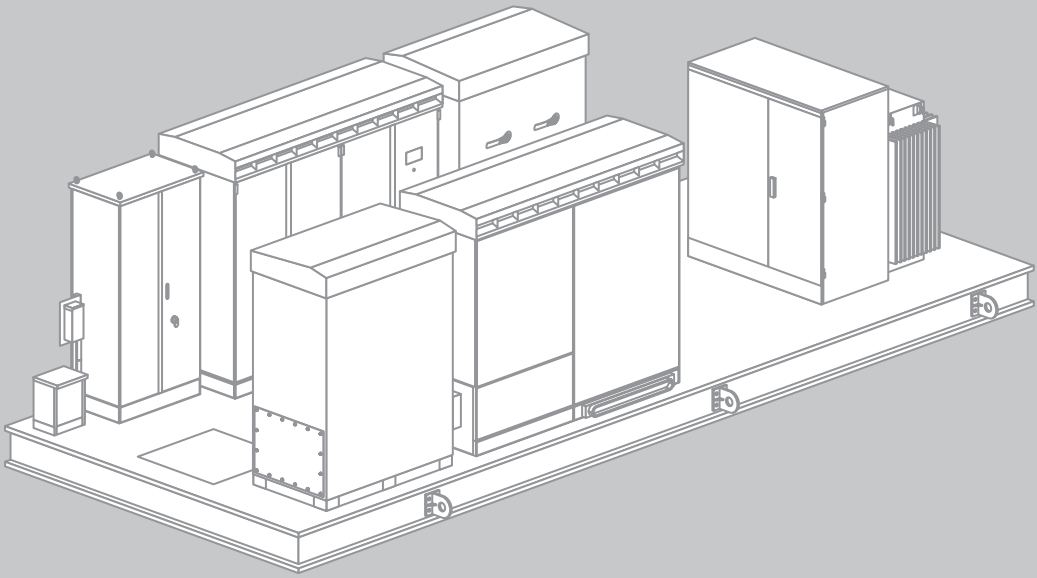
Central Inverter

MV POWER PLATFORM 1.0 MW / 1.25 MW / 1.44 MW
MV POWER PLATFORM 1.5 MW / 1.6 MW
Open/Canopy Version with Disconnect Unit

Operating and Maintenance Manual



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Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- MV-1000-HE-US Open/Canopy Version with Disconnect Unit
- MV-1000-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1000-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1250-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1250-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1440-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1440-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1500-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1500-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1600-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1600-CP-US-10 Open/Canopy Version with Disconnect Unit

This manual must be followed during installation and maintenance.

The product is designed and tested according to 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 personal 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 MV Power Platform. Among other things, this document specifies the MV Power Platform versions for which this document is valid and the target group for which it has been compiled.

1.1 Validity

This document is valid for the following Medium Voltage Power Platforms:

- MV-1000-HE-US Open/Canopy Version with Disconnect Unit
- MV-1000-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1000-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1250-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1250-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1440-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1440-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1500-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1500-CP-US-10 Open/Canopy Version with Disconnect Unit
- MV-1600-CP-10 Open/Canopy Version with Disconnect Unit
- MV-1600-CP-US-10 Open/Canopy Version with Disconnect Unit

This document describes the maintenance of the Medium Voltage Power Platform.

1.2 Target Group

This document is intended for qualified persons. Only qualified personnel 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 have been trained in how to deal with the dangers and risks associated with installing electrical installations and possess all the necessary knowledge for averting danger.

Qualified persons are aware of the obligation to wear 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

Document type	Contents
Installation manual	Transporting, mounting and installing the MV Power Platform
Operating and maintenance manual	Disconnecting and maintaining the MV Power Platform
User manual of the inverter	Setting the network, the parameters and the target values for active and reactive power, troubleshooting and instantaneous value display on the inverter
Maintenance report	Checklist of the maintenance work to be carried out on the MV Power Platform

You will find further information in the download area of www.SMA-America.com.

1.4 Nomenclature

In general, the products mounted on the Medium Voltage Power Platform (inverter, Control & Supply Panel, DC Disconnect Unit) will be referred to as "components" when instructions for all components are given.

The following nomenclature is used in this document:

Complete designation	Designation in this document
SMA America, LLC	SMA
SMA Solar Technology Canada Inc.	SMA
Medium Voltage Power Platform	MV Power Platform
Sunny Central Communication Controller	SC-COM

1.5 Abbreviations

In this document, abbreviations are used at certain points. In the following table, you will find the full designation and where applicable, an explanation.

Abbreviation	Designation	Explanation
AC	Alternating Current	–
DC	Direct Current	–
GFDI	Ground Fault Detection Interruption	–
IP	Internet Protocol	–
OF	Optical Fiber	–
MPP	Maximum Power Point	–
MSL	Mean Sea Level	–
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 throughout the entire installation process. Pay special attention to these sections to avoid personal injury and property damage.

2.1 Intended Use

The Medium Voltage Power Platform is a complete system for large-scale PV plants. All components that are necessary to convert the direct current generated by the PV modules into alternating current and to feed this in to the medium-voltage grid are to be found on the Medium Voltage Power Platform.

The Medium Voltage Power Platform is suitable for outdoor installation. All components mounted on the Medium Voltage Power Platform comply with NEMA 3R and may also be operated during rain and hail.

The Medium Voltage Power Platform may only be operated providing that the maximum permissible DC input voltage and the permitted ambient conditions are observed. The design and the configuration of the individual components of the Medium Voltage Power Platform are crucial for the respective permissible DC input voltage and the permissible ambient conditions. The fulfillment of these conditions must be ensured prior to operating the Medium Voltage Power Platform.

Only persons fulfilling all of the skills for the target group may work on or with the Medium Voltage Power Platform.

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

All work on the Medium Voltage Power Platform must be performed using the appropriate tools and in compliance with the ESD protection regulations.

Suitable personal protective equipment is to be worn by all persons working on or with the Medium Voltage Power Platform.

The Medium Voltage Power Platform must not be installed, operated or serviced by unauthorized persons. Such persons must be kept away from the Medium Voltage Power Platform.

Any rebuilding, modification or installation of additional components on the Medium Voltage Power Platform requires the express consent of SMA America, LLC.

The Medium Voltage Power Platform may only be operated providing that all the installed components are closed, locked and in perfect working order.

The components of the Medium Voltage Power Platform must not be opened during a sandstorm, when it is raining or when humidity exceeds 95%.

Any use of the Medium Voltage Power Platform other than that described in the Intended Use section does not qualify as appropriate. Unauthorized installations and modifications compromise operational safety and void the operation permission as well as all warranty claims.

2.2 Safety Precautions

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

Electrical Hazards

⚠ DANGER

Electric shock due to live voltage

There are high voltages present in the Medium Voltage Power Platform and its components. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- When working in a high contact-risk environment, wear Class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch live components.
- Follow the instructions precisely.
- Observe safety messages.
- Before performing any work on the Medium Voltage Power Platform, always disconnect all components of the MV Power Platform whenever voltage is not absolutely necessary.
- Ensure that all disconnected components cannot be reconnected.
- After disconnecting the Medium Voltage Power Platform, wait at least 15 minutes until the inverter capacitors have discharged completely.
- Before performing any work on the Medium Voltage Power Platform ensure that no voltage is present in any of the components.

Electric shock caused by ground fault

If a ground fault has occurred, parts of the plant that are supposedly grounded may in fact be live. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- Before entering the plant, ensure that no ground fault is present.
- Wear personal protective equipment.

Electric shock due to damaged components

Operating damaged components can lead to hazardous situations that may result in serious or lethal injuries due to electric shock.

- Only operate the Medium Voltage Power Platform when it is in a technically perfect and operationally safe state.
- Regularly check 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.

NOTICE

Damage to electronic components due to electrostatic discharge

Electrostatic discharge can damage or destroy electronic components.

- When working on the inverter and handling the assemblies, observe all ESD safety regulations.
- Wear personal protective equipment.
- Discharge the 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.

Environmental Hazards

⚠ WARNING

Danger to life due to blocked escape routes

In hazardous situations, blocked escape routes can lead to serious injury or death.

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

NOTICE

Damage to the components due to dust or moisture penetration

Dust intrusion or moisture penetration can damage the components of the Medium Voltage Power Platform or impair their functionality.

- Do not open any components during a sandstorm, when it is raining or when humidity exceeds 95%.
- Perform maintenance on the components only when the environment is dry and free of dust.

Hazards Due to Human Error

⚠ WARNING

Danger to life due to electric shock if components are left unlocked

Unlocked components can be opened by unauthorized persons. This means that unauthorized persons have access to components in which lethal voltages are present.

- Ensure that unauthorized persons have no access to the Medium Voltage Power Platform.
- Always close and lock all components of the Medium Voltage Power Platform.

⚠ CAUTION

Risk of falling into the excavation pit when the Medium Voltage Power Platform is elevated

- Take safety measures, such as installing barriers around the sides of the Medium Voltage Power Platform.

Mechanical Hazards

⚠ WARNING

Risk of fire due to failure to observe torque specifications

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

- Always use the torques specified in the installation manual.
- Ensure that current-carrying components are always mounted with the exact torque specified in the installation manual.
- For installation work, use only suitable tools.
- Avoid repeated tightening, as this may result in excessive torques.

Thermal Hazards

⚠ CAUTION

Risk of burns due to hot components

Some components of the Medium Voltage Power Platform can reach high temperatures during operation. Touching these components can result in burn injuries.

- Do not touch hot components.
- Wait until hot components, e.g., MV transformer, have sufficiently cooled down.
- Observe safety warnings on the components.
- Wear personal protective equipment.

2.3 Personal Protective Equipment

When carrying out any work on the Medium Voltage Power Platform, always wear suitable personal protective equipment.

The following personal protective equipment is regarded by SMA America, LLC to be the minimum requirement:

Designation	Description
Safety shoes, category S3*	With perforation-proof soles and steel toecaps
Safety boots, category S5**	With perforation-proof soles and steel toecaps
Tight-fitting work clothes made of 100% cotton	-
Work trousers with arc-fault protection	-
Specially fitted hearing protection	-
Safety gloves	-

* In a dry environment

** During rain or on moist ground

Any protective equipment otherwise required must be used as well.

Class 2 protective equipment required

In accordance to 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. Class 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 Medium Voltage Power Platform, as described in Section 5 of this manual.

For additional information, please contact the SMA Service Line.

3 Product Description

This section will give you an overview of the design and function of the MV Power Platform and its components.

3.1 MV Power Platform

3.1.1 Plant Overview

The MV Power Platform is a comprehensive solution for large-scale PV plants. It converts the direct current generated in the PV arrays into alternating current and feeds this into the medium-voltage grid. The MV Power Platform is equipped with all the components necessary to carry out this task.

The MV Power Platform is based on a modular concept in which you can select the components according to the specific project requirements.

Principle with Disconnect Unit

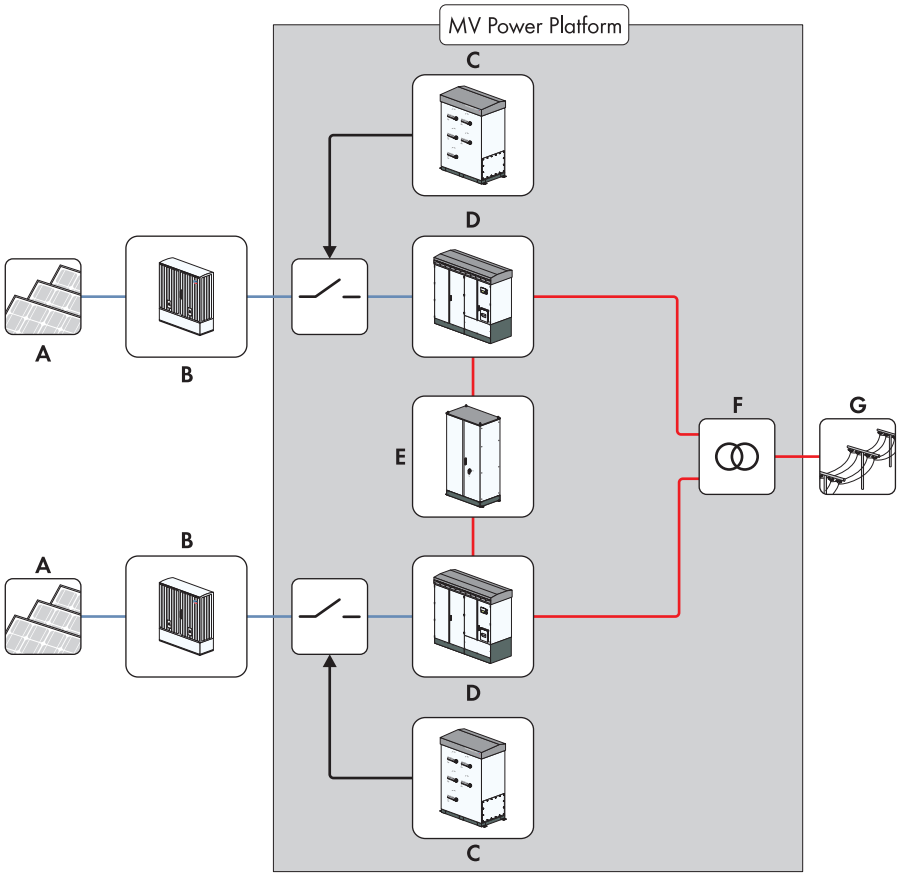
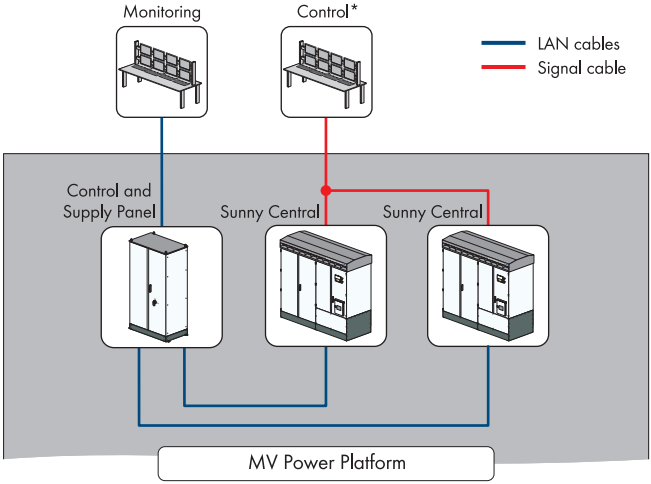


Figure 1: Principle of a large-scale PV plant with an MV Power Platform and Disconnect Unit (example)

Position	Designation
A	PV array
B	DC main distribution/DC sub-distribution (e.g., Sunny Central String-Monitor US)
C	Disconnect Unit
D	Inverter
E	Control and Supply Panel
F	MV transformer
G	Medium-voltage grid

Principle Communication Concept



*In the MV Power Platform with CP-XT or CP-US inverters, it is possible to set up discrete networks for Monitoring of data, and for Control commands.

Figure 2: Principle communication concept of the MV Power Platform (example)

3.1.2 Design of the MV Power Platform

The MV Power Platform is a fully integrated, turnkey solution which is cabled and tested at the factory. The MV Power Platform is standardly equipped with two inverters, one Control & Supply Panel and one Medium Voltage Step-Up Transformer. Depending on the order option, the MV Power Platform is equipped with one Disconnect Unit per inverter for disconnection of the DC inputs.

The MV Power Platform can be mounted on supporting pillars, a concrete foundation or over a cable vault, and is suitable for installation in Class D seismic zones. Depending on the ordered option, the MV Power Platform can be installed in regions where temperatures go down as far as − 40°F (− 40°C).

Underneath the individual components of the MV Power Platform there are removable base plates to which conduits can be mounted. The conduits protect the cables when they are routed to the components.

The Main Auxiliary Transformer consists of all transformers for auxiliary power supply.

The Control & Supply Panel provides supply voltage to the customer-side loads and the inverters. The main switches for disconnecting the internal power supply are in the Control & Supply Panel.

3.1.2.1 Open MV Power Platform with Disconnect Unit

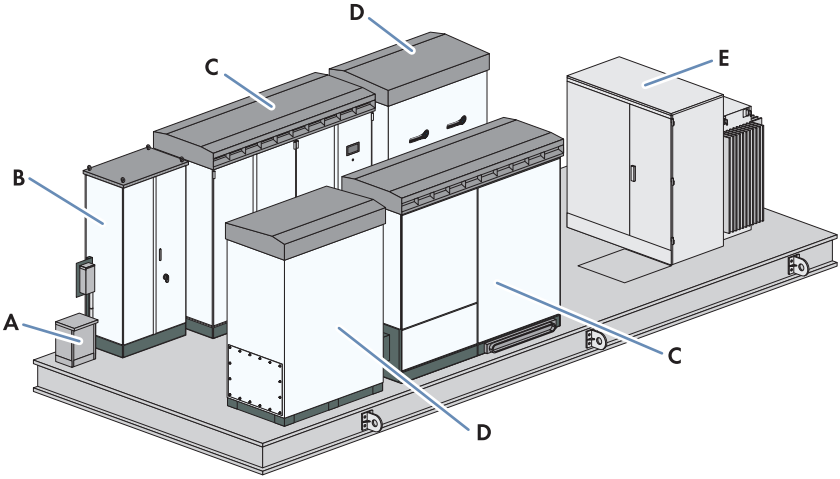


Figure 3: Design of the Open MV Power Platform with Disconnect Unit

Position	Designation
A	Main Auxiliary Transformer
B	Control and Supply Panel
C	Inverter
D	Disconnect Unit
E	MV transformer

3.1.2.2 Canopy MV Power Platform with Disconnect Unit

In addition, the MV Power Platform is equipped with frame, roof and lights.

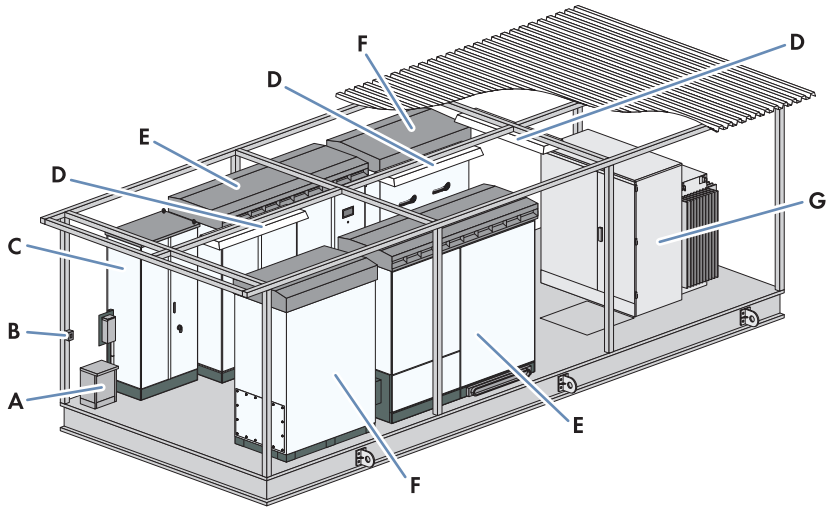


Figure 4: Design of the Canopy MV Power Platform with Disconnect Unit

Position	Designation
A	Main Auxiliary Transformer
B	Light switch
C	Control and Supply Panel
D	Lights
E	Inverter
F	Disconnect Unit
G	MV transformer

3.1.3 MV Power Platform Type Label

You can identify the MV Power Platform by means of the type label.

3.1.3.1 Position of the type label with Disconnect Unit

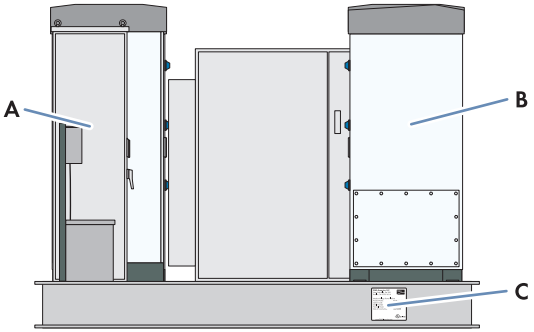


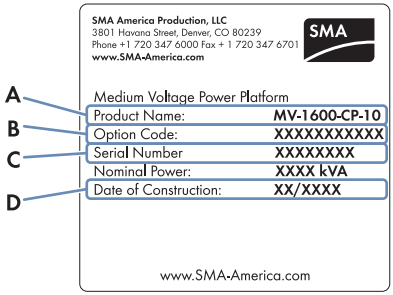
Figure 5: Position of Type Label on the MV Power Platform with Disconnect Unit

Position	Designation
A	Control and Supply Panel
B	Disconnect Unit
C	MV Power Platform type label

3.1.3.2 Type Label of the MV Power Platform

The type label is in the right-hand section on the narrow side of the MV Power Platform facing the Medium Voltage Step-Up Transformer.

Position	Designation
A	Type designation of the MV Power Platform
B	Option code
C	Serial number of the MV Power Platform
D	Date of construction



3.2 Sunny Central CP

3.2.1 Design of the Sunny Central CP

The Sunny Central is a PV inverter that converts the direct current from the PV array into grid-compliant alternating current.

The Sunny Central can be controlled via a Power Reducer Box or the Sunny Central Communication Controller (SC-COM), and thus meets the requirements of the grid operator.

Depending on the order option, the Sunny Central may be equipped with a touch display or indicator lights.

