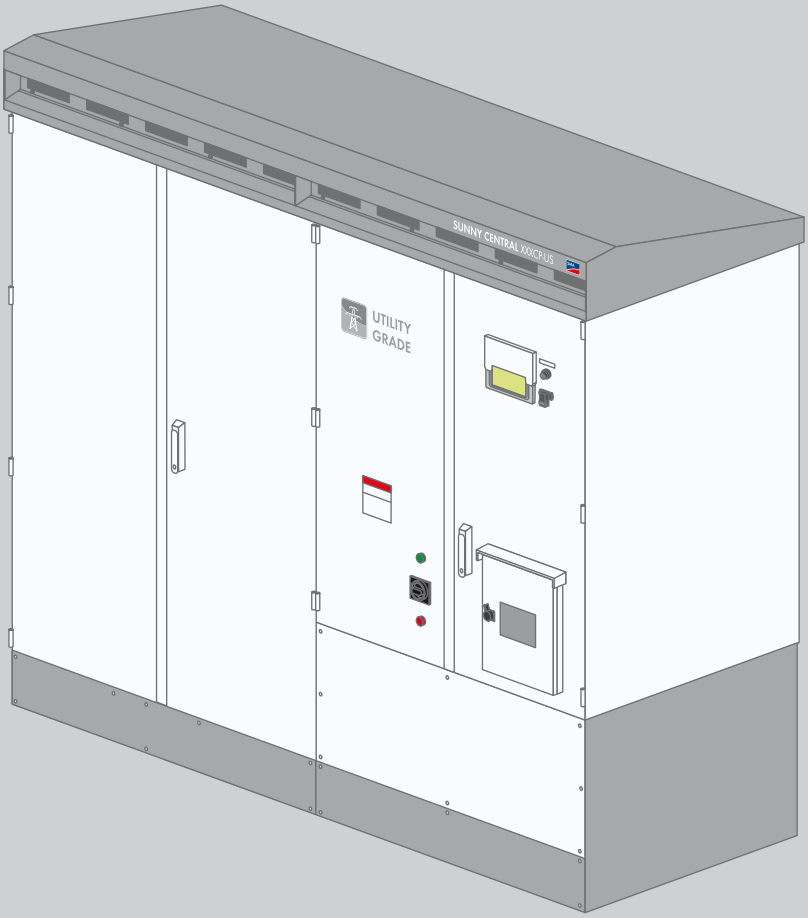
Installation Manual

SUNNY CENTRAL 500CP-US/CA / 500CP-US/CA 600V / 630CP-US/CA / 720CP-US/CA / 750CP-US/CA / 800CP-US/CA / 850CP-US/CA / 900CP-US/CA



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AMERICAN ENGLISH

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Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- SC 500CP-US-10 (Sunny Central 500CP-US/CA)
- SC 500CP-US-10 600V (Sunny Central 500CP-US/CA 600V)
- SC 630CP-US-10 (Sunny Central 630CP-US/CA)
- SC 720CP-US-10 (Sunny Central 720CP-US/CA)
- SC 750CP-US-10 (Sunny Central 750CP-US/CA)
- SC 800CP-US-10 (Sunny Central 800CP-US/CA)
- SC 850CP-US-10 (Sunny Central 850CP-US/CA)
- SC 900CP-US-10 (Sunny Central 900CP-US/CA)

This manual must be followed during installation and maintenance.

The product is designed and tested in accordance with international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the product. To reduce the risk of injury and to ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this manual.

Warnings in this Document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.

Symbol	Description
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE is used to address practices not related to personal injury.

Warnings on this product

The following symbols are used as product markings with the following meanings.

Symbol	Description
	**Warning regarding dangerous voltage** The product works with high voltages. All work on the product must only be performed as described in the documentation of the product.
	**Beware of hot surface** The product can become hot during operation. Do not touch the product during operation.
	**Electric arc hazards** The product has large electrical potential differences between its conductors. Arc flashes can occur through air when high-voltage current flows. Do not work on the product during operation.
	**Risk of Fire** Improper installation of the product may cause a fire.
	**Observe the operating instructions** Read the documentation of the product before working on it. Follow all safety precautions and instructions as described in the documentation.

General Warnings

⚠ WARNING

General Warnings

All electrical installations must be made in accordance with the local and *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not and is not intended to replace any local, state, provincial, federal or national laws, regulation or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or noncompliance with such laws or codes in connection with the installation of the product.

Before installing or using the product, read all of the instructions, cautions, and warnings in this manual.

Before connecting the product to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

Wiring of the product must be made by qualified personnel only.

Table of Contents

1 Information on this Document

This section provides important information on how to use this document and how to work with the Sunny Central inverter. Among other things, this document specifies the Sunny Central inverters for which this document is valid and the target group for which it has been written.

1.1 Validity

This document is valid for the following device types:

- Sunny Central 500CP-US/CA (SC 500CP-US-10)
- Sunny Central 500CP-US/CA 600V (SC 500CP-US-10 600V)
- Sunny Central 630CP-US/CA (SC 630CP-US-10)
- Sunny Central 720CP-US/CA (SC 720CP-US-10)
- Sunny Central 750CP-US/CA (SC 750CP-US-10)
- Sunny Central 800CP-US/CA (SC 800CP-US-10)
- Sunny Central 850CP-US/CA (SC 850CP-US-10)
- Sunny Central 900CP-US/CA (SC 900CP-US-10)

The production version is indicated on the type label.

1.2 Target Group

This document is intended for qualified persons. Only qualified persons are allowed to perform the tasks described in this document.

Qualified persons have received appropriate training and have demonstrated the ability and knowledge to install, operate, and perform maintenance on the device.

Qualified persons are aware of the obligation to wear Hazard Risk Category 2 personal protective equipment and always comply with the general safety regulations for dealing with electric voltage.

Qualified persons have been trained in how to deal with the dangers and risks associated with installing electrical installations as specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E, and possess all the necessary knowledge for averting danger. There must be written documentation of their training.

1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com.

Information	Document type
Installation requirements for Sunny Central 500CP-US / 500CP-US 600V / 630CP-US / 720CP-US / 750CP-US / 800CP-US / 850CP-US / 900CP-US	Technical Information
Medium-voltage transformers - Important Requirements for Medium-Voltage Transformers and Transformers for Auxiliary Power Supply for SUNNY CENTRAL CP-US Series Inverters	Technical Information
Sunny Central Communication Controller	Technical Information
SC-COM Modbus® Interface (Modbus information including the Zone Monitoring option)	Technical description
Q at Night	Technical Information

1.4 Symbols

Symbol	Explanation
i	Information that is important for a specific topic or goal, but is not safety-relevant

Symbol	Explanation
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that could occur

1.5 Nomenclature

Complete designation	Designation in this document
SMA America Production, LLC	SMA
SMA Solar Technology Canada Inc.	SMA
Sunny Central Communication Controller	SC-COM

1.6 Abbreviations

Abbreviation	Designation	Explanation
AC	Alternating Current	–
DC	Direct Current	–
GFDI	Ground Fault Detection Interruption	–
MPP	Maximum Power Point	–
MSL	Mean Sea Level	–
OF	Optical Fiber	–
PC	Personal Computer	–
PE	Protective Earth	Protective conductor
PV	Photovoltaics	–

2 Safety

In this section, you will find general safety precautions which you must observe whenever working on the Sunny Central inverter. Pay special attention to these sections to avoid personal injury and property damage.

2.1 Intended Use

The inverter converts the direct current generated in the PV modules into grid-compliant alternating current. An external MV transformer fitted downstream feeds the alternating current generated into the utility grid.

The inverter is designed for indoor and outdoor installation. The inverter is only licensed for use with a suitable transformer and providing that the maximum permissible DC input voltage and the permitted ambient conditions are complied with (see Section 17 "Technical Data", page 98). The transformer must be designed for voltages that arise during pulsed mode of the inverter.

The inverter has been evaluated by UL for compliance with UL 1741 / IEEE 1547 requirements at the inverter's terminals on the local area side of an interconnection transformer for all IEEE 1547 tests other than for Unintentional Islanding. It has additionally been evaluated for selected tests for use with UL Recognized Component low-voltage transformers as noted in the table below:

Test	Manufacturer	Model	Electrical Ratings
Unintentional Islanding Test	J. Schneider	DLGX 1000F-1016TO1001	Primary 289 V Secondary 480 V, 1,000 kVA
Synchronization, Harmonics, and Open Phase	J. Schneider	DLGX 1250F-1001TO1001	Primary 480 V / 1,500 A Secondary 480 V / 1,500 A, 1,250 kVA

The inverter has not been evaluated for exporting current into low-voltage electrical power system (EPS) with local loads present, and must connect to the medium voltage EPS via an externally-provided medium-voltage transformer.

The external medium-voltage transformer shall provide isolated primary and secondary windings rated for the output voltage and kVA rating of the inverter. The medium-voltage transformer shall be located between the output of the inverter and the medium-voltage utility power connection.

The Authority Having Jurisdiction (AHJ) must consider the effect of the medium-voltage transformer provided in the field with respect to electrical ratings, impedance, and the resultant effects on the utility interconnection performance of the inverter, with respect to the ratings and impedance of the transformer selected.

The inverter has not been evaluated for an installation of multiple inverters connected to one transformer. The Authority Having Jurisdiction shall determine if any additional evaluation is necessary of such a system.

The inverter can optionally be equipped with an AC power switch for "branch circuit protection". This AC circuit breaker simultaneously acts as the AC Disconnect in accordance with NEC ANSI/NFPA 70 and CEC. For inverters without an AC circuit breaker, "branch circuit protection" and an AC Disconnect must be implemented by the installer. Further information is provided in section 3.1.

The inverter with an integrated AC Disconnect can be optionally ordered with an integrated DC Switch in order to be able to disconnect the inverter from the PV array. Both devices are designed to be used with a lockout device to secure the inverter against reconnection during service. If the inverter does not have an integrated DC Switch, an external DC Disconnect must be installed in accordance with NEC ANSI/NFPA 70 and CEC, in order to be able to disconnect the inverter from the PV array.

⚠ WARNING

If the unit is not provided with a GFDI or insulation monitoring device, this inverter must be used with an external GFDI as required by the Article 690 of the *National Electrical Code*® for the installation location or an external insulation monitoring device according to UL 1741.

The models SC 850CP-US and SC 900CP-US are only provided with transfer trip functionality to meet unintentional islanding requirements. An external signal is required from the utility (EPS) to cause the inverter to cease-to-energize the EPS during an island condition. Both inverters have also been tested for automatic unintentional islanding performance (IEEE 1547.1 chapter 5.7, "Unintentional Islanding") up to 880 kVA AC power.

The outdoor version of the inverter corresponds to UL 1741 "Type 3R" and can also be operated in rain, sleet, and snow.

The indoor version corresponds to UL 1741 "Type 1" and is only licensed for installation in electrical equipment rooms.

Only persons fulfilling all of the skills for the target group may work on or with the inverter.

Intended use also includes reading the product documentation and observing all safety precautions.

All work on the inverter must be performed using appropriate tools and in compliance with the ESD protection regulations.

NFPA 70B Table 130.7(C)(16) Hazard Risk Category 2 personal protective equipment is to be worn by all persons working on or with the inverter.

Unauthorized persons may not operate the inverter and must keep at a distance from the inverter.

No reconstruction, modification or installation of additional components may be carried out on the inverter without the express consent of SMA America, LLC.

The inverter must not be operated with its doors open.

The inverter must not be opened when it is raining or when humidity exceeds 95%.

The inverter must not be operated with any technical defects.

For safety reasons, it is forbidden to modify the product or install components that are not explicitly recommended or distributed by SMA.

Only use the inverter in accordance with the information provided in the enclosed documentation. Any other application may cause personal injury or property damage.

The enclosed documentation is an integral part of this product.

- Read and observe the documentation.
- Keep the documentation in a convenient place for future reference.

2.2 Safety Precautions

This section contains safety precautions that must be observed at all times when working on or with the product. To prevent personal injury or property damage and to ensure long-term operation of the product, read this section carefully and follow all safety precautions at all times.

⚠ DANGER

Danger to life from electric shock due to live voltage

High voltages are present in the live components of the inverter. Touching live components results in death or serious injury due to electric shock.

- When working in a high contact-risk environment, wear Hazard Risk Category 2 personal protective equipment.
- Do not touch live components.
- Follow the instructions precisely.
- Observe all safety messages on the product and in the documentation.
- Observe all safety precautions of the module manufacturer.
- Before any work on the inverter is performed, always disconnect the following components from voltage sources if live voltage is not absolutely necessary:
  - Power line voltage for grid feed-in
  - Internal power supply
  - DC voltage from the PV array
  - Additional external voltages, e.g. control signals of a control room
- Ensure that no disconnected components can be reconnected.
- After disconnecting the inverter from voltage sources, wait at least 15 minutes for the capacitors of the inverter to discharge completely.
- Always check that no voltage is present in any of the components before working on the inverter.
- Ground and short-circuit the device.
- Cover or shield any adjacent live components.

Danger to life from electric shock due to live DC cables

DC cables connected to PV modules that are exposed to sunlight are live. Touching live components results in death or serious injury.

- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.
- Prior to connecting the DC cables, ensure that the DC cables are voltage-free.

Danger to life from electric shock due to ground fault

If a ground fault has occurred, parts of the plant that are supposedly grounded may in fact be live. Touching incorrectly grounded components can result in death or very serious injuries from electric shock.

- Ensure that no voltage is present before touching any components of the PV plant.
- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.

Danger to life from electric shock when entering the PV field

The insulation monitoring device with GFDI and Advanced Remote GFDI does not provide protection from injury when GFDI is activated. PV modules grounded by GFDI discharge voltage to ground. When entering the PV field, lethal electric shocks may occur.

- Before entering the PV field, switch the PV array to insulated operation.
- Ensure that the insulation resistance of the PV array is greater than 1 k Ω .

⚠ DANGER

Danger to life from electric shock if the inverter is damaged

Operating a damaged inverter can lead to hazardous situations that result in death or serious injuries due to electric shock.

- Only use the inverter when it is technically faultless and in an operationally safe state.
- Regularly check the inverter for visible damage.
- Make sure that all external safety equipment is freely accessible at all times.
- Make sure that all safety equipment is in good working order.
- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.

Danger to life from electric shock even if the inverter is disconnected on the AC and DC sides

The precharge unit of the option "Q at Night" is also live if the AC contactor and the DC switch are open. Touching live components of this assembly will result in death or serious injury.

- Do not touch live components.
- Do not remove protective covers.
- Observe the warning messages.
- Wear Hazard Risk Category 2 personal protective equipment.

⚠ WARNING

Danger to life from electric shock when the inverter is not locked

If the inverter is not locked, this means that unauthorized persons have access to components carrying lethal voltages. Touching live components may result in death or serious injury due to electric shock.

- Always close and lock the inverter.
- Remove the keys from the door locks and from the key switch.
- Keep the keys in a safe place.
- Ensure that unauthorized persons do not have access to the PV plant.

Danger to life due to blocked escape routes

In hazardous situations, blocked escape routes can lead to death or serious injury. Opening the doors of two inverters located opposite each other blocks the escape route. It is imperative that the escape route is freely accessible at all times.

- An escape route of at least 3 ft. (915 mm) width must be available at all times. Make sure the minimum passage width of the route meets local standards.
- Do not place any objects in the escape route path.
- Remove all tripping hazards from the escape routes.
- If two inverters have been installed facing each other, never open the doors of both inverters simultaneously.

Risk of fire due to failure to observe torque specifications on high-voltage bolted connections

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

- Ensure that high-voltage bolted connections are always executed with the exact torques specified in this document.
- Use suitable tools when working on the device.
- Avoid repeated tightening of high-voltage bolted connections, as this may result in inadmissibly high torques.

⚠ CAUTION

Risk of burns due to hot components

Some components of the inverter can become very hot during operation. Touching these components can result in burn injuries.

- Observe safety messages on the components.
- During operation, do not touch any components marked with such messages.
- After disconnecting the plant from voltage sources, wait until any hot components have cooled down sufficiently.
- Wear personal protective equipment for all work on the inverter.

NOTICE

Damage to the components due to dust or moisture penetration

Dust intrusion or moisture penetration can damage the inverter or impair its functionality.

- Do not open the inverter during rainfall or humidity of more than 95%.
- Only maintain the inverter when the environment is dry and free of dust.
- Do not operate the inverter while the door is open.
- If present, connect the external supply voltage after having set up and installed the inverter.
- Switch on the circuit breaker of the external supply voltage as well as the circuit breakers of the 24 V circuits. This will activate the heating and interior fans, which will then switch on automatically.
- Mount all panels of the inverter when interrupting the installation process or commissioning.
- Close and lock the inverter.

Damage to electronic components due to electrostatic discharge

Electrostatic discharge can damage or destroy electronic components.

- Observe the ESD safety regulations when working on the device.
- Wear personal protective equipment for all work on the devices.
- Discharge electrostatic charge by touching uncoated, grounded enclosure parts, e.g. at the PE connection on the doors. Only then is it safe to touch any electronic components.

2.3 Personal Protective Equipment

Always wear the personal protective equipment recommended by SMA America, LLC when working on the inverter. All clothing should be in accordance with NFPA 70E Section 130.7. Appropriate Insulated gloves for shock protection in accordance with NFPA 70E Section 130.7(C), rated at least 1000V shall be worn as required.

Any other prescribed protective equipment must also be used. When carrying out work on live parts of the inverter, protective equipment of at least Hazard Risk Category 2 is required in accordance with NEMA NFPA 70 E, table 130.7(C)(16).

i Hazard Risk Category 2 Personal Protective Equipment Required

In accordance with NFPA 70E, an arc flash hazard risk analysis has been performed by SMA, and appropriate Arc Flash Hazard labels stating the required Personal Protective Equipment (PPE) for exposed, energized interaction with the equipment, are installed. Hazard Risk Category 2 PPE is the requirement for all routine maintenance, diagnostics, and commissioning activities as described in the SMA protocols. Areas within the machine also exist that cannot, under any circumstances, be exposed while energized. These areas are marked accordingly on the machine, and can only be made accessible after de-energization of the inverter.

For additional information, please contact the SMA Service Line.

2.4 Symbols on the Sunny Central Inverter

Symbol	Explanation
⎓	DC current
⏚	Earth Ground
~	AC current
	On position of the AC Disconnect
	Off position of the AC Disconnect
	Center of gravity

2.5 Labels on the Sunny Central Inverter

This section describes the positions of the labels on the inverter. The warning labels identify potentially hazardous areas or components. Familiarize yourself with the warning labels and their positions before working on the inverter.

2.5.1 Inverter without Integrated DC Switch

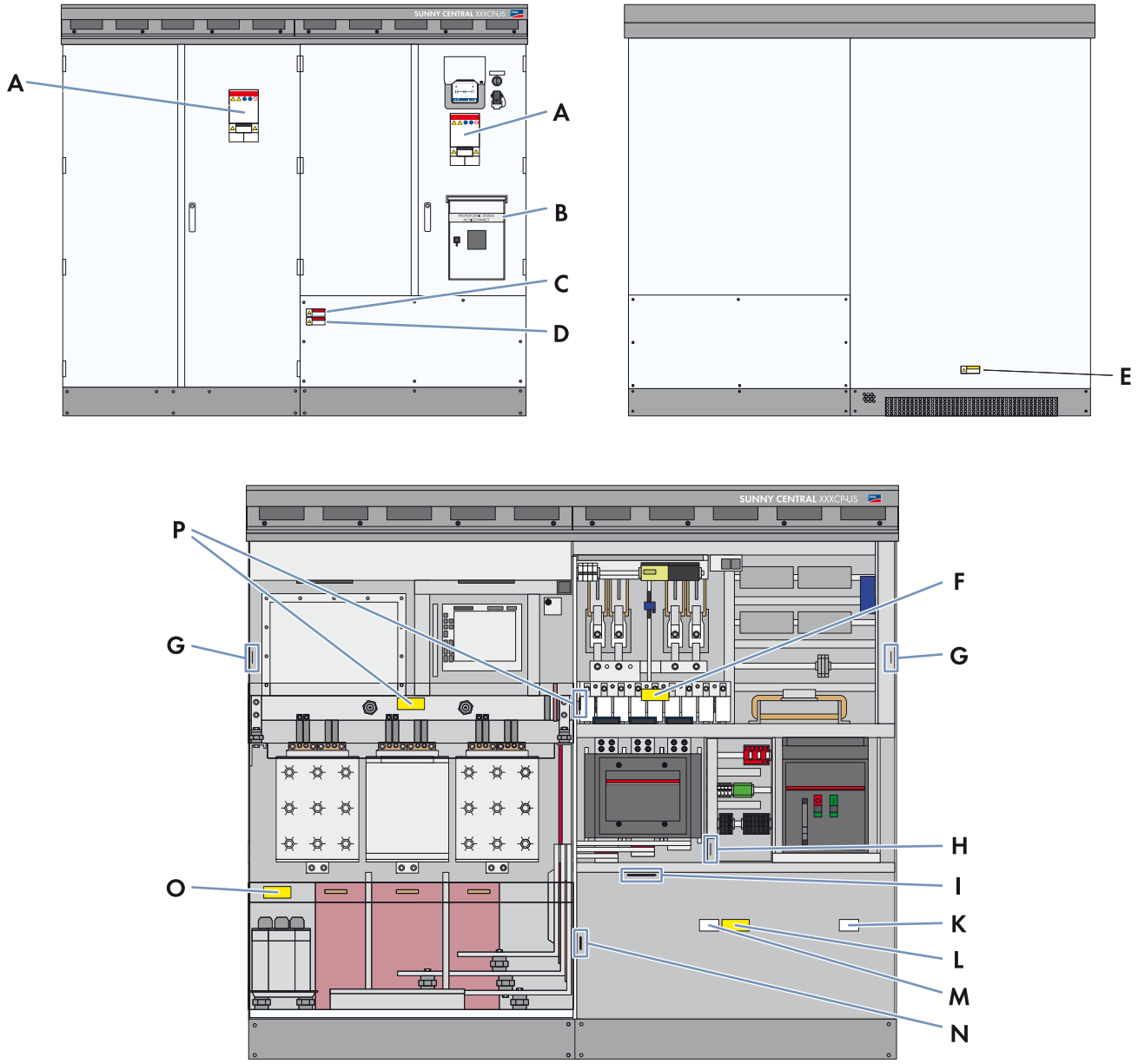


Figure 1: Safety messages on the inverter

Position	SMA order number	Description
A	86-0043464	Warning label general SC-US EN
	86-430042	Warning label Arc Flash Hazard Protection
B	86-00480030	Only with order option AC Disconnect: Photovoltaic System AC Disconnect
C	86-00480020	Warning label Arc Flash
D	86-0043474	Warning label SC-US external transformer EN

Position	SMA order number	Description
E	86-004300	Warning label, Burn Hazard, Hot surface
F	86-0043472	Only for order option DC fuses: Warning label SC-US DC fuses EN/ES
	86-0043473	Only for order option DC fuses: Warning label SC-US DC fuses EN/FR
G	–	Type label
H	–	Label control supply voltage
I	86-10867027	For positive grounding: 1,000 V PV–
	86-430045	For positive grounding: 600 V PV–*
	86-10867028	For negative grounding: 1,000 V PV+
	86-430044	For negative grounding: 600 V PV+*
K	86-0043462	ABC 60 Hz
	86-101300.1	ABC 50 Hz
L	86-0043470	Warning label SC-US Conductors, EN-FR
	86-0043469	Warning label SC-US Conductors, EN-ES
M	86-0043460	Grounding Electrode Terminal
N	86-10867027	For negative grounding or insulated: 1,000 V PV–
	86-430045	For negative grounding or insulated: 600 V PV–*
	86-10867028	For positive grounding or insulated: 1,000 V PV+
	86-430044	For positive grounding or insulated: 600 V PV+*
O	86-108680046	Warning label SC US capacitors C1-C3, C6 optional EN/FR
	86-108680047	Warning label SC US capacitors C1-C3, C6 optional EN/ES
P	86-0043476	Warning label, SC US stack capacitors EN/ES
	86-0043477	Warning label, SC US stack capacitors EN/FR

* For Sunny Central 500CP-US 600V

Replacing warning labels

Missing or damaged warning labels must be replaced. The warning labels can be ordered from SMA using the SMA order numbers listed above.

2.5.2 Inverter with Integrated DC Switch

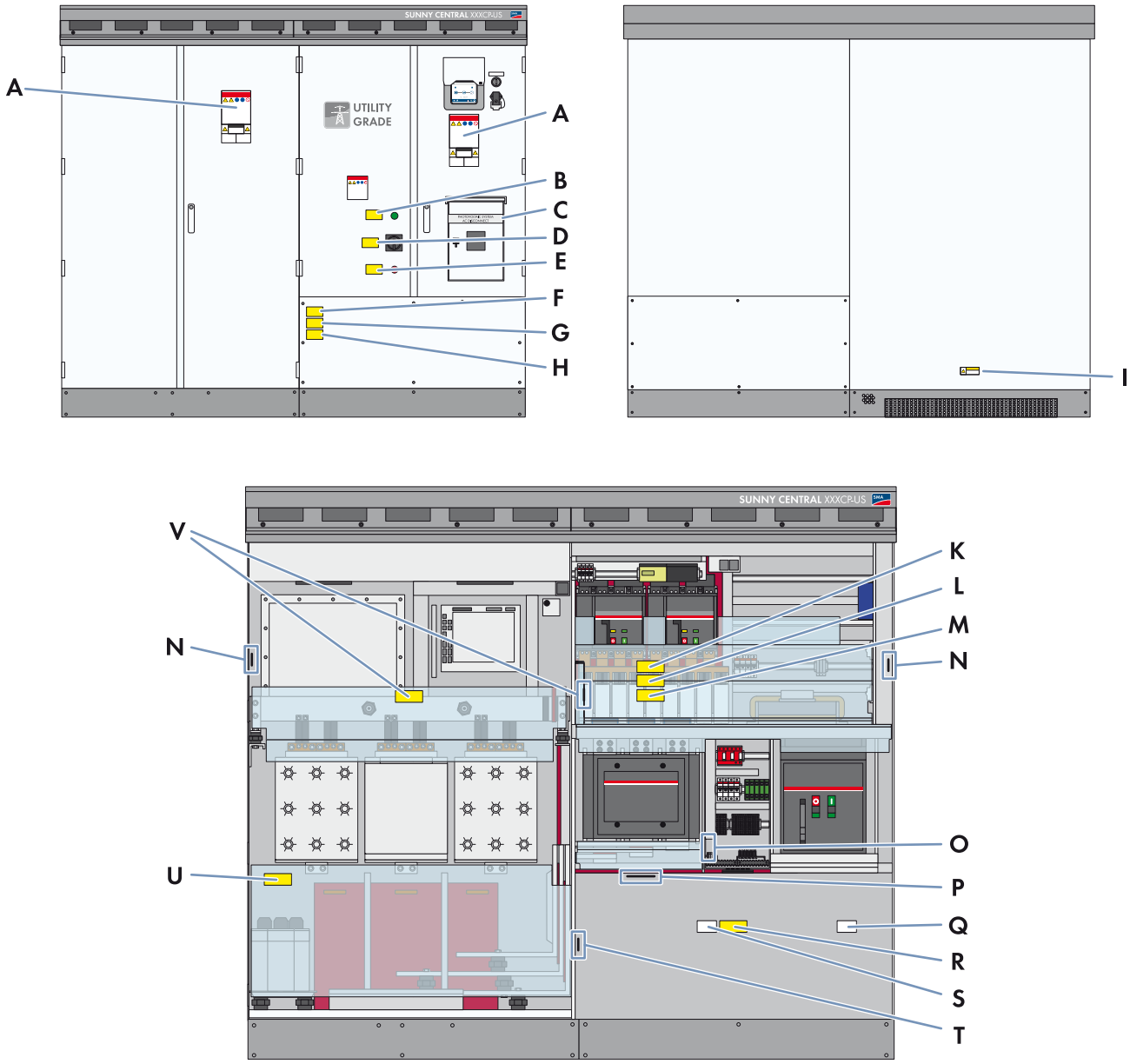


Figure 2: Safety messages on the inverter

Position	SMA order number	Description
A	86-0043464	Warning label general SC-US EN
	86-430042	Warning label Arc Flash Hazard Protection
B	86-0033325	Label "Closed"
C	86-00480030	Label "Photovoltaic System AC Disconnect"
D	86-101400.1	Label "DC-Switch"
E	86-0033324	Label "Open"
F	86-00480020	Warning label Arc Flash
G	86-0043474	Warning label SC-US external transformer EN

Position	SMA order number	Description
H	86-0033326	Warning label Electric Shock due to Live Voltage EN/ES
	86-0033327	Warning label Electric Shock due to Live Voltage EN/FR
I	86-004300	Warning label Burn Hazard
K	86-0043472	Only for order option DC fuses: Warning label SC-US DC fuses EN/ES
	86-0043473	Only for order option DC fuses: Warning label SC-US DC fuses EN/FR
L	86-0033321	Warning label Electric Shock Hazard EN/FR
	86-0033322	Warning label Electric Shock Hazard EN/ES
M	86-0033329	Warning label Danger: Do not pull out fuses under load EN/FR
	86-0033328	Warning label Danger: Do not pull out fuses under load EN/ES
N	–	Nameplate
O	–	Label control supply voltage
P	86-10867027	For positive grounding: 1,000 V PV–
	86-430045	For positive grounding: 600 V PV–*
	86-10867028	For negative grounding: 1,000 V PV+
	86-430044	For negative grounding: 600 V PV+*
Q	86-0043462	ABC 60 Hz
	86-101300.1	ABC 50 Hz
R	86-0043470	Warning label SC-US Conductors, EN-FR
	86-0043469	Warning label SC-US Conductors, EN-ES
S	86-0043460	Grounding Electrode Terminal
T	86-10867027	For negative grounding or insulated: 1,000 V PV–
	86-430045	For negative grounding or insulated: 600 V PV–*
	86-10867028	For positive grounding or insulated: 1,000 V PV+
	86-430044	For positive grounding or insulated: 600 V PV+*
U	86-108680046	Warning label SC US capacitors C1-C3, C6 optional EN/FR
	86-108680047	Warning label SC US capacitors C1-C3, C6 optional EN/ES
V	86-0043476	Warning label, SC US stack capacitors EN/ES
	86-0043477	Warning label, SC US stack capacitors EN/FR

* For Sunny Central 500CP-US 600V

i Replacing warning labels

Missing or damaged warning labels must be replaced. The warning labels can be ordered from SMA using the SMA order numbers listed above.

