.3.113 Event E113

⚠ QUALIFIED PERSON

Event message:

- Discharge current limit exceeded

Explanation:

The limit for discharge current has been exceeded.

Corrective measures:

- Contact the Service.

13.3.114 Event E114

⚠ QUALIFIED PERSON

Event message:

- BMU count detection failed

Explanation:

Automatic addressing failed.

Corrective measures:

- Check the BMU communication and the addressing cabling.

13.3.115 Event E115

⚠ QUALIFIED PERSON

Event message:

- Maintenance switch disconnected

Explanation:

The DC circuit breaker is not connected. If alternating current remains present after a tripping event, this can lead to events E019, E020 or E029.

Corrective measures:

- Check the DC circuit breaker.

13.3.116 Event E116

⚠ QUALIFIED PERSON

Event message:

- Water immersion

Explanation:

Faulty water signal. If alternating current remains present after the tripping event, this can lead to events E019, E020 or E029.

Corrective measures:

- Check the water ingress signal.

13.3.117 Event E117

⚠ QUALIFIED PERSON

Event message:

- Surge Protector

Explanation:

Surge protection device signal error.

Corrective measures:

- Check the overvoltage protection.

13.3.118 Event E118

⚠ QUALIFIED PERSON

Event message:

- The concentration of flammable gas is too high

Explanation:

The concentration of the flammable gas is too high.

Corrective measures:

- Check the concentration of the flammable gas in the battery cabinet.

13.3.119 Event E119

⚠ QUALIFIED PERSON

Event message:

- Communication line break of flammable gas detector

Explanation:

Interruption of the communication cable on the detector for flammable gases.

Corrective measures:

- Check the cabling of the detector for flammable gases in the battery cabinet.

13.3.120 Event E120

⚠ QUALIFIED PERSON

Event message:

- Communication with slave LCU disconnected

Explanation:

The connection to the slave LCU has been interrupted.

Corrective measures:

- Check the cabling of the slave LCU.

13.3.121 Event E121

⚠ QUALIFIED PERSON

Event message:

- Multiple host LCU device conflict

Explanation:

The system has detected several LCUs (Local Control Units) that are configured with the "Master" role that are present in the network at the same time. To prevent system disturbances due to controller conflicts, the system has triggered an error and performed a safety shutdown.

Corrective measures:

- Log into the configuration interface of each LCU device one after another and check and confirm the parameters "Device role" or "Master/Slave".
- Ensure that within the entire system, exactly one device has this parameter set to "Master"; the parameter for all other devices must be set to "Slave".
- Upon confirmation of the changes, the LCU device will be restarted automatically so that the configuration takes effect. Once the configuration takes effect, the system automatically restores operation following this error.

13.3.122 Event E122

⚠ QUALIFIED PERSON

Event message:

- Charging current limiting value control failure

Explanation:

The system has detected that the actual charging current continuously exceeds the current limit setpoint specified by the BMS, whereby the deviation exceeds the permissible range, indicating an error in the current control. The system has triggered an error and performed a protective shutdown.

Corrective measures:

- On the PCS monitoring interface, check whether the charging current limit value output by the BMS in real time has been correctly received, and ensure that this value matches the setting on the BMS side.
- If the command has been received correctly, check for irregularities in the internal current control logic, the power components, and the drive circuits of the PCS that prevent the implementation of the current limiting.
- If the message remains, contact Service.

13.3.123 Event E123

⚠ QUALIFIED PERSON

Event message:

- Discharging current limiting value control failure

Explanation:

The system has detected that the actual discharging current continuously exceeds the current limit setpoint specified by the BMS, whereby the deviation exceeds the permissible range, indicating an error in the current control. The system has triggered an error and performed a protective stop.

Corrective measures:

- On the PCS monitoring interface, check whether the discharging current limit value output by the BMS in real time has been correctly received, and ensure that this value matches the setting on the BMS side.
- If the command has been received correctly, check for irregularities in the internal current control logic, the power components, and the drive circuits of the PCS that prevent the implementation of the current limiting.
- If the message remains, contact Service.

13.3.124 Event E124

⚠ QUALIFIED PERSON

Event message:

- Smoke Alarm

Explanation:

The smoke detector has been triggered.
If grid current remains present after the tripping event, this can lead to events E019, E020 or E029.

Corrective measures:

- Check the cause of the smoke and the status of the smoke detector.

13.3.125 Event E125

⚠ QUALIFIED PERSON

Event message:

- Fire Suppression Signal Triggered

Explanation:

The fire suppression signal has been triggered.
If alternating current remains present after the tripping event, this can lead to events E019, E020 or E029.

Corrective measures:

- Check the status of the fire suppression system and determine whether there is a false alarm or an actual fire.

13.3.126 Event E126

⚠ QUALIFIED PERSON

Event message:

- Emergency Stop Signal Triggered

Explanation:

Emergency switch pressed. If alternating current remains present after the tripping event, this can lead to events E019, E020 or E029.

Corrective measures:

- Check the emergency switch or emergency switch electric circuit.

13.3.127 Event E127

⚠ QUALIFIED PERSON

Event message:

- Battery Stack Leakage

Explanation:

The system has detected that a battery module in the battery pack has reported an insulation error. This is a system-level error alarm indicating an insulation disturbance. The system has activated an error protection state, thereby preventing charging and discharging.

Corrective measures:

- First, via the battery pack's monitoring interface, use the detailed information regarding this alarm or the associated alarm list to identify the exact number of the battery module that reported the insulation error.
- Based on the specific insulation error code (e.g. E050 or E054) reported by this module, follow the corresponding, more detailed troubleshooting instructions in the manual. This generally includes checking the electrical insulation of this module's batteries, its distribution board, and the corresponding PCS branch circuit.
- Once the insulation problem for this battery module has been resolved, its specific insulation error alarm will be reset. As soon as the insulation status of all battery modules has returned to normal, this system-wide collective alarm will be automatically reset.