3.2.1.1 Sunny Central CP with Touch Display

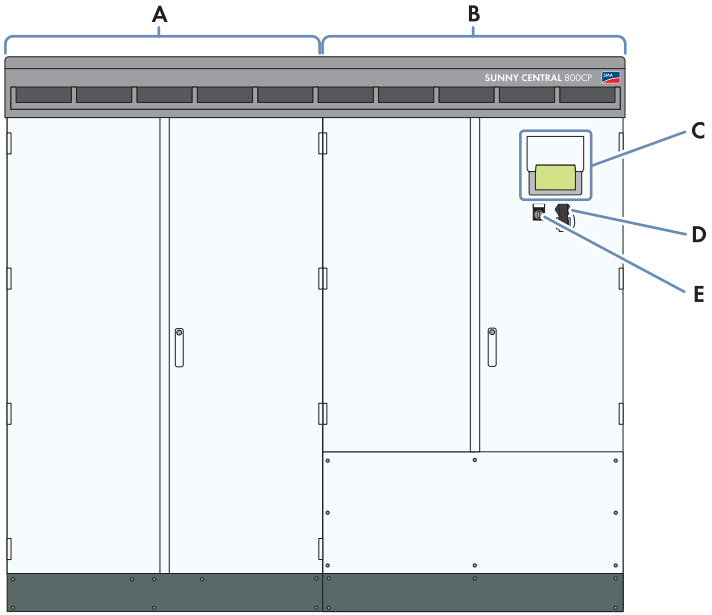


Figure 6: Sunny Central with touch display (example)

Position	Designation
A	Inverter cabinet
B	Interface cabinet
C	Touch display
D	Service interface
E	Key switch

3.2.1.2 Sunny Central CP with Indicator Lights

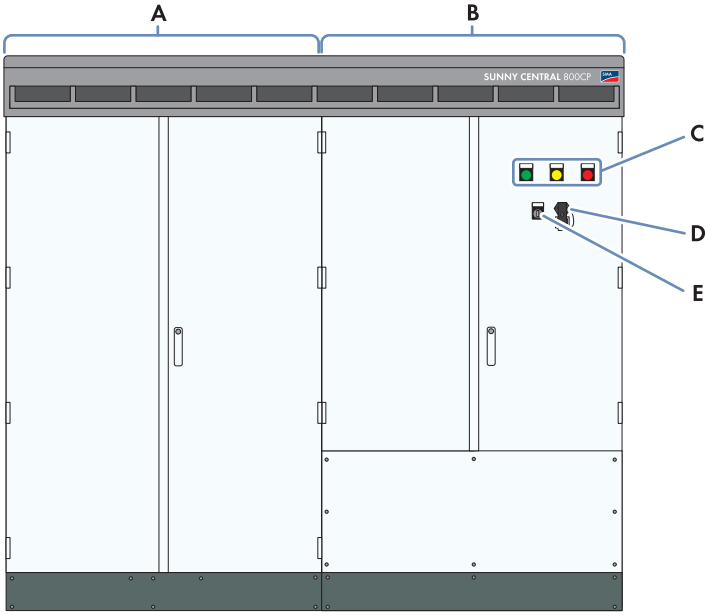


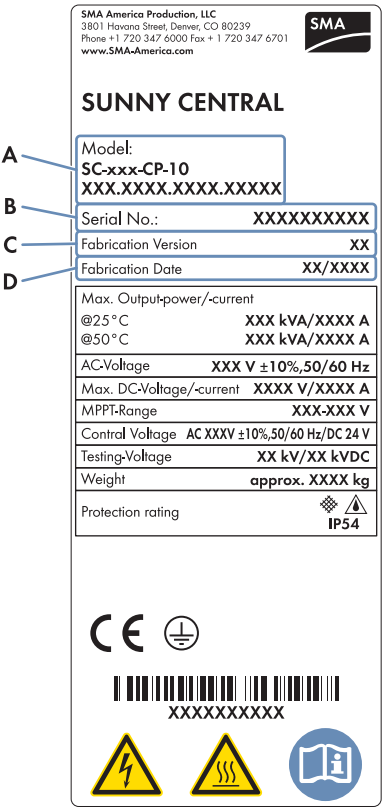
Figure 7: Sunny Central with indicator lights (example)

Position	Designation
A	Inverter cabinet
B	Interface cabinet
C	Indicator lights
D	Service interface
E	Key switch

3.2.2 Type Label of the Sunny Central CP

You can identify the inverter by the type label. Type labels can be found in the inverter cabinet to the left of the air duct and in the interface cabinet on the left side of the enclosure.

Position	Designation
A	Type designation of the Sunny Central
B	Serial number of the Sunny Central
C	Fabrication version
D	Fabrication date



Reading off the serial number

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

Reading off the firmware version

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

Symbols on the Type Label

All the symbols on the type label are explained below.

Symbol	Designation	Explanation
	CE marking	The Sunny Central complies with all relevant EU directives.
	Protection class I	All electric equipment is connected to the Sunny Central's protective conductor system.
	Degree of protection IP54	The Sunny Central is protected against interior dust deposits and against splash water from all angles.
	Beware of dangerous voltage	The inverter operates at high voltages. All work on the inverter must be carried out by skilled persons.
	Beware of hot surface	The inverter can get hot during operation. Avoid touching the inverter during operation. Allow the inverter to cool down sufficiently before carrying out any work. When carrying out any work on the inverter, always wear your personal protective equipment.
	Observe documentation	Observe all documentation supplied with the inverter.

3.2.3 Touch Display

Depending on the order option, the Sunny Central may be equipped with a touch display.

Different kinds of inverter data can be viewed on the touch display. The touch display is fitted with a cover to protect it from the weather. This cover can be pushed up to read the display.

The touch display is only used for viewing data. If the touch display is not touched for five minutes, it switches off. Touching the touch display will activate the display.

3.2.4 Indicator Lights

Depending on the order option, the Sunny Central may be equipped with three indicator lights.

The indicator lights show the current status of the inverter. If the indicator lights display a warning or a fault, you can call up the message via the SC-COM interface.

The functions assigned to each status are described below.

Status		Designation	Function
	Green indicator light is permanently on	Feed-in operation	The Sunny Central is feeding power into the power distribution grid.
	Yellow and green indicator lights are permanently on	Limited operation	The Sunny Central has detected a warning. The warning currently does not affect the operation of the Sunny Central.
	Yellow indicator light is permanently on	Warning	The Sunny Central is currently not feeding power into the grid and has detected a warning. The warning will be automatically reset as soon as it is no longer active. This status is used, for instance, when the level of irradiation is low.
	Red indicator light is permanently on	Fault	The Sunny Central has detected a fault and is now switched off .
	All indicator lights are off	No feed-in operation	The key switch is set to the **Stop** position, the Sunny Central is not feeding in power, is in night mode or is not connected to the supply voltage.

3.2.5 Key Switch

The key switch is used to switch the inverter on and off.

Switch position "Start"

After turning the key switch to the **Start** position, a motor drive switches the DC main switch on and the Sunny Central switches from operating state "Stop" to operating state "Grid monitoring" and the DC main switch is activated. If there is sufficient irradiation and a valid power distribution grid connection, the Sunny Central switches to feed-in operation. If there is insufficient irradiation and the input voltage is therefore too low, the Sunny Central remains in "Grid monitoring" operating state.

Switch position "Stop"

If the key switch is turned to **Stop** while the Sunny Central is in the "Grid monitoring" operating state, a motor drive automatically switches off the DC main switch. The Sunny Central switches to the operating state "Stop".

If the key switch is turned to **Stop** while the Sunny Central is in "MPP load operation" operating state, the Sunny Central switches to the operating state "Shutdown". Once shutdown is complete, the AC contactor and the DC main switch turn off automatically and the Sunny Central goes into operating state "Stop".

3.2.6 Sunny Central Communication Controller

The Sunny Central Communication Controller (SC-COM) is the central communication interface of the inverter. The SC-COM establishes the connection between the inverter and the plant operator.

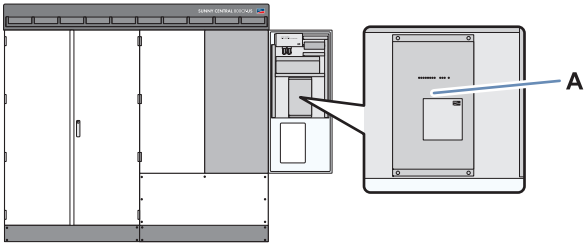


Figure 8: SC-COM

Position	Designation
A	SC-COM

The SC-COM collects all data from the connected devices. The SC-COM enables monitoring, parameterization and remote diagnosis of the inverter via computer, as well as power control by the grid operator.

These various tasks performed by the SC-COM can be organized in two separate networks:

- Monitoring network: for performing monitoring, parameterization and remote diagnosis. The data for the monitoring network is provided via the interface in the Control & Supply Panel.
- Control network: for transmitting the grid management specifications of the grid operator. Since the control network is used exclusively for transmitting data from the grid operator, the specifications will be available in the required time. The interfaces for plant control by the grid operator are inside the inverter.

If the amount of data flowing through the monitoring network is low, the grid operator specifications can also be transmitted via the monitoring network. In this case, there is no need for two networks.

The operator can access all data stored in the SC-COM via an Ethernet connection.

You can set the parameters of the inverter via the SC-COM.

The networks can be set up using copper cables or optical fibers.

Communication type of the PV plant

The interface of the SC-COM is set by default to **COM3** and a 115,200 baud rate. Do not modify these settings.

3.2.7 External Fast-Stop Function

There is an additional option of connecting an external fast-stop function to the inverter. The external fast-stop function disconnects the inverter from the electricity grid in less than 100 ms.

External fast-stop function options:

- External fast-stop function deactivated

  The terminals of the active fast-stop function are bridged. This deactivates the fast-stop function. You will need to bridge the terminals as necessary.

- External fast-stop function operates on internal 24-V supply.

  An external latching switch (break contact) is connected to the inverter terminals via the internal voltage supply in the inverter. When the switch is closed, the switch relay is energised and the inverter feeds into the grid. If the fast-stop function is tripped, the switch opens and the relay is de-energised. The inverter is deactivated and no longer feeds energy to the grid.

- External fast-stop function operates on external 24-V supply.

  An external latching switch (break contact) is connected to the inverter terminals via an external 24-V voltage supply. When the switch is closed, the switch relay is energised and the inverter feeds into the grid. If the fast-stop function is tripped, the switch opens and the relay is de-energised. The inverter is deactivated and no longer feeds energy to the grid.

Tripping the Fast-Stop Function

Only trip the fast-stop function in the event of imminent danger. Tripping the fast-stop function does not cause a rapid discharge of the capacitors.

3.2.8 Low-Temperature Option

With the "Low-temperature Option", the stand-by temperature range is expanded to −40°F ... +140°F (−40°C ... +60°C); however, the inverter will only maintain feed-in operation as far as −13°F (−25°C). If the ambient temperature falls below −13°F (−25°C), the inverter goes into the "Stop" operating state and the additionally installed heating unit is activated. As soon as the ambient temperature exceeds − 4°F (− 20°C), the inverter resumes feed-in operation.

3.2.9 Schematic Diagram

Schematic diagrams in PDF format have jump marks. Double clicking a jump mark causes the display to change to the appropriate current path or the referenced place in the list of electric equipment.

SMA Solar Technology AG recommends using schematic diagrams in PDF format during installation. Schematic diagrams in PDF format are available on request. Contact the SMA Service Line with your request.

3.3 Sunny Central CP-US

3.3.1 Design and Function of the Sunny Central CP-US

The Sunny Central is a PV inverter that converts the direct current from the PV array into grid-compliant alternating current.

3.3.1.1 Sunny Central CP-US with Touch Display

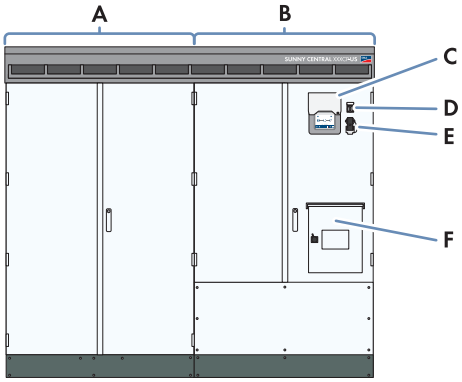


Figure 9: Sunny Central with touch display (example)

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

* Optional

3.3.1.2 Sunny Central CP-US with Indicator Lights

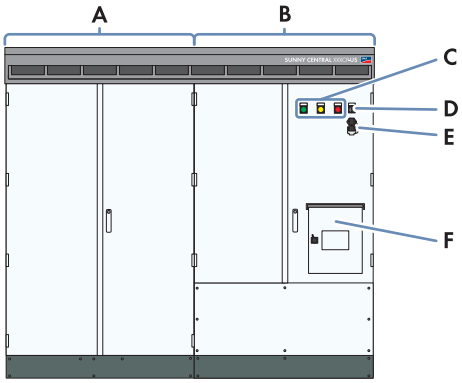


Figure 10: Sunny Central with indicator lights (example)

Position	Designation
A	Inverter cabinet
B	Interface cabinet
C	Indicator lights
D	Key switch
E	Service interface
F	Integrated AC Disconnect*

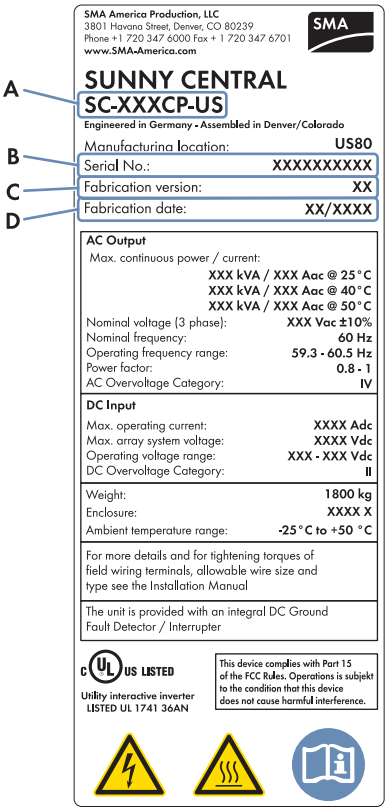
* Optional

The Sunny Central is controlled via the SC-COM and Power Reducer Box and can therefore meet the requirements of your grid operator.

3.3.2 Type Label of the Sunny Central CP-US

You can identify the inverter by the type label. Type labels are situated on the inner top left side of the inverter cabinet and on the right side in the interface cabinet.

Position	Designation
A	Type designation of the Sunny Central
B	Serial number of the Sunny Central
C	Fabrication version
D	Fabrication date



Reading off the serial number

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

Reading off the firmware version

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

Symbols on the Type Label

All the symbols on the type label are explained below.

Symbol	Designation	Explanation
	UL marking	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".
	Beware of dangerous voltage	The inverter operates at high voltages. All work on the inverter must be carried out by skilled persons.
	Beware of hot surface	The inverter can get hot during operation. Avoid touching the inverter during operation. Allow the inverter to cool down sufficiently before carrying out any work. When carrying out any work on the inverter, always wear your personal protective equipment.
	Observe documentation	Observe all documentation supplied with the inverter.

3.3.3 Touch Display

Depending on the order option, the Sunny Central may be equipped with a touch display.

Different kinds of inverter data can be viewed on the touch display. The touch display is fitted with a cover to protect it from weather influences. This cover can be pushed up to read the display.

The touch display is only used for viewing data. If the touch display is not touched for five minutes, it switches off. Touching the touch display will activate the display.

3.3.4 Indicator Lights

Depending on the order option, the Sunny Central may be equipped with three indicator lights.

The indicator lights show the current status of the inverter.

The functions assigned to each status are described below.

Status		Designation	Function
	Green indicator light is permanently on	Feed-in operation	The Sunny Central is feeding into the power distribution grid.
	Yellow and green indicator lights are permanently on	Limited operation	The Sunny Central has detected a warning. The warning currently does not affect the operation of the Sunny Central.
	Yellow indicator light is permanently on	Warning	The Sunny Central is currently not feeding power into the grid and has detected a warning. The warning will be automatically reset as soon as it is no longer active. This status is used, for instance, when the level of irradiation is low.
	Red indicator light is permanently on	Fault	The Sunny Central has detected a fault and is now switched off.
	All indicator lights are off	No feed-in operation	The key switch is set to the **Stop** position, the Sunny Central is not feeding in, is in night mode or is not connected to the supply voltage.

3.3.5 Key Switch

The key switch is used to switch the Sunny Central on and off.

Switch position "Start"

After turning the key switch to **Start**, the DC contactor closes and the Sunny Central goes from the operating state "Stop" to the operating state "Grid monitoring". If there is sufficient irradiation and a valid grid connection, the Sunny Central switches to feed-in operation. If there is insufficient irradiation, the input voltage is too low for startup and the Sunny Central remains in the "Grid monitoring" operating state.

Switch position "Stop"

If the key switch is turned to **Stop** while the Sunny Central is in the operating state "Grid monitoring", the DC contactor switches off. The Sunny Central switches to the operating state "Stop".

If the key switch is turned to **Stop** while the Sunny Central is in the "MPP load operation" state, the Sunny Central switches to the "Shutdown" operating state. Once shutdown is complete, the AC contactor and the DC contactor open automatically and the Sunny Central switches to the "Stop" operating state.

3.3.6 Integrated AC Disconnect

The integrated AC Disconnect unit allows you to disconnect the inverter during an emergency and for performing service and maintenance work on the AC side, as required in the *National Electrical Code*® 2008.

3.3.7 Sunny Central Communication Controller

The Sunny Central Communication Controller is the central communication interface of the inverter. The SC-COM establishes the connection between the inverter and the plant operator.

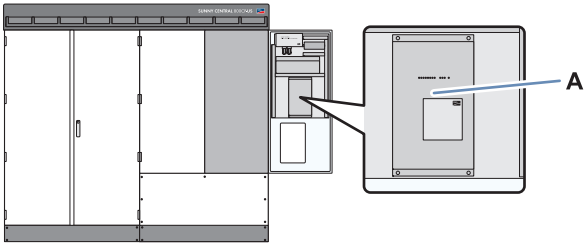


Figure 11: SC-COM

Position	Designation
A	SC-COM

The SC-COM collects all data from the connected devices. The SC-COM enables monitoring, parameterization and remote diagnosis of the inverter via computer, as well as power control by the grid operator.

These various tasks performed by the SC-COM can be organized in two separate networks:

- Monitoring network: for performing monitoring, parameterization and remote diagnosis. The data for the monitoring network is provided via the interface in the Control & Supply Panel.
- Control network: for transmitting the grid management specifications of the grid operator. Since the control network is used exclusively for transmitting data from the grid operator, the specifications will be available in the required time. The interfaces for plant control by the grid operator are inside the inverter.

If the amount of data flowing through the monitoring network is low, the grid operator specifications can also be transmitted via the monitoring network. In this case, there is no need for two networks.

The operator can access all data stored in the SC-COM via an Ethernet connection.

You can set the parameters of the inverter via the SC-COM.

The networks can be set up using copper cables or optical fibers.

Communication type of the PV plant

The interface of the SC-COM is set by default to **COM3** and a 115,200 baud rate. Do not modify these settings.

3.3.8 Remote Shutdown

3.3.8.1 Standard Remote Shutdown

With the standard remote shutdown unit, you can set the Sunny Central to switch off or shut down within six seconds, e.g. from a control room. The remote shutdown unit works the same way as the stop function of the key switch.

If the remote shutdown unit is activated while the Sunny Central is in the "Grid monitoring" operating state, the DC contactor automatically shuts off and the Sunny Central switches to the "Stop" operating state.

If the remote shutdown unit is activated while the Sunny Central is in the "MPP load operation" state, the Sunny Central switches to the "Shutdown" operating state. Once shutdown is complete, the AC contactor and the DC contactor automatically switch off and the Sunny Central switches to the "Stop" operating state.

3.3.8.2 Quick Remote Shutdown

The quick remote shutdown unit must be used if the inverter is to be disconnected by an external signal according to IEEE 1547 (e.g. External Islanding detection). The quick remote shutdown unit is connected via the quick-stop switch input.

With the quick remote shutdown unit, you can set the Sunny Central to switch off or shut down within one second. The remote shutdown unit works the same way as the stop function of the key switch.

If the remote shutdown unit is activated while the Sunny Central is in the "Grid monitoring" operating state, the DC contactor automatically opens and the Sunny Central switches to the "Stop" operating state.

If the remote shutdown unit is activated while the Sunny Central is in the "MPP load operation" state, the Sunny Central switches to the "Shutdown" operating state. Once shutdown is complete, the AC contactor and the DC contactor open automatically and the Sunny Central switches to the "Stop" operating state.

3.3.9 Schematic Diagram

Schematic diagrams in PDF format have jump marks. Double clicking a jump mark causes the display to change to the appropriate current path or the referenced place in the list of electric equipment.

SMA Solar Technology AG recommends using schematic diagrams in PDF format during installation. Schematic diagrams in PDF format are available on request. Contact the SMA Service Line with your request.

3.4 Sunny Central HE-US

3.4.1 Design and Function of the Sunny Central HE-US

The Sunny Central is a PV inverter that converts the direct current from the PV array into alternating current for the power distribution grid.

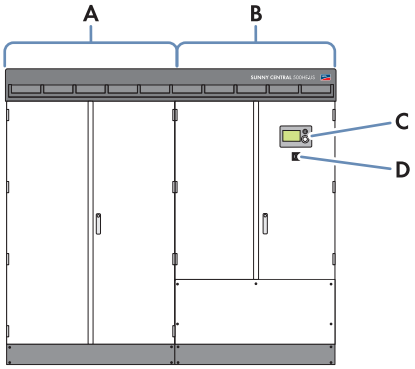


Figure 12: Sunny Central 500HE-US

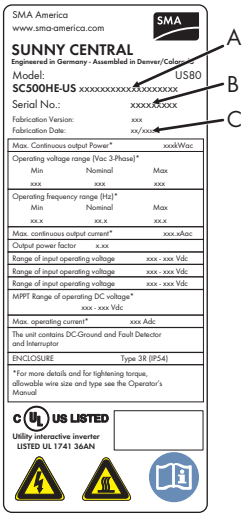
Position	Designation	Explanation
A	Inverter Cabinet	The inverter cabinet contains the inverter bridge for converting direct current to alternating current.
B	Interface Cabinet	All AC, DC, and data cables can be connected to the interface cabinet. This cabinet contains the system control and optional communication devices.
C	Display	Read the yield values and error messages off the display.
D	Stop/Start Switch	Use the stop/start switch to switch the Sunny Central on or off.

The Sunny Central can be controlled via the Power Reducer Box and the Sunny WebBox, and therefore can meet the requirements of the grid operator.

3.4.2 Type Label of the Sunny Central HE-US

The type label provides a clear identification of the Sunny Central. Two type labels are attached to the Sunny Central. The type labels can be found on both the top left side in the connection cabinet and on the right side in the inverter cabinet.

Position	Designation
A	Type description of the Sunny Central
B	Serial number of the Sunny Central
C	Date of manufacture



Reading off the serial number

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

Symbols on the Type Label

All the symbols on the type label are explained below.

Symbol	Designation	Explanation
	UL marking	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".
	Beware of dangerous voltage	The inverter operates at high voltages. All work on the inverter must be carried out by skilled persons.
	Beware of hot surface	The inverter can get hot during operation. Avoid touching the inverter during operation. Allow the inverter to cool down sufficiently before carrying out any work. When carrying out any work on the inverter, always wear your personal protective equipment.
	Observe documentation	Observe all documentation supplied with the inverter.

3.4.3 Display

Read the yield values of the inverter and error messages off the display. If there is an error, the button glows red.

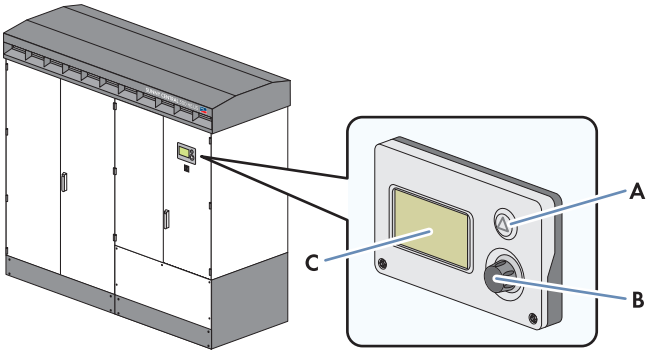


Figure 13: Display and control elements

Position	Designation
A	Button
B	Switch
C	Display

The display can be operated by pushing and pulling the switch and by using the button. By pushing the switch, you can switch on the backlight of the display.

3.4.4 Stop/Start Switch

Use the stop/start switch to switch the Sunny Central on or off.

Switch position "Start"

After turning the stop/start switch to **Start**, a motor drive closes the DC contactor and the Sunny Central goes from the operating state "Stop" to the operating state "Grid monitoring". If there is sufficient irradiation and a valid power distribution grid connection, the Sunny Central switches to feed-in operation. If there is insufficient irradiation and, in turn, the input voltage is too low, the Sunny Central remains in the operating state "Grid monitoring".