3 Product Description

This section will give you an overview of the inverter and its components.

3.1 Plant Overview

The inverter converts the direct current generated in the PV modules into grid-compliant alternating current. An external MV transformer fitted downstream feeds the alternating current generated into the utility grid.

An AC Disconnect and DC Disconnect must be installed in accordance with NEC ANSI/NFPA 70 and CEC.

The inverter can be optionally ordered with an integrated AC Disconnect and an integrated DC Switch. Both devices are designed to be used with a lockout device to secure the inverter against reconnection during service. With the AC Disconnect, the inverter can be disconnected from the utility grid simply and safely. This option does not require an additional AC Disconnect Unit on the AC side.

With the DC Switch, the inverter can be disconnected from the PV array. If the inverter does not have an integrated DC Switch, an external DC Disconnect must be installed in accordance with NEC ANSI/NFPA 70 and CEC, in order to be able to disconnect the inverter from the PV array. This allows you to easily and safely disconnect the inverter as needed. In some jurisdictions, additional external disconnecting means may be required for servicing of the DC input fuses. SMA recommends an early review with the AHJ to identify their requirements for the PV System.

Sunny Central Inverter with Integrated AC Disconnect and Integrated DC Switch

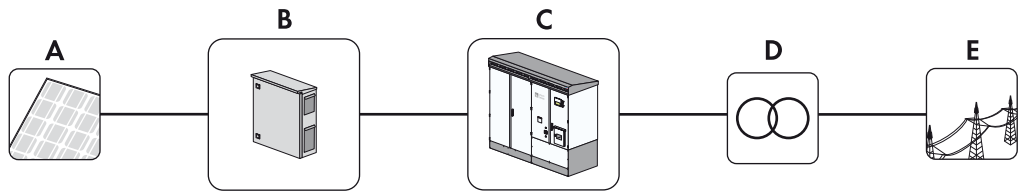


Figure 3: Principle of a grid-tie PV plant with a Sunny Central Inverter with integrated AC Disconnect and DC Switch

Position	Description
A	PV array
B	String Combiner Box
C	Inverter with integrated AC Disconnect and DC Switch
E	External transformer
F	Utility grid

Sunny Central Inverter with Integrated AC Disconnect and External DC Disconnect

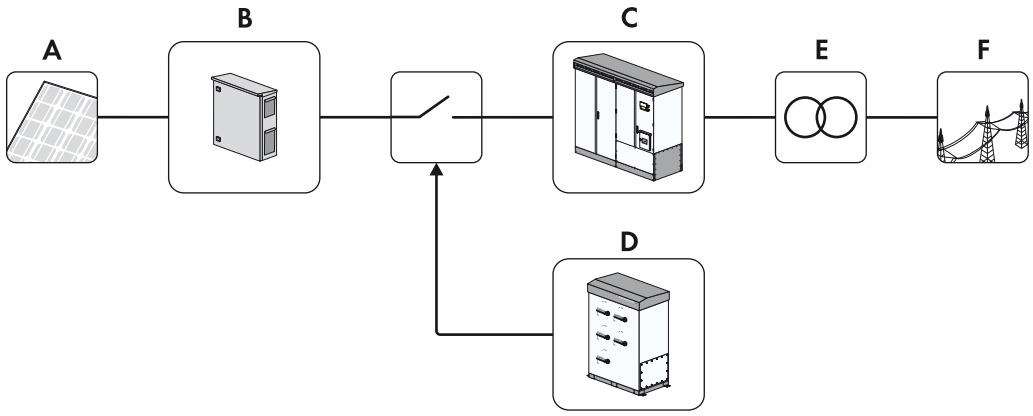


Figure 4: Principle of a grid-tie PV plant with an external DC Disconnect and a inverter with integrated AC Disconnect

Position	Description
A	PV array
B	String Combiner Box
C	Inverter with Integrated AC Disconnect
D	DC Disconnect Unit
E	External transformer
F	Utility grid

Sunny Central Inverter with External AC Disconnect and External DC Disconnect

As an option, the AC circuit breaker can be mounted externally.

Circuit breaker

The unit is provided with a UL listed circuit breaker on the output rated 1,600 A for branch circuit protection. If the circuit breaker shall be located externally to secure the AC path, you have to use the same type of circuit breaker (ABB Emax E2B-A with 42 kA rated short-circuit current, ABB Emax E2N-A with 65 kA rated short-circuit current or ABB Emax E2H-A with 85 kA rated short-circuit current and 1,600 A continuous current rating each).

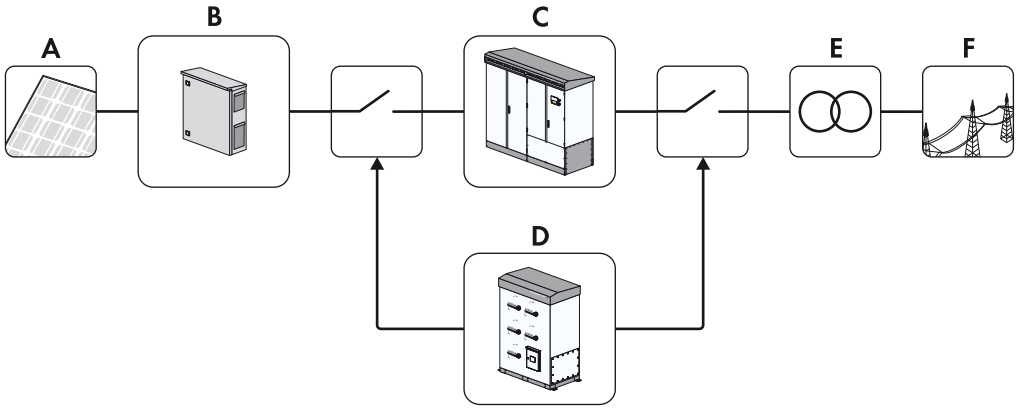


Figure 5: Principle of a grid-tie PV plant with a Sunny Central inverter and external AC / DC Disconnect Unit

Position	Description
A	PV modules

Position	Description
B	String Combiner Box
C	Inverter without integrated AC Disconnect and without integrated DC Switch
D	AC / DC Disconnect Unit
E	External transformer
F	Utility grid

3.2 Design of the Sunny Central Inverter

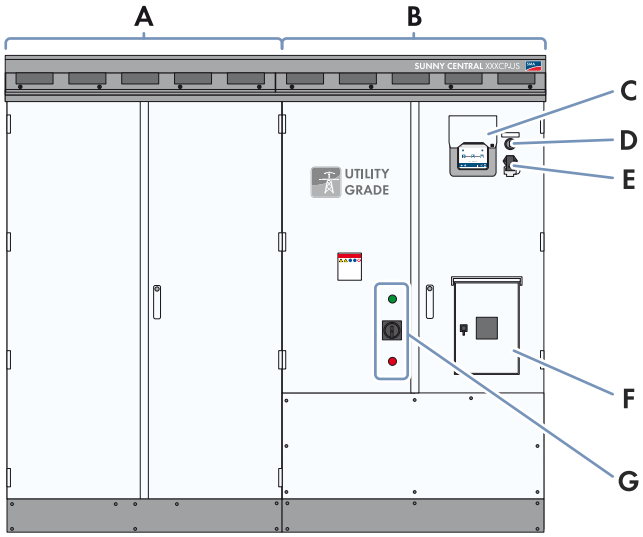


Figure 6: Design of the Sunny Central inverter (example)

Position	Description
A	Inverter cabinet
B	Interface cabinet
C	Touch display
D	Key switch
E	Service interface
F	Integrated AC Disconnect*
G	Integrated DC Switch*

* Optional

3.3 Integrated AC Disconnect

Depending on the option ordered, the Sunny Central CP-US may be fitted with an integrated AC Disconnect. The AC Disconnect enables you to disconnect the inverter from the AC grid in the event an emergency and for service and maintenance work.

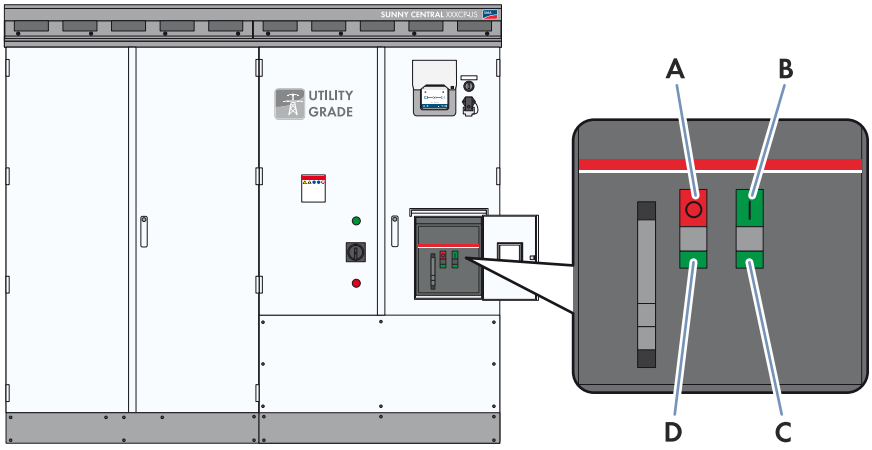


Figure 7: AC Disconnect

Position	Description
A	OFF button
B	ON button
C	Spring status indicator
D	Position indicator

3.4 Integrated DC Switch

Depending on the option ordered, the Sunny Central CP-US inverter may be fitted with an integrated DC Switch. The DC Switch enables you to disconnect the inverter from the PV array in the event an emergency and for service- and maintenance work. Despite disconnecting the integrated DC Switch, voltages are still present on the DC fuses and the inverter busbars. Touching the DC fuses or the busbars will result in death or very serious injuries from electric shock.

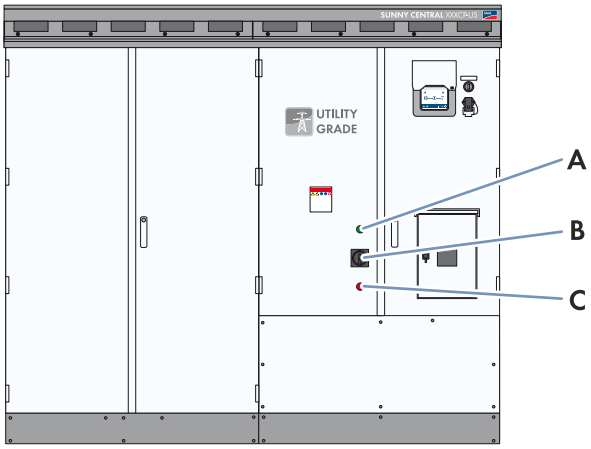


Figure 8: Integrated DC Switch

Position	Description
A	Green light repeater The DC Switch is closed.
B	DC Switch (lockable with a lockout device)
C	Red light repeater The DC Switch is open.

3.5 External Fast Stop

The external fast stop is to be used if the inverter is to be disconnected via an external signal in accordance with IEEE 1547 (e.g. External Islanding Detection). The inverter is delivered with a fast stop input. It is possible to connect an external switch to this fast stop input. The external fast stop disconnects the inverter from the utility grid within 100 ms.

The options for configuring the external fast stop are displayed in the following table.

Option	Description
The external fast stop is deactivated.	The terminals of the active fast stop are bridged ex works. The fast stop function is thus deactivated.
The external fast stop is operated via an external 24 V supply.	An external latching switch (break contact) is connected to the inverter terminals via an external 24 V voltage supply. If the external switch is inactive, the switch relay is energized and the inverter feeds into the grid. If the external switch is activated, the relay is de-energized and the fast stop is tripped. The inverter is stopped and no longer feeds energy into the grid. Voltage ranges for the relay: 24 V to 30 V: The inverter is in operation. 0 V to 4 V: The inverter is not in operation.

Tripping the fast stop function

The fast stop function should only be tripped in the event of immediate danger. Tripping the fast stop will not rapidly discharge the capacitors. If the inverter is to be switched off and correctly shut down via an external signal, use the input of the remote shutdown function.

The models SC 850CP-US inverter and SC 900CP-US inverter are only provided with transfer trip functionality to meet unintentional islanding requirements. An external signal is required from the utility (EPS) to utilize this feature.

3.6 Islanding Detection

Stand-alone grids form when the following conditions occur simultaneously:

- The medium-voltage grid fails.
- The inverter feeds in an amount x of power. There is an electrical load on the same branch of the grid with a load equal to that of power x.

There are two methods for islanding detection:

- Active Islanding Detection*
- External Islanding Detection

Active Islanding Detection

The inverter detects the formation of stand-alone grids during a grid failure and disconnects the inverter from the utility grid.

This function is set via the parameter **EnaAID** and cannot be active at the same time as the "FRT" function.

External Islanding Detection

In the event of a grid failure, the formation of stand-alone grids is detected at the farm level. If a stand-alone grid is formed, a signal is transmitted to the fast stop input of the inverter.

If the signal appears at the fast stop input of the inverter while the inverter is in the "MPP load operation" operating state, the inverter switches to the operating state "Shutdown". Once shutdown is complete, the AC contactor and the DC switching device open automatically and the inverter switches to the operating state "Stop".

For external islanding detection, a suitable cable must be connected to the inverter fast stop input during installation.

* Not with some models of the SC 850CP-US inverter and the SC 900CP-US inverter

3.7 Type Label

You can identify the Sunny Central CP-US via the type label. Type labels are attached at the top right on the inside of the interface cabinet and on the top left side of the inverter cabinet. You will find the following information on the type label:

- Device type
- Serial number
- Production version
- Production date
- Device-specific data

Reading the serial number

You can read the serial number without opening the inverter. The serial number can be found on the inverter on the top left corner of the roof. You can also read the serial number from the display.

Reading the firmware version

You can read the version number of the firmware of the inverter and the display via the user interface of the SC-COM or on the display.

Symbols on the Type Label

Symbol	Description	Explanation
	Danger to life due to high voltages	The product operates at high voltages. All work on the product must be carried out by qualified persons only.
	Risk of burns due to hot surfaces	The product can become hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work. Wear personal protective equipment such as safety gloves.
	Observe the documentation.	Observe all documentation that is supplied with the product.
		Evaluated to the requirements of the Underwriters Laboratories Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741. The inverter has been additionally evaluated by Underwriters Laboratories to CAN/CSA C22.2 No. 107.1-1, "General Use Power Supplies".

3.8 Schematic Diagram

Schematic diagrams in PDF format contain jump marks. By double clicking a jump mark, the display will change to the corresponding current path or the referenced place in the equipment list.

SMA recommends using schematic diagrams in PDF format during troubleshooting. The schematic diagrams in PDF format are available on request. Contact the SMA Service Line.

4 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.

The scope of delivery depends on the order options.

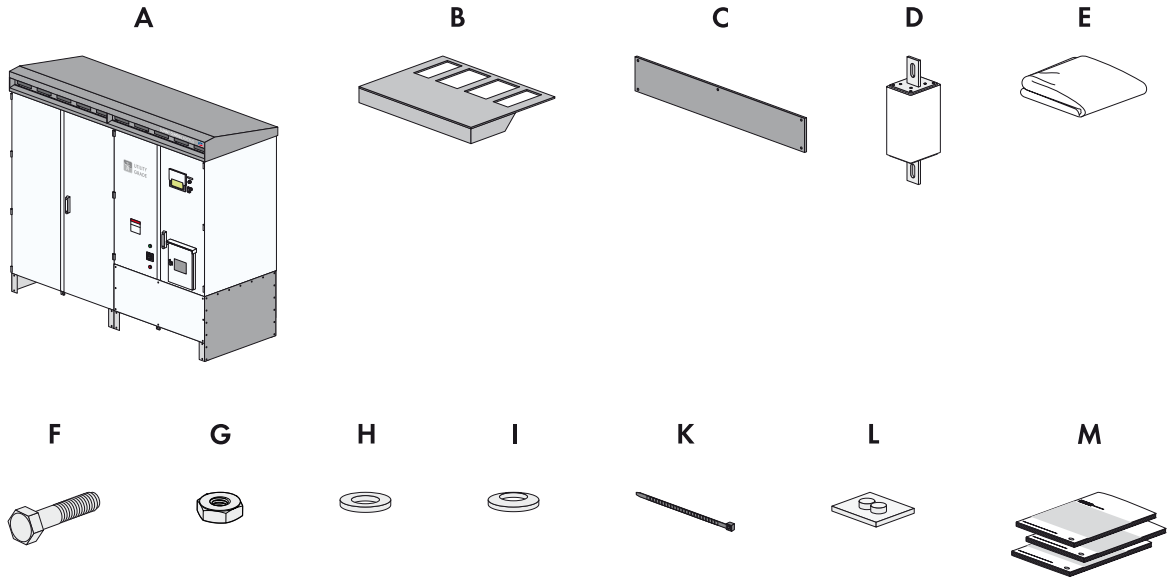


Figure 9: Components included in the scope of delivery

Position	Number	Description
A	1	Inverter
B	1	Ventilation plate
C	4	Kick plate
D	6/7/8/9	DC fuse*
E	1	Non-woven abrasive
F	74	Hexagon screw*
G	74	Hexagon nut*
H	148	Washer*
I	148	Spring washer*
K	80	Cable tie
L	3	Rubber seal
M	1 each	Installation manual, user manual, circuit diagram, commissioning report

* Optional

5 Storage

This section gives you information on how to store the inverter correctly. Follow the information in this section if the inverter is not to be mounted immediately on its foundation or base. This will help prevent damage to the inverter.

NOTICE

Damage to the inverter due to moisture penetration

If the inverter is not stored properly, moisture can penetrate the enclosure and cause damage to electronic components.

- Only store the inverter in its closed state.
- Storage for six months or more permissible in dry locations only.
- Store at a temperature between –13°F and +140°F (– 25°C to +60°C).

NOTICE

Damage to the inverter due to uneven building ground

Storing the inverter on an unsuitable building ground could damage the frame construction. Dust and moisture can penetrate the inverter and damage electronic components.

- The building ground must be suitable for the weight of the inverter of 4,123 lbs. (1,870 kg).
- The unevenness of the building ground must not exceed 0.25%.

Storage in cold temperatures and high humidity

If, when storing the device, you connect the external voltage supply and switch on the circuit breaker of the external voltage supply as well as the circuit breakers of the 24 V circuits, the heater is activated automatically in the event of high humidity. As a result, you prevent condensation water from forming. The connection of the external voltage supply is described in Section 12.8.

6 Preparation for Installation

This section describes which preparations you need to perform for the various installation options of the inverter. Read this section and follow the instructions to perform all the necessary preparations prior to transporting the inverter.

6.1 Dimensions of the Inverter

6.1.1 Dimensions for Outdoor and Indoor Installation

Depending on the order option, the inverter will be delivered with the roof for outdoor installation or without the roof for indoor installation.

Dimensions with Roof

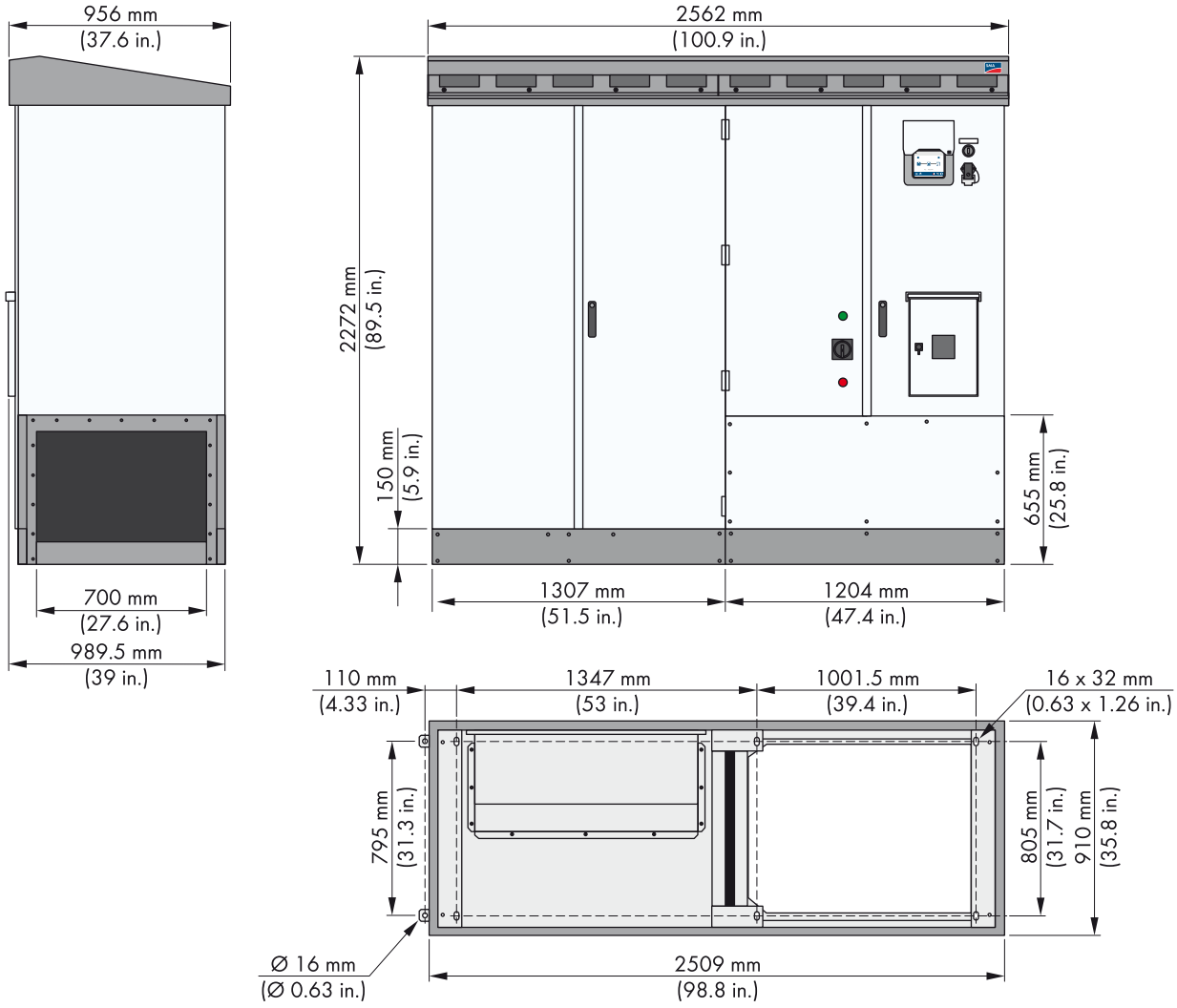


Figure 10: Dimensions with Roof

Width	Height	Depth	Weight
8 ft. 4.87 in. (2,562 mm)	7 ft. 5.45 in. (2,272 mm)	3 ft. 1.64 in. (956 mm)	4,123 lb (1,870 kg)

Dimensions without Roof

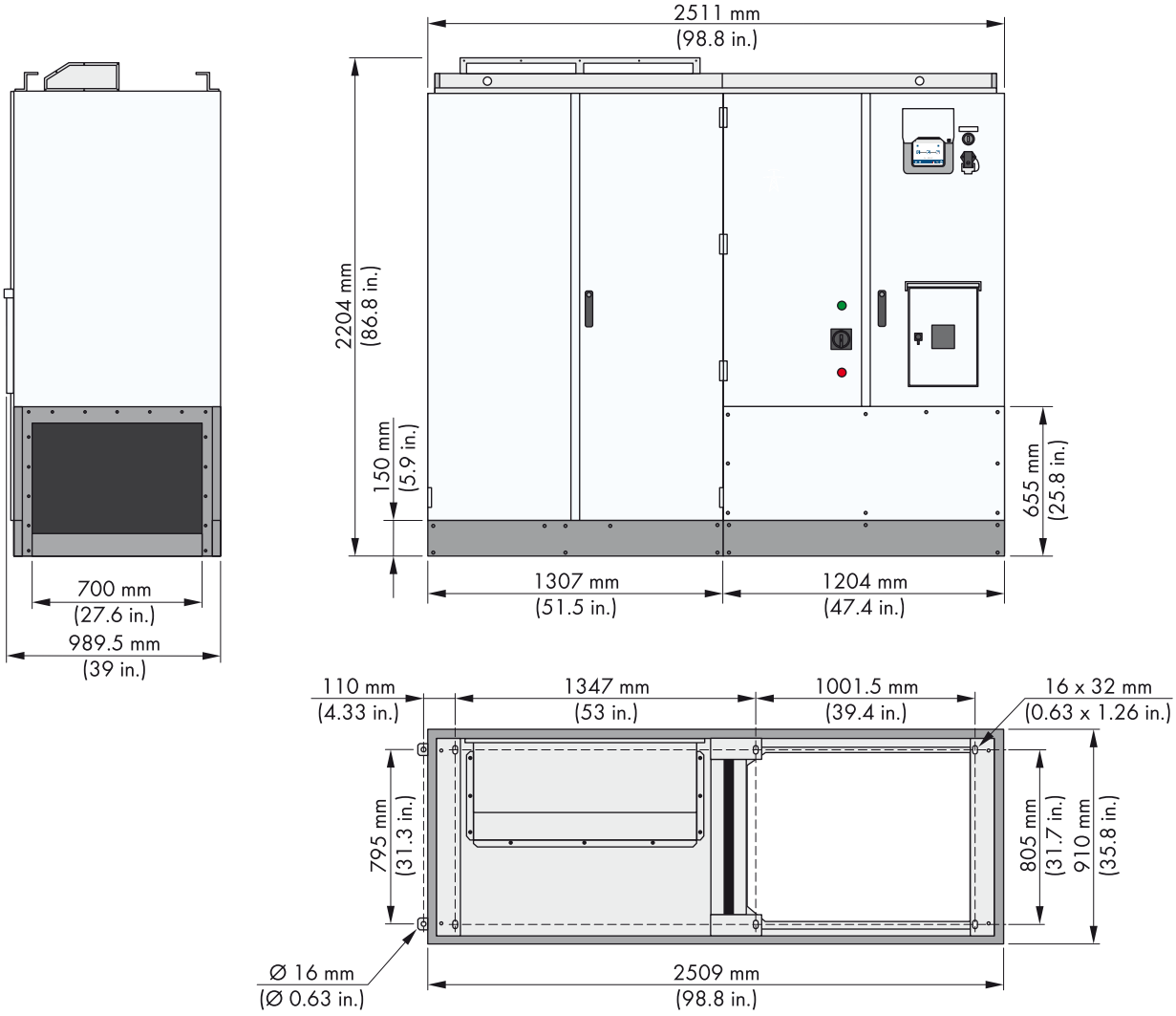


Figure 11: Dimensions without roof

Width	Height	Depth	Weight
8 ft. 2.59 in. (2,511 mm)	7 ft. 2.78 in. (2,204 mm)	2 ft. 11.83 in. (910 mm)	4,045 lb (1,835 kg)