13.3.128 Event E128

⚠ QUALIFIED PERSON

Event message:

- Control Failure in Battery Pack #X Contactor

Explanation:

During the control of the switching operation (Close/Open), the system did not receive the correct status feedback signal from the main contactor or pre-charge contactor of battery module X# within the specified time, resulting in a failure of the control process. The system subsequently entered an error state.

Corrective measures:

- First, execute a stop command via the system interface to ensure that the module affected and the entire system are in a safe state.
- Control circuit check: Measure the voltage at the contactor coil and check the control relay and the cabling.
- Feedback circuit check: Ensure that the auxiliary contact used for status feedback and the corresponding cabling are functioning correctly.
- Repair the cabling or replace the defective contactor / feedback part. After the repair, try to actuate the contactor from the system again to ensure that both its function and the feedback signal are back to normal.
- The error will be automatically reset as soon as the contactor has performed a correct action successfully.

13.3.129 Event E129

⚠ QUALIFIED PERSON

Event message:

- Anomaly in Battery Pack #X Contactor

Explanation:

The system has detected that the actual feedback status of the DC contactor for the battery module X# does not match the status expected by the system based on the current operating mode. For example, the system command is "close" but the feedback is "open," or the command is "open" but the feedback is "close". This deviation leads to the disconnection of the affected module and triggers a system error state.

Corrective measures:

- Check the actual physical state (on/off) of the DC contactor on the enclosure of the affected battery module and compare this with the feedback signal displayed in the system.
- If the physical state does not match the feedback signal, first check whether the auxiliary feedback contacts and their cabling are functioning correctly.

  If the physical state matches the feedback signal but does not correspond to the system command, first check the control circuit and communication cables (e.g. CAN bus) for disturbances or interruptions.
- After resolving any cabling issues, try executing a status change command (e.g. "Start" or "Disconnection") on the system again and observe whether the function of the contactor and the feedback return to normal.
- Once the contactor executes the command correctly and the feedback signal matches the expected state, the error is automatically reset.

13.4 Battery end of life

If the state of health (SoH) of the battery is 70% or the maximum nominal energy throughput has been reached, the battery is considered to have reached to the end of its life.

When a battery reaches the end of its life, the battery management system transitions into a permanent locked condition. The battery management system display shows **Permanent System Lock**.

To perform a standardized capacity determination and assess the remaining system availability, Service must be notified.

Also see:

- Decommissioning ⇒ page 191
- Disconnecting from voltage sources ⇒ page 118
- Disposal ⇒ page 203

13.5 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 "Disconnecting the Inverter from Voltage Sources", page 118).
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 Decommissioning

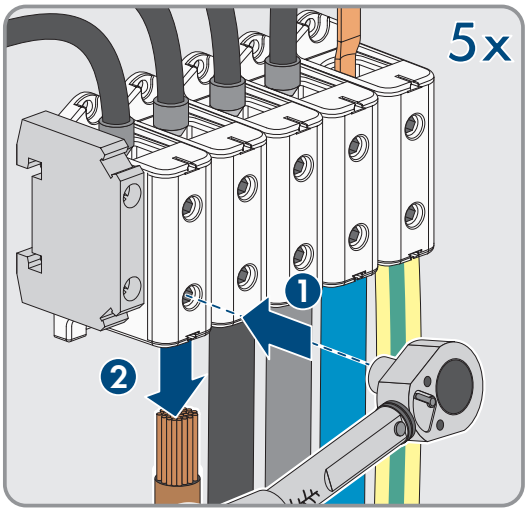
14.1 Disconnect the terminals on the inverter

⚠ QUALIFIED PERSON

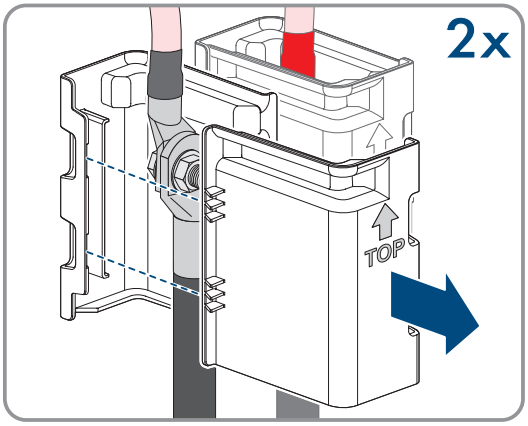
To decommission the product completely upon completion of its service life, first disconnect all connections from the product.

Procedure:

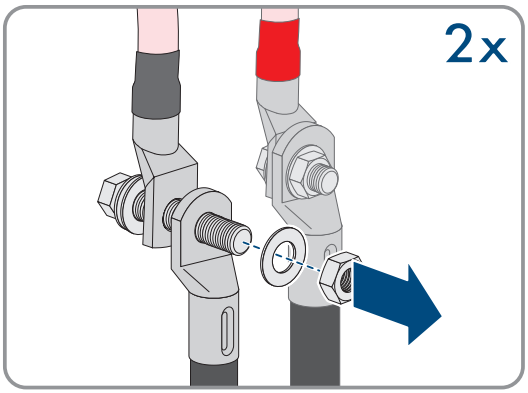
1. Disconnect the product from voltage sources (see Section 11.1 "Disconnecting the Inverter from Voltage Sources", page 118).
2. Remove the AC cable from the inverter. To do so, loosen the screws (AF5) and pull the cables out of the terminal.