Switch position "Stop"

If the stop/start switch is turned to **Stop** while the Sunny Central is in the operating state "Grid monitoring", a motor drive opens the DC contactor. The Sunny Central switches to the operating state "Stop".

If the stop/start switch is turned to **Stop** while the Sunny Central is in the operating state "MPP load operation", the Sunny Central switches to the operating state "Shutdown". Once shutdown is complete, the AC contactor and the DC contactor open automatically and the Sunny Central switches to the operating state "Stop".

3.4.5 Sunny WebBox

The Sunny WebBox is a device that monitors and controls the inverter. The Sunny WebBox establishes the connection between the PV plant and its operator.

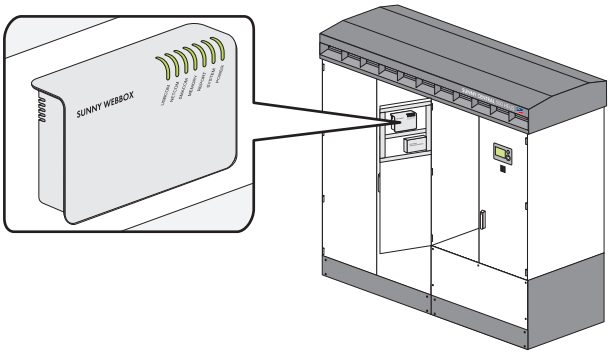


Figure 14: Sunny WebBox in the Sunny Central

The Sunny WebBox collects all the data from connected devices. Using the Sunny WebBox, the monitoring, parameterization, and remote diagnosis of the Sunny Central can be performed via a computer. The operator can access all data stored in the Sunny WebBox via an Internet connection or a GSM modem.

You can configure the settings of the Sunny WebBox in the web browser by entering the IP address of the Sunny WebBox.

Communication type of the PV plant

The interface of the Sunny WebBox is set by default to **SMA-COM** and a 19 200 baud rate. Do not modify these settings.

3.4.6 Low-Temperature Option

With the "Low-temperature Option", the stand-by temperature range is expanded to −40°F ... +140°F (−40°C ... +60°C); however, the inverter will only maintain feed-in operation as far as −13°F (−25°C). If the ambient temperature falls below −13°F (−25°C), the inverter goes into the "Stop" operating state and the additionally installed heating unit is activated. As soon as the ambient temperature exceeds − 4°F (− 20°C), the inverter resumes feed-in operation.

3.4.7 Schematic Diagram

Schematic diagrams in PDF format have jump marks. Double clicking a jump mark causes the display to change to the appropriate current path or the referenced place in the list of electric equipment.

SMA Solar Technology AG recommends using schematic diagrams in PDF format during installation. Schematic diagrams in PDF format are available on request. Contact the SMA Service Line with your request.

3.5 Disconnect Unit

3.5.1 Operating principles

Depending on the order option, the MV Power Platform is equipped with one Disconnect Unit per inverter. The Disconnect Unit is for disconnecting the inverter from the PV modules and from the power distribution grid for service and maintenance issues and in case of emergency as demanded by *National Electrical Code*® 2008.

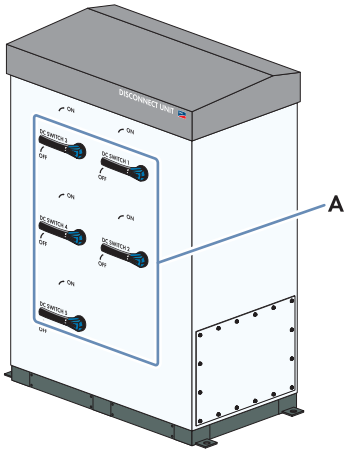


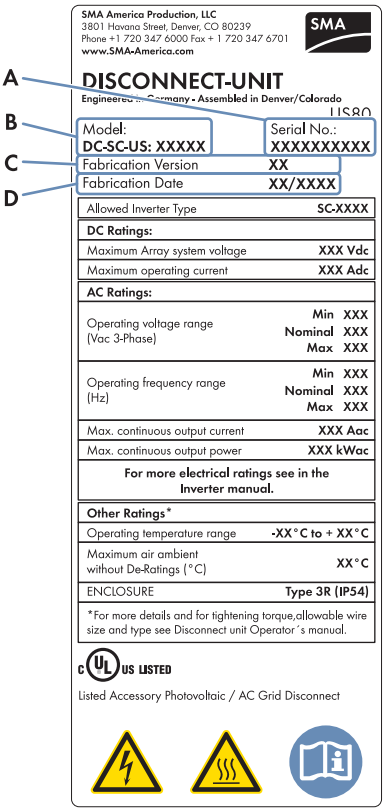
Figure 15: Arrangement of the switches

Position	Designation
A	Switch for the DC inputs

3.5.2 Type Label of the Disconnect Unit

You can identify the Disconnect Unit by its type label.
The type label is located at the top right of the rear wall.

Position	Designation
A	Serial number of the Sunny Central
B	Type designation of the Disconnect-Unit
C	Fabrication version
D	Fabrication date



Symbols on the Type Label

All the symbols on the type label are explained below.

Symbol	Designation	Explanation
	UL marking	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".
	Beware of dangerous voltage	The inverter operates at high voltages. All work on the inverter must be carried out by skilled persons.
	Beware of hot surface	The inverter can get hot during operation. Avoid touching the inverter during operation. Allow the inverter to cool down sufficiently before carrying out any work. When carrying out any work on the inverter, always wear your personal protective equipment.
	Observe documentation	Observe all documentation supplied with the inverter.

3.6 Control & Supply Panel

3.6.1 Design of the Control & Supply Panel

The Control & Supply Panel is the central supply unit for all the components of the MV Power Platform.

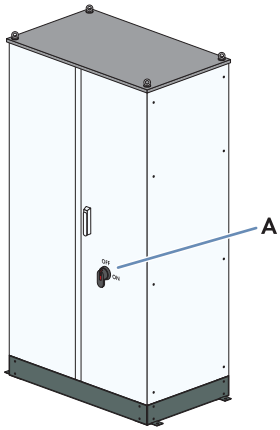


Figure 16: Control & Supply Panel

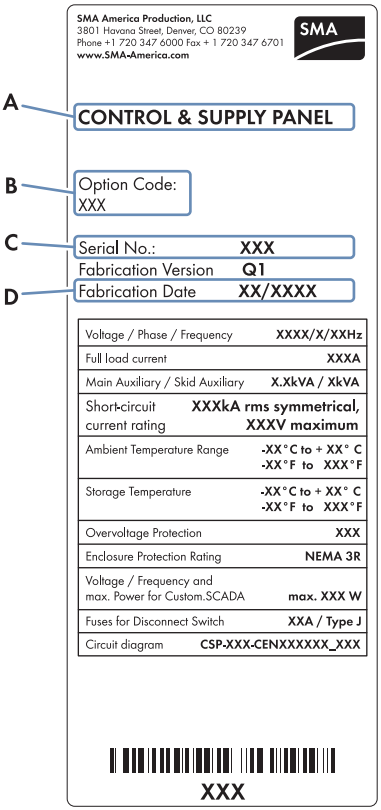
Position	Designation
A	Main switch

The external switch on the Control & Supply Panel enables the simple and safe disconnection of the Control & Supply Panel.

3.6.2 Type Label of the Control & Supply Panel

You can identify the Control & Supply Panel by means of the type label. The type label is on the inside of the left-hand side panel.

Position	Designation
A	Type designation of the Control & Supply Panel
B	Option code
C	Serial number
D	Fabrication date



Symbols on the Type Label

All the symbols on the type label are explained below.

Symbol	Designation	Explanation
	UL marking	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".
	Beware of dangerous voltage	The inverter operates at high voltages. All work on the inverter must be carried out by skilled persons.
	Beware of hot surface	The inverter can get hot during operation. Avoid touching the inverter during operation. Allow the inverter to cool down sufficiently before carrying out any work. When carrying out any work on the inverter, always wear your personal protective equipment.
	Observe documentation	Observe all documentation supplied with the inverter.

3.7 Medium Voltage Step-Up Transformer

The Medium Voltage Step-Up Transformer is the link between central inverter and medium-voltage grid. The Medium Voltage Step-Up Transformer is equipped with disconnect devices enabling simple and safe disconnection on the low and medium voltage level. You will find further information on the Medium Voltage Step-Up Transformer in the manufacturer's documentation.

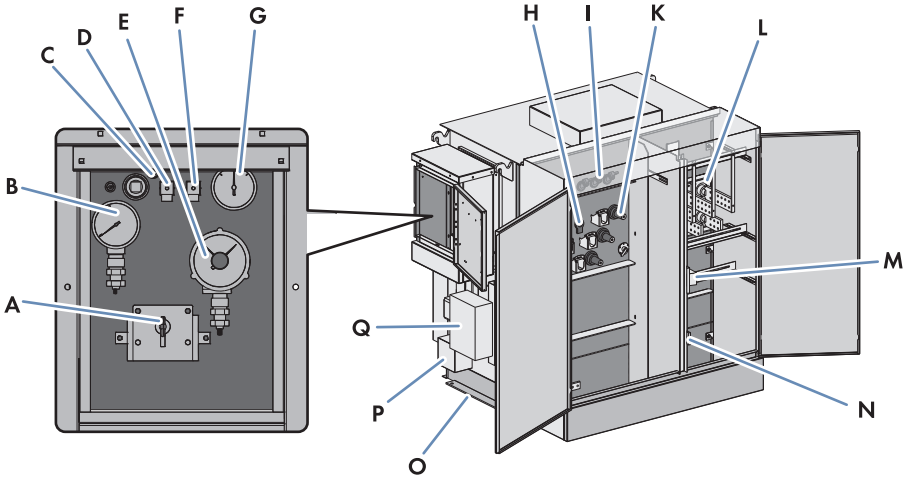


Figure 17: Medium Voltage Step-Up Transformer

Position	Designation
A	Medium Voltage Load Break Switch
B	Liquid Level Gage and Alarm Contacts
C	Pressure Relief Valve
D	Vacuum Switch with Alarm Contacts
E	Liquid Temperature Gage with Alarm Contacts
F	Pressure Switch with Alarm Contacts
G	Pressure Vacuum Gage
H	Tap Changer
I	Fuse Holders / Fusess, oil immersed expulsion (for MV < 23 kV)
K	Primary (MV) Bushings
L	Secondary (LV) Bushings
M	Fuse Block (for LV distribution)
N	Grounding Bus Bar
O	Seismic Tie Down Bracket

Position	Designation
P	Drain Valve in Padlockable Enclosure
Q	Alarm Contact Terminations

4 Information on Maintenance

4.1 Maintenance Intervals

4.1.1 Dependency on the Ambient Conditions

Shorter maintenance intervals in the event of adverse ambient conditions

The plant location and ambient conditions influence the maintenance intervals.

- If the MV Power Platform is installed in adverse ambient conditions, SMA America, LLC recommends a monthly inspection in order to determine the need for maintenance. The maintenance intervals are to be shortened dependent of the determined maintenance requirements. In particular, cleaning work and corrosion protection can be necessary more frequently.
- Adherence to the maintenance intervals ensures trouble-free operation of the MV Power Platform (see the MV Power Platform maintenance report).

4.1.2 Sunny Central CP XT

Maintenance under normal ambient conditions:

Description	Interval
Maintenance	Every 24 months
AC circuit breaker • Functional Test* • Cleaning* • Checking the contact elements*	Every 24 months

* See the AC circuit breaker manufacturer's maintenance manual.

Preventive replacement intervals:

Description	Interval
Replacing the 24 V power supply units*	Every 10 years
Replacing the inverter bridge fan*	Every 13 years
Replacing the interior fan*	Every 13 years
GFDI / Soft Grounding / ABB High-Performance Circuit Breaker*	After 100 trippings due to short circuit
Surge arrester	If tripped

* Contact the SMA Service Line.

4.1.3 Sunny Central CP-US

Maintenance under normal ambient conditions:

Description	Interval
Maintenance	Every 24 months
AC circuit breaker • Functional Test* • Cleaning* • Checking the contact elements*	Every 24 months
Retightening the power cable connection if screw terminals are used	Every 12 months

* See the AC circuit breaker manufacturer's maintenance manual.

Preventive replacement intervals:

Description	Interval
Replacing the 24 V power supply units*	Every 10 years
Replacing the inverter bridge fan*	Every 13 years
Replacing the interior fan*	Every 13 years
GFDI / Soft Grounding / ABB High-Performance Circuit Breaker*	After 100 trippings due to short circuit
Surge arrester	If tripped

* Contact the SMA Service Line.

4.1.4 Sunny Central 500HE-US

Maintenance under normal ambient conditions:

Description	Interval
Maintenance	Every 24 months
AC circuit breaker • Functional test* • Cleaning* • Checking the contact elements*	Every 24 months
Retightening the power cable connection if screw terminals are used	Every 12 months
Unscheduled maintenance	After any short circuit • Contact the SMA Service Line.

* See the AC circuit breaker manufacturer's maintenance manual.

Preventive replacement intervals:

Description	Interval
Replacing the inverter bridge fan*	Every 10 years
Replacing the interior fan*	Every 10 years
GFDI / Soft Grounding / ABB High-Performance Circuit Breaker*	After 100 trippings
Surge arrester	If tripped

* Contact the SMA Service Line.

4.1.5 Disconnect Unit

Maintenance under normal ambient conditions:

Description	Interval
Maintenance	Every 24 months
Retightening the power cable connection if screw terminals are used	Every 12 months
Unscheduled maintenance	After any short circuit • Contact the SMA Service Line.

4.1.6 Control & Supply Panel

Maintenance under normal ambient conditions:

Description	Interval
Maintenance	Every 24 months

4.1.7 Low Voltage Transformer Rack

Maintenance under normal ambient conditions:

Description	Interval
Exterior maintenance • Checking unprotected surfaces for corrosion and signs of wear	Every 12 months

4.1.8 Base Platform

Maintenance under normal ambient conditions:

Description	Interval
Exterior maintenance • Checking unprotected surfaces for corrosion and signs of wear	Every 12 months
Check the functionality of the lighting. Replace if required.	Every 12 months or in case the lighting is defective.

4.1.9 Medium Voltage Step-Up Transformer

Transformer Exterior Maintenance:

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Quarterly	Exterior Surfaces	Inspect for evidence of tampering, battered metal, gouges, etc.	Any such damage should be repaired immediately.
Quarterly	Paint or Protective Coatings	Inspect for scratches or weathering.	Any such damage should be touched up immediately.

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Quarterly	Tank Leaks	Check tank exterior for signs of a leak.	Any such leaks should be repaired immediately.
Quarterly	General Location	Check the area around the transformer for stored tools, materials, equipment or debris.	Anything on or against the transformer should be removed.
Quarterly	Pad	Check transformer pad for proper support of unit and level.	If pad support is compromised or out of level greater than 2°, repair it immediately.

Cabinet Interior Maintenance:

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Quarterly	Gauges and Controls	Check for proper operation.	Repair or replace damaged or defective equipment.
Quarterly	Equipment Leaks	Inspect drain cocks, plugs, fuse mountings, and switches. Look for evidence of insulating liquid seepage around tank-wall gaskets, seals, etc.	Repair as required. Replacement of gaskets or seals in the tank wall may require that the tank be opened and the insulating liquid lowered to the appropriate level. For instruction on opening the tank and for draining and replacing the insulating liquid, refer to the Insulating Liquid Maintenance section in the Cooper Power Systems Three-Phase Pad mounted Compartmental Type Installation and Maintenance Instructions Manual (S210-12-1).

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Quarterly	Tank Pressure	Check that pressure/vacuum gauge does not remain at zero for an extended period of time.	If the pressure/vacuum gauge remains at zero for an extended period of time this may be evidence of air leakage in and out of the tank. A leak test should be performed by adding nitrogen to the airspace and observing for loss of pressure over an interval of a minimum of 12 hours. If the pressure is lost, locate the leak and repair immediately.
Quarterly	Oil Level	Check oil level gauge.	If the oil level is below the nominal level, check transformer for signs of a leak. If a leak is observed, repair immediately. If no leak is observed, add oil to bring level to nominal operating level.
Quarterly	Fluid Temperature	Check liquid temperature gauge for elevated temperature. Reset the drag hand if one exists. Compare temperature to that of similar units to identify units that may be overheating.	If temperature is elevated, have transformer serviced immediately to determine source of elevation.
Quarterly	Cable Connections	If there are signs of overheating, check all cables for loose connections.	Tighten any loose connections immediately.
Quarterly	Bushings	Check condition of the HV and LV bushings. Observe for any indication of dirt, breakage, general damage, heat damage or flashover.	If the bushings are dirty, clean them immediately. Any damage that is observed should be addressed immediately by a qualified technician.
Quarterly	Cubicle Padlock	Check that all cubicles are locked.	Replace any missing locks immediately.

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Quarterly	LV Bushing Cantilever	Check for excessive cable/ conductor weight or stiff cable conductors putting upward or downward pressure on the bushings due to pad settling.	Immediately adjust cable/ conductor position to eliminate pressure.
Quarterly	Pressure Relief Valve	Check for dirt, debris and operation.	Replace immediately if damage. Clean if dirty or clogged with debris.
Quarterly	Lightning Arresters*	Check for damage or breakage and an intact and tight ground connection.	Replace damaged arresters and tighten or secure any lose ground connections.

* If installed separately by Customer.

Dissolved Gas Analysis:

Frequency	Equipment / Items to Inspect	Points to be checked	Remedial Action
Every 2 to 5 Years	Oil Sample	Take an oil sample and send it to a third party tester to check dissolved gas levels.	Compare dissolved gas analysis results to the baseline result. Look for abrupt changes in dissolved gas levels. Any abrupt changes should be investigated immediately.

Maintenance of the AC circuit breaker under normal ambient conditions:

Description	Interval
• Operating mechanism / Electrical accessories* • Arcing and main contacts* • Arcing chambers* • Maincircuit / Busbar / Insulating contacts* • Earthing contacts (only for withdrawable circuit-breaker)* • Earth connection (only for fixed circuit-breaker)* • Auxiliary circuit power supply voltage* • Operating and control parts* • Checking contact wear*	Every 12 months / after every short circuit
• External visual check and inspection of the power section* • Checking trip of the release*	Every 12 months
• Operating mechanism maintenance*	Every 12 months / after 10,000 switch operations

* See the AC circuit breaker manufacturer's maintenance manual.

Maintenance of the AC circuit breaker in conditions of high dust exposure:

Description	Interval
• Operating mechanism / Electrical accessories* • Arcing and main contacts* • Arcing chambers* • Maincircuit / Busbar / Insulating contacts* • Earthing contacts (only for withdrawable circuit-breaker)* • Earth connection (only for fixed circuit-breaker)* • Auxiliary circuit power supply voltage* • Operating and control parts* • Checking contact wear*	Every 6 months / after every short circuit

Description	Interval
• External visual check and inspection of the power section* • Checking trip of the release*	Every 6 months
• Operating mechanism maintenance*	Every 6 months / after 10,000 switch operations

* See the AC circuit breaker manufacturer's maintenance manual.

4.2 Spare Parts

Spare parts can be identified via their reference designation and the circuit diagram. The spare parts list includes the item number of each part. For information on a specific item number, contact the SMA Service Line.

5 Disconnecting the MV Power Platform

This section deals with how to disconnect the MV Power Platform safely. Pay attention to this section to avoid personal injury and property damage.

5.1 Safety

⚠ WARNING

High voltages that can result in lethal electrical shocks are present in the individual parts of the live components.

- Move the key switch on the inverters to the **Stop** position and ensure that the devices cannot be switched on accidentally.
- Do not touch live components. Observe all applicable safety precautions.
- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

5.2 System Electrical Overview

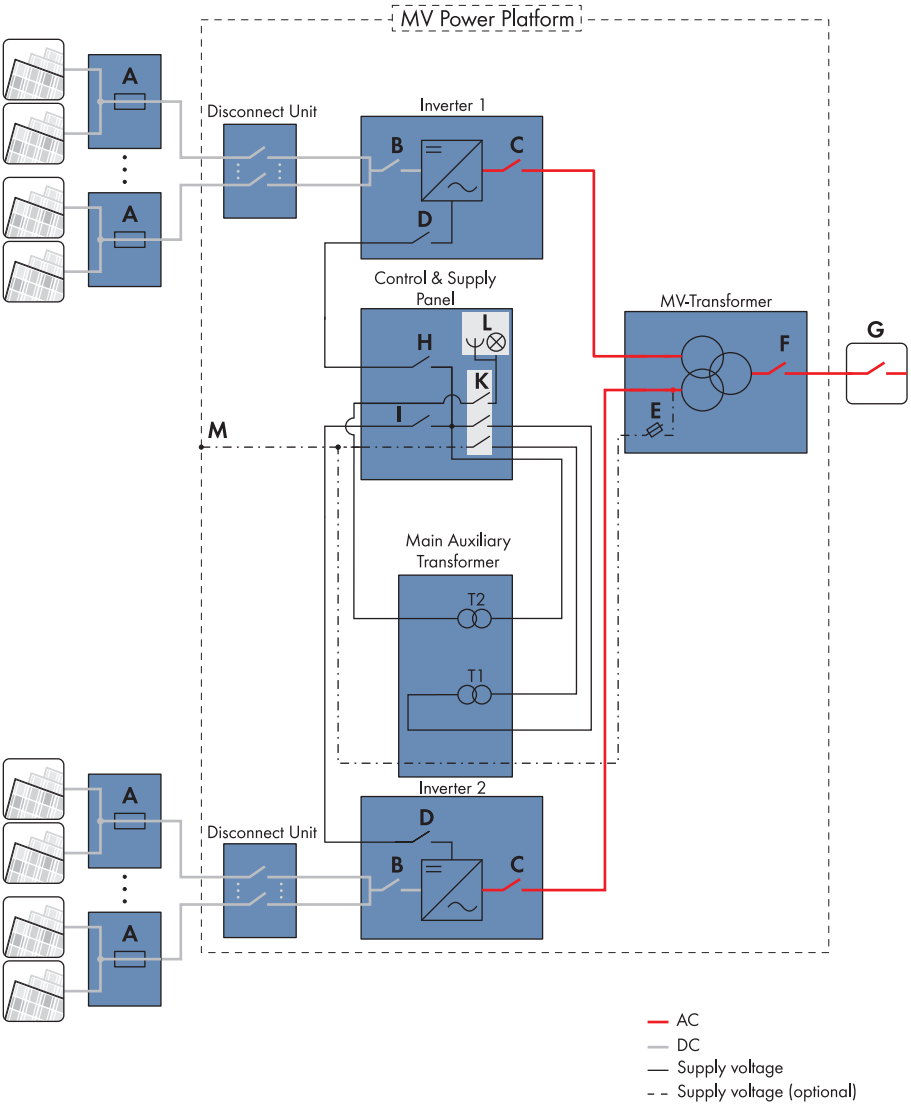


Figure 18: Overview of switching devices

Position	Components	Designation
A	String Combiner Boxes*	Switching devices
B	Sunny Central	DC switch-disconnector
C	Sunny Central	AC circuit breaker
D	Sunny Central	Miniature circuit-breaker for external voltage supply
E	Transformer	Fuses
F	Transformer	MV switch
G	Substation feeder*	Medium-voltage switchgear
H	Control & Supply Panel	Miniature circuit-breaker for external voltage supply of Sunny Central 1
I	Control & Supply Panel	Miniature circuit-breaker for external voltage supply of Sunny Central 2
K	Control & Supply Panel*	Switch for 400 V voltage supply
L	Control & Supply Panel	Customer loads
M	–	External voltage supply connection

* Plant-specific

5.3 Disconnecting the MV Power Platform

⚠ DANGER

Danger to life due to electric shock by touching live components

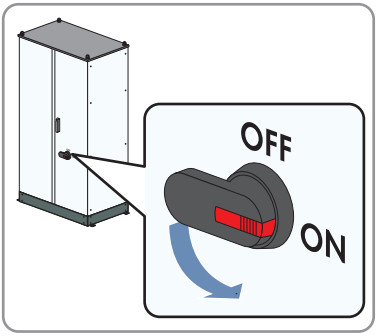
- All works on the MV Power Platform and its components may only be performed when they are disconnected and free of voltage.