6.1.2 Dimensions of the Connection Area

Dimensions of the Connection Area for the Option DC Fuses

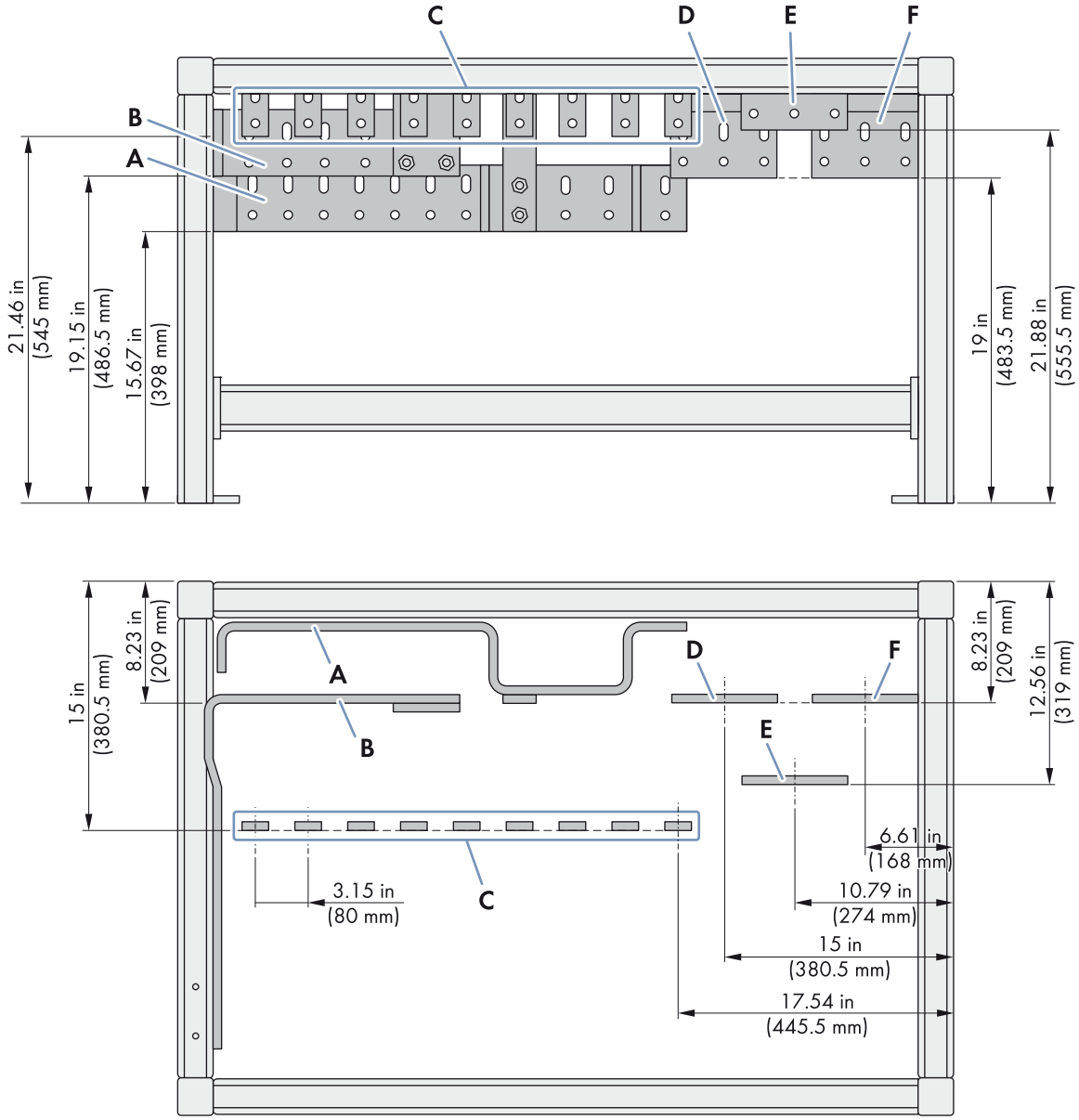


Figure 12: Dimensions of the connection area for the option DC fuses

Position	Description
A	Grounding busbar
B	For negative grounding: busbar DC- For positive grounding: busbar DC+
C	For positive grounding: busbar DC- For negative grounding: busbar DC+
D	AC busbar: line conductor A
E	AC busbar: line conductor B
F	AC busbar: line conductor C

Dimensions of the Connection Area for the Option DC Busbar

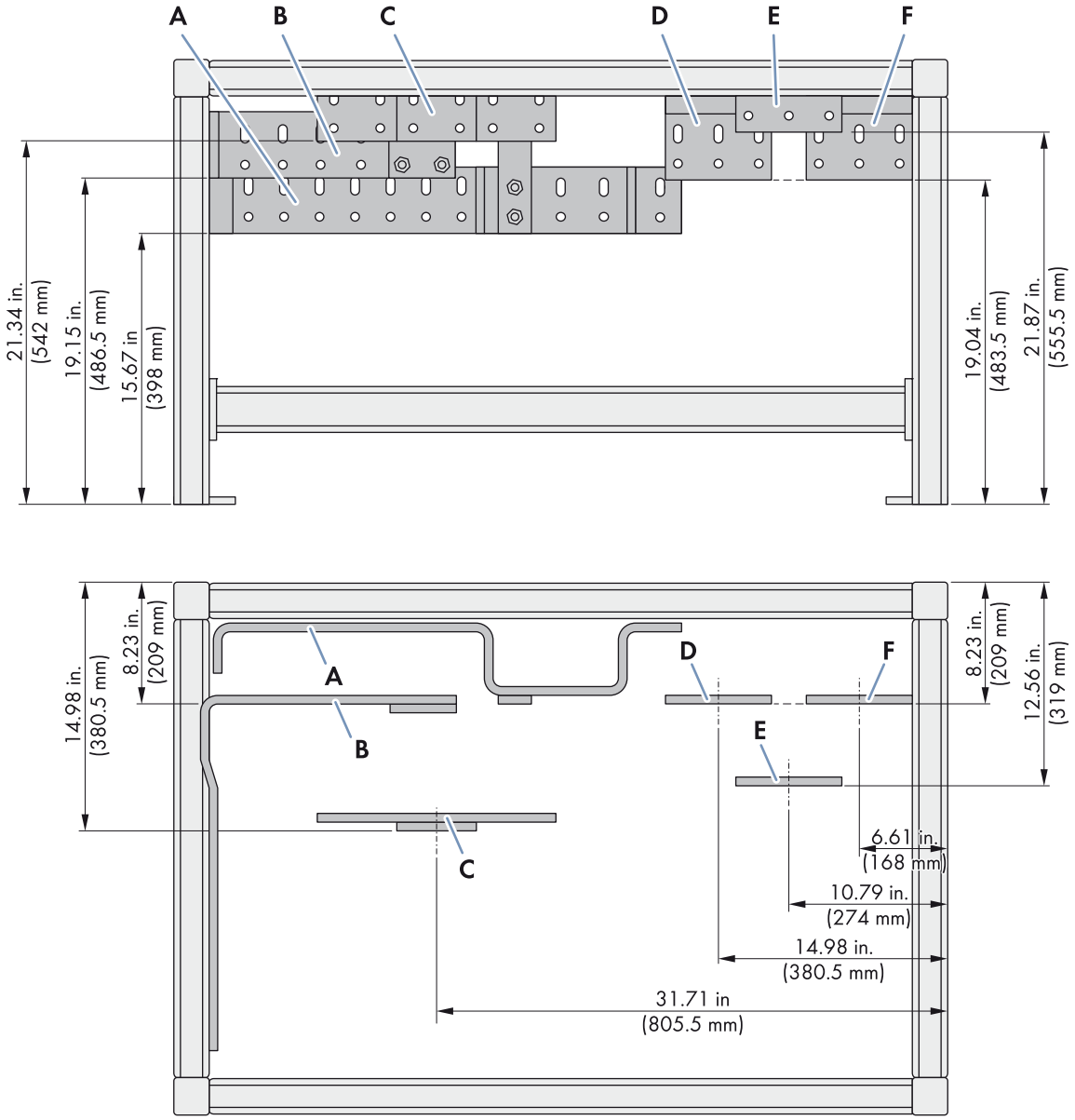


Figure 13: Dimensions of the connection area for the option DC busbar

Position	Description
A	Grounding busbar
B	For negative grounding: busbar DC- For positive grounding: busbar DC+
C	For positive grounding: busbar DC- For negative grounding: busbar DC+
D	AC busbar: line conductor A
E	AC busbar: line conductor B
F	AC busbar: line conductor C

6.2 Requirements for the Mounting Location

This section describes which requirements must be met at the mounting location of the inverter. The conditions specified here apply equally for each installation option. Observe this section and make sure that the requirements are met prior to preparing the mounting location for the inverter.

6.2.1 Ambient Conditions

NOTICE

Damage to the inverter due to dust or moisture penetration

Dust intrusion or moisture penetration can damage the inverter or impair the functionality of the inverter.

- Do not open the inverter during rainfall or humidity of more than 95%.
- Only open the inverter when the environment is dry and free of dust.
- Only use rainproof, wet-room suitable conduits that comply with UL 514B for the connection to the switch cabinet.

The following ambient conditions must be maintained under all circumstances to ensure the optimum and safe operation of the inverter.

☐ The mounting location must be freely accessible at all times.

☐ The ambient temperature must be within the operating temperature range.

☐ For further information on the ambient conditions, (see Section 17 "Technical Data", page 98).

For further information on the installation, see "Installation requirements for Sunny Central CP-US", which can be downloaded in the download area at www.SMA-America.com or www.SMA-Solar.com.

6.2.2 Supply Air and Exhaust Air

The innovative OptiCool cooling concept makes it possible to operate inverters at full nominal power at ambient temperatures of up to +122°F (+50°C).

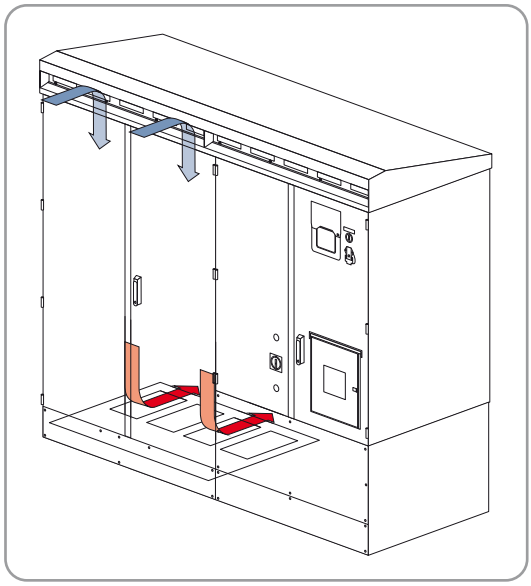
At temperatures exceeding +122 °F (+50 °C), the inverter continues feeding in but reduces feed-in power to protect the PV system.

The cooling air is drawn in through the inverter roof and is blown out again through the slits at the rear of the inverter.

The illustration on the right shows the principle of the air circulation within the inverter.

The inverter needs 1766 SCFM (3,000 m^3/h) of fresh air, which the inverter draws in through the ventilation grids in the front. The fresh air must meet the 4S2 classification.

You can install the inverter in a chemically active environment. The inverter is protected against salt spray in accordance with EN 60721-3-4 class 4C2. You will find the required air qualities in the following table.



Air quality classification for mechanically active substances

Ambient conditions for stationary application	Class 4S2
a) Sand in air [mg/m^3]	300
b) Dust (suspended matter) [mg/m^3]	5.0
c) Dust (precipitation) [mg/m^3]	20
Installation sites where appropriate measures are taken to keep dust levels to a minimum.	x
Installation sites where no special measures have been taken to reduce the sand or dust levels and which are not located in the vicinity of sand or dust sources.	x

Air quality classification for chemically active substances

Ambient conditions for stationary application	Class 4C2	
	Mean value	Threshold
a) Sea salt	Occurrence of salt spray	
b) Sulfur dioxide [mg/m^3]	0.3	1.0
c) Hydrogen sulfide [mg/m^3]	0.1	0.5
d) Chlorine [mg/m^3]	0.1	0.3
e) Hydrogen chloride [mg/m^3]	0.1	0.5
f) Hydrogen fluoride [mg/m^3]	0.01	0.03
g) Ammonia [mg/m^3]	1.0	3.0
h) Ozone [mg/m^3]	0.05	0.1
i) Nitrogen oxides [mg/m^3]	0.5	1.0
Installation sites in rural or densely populated areas with little industry and moderate traffic volume.	x	
Installation sites in densely populated areas with industry and high traffic volume.	x	

Exhaust air

The Sunny Central blows the exhaust air out through the openings in the base area of the inverter cabinet. The following figure shows the dimensions of the exhaust air opening.

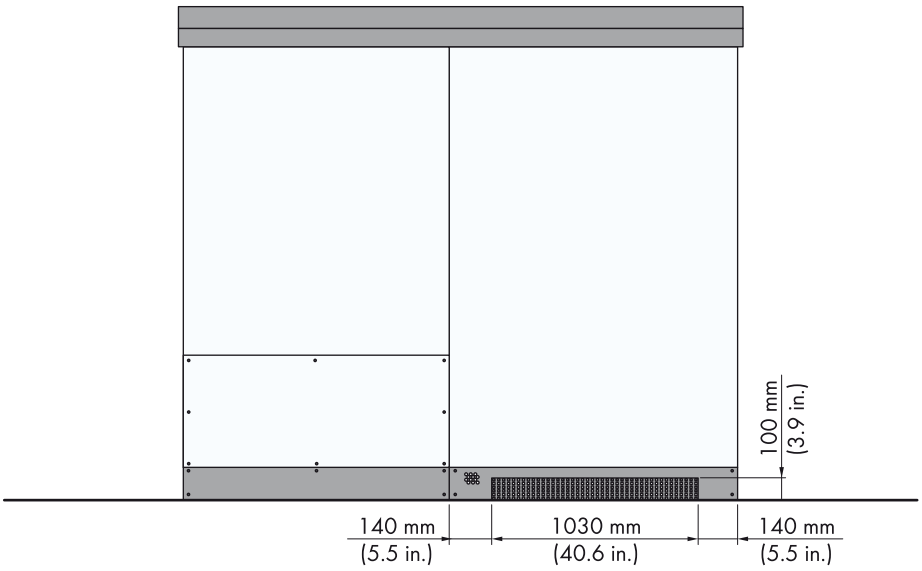


Figure 14: Dimensions of the exhaust air opening

6.2.3 Minimum Clearances for Outdoor Installation

⚠ WARNING

Fire hazard due to overheating of cables

Differing cable lengths lead to overheating of the cables. Excessive heat can result in cable fires. Death or serious injury due to fire can result.

- All line conductors from the inverter to the transformer must be of the same length. However, the cables must not be longer than 49 ft. (15 m) between connection points.

NOTICE

Damage to the inverter or transformer due to overheating

Inverters or transformers can overheat and be damaged due to the drawing-in of exhaust air from other inverters.

- Install the plant in such a way that the inverter cannot draw in any exhaust air from other devices.
- Follow the supply air and exhaust air requirements (see Section 6.2.2 "Supply Air and Exhaust Air", page 33)I

Minimum Clearances for One Inverter

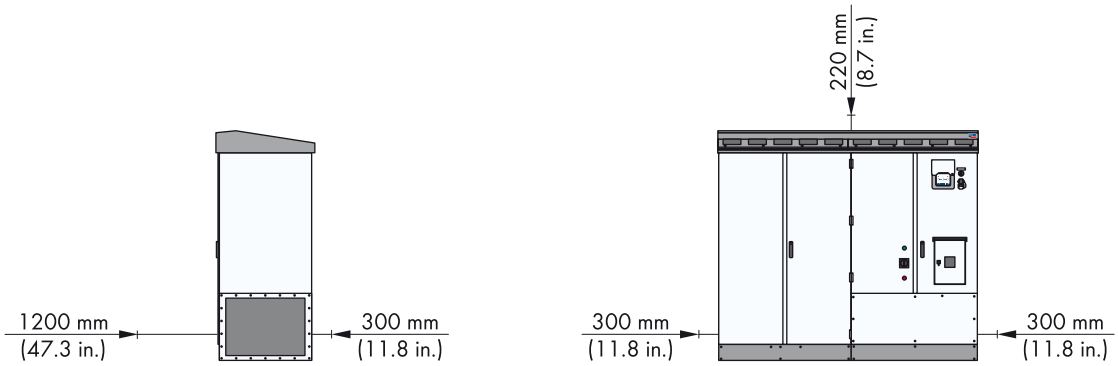


Figure 15: Minimum clearances for one inverter

Minimum Clearances for Two Inverters with Transformer

Version 1 - Rear to Rear:

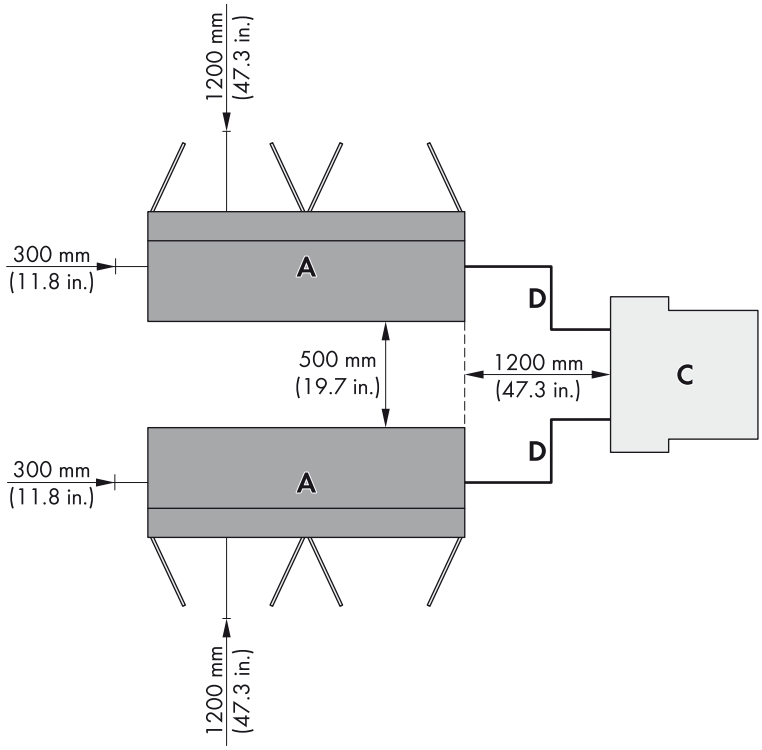


Figure 16: Minimum Clearances for two inverters with transformer - version 1

Position	Description
A	Inverter 1
B	Inverter 2
C	MV transformer and medium-voltage switchgear
D	Cable route between inverter and MV transformer (49 ft. (15 m))

Version 2 - Front to Front:

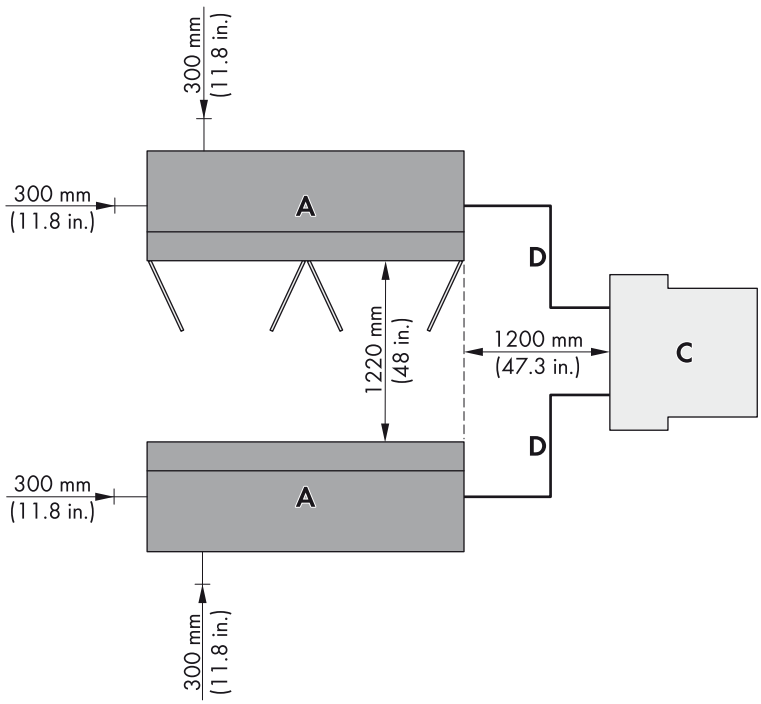


Figure 17: Minimum clearances for two inverters with transformer - version 2

Position	Description
A	Inverter 1
B	Inverter 2
C	MV transformer and medium-voltage switchgear
D	Cable route between inverter and MV transformer (49 ft. (15 m))

6.2.4 Minimum Clearances for Installation in Electrical Equipment Rooms

NOTICE

Damage to the inverter or transformer due to overheating

Inverters or transformers can overheat and be damaged due to the drawing-in of exhaust air from other inverters.

- Install the plant in such a way that the inverter or the transformer cannot draw in any exhaust air from other devices.
- Follow the supply air and exhaust air requirements (see Section 6.2.2 "Supply Air and Exhaust Air", page 33)

Minimum Clearances for One Inverter Installed in Electrical Equipment Rooms

The minimum passage width between the open door of the inverter and the next fixed obstacle must be maintained. The minimum passage width must comply with national standards. In the USA, the minimum passage width is 3 ft. (915 mm).

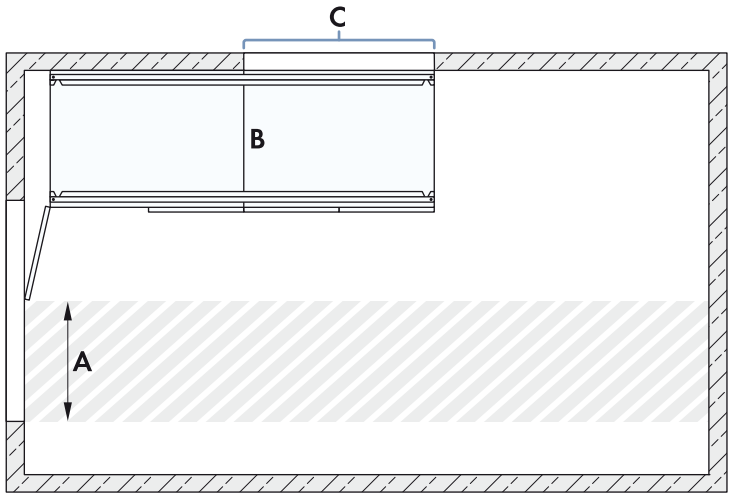


Figure 18: Minimum clearances for one inverter installed in electrical equipment rooms

Position	Description
A	Minimum passage width Maintain the minimum passage width between the open door of the inverter and the next fixed obstacle. The minimum passage width must comply with national standards. In the USA, the minimum passage width is 36 in. (915 mm).
B	Inverter
C	Removable wall of the electrical equipment room. A removable wall is only necessary if the option "Zone Monitoring" has been selected.

Minimum Clearances for Two Inverters Installed in Electrical Equipment Rooms

⚠ WARNING

Danger to life due to blocked escape routes

In hazardous situations, blocked escape routes can lead to death or serious injury as escape is not possible.

- An escape route of at least 3 ft. (915 mm) width must be available at all times.
- Do not place any objects in the escape route path.
- Remove all tripping hazards from the escape routes.

The minimum passage width between the open door of the inverter and the next fixed obstacle must be maintained. The minimum passage width must comply with national standards. In the USA, the minimum passage width is 3 ft. (915 mm).

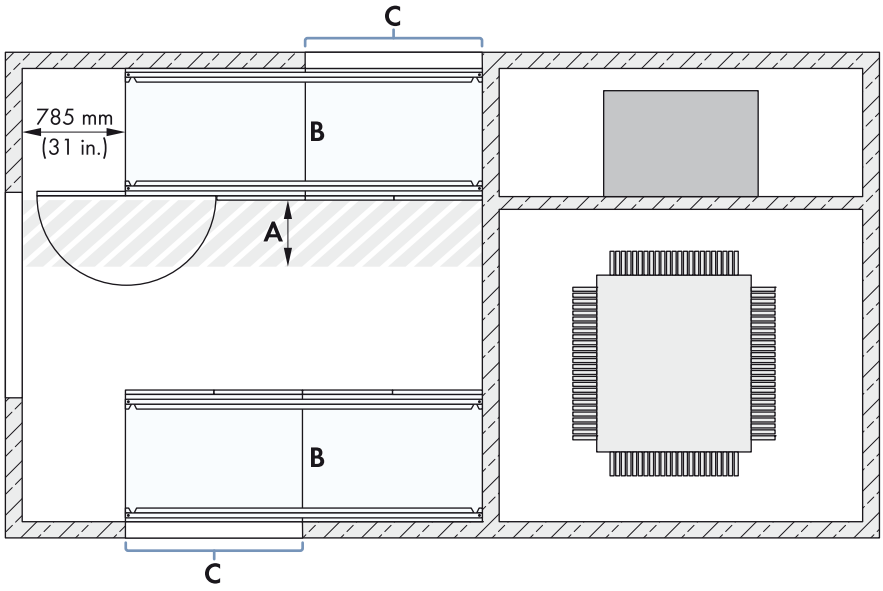


Figure 19: Minimum clearances for two inverters installed in electrical equipment rooms

Position	Description
A	Minimum passage width Maintain the minimum passage width between the open door of the inverter and the next fixed obstacle. The minimum passage width must comply with national standards. In the USA, the minimum passage width is 36 in. (915 mm).
B	Inverter
C	Removable wall of the electrical equipment room. A removable wall is only necessary if the option "Zone Monitoring" has been selected.

6.2.5 Requirements for the Cable Routing between MV Transformer and Inverter

This section explains how to arrange the AC cables to minimize the interferences between the different line conductors. Make sure that the cables of the different line conductors are of the same length.

⚠ WARNING

Fire hazard due to wrong AC cable routing

Incorrect routing can lead to the AC cables overheating and catching fire. Death or serious injury due to fire can result.

- Only route the AC cables as described.
- All cables used must have sufficient ampacity.
- All cables must be of the same length.
- The maximum length of the cables of 49 ft. (15 m) must not be exceeded.

Number of cables per line conductor	AC cable arrangement
3	AC cable arrangement 1
4	If possible: AC cable arrangement 2 Otherwise: AC cable arrangement 1
5	AC cable arrangement 1

Number of cables per line conductor	AC cable arrangement
6	If possible: AC cable arrangement 3 Otherwise: AC cable arrangement 1

Cable Arrangement for AC Cables Shorter than 6.5 ft. (2 m)

Arrange the cables as shown in the following figure for each number of cables having a length shorter than 6.5 ft. (2 m). The description is provided as an example for an arrangement with four cables per line conductor. The distance between the cables should be twice the diameter of a single cable.

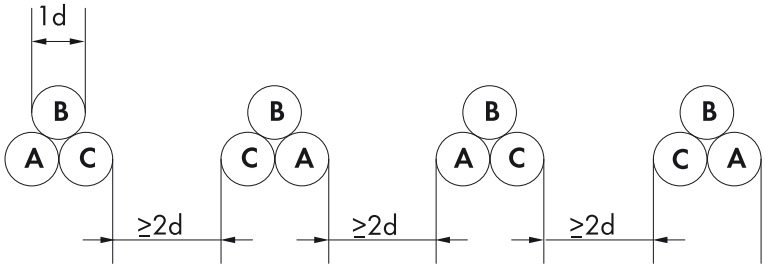


Figure 20: AC cable arrangement 1

Cable Arrangement for AC Cables Longer than 6.5 ft. (2 m)

Arrange all cables with a length of over 6.5 ft. (2 m) as shown in the following figure. The description is provided as an example for an arrangement with four cables per line conductor.

For AC cable arrangement 1: The distance between the cables should be twice the diameter of a single cable.

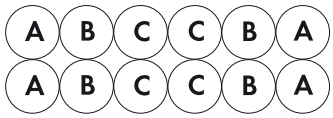


Figure 21: AC cable arrangement 2

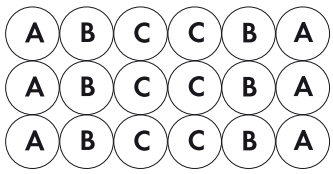


Figure 22: AC cable arrangement 3

Requirement:

☐ The AC cables must be bundled in the three-phase system.

☐ Between the medium-voltage transformer and the inverter there must be three separate cable routes for the AC cables, e.g. cable channels.

Procedure:

- Lay one A, B and C line conductor in each cable route. Ensure the distance between the cable bundles is at least double that of the diameter of a cable. This prevents current imbalances.*

* For further information, see the Technical Information "Cable Set – Requirements for and Laying of Cables between SUNNY CENTRAL CP and TRANSFORMER COMPACT STATION"

6.3 Preparation for Installation on a Foundation

In this section, the installation of the inverter on a foundation is described. Read this section if you are installing the inverter on a foundation.

6.3.1 Requirement for Foundation and Cable Arrangement

Laying the cables

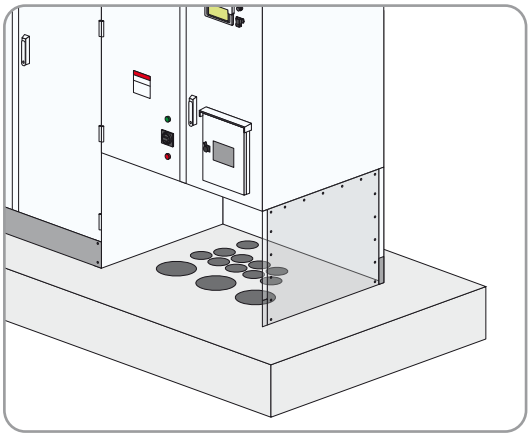
This manual does not specify at what stage the cables are to be laid in the foundation. When the cables are laid must be determined individually for each plant.

Requirements for the foundation:

- ☐ The foundation must be suitable for the weight of the inverter.
- ☐ The unevenness of the foundation must be less than 0.25%.
- ☐ Minimum dimensions: 9 $^{3}/_{16}$ ft. (2,800 mm) wide, 3 ft. 9 $^{1}/_{4}$ in. (1,150 mm) deep.
- ☐ The foundation must have a maximum tilt of 1% to allow rain water to drain away.

Requirement for openings in the foundation and cable arrangement:

- ☐ Openings for the cables must be located in the foundation underneath the interface cabinet.
- ☐ Openings for the cables must designed for the connection of conduits.
- ☐ The data cables must be kept separate from the AC and DC cables.
- ☐ A sufficient amount of openings must be available:
  - AC cables: number according to the cable routing (see Section 6.2.5)
  - DC cables: in accordance with the number of DC cables
  - Data cable: 1
  - Grounding electrode conductor: 1



Example: Arrangement of the openings in the foundation

The number of cable openings in the foundation must be equal to the number of cables to be laid.