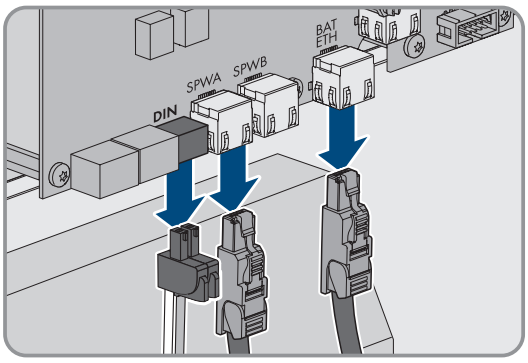
3. Remove the protection elements against contact from the terminal lugs for the DC connection. To do so, unlock the side brackets.



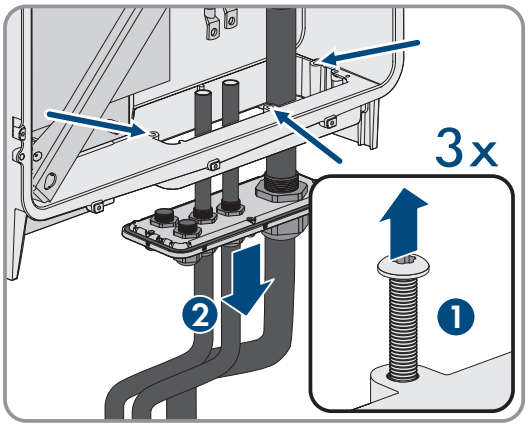
4. Remove the DC cable connection. Loosen the hex nuts (AF10) and remove the combined hexagon head screw (AF16).



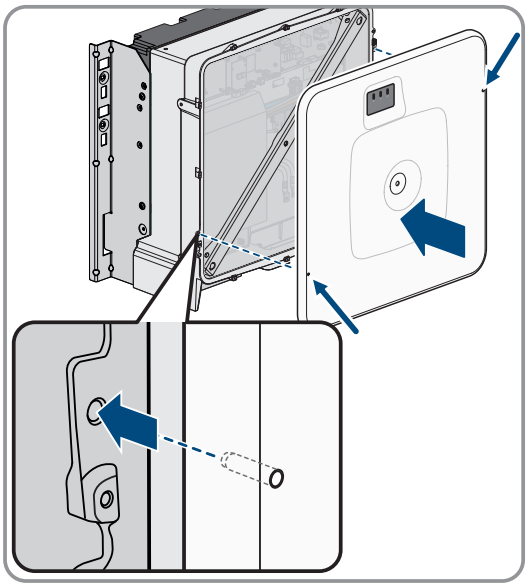
5. Remove the network cables, the battery data cables and the signal cables from the sockets.
6. Remove all cable glands from the connecting plate. To do so, unscrew the counter nuts from inside and remove the cable glands from the opening.



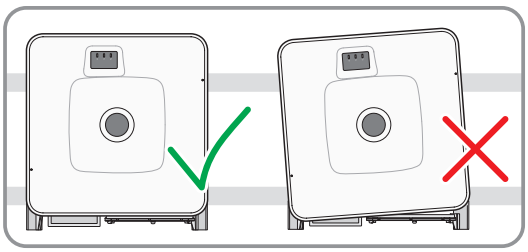
7. Dismantle the connecting plate. To do so, unscrew the three screws (TX40).



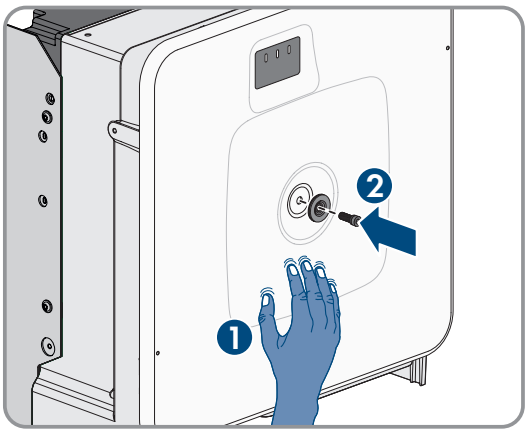
8. Position the enclosure lid. The two guide pins on the enclosure lid must slide into the guide openings on the enclosure lid.



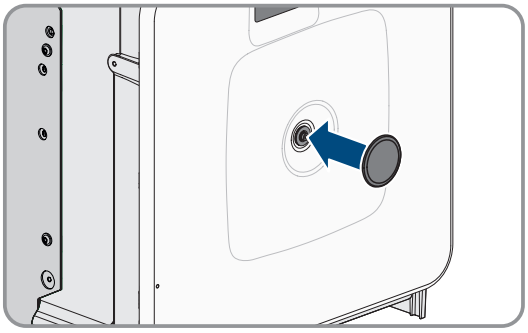
9. Ensure that the cover sits straight on the enclosure.



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 14.3 "Disassembling the Inverter", page 193).



14.2 Disconnecting the Connections on the Battery

⚠ QUALIFIED PERSON

1. Disconnect the battery from voltage sources (see Section 11.2 "Disconnecting the Indoor Version Battery from Voltage Sources", page 120) (see Section 11.3 "Disconnecting the Outdoor Version Battery from Voltage Sources", page 122).
2. At each battery cabinet, disconnect the DC cables leading to the inverter or other battery cabinets.
3. At each battery cabinet, disconnect the communication cables leading to the inverter or other battery cabinets.
4. At each battery cabinet, disconnect the AC cables of the voltage supply.
5. On the central ground point of each battery cabinet, undo the bolted ground conductor connection (hexagon socket, AF13).

14.3 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.