Authorization for switching the Medium Voltage Step-Up Transformer

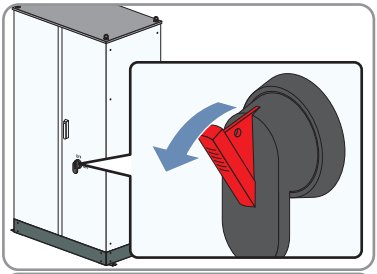
Only a duly authorized person trained in electrical safety is allowed to connect or disconnect the AC voltage of the medium-voltage transformer. To do this, use the medium-voltage switch on the Medium Voltage Step-Up Transformer on the medium-voltage side.

1. Set the key switch on the inverter to **Stop**.
2. Disconnect the DC Disconnect Unit (see Section 5.5 "Disconnecting the Control & Supply Panel", page 71).
3. Switch off the medium-voltage switch on the medium-voltage side of the Medium Voltage Step-Up Transformer (see documentation Medium Voltage Step-Up Transformer).

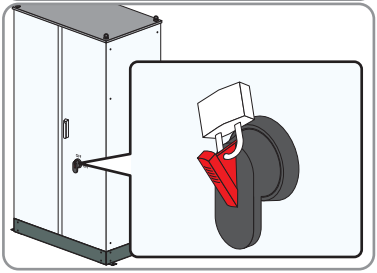
4. Switch off main switch on Control & Supply Panel



5. Pull the lock bracket out of the switch.



6. Hook a suitable padlock into the lock bracket and lock it. This will ensure that the Control & Supply Panel cannot reconnect inadvertently.



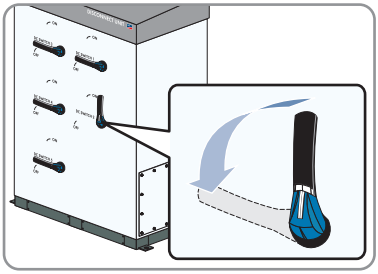
7. If any other devices are supplied with external voltage, switch off the external voltage.
8. **⚠ DANGER**

   Danger to life due to electric shock by touching live components

   - After disconnecting the inverter, wait at least 15 minutes until the inverter capacitors have discharged completely.
9. Ensure that all poles in each component are free of voltage.
10. Ground and short-circuit the device.
11. Cover or safeguard any adjacent live components.

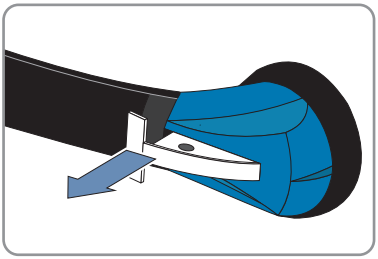
5.4 Switching off and securing the Disconnect Unit

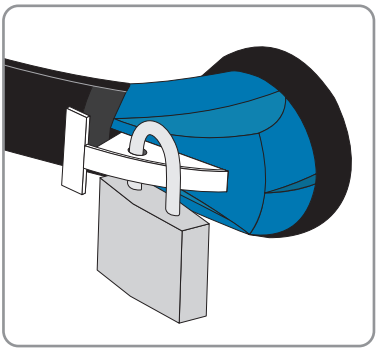
1. Turn all switches to the left into position **OFF**. You need to pull sharply in order to move the switches.



2. To secure the switches, pull the lock holder out of the switch handle and attach up to 3 padlocks to the handle of the switch.

Diameter of a padlock	$^{3}/_{16}$ in. ... $^{5}/_{16}$ in. (5 mm ... 8 mm)





5.5 Disconnecting the Control & Supply Panel

⚠ DANGER

Electric shock due to live voltage

There are high voltages present in the Medium Voltage Power Platform and its components. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

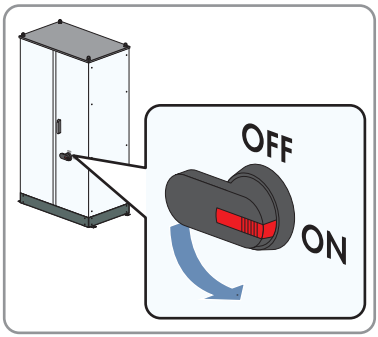
- When working in a high contact-risk environment, wear Class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch live components.
- Follow the instructions precisely.
- Observe safety messages.
- Before performing any work on the Medium Voltage Power Platform, always disconnect all components of the MV Power Platform whenever voltage is not absolutely necessary.
- Ensure that all disconnected components cannot be reconnected.
- After disconnecting the Medium Voltage Power Platform, wait at least 15 minutes until the inverter capacitors have discharged completely.
- Before performing any work on the Medium Voltage Power Platform ensure that no voltage is present in any of the components.

Class 2 protective equipment required

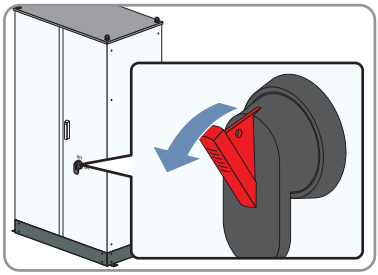
In accordance to NFPA 70E, an arc flash hazard risk analysis has been performed by SMA, and appropriate Arc Flash Hazard labels stating the required Personal Protective Equipment (PPE) for exposed, energized interaction with the equipment, are installed. Class 2 PPE is the requirement for all routine 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 Medium Voltage Power Platform, as described in Section 5 of this manual.

For additional information, please contact the SMA Service Line.

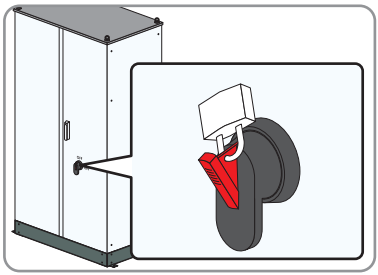
1. Set the key switch on the inverter to **Stop**.
2. Switch off main switch on Control & Supply Panel



3. Pull the lock bracket out of the switch.



4. Hook a suitable padlock into the lock bracket and lock it. This will ensure that the Control & Supply Panel cannot reconnect inadvertently.



5.6 Disconnecting the Inverter

⚠ DANGER

Electric shock due to live voltage

There are high voltages present in the Medium Voltage Power Platform and its components. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- When working in a high contact-risk environment, wear Class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch live components.
- Follow the instructions precisely.
- Observe safety messages.
- Before performing any work on the Medium Voltage Power Platform, always disconnect all Medium Voltage Power Platform components if voltage is not absolutely necessary.
- Ensure that all disconnected components cannot be reconnected.
- After disconnecting the Medium Voltage Power Platform, wait at least 15 minutes until the inverter capacitors have discharged completely.
- Before performing any work on the Medium Voltage Power Platform ensure that no voltage is present in any of the components.

Class 2 protective equipment required

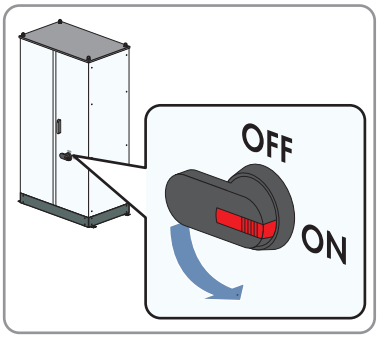
In accordance to NFPA 70E, an arc flash hazard risk analysis has been performed by SMA, and appropriate Arc Flash Hazard labels stating the required Personal Protective Equipment (PPE) for exposed, energized interaction with the equipment, are installed. Class 2 PPE is the requirement for all routine 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 Medium Voltage Power Platform, as described in Section 5 of this manual.

For additional information, please contact the SMA Service Line.

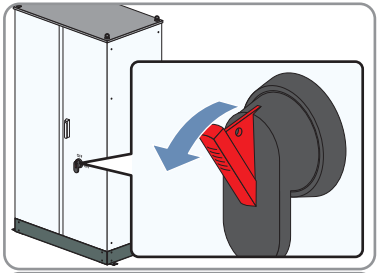
Authorization for switching the Medium Voltage Step-Up Transformer

Only a duly authorized person trained in electrical safety is allowed to connect or disconnect the AC voltage of the medium-voltage transformer. To do this, use the medium-voltage switch on the Medium Voltage Step-Up Transformer on the medium-voltage side.

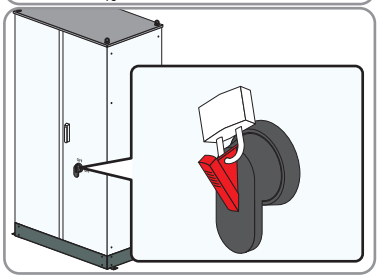
1. Set the key switch on the inverter to **Stop**.
2. Disconnect the DC Disconnect Unit (see Section 5.4 "Switching off and securing the Disconnect Unit", page 70).
3. If the Sunny Central CP-US has an integrated AC Disconnect, switch it off.
   For the inverter types Sunny Central CP-US without integrated AC Disconnect, Sunny Central CP and Sunny Central HE-US, switch off the medium-voltage transformer on the medium-voltage side (see documentation of the medium-voltage transformer).
4. Switch off main switch on Control & Supply Panel.



5. Pull the lock bracket out of the switch.



6. Hook a suitable padlock into the lock bracket and lock it. This will ensure that the Control & Supply Panel cannot reconnect inadvertently.



7. If any other devices are supplied with external voltage, switch off the external voltage.

8. **⚠ DANGER**

   Danger to life due to electric shock by touching live components

   - After disconnecting the inverters, wait at least 15 minutes until the inverter capacitors have discharged completely.

9. Open the interface cabinets of the inverters.
10. Switch off the miniature circuit-breakers for voltage supply in the inverters.
11. Ensure that all poles in each component are free of voltage.
12. Ground and short-circuit the MV Power Platform.
13. Cover or safeguard any adjacent live components.

5.7 Disconnecting the Medium Voltage Step-Up Transformer

⚠ DANGER

Danger to life due to electric shock when live components are touched.

- Adhere to the disconnection procedure specified in the documentation of the medium-voltage switching device (see medium-voltage switching device documentation).
- Do not operate loadbreak euipment if a fault condition is suspected. Doing so can cause an explosion or fire.
- Use a hotstick to operate transformer loadbreak equipment.
- After operating transformer loadbreak equipment, check that voltages at transformer terminals are the expected values. Checking voltages verifies that loadbreak equipment operated properly and that electrical circuit conditions are as expected.
- Before servicing transformer secondary connected equipment, verify that all transformer secondary terminals have zero voltage and ground the transformer secondary terminals following industry accepted safe grounding practices. Grounding secondary terminals protects against situations such as a standby generator energizing transformer from the secondary circuit.
- Before servicing transformer, ALWAYS de-energize the transformer from a remote upstream source and then proceed to ground all primary and secondary transformer terminals following industry accepted safe grounding practices. Grounding secondary terminals protects against situations such as a standby generator energizing transformer from the secondary circuit.
- Follow industry accepted safety practices. Utilize protective clothing and equipment when working with loadbreak equipment.
- Ground the outgoing feeder section.
- Ensure that no voltage is present.

⚠ DANGER

When switching at low temperatures, the two-position load-break switch does not work properly. Components that are supposedly disconnected, may be live.

- Three-phase padmounted transformers use conventional transformer oil, R-Temp®, or Envirotemp® FR3n for an insulating liquid. When the insulating liquid temperature is less than −4°F (−20°C) for conventional transformer oil, less than +32°F (0°C) for R-Temp or less than +14°F (−10°C) for Envirotemp FR3, viscosity is reduced, which may reduce make and break capabilities of loadbreak devices. Below these temperatures, under-oil loadbreak accessories should not be used to make or break a load. Instead, de-energize transformer from a remote upstream source before operating under-oil loadbreak devices.

It is recommended that remote energization be used whenever possible. Operate loadbreak switches using hotstick tool. After loadbreak switch is switched to **OPEN** position, verify that transformer secondary terminals have zero voltage and then ground the secondary terminals to prevent transformer backfeed energization.

1. Switch the inverter to **Stop**.
2. Switch Two-Position Loadbreak Switch to Position **OPEN**.
3. Lock and Tag Out the switch in accordance to the LOTO procedures established by the PV Plant owner/operator.

6 Maintenance when DC, AC and Control Voltage is Present

6.1 Sunny Central CP XT

6.1.1 Reading off Error Messages and Warnings

Use the service interface on the outside of the interface cabinet to connect a PC (see inverter operating manual).

- If an error occurs, you can read off and remedy the error via the display or the user interface of the SC-COM (see inverter operating manual).

6.1.2 Checking the DC Switch-Disconnector

⚠ DANGER

Electric shock due to live voltage

High voltages are present on the inverter and its components. Some maintenance work must be carried out with voltage present. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch any live components in the inverter or on the medium-voltage grid.
- Follow the instructions precisely.
- Observe the safety messages.

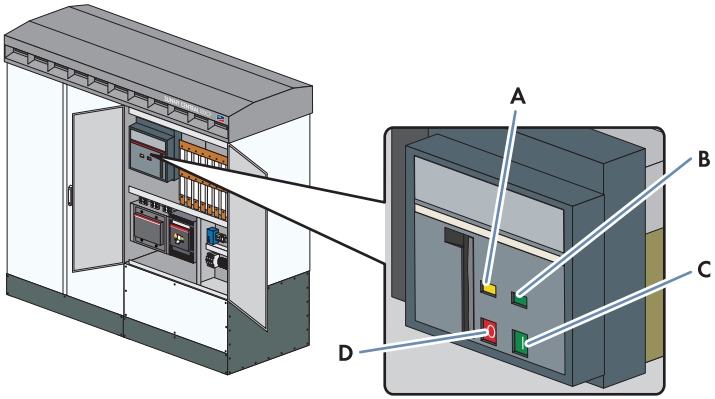


Figure 19: Position of the DC switch-disconnector

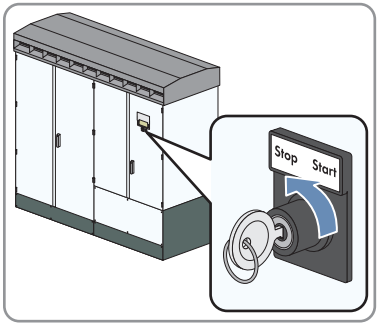
Item	Designation
A	Spring status indicator
B	Position indicator
C	ON button
D	OFF button

Requirements:

☐ Control voltage is present.

☐ DC voltage is connected.

1. Switch the inverter to **Stop**.



2. Open the doors of the interface cabinet.
3. Check the switching state of the DC switch-disconnector.

   ☑ The DC switch-disconnector is switched off and moves to the **Off** position.

   ✖ Does the DC switch-disconnector not turn off?

   - Contact the SMA Service Line.

4. Close the doors of the interface cabinet.
5. Set the inverter to **Start**.
6. Open the doors of the interface cabinet.
7. Check the switching state of the DC switch-disconnector.
   ☑ The DC switch-disconnector is switched on and moves to the **On** position.
   ✖ Does the DC switch-disconnector not turn on?
   - Contact the SMA Service Line.
8. Switch the inverter to **Stop**.
9. Test the switch process 3 times.
10. Close the doors of the interface cabinet.

6.1.3 Checking the AC Circuit Breaker

⚠ DANGER

Electric shock due to live voltage

High voltages are present on the inverter and its components. Some maintenance work must be carried out with voltage present. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch any live components in the inverter or on the medium-voltage grid.
- Follow the instructions precisely.
- Observe the safety messages.

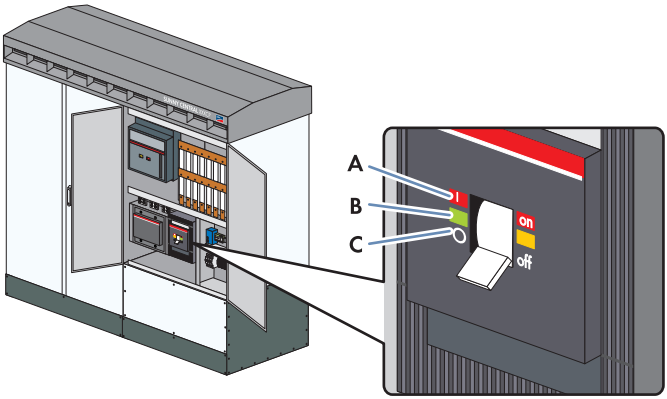


Figure 20: Position of the AC circuit breaker

Item	Designation
A	Switch position **ON**
B	Tripped switch position
C	Switch position **OFF**

Additional maintenance material that is required but not included in the delivery:

☐ A testing device approved by the manufacturer of the AC circuit breaker (e.g. TT1 from ABB).

Procedure:

1. Open the doors of the interface cabinet.
2. Use the testing device to check whether the AC circuit breaker is ready for operation (instructions are included in the manual of the testing device).

   If a fault occurs during the test, contact the SMA Service Line.
3. Close the doors of the interface cabinet.

6.2 Sunny Central CP-US

6.2.1 Reading off Error Messages and Warnings

Use the service interface on the outside of the interface cabinet to connect a PC (see inverter operating manual).

- If an error occurs, you can read off and remedy the error via the display or the user interface of the SC-COM (see inverter operating manual).

6.2.2 Checking the DC Contactor

⚠ DANGER

Electric shock due to live voltage

High voltages are present on the inverter and its components. Some maintenance work must be carried out with voltage present. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch any live components in the inverter or on the medium-voltage grid.
- Follow the instructions precisely.
- Observe the safety messages.

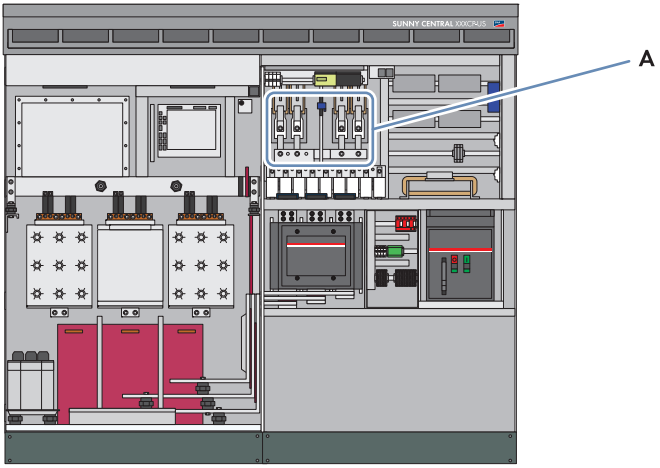


Figure 21: Position of the DC contactor

Item	Designation
A	DC contactor

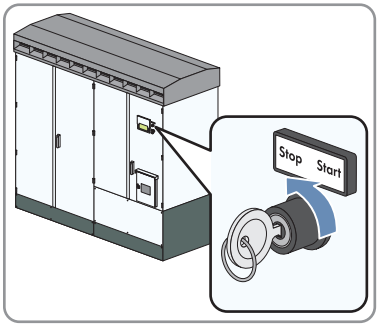
Requirements:

☐ Control voltage is present.

☐ DC voltage is connected.

Procedure:

1. Switch the inverter to **Stop**. By doing so, the DC contactor is audibly switched off.



2. Open the doors of the interface cabinet.
3. Check the switching state of the DC contactor.
   ☑ The DC contactor is switched off.
   ✖ The DC contactor does not switch off?
   - Contact the SMA Service Line.
4. Close the doors of the interface cabinet.
5. Set the inverter to **Start**.
6. Open the doors of the interface cabinet.
7. Check the switching state of the DC contactor.
   ☑ The DC contactor is switched off.
   ✖ The DC contactor does not switch off?
8. Contact the SMA Service Line.
9. Switch the inverter to **Stop**.
10. Test the switch process 3 times.
11. Close the doors of the interface cabinet.

6.2.3 Checking the AC Circuit Breaker

⚠ DANGER

Electric shock due to live voltage

High voltages are present on the inverter and its components. Some maintenance work must be carried out with voltage present. Failure to adhere to the safety messages leads to serious injuries or death as a result of electric shock.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch any live components in the inverter or on the medium-voltage grid.
- Follow the instructions precisely.
- Observe the safety messages.

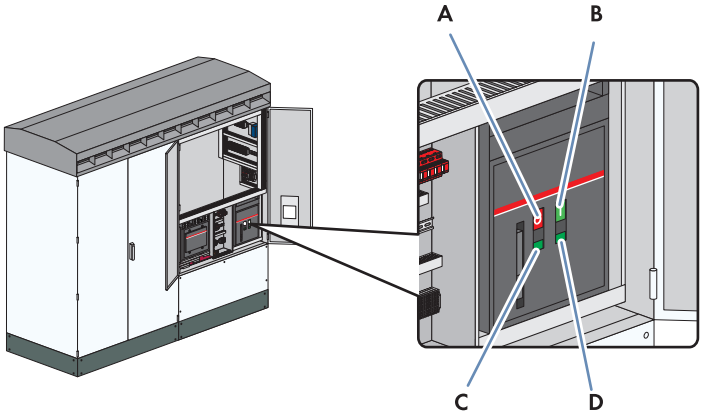


Figure 22: Design of the AC circuit breaker

Item	Designation
A	ON button
B	OFF button
C	Spring status indicator
D	Position indicator

Additional maintenance material that is required but not included in the delivery:

☐ A testing device approved by the manufacturer of the AC circuit breaker (e.g. TT1 from ABB).

Procedure:

1. Open the doors of the interface cabinet.
2. Use the testing device to check whether the AC circuit breaker is ready for operation (instructions are included in the manual of the testing device).

   If a fault occurs during the test, contact the SMA Service Line.
3. Close the doors of the interface cabinet.

6.3 Sunny Central HE-US

6.3.1 Reading off Error Messages and Warnings

Use the service interface on the outside of the interface cabinet to connect a PC (see inverter operating manual).

- If an error occurs, you can read off and remedy the error via the display or the user interface of the Sunny WebBox (see inverter operating manual).

7 Maintenance in Disconnected State

7.1 Sunny Central CP XT

7.1.1 Safety

⚠ DANGER

Danger to life due to electric shock

High voltages that can result in lethal electrical shocks are present in the live components of the MV Power Platform.

- All work is to be carried out in accordance with this document.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- After disconnection, wait at least 15 minutes until the capacitors have discharged.
- Follow all safety precautions (see Section 2.2).
- Disconnect the Sunny Central CP XT (see Section 5.6).