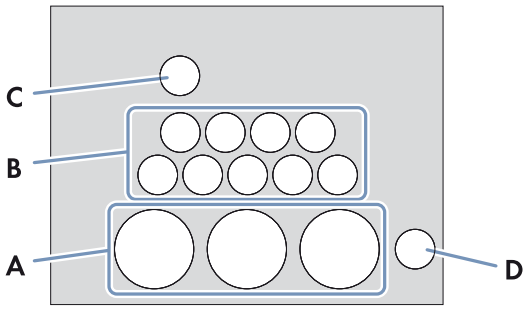


Figure 23: Arrangement of the cable openings (example)

Position	Designation
A	Openings for AC cables
B	Openings for DC cables
C	Openings for data cables
D	Openings for grounding electrode

6.3.2 Position of the Mounting Holes on the Inverter

There are six mounting holes in the base area of the inverter for fixing it to the foundation. In addition, you can use the two outer mounting brackets.

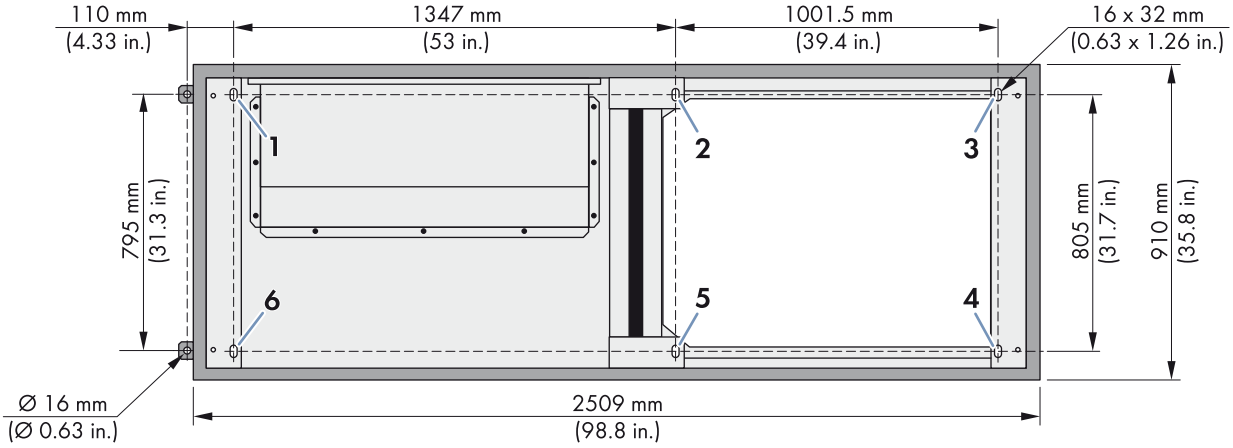


Figure 24: Position of the mounting holes on the inverter

The diameter of the mounting holes is $^{5}/_{8}$ in. (16 mm).

Clearance between	Clearance
Mounting holes 1 and 2	53.03 in. (1,347 mm)
Mounting holes 2 and 3	39.37 in. (1,000 mm)
Mounting holes 3 and 4	31.69 in. (805 mm)
Mounting holes 4 and 5	39.37 in. (1,000 mm)
Mounting holes 5 and 6	53.03 in. (1,347 mm)
Mounting holes 1 and 6	31.69 in. (805 mm)
Outer mounting holes	31.30 in. (795 mm)

6.3.3 Drilling Mounting Holes in the Foundation

1. Measure the distance for the drill holes.
2. Mark the positions of the drill holes.
3. Drill mounting holes at the positions marked in the foundation (diameter 0.62 in. (16 mm)).

7 Transporting the Inverter

Once you have taken all the preparatory measures, you can transport the inverter to the mounting location. In this section, you will learn which transport options SMA recommends and what you must observe when transporting the inverter.

Make sure to observe the following for installation in electrical equipment rooms

If you install the inverter in an electrical equipment room, you must first mount the rear kick plates of the inverter (see Section 7.3 "Mounting the Rear Kick Plates for Installation in Electrical Equipment Rooms", page 44). Once the inverter has been installed, there may no longer be sufficient room for mounting the kick plates.

7.1 Safety Precautions for Transport

This section contains safety precautions that must be taken into consideration and followed at all times during the transport. This prevents major accidents or damage to the inverter.

⚠ WARNING

Danger of crushing through tipping, falling or swaying of raised or suspended inverter

If the inverter is raised and transported without due care or too quickly and if unsuitable transport equipment is selected, the inverter may tip over or fall. This may result in death or serious injury.

- Wear personal protective equipment for all work on the inverter.
- All means of transport used must be designed for at least the weight of the inverter of 4,123 lbs. (1,870 kg).
- Always use all attachment points for transporting.
- Keep a safe distance from the inverter at all times during transport.
- Always transport the inverter as close to the ground as possible.
- Avoid sudden, jerky movements during transportation.
- Ensure that the inverter cannot tip over.
- Always take the center gravity of the inverter into consideration during transport.

NOTICE

Damage to the inverter due to improper temporary storage

The inverter may be damaged if it is set down on an unsuitable or uneven building ground.

- Never store the inverter even for a short time, on an uneven or unsuitable surface.
- Only transport the inverter to the mounting location when the base is completely prepared for the installation.

7.2 Center of Gravity of the Inverter

The center of gravity of the inverter is marked with the centre of gravity symbol on the packaging and the enclosure of the inverter. Whatever type of transport you are using, you must take the center of gravity into consideration in order to transport the inverter safely.

Position of the center of gravity

The center of gravity is not in the middle of the inverter.

- Observe the center of gravity marking on the packaging and on the inverter.

Center of Gravity Symbol

Figure 25: Center of gravity symbol

7.3 Mounting the Rear Kick Plates for Installation in Electrical Equipment Rooms

The actions described in this section only need to be performed if you install the inverter in an electrical equipment room.

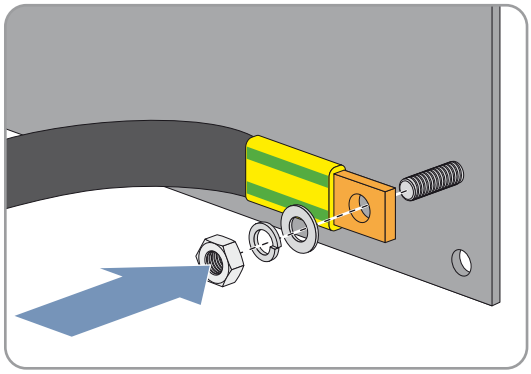
Attach the kick plates to the rear of the inverter before you install and align the inverter in an electrical equipment room. Once the inverter has been installed, there may no longer be sufficient room for mounting the kick plates.

Transporting the inverter after the rear kick plates are mounted

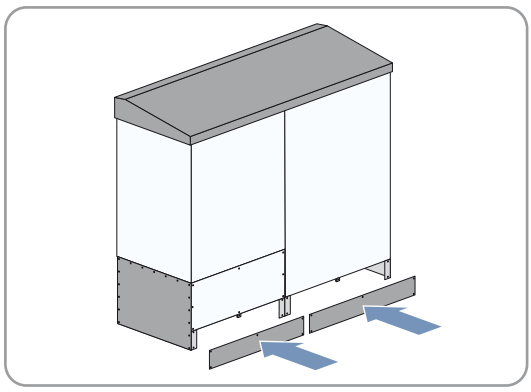
After the kick plates are mounted, you can no longer transport the inverter with a forklift truck or a crane fork. With mounted rear kick plates, you must use a crane for transportation (see Section 7.7 "Transporting the Inverter Using a Crane", page 46).

Procedure:

1. Position the kick plates on the rear side of the inverter.
2. Fasten the grounding straps on the rear kick plates.
   Torque: 6 ft.-lbs. to 8 ft.-lbs. (8 Nm to 10 Nm).



3. Fasten the kick plates on the inverter using all eight screws. Use a suitable TX screwdriver. Torque: 1.5 ft.-lbs. to 2.5 ft.-lbs (2 Nm to 3 Nm).



7.4 Transporting the Inverter Using a Crane Fork

⚠ WARNING

Danger of crushing if the inverter tips over

With the kick plates mounted at the rear side of the inverter, the supporting surface of the inverter is insufficient for the forks of the crane fork. Vibrations during transport may cause the inverter to slip off the crane fork and tip over. This may result in death or serious injury.

- When the kick plates are mounted, always transport the inverter with suitable lifting accessories.

Requirements:

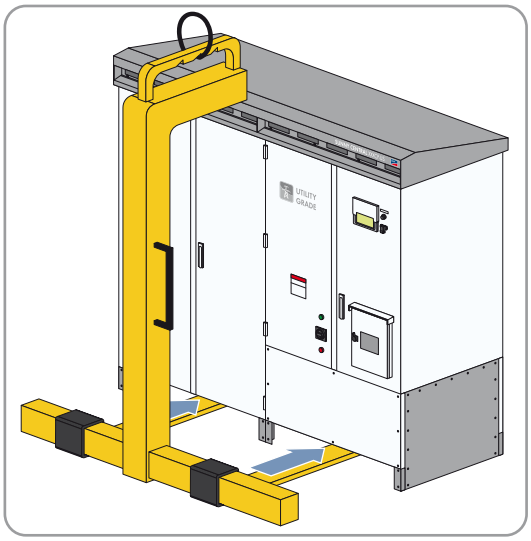
☐ The crane and crane fork must be designed to take the weight of the inverter.

☐ The crane fork must be properly coupled to the crane.

☐ The kick plates of the inverter must be disassembled.

Procedure:

1. Move the crane forwards until the crane fork is positioned underneath the inverter from the front or the rear. When doing so observe the centre of gravity of the inverter and position the crane fork completely under the inverter.



2. Slowly raise the crane fork with the inverter.
3. Transport the inverter to the mounting location and set down on a suitable surface.

7.5 Transporting the Inverter Using a Forklift Truck

⚠ WARNING

Danger of crushing if the inverter tips over

With the kick plates mounted at the rear side of the inverter, the supporting surface of the inverter is insufficient for the forks of the forklift truck. Vibrations during transport may cause the inverter to slip off the forklift truck and tip over. This may result in death or serious injury.

- When the kick plates are mounted, always transport the inverter with suitable lifting accessories.

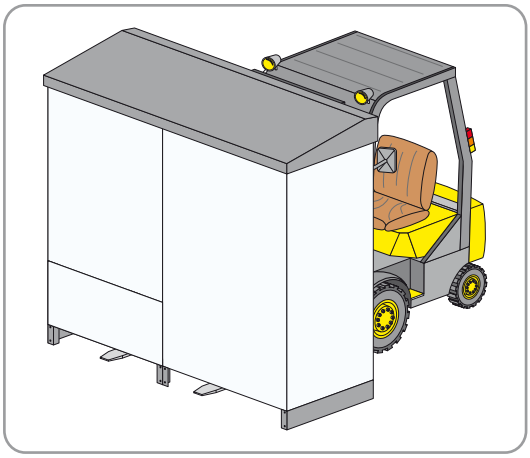
Requirements:

☐ The forklift truck must be designed to take the weight of the inverter.

☐ The kick plates of the inverter must be removed.

Procedure:

1. Move the forks of the forklift truck under the inverter at the front or rear side. When doing so, observe the center of gravity of the inverter and move the forks far enough under the inverter to ensure that when the inverter is lifted, it rests completely on the forks.



2. Secure the inverter against tipping using tension belts.
3. Slowly lift the inverter.
4. Transport the inverter to the mounting location and set down on a suitable surface.

7.6 Transporting the Inverter Using a Pallet Truck

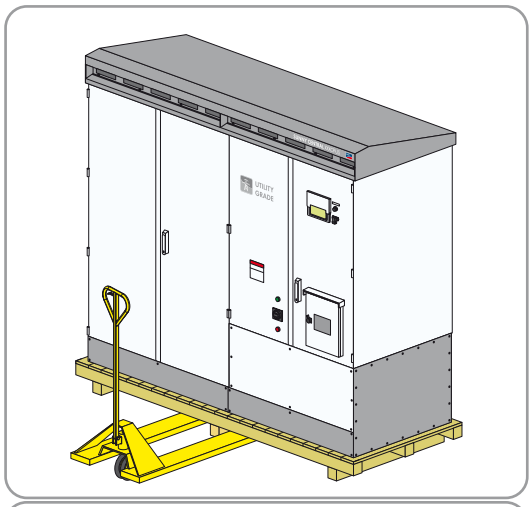
Requirements:

☐ The pallet truck must be designed to take the weight of the inverter.

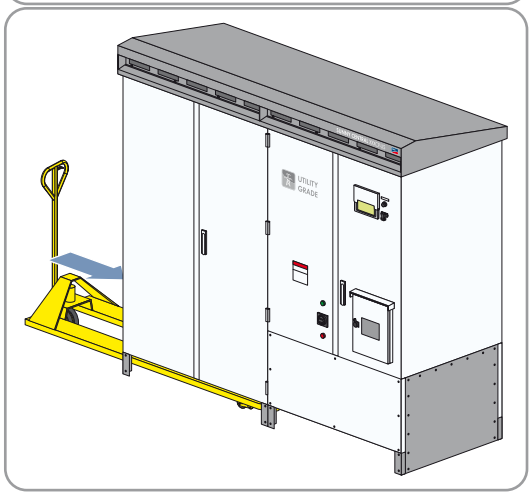
☐ The kick plates of the inverter must be disassembled.

Procedure:

1. If the inverter is to be transported on a wooden pallet, drive the pallet truck under the inverter from the rear side (as seen from the front of the inverter).



2. If the inverter is to be transported without a wooden pallet, the pallet truck must always be positioned under the inverter from the inverter cabinet side. When doing so, ensure that you do not damage the side panels of the inverter with the forks.



3. Slightly lift the inverter.
4. Transport the inverter to the mounting location and set down on a suitable surface.

7.7 Transporting the Inverter Using a Crane

This section describes how you transport the inverter using suitable lifting accessories, for example, lifting gear. The roof of the inverter must be removed for transporting the inverter using suitable lifting accessories.

7.7.1 Removing the Roof of the Inverter

⚠ CAUTION

Danger of crushing due to heavy and unwieldy roof

The roof of the inverter weighs 66 $^{1}/_{4}$ lbs. (30 kg) and is bulky. Attempting to move the roof alone can result in injuries from crushing.

- Wear personal protective equipment for all work on the inverter.
- Move the roof with two people.

NOTICE

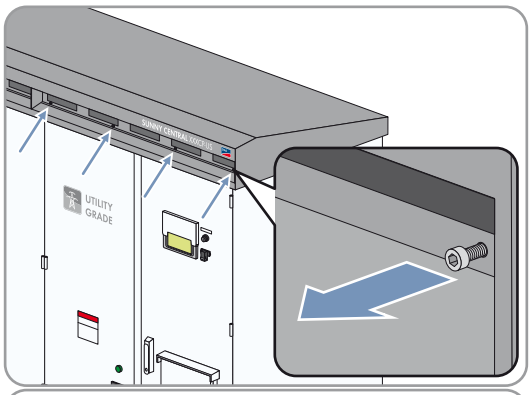
Damage to the inverter due to non-compliance with the grounding strap requirement

The roof and switch cabinet of the inverter are connected with a grounding strap. If the roof is removed without due care, the grounding strap could rip and the inverter be damaged.

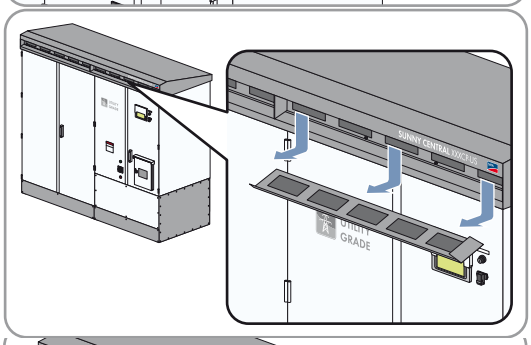
- Make sure that the grounding strap is not damaged when the roof is removed.
- Unscrew the grounding strap before you remove the roof from the inverter.
- Avoid fast, jerky movements when dismantling the roof.

Procedure:

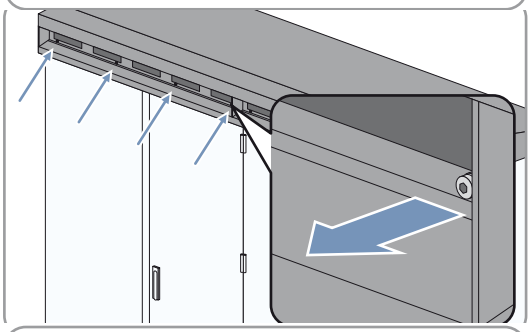
1. Release the screws of the right-hand ventilation grid.



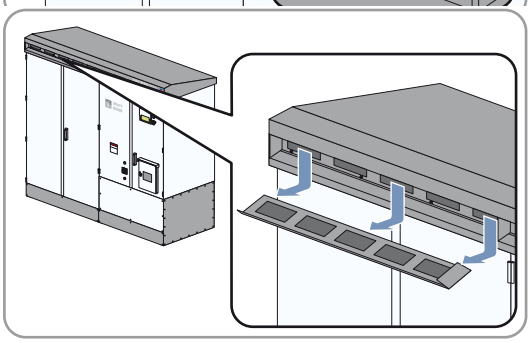
2. Pull the lower side of the right-hand ventilation grid forwards. This is how you remove the ventilation grid.



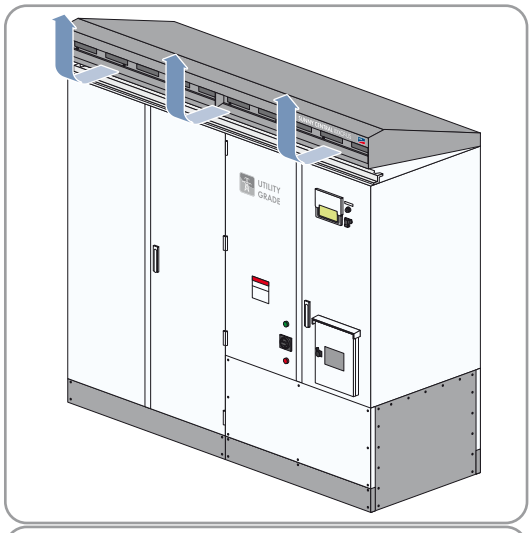
3. Loosen the screws of the left-hand ventilation grid.



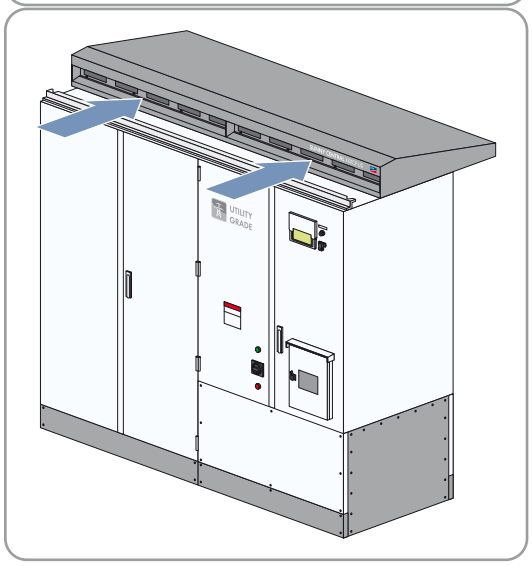
4. Pull the lower side of the left-hand ventilation grid forwards. This is how you remove the ventilation grid.



5. Pull the front edge of the roof forwards and push upwards at the same time.



6. Gently push the roof to the rear to slide it out of the guide rails.

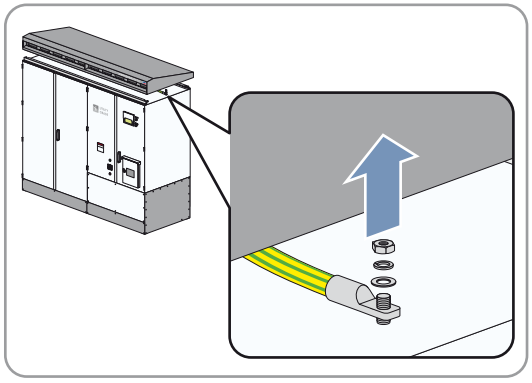


7. **NOTICE**

Damage to the inverter due to the ripping off of the grounding strap

- Push the roof on the inverter to the left until the grounding strap is visible. Then set the roof down on the inverter. This prevents the grounding strap from being torn off.

8. Remove the grounding strap from the inverter.



9. Remove the inverter roof and store it correctly.

7.7.2 Transporting the Inverter

When transporting the inverter with a crane, only use suitable lifting accessories, such as steel cable or steel chains and shackles designed to take at least the weight of the inverter. Make sure to observe the manufacturer's specifications for the respective lifting accessories.

⚠ WARNING

Danger of crushing if the inverter falls down due to a prohibited tilt angle of the lifting accessories

If the maximum allowed tilt angle of 60° for the lifting accessories is exceeded, the specified load-bearing capacity of the lifting accessories is no longer ensured. The lifting accessories used can tear. This may cause the inverter to fall down.

- Make sure that the maximum allowed tilt angle of the lifting accessories is not exceeded.
- Observe the manufacturer's specifications for the lifting accessories.
- Keep a sufficiently safe distance from the inverter.
- Wear personal protective equipment for all work on the inverter.

Requirements:

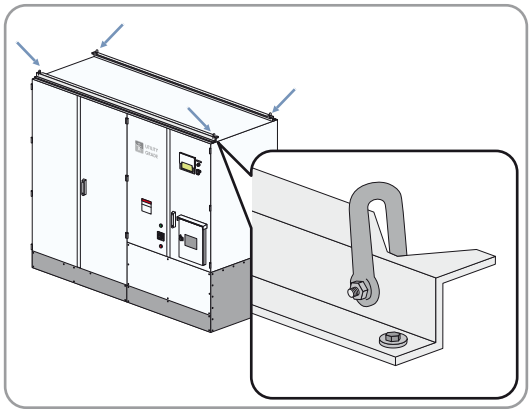
☐ The roof must be disassembled.

☐ Suitable lifting accessories must be available (observe the manufacturer's specifications).

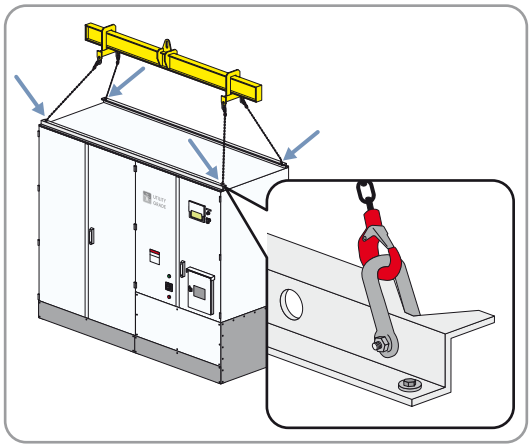
☐ The hoist must be properly connected to the crane.

Procedure:

1. Mount the shackles to all four corners of the top of the inverter.



2. Hook suitable lifting accessories in the crane.
3. Position the lifting accessories in the center above the inverter.
4. Hook the lifting accessories in all four shackles.



5. Ensure that all lifting accessories and load hooks are attached correctly.
6. Raise the crane hook slowly until the lifting accessories are under tension.

7. **⚠ WARNING**

   Danger of crushing if the inverter falls down

   If the maximum allowed tilt angle of 60° is exceeded, the specified load-bearing capacity of the lifting accessories is no longer ensured. The lifting accessories used can tear. This may cause the inverter to fall down.

   - Make sure that the maximum allowed tilt angle is not exceeded.
   - Observe the manufacturer's specifications for the lifting accessories.
   - Keep a sufficiently safe distance from the inverter.
   - Wear personal protective equipment for all work on the inverter.

8. Slowly lift the inverter.
9. Transport the inverter as close to the ground as possible.
10. Transport the inverter to the mounting location and set down on a suitable surface.
11. Remove all lifting accessories.

7.7.3 Mounting the Roof of the Inverter

After transporting the inverter using the crane, you must mount the roof.

When the inverter is installed in an electrical equipment room, it is not necessary to mount the roof.

⚠ CAUTION

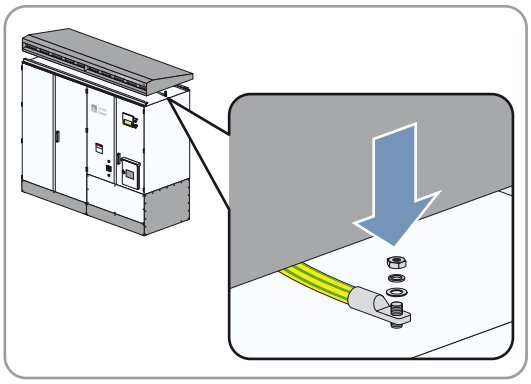
Danger of crushing due to heavy and unwieldy roof

The roof of the inverter weighs 66 $^{1}/_{4}$ lbs. (30 kg) and is bulky. Attempting to move the roof alone can result in injuries from crushing.

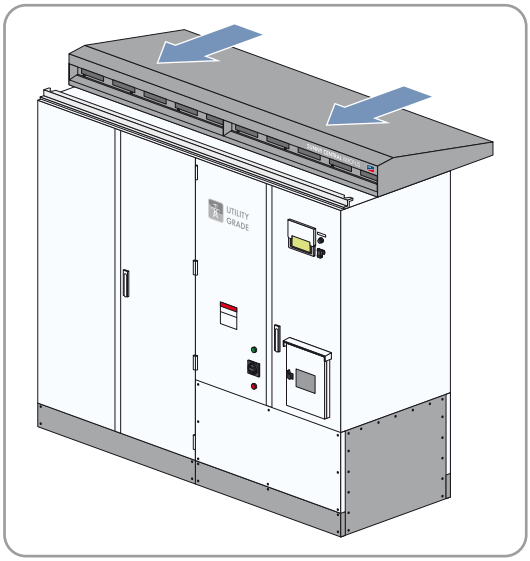
- Wear personal protective equipment for all work on the inverter.
- Only move the roof with two people.

Procedure:

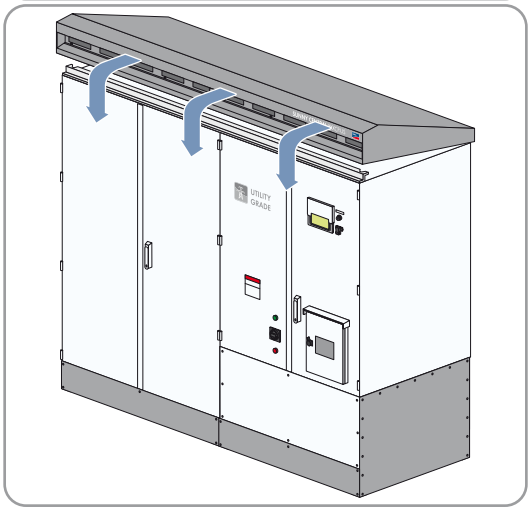
1. Place the roof on the inverter.
2. Fasten the roof grounding strap to the inverter.
   Torque: 10.5 ftlbs. (14 Nm).



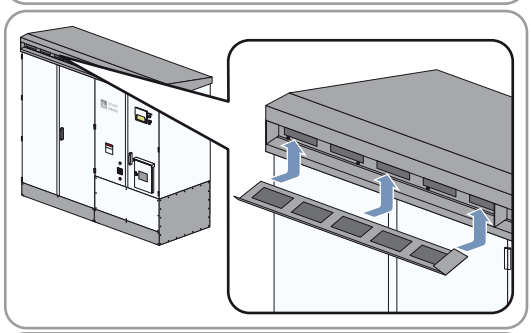
3. Push the roof into the rails and pull it forwards.



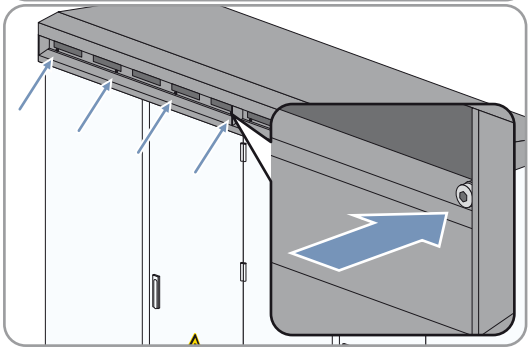
4. Push the roof downwards.



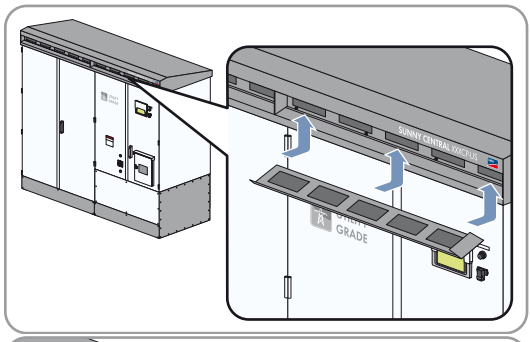
5. Insert the left-hand ventilation grid.



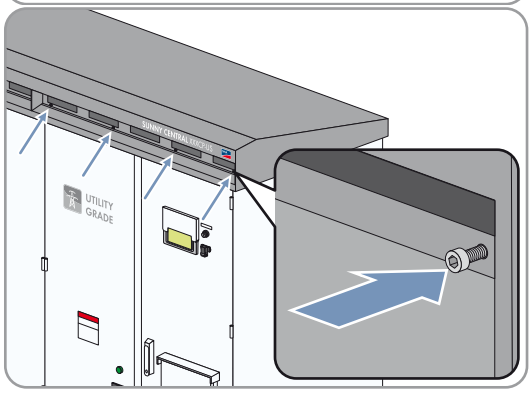
6. Insert and tighten the screws of the left-hand ventilation grid. (Torque: 14.5 ft·lbs. (20 Nm)).



7. Insert the right-hand ventilation grid.



8. Insert and tighten the screws of the right-hand ventilation grid. (Torque: 14.5 ft·lbs. (20 Nm)).



8 Installation of the Inverter

This section contains all information necessary for installing the inverter. The various installation options are described consecutively.