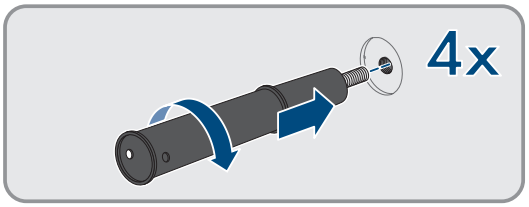
To decommission the inverter completely upon completion of its service life, disassemble the inverter as described as follows.

Requirements:

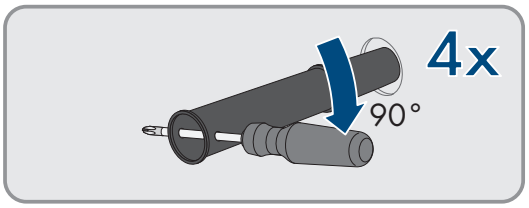
- All connections of the inverter are disconnected.
- Original packaging or packaging suitable for the weight and dimensions of the inverter is available.
- A pallet is available.
- Mounting material for attaching the packaging on the pallet is available (e.g., tie-down straps).
- All transport handles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

Procedure:

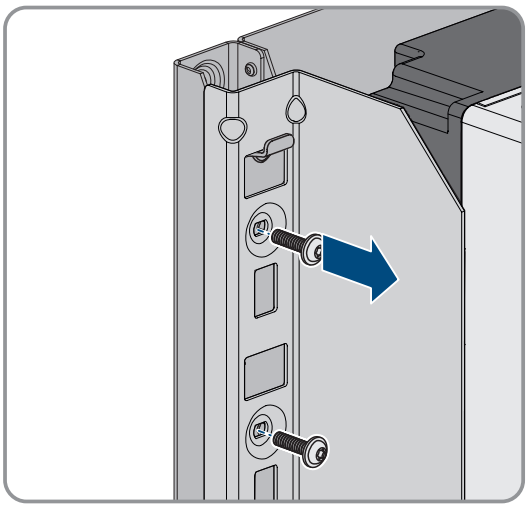
1. Screw the transport handles as far as they will go into the tapped holes on the right- and left-hand side until they lie flush with the enclosure. When doing so, ensure that the carrying handles are screwed into the threaded holes so that they are perfectly straight. If the transport handles are not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



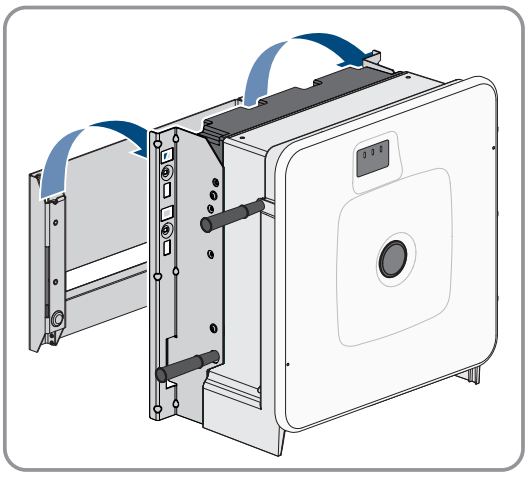
2. Insert a screwdriver into the holes in the transport handle and turn the screwdriver through 90°. This ensures that the transport handles are securely tightened.



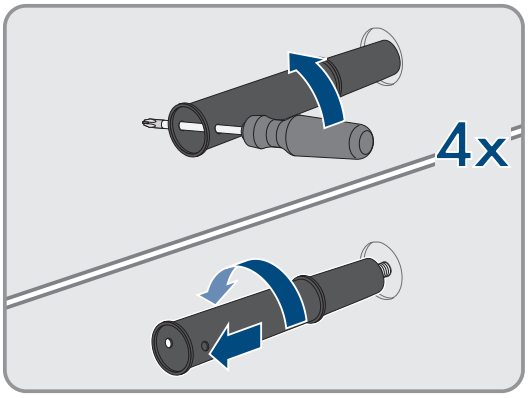
3. If the product should be lifted from the mounting bracket with the help of a hoist, screw the eye bolts into the threads on the top of the product and attach the hoist to them. The hoist must be suitable for the weight of the product.
4. Unscrew the screw for securing the product to the mounting brackets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



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



6. Remove all 4 transport handles from the tapped holes. If necessary, insert a screwdriver into the holes on the transport handle and use the screwdriver to remove the transport handle.
7. If the product should be stored or shipped: Package the product and the wall mounting bracket. To do this, use original packaging or packaging suitable for the weight and size of the product and secure the packaging to the pallet with tension straps.
8. Dispose of the inverter, if necessary.



Also see:

- Disposal ⇒ page 203
- Disconnect the terminals on the inverter ⇒ page 191

14.4 Disassembling the Battery

⚠ QUALIFIED PERSON

⚠ WARNING

Risk of injury due to weight of the battery

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

- Transport and lift the battery carefully. Ensure the weight is considered during transportation.
- 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.

☐ Euro pallet for battery cabinet is available.

☐ Mounting material for attaching the packaging on the Euro pallets is available (e.g., tie-down straps).

Procedure:

1. Ensure that there are no more moving components (e.g., dropped screws) in the battery cabinet.
2. For outdoor version: Close the battery cabinet.
3. Loosen the fastening screws on the floor or foundation.
4. If the battery cabinet is to be stored or shipped, place the battery cabinet 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.
5. Secure all packages to the Euro pallet with tie-down straps.