7.1.2 Disassembling the Panels

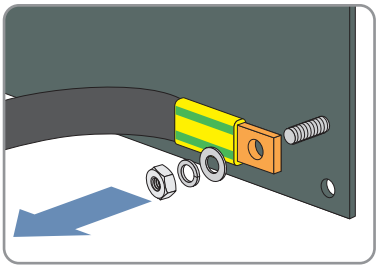
Grounding cables on the kick plates

The panels are connected to the inverter via grounding cables.

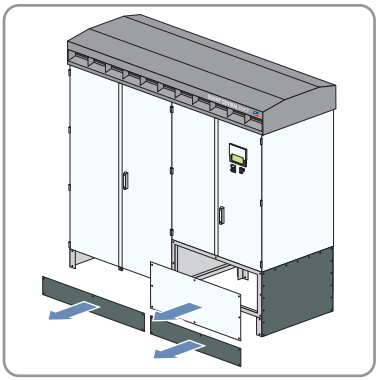
1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).
2. Remove the screws of the front panels with a Torx screwdriver.
3. Pull the panels toward the front.
4. Disconnect the PE cable between the panels and the interface cabinet.



5. Remove the panels.

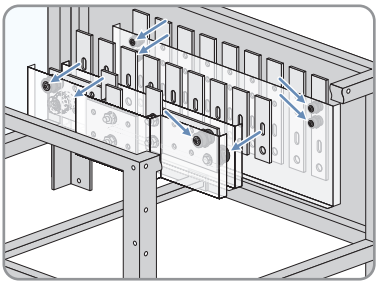


6. **DANGER**

Danger to life due to electric shock or electric arc by touching live components

- Ensure that no voltage is present.
  - On DC connection lugs/DC busbars/DC terminals
  - On AC connection lugs
- Ground and short-circuit the inverter.
- Cover or safeguard any adjacent live components.

7. Remove the protective covers in the connection area.



7.1.3 Cleaning the Ventilation Plate

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the ventilation plate depends on the ambient conditions.

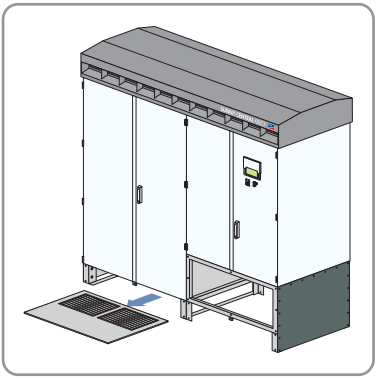
- Clean the ventilation plate more frequently in cases where there is high sand or dust content in the air (see maintenance report).

1. **DANGER**

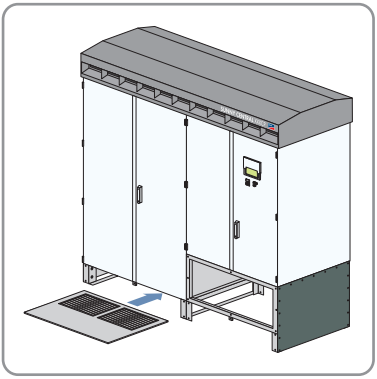
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Disassemble the panels (see Section 7.1.2).
3. Remove the ventilation plate from the inverter cabinet. To do this, grasp under the ventilation plate and press upwards in the middle when removing.



4. Clean the ventilation plate with a brush or vacuum.
5. Push the ventilation plate into the inverter cabinet with the filter frame facing the back panel; to do this, grip under the ventilation plate and apply an upward pressure in the middle.



6. Mount the panels (see Section 7.1.14).

7.1.4 Cleaning the Air Duct and Insect Screens

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the air duct and insect screens depends on the ambient conditions.

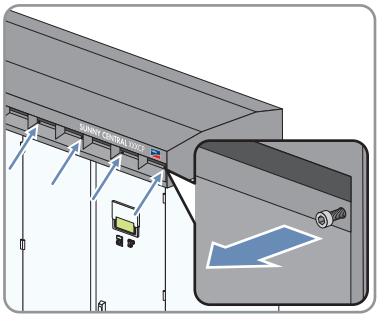
- Clean the air duct and insect screen more frequently in cases where there is high sand or dust content in the air (see maintenance report).

1. **⚠ DANGER**

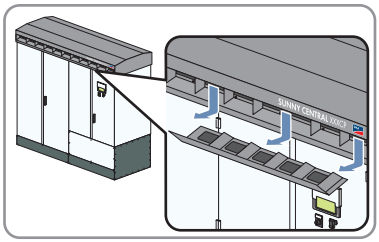
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

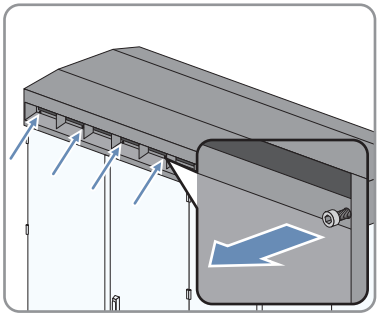
2. Remove the screws of the right insect screen. Use an Allen key for this.



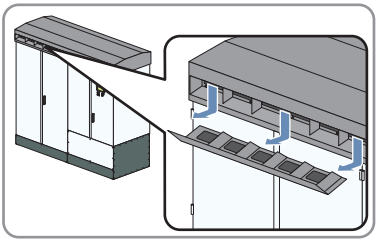
3. Pull the bottom of the right-hand insect screen forward. This removes the insect screen.



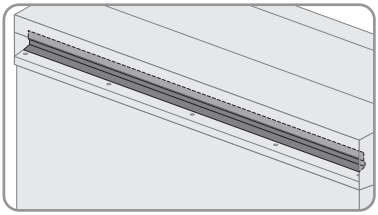
4. Remove the screws of the left insect screen. Use an Allen key for this.



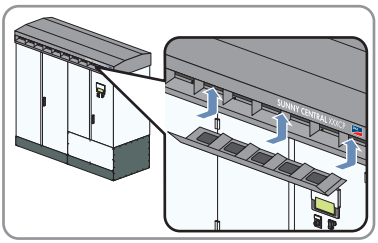
5. Pull the bottom of the left-hand insect screen forward. This removes the insect screen.



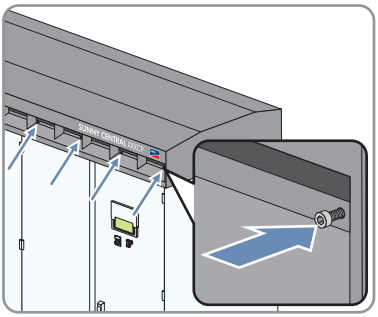
6. Vacuum the air duct or clean it with a brush.



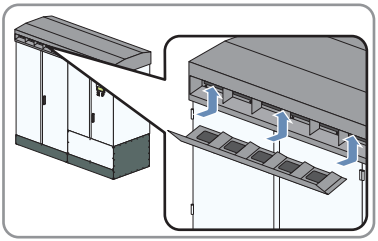
7. Vacuum the insect screens or clean them with a brush.
8. Check the insect screens for visible damage.
   ☑ Insect screens are not damaged.
   ✖ Are the insect screens damaged?
   - Replace damaged insect screens.
9. Insect the right insect screen.



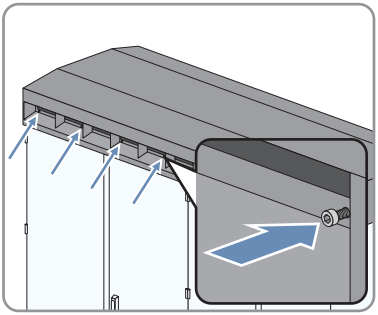
10. Screw the right insect screen in place. Use an Allen key for this. Torque: 177 in.-lbs. (20 Nm).



11. Insert the left insect screen.



12. Screw the left insect screen in place. Use an Allen key for this. Torque: 177 in.-lbs. (20 Nm).



7.1.5 Cleaning the Interior

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Ensure that the switch cabinet is shut.
4. Remove dirt and dust from the interior of the connection cabinet and from all assemblies (e.g. DC switch-disconnector and AC circuit breaker).
5. Remove moisture.
6. Check for leaks. If leaks are present, remove the leaks.
7. Close the inverter.

7.1.6 Checking the Fuses and/or Isolating Blades

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the circuit diagram of the inverter. Contact the SMA Service Line if specifications are missing.

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the interface cabinet.
3. Check the fuses and/or isolating blades or tension springs for discoloration and signs of wear.

   If the fuses and/or isolating blades or tension springs are discolored or show signs of wear, replace them.
4. Check the insulation and terminals for discoloration and signs of wear.

   If the insulation or terminals are discolored or show signs of wear, contact the SMA Service Line.
5. Close the interface cabinet.

7.1.7 Checking the Surge Arrester

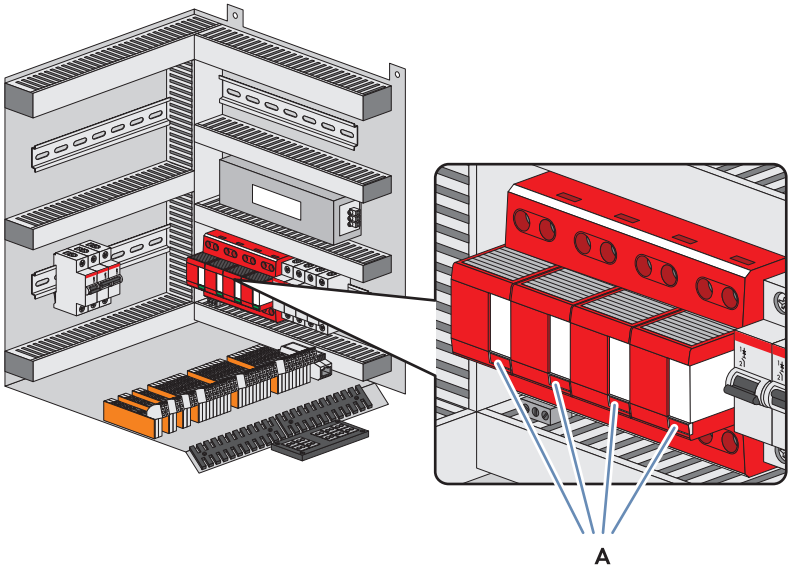


Figure 23: Position of the surge arrester

Item	Designation
A	Ready indicator of the surge arrester

Additional maintenance material that is required but not included in the delivery:

☐ A testing device approved by the manufacturer of the surge arrester (e.g. the PM20 by are shown in the inverter's circuit diagram DEHN + SÖHNE GmbH + Co. KG.).

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

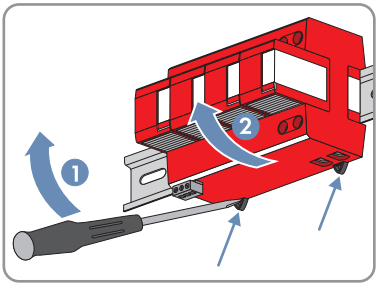
2. Open the interface cabinet.
3. Check the surge arrester (see test device documentation).

4. Check whether the ready indicator of one of the surge arresters is red.

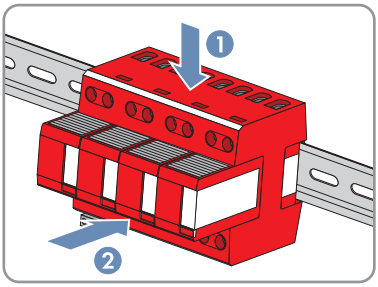
   If the ready indicator of one of the surge arresters is red, replace the surge arrester.

   – Remove the cables from the surge arrester. Mark the cables in the process. The cables must be reconnected to the same terminals later.

   – Open the terminal and remove the surge arrester upwards out of the top-hat rail.



   – Insert the new surge arrester into the top-hat rail from above and press it against the top-hat rail.



   – Connect the cables to the same terminals of the surge arrester from which they were previously removed.

5. Close the interface cabinet.

7.1.8 Checking the Screw Connections of the Power Cabling

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the circuit diagram of the inverter. Contact the SMA Service Line if specifications are missing.

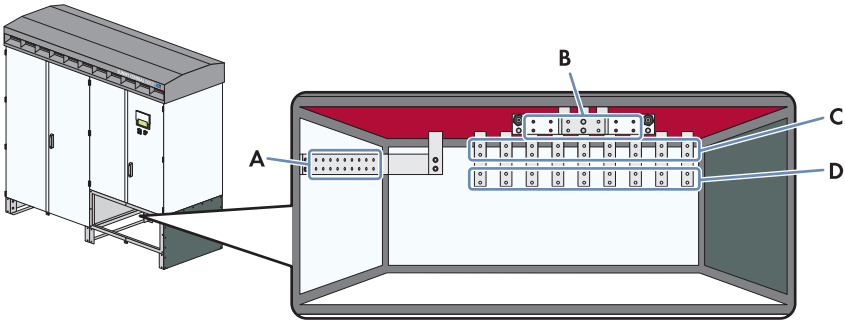


Figure 24: Position of the power cabling

Position	Designation
A	Connection bar PE cable
B	Connection lugs AC cables
C	Connection lugs DC+ cables
D	Connection lugs DC − cables

Procedure:

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check that all screw connections are tight.

   If screw connections are loose, tighten them with a torque wrench. Adhere to the torque specifications when doing so.

3. Check insulation and connections for discoloration and signs of wear.

   If the insulation or connections are discolored or show signs of wear, contact the SMA Service Line.

7.1.9 Inverter with Low-Temperature Option: Cleaning the Heating Element

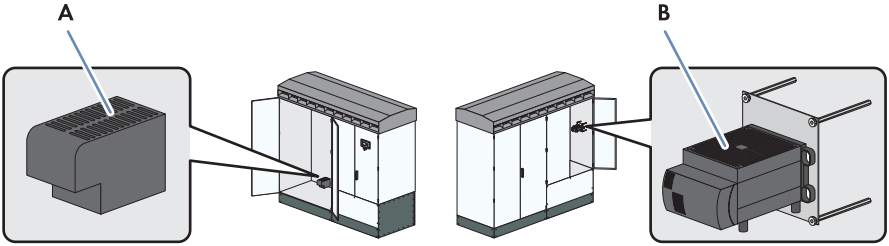


Figure 25: Position of the heating elements

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Remove the protective covers of the heating.
4. Remove dirt and dust from the heating elements.
5. Remove moisture.
6. Mount the protective covers of the heating. Torque: 89 in.-lbs. (10 Nm).
7. Close the inverter.

7.1.10 Checking the Safety Messages

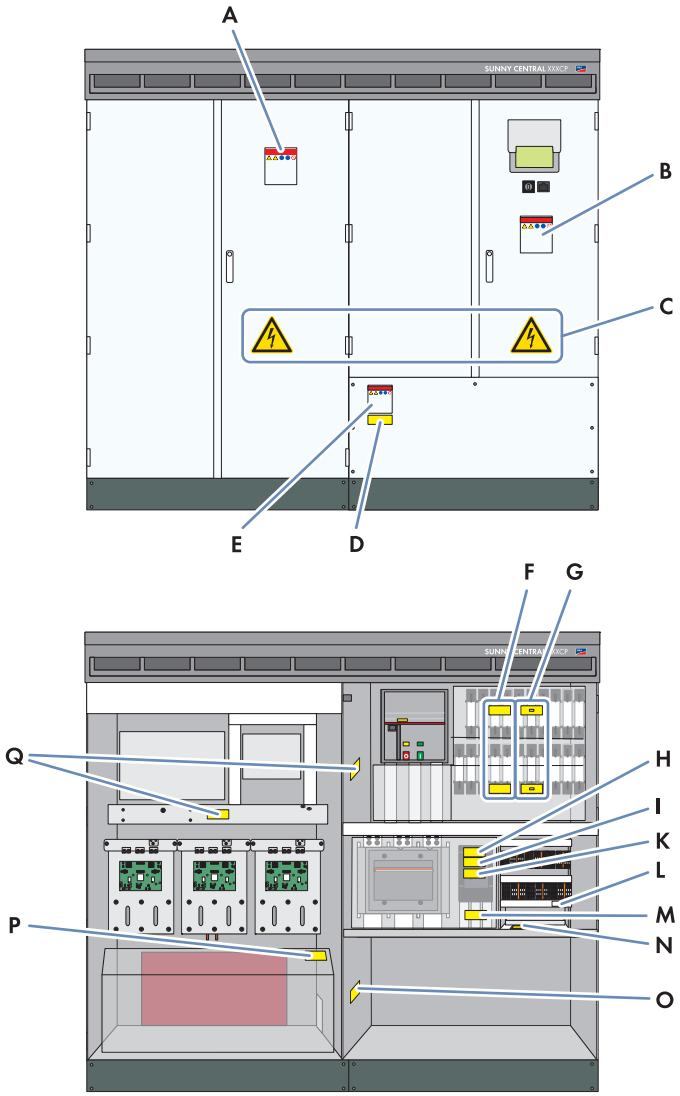


Figure 26: Position of the stickers

Item	SMA order number	Designation
A	86-004330	Beware of dangerous voltage

Item	SMA order number	Designation
B	86-004332	Beware of dangerous voltage
C	86-05200	Beware of dangerous voltage
D	86-004345	Risk of short circuit if operated without a transformer
E	86-004332	Beware of dangerous voltage
F	86-004345	Risk of electric shock from active power source
G	86-108670106	Risk of burns due to hot fuses under the cover
H	86-0032311	Five safety rules
I	86-10867021	Risk of fire due to insufficient contact
K	86-10867024	Unintended tripping due to modified settings
L	86-0032310	Plant protected by surge arresters
M	86-108670104	Risk of electric shock from active power source
N	86-10867035	Incorrect connection leads to destruction of the device
O	86-0099	Position of grounding
P	86-108670105	Risk of burns due to hot components beneath the cover
Q	86-10867022	Dangerous touch voltage even when device is disconnected

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Ensure that all safety messages and stickers are attached and undamaged.

   Replace the safety messages and stickers if they are damaged or missing. In the case of missing or damaged safety messages or stickers, contact the SMA Service Line.
4. Close the inverter.

7.1.11 Checking the Door Seals

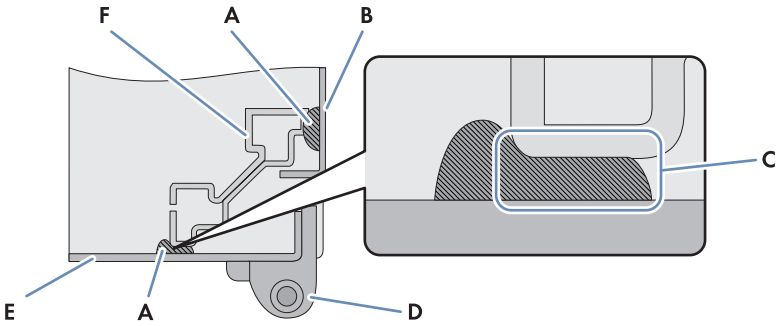


Figure 27: Section drawing with top view of seals (example)

Item	Designation
A	Seal
B	Side panel
C	Sealing area
D	Hinge
E	Door
F	Frame section

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

☐ A suitable water-free, heat-resistant lubricant.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the seals in the sealing area show any damage. Tip: The sealing area must be hidden when the door is closed.

   If seals are damaged, contact the SMA Service Line.

3. Maintain seals with talcum, petroleum jelly or wax. This prevents frost damage.
4. If the side panels are disassembled: Check whether the seals in the side panels show any damage in the sealing area.

   If seals are damaged, contact the SMA Service Line.

7.1.12 Checking the Locking Devices, Door Stops and Hinges

Additional maintenance material that is required but not included in the delivery:

- ☐ A suitable water-free, heat-resistant lubricant, e.g. WD40.
- ☐ Non-greasing antifreeze, e.g. PS88.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the doors latch easily. Open and shut the doors several times in the process.

   If the doors do not latch easily, lubricate all moving parts of the latch.

3. Check whether the doors can be held in place.

   If the doors cannot be held in place, lubricate the door stops.

4. Check whether the door hinges move easily.

   If the door hinges do not move easily, lubricate them.

5. Lubricate all moving latch elements and movement points.
6. If the MV Power Platform is installed in regions where below-freezing temperatures occur, apply the non-greasing antifreeze agent to the profile cylinder of the door locks and the key switches in order to protect against freezing.

7.1.13 Checking the Switch Cabinet for Corrosion

Additional maintenance material that is required but not included in the delivery:

- ☐ Touch-up sticks, paint brushes, cans of spray paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to remove minor surface damage. Observe the relevant instructions of the paint manufacturer.
- ☐ Touch-up paint or 2K-PUR acrylic paint in the proper RAL color can be used to repair large-area surface damage. Observe the relevant instructions of the paint manufacturer.

Item	RAL color	Color scheme
Roof	RAL 7004	Signal gray
Base	RAL 7005	Mouse gray
enclosure	RAL 9016	Traffic white

- ☐ Abrasive cloth
- ☐ Degreaser

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check surfaces for damage or corrosion.

   If the surfaces are damaged, repair them without delay or within three weeks at the latest.

   If the surfaces are corroded, repair them without delay or within three weeks at the latest.

3. Remove dirt.
4. To remove small-area surface damage:
   - Sand the affected area.
   - Clean the affected area with a degreaser.
   - Paint the affected area.
5. To remove large-area surface damage:
   - Sand the entire surface.
   - Clean the entire surface with a degreaser.
   - Paint the entire surface.

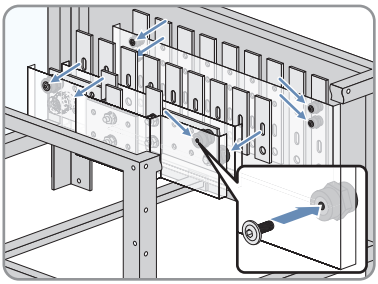
7.1.14 Mounting the Panels

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

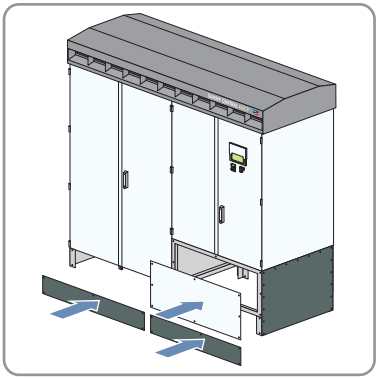
   - Disconnect the inverter (see Section 5.6).

2. Check that no animals have entered the base area.
3. Mount the protective covers in the connection area.
   Torque: 89 in.-lbs. (10 Nm).



4. Mount the PE cables of the panels. Torque: 71 in.-lbs. (8 Nm).
5. Ensure that the PE cables are securely in place.

6. Attach the panels to the inverter using a Torx screwdriver. Torque: 18 in.-lbs. ... 27 in.-lbs. (2 Nm ... 3 Nm).



7.2 Sunny Central CP-US

7.2.1 Safety

⚠ DANGER

Danger to life due to electric shock

High voltages that can result in lethal electrical shocks are present in the live components of the MV Power Platform.

- All work is to be carried out in accordance with this document.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- After disconnection, wait at least 15 minutes until the capacitors have discharged.
- Follow all safety precautions (see section 2.2).
- Disconnect the Sunny Central CP-US (see section 5.6).