8.1 Installing the Inverter

8.1.1 Installing the Inverter on a Foundation

Once the inverter has been aligned on the foundation, you can attach it to the foundation using concrete screw anchors.

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

☐ Six suitable concrete screw anchors

Requirements:

☐ The mounting surface must be prepared for installation (see Section 6.3 "Preparation for Installation on a Foundation", page 41).

Procedure:

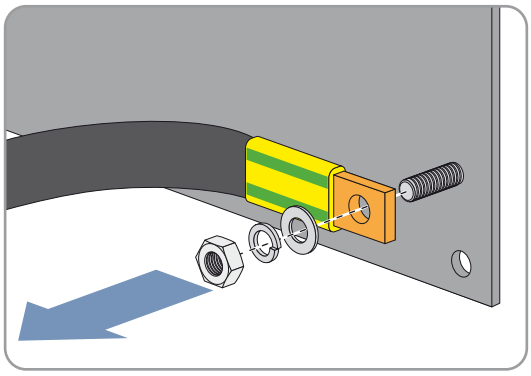
1. Insert the concrete screw anchors through the brackets of the inverter into the foundation. The exact procedure depends on the type of screw anchors used.
2. Tighten the concrete screw anchors using the torque specified by the screw anchor manufacturer.
3. Make sure that all concrete screw anchors and the inverter are securely connected to the foundation.

8.2 Removing the Connection Area Panels

1. Remove all eight screws of the front panel using a TX screwdriver.
2. **NOTICE**

   Damage to the inverter due to the grounding strap being ripped off

   - Pull the panel approximately 8 in. (200 mm) away from the inverter.
3. Unscrew the grounding strap of the front panel.

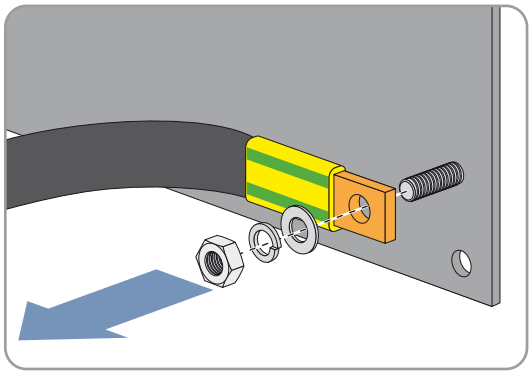


4. Remove the panel and store the screws safely.
5. Remove all 17 screws of the side panel using a TX screwdriver.
6. **NOTICE**

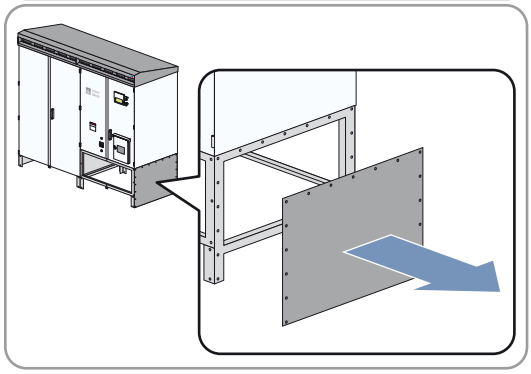
   Damage to the inverter due to the ripping off of the grounding strap

   - Pull the panel approximately 8 in. (200 mm) away from the inverter.

7. Unscrew the grounding strap of the side panel.



8. Remove the panel and store the screws safely.



8.3 Mounting the Ventilation Plate

NOTICE

Damage to the inverter or transformer due to overheating

Inverters or transformers can overheat and be damaged due to the drawing-in of exhaust air from other inverters.

- Install the plant in such a way that the inverter or the transformer cannot draw in any exhaust air from other devices.
- Follow the supply air and exhaust air requirements (see Section 6.2.2 "Supply Air and Exhaust Air", page 33)

The guide rails for the ventilation plate can be found in the base area of the inverter cabinet.

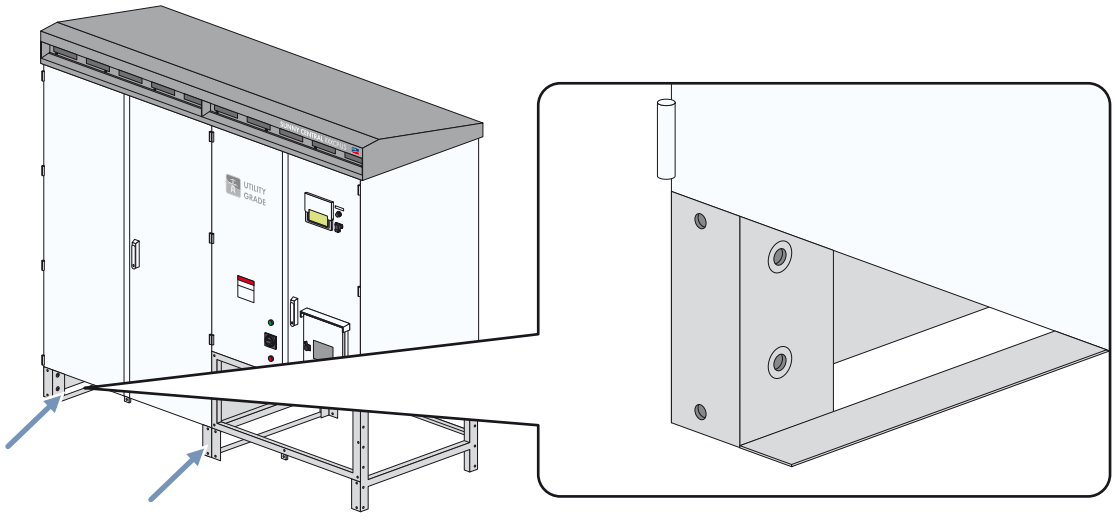


Figure 26: Position of the guide rails for the ventilation plate

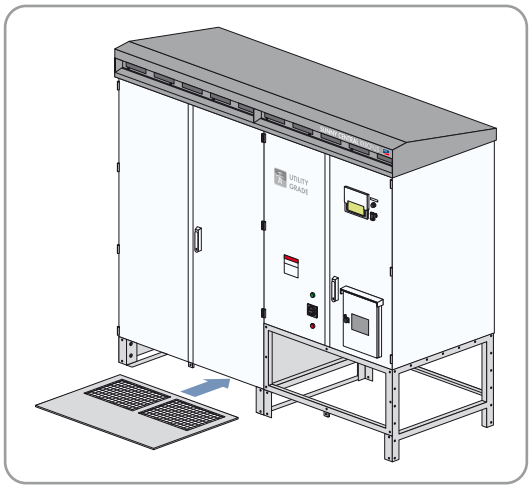
Procedure:

- Push the ventilation plate into the inverter cabinet. The ventilation grid is facing the rear panel.

  ☑ The ventilation grid is flush with the inverter enclosure.

  ✖ The ventilation plate does not go all the way in?

  - Grasp the ventilation plate from underneath and press upwards in the middle while pushing it in.



8.4 Mounting the Base Braces

The base braces are in the floor area of the interface cabinet. You must mount the base braces so that the cable can be easily connected.

1. Loosen the base braces.
2. Position the base braces.
3. Screw on the base braces tightly.
4. If you are not carrying out the electrical connection immediately, mount the panels of the connection area (see Section 16.8).
5. Close and lock the inverter.

9 Grounding Connection

In this section, you will learn how to connect the grounding cables in the connection area.

The grounding busbar is used to connect the equipment ground conductors and the grounding electrode conductor.

9.1 Requirements for the Cables and Cable Connection

9.1.1 Cable Requirements for the Grounding Connection

- ☐ All cables must be suitable for temperatures of up +197°F (+90°C) and in accordance with the *National Electrical Code*® ANSI/NFPA 70.
- ☐ Use only copper cables or tin-plated aluminum cables.
- ☐ The cable cross-sections of the PE connections depend on the installed overcurrent protective device. Refer to the *National Electrical Code*® ANSI/NFPA 70 Article 250.122 for how to calculate the required cross-sections.
- ☐ The grounding of the PV plant must be designed in accordance with the requirements of sections 690.41 to 690.47 of the *National Electrical Code*® ANSI/NFPA 70 and is the responsibility of the installer.

9.1.2 Requirements for the Cable Connection with Terminal Lugs

- ☐ All used terminal lugs must have a valid UL approval.
- ☐ Cable lugs have to be UL listed compression lugs with two securement holes ($^1/_2$ in. (13 mm) in diameter) and a distance between the holes of 1 $^3/_4$ in. (44 mm). Both holes have to be utilized in installation.
- ☐ The terminal lug width must be larger than the diameter of the washers 1 $^1/_4$ in. (32 mm). This will ensure that the specified torques are effective over the whole surface.
- ☐ Use only copper terminal lugs or tin-plated aluminum lugs.
- ☐ Connect a maximum of two grounding cables to the grounding connection lug.
- ☐ Only use screws, nuts and washers included in the scope of delivery.
- ☐ The specified torques must always be complied with.

Information on torques

The torques specified in the following table are the torques with which the terminal lugs are mounted to the copper bus bar.

Connection option	Cable cross-section	Torque
Copper terminal lug on copper bus bar	6 AWG to 350 kcmil ($16mm^2$ to $185\ mm^2$)	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	6 AWG to 350 kcmil ($16mm^2$ to $185\ mm^2$)	27.5 ft.-lbs. (37 Nm)

9.2 Grounding Connection Overview

The unit has 10 ground terminal connection locations on the busbar. A maximum of two conductors may be connected per location.

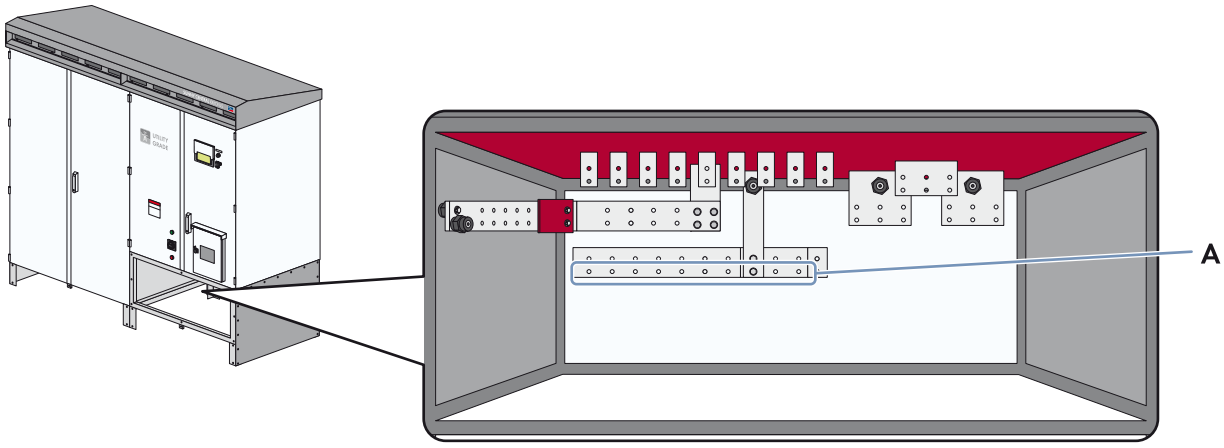


Figure 27: Grounding connection area with terminal lugs

Description	Explanation
A	Copper bus bars for connecting the grounding cables

9.3 Connecting the Grounding Cables with Terminal Lugs

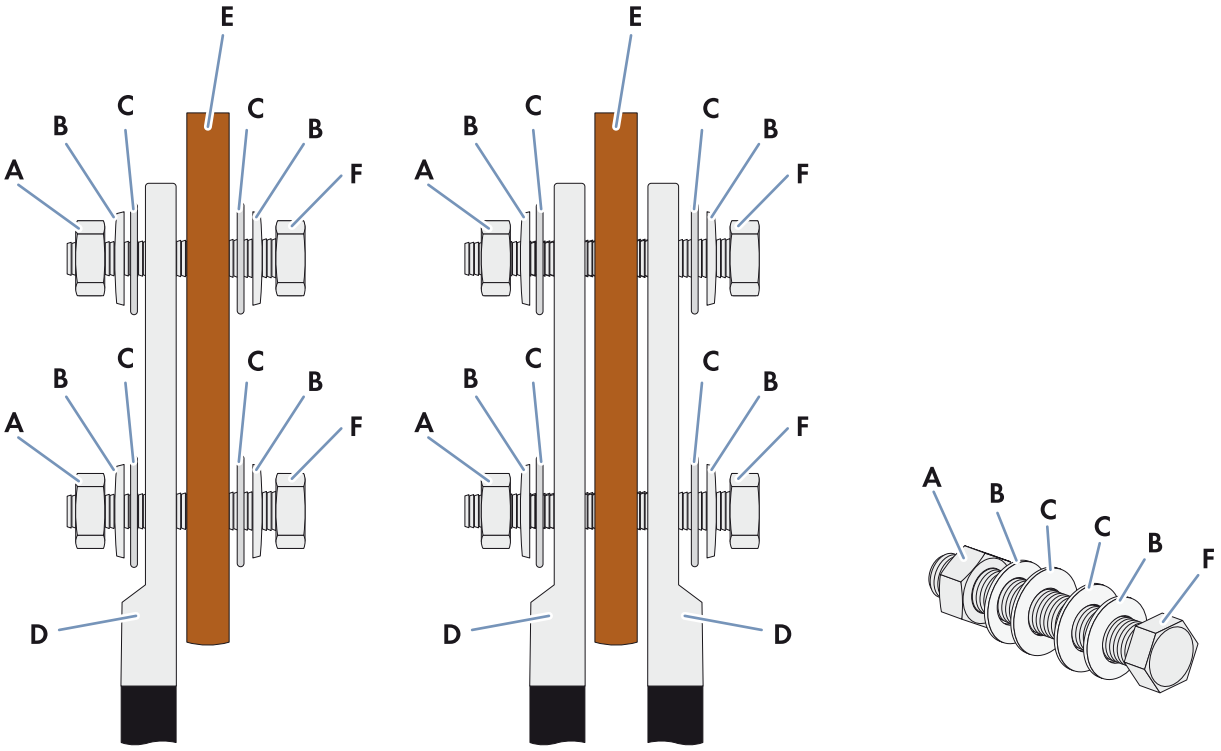


Figure 28: Assembly of the connection with two-hole terminal lugs

Position	Description
A	Nut M12
B	Spring washer

Position	Description
C	Fender washer
D	Two-hole terminal lug
E	Copper bus bar
F	Screw M12

Requirement:

☐ The cable requirements must be complied with (see Section 9.1 "Requirements for the Cables and Cable Connection", page 56).

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

☐ Clean cloth

☐ Ethanol cleaning agent

Procedure:

1. Strip the grounding cable insulation.
2. Fit terminal lugs to the grounding cable.
3. Clean the contact surfaces using a clean cloth and ethanol cleaning agent.
4. Clean the contact surfaces with the non-woven abrasive until they have a light metallic sheen. At the same time, ensure that the coated contact surfaces are not damaged.
5. Remove metal dust using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.
6. Connect the grounding cable to the grounding connection busbar with the appropriate torque in accordance with the circuit diagram. Only use the screws, washers and nuts included in the scope of delivery.

Connection option	Cable cross-section	Torque
Copper terminal lug on copper bus bar	6 AWG to 350 kcmil (16 mm² to 185 mm²)	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	6 AWG to 350 kcmil (16 mm² to 185 mm²)	27.5 ft.-lbs. (37 Nm)

7. Secure the grounding cable to the cable support rail.
8. Make sure that the grounding cable is correctly mounted.

10 DC Connection

This section describes how the inverter is connected to the PV array and which safety measures must be taken in order to avoid personal injury and property damage. It contains information on the cable requirements and the torque for correctly connecting the cable.

10.1 Safety Precautions for the DC Connection

In this section, you will find safety precautions which you must observe throughout the entire process of making the DC connection. Read this section carefully and follow the instructions to prevent personal injury and property damage and to ensure smooth operation of the inverter.

The DC inputs are isolated from the enclosure and the system grounding. If required by section 250 of the *National Electrical Code®*, ANSI/NFPA 70, the installer is responsible for this grounding.

⚠ DANGER

Danger to life from electric shock due to live voltage

High voltages are present in the live components of the inverter. Touching live components results in death or serious injury due to electric shock.

- When working in a high contact-risk environment, wear Hazard Risk Category 2 personal protective equipment.
- Do not touch live components.
- Follow the instructions precisely.
- Observe all safety messages on the product and in the documentation.
- Observe all safety precautions of the module manufacturer.
- Before any work on the inverter is performed, always disconnect the following components from voltage sources if live voltage is not absolutely necessary:
  - Power line voltage for grid feed-in
  - Internal power supply
  - DC voltage from the PV array
  - Additional external voltages, e.g. control signals of a control room
- Ensure that no disconnected components can be reconnected.
- After disconnecting the inverter from voltage sources, wait at least 15 minutes for the capacitors of the inverter to discharge completely.
- Always check that no voltage is present in any of the components before working on the inverter.
- Ground and short-circuit the device.
- Cover or safeguard any adjacent live components.

Danger to life from electric shock due to live DC cables

DC cables connected to PV modules that are exposed to sunlight are live. Touching live components results in death or serious injury.

- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.
- Prior to connecting the DC cables, ensure that the DC cables are voltage-free.

⚠ DANGER

Danger to life from electric shock due to ground fault

If a ground fault has occurred, parts of the plant that are supposedly grounded may in fact be live. Touching incorrectly grounded components can result in death or very serious injuries from electric shock.

- Ensure that no voltage is present before touching any components of the PV plant.
- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.

Danger to life from electric shock when entering the PV field

The insulation monitoring device with GFDI and Advanced Remote GFDI does not provide protection from injury when GFDI is activated. PV modules grounded by GFDI discharge voltage to ground. When entering the PV field, lethal electric shocks may occur.

- Before entering the PV field, switch the PV array to insulated operation.
- Ensure that the insulation resistance of the PV array is greater than 1 k Ω .

Danger to life from electric shock if the inverter is damaged

Operating a damaged inverter can lead to hazardous situations that result in death or serious injuries due to electric shock.

- Only use the inverter when it is technically faultless and in an operationally safe state.
- Regularly check the inverter for visible damage.
- Make sure that all external safety equipment is freely accessible at all times.
- Make sure that all safety equipment is in good working order.
- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.

Danger to life from electric shock even if the inverter is disconnected on the AC and DC sides

The precharge unit of the option "Q at Night" is also live if the AC contactor and the DC switch are open. Touching live components of this assembly will result in death or serious injury.

- Do not touch live components.
- Do not remove protective covers.
- Observe the warning messages.
- Wear personal protective equipment.

10.2 Requirements for the Cables and Cable Connection

10.2.1 Cable Requirements for the DC Connection

☐ All cables must be suitable for temperatures of up +197°F (+90°C) and in accordance with the *National Electrical Code®* ANSI/NFPA 70.

☐ Use only copper cables or tin-plated aluminum cables.

☐ The wire size has to be based on the ampacities given in Table 310.16 of the *National Electrical Code®*, ANSI/NFPA 70, and the derating factor of no less than 125 percent of the RMS or DC current that the circuit carries during rated conditions.

10.2.2 Requirements for the Cable Connection with Terminal Lugs

☐ All used terminal lugs must have a valid UL approval.

☐ Cable lugs have to be UL listed compression lugs with two securement holes ($^1/_2$ in. (13 mm) in diameter) and a distance between the holes of 1 $^3/_4$ in. (44 mm). Both holes have to be utilized in installation.

☐ The terminal lug width must be larger than the diameter of the washers (1 $^1/_4$ in. (32 mm)). This will ensure that the specified torques are effective over the whole surface.

☐ Use only copper terminal lugs or tin-plated aluminum lugs.

☐ Connect a maximum of two cables to the connection lug.

☐ Only use screws, nuts and washers included in the scope of delivery.

☐ The specified torques must always be complied with.

Connection option	Cable cross-section	Torque
Copper terminal lug on copper bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	27.5 ft.-lbs. (37 Nm)
Tin-plated aluminum terminal lug on tin-plated aluminum bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	27.5 ft.-lbs. (37 Nm)
Copper terminal lug on tin-plated aluminum bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	27.5 ft.-lbs. (37 Nm)

10.3 Overview of the DC Connection for the Option DC Fuse

With this connection option, you can use terminal lugs to connect the DC cables. An overview of drawings on the various connection areas is provided below for orientation. Depending on the order option and how the modules are grounded, the connection areas may look different.

The maximum number of DC inputs is: 9 x DC+, 9 x DC–. A maximum of two cables may be connected per DC input.

10.3.1 DC Connection with Negative Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has a negative grounding.

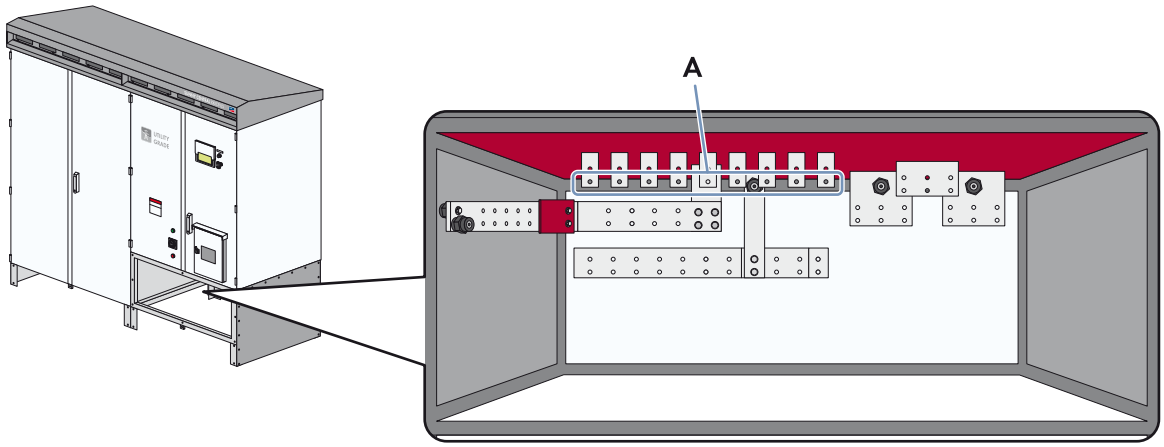


Figure 29: Illustration of the positive terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC+ terminal (negative grounding)

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has a negative grounding.

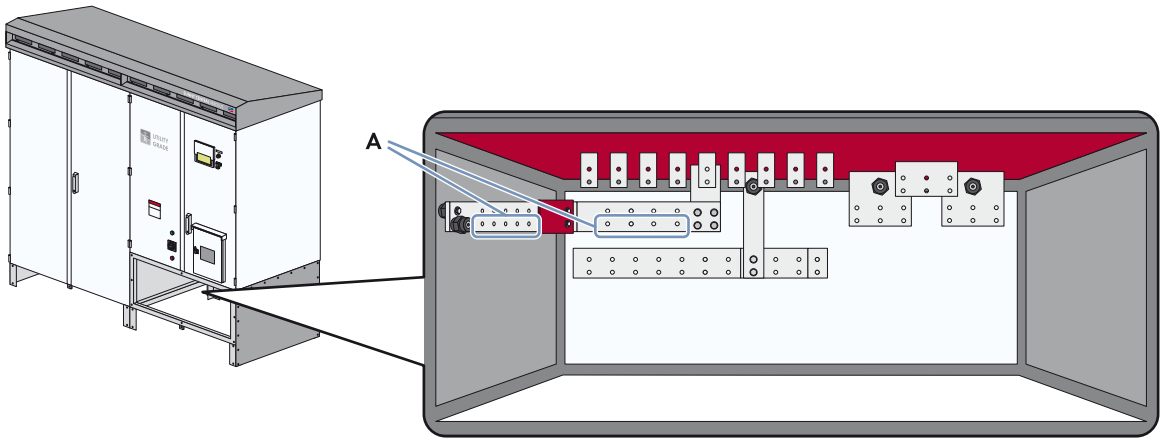


Figure 30: Illustration of the negative terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC– terminal (negative grounding)

10.3.2 DC Connection with Positive Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has a positive grounding.

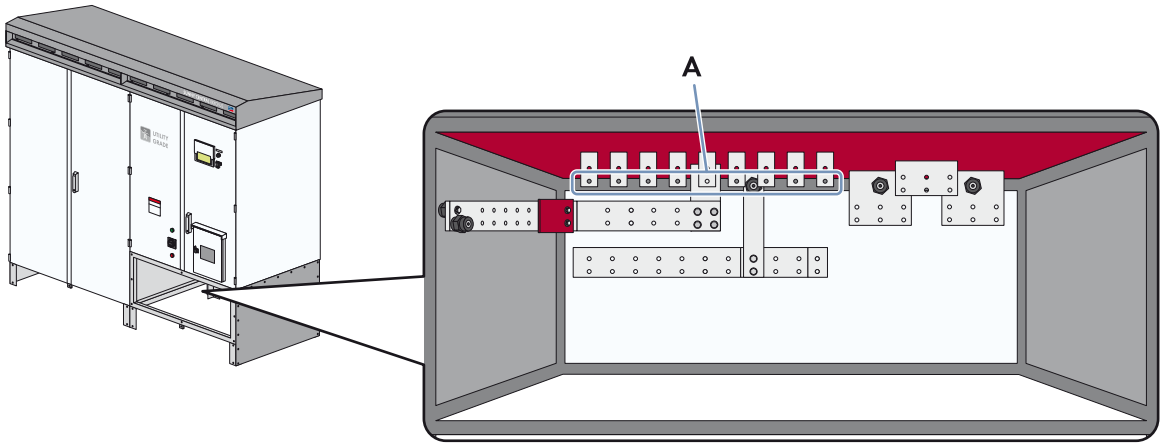


Figure 31: Illustration of the negative terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC– terminal (positive grounding)

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has a positive grounding.

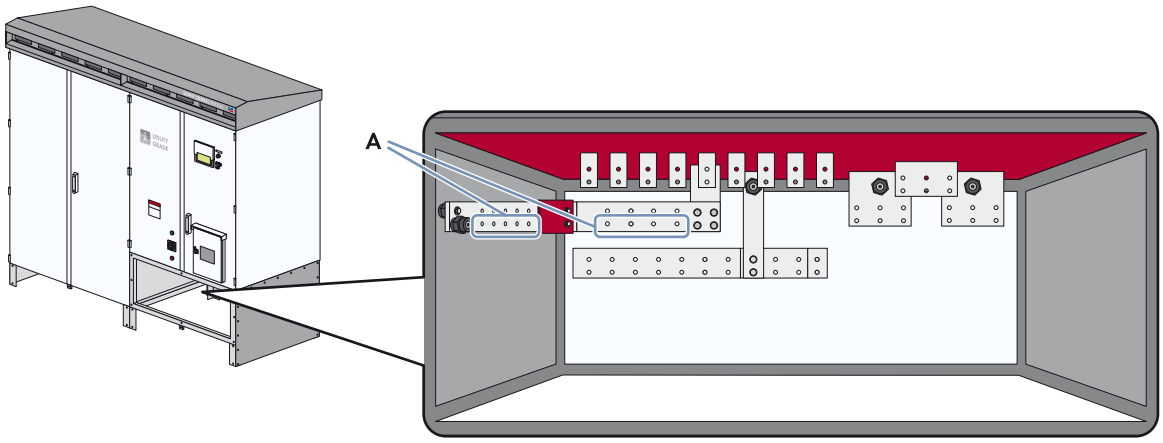


Figure 32: Illustration of the positive terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC+ terminal (positive grounding)

10.3.3 DC Connection without Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has no grounding.

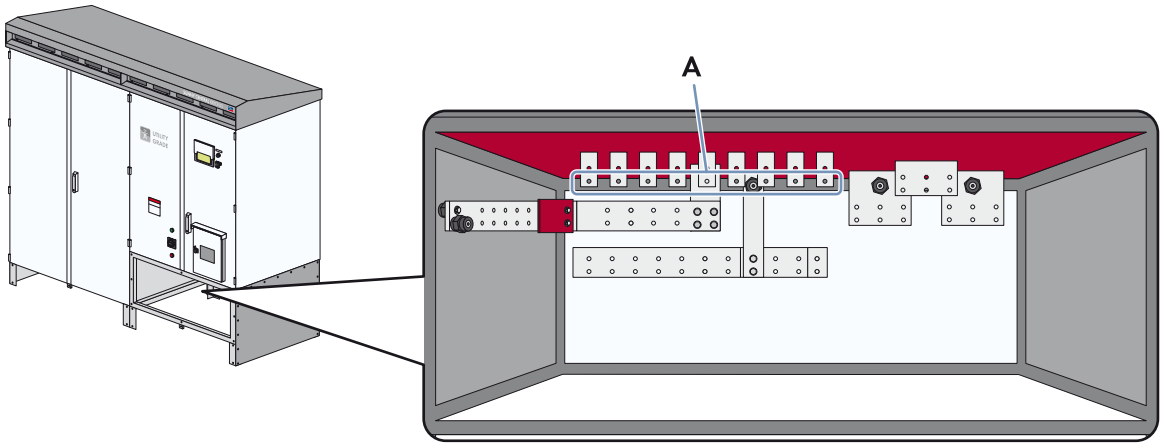


Figure 33: Illustration of the positive terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC+ terminal (without grounding)

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has no grounding.