Also see:

- Disposal ⇒ page 203
- Storage ⇒ page 201

15 Replace the inverter with a replacement device

⚠ QUALIFIED PERSON

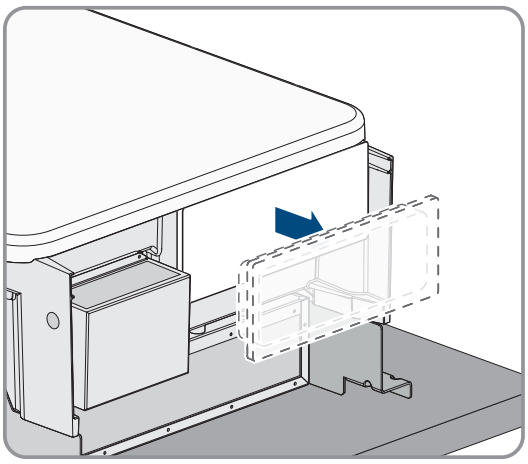
Under fault conditions, the inverter may need to be replaced. If this is the case, you will receive a replacement device from SMA Solar Technology AG. If you received a replacement device, replace the defective product with the replacement device as described below.

i Transport cover on the replacement device

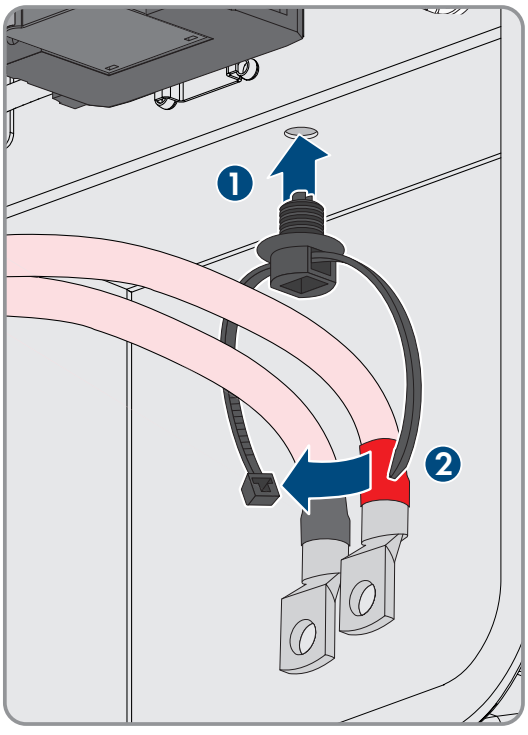
The cover of the enclosure of the replacement device can be a transport cover (see info on the cover of the enclosure). In this case, the transport cover must be exchanged for the cover of the enclosure of the defective product. The procedure for this is described below at the relevant point.

Procedure:

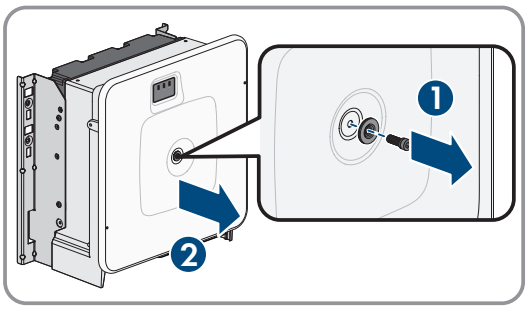
1. To simplify the configuration of the replacement device, create a backup file with the configuration of the defective product.
2. Reset defective product to default settings.
3. Disconnect the product connections of the defective product.
4. Disassemble the defective product.
5. Remove the transport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



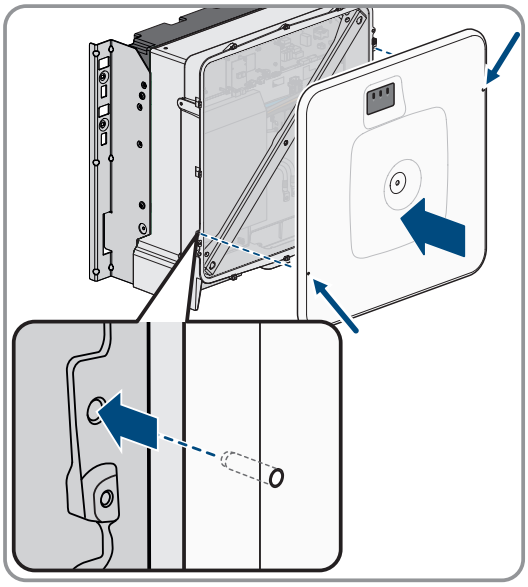
6. Secure the pre-configured DC connection cables in the defective product for transport. To do so, screw the supplied cable tie into the hole below the DC surge protection devices and place and tighten the cable tie around the DC connection cables.
7. Mount the replacement device and make the electrical connections as described in this document. Use the connection plate and the DC protection elements against contact of the defective product.
8. If you have to replace the cover of the enclosure: Remove the cover from the cover of the enclosure.



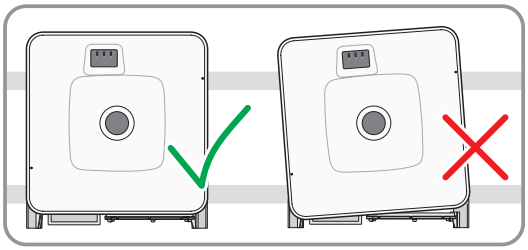
9. If you have to replace the cover of the enclosure: Unscrew the screw on the cover of the enclosure (hex socket, AF10) and remove the cover of the enclosure.
10. If you have to replace the cover of the enclosure: Carry out the following 4 steps.