7.2.2 Disassembling the Panels

Grounding cables on the kick plates

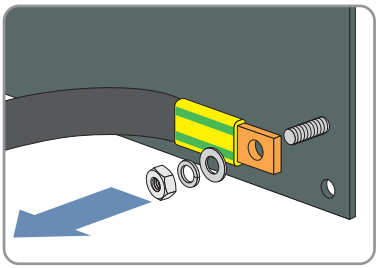
The panels are connected to the inverter via grounding cables.

1. **DANGER**

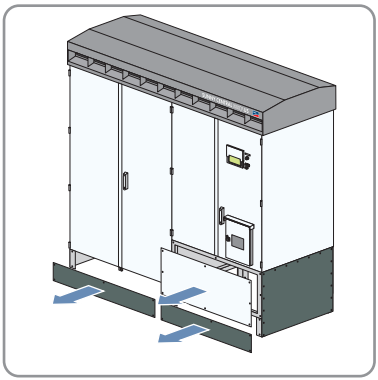
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Remove the screws of the front panels with a Torx screwdriver.
3. Pull the panels toward the front.
4. Disconnect the PE cable between the panels and the interface cabinet.



5. Remove the panels.

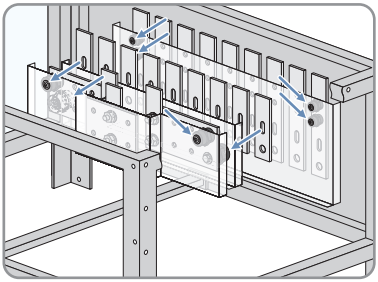


6. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Ensure that no voltage is present.
     - On DC connection lugs/DC busbars/DC terminals
     - On AC connection lugs
   - Ground and short-circuit the inverter.
   - Cover or safeguard any adjacent live components.

7. Remove the protective covers in the connection area.



7.2.3 Cleaning the Ventilation Plate

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the ventilation plate depends on the ambient conditions.

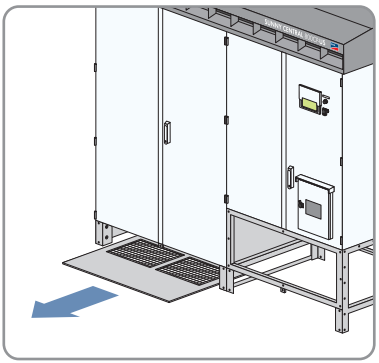
- Clean the ventilation plate more frequently in cases where there is high sand or dust content in the air (see maintenance report).

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

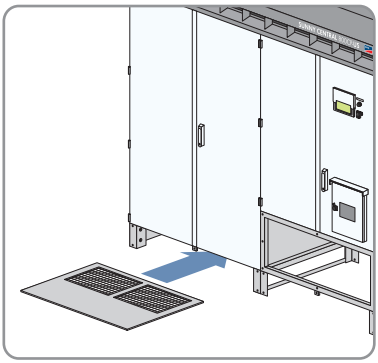
   - Disconnect the inverter (see Section 5.6).

2. Disassemble the panels (see Section 7.2.2).
3. Remove the ventilation plate from the inverter cabinet. To do this, grasp under the ventilation plate and press upwards in the middle when removing.



4. Clean the ventilation plate with a brush or vacuum.

5. Push the ventilation plate into the inverter cabinet with the filter frame facing the back panel; to do this, grip under the ventilation plate and apply an upward pressure in the middle.



6. Mount the panels (see Section 7.2.14).

7.2.4 Cleaning the Air Duct and Insect Screens

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the air duct and insect screens depends on the ambient conditions.

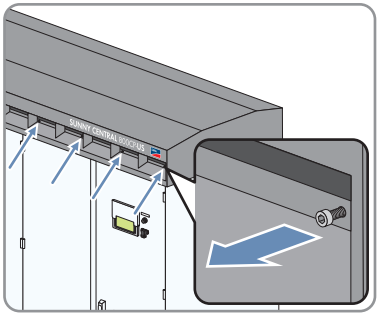
- Clean the air duct and insect screen more frequently in cases where there is high sand or dust content in the air (see maintenance report).

1. **DANGER**

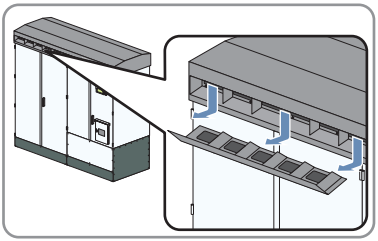
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

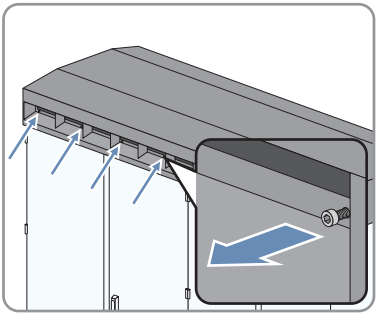
2. Remove the screws of the right insect screen. Use an Allen key for this.



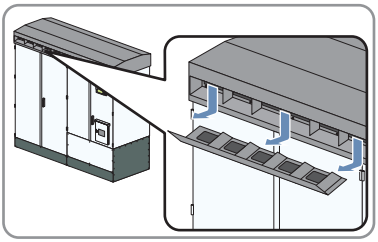
3. Pull the bottom of the right-hand insect screen forward. This removes the insect screen.



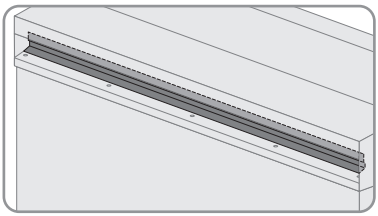
4. Remove the screws of the left insect screen. Use an Allen key for this.



5. Pull the bottom of the left-hand insect screen forward. This removes the insect screen.



6. Vacuum the air duct or clean it with a brush.



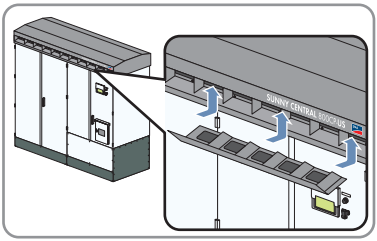
7. Vacuum the insect screens or clean them with a brush.
8. Check the insect screens for visible damage.

   ☑ Insect screens are not damaged.

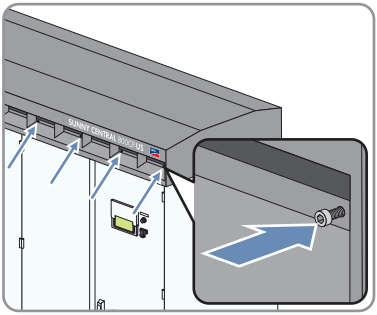
   ✖ Are the insect screens damaged?

   - Replace damaged insect screens.

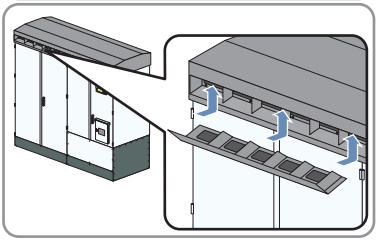
9. Insert the right insect screen.



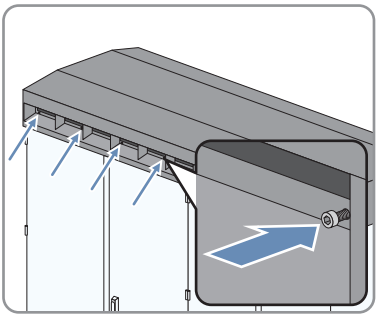
10. Screw the right insect screen in place. Use an Allen key for this. Torque: 177 in.-lbs. (20 Nm).



11. Insert the left insect screen.



12. Screw the left insect screen in place. Use an Allen key for this. Torque: 177 in.-lbs. (20 Nm).



7.2.5 Cleaning the Interior

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Ensure that the switch cabinet is shut.
4. Remove dirt and dust from the interior of the connection cabinet and from all assemblies (e.g. DC switch-disconnector and AC circuit breaker).
5. Remove moisture.
6. Check for leaks. If leaks are present, fix the leaks.
7. Close the inverter.

7.2.6 Checking the Fuses

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the circuit diagram of the inverter. Contact the SMA Service Line if specifications are missing.

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the interface cabinet.
3. Check the fuses or tension springs for discoloration and signs of wear.

   If the fuses or tension springs are discolored or show signs of wear, replace them.
4. Check the insulation and terminals for discoloration and signs of wear.

   If the insulation or terminals are discolored or show signs of wear, contact the SMA Service Line.
5. Close the interface cabinet.

7.2.7 Checking the Surge Arrester

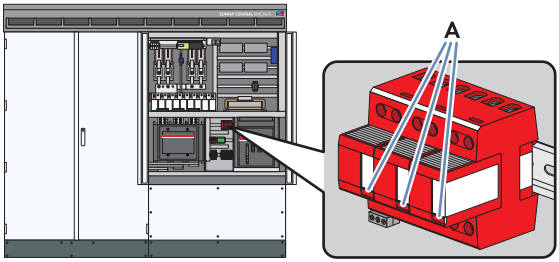


Figure 28: Position of the surge arrester

Item	Designation
A	Ready indicator of the surge arrester

Additional maintenance material that is required but not included in the delivery:

☐ A testing device approved by the manufacturer of the surge arrester (e.g. the PM20 by are shown in the inverter's circuit diagram DEHN + SÖHNE GmbH + Co. KG.).

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

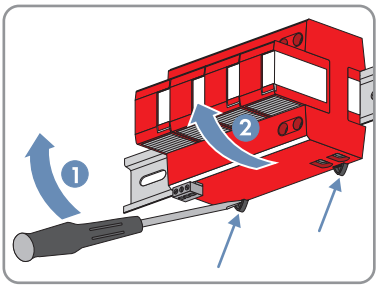
   - Disconnect the inverter (see Section 5.6).

2. Open the interface cabinet.
3. Check the surge arrester (see test device documentation).
4. Check whether the ready indicator of one of the surge arresters is red.

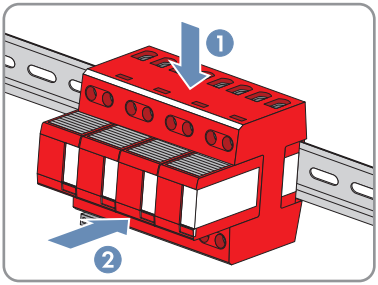
   If the ready indicator of one of the surge arresters is red, replace the surge arrester.

   – Remove the cables from the surge arrester. Mark the cables in the process. The cables must be reconnected to the same terminals later.

   – Open the terminal and remove the surge arrester upwards out of the top-hat rail.



– Insert the new surge arrester into the top-hat rail from above and press it against the top-hat rail.



– Connect the cables to the same terminals of the surge arrester from which they were previously removed.

5. Close the interface cabinet.

7.2.8 Checking the Screw Connection of the Power Cabling when using Terminal Lugs (optional)

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the installation manual of the inverter. Contact the SMA Service Line if specifications are missing.

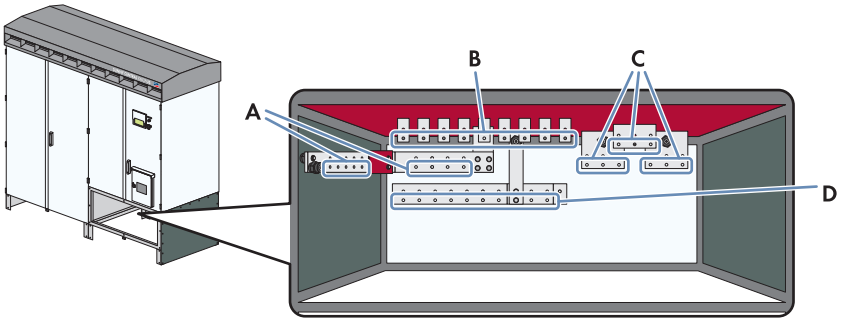


Figure 29: Position of the power cabling for connection wiht terminal lugs

Item	Designation
A	For negative grounding: connection busbar of the DC − cables For positive grounding: connection busbar of the DC+ cables

Item	Designation
B	For positive grounding: connection lugs of the DC – cables For negative grounding: connection lugs of the DC+ cables
C	Connection lugs of the AC cables
D	Connection busbar of the grounding cables

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether all screw connections for the power cables are tight.

   If screw connections are loose, tighten them with a torque wrench.

3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

4. Check screw connections for damage and contact elements for corrosion.

   If screw connections are damaged or contact elements are corroded, contact the SMA Service Line.

7.2.9 Retightening the Screw Connection of the Power Cabling when using Screw Terminals (optional)

NOTICE

Damage to screw connections from over-tightening

- Only apply the prescribed torque to tighten screw connections with the screw terminal option. Torque specifications are shown in the installation manual of the inverter. Contact the SMA Service Line if specifications are missing.

NOTICE

Inadequate screw connections due to harsh ambient conditions

- Check the screw connections for discoloration or changes more frequently in the case of significant daytime temperature differences (see maintenance report).

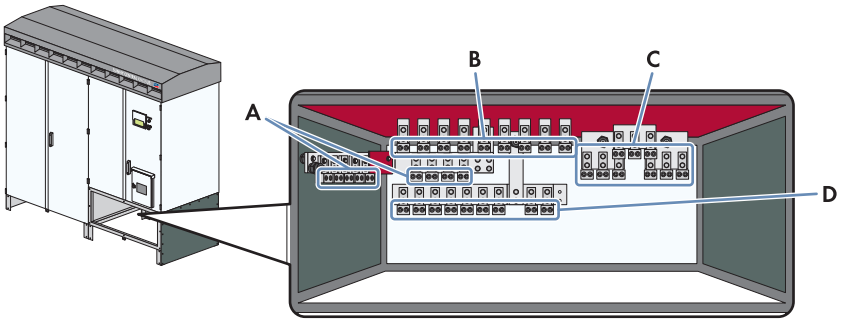


Figure 30: Position of the screw connections for connection with screw terminals

Item	Designation
A	For negative grounding: screw terminals of the DC − cables For positive grounding: screw terminals of the DC+ cables
B	For positive grounding: screw terminals of the DC − cables For negative grounding: screw terminals of the DC+ cables
C	Screw terminals of the AC cables
D	Screw terminals of the grounding cables

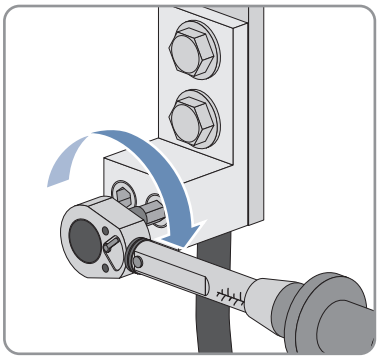
Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Tighten the screw connections with screw terminal using a torque wrench. Torque: 41.5 ft.-lbs. (56.5 Nm)



3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

4. Check screw connections for damage and contact elements for corrosion.

   If screw connections are damaged or contact elements are corroded, contact the SMA Service Line.

7.2.10 Checking the Safety Messages

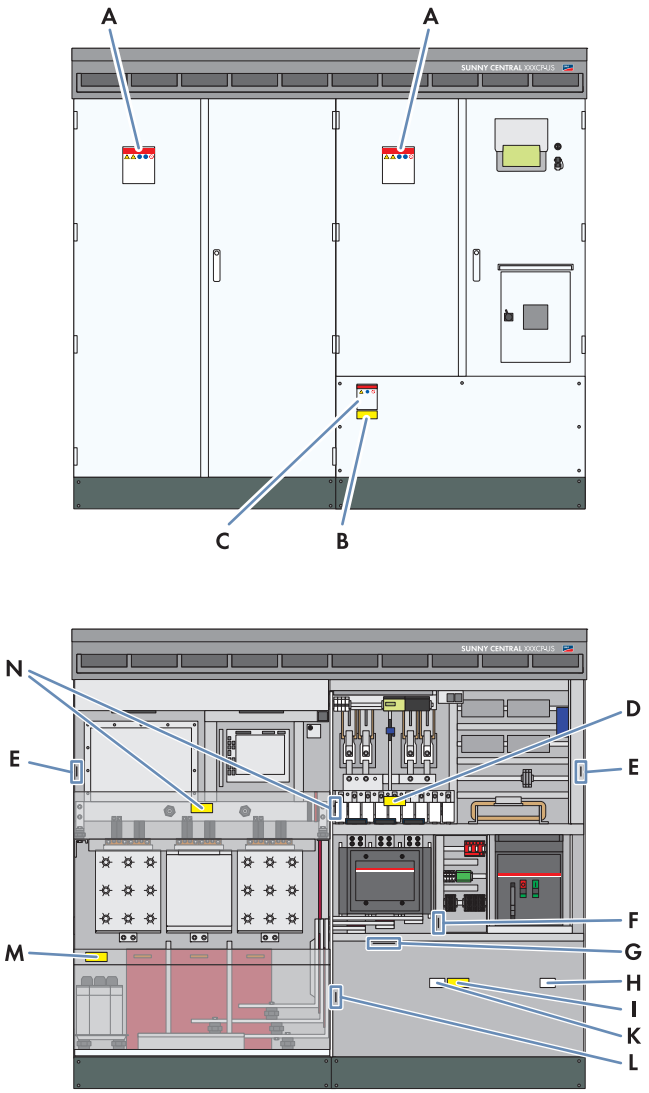


Figure 31: Safety Messages on the Sunny Central

Item	SMA order number	Designation
A	86-0043464	Warning label general SC-US EN

Item	SMA order number	Designation
B	86-0043474	Warning label SC-US external transformer EN
C	86-004332	Warning label SC general
D1	86-0043472	Only for order option DC fuses: Warning label SC-US DC-fuses EN/ES
D2	86-0043473	Only for order option DC fuses: Warning label SC-US DC-fuses EN/FR
E	–	Nameplate
F	–	Label control supply voltage
G1	86-10867027	For positive grounding: 1 000 V PV–
G2	86-10867028	For negative grounding: 1 000 V PV+
H	86-0043462	ABC 60 Hz
I1	86-0043470	Warning label SC-US Conductors, EN-FR
I2	86-0043469	Warning label SC-US Conductors, EN-ES
K	86-0043460	Grounding Electrode Terminal
L1	86-10867027	For negative grounding or insulated: 1 000 V PV–
L2	86-10867028	For positive grounding or insulated: 1 000 V PV+
M1	86-0043467	Warning label SC US capacitors C1-C3 EN/FR
M2	86-0043466	Warning label SC US capacitors C1-C3 EN/ES
N1	86-0043476	Warning label, SC US stack capacitors EN/ES
N2	86-0043477	Warning label, SC US stack capacitors EN/FR

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Ensure that all safety messages and stickers are attached and undamaged.

   Replace the safety messages and stickers if they are damaged or missing. In the case of missing or damaged safety messages or stickers, contact the SMA Service Line.
4. Close the inverter.

7.2.11 Checking the Door Seals

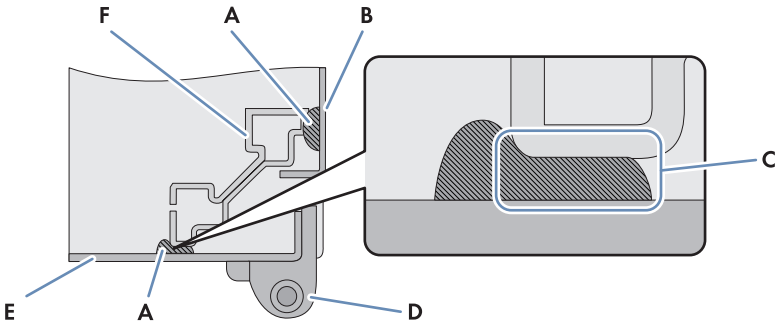


Figure 32: Section drawing with top view of seals (example)

Item	Designation
A	Seal
B	Side panel
C	Sealing area
D	Hinge
E	Door
F	Frame section

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

☐ A suitable water-free, heat-resistant lubricant.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the seals in the sealing area show any damage. Tip: The sealing area must be hidden when the door is closed.

   If seals are damaged, contact the SMA Service Line.

3. Maintain seals with talcum, petroleum jelly or wax. This prevents frost damage.
4. If the side panels are disassembled: Check whether the seals in the side panels show any damage in the sealing area.

   If seals are damaged, contact the SMA Service Line.

7.2.12 Checking the Locking Devices, Door Stops and Hinges

Additional maintenance material that is required but not included in the delivery:

☐ A suitable water-free, heat-resistant lubricant, e.g. WD40.

☐ Non-greasing antifreeze, e.g. PS88.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the doors latch easily. Open and shut the doors several times in the process.

   If the doors do not latch easily, lubricate all moving parts of the latch.

3. Check whether the doors can be held in place.

   If the doors cannot be held in place, lubricate the door stops.

4. Check whether the door hinges move easily.

   If the door hinges do not move easily, lubricate them.

5. Lubricate all moving latch elements and movement points.

6. If the MV Power Platform is installed in regions where below-freezing temperatures occur, apply the non-greasing antifreeze agent to the profile cylinder of the door locks and the key switch in order to protect against freezing.

7.2.13 Checking the Switch Cabinet for Corrosion

Additional maintenance material that is required but not included in the delivery:

☐ Touch-up sticks, paint brushes, cans of spray paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to remove minor surface damage. Observe the relevant instructions of the paint manufacturer.

☐ Touch-up paint or 2K-PUR acrylic paint in the proper RAL color can be used to repair large-area surface damage. Observe the relevant instructions of the paint manufacturer.

Item	RAL color	Color scheme
Roof	RAL 7004	Signal gray
Base	RAL 7005	Mouse gray
enclosure	RAL 9016	Traffic white

☐ Abrasive cloth

☐ Degreaser

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check surfaces for damage or corrosion.

   If the surfaces are damaged, repair them without delay or within three weeks at the latest.

   If the surfaces are corroded, repair them without delay or within three weeks at the latest.

3. Remove dirt.
4. To remove small-area surface damage:
   - Sand the affected area.
   - Clean the affected area with a degreaser.
   - Paint the affected area.
5. To remove large-area surface damage:
   - Sand the entire surface.
   - Clean the entire surface with a degreaser.
   - Paint the entire surface.

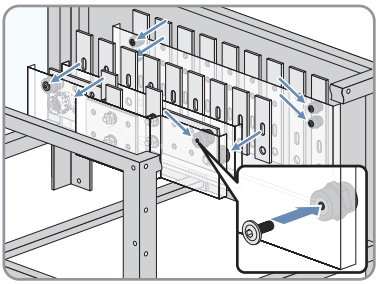
7.2.14 Mounting the Panels

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

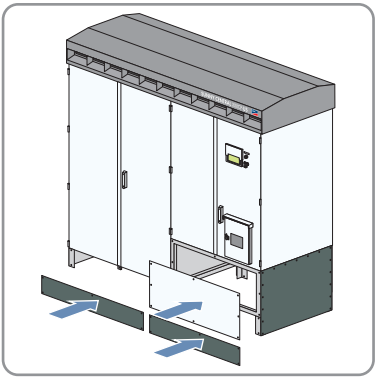
   - Disconnect the inverter (see Section 5.6).

2. Check that no animals have entered the base area.
3. Mount the protective covers in the connection area. Torque: 89 in.-lbs. (10 Nm).