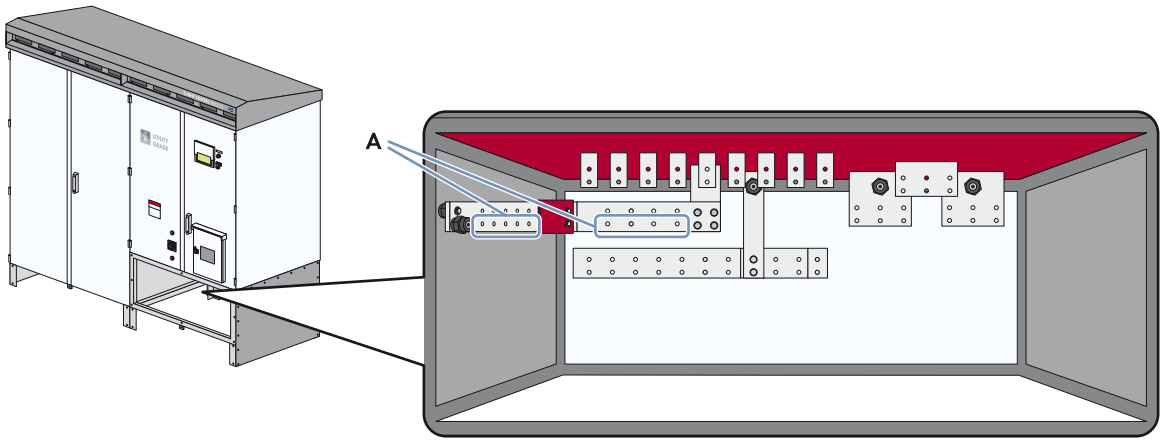


Figure 34: Illustration of the negative terminal with the DC fuse option for connecting terminal lugs

Position	Description
A	DC– terminal (without grounding)

10.4 Overview of the DC Connection for the Optional DC Busbar

With this connection option, the DC fuses are located in a DC main distribution or DC sub-distribution. There are no DC fuses in the inverter. The cables are connected directly to the DC busbars.

The maximum number of DC inputs is: 10 x DC+, 4 x DC–, or 4 x DC+, 10 x DC–. A maximum of two cables may be connected per DC input.

10.4.1 DC Connection with Negative Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has a negative grounding.

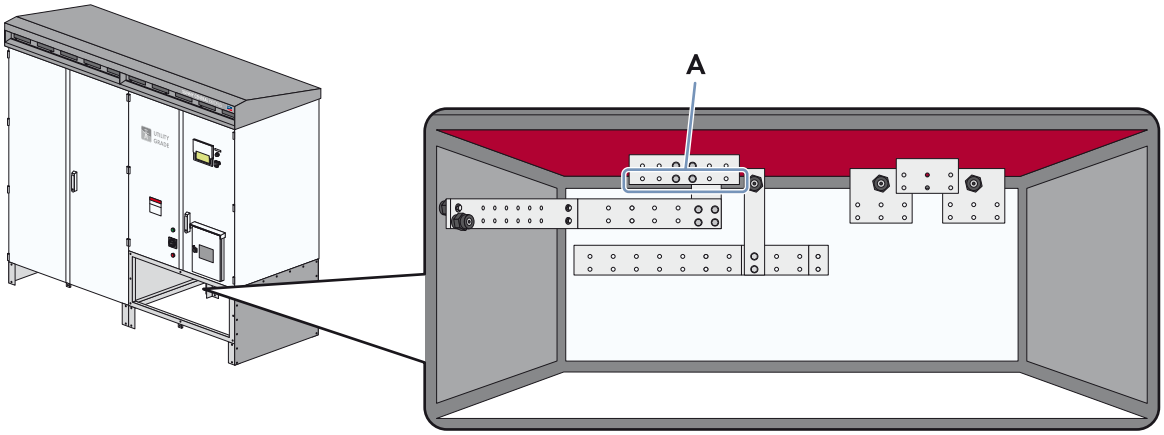


Figure 35: Illustration of the positive terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC+ terminal (negative grounding)

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has a negative grounding.

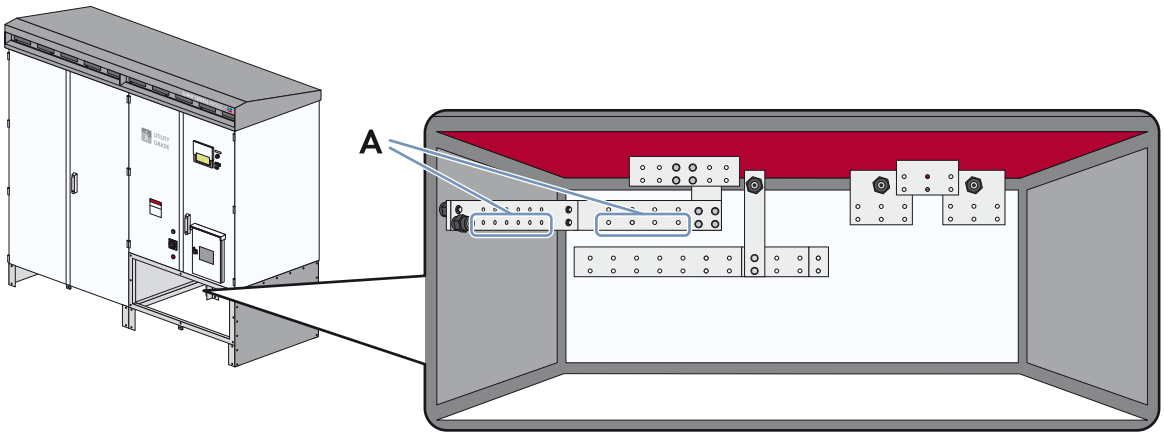


Figure 36: Illustration of the negative terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC– terminal (negative grounding)

10.4.2 DC Connection with Positive Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has a positive grounding.

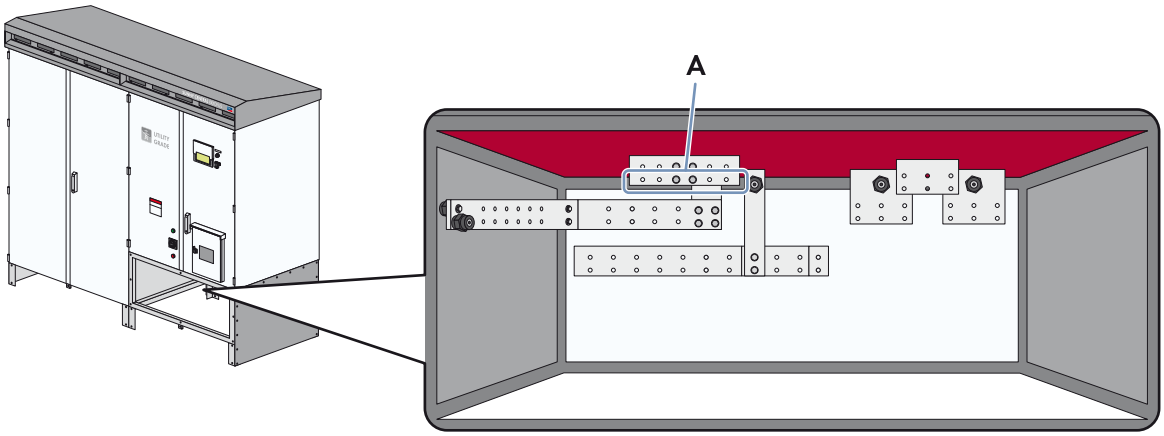


Figure 37: Illustration of the negative terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC– terminal (positive grounding)

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has a positive grounding.

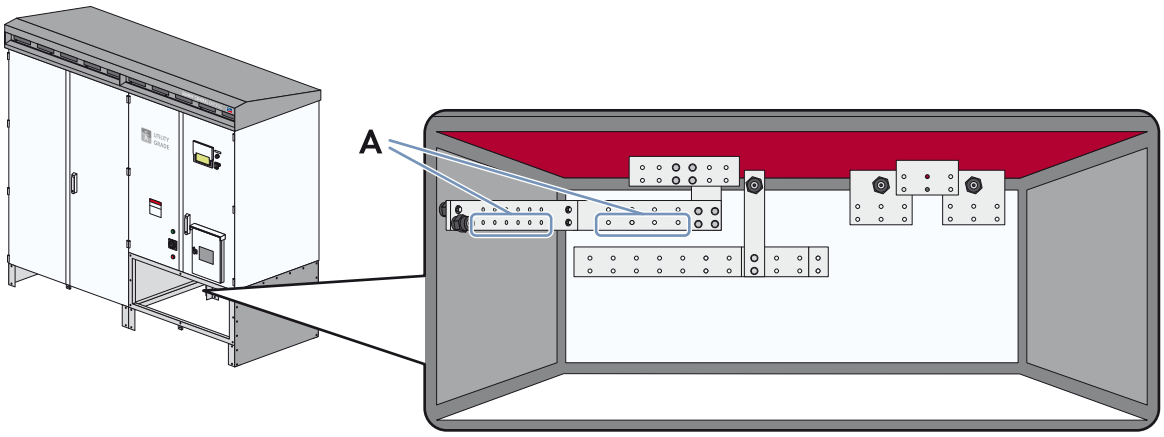


Figure 38: Illustration of the positive terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC+ terminal (positive grounding)

10.4.3 DC Connection without Grounding

The DC cables previously fitted with terminal lugs are connected directly to the copper bus bars. You can connect a maximum of two terminal lugs per DC input.

DC+ Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the positive terminal when the module has no grounding.

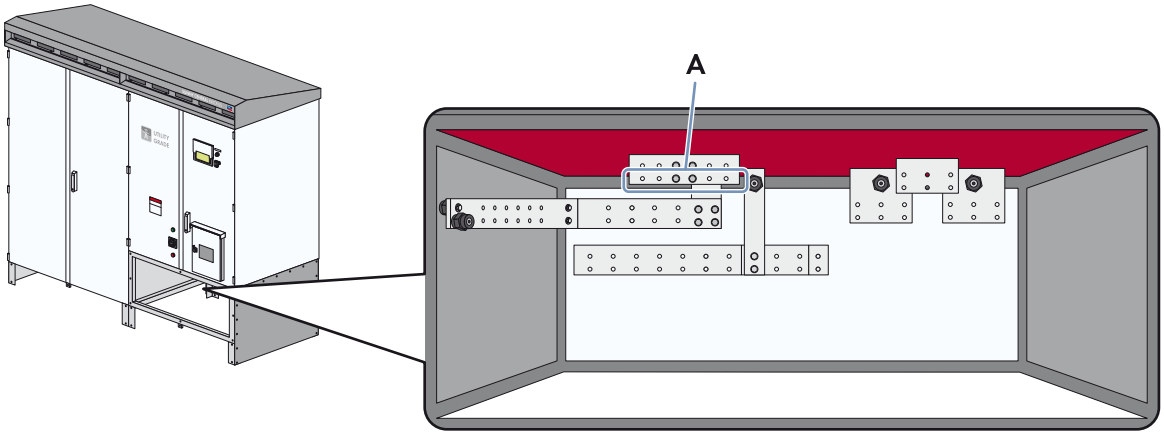


Figure 39: Illustration of the positive terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC+ terminal (without grounding)

DC– Connection with Terminal Lugs

Observe polarity

The polarity of the connection area depends on how the PV modules are grounded.

The following overview displays the negative terminal when the module has no grounding.

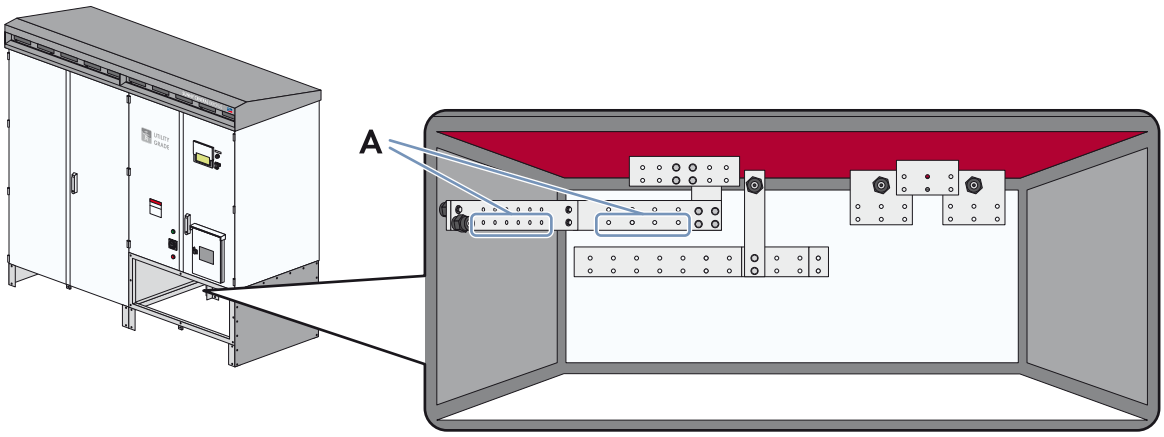


Figure 40: Illustration of the negative terminal with the DC busbar option for connecting terminal lugs

Position	Description
A	DC– terminal (without grounding)

10.5 Connecting the DC Cables

DANGER

Danger to life from electric shock due to live DC cables

DC cables connected to PV modules that are exposed to sunlight are live. Touching live components results in death or serious injury.

- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.
- Prior to connecting the DC cables, ensure that the DC cables are voltage-free.

WARNING

Fire hazard due to faulty connections and oxidized contact surfaces

Contaminated and incorrectly mounted connections can excessively heat up under high loads. As a result, the connections may catch fire. Death and serious injury due to fire can result.

- Use only copper terminal lugs or tin-plated aluminum lugs.
- Before connecting the cables, clean the contact surfaces.
- Do not touch the contact surfaces after cleaning.
- Observe the specified torque.

Fire hazard due to the connection of unsuitable terminal lugs

If unsuitable terminal lugs are used or incorrectly mounted, ampacity is not ensured. The connections can overheat. Death or serious injury due to fire can result.

- Only use two-hole terminal lugs.
- Always connect terminal lugs to the busbars using two screws.
- Make sure that the terminal lugs are correctly mounted.

Disconnection on the DC side

The DC main distributions and DC sub-distributions should be equipped with circuit breakers. Circuit breakers enable trouble-free DC-side disconnection of the inverter.

Overview of the Connection Assembly

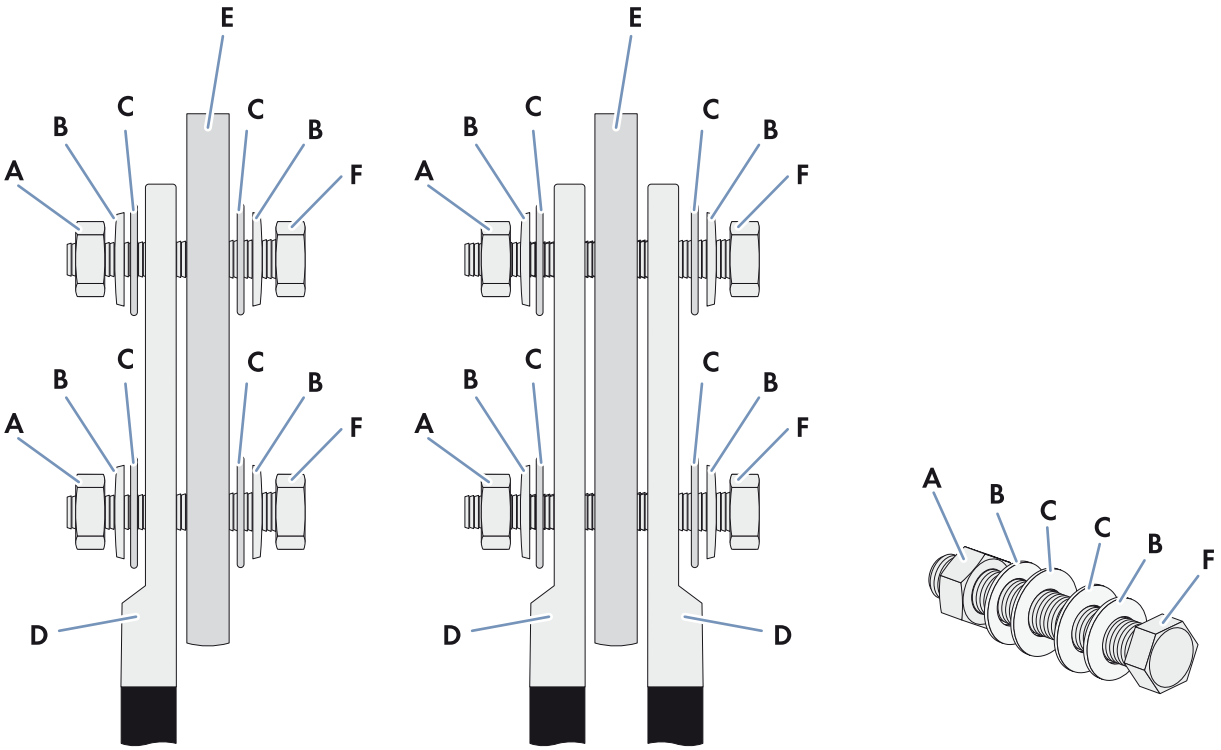


Figure 41: Assembly of the connection with two-hole terminal lugs

Position	Description
A	Nut M12
B	Spring washer
C	Fender washer
D	Two-hole terminal lug
E	Busbar
F	Screw M12

Requirements:

☐ The grounding type of the PV modules must be known.

☐ The cable requirements must be complied with (see Section 10.2 "Requirements for the Cables and Cable Connection", page 60).

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

☐ Clean cloth

☐ Ethanol cleaning agent

Procedure:

1. Strip the DC cable insulation appropriately for the terminal lugs to be used.
2. Fit terminal lugs to the DC cables.
3. Clean the contact surfaces using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.
4. Connect the DC cables with the specified torque in accordance with the circuit diagram. Only use the screws, washers and nuts included in the scope of delivery.

Type of terminal lug	Torque
Copper terminal lug on copper bus bar	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	27.5 ft.-lbs. (37 Nm)
Tin-plated aluminum terminal lug on tin-plated aluminum bus bar	27.5 ft.-lbs. (37 Nm)
Copper terminal lug on tin-plated aluminum bus bar	27.5 ft.-lbs. (37 Nm)

5. Secure the DC cables on the cable support rail.

11 AC Connection

This section describes how to make the AC connection on the inverter and what safety measures must be taken in order to avoid personal injury and property damage. It contains information on the cable requirements and the torque for correctly connecting the cable.

The AC outputs are isolated from the enclosure and the system grounding, so that the AC output and neutral are not bonded to ground. If required by section 250 of the *National Electrical Code®*, ANSI/NFPA 70, the installer is responsible for this grounding.

11.1 Safety Precautions for the AC Connection

⚠ DANGER

Danger to life from electric shock due to live voltage

High voltages are present in the live components of the inverter. Touching live components results in death or serious injury due to electric shock.

- When working in a high contact-risk environment, wear Hazard Risk Category 2 personal protective equipment.
- Do not touch live components.
- Follow the instructions precisely.
- Observe all safety messages on the product and in the documentation.
- Observe all safety precautions of the module manufacturer.
- Before any work on the inverter is performed, always disconnect the following components from voltage sources if live voltage is not absolutely necessary:
  - Power line voltage for grid feed-in
  - Internal power supply
  - DC voltage from the PV array
  - Additional external voltages, e.g. control signals of a control room
- Ensure that no disconnected components can be reconnected.
- After disconnecting the inverter from voltage sources, wait at least 15 minutes for the capacitors of the inverter to discharge completely.
- Always check that no voltage is present in any of the components before working on the inverter.
- Ground and short-circuit the device.
- Cover or safeguard any adjacent live components.

⚠ WARNING

Risk of fire due to failure to observe torque specifications on high-voltage bolted connections

Failure to follow the specified torques reduces the ampacity of the high-voltage bolted connections so that the contact resistances increase. This can cause components to overheat and catch fire. This may result in death or serious injury.

- Ensure that high-voltage bolted connections are always executed with the exact torques specified in this document.
- Use suitable tools when working on the device.
- Avoid repeated tightening of high-voltage bolted connections, as this may result in inadmissibly high torques.

Fire hazard due to different cable lengths

Different cable lengths may cause the cables to overheat and catch fire. This may result in death or serious injury.

- The cables of the individual line conductors must be of the same length.

11.2 Requirements for the Cables and Cable Connection

11.2.1 Cable Requirements for the AC Connection

- ☐ All cables must be suitable for temperatures of up +197°F (+90°C) and in accordance with the *National Electrical Code®* ANSI/NFPA 70.
- ☐ Use only copper cables or tin-plated aluminum cables.
- ☐ The wire size has to be based on the ampacities given in Table 310.16 of the *National Electrical Code®*, ANSI/NFPA 70, and the derating factor of no less than 125 percent of the RMS or DC current that the circuit carries during rated conditions.

11.2.2 Requirements for the Cable Connection with Terminal Lug

- ☐ All used terminal lugs must have a valid UL approval.
- ☐ Cable lugs have to be UL listed compression lugs with two securement holes ($^1/_2$ in. (13 mm) in diameter) and a distance between the holes of 1 $^3/_4$ in. (44 mm). Both holes have to be utilized in installation.
- ☐ The terminal lug width must be larger than the diameter of the washers (1 $^1/_4$ in. (32 mm)). This will ensure that the specified torques are effective over the whole surface.
- ☐ Use only copper terminal lugs or tin-plated aluminum lugs.
- ☐ A maximum of six cables may be connected per line conductor.
- ☐ Only use screws, nuts and washers included in the scope of delivery.
- ☐ The specified torques must always be complied with.

Information on torques

The torques specified in the following table are the torques with which the terminal lugs are mounted to the copper bus bar.

Connection option	Cable cross-section	Torque
Copper terminal lug on copper bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	4 AWG to 800 kcmil (25 mm^2 to 405 mm^2)	27.5 ft.-lbs. (37 Nm)

11.3 Overview of the AC Connection

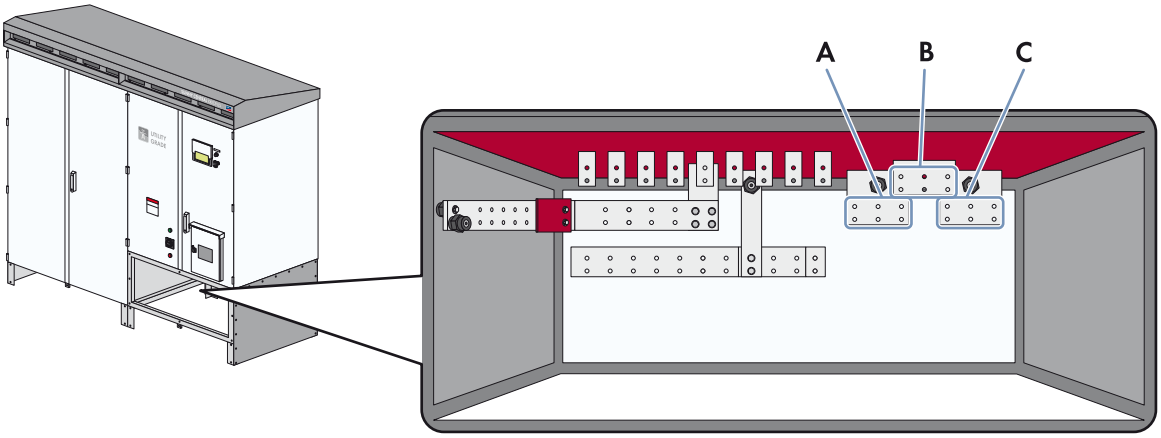


Figure 42: AC connection area with copper bus bars

Description	Explanation
A	Copper bus bars for line conductor A
B	Copper bus bars for line conductor B
C	Copper bus bars for line conductor C

11.4 Connecting the AC Cables

⚠ WARNING

Fire hazard due to the connection of unsuitable terminal lugs

If unsuitable terminal lugs are used or incorrectly mounted, ampacity is not ensured. The connections can overheat. Death or serious injury due to fire can result.

- Only use two-hole terminal lugs.
- Always connect terminal lugs to the copper bus bars using two screws.
- Make sure that the terminal lugs are correctly mounted.

Fire hazard due to faulty connections and oxidized contact surfaces

Contaminated and incorrectly mounted connections can excessively heat up under high loads. As a result, the connections may catch fire. Death and serious injury due to fire can result.

- Use only copper terminal lugs or tin-plated aluminum lugs.
- Before connecting the cables, clean the contact surfaces.
- Do not touch the contact surfaces after cleaning.
- Observe the specified torque.

Scope of delivery and torques for tin-plated terminal lugs

For the connection of the terminal lugs, the supplied screws, washers and nuts must be used.

The fender washers and spring washers must not protrude over the terminal lug. The following torques are to be observed:

- Tin-plated aluminum terminal lugs: 27.5 ft.lbs. (37 Nm)
- Copper terminal lugs: 44.5 ft.lbs. (60 Nm)

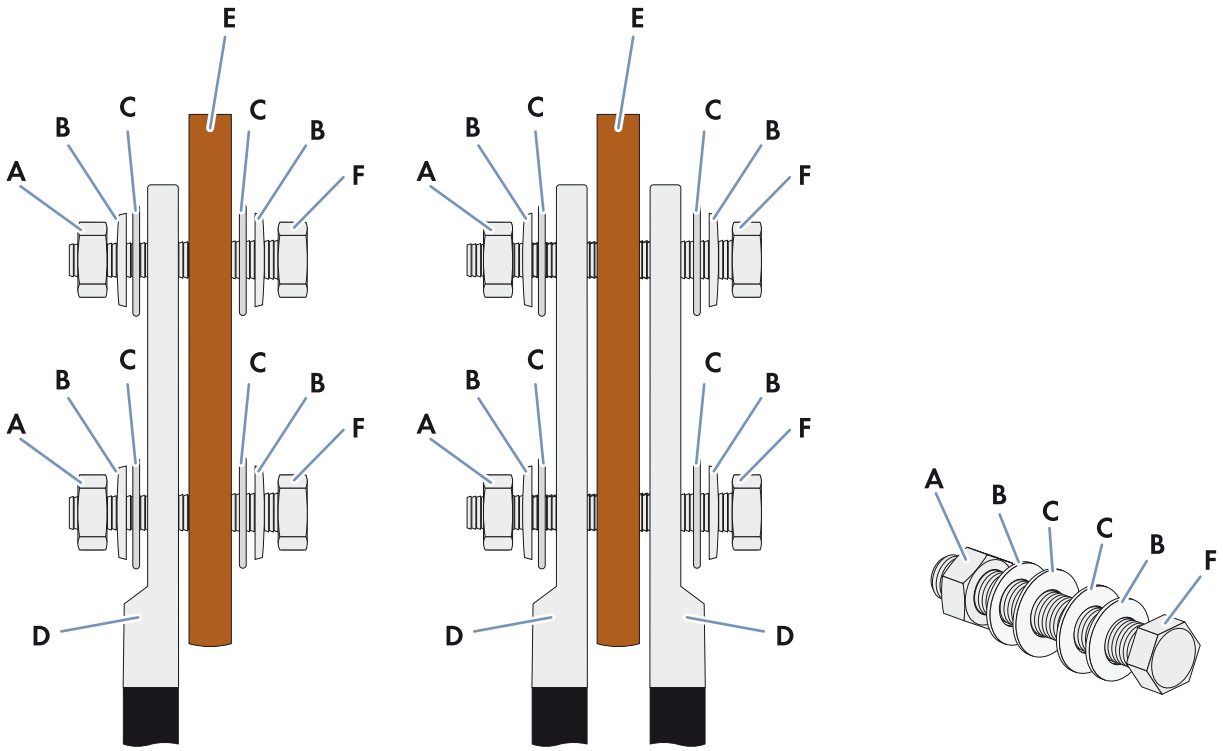


Figure 43: Assembly of the connection with two-hole terminal lugs

Position	Description
A	Nut M12
B	Spring washer
C	Fender washer
D	Two-hole terminal lug
E	Copper bus bar
F	Screw M12

Requirement:

☐ The cable requirements must be complied with (see Section 11.2 "Requirements for the Cables and Cable Connection", page 72).

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

☐ Clean cloth

☐ Ethanol cleaning agent

Procedure:

1. Strip the insulation of the AC cables according to the terminal lugs to be used.
2. Fit the AC cables with terminal lugs.
3. Clean the contact surfaces using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.
4. Connect the AC cables with the specified torque in accordance with the circuit diagram. Only use the screws, washers and nuts included in the scope of delivery.