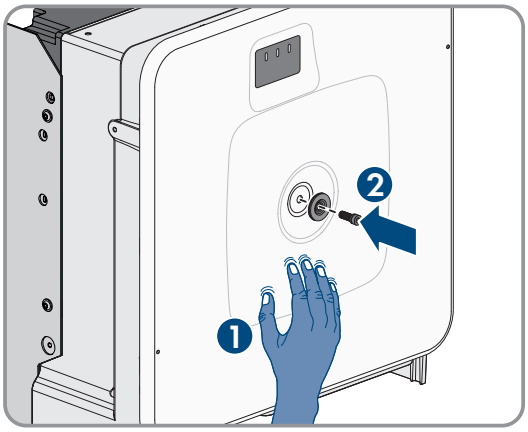
11. Position the cover of the enclosure. The two guide pins on the cover of the enclosure must slide into the guide openings on the enclosure.

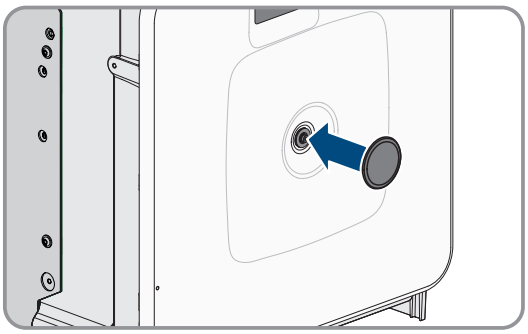


12. Ensure that the cover sits straight on the enclosure.



13. Hold the cover of the enclosure pressed against the enclosure and screw and tighten the screw (hex socket AF8, tightening torque: 18 Nm).





14. Place the cover on the screw in the cover of the enclosure.
15. Switch on the replacement device (see Section 9.5 "Switching the Inverter On", page 114).
16. Establish a connection to the user interface.
17. For the configuration, upload the backup file with the configuration of the defective product to the replacement product.
18. If the defective product had been registered by a communication product, replace it with the new product in the communication product.
19. Pack the defective product in the packaging of the replacement device.
20. Fasten the packaging to the pallet on which the replacement device was supplied using the reusable lashing straps.
21. Arrange for pick-up by SMA Solar Technology AG.

Also see:

- Disconnect the terminals on the inverter ⇒ page 191
- Mounting the Inverter ⇒ page 59
- Disassembling the Inverter ⇒ page 193

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 Installing an Additional Battery Cabinet

⚠ QUALIFIED PERSON

Requirements:

☐ The additional battery cabinet is of the same type and has the same storage capacity as the battery cabinets already installed.

Procedure:

1. Disconnect the battery and battery inverter from voltage sources (see Section 11 "Disconnecting from voltage sources", page 118).
2. Install the additional battery cabinet.
3. Ground the additional battery cabinet (see Section 8.7.2 "Earthing the battery cabinet", page 86).
4. Disconnect the DC cables, AC cables and CAN communication between all battery cabinets and to the inverter. If a DC distributor is present, disconnect the DC connections to the DC distributor.
5. Configure the additional battery cabinet as a secondary battery cabinet (see Section 9.3.8 "Configuring secondary battery cabinets", page 109).
6. Configure the primary battery cabinet (see Section 9.3.9 "Configuring the primary battery cabinet with multiple battery cabinets", page 110).
7. Establish all electrical connections Connecting the Battery.
8. Commission the battery (see Section 9.3 "Commissioning the Battery", page 104).
9. Commission the inverter.
10. Reconfigure the inverter.

Also see:

- Switching the Inverter On ⇒ page 114
- Safety when Extending the Battery ⇒ page 200

17 Storage

17.1 Specifications for Battery Storage

⚠ WARNING

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

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

- Put the battery into operation within the specified time limits.
- If the battery is not put into operation within the specified time limits, contact Service to request recyclization of the battery-storage system.
- Before commissioning the system, verify that the battery is not deeply discharged.
- Do not commission the system if the battery is deeply discharged.
- If the battery is deeply discharged, contact Service.

Each individual battery cabinet can potentially cause a fire. Any damage to a battery cabinet will increase the fire risk.

To minimize the risks during storage, the following points must be observed:

- Do not remove the battery modules from the battery cabinet.
- The battery cabinet must be stored as a whole in a dry indoor environment.
- Do not tilt the battery cabinet and place it on a level surface suitable for its weight.
- Check the condition of the battery at least every 12 months.
- For long-term storage, check the battery state of charge at least every 6 months. The state of charge should be kept between 30% and 50%.
- Observe the locally applicable fire regulations at all times during storage.
- Clearly label the storage room from the outside as a lithium-ion battery storage location.

17.2 Climatic Requirements for the Storage Location

The following climatic requirements for the storage location must always be observed. You can find the manufacturing date on the packaging box (**Manufacturing Date**) or on the front side of the enclosure. If the battery has undergone recyclization, the date of the last cyclization date (**Last Cyclization Date**) can be found on the battery.

Humidity	Storage temperature	Maximum storage period
5% to 80%	Recommended: 20°C to 25°C Required: -45°C to 25°C	18 months after manufacture or cyclization, maximum up to the **best before date**

17.3 Storing the Battery

⚠ QUALIFIED PERSON

1. Charge or discharge each battery cabinet to an **SOC** of 45%.
2. Disconnect the battery from voltage sources (see Section 11 "Disconnecting from voltage sources", page 118).
3. Disconnect the connections on the battery (see Section 14.2 "Disconnecting the Connections on the Battery", page 193).
4. Observe the battery storage requirements (see Section 17.1 "Specifications for Battery Storage", page 201).
5. 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.

6. The battery should be cycled no later than 18 months after manufacture and no later than before the **best before date**.
7. Before commissioning, check whether the battery is deeply discharged. Note the deep discharge protection limits.
8. If the battery is deeply discharged, contact Service.

17.4 Requesting Recyclization of a Battery

If the battery is not commissioned within 18 months of manufacture or cyclization, request recyclization of the battery storage system. Contact the Service.