4. Mount the PE cables of the panels. Torque: 71 in.-lbs. (8 Nm)
5. Ensure that the PE cables are securely in place.

6. Attach the panels to the inverter using a Torx screwdriver. Torque: 18 in.-lbs. ... 27 in.-lbs. (2 Nm ... 3 Nm).



7.3 Sunny Central 500HE-US

7.3.1 Safety

⚠ DANGER

Danger to life due to electric shock

High voltages that can result in lethal electrical shocks are present in the live components of the MV Power Platform.

- All work is to be carried out in accordance with this document.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- After disconnection, wait at least 10 minutes until the capacitors have discharged.
- Follow all safety precautions (see section 2.2).
- Disconnect the Sunny Central HE-US (see Section 5.6).

7.3.2 Disassembling the Panels

Grounding cables on the kick plates

The panels are connected to the inverter via grounding cables.

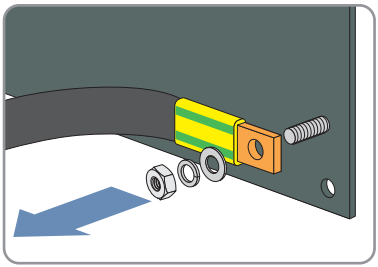
1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

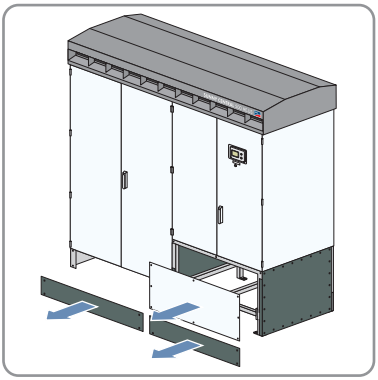
   - Disconnect the inverter (see Section 5.6).

1. Undo the screws on the two front panels.
2. Pull the panels toward the front.

3. Detach the equipment grounding connection between the panel and the interface cabinet.



4. Remove the panels.

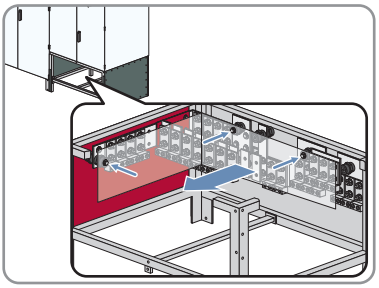


5. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Ensure that no voltage is present.
     - On DC connection lugs/DC busbars/DC terminals
     - On AC connection lugs
   - Ground and short-circuit the inverter.
   - Cover or safeguard any adjacent live components.

6. Remove the protective covers in the connection area.



7.3.3 Cleaning the Ventilation Plate

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the ventilation plate depends on the ambient conditions.

- Clean the ventilation plate more frequently in cases where there is high sand or dust content in the air (see maintenance report).

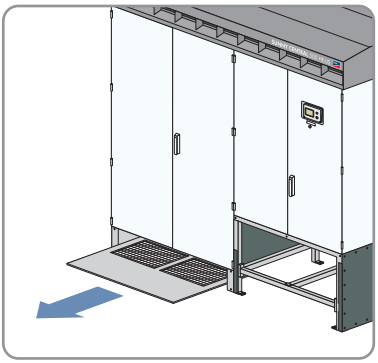
Procedure:

1. **⚠ DANGER**

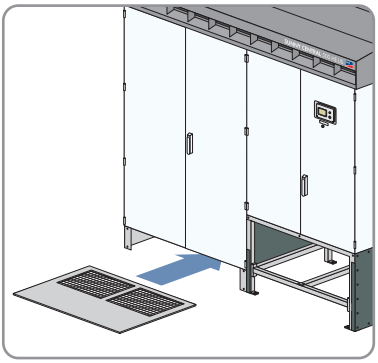
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Disassemble the panels (see Section 7.3.2).
3. Remove the ventilation plate from the inverter cabinet. To do this, grasp under the ventilation plate and press upwards in the middle when removing.



4. Clean the ventilation plate using a brush and vacuum.
5. Push the ventilation plate into the inverter cabinet with the filter frame facing the back panel; to do this, grip under the ventilation plate and apply an upward pressure in the middle.



6. Mount the panels (see Section 7.3.15).

7.3.4 Cleaning the Air Duct and Insect Screens

NOTICE

Impaired air circulation increases the internal temperature and can reduce the electrical endurance of temperature-sensitive components.

The cleaning interval for the air duct and insect screen depends on the ambient conditions.

- Clean the air duct and insect screen more frequently in cases where there is high sand or dust content in the air (see maintenance report).

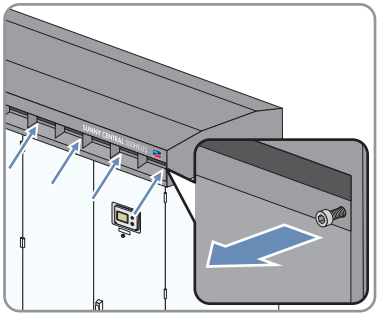
Procedure:

1. **⚠ DANGER**

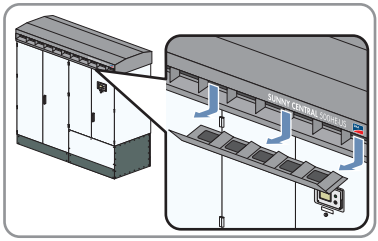
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

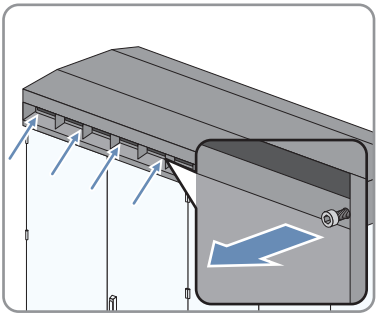
2. Remove the screws of the right insect screen.



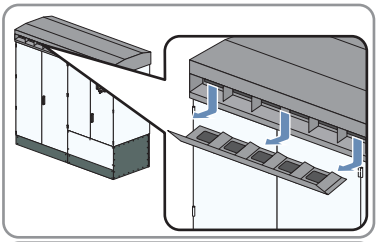
3. Pull the bottom of the right-hand insect screen forward. This removes the insect screen.



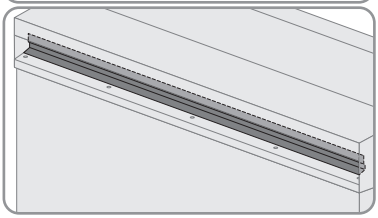
4. Remove the screws of the left insect screen.



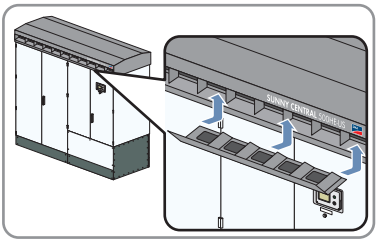
5. Pull the bottom of the left-hand insect screen forward. This removes the insect screen.



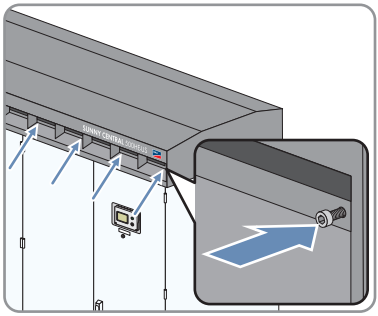
6. Clean the air duct from the outside.



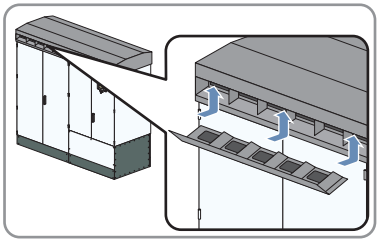
7. Clean the insect screens using a brush.
8. Vacuum the insect screens.
9. Check the insect screens for visible damage.
   ☑ Insect screens are not damaged.
   ✖ Are the insect screens damaged?
   - Replace damaged insect screens.
10. Insert the right insect screen.



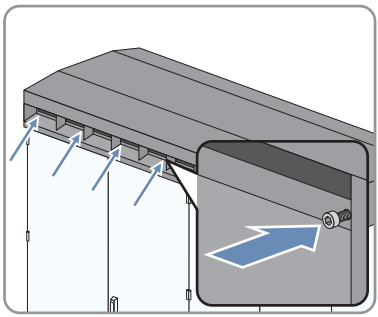
11. Screw the right insect screen in place.
Torque: 177 in.-lbs. (20 Nm).



12. Insert the left insect screen.



13. Screw the left insect screen in place.
Torque: 177 in.-lbs. (20 Nm)



7.3.5 Cleaning the Interior

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Remove dirt and dust from the interior of the switch cabinet and from all assemblies, (e.g. DC contactor and AC circuit breaker).
4. Remove moisture.
5. Check for leaks. If leaks are present, fix the leaks.
6. Close the inverter.

7.3.6 Checking the Fuses and/or Isolating Blades

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the circuit diagram of the inverter. Contact the SMA Service Line if specifications are missing.

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

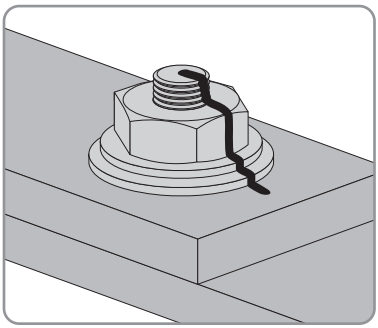
   - Disconnect the inverter (see Section 5.6).

2. Open the interface cabinet.
3. Check fuses and/or isolating blades as well as the terminals and the insulation for discoloration or changes. When checking, do not remove the fuses.

   If the fuses and/or isolating blades as well as the terminals or the insulation are discolored or changed, contact the SMA Service Line.

4. Check whether the mark on the screw connections of the fuses is in the right place.

   If the mark on the screw connections is not in the right place, retighten the screw connection (see the inverter's circuit diagram for the torque specification). Contact the SMA Service Line in the event of damage or changes.



5. Check whether discolorations can be seen on the screw connections of the fuses.

   If discolorations can be seen on the screw connections, contact the SMA Service Line.

6. Close the interface cabinet.

7.3.7 Checking the Surge Arresters (Optional)

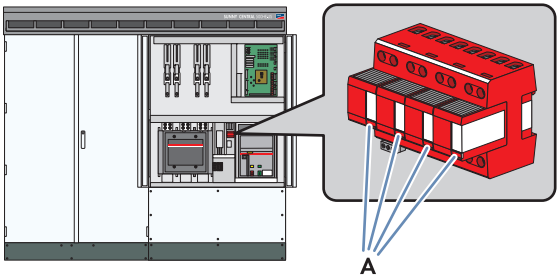


Figure 33: Position of the surge arrester

Item	Designation
A	Ready indicator of the surge arrester

Additional maintenance material that is required but not included in the delivery:

☐ A testing device approved by the manufacturer of the surge arrester (e.g. the PM20 by are shown in the inverter's circuit diagram DEHN + SÖHNE GmbH + Co. KG.).

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

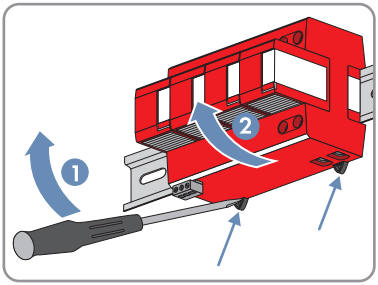
   - Disconnect the inverter (see Section 5.6).

2. Open the interface cabinet.
3. Check the surge arrester (see test device documentation).
4. Check whether the ready indicator of one of the surge arresters is red.

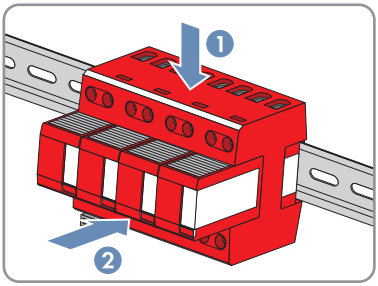
   If the ready indicator of one of the surge arresters is red, replace the surge arrester.

   – Remove the cables from the surge arrester. Mark the cables in the process. It must be connected to the same terminal again later.

– Depress the lever and lift the surge arrester upward out of the top-hat rail.



– Insert the new surge arrester into the top-hat rail from above and press it against the top-hat rail.



– Connect the cables to the terminals of the surge arrester, from which they were previously removed.

5. Close the interface cabinet.

7.3.8 Checking the Screw Connection of the Power Cabling when using Terminal Lugs (optional)

NOTICE

Damage to screw connections from over-tightening

- Only tighten loose screw connections applying the prescribed torque. Torque specifications are shown in the installation manual of the inverter. Contact the SMA Service Line if specifications are missing.

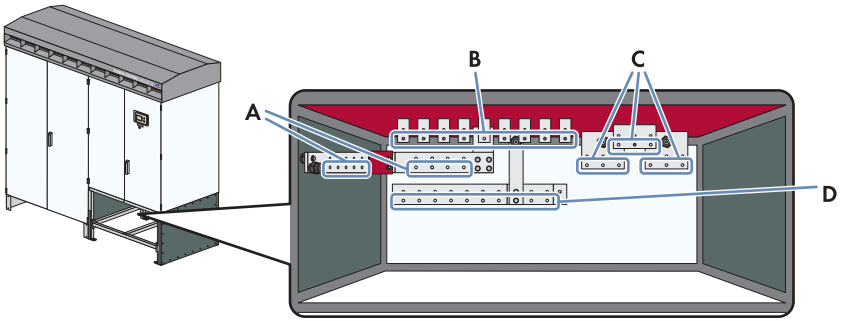


Figure 34: Position of the power cabling for connection with terminal lugs

Item	Designation
A	For negative grounding: connection busbar of the DC − cables For positive grounding: connection busbar of the DC+ cables
B	For positive grounding: connection busbar of the DC − cables For negative grounding: connection busbar of the DC+ cables
C	Connection busbar of the AC cables
D	Connection busbar of the grounding cables

Procedure:

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether all screw connections for the power cables are tight.
   If screw connections are loose, tighten them with a torque wrench.

3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

4. Check screw connections for damage and contact elements for corrosion.

   If screw connections are damaged or contact elements are corroded, contact the SMA Service Line.

7.3.9 Retightening the Screw Connection of the Power Cabling when using Screw Terminals (optional)

NOTICE

Damage to screw connections from over-tightening

- Only apply the prescribed torque to tighten screw connections with the screw terminal option. Torque specifications are indicated in the installation manual of the inverter. Contact the SMA Service Line if specifications are missing.

NOTICE

Inadequate screw connections due to harsh ambient conditions

- Check the screw connections for discoloration or changes more frequently in the case of significant daytime temperature differences (see maintenance report).

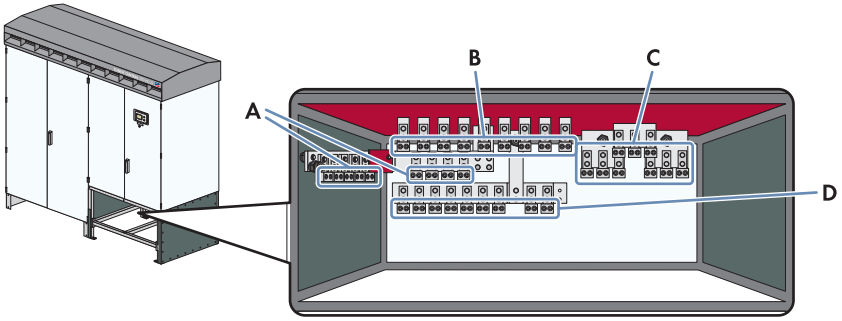


Figure 35: Position of the screw connections for connection with screw terminals

Item	Designation
A	For negative grounding: screw terminals of the DC − cables For positive grounding: screw terminals of the DC+ cables
B	For positive grounding: screw terminals of the DC − cables For negative grounding: screw terminals of the DC+ cables

Item	Designation
C	Screw terminals of the AC cables
D	Screw terminals of the grounding cables

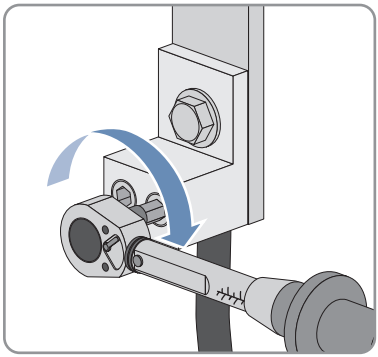
Procedure:

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Tighten the screw connections with screw terminals using a torque wrench. Torque: 41.5 ft.-lbs. (56.5 Nm).



3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

4. Check screw connections for damage and contact elements for corrosion.

   If screw connections are damaged or contact elements are corroded, contact the SMA Service Line.

7.3.10 Inverter with Low-Temperature Option: Cleaning the Heating Element

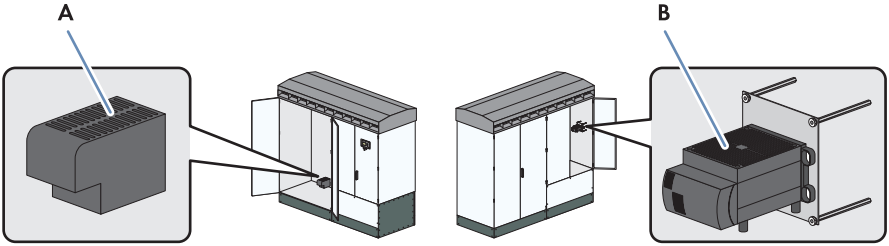


Figure 36: Position of the heating elements

1. **DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Remove the protective covers of the heating.
4. Remove dirt and dust from the heating elements.
5. Remove moisture.
6. Mount the protective covers of the heating. Torque: 89 in.-lbs. (10 Nm).
   Close the inverter.

7.3.11 Checking the Safety Messages

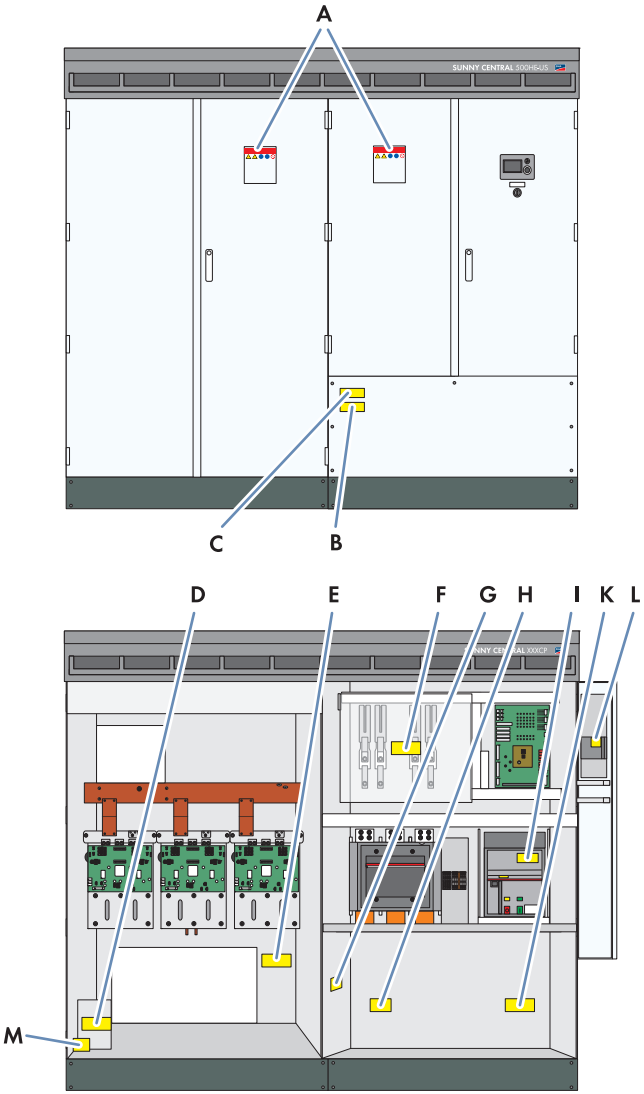


Figure 37: Location of safety messages on device

Item	Designation
A	Hazardous voltage inside

Item	Designation
B	Hazardous voltage inside
C	Operating the Sunny Central without transformer causes a short circuit and can destroy the Sunny Central
D	Hazardous voltage
E	BURN HAZARD
G	max. 600 V PV+ / max. 600 V PV –
H	Equipment ground
I	Do not change settings
K	A, B, C, 200 V / 60 Hz
L*	Software version identifier
M	Risk of electric shock or electrical energy-high current levels

* Optional

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Open the inverter.
3. Ensure that all safety messages and stickers are attached and undamaged.

   Replace the safety messages and stickers if they are damaged or missing. In the case of missing or damaged safety messages or stickers, contact the SMA Service Line.
4. Close the inverter.

7.3.12 Checking the Door Seals

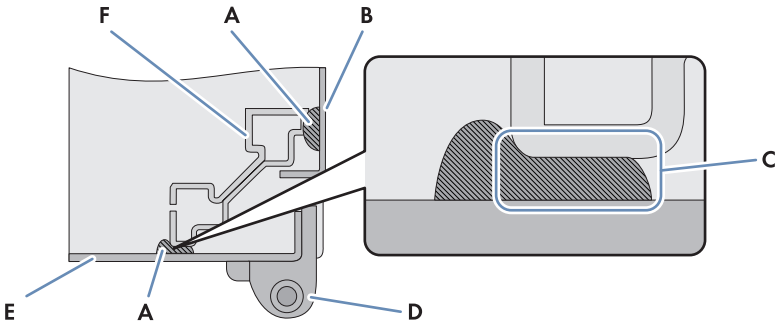


Figure 38: Section drawing with top view of seals (example)

Item	Designation
A	Seal
B	Side panel
C	Sealing area
D	Hinge
E	Door
F	Frame section

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

☐ A suitable water-free, heat-resistant lubricant.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the seals in the sealing area show any damage. Tip: The sealing area must be hidden when the door is closed.

   If the seals are damaged, contact the SMA Service Line.

3. Maintain seals with talcum, petroleum jelly or wax. This prevents frost damage.
4. If the side panels are disassembled: Check whether the seals in the side panels show any damage in the sealing area.

   If seals are damaged, contact the SMA Service Line.

7.3.13 Checking the Locking Devices, Door Stops and Hinges

Additional maintenance material that is required but not included in the delivery:

- ☐ A suitable water-free, heat-resistant lubricant, e.g. WD40.
- ☐ Non-greasing antifreeze, e.g. PS88.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Check whether the doors latch easily. Open and shut the doors several times in the process.

   If the doors do not latch easily, lubricate all moving parts of the latch.

3. Check whether the doors can be held in place.

   If the doors cannot be held in place, lubricate the door stops.

4. Check whether the door hinges move easily.

   If the door hinges do not move easily, lubricate them.

5. Lubricate all moving latch elements and movement points.

6. If the MV Power Platform is installed in regions where below-freezing temperatures occur, apply the non-greasing antifreeze agent to the profile cylinder of the door lock and the key switch in order to protect against freezing.

7.3.14 Checking the Switch Cabinet for Corrosion

Required maintenance material:

- ☐ Touch-up sticks, paint brushes, cans of spray paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to remove minor surface damage. Observe the relevant instructions of the paint manufacturer.
- ☐ Touch-up paint or 2K-PUR acrylic paint in the proper RAL color can be used to repair large-area surface damage. Observe the relevant instructions of the paint manufacturer.