Type of terminal lug	Torque
Copper terminal lug on copper bus bar	44.5 ft.-lbs. (60 Nm)
Tin-plated aluminum terminal lug on copper bus bar	27.5 ft.-lbs. (37 Nm)

5. Secure the AC cables on the cable support rail.

12 Cable Connection of External Devices in the Interface Cabinet

12.1 Connection Area

12.1.1 Inverter Without Integrated DC Switch

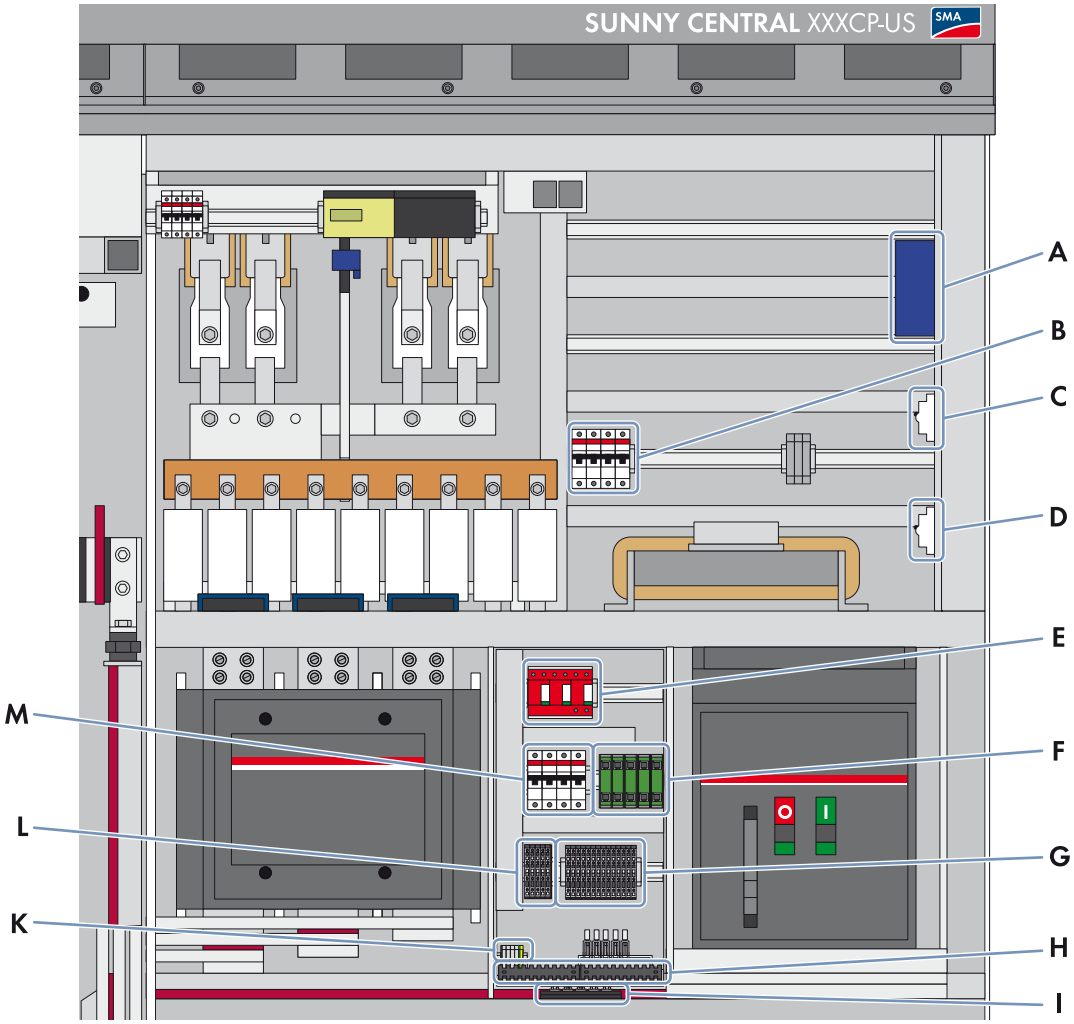


Figure 44: Terminals in the interface cabinet

Position	Description
A	Splice box*
B	Circuit breaker of the internal voltage supply*
C	Circuit breaker of the 24 V circuits
D	Circuit breaker of the grid monitoring
E	Overvoltage and lightning protection*
F	RJ45 network port network terminal
G	Terminals for external setpoint for reactive power and active power, external insulation monitoring, transformer protection, remote shutdown
H	Cable support rail
I	Sealing plate
K	External voltage supply terminal

Position	Description
L	External fast stop terminal
M	Circuit breaker of the external voltage supply*

* Optional

12.1.2 Inverter With Integrated DC Switch

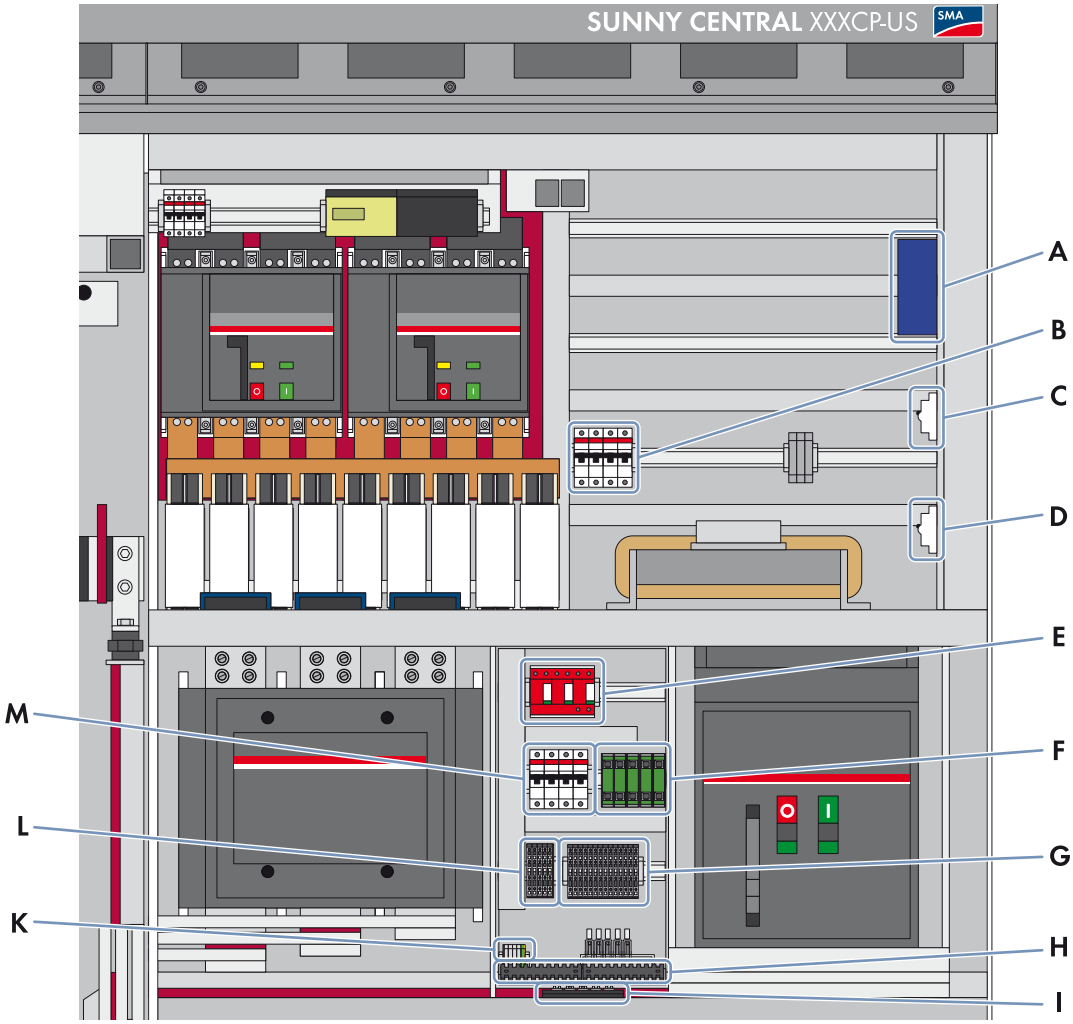


Figure 45: Terminals in the interface cabinet

Position	Description
A	Splice box*
B	Circuit breaker of the internal voltage supply*
C	Circuit breaker of the 24 V circuits
D	Circuit breaker of the grid monitoring
E	Overvoltage and lightning protection*
F	RJ45 network port network terminal
G	Terminals for external setpoint for reactive power and active power, external insulation monitoring, transformer protection, remote shutdown
H	Cable support rail

Position	Description
I	Sealing plate
K	External voltage supply terminal
L	External fast stop terminal
M	Circuit breaker of the external voltage supply*

* Optional

12.2 Cable Requirements

☐ Only use copper cables.

☐ The cables for the setpoints, remote shutdown and external fast stop must be shielded.

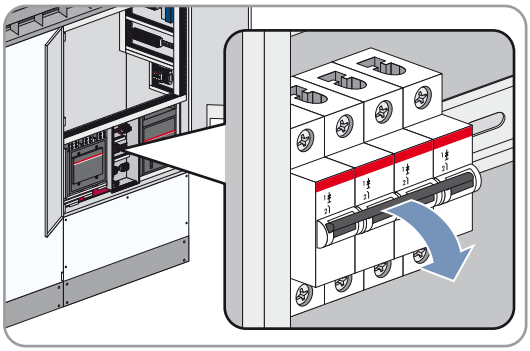
☐ The data cables must be laid and attached separately from the power cables in accordance with 300.3(C)(2) NEC 2011.

The following table shows the requirements of the field wiring conductors:

Terminal	Cable size	Cable type
=SC-X210	12 AWG (2.5 mm²) minimum	+140°F (+60°C) minimum, copper wire
=SC-X725 / =SC-X750 ... =SC-X757; =SC-X760; =SC-X770; =SC-X780	14 AWG (1.5 mm²) minimum	+194°F (+90°C) minimum, copper wire

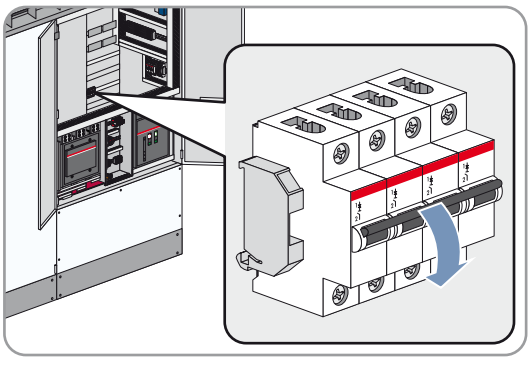
12.3 Switching off the Circuit Breaker

1. Switch off the voltage supply.
   - If the voltage is supplied externally, switch off the circuit breaker of the external voltage supply.

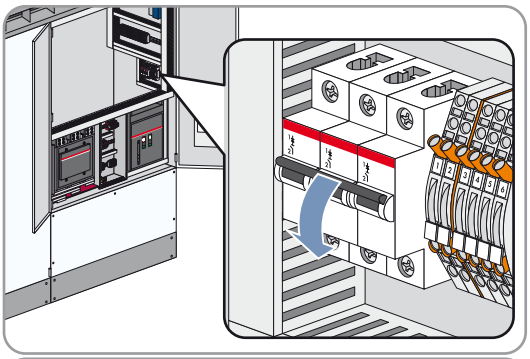


or

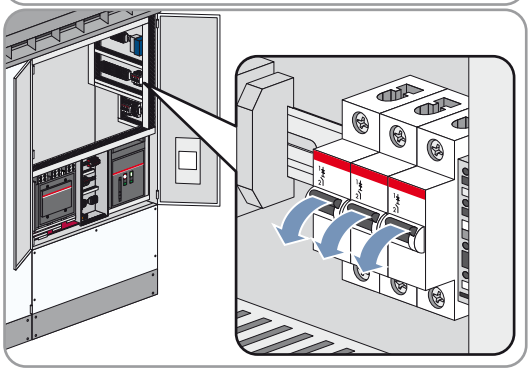
   - If the voltage supply is supplied internally, switch off the circuit breaker of the internal supply voltage.



2. Switch off the circuit breaker of the grid monitoring.

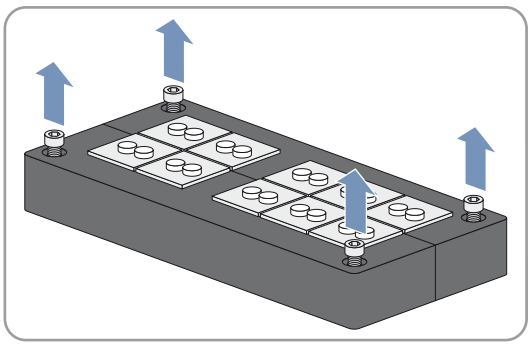


3. Disconnect the circuit breaker of the 24 V circuits.

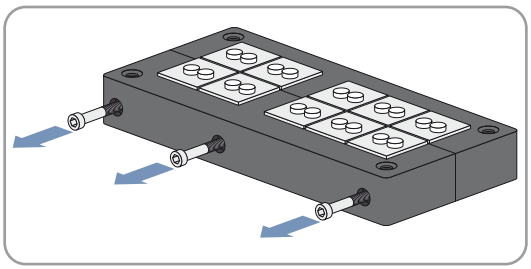


12.4 Inserting the Cables into the Interface Cabinet

1. Remove the four sealing plate screws.



2. Remove the sealing plate.
3. Release the three screws at the side of the sealing plate.



4. Remove the required cable support sleeves from the sealing plate. Make sure that the diameter of the cable support sleeves corresponds to the diameter of the cables to be inserted. Use the additional cable support sleeves included in the scope of delivery, if necessary.
5. Remove the necessary number of sealing plugs.
6. Insert the cables into the cable support sleeves.
7. Insert the cable support sleeves into the sealing plate without deforming them. Thus, tightness is guaranteed.
8. Tighten the three screws on the side of the sealing plate.
9. Screw the sealing plate to the floor of the interface cabinet.

12.5 Connecting the Remote Shutdown

The remote shutdown enables the inverter to be switched off from a control room, for example. The function of the remote shutdown is similar to the stop position of the key switch.

Cable requirement:

☐ The cable must be shielded.

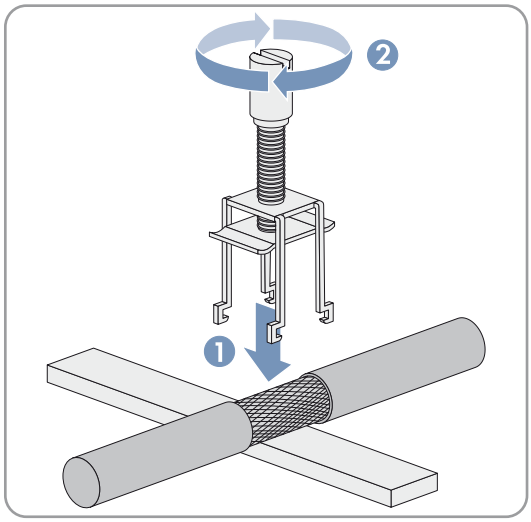
Requirements:

☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The cable must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Dismantle the cable and strip the insulation.
2. Remove the shield clamp from the busbar.
3. Place the cable shield on the shield bus.
4. Press the shield clamping saddle down until it clicks into place and fasten hand-tight.



5. Connect the cable in accordance with the circuit diagram.
6. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.6 Connecting the External Setpoint Specification

Signal transmission

External setpoints for reactive- and active power are normally specified by the grid operator and transmitted, e.g. via a ripple control receiver. The Power Reducer Box receives the target values and sends them to the inverter via the SC-COM. The inverter applies the specifications of the grid operator and feeds, for example, a specified reactive power into the utility grid. Ask your grid operator which type of signal transmission is used.

If these setpoints are not transmitted via the SC-COM and Power Reducer Box, there are terminals located in the inverter for connecting the external setpoints. The inverter processes standardized signals of 4 mA to 20 mA.

You will find further information on how the external setpoints work in the Sunny Central user manual.

Requirements:

☐ The inverter must be disconnected (see Section 14, page 86).

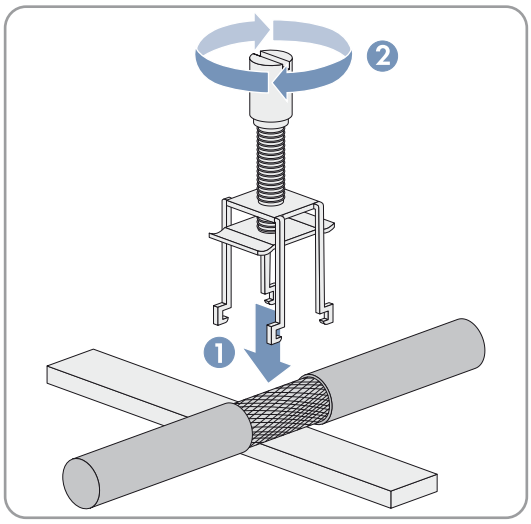
☐ The cable must be routed into the interface cabinet (see Section 12.4, page 79).

Cable requirements:

☐ The cable must be shielded.

Procedure:

1. Dismantle the cable and strip the insulation.
2. Connect the cable in accordance with the circuit diagram.
3. Place the cable shield on the shield bus.
4. Press the shield clamping saddle down until it clicks into place and fasten hand-tight.



5. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.7 Connecting the Transformer Protection

The inverter is equipped with a connection for monitoring the medium-voltage transformer that switches the inverter off immediately under fault conditions.

Inverter without Transformer Protection

- If you are not using the transformer protection option, set the **ExtTrfErrEna** parameter to **Off** after commissioning.

Requirements:

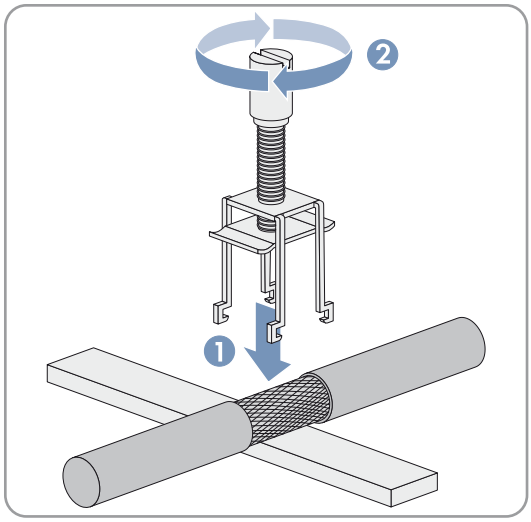
☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The cable must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Dismantle the cable and strip the insulation.
2. Connect the cable in accordance with the circuit diagram.
3. Place the cable shield on the shield bus.

4. Press the shield clamping saddle down until it clicks into place and fasten hand-tight.



5. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.8 Connecting the External Voltage Supply (Optional)

The inverter draws electric current for its internal power supply via the optional external voltage supply. You must connect the inverter to an external auxiliary supply voltage.

Circuit Breaker between the External Voltage Supply and the Inverter

A circuit breaker with a rated current of 16 A is present in the inverter.

Install a selective circuit breaker for isolating the cable to the inverter.

Maximum wire size

Use a cable with a maximum wire size of 12 AWG (4 mm^2).

Requirements:

☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The cable must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Dismantle the cable.
2. Strip the cable insulation.
3. Connect the cable in accordance with the circuit diagram.
4. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.9 Insulation Monitoring

The optional insulation measuring device emits a warning if the PV field does not have sufficient insulation resistance. This warning signal can be tapped via a potential-free relay contact (changeover contact).

Procedure:

1. Dismantle the cable and strip the insulation.
2. Connect the cable in accordance with the circuit diagram.
3. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.10 Connecting the External Fast Stop

If an external fast stop should be activated, the external fast stop must be connected in accordance with the circuit diagram.

NOTICE

Damage to the inverter due to faulty installation of the external fast stop

- When connecting the external fast stop cabling, it is obligatory to follow the circuit diagram supplied. The connection is made at the terminals.

Tripping the fast stop function

If the external supply voltage of the external fast stop is between 24.0 V_{DC} and 30.0 V_{DC}, the inverter will continue to operate in its current operating state. If the external supply voltage at the fast stop is between 0 V_{DC} and 4 V_{DC}, the inverter will change its operating state to "Stop."

The fast stop function should only be tripped in the event of immediate danger. Tripping the fast stop will not rapidly discharge the capacitors.

Cable requirements:

- ☐ The cable must be shielded.
- ☐ Cable length with a wire size of AWG 14 (2.5 mm^2): maximum 426 ft. (130 m)
- ☐ Cable length with a wire size of AWG 16 (1.5 mm^2): maximum 262 ft. (80 m)

Requirements:

- ☐ Use latching switches only.
- ☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).
- ☐ The cable must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Connect the cable to the plug in accordance with the circuit diagram.
2. Plug the connector into the connecting terminal plate in accordance with the circuit diagram.
3. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

12.11 External AC Power Contactor Monitoring

The AC power contactor is closed when the inverter is operating. The switching state of the AC power contactor is signaled by a potential-free contact (NC normally closed). The signal can be used, for example, to switch on external fans in an electrical equipment room.

Procedure:

1. Dismantle the cable and strip the insulation.
2. Connect the cable in accordance with the circuit diagram.
3. Attach the cable to the cable support rail using a cable tie. This ensures that the cable cannot be pulled out.

13 Installing the DC Fuses

⚠ DANGER

Danger to life from electric shock due to live voltage

Despite disconnecting the integrated DC Switch, voltages are still present in the DC fuses and the inverter busbars. Touching the DC fuses or the busbars will result in death or very serious injuries from electric shock (see Section 14 "Disconnecting the Inverter", page 86).

- Disconnect the DC voltage in the main distribution or the sub-distribution.
- Wait 15 minutes until the inverter capacitors have discharged completely.

13.1 Units without Integrated DC Switch

Each fuse shall be rated 450 A_{DC} maximum, 1,000 V_{DC}. For continued protection against risk of fire, replace only with same type and ratings of fuse.

The maximum number of DC fuses is nine.

i Maximum short-circuit current

- Observe the maximum short-circuit current of 2,596 A_{DC} when selecting the DC fuses.

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

☐ Clean cloth

☐ Ethanol cleaning agent

Procedure:

1. Clean the contact surfaces of the copper bus bars and the DC fuses using a clean cloth and ethanol cleaning agent.
2. Clean the contact surfaces with the non-woven abrasive until they have a light metallic sheen. At the same time, ensure that the coated contact surfaces are not damaged.
3. Remove metal dust using a clean cloth and ethanol cleaning agent and do not touch the contact surfaces after cleaning.
4. Insert the fuse of type 20 034 28.XXX from SIBA in accordance with the circuit diagram and mount it with a torque of 38.5 ft.lbs. (52 Nm). Only use the pre-installed screws.
5. Attach the label with the corresponding nominal current of the fuse directly next to the fuse on the copper bus bar.
6. Attach the label with the corresponding nominal current of the fuse to the relevant page of the circuit diagram.

13.2 Units with Integrated DC Switch

Each fuse shall be rated 400 A_{DC} maximum, 1000 V_{DC}. For continued protection against risk of fire, replace only with same type and ratings of fuse.

The maximum number of DC fuses is 9.

i Maximum short-circuit current

- Observe the maximum short-circuit current of 2,596 A_{DC} when selecting the DC fuses.

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

☐ Tool for inserting the DC fuses

- SMA part number 61–1590
- SIBA part number 22 031 01

Procedure:

1. Insert the DC fuses in accordance with the circuit diagram. Use a suitable tool or safety gloves when doing so.
2. Attach the label with the corresponding nominal current of the fuse directly next to the fuse on the copper bus bar.
3. Attach the label with the corresponding nominal current of the fuse to the relevant page of the circuit diagram.

14 Disconnecting the Inverter

This section explains how to disconnect the inverter from voltage sources. Follow all instructions when carrying out work on the inverter, in order to avoid personal injury and property damage.

⚠ DANGER

Danger to life from electric shock due to live voltage

High voltages are present in the live components of the inverter. Touching live components results in death or serious injury due to electric shock.

- When working in a high contact-risk environment, wear Hazard Risk Category 2 personal protective equipment.
- Do not touch live components.
- Follow the instructions precisely.
- Observe all safety messages on the product and in the documentation.
- Observe all safety precautions of the module manufacturer.
- Before any work on the inverter is performed, always disconnect the following components from voltage sources if live voltage is not absolutely necessary:
  - Power line voltage for grid feed-in
  - Internal power supply
  - DC voltage from the PV array
  - Additional external voltages, e.g. control signals of a control room
- Ensure that no disconnected components can be reconnected.
- After disconnecting the inverter from voltage sources, wait at least 15 minutes for the capacitors of the inverter to discharge completely.
- Always check that no voltage is present in any of the components before working on the inverter.
- Ground and short-circuit the device.
- Cover or shield any adjacent live components.

Danger to life from electric shock due to live DC cables

DC cables connected to PV modules that are exposed to sunlight are live. Touching live components results in death or serious injury.

- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.
- Prior to connecting the DC cables, ensure that the DC cables are voltage-free.

Danger to life from electric shock due to ground fault

If a ground fault has occurred, parts of the plant that are supposedly grounded may in fact be live. Touching incorrectly grounded components can result in death or very serious injuries from electric shock.

- Ensure that no voltage is present before touching any components of the PV plant.
- Wear Hazard Risk Category 2 personal protective equipment for all work on the inverter.

Danger to life from electric shock when entering the PV field

Ground fault monitoring with GFDI and Advanced Remote GFDI does not provide protection from injury when GFDI is activated. PV modules grounded by GFDI discharge voltage to ground. When entering the PV field, lethal electric shocks may occur.

- Before entering the PV field, switch the PV array to insulated operation.
- Ensure that the insulation resistance of the PV array is greater than 1 k Ω .

⚠ DANGER

Danger to life from electric shock due to live voltage

Despite disconnecting the integrated DC Switch, voltages are still present in the DC fuses and the inverter busbars. Touching the DC fuses or the busbars will result in death or very serious injuries from electric shock.

- Disconnect the DC voltage in the main distribution or the sub-distribution.
- Wait 15 minutes until the inverter capacitors have discharged completely

Danger to life from electric shock even if the inverter is disconnected on the AC and DC sides

The precharge unit of the option "Q at Night" is also live if the AC contactor and the DC switch are open. Touching live components of this assembly will result in death or serious injury.

- Do not touch live components.
- Do not remove protective covers.
- Observe the warning messages.
- Wear Hazard Risk Category 2 personal protective equipment..

Hazard Risk Category 2 protective equipment required

In accordance with NFPA 70E, an arc flash hazard risk analysis has been performed by SMA, and appropriate Arc Flash Hazard labels stating the required Personal Protective Equipment (PPE) for exposed, energized interaction with the equipment, are installed. Hazard Risk Category 2 PPE is the requirement for all routine maintenance, diagnostics, and commissioning activities as described in the SMA protocols. Areas within the machine also exist that cannot, under any circumstances, be exposed while energized. These areas are marked accordingly on the machine, and can only be made accessible after de-energization of the inverter.

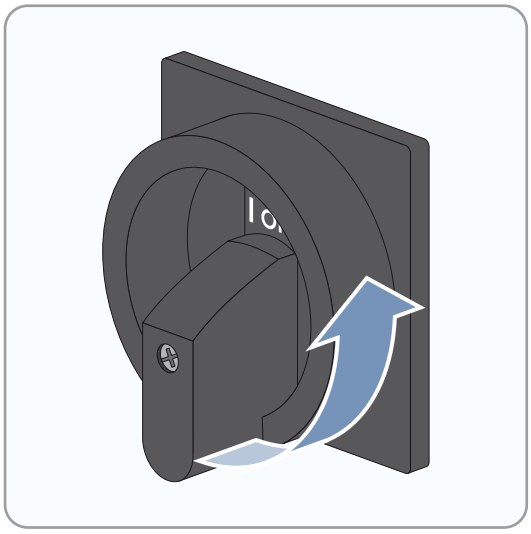
For additional information, please contact the SMA Service Line.

Disconnecting the AC Voltage of the Medium-Voltage Transformer

Only a duly authorized person trained in electrical safety is allowed to connect and disconnect the AC voltage of the medium-voltage transformer.

Procedure:

1. Switch the key switch of the inverter to **Stop**.
2. If a DC Switch is present, switch the DC Switch in the door to **OFF**.
   ☑ The red light repeater lights up.

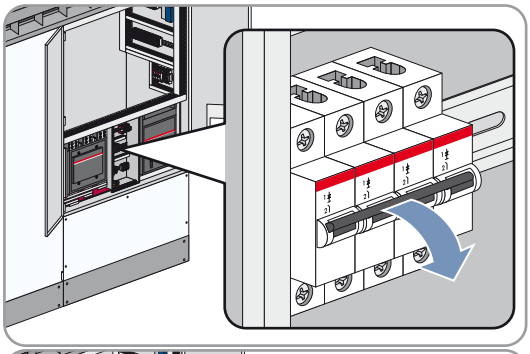


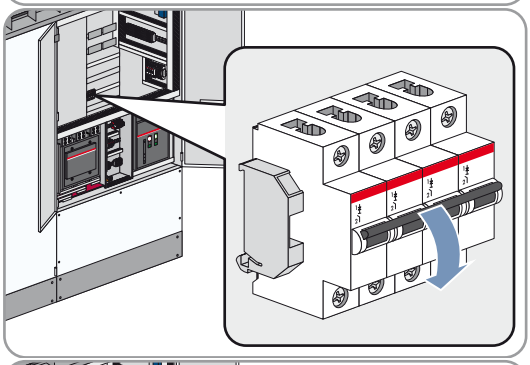
3. Secure the DC Switch in the door against accidental reconnection using a lockout device.
4. Wait 15 minutes until the inverter capacitors have discharged completely.

5. Externally disconnect the AC voltage of the medium-voltage transformer.
6. If no DC Switch is present, disconnect the external AC/DC Disconnect unit.
7. Disconnect the DC voltage in the main distribution or the sub-distribution.
8. If an internal AC Disconnect is present, open the flap of the AC Disconnect and switch the AC Disconnect off.
9. Disconnect the external supply voltage externally.
10. If applicable, disconnect any additional external voltage.
11. Open the door of the interface cabinet.
12. Switch off supply voltage:
    - If the supply voltage is supplied externally, switch off the circuit breaker of the external voltage supply in the inverter.

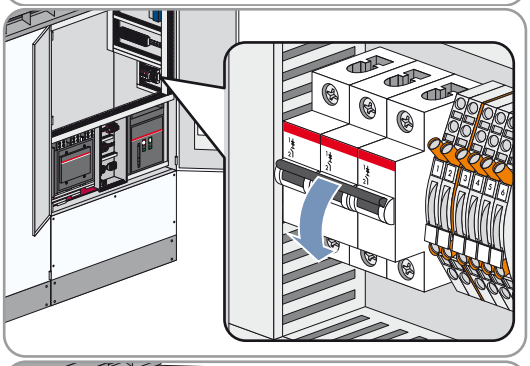
    or

    - If the supply voltage is supplied internally, switch off the circuit breaker of the internal voltage supply in the inverter.