17.5 Procedure in case of fire

In case of fire, call the fire department immediately. Before use, refer to the storage conditions for lithium-ion batteries.

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 Providers for the disposal of batteries

The latest version of this document including the following table can be found in PDF format at www.SMA-Solar.com.

Country	Supplier	Procedure
Germany	GRS Batterien: www.grs-batterien.de SMA Solar Technology AG is cooperating with the Stiftung Gemeinsames Rücknahmesystem Batterien (Foundation Joint Collection Scheme for Batteries, known as GRS Batterien) for the disposal of old lithium-ion batteries. All batteries put on the market by SMA Solar Technology AG can be disposed of via GRS Batterien.	As a battery installer, you are obliged to take back and dispose of this battery. After registering on the website of **GRS Batterien** and your registration as a disposal point, batteries can be collected at your location according to the Batteriegesetz (BattG)/ Batteries Act.
Italy	SMA Solar Technology AG: logistica@sma-italia.com	As an end user, please contact your installer for more information on proper battery disposal. As an installer, please contact the e-mail address provided for more information on proper battery disposal.
Australia, Austria, Belgium, Czech Republic, Denmark, Finland, France, Hungary, Netherlands, New Zealand, Poland, Portugal, Romania, Spain, Sweden, Switzerland	-	As an end user, please contact your installer for more information on proper battery disposal. As an installer, please contact your distributor for more information on proper battery disposal. As a distributor, you are obliged to take back and dispose of this battery.

18.3 Specifications for Battery Disposal

Batteries from PV systems can only be returned via specialist dealers. The special disposal conditions for lithium batteries must be observed. Just like all other batteries, lithium-ion batteries must under no circumstances be disposed of with residual waste. Please note the regulations for the disposal of old batteries that apply at the time of disposal:

- There is a legal obligation to return used batteries. Batteries must not be disposed of 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.
- Batteries may only be disposed of in accordance with the local regulations for used batteries valid at the time of disposal.
- Dangerous goods must be packed, transported and labeled for Europe in accordance with the regulations of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

- Regional providers for the disposal of used batteries must be contacted.

Also see:

- Providers for the disposal of batteries ⇒ page 203

18.4 Reporting damaged battery

- If a battery is damaged, immediately contact the installer or sales partner.

18.5 Disposing of the Battery

⚠ QUALIFIED PERSON

1. Immediately decommission the battery if damaged.
2. To avoid short circuits and a possible fire, the poles, loose cables and cable ends must be covered. To do this, use suitable insulation material (e.g. provided filler plugs or adhesive tape).
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.

19 Technical Data

19.1 Technical Data for Inverter

19.1.1 General Data

	STPS30-20 / STPS50-20
Width x height x depth	770 mm x 837.8 mm x 443.8 mm
Weight with cover of the enclosure and connecting plate	104 kg
Weight without cover of the enclosure and connecting plate	97 kg
Length x width x height of the packaging	1150 mm x 850 mm x 630 mm
Transport weight (including pallet)	129.5 kg
Operating temperature range without derating	-25°C to +45°C
Operating temperature range with derating	-25°C to +60°C
Maximum permissible value for relative humidity (non-condensing)	95%
Maximum operating altitude above mean sea level (MSL)	3000 m
Typical noise emission	69 dB(A)
Standby[7)]	25 W
Topology	Three-phase
Cooling method	Active
Number of external fans	3
Number of internal fans	2
Degree of protection (according to IEC 60529)	IP65
Climatic categories for the ongoing operation (as per IEC 60721-3-4)	4K4 / 4Z4 /4S2 / 4M3 / 4C2 / 4B2
Climatic category for storage (at a humidity range of 15% to 95%)	1K5
Climatic category for transport (as per IEC 60721-3-2)	2K3

Equipment

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

[7)] The self-consumption of the entire system during operation can be higher depending on the battery voltage and system design, typically between 80 and 200 W.

19.1.2 DC Input

	STPS30-20	STPS50-20
Maximum power DC power	30600 W	51000 W
Rated input voltage	750 V	750 V
Voltage range	200 V to 980 V	200 V to 980 V
DC voltage range at nominal power	200 V to 980 V	350 V to 980 V
Maximum usable input current	150 A	150 A
Maximum output current under fault conditions for 10 ms	491 A	491 A
Maximum inrush current	1 A	1 A
Battery type	Lithium-ion battery	Lithium-ion battery
Connectable conductor cross-section	50 mm² to 95 mm²	50 mm² to 95 mm²
Overvoltage category (according to IEC 60664-1)	II	II
Maximum fuse protection (all poles)	200 A	200 A

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[8)]	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[8)]	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at grid frequency 50 Hz[8)]	44 Hz to 55 Hz	44 Hz to 55 Hz
Operating range at grid frequency 60 Hz[8)]	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

[8)] 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
Surge protection device according to IEC 61643-11	Type 2 / class II	Type 2 / class II
Connectable conductor cross-section	16 mm² to 95 mm²	16 mm² to 95 mm²
External diameter of the connection cables	35 mm to 48 mm	35 mm to 48 mm
Grid configuration	TT / TN-C / TN-S / TN-C-S	TT / TN-C / TN-S / TN-C-S

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%

	STPS30-20 / STPS50-20
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 mm² to 95 mm²	20 Nm
Screws for attaching terminal lugs to DC connection (M10x40, AF16)	24 Nm ± 2 Nm
Screw enclosure lid (AF8, torque: 18 Nm)	18 Nm
Optional connection for additional grounding or equipotential bonding (M6x16, TX20)	6 Nm