Item	RAL color	Article number
enclosure	RAL 9016	87-5051310
Roof	RAL 7004	87-5051311
Base	RAL 7005	87-5051312

- ☐ Abrasive cloth
- ☐ Degreaser

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Remove dirt.
3. To remove small-area surface damage:
   - Abrade the surface.
   - Clean the surface with a degreaser.
   - Paint the surface.
4. To remove large-area surface damage:
   - Abrade the surface.
   - Clean the surface with a degreaser.
   - Paint the entire surface.

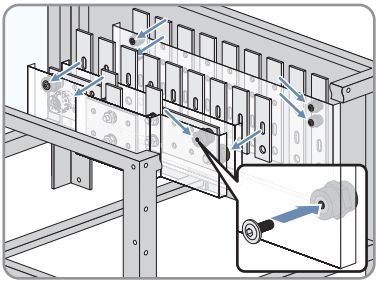
7.3.15 Mounting the Panels

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

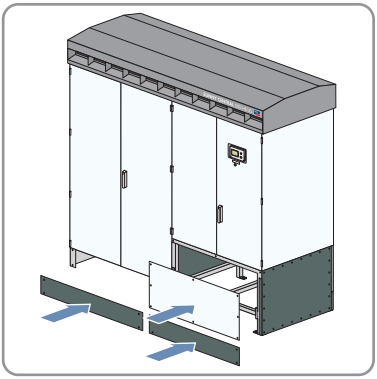
   - Disconnect the inverter (see Section 5.6).

2. Check that no animals have entered the base area.
3. Mount the protective covers in the connection area. Torque: 89 in.-lbs. (10 Nm).



4. Mount the PE cables of the panels. Torque: 71 in.-lbs. (8 Nm).
5. Ensure that the PE cables are securely in place.

6. Attach the panels to the inverter using a Torx screwdriver. Torque: 18 in.-lbs. ... 27 in.-lbs. (2 Nm ... 3 Nm).



7.4 Disconnect Unit

7.4.1 Safety

⚠ DANGER

Danger to life due to electric shock

High voltages that can result in lethal electrical shocks are present in the live components of the MV Power Platform.

- All work is to be carried out in accordance with this document.
- Do not touch any live components in the Disconnect Unit or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- Follow all safety precautions (see section 2.2).
- Disconnect the Disconnect Unit (see Section 5.4).

7.4.2 Disassembling the Front Plate of the Disconnect Unit

To insert and connect the cables, you must open the Disconnect Unit. The front of the Disconnect Unit consists of a single front plate fixed by screws.

⚠ CAUTION

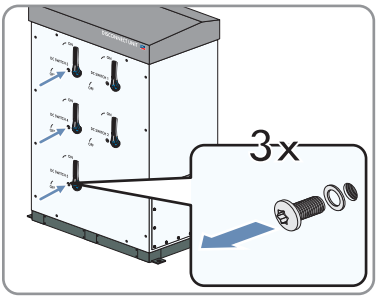
Risk of injury due to the weight of the front plate of the Disconnect Unit

- Regard the heavy weight of the front plate of the Disconnect Unit.
- Two persons are necessary to move the front plate of the Disconnect Unit.
- Make sure that one person always hold the front plate of the enclosure while the other person performs work at it.

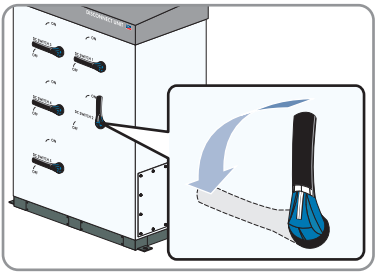
Requirement:

☐ The inverters are disconnected (see Section 5.6 "Disconnecting the Inverter", page 73).

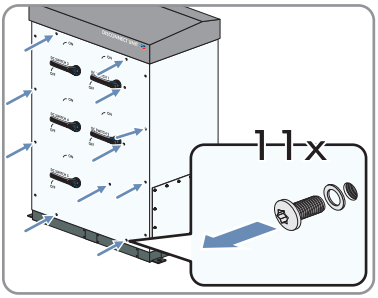
1. Unscrew the 3 screws at the handles on the left side of the front plate.



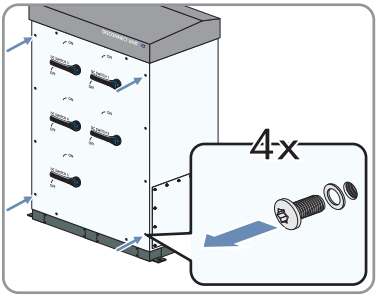
2. Turn all switches of the Disconnect Unit to the left into **OFF** position. You need to pull sharply in order to move the switches.



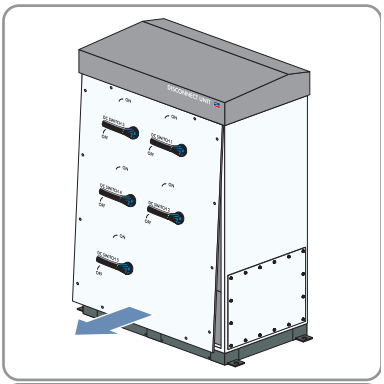
3. Loosen all screws except for the 4 screws at the corners of the front plate.



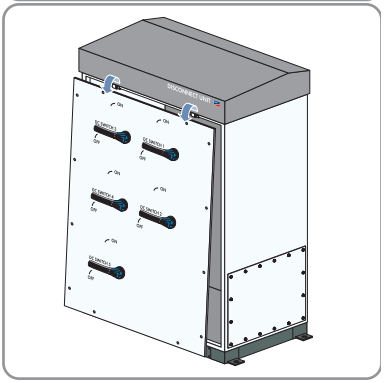
4. Hold the front plate of the Disconnect Unit and loosen the 4 screws at the corners of the front plate.



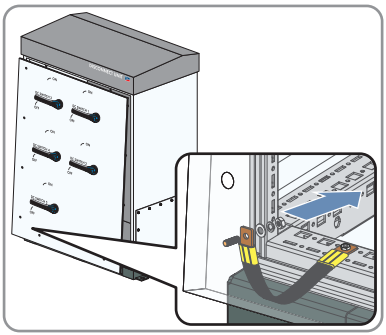
5. Pull the bottom edge of the front plate of the enclosure approximately 6 in. (150 mm) to the front.



6. Unhook the front plate of the enclosure by pulling it upwards.



7. Move the front plate for approximately 8 in. (200 mm) and hold it with 2 hands.
8. Remove the ground strap from the bottom left corner of the front plate.



9. Remove the front plate.

7.4.3 Cleaning the Inside of the Switch Cabinet

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Ensure that the switch cabinet is sealed.
3. Remove dirt and dust from the interior of the switch cabinet and from all assemblies (e.g. DC switch-disconnector and AC circuit breaker).
4. If there is moisture inside the switch cabinet, remove it.
5. If leaks are present, fix the leaks.

7.4.4 Checking the Screw Connections of the Assemblies

NOTICE

Damage to screw connections due to over-tightening

Torque specifications are indicated in the circuit diagram and the installation manual.

- Only tighten loose screw connections with the prescribed torque.
- Contact the SMA Service Line if specifications are missing.

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Check the screw connections on all assemblies, e.g. DC switch-disconnectors.

   If screw connections are loose, tighten them with a torque wrench.
3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

7.4.5 Checking the Screw Connections of the Power Cabling

NOTICE

Damage to screw connections due to over-tightening

Torque specifications are indicated in the circuit diagram and the installation manual.

- Only tighten loose screw connections with the prescribed torque.
- Contact the SMA Service Line if specifications are missing.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Check whether all screw connections for the power cables are tight.

   If screw connections are loose, tighten them with a torque wrench.

3. Check insulation and connections for discoloration and changed appearance.

   If insulation and connections are discolored or changed, contact the SMA Service Line.

4. Replace damaged power connections and corroded contact elements.

7.4.6 Checking the Seal on the Front Panel

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

☐ A suitable water-free, heat-resistant lubricant.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Check whether the seal on the front panel is damaged.

   If the seal is damaged, contact the SMA Service Line.

3. Maintain the seal with talcum, petroleum jelly or wax. This prevents frost damage.

7.4.7 Checking the Locks of the DC Switches

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

☐ A suitable, water-free and heat-resistant lubricant (e.g. WD40).

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Check whether the locks of the DC switches latch easily.

   If the locks do not latch easily, lubricate them.

7.4.8 Checking the Switch Cabinet for Corrosion

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

☐ Touch-up sticks, paint brushes, cans of spray paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to remove small-area surface damage. Observe the relevant instructions of the paint manufacturer.

☐ Touch-up paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to repair large-area surface damage. Observe the relevant instructions of the paint manufacturer.

Position	RAL color	Color scheme
Roof	RAL 7004	Signal gray
Base	RAL 7005	Mouse gray
enclosure	RAL 9016	Traffic white

☐ Abrasive cloth

☐ Degreaser

Procedure:

1. ⚠ DANGER

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Disconnect Unit (see section 5.4).

2. Check surfaces for damage or corrosion.

   If the surfaces are damaged, repair them immediately or within three weeks at the latest.

   If the surfaces are corroded, repair them immediately or within three weeks at the latest.

3. Remove dirt.
4. To remove small-area surface damage:
   - Sand the affected area.
   - Clean the affected area with a degreaser.
   - Paint the affected area.
5. To remove large-area surface damage:
   - Sand the entire surface.
   - Clean the entire surface with a degreaser.
6. Paint the entire surface.

7.4.9 Checking the Safety Messages

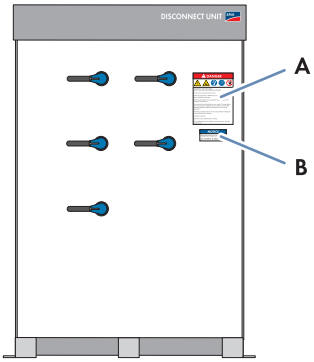


Figure 39: Safety messages on the Disconnect Unit

Position	SMA order number	Designation
A	86-004330	Beware of dangerous voltage
B	86-10867020	Positive / Negative pole of DC system is grounded.

- Ensure that all safety messages and labels are attached and undamaged.

  Replace the safety messages and labels if they are damaged or missing. In the case of missing or damaged safety messages or labels, contact the SMA Service Line.

7.4.10 Mounting the Front Plate of the Disconnect Unit

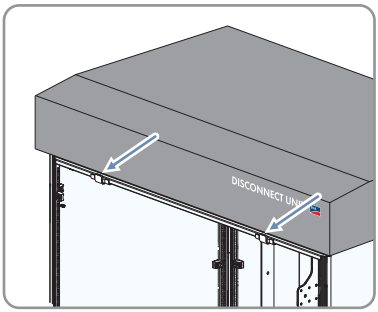
⚠ CAUTION

Risk of injury due to the weight of the front plate of the Disconnect Unit

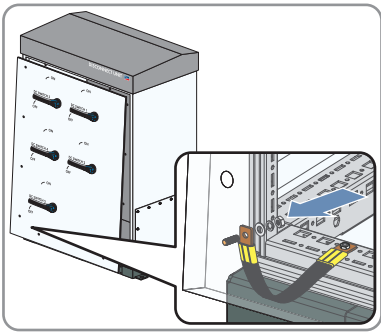
- Regard the heavy weight of the front plate of the Disconnect Unit.
- Two persons are necessary to move the front plate of the Disconnect Unit.
- Make sure that one person always hold the front plate of the enclosure while the other person performs work at it.

1. Set the handles of the front plate of the Disconnect Unit to **OFF**.

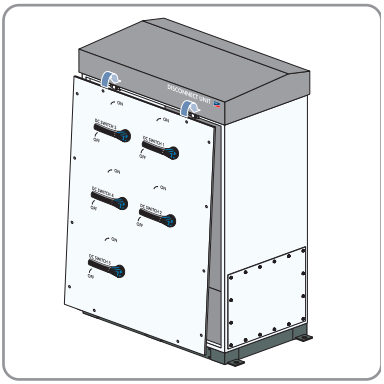
2. Set the 2 mounting clamps of the enclosure to the correct position of 11 3⁄4 in. to 1 ft. 3 3⁄4 in. (300 mm to 400 mm) from the sides.



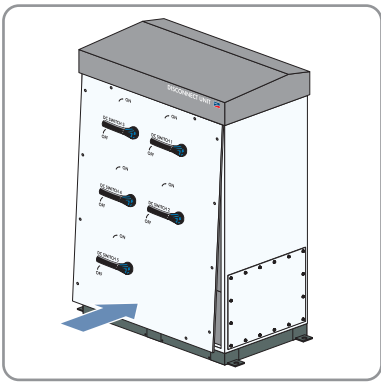
3. Hold the front plate of the enclosure with 2 hands and move it to the front of the Disconnect Unit. The distance between the Disconnect Unit and its front plate must be approximately 8 in. (200 mm).
4. Connect the ground strap from the bottom left corner of the Disconnect Unit to the front plate of the enclosure. (Torque: 70 in.-lbs. (8 Nm)).



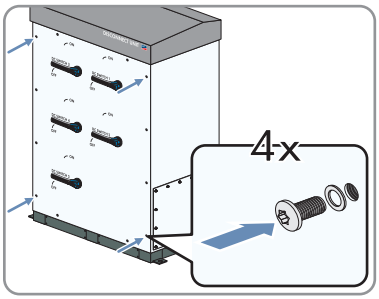
5. Hook the front plate of the enclosure into the two mounting clamps at the front of the Disconnect Unit.



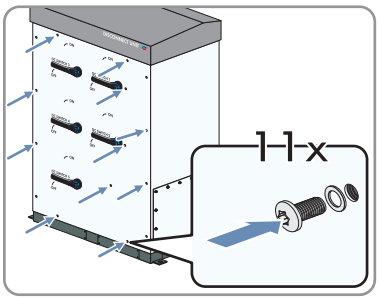
6. Push the bottom edge of the front plate of the enclosure to the Disconnect Unit.



7. Slightly shake every handle of the switches a few times so that the shaft of the switch snaps into the handle.
8. Attach the front plate of the enclosure to the Disconnect Unit at its 4 corners with 4 screws and 4 seal washers. Fasten the screws hand-tight so that the front plate of the enclosure can be moved.



9. Insert 11 screws with seal washers in the holes and fasten the screws hand-tight. The 3 holes behind the left handles are not reachable yet.



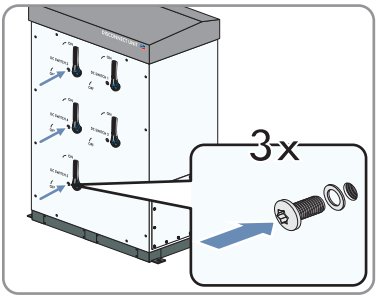
10. Make sure that the front plate of the enclosure is aligned to the edges of the Disconnect Unit. Fasten all screws with a torque of 44 in-lbs (5 Nm).
11. Make sure that all switches function properly by switching them into position **ON** and back to position **OFF**.

    ☑ There is no backlash of the shafts and the switches make a clear sound.

✖ There is a backlash of the shafts or the switches make a strange sound?

- Re-adjust the front plate of the enclosure.

12. If all switches function properly, switch all switches into position **ON** and insert 3 screws with seal washers into the holes at the handles at the left side. Tighten the screws with a torque of 44 in.-lbs. (5 Nm).



13. Switch all switches into position **OFF**.

7.5 Control & Supply Panel

7.5.1 Cleaning the Interior

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Ensure that the switch cabinet is shut.
3. Remove dirt and dust from the interior of the switch cabinet and from all assemblies.
4. Remove moisture.
5. Check for leaks. If leaks are present, fix the leaks.
6. Close the doors of the Control & Supply Panel.

7.5.2 Checking the Door Seals

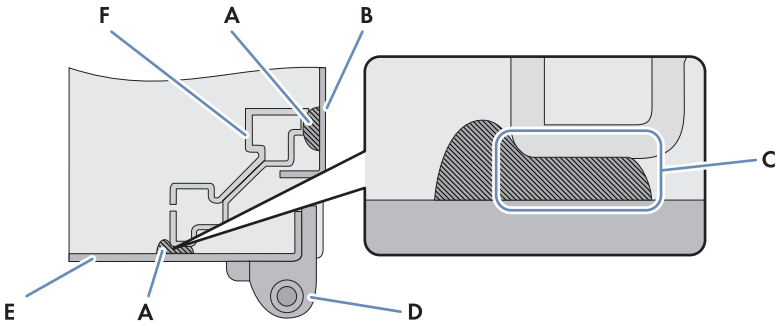


Figure 40: Section drawing with top view of seals (example)

Item	Designation
A	Seal
B	Side panel
C	Sealing area
D	Hinge
E	Door
F	Frame section

Additional maintenance material that is required but not included in the delivery:

☐ A suitable water-free, heat-resistant lubricant.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Check whether the seals in the sealing area show any damage. Tip: The sealing area must be hidden when the door is closed.

   If seals are damaged, contact the SMA Service Line.

3. Maintain seals with talcum, petroleum jelly or wax. This prevents frost damage.
4. Close the doors of the Control & Supply Panel.

7.5.3 Checking the Locking Devices and Hinges

Additional maintenance material that is required but not included in the delivery:

- ☐ A suitable water-free, heat-resistant lubricant, e.g. WD40.
- ☐ Non-greasing antifreeze, e.g. PS88.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Check whether the doors latch easily. Open and shut the doors several times in the process.

   If the doors do not latch easily, lubricate all moving parts of the latch.

3. Check whether the door hinges move easily.

   If the door hinges do not move easily, lubricate them.

4. Lubricate all moving latch elements and movement points.
5. If the MV Power Platform is installed in regions where below-freezing temperatures occur, apply the non-lubricating antifreeze agent to the profile cylinder of the door lock.
6. Close the doors of the Control & Supply Panel.

7.5.4 Checking the Switch Cabinet for Corrosion

Additional maintenance material that is required but not included in the delivery:

- ☐ Touch-up sticks, paint brushes, cans of spray paint or, alternatively, 2K-PUR acrylic paint in the proper RAL color can be used to remove minor surface damage. Observe the relevant instructions of the paint manufacturer.
- ☐ Touch-up paint or 2K-PUR acrylic paint in the proper RAL color can be used to repair large-area surface damage. Observe the relevant instructions of the paint manufacturer.

Item	RAL color	Color scheme
Roof	RAL 7004	Signal gray
Base	RAL 7005	Mouse gray
enclosure	RAL 9016	Traffic white

- ☐ Abrasive cloth
- ☐ Degreaser

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Check surfaces for damage or corrosion.

   If the surfaces are damaged, repair them without delay or within three weeks at the latest.

   If the surfaces are corroded, repair them without delay or within three weeks at the latest.

3. Remove dirt.
4. To remove small-area surface damage:
   - Sand the affected area.
   - Clean the affected area with a degreaser.
   - Paint the affected area.
5. To remove large-area surface damage:
   - Sand the entire surface.
   - Clean the entire surface with a degreaser.
   - Paint the entire surface.

7.6 Medium Voltage Step-Up Transformer

7.6.1 Checking the Oil Separator and Oil Tray

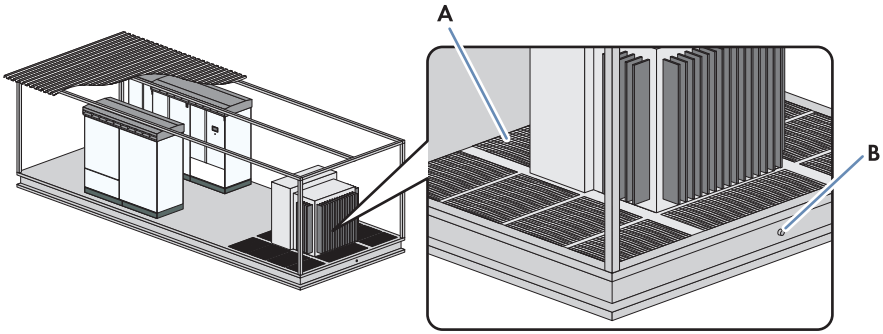


Figure 41: Position of the oil separator and oil tray

Position	Designation
A	Oil tray
B	Oil separator

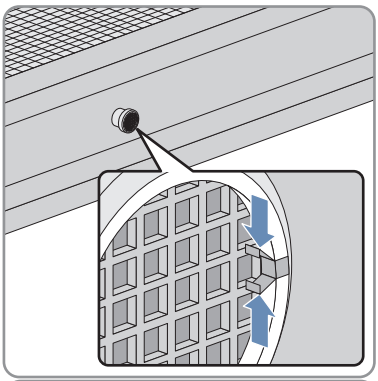
Additional maintenance material that is required but not included in the delivery:

- ☐ Pump
- ☐ Oil separator 4" Petro-Pipe w/1.5" Male fitting 16" Long, PIT-416

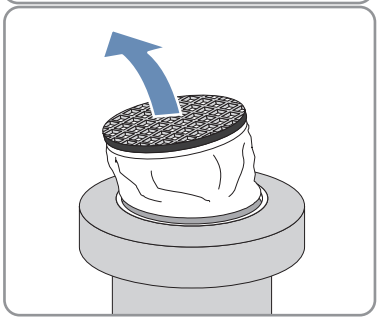
Procedure:

1. Remove the grille above the oil tray.
2. Check whether there is oil present in the oil tray.

   If there is oil present in the oil tray, pump out the oil using a pump and properly dispose of the oil. If there is no oil in the oil tray, it is not necessary to replace the oil separator.
3. After having pumped out the oil, replace the oil separator.
   - Remove the safety ring. When removing, press the safety ring together and pull upwards.



   - Remove the grille, net, filter mat and oil separator.



   - Clean the hollow space.
   - Insert new oil separator.
   - Insert new filter mat.
   - Insert the net and grille.
   - Insert safety ring. When inserting, press the safety ring together.
4. Insert the grille above the oil tray.

8 Connecting the Control Voltage

Requirements:

☐ The Control & Supply Panel is disconnected (see Section 5.5).

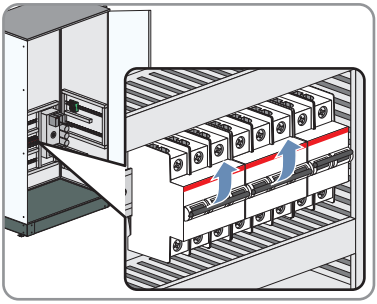
Procedure:

1. **⚠ DANGER**

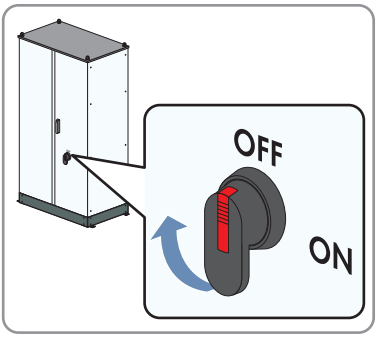
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Switch on the voltage supply miniature circuit-breaker in the Control & Supply Panel.



3. Switch on the main switch on the Control & Supply Panel.



9 Maintenance when Control Voltage is Present

9.1 Sunny Central CP XT

9.1.1 Safety

⚠ WARNING

High voltages that can cause fatal electric shocks are present in the live components of the inverter.

- Switch the inverter key switch to the **Stop** position and ensure that the device cannot be accidentally reconnected.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

9.1.2 Checking the Heating, Hygrostat and Fan

⚠ DANGER

Danger to life due to electric shock when opening the inverter cabinet

There are live components behind the