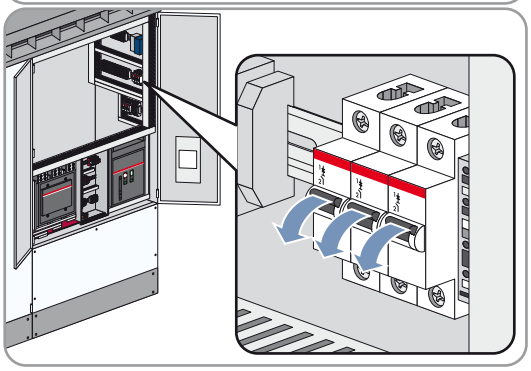




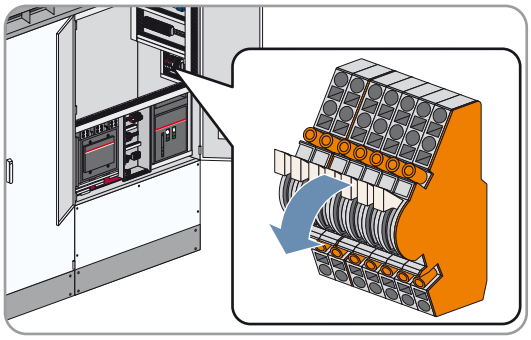
13. Switch off the circuit breaker of the grid monitoring.



14. Disconnect the circuit breaker of the 24 V circuits.



15. Open the test and disconnect terminals.



16. Ensure that all poles are free of voltage.
17. Ground and short-circuit the inverter.
18. Cover or shield any adjacent live components.
19. Unscrew the protective cover over the DC fuses.
20. Remove all DC fuses from all DC fuse holders. Use a suitable tool or safety gloves.

15 Setting up a Plant Network

15.1 Setting up a Plant Network with Copper Cables

The inverter can be integrated into the plant network using copper cables. If you integrate the inverter permanently into a network with Internet access, the inverter can automatically transmit data to Sunny Portal.

Cable requirements:

☐ Shielded twisted-pair patch cable of category 5 (CAT 5) or higher

☐ Maximum cable length: 328 ft. (100 m)

Requirements:

☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The network cable must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

- Connect the network cable in accordance with the circuit diagram.

15.2 Setting up a Plant Network with Optical Fiber

NOTICE

Damage to optical fibers due to too tight bend radii

Overly bending or kinking the optical fiber will damage the optical fibers.

- Observe the minimum bend radii of optical fibers.

Depending on the order option, you can integrate the inverter into the plant network using optical fibers. In this case, the inverter has an integrated splice box. The splice box features an SC-P plug to which the optical fibers can be connected directly.

There are two ways of connecting the optical fiber to the SC-P plug:

- Connecting the optical fiber using an SC Plug
- Connecting the optical fiber using an optical fiber pigtail

Connecting the Optical Fiber using an SC Plug

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

☐ The SC plugs

Requirements:

☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The optical fibers must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Mount the SC plugs to the optical fibers.
2. Insert the SC plug in the splice box into the SC-P plug.

Connection of Optical Fibers using Optical Fiber Pigtails

Optical fiber pigtail requirements:

☐ The cable must be equipped with a 50 µm multi-mode optical fiber.

☐ The cable must have an SC plug.

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

☐ Optical fiber pigtail corresponding with the specifications.

Requirements:

☐ The inverter must be disconnected (see Section 14 "Disconnecting the Inverter", page 86).

☐ The optical fibers must be routed into the interface cabinet (see Section 12.4 "Inserting the Cables into the Interface Cabinet", page 79).

Procedure:

1. Insert the optical fibers into the splice box.
2. Splice the optical fibers in the splice box with the optical fiber pigtail.
3. Insert the SC plug in the splice box into the SC-P plug.

15.3 Connecting the Inverter via the Service Interface

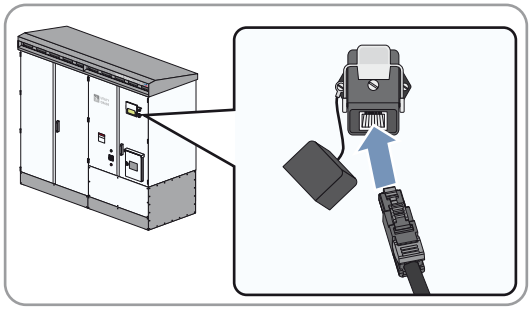
You can connect a laptop to the inverter to read out data or change parameters via the service interface. The service interface is located outside on the interface cabinet. You do not have to open the inverter. This connection may not be made over a long period of time.

Required material:

- PC or laptop with network connection
- Cable with the following properties:
  - 328 ft. (100 m) maximum length
  - High-quality Ethernet crossover cable
  - Cable of category 5 (CAT 5) or higher

Procedure:

1. Insert the network cable into the service interface.



2. Plug the network cable into the pin connector of the laptop.

16 Commissioning

16.1 Commissioning the Inverter

⚠ WARNING

Fire hazard due to faulty connection

If the cables and connections are incorrectly connected, the cables and connections can overheat and catch fire. This may result in death or serious injury.

- Before commissioning, make sure that all cables and connections are correctly connected.
- Switch off all switch elements before the test:
  - Switch the inverter to **Stop** using the key switch.
  - Remove the fuses.
  - Switch off the internal main switches and circuit breakers.

i Statutory warranty or guarantee claims

Statutory warranty or guarantee claims can only be asserted if the initial start-up was carried out by SMA or if the fully completed and signed "Commissioning Report for Sunny Central Plants" is available at SMA.

i Unused remote shutdown

- If the remote shutdown is not used, set the parameter **ExtStrStpEna** to **Off** during commissioning (see the Sunny Central operating manual).

i Inverter without transformer protection

- If you are not using the transformer protection option, set the **ExtTrfErrEna** parameter to **Off** after commissioning (see the Sunny Central operating manual).

i Connecting and disconnecting the AC voltage of the medium-voltage transformer

Only a duly authorized person trained in electrical safety is allowed to connect and disconnect the AC voltage of the medium-voltage transformer.

Procedure		See
1.	Check the inverter cabling.	Section 16.2, page 93
2.	Insert the DC fuses.	Section 13, page 84
3.	Mount the protective covers.	Section 16.3, page 93
4.	If applicable, commission the DC sub-distribution.	DC sub-distribution documentation
5.	If applicable, commission the DC main distribution.	DC main distribution documentation
6.	Check the DC voltages.	Section 16.4.1, page 94
7.	Have a duly authorized person trained in electrical switching connect the AC voltage of the medium-voltage transformer externally.	Medium-voltage transformer documentation
8.	Check the AC line voltage.	Section 16.4.2, page 94
9.	Check the internal power supply.	Section 16.4.3, page 94
10.	Switch the voltage supply on.	Section 16.5, page 95
11.	If applicable, switch on the AC Disconnect.	Section 16.6, page 96

Procedure		See
12.	Mount the panels.	Section 16.7, page 96
13.	Switch on the inverter.	Section 16.8, page 97

16.2 Checking the Inverter Cabling

1. Ensure that all connections are executed in accordance with the circuit diagram.
2. Check that the AC, DC, and protective conductor cables are securely connected.
3. Ensure that there is equipotential bonding between the inverter and the mounting location.
4. Ensure that all connections in the interface cabinet are securely in place.
5. Attach all cables in the connection area to the cable support rail using cable ties.

16.3 Mounting the Protective Covers

Before you switch on the inverter, all protective covers and panels must be mounted.]

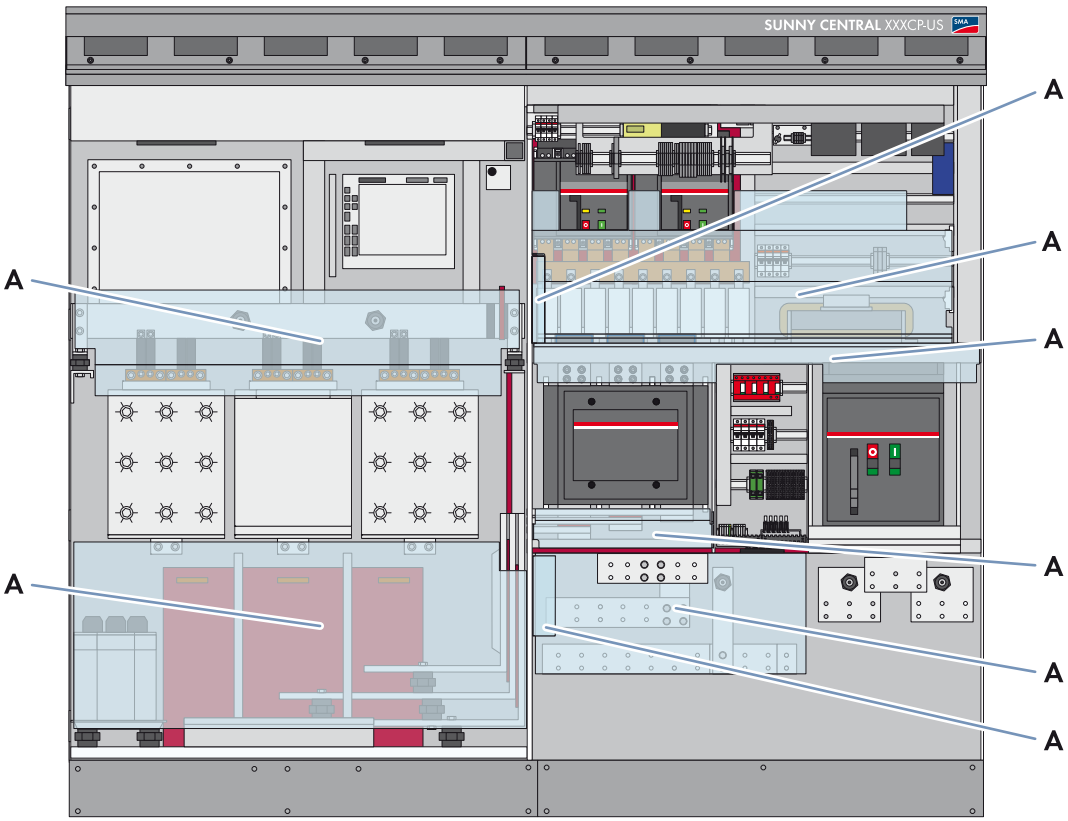


Figure 46: Position of the protective covers in the inverter

Position	Description
A	Protective cover

Procedure:

- Screw all protective covers into place. Tighten to the torque specified:

Protective covers		Torque
In the interface cabinet	In the connection area	7.4 ft.-lbs (10 Nm)
	All others	2.2 ft.-lbs. (3 Nm)

Protective covers		Torque
In the inverter cabinet	All	7.4 ft.-lbs (10 Nm)

16.4 Checking the Voltages on the Inverter

16.4.1 Checking the DC Voltages

⚠ DANGER

Danger to life due to electric arcs if the multimeter is not connected correctly

Contacting the measurement points incorrectly can cause an electric arc. Death or serious injury may result from an electric arc.

- Wear Hazard Risk Category 2 personal protective equipment.
- Select the appropriate measurement range on the multimeter.
- Select the correct measurement points.

NOTICE

Damage to the inverter due to high DC voltages

The DC voltage of the PV array must not exceed the maximum voltage of the inverter.

- V_{PV} = 1,000 V

1. Measure the DC voltage for each input and record it in the commissioning report.
2. Compare the DC voltages. The voltages must be approximately the same and must not exceed the maximum DC voltage of the inverter.
3. Check that the polarity of each input is correct. Correct if necessary.
4. Measure the DC voltage for each positive terminal to ground and record in the commissioning report.

☑ Voltage drops out.

✖ Is a stable value present?

A ground fault has occurred.

- Eliminate the ground fault.

16.4.2 Checking the AC Line Voltage

1. Check the line voltage for the right-hand rotating magnetic field. Correct if necessary.
2. Measure the AC voltage between the line conductors and record in the commissioning report.
   - A - B
   - A - C
   - B - C

☑ The AC voltage is approximately the same as the inverter nominal voltage.

✖ Does the AC voltage deviate significantly from the nominal voltage of the inverter?

- Have the transmission ratio of the medium-voltage transformer adjusted by an authorized person.

16.4.3 Checking the External AC Power Supply Voltage

The inverter draws electric current for its internal power supply via the optional external voltage supply. You have to measure and record the external supply voltage.

Voltages between the conductors

The voltages between the conductors specified in the table below must correspond to the values you have measured.

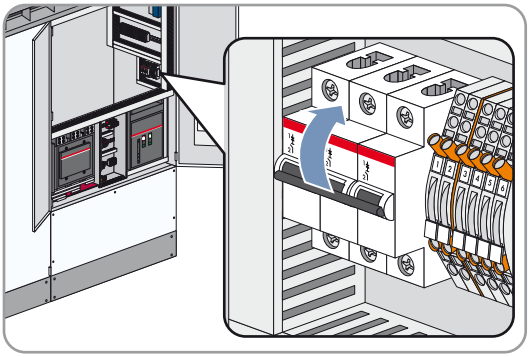
External auxiliary power supply voltage	208 V	400 V	480 V
A - B	208 V	400 V	480 V
A - C	208 V	400 V	480 V
B - C	208 V	400 V	480 V
A - N	–	230 V	–
B - N	–	230 V	–
C - N	–	230 V	–
A - PE	120 V	230 V	277 V
B - PE	120 V	230 V	277 V
C - PE	120 V	230 V	277 V

Procedure:

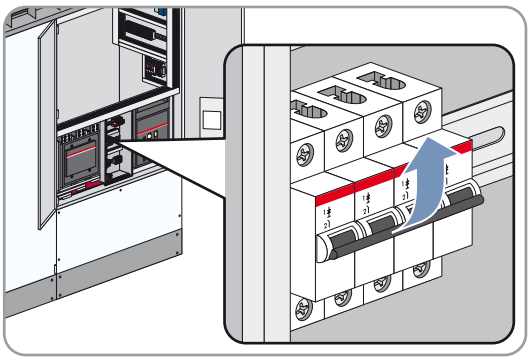
1. Check the external supply voltage for the right-hand rotating magnetic field. Correct if necessary.
2. Measure the AC voltage between the line conductors as well as between the line conductors and the neutral conductor and record in the commissioning report.

16.5 Switching the Voltage Supply On

1. Switch the circuit breaker of the grid monitoring on.

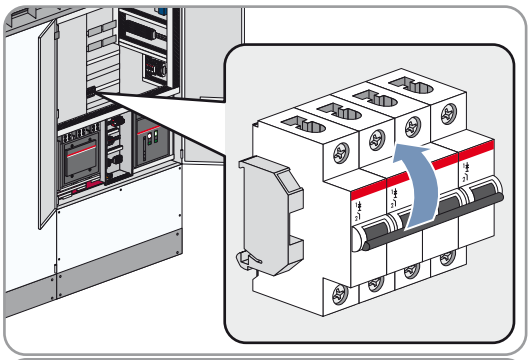


2. Switching the voltage supply on:
   - If the voltage is supplied externally, switch on the circuit breaker of the external voltage supply in the inverter.

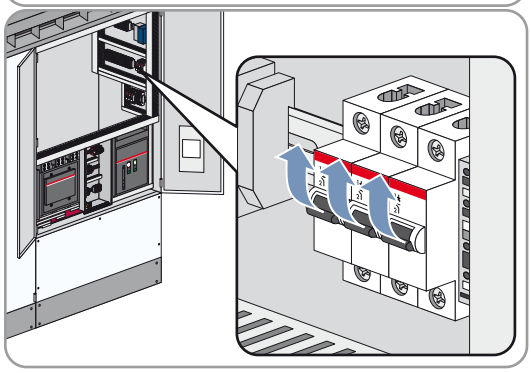


or

- If the voltage is supplied internally, switch on the circuit breaker of the internal voltage supply in the inverter.



3. Switch on the circuit breakers of the 24 V circuits.

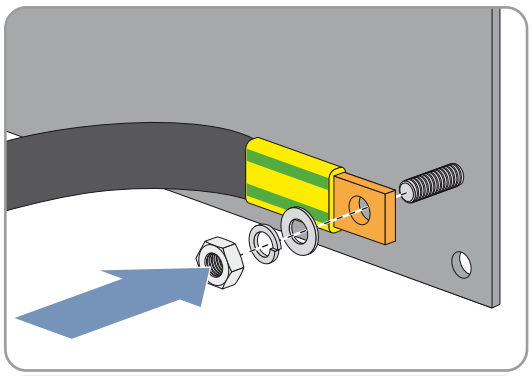


16.6 Switching the AC Disconnect On

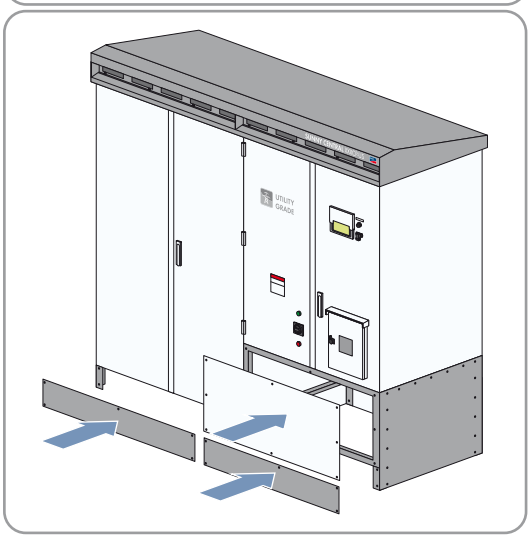
- If the inverter is fitted with an AC Disconnect, switch on the AC Disconnect.

16.7 Mount the Panels

1. Position the panels on the inverter.
2. Fasten the grounding cables to the panels of the interface cabinet with a torque of 10.5 ft.-lbs. (14 Nm).



3. Fasten the panels on the inverter using all screws.



16.8 Switch the Inverter On

⚠ DANGER

Danger to life through electric shock in the event of improper use or unauthorized opening of the inverter

During operation, high voltages are present in the inverter. Touching live components results in death or serious injury due to electric shock.

- Do not operate the inverter while the door is open.
- Only switch on the inverter if the doors are closed and locked.
- Keep the keys in a safe place.

Requirements:

☐ All electrical connections made on site must be correctly established.

☐ The grounding resistance of the plant has been measured.

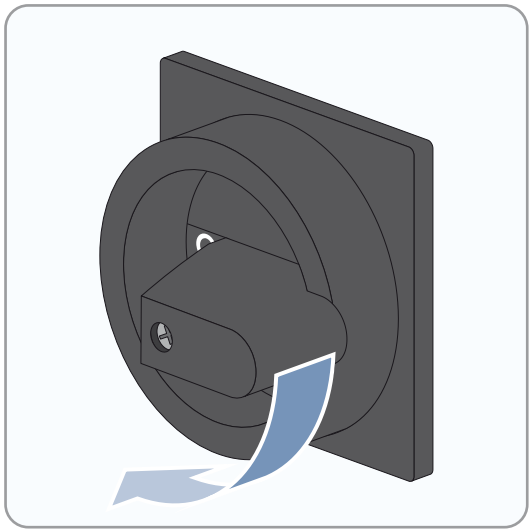
☐ All values measured must be within the permissible range.

☐ The grounding resistance of the plant must be greater than 45 k Ω .

☐ The inverter doors must be kept closed.

Procedure:

1. Lock the inverter cabinet doors.
2. If a DC switch is present, switch the DC Switch in the door to **ON**.



3. Turn the key switch to **Start**.
   ☑ The DC switch audibly switches on.
   ☑ The AC switch audibly switches on.
4. If the inverter carries out a fan test, check the ventilation.
   ☑ The fans switch on and start drawing air in through the air intake vents.
   ✖ The fans do not switch on?
   - Contact the SMA Service Line.

☑ If there is sufficient irradiation, the inverter will feed into the utility grid.

✖ The touch display is showing an error.

- Eliminate the error (see the Sunny Central operating manual).

17 Technical Data

17.1 Measurement Accuracy

The inverter is not equipped with a calibrated meter. The display values may deviate from the actual values and must not be used as a basis for invoicing. The inverter's measured values are required for the system management and to control the current to be fed to the grid.

Deviation:

Voltage measurement: +/– 8.5 V

Frequency measurement: +/– 0.06 Hz

Disconnect time: +/–4.5%

17.2 Sunny Central 500CP-US/CA

Input Data

MPP voltage range	430 V_{DC} to 820 V_{DC}
Maximum DC voltage	1,000 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	500 kVA
Continuous AC power at +104°F (+40°C)	520 kVA
Continuous AC power at +77°F (+25°C)	550 kVA
AC current at +122°F (+50°C)	1,069 A_{AC}
AC current at +104°F (+40°C)	1,112 A_{AC}
AC current at +77°F (+25°C)	1,167 A_{AC}
Nominal AC voltage ± 10%	270 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current total harmonic distortion	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.46%
CEC-eta	98%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	– 13°F to 122°F (– 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.3 Sunny Central 500CP-US/CA 600V

Input Data

MPP voltage range at 550 kW	363 V_{DC} to 480 V_{DC}
MPP voltage range at 500 kW	330 V_{DC} to 480 V_{DC}
Maximum DC voltage	600 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	500 kVA
Continuous AC power at +104°F (+40°C)	520 kVA
Continuous AC power at +77°F (+25°C)	550 kVA
AC current at +122°F (+50°C)	1,443 A_{AC}
AC current at +104°F (+40°C)	1,501 A_{AC}
AC current at +77°F (+25°C)	1,588 A_{AC}
Nominal AC voltage ± 10%	200 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1

Current THD	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.46%
CEC-eta	98%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	− 13°F to +122°F (− 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.4 Sunny Central 630CP-US/CA

Input Data

MPP voltage range	500 V_{DC} to 820 V_{DC}
Maximum DC voltage	1,000 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	630 kVA
Continuous AC power at +104°F (+40°C)	655 kVA
Continuous AC power at +77°F (+25°C)	693 kVA
AC current at +122°F (+50°C)	1,155 A_{AC}

AC current at +104°F (+40°C)	1,201 A_{AC}
AC current at +77°F (+25°C)	1,270 A_{AC}
Nominal AC voltage ± 10%	315 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current total harmonic distortion	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.53%
CEC-eta	98%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	– 13°F to 122°F (– 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.5 Sunny Central 720CP-US/CA

Input Data

MPP voltage range	515 V_{DC} to 820 V_{DC}
Maximum DC voltage	1,000 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	720 kVA
Continuous AC power at +104°F (+40°C)	749 kVA
Continuous AC power at +77°F (+25°C)	792 kVA
AC current at +122°F (+50°C)	1,283 A_{AC}
AC current at +104°F (+40°C)	1,334 A_{AC}
AC current at +77°F (+25°C)	1,411 A_{AC}
Nominal AC voltage ± 10%	324 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current total harmonic distortion	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.58%
CEC-eta	98%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	− 13°F to 122°F (− 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.6 Sunny Central 750CP-US/CA

Input Data

MPP voltage range	545 V_{DC} to 820 V_{DC}

Maximum DC voltage	1,000 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	750 kVA
Continuous AC power at +104°F (+40°C)	780 kVA
Continuous AC power at +77°F (+25°C)	825 kVA
AC current at +122°F (+50°C)	1,266 A_{AC}
AC current at +104°F (+40°C)	1,317 A_{AC}
AC current at +77°F (+25°C)	1,393 A_{AC}
Nominal AC voltage ± 10%	342 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current total harmonic distortion	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.62%
CEC-eta	98%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	− 13°F to 122°F (− 25°C to +50°C)

Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.7 Sunny Central 800CP-US/CA

Input Data

MPP voltage range	570 V_{DC} to 820 V_{DC}
Maximum DC voltage	1,000 V_{DC}
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	800 kVA
Continuous AC power at +104°F (+40°C)	832 kVA
Continuous AC power at +77°F (+25°C)	880 kVA
AC current at +122°F (+50°C)	1,283 A_{AC}
AC current at +104°F (+40°C)	1,334 A_{AC}
AC current at +77°F (+25°C)	1,411 A_{AC}
Nominal AC voltage ± 10%	360 V_{AC}
Nominal power frequency	60 Hz
Power frequency range	60 Hz [50 Hz]
Power factor cos φ	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Current THD	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.68%

CEC-eta	98.5%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	– 13°F to 122°F (– 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.8 Sunny Central 850CP-US/CA

Input Data

MPP voltage range	620 V_{DC} to 820 V_{DC}
Maximum DC voltage	820 V
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	850 kVA
Continuous AC power at +104°F (+40°C)	884 kVA
Continuous AC power at +77°F (+25°C)	935 kVA
AC current at +122°F (+50°C)	1,271 A_{AC}
AC current at +104°F (+40°C)	1,322 A_{AC}
AC current at +77°F (+25°C)	1,399 A_{AC}
Nominal AC voltage ± 10%	386 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current THD	< 5% (with respect to IEEE 1547)
AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.6%
CEC-eta	98.5%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	− 13°F to 122°F (− 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.9 Sunny Central 900CP-US/CA

Input Data

MPP voltage range	655 V_{DC} to 820 V_{DC}
Maximum DC voltage	820 V
Maximum DC current	1,600 A_{DC}
Max. array short circuit current	2,596 A_{DC}
Number of DC inputs*	9
DC overvoltage category	II

* Only in the inverter option with DC fuses single phase

Output Data

Continuous AC power at +122°F (+50°C)	900 kVA
Continuous AC power at +104°F (+40°C)	936 kVA
Continuous AC power at +77°F (+25°C)	990 kVA
AC current at +122°F (+50°C)	1,283 A_{AC}
AC current at +104°F (+40°C)	1,334 A_{AC}
AC current at +77°F (+25°C)	1,411 A_{AC}
Nominal AC voltage ± 10%	405 V_{AC}
Nominal power frequency	60 Hz [50 Hz]
Power frequency range	59.3 Hz to 60.5 Hz [49.3 Hz to 50.5 Hz]
Power factor cos φ	0.8 to 1
Current total harmonic distortion	< 5% (with respect to IEEE 1547)

AC overvoltage category	IV

Power Consumption

Self-consumption in operation	< 1,800 W
Standby consumption	< 150 W
Control supply voltage	See nameplate in the connection area of the control circuit

Dimensions and Weight

Width x height x depth	8 ft. 4.87 in x 7 ft. 5.45 in x 3 ft. 1.64 in. (2,562 mm x 2,272 mm x 956 mm)
Weight	4,123 lb (1,870 kg)

Efficiency

Maximum efficiency	98.6%
CEC-eta	98.5%

Ambient Conditions

Enclosure rating outdoor	Type 3R
Enclosure rating indoor	Type 1
Operating temperature range	– 13°F to 122°F (– 25°C to +50°C)
Maximum altitude above mean sea level, MSL	6,562 ft. (2,000 m)
Supply air flow and quality	1766 SCFM (3,000 m^3/h), Class 4S2

17.10 Integrated AC Disconnect

AC Disconnect Ratings

Compliance Standard	UL 1066
Frame Size	1600 A
Rated maximum voltage	635 V
Rated short-circuit current	42 kA
Rated short-time current	42 kA
Rated frequency	50 Hz - 60 Hz
Make time (max)	80 ms
Break time (I<ST current)(max)	70 ms
Break time (I>ST current)(max)	30 ms

18 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We need the following data in order to provide you with the necessary assistance:

- Inverter type
- inverter serial number
- Type and number of PV modules connected
- Type of communication
- Display information of the inverter
- Disturbance or warning number displayed on the inverter

United States/ Estados Unidos	SMA America, LLC Rocklin, CA	+1 877-MY-SMATech (+1 877-697-6283)* +1 916 625-0870**
Canada/ Canadá	SMA Canada, Inc. Toronto	+1 877-MY-SMATech (+1 877-697-6283)***

* toll free for USA, Canada and Puerto Rico / Llamada gratuita en EE. UU., Canadá y Puerto Rico
** international / internacional
*** toll free for Canada / gratuit pour le Canada

19 Revision History

In this section, you will find an overview of the content changes in the new version of this document. The pages where changes were made are indicated behind the version.

Revisions to version 4.0

New additional information

- Q at Night ▸ 9
- SC-COM Modbus (Zone Monitoring) ▸ 9

New danger

- Q at Night ▸ 14, 60, 87

New feature

- Zone Monitoring ▸ 9, 38, 39

New function

- Integrated DC Switch ▸ 21, 24, 77, 84, 87, 97

New installation content

- number of ground connections ▸ 57
- updated drawing ▸ 29, 30, 31, 32, 36, 37, 42

New label

- "Closed" ▸ 19
- "DC-Switch" ▸ 19
- "Open" ▸ 19

New technical data

- integrated AC disconnect ratings ▸ 107

New warning

- GFDI required ▸ 11

New warning label

- Danger Do not pull out fuses under load ▸ 20
- Electric Shock due to Live Voltage ▸ 20
- Electric Shock Hazard ▸ 20

Revised operating content

- disconnecting the inverter ▸ 86

Revisions to version 4.1

New installation content

- Supply air and exhaust air ▸ 33, 35, 38, 54, 99, 100, 101, 102, 104, 105, 106, 107

Updated content

- DC disconnect requirements ▸ 21
- Hazard Risk Category 2 ▸ 9, 12, 13, 14, 15, 59, 60, 68, 71, 86, 87, 94
- lockout device ▸ 11, 21
- Personal protective equipment clothing requirement ▸ 15

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