19.1.8 System Limits

	STPS30-20 / STPS50-20
Number of additional devices supported if a Sunny Tripower Storage is the System Manager[9)]	10
Centralized commissioning of all devices in the system	Available
Remote parameterization of SMA devices with Sunny Portal powered by ennexOS	Available
Total number of supported devices when an EDMM-20 (SMA Data Manager M) is the System Manager[9)]	50

19.2 Technical Data for Battery

19.2.1 General Data for Battery

	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Width x height x depth of battery cabinet	780 x 2058 x 960 mm	1147 x 2058 x 994 mm	1150 x 2200 x 1375 mm	

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

	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Total weight of a battery cabinet	941 kg	1797 kg	1515 kg	2200 kg
Operating temperature, ambient temperature	0°C to 55°C		−25 °C to +55 °C	
Maximum installation height above MSL	3000 m		3000 m	
Degree of protection (according to IEC 60529)	IP20		IP55	
Protection class (according to IEC 62109-1)	I		I	
Pollution Degree	PD 2		PD 2	
Maximum noise emission	75 dB		75 dB	
System warranty	10 years[10)]		10 years[10)]	
Capacity warranty	10 years[10)]		10 years[10)]	
Recycling	Free collection of batteries within Germany		Free collection of batteries within Germany	
Certificates and standards for battery	CE, UN 38.3, VDE 2510, IEC 61000, IEC 62619, IEC 62477, IEC 60730, IEC 63056, REACH, RoHS		CE, UN 38.3, VDE 2510, IEC 61000, IEC 62619, IEC 62477, IEC 60730, IEC 63056, REACH, RoHS	
Cooling concept	Active air cooling		Integrated HVAC with active air conditioning	
Security features	–		Integration fire suppression system, gas/ smoke detection, thermal management	
Remote access and monitoring	Supports remote updates through the inverter and remote maintenance			
Corrosion protection class (according to ISO12944)	–		C3	

19.2.2 DC Connection

	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Energy (at 100% depth of discharge)	89 kWh	197 kWh	107 kWh	197 kWh
Nominal voltage	320 V	704 V	384 V	704 V
Voltage range	280 V to 360 V	616 V to 792 V	336 V to 432 V	616 V to 792 V
Nominal charge/discharge current	180 A	180 A	180 A	180 A
Maximum C rate	1C	1C	1C	1C

[10)] Only valid after system registration with SMA has been carried out. Battery: ten-year capacity warranty. The SMA warranty conditions apply.

	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Overvoltage category	III	III	III	III
Cell	Lithium Iron Phosphate (LFP)	Lithium Iron Phosphate (LFP)	Lithium Iron Phosphate (LFP)	Lithium Iron Phosphate (LFP)
Anticipated cycles	12000	12000	12000	12000
Guaranteed cycles	8000	8000	8000	8000
Self-consumption in standby mode (without battery inverter)	40 W, at less than 27°C	40 W, at less than 27°C	300 W, at less than 27°C	300 W, at less than 27°C
AC auxiliary connection (AUX IN)	1.2 kW, single-phase	1.2 kW, single-phase	3.5 kW, single-phase	3.5 kW, single-phase

19.2.3 Commissioning deadlines

	CS-xx-IN-30 / CS-xx-OUT-30
Latest commissioning after manufacture	18 months
Latest commissioning after delivery	8 months

19.2.4 Efficiency

	CS-xx-IN-30 / CS-xx-OUT-30
Maximum battery efficiency	98 %

19.2.5 Climatic Conditions

	CS-xx-IN-30	CS-xx-OUT-30
Optimum operating and storage temperature, ambient temperature	22°C to 25°C	22°C to 25°C
Maximum operating temperature, ambient temperature	0°C to 55°C	−25 °C to 55 °C
Maximum temperature for long-term storage, ambient temperature	−45 °C to 25 °C	−45 °C to 25 °C
Humidity (non-condensing)	0% to 95%	0% to 95%
Cooling concept	Active air cooling	Integrated air conditioner for active climate control

19.2.6 Battery extendability

	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Number of battery cabinets per inverter	1 to 4	1 to 4	1 to 4	1 to 4
Permitted battery types for parallel connection	CS-89-IN-30	CS-197-IN-30	CS-107-OUT-30	CS-197-OUT-30
Capacity per battery cabinet	89 kWh	197 kWh	107 kWh	197 kWh

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
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
CS-107-OUT-30	Additional battery cabinet for outdoor version	CS-107-OUT-30
CS-197-OUT-30	Additional battery cabinet for outdoor version	CS-197-OUT-30
CS-89-IN-30	Additional battery cabinet for indoor version	CS-89-IN-30
CS-197-IN-30	Additional battery cabinet for indoor version	CS-197-IN-30
SMA Commercial DC Connection 10 m	Cable set for the connection between the battery cabinet and the inverter Length of DC lines, grounding cable, and communication cable: 10 m	CS-CON-10-30
SMA Commercial DC Connection 15 m	Cable set for the connection between the battery cabinet and the inverter Length of DC lines, grounding cable, and communication cable: 15 m	CS-CON-15-30
SMA Commercial DC Battery Extension 5 m	Cable set for the connection between multiple battery cabinets Length of DC lines, grounding cable, and communication cable: 5 m	CS-BEXT-5-30
SMA I/O Module	Module for implementing grid management services The SMA I/O Module is supported from firmware version 3.02.xx.R of the inverter.	MD.IO-41

21 EU Declaration of Conformity

within the scope of the EU directives

CE

- Electromagnetic compatibility 2014/30/EU (29.3.2014 L 96/79-106) (EMC)

1. European Battery Regulation (EU) 2023/1542 (2023-07-12)

- 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.

22 Contact

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

- Device type
- Serial number
- Firmware version
- Event message
- Installation site 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

ENERGY
THAT
CHANGES

SMA

www.SMA-Solar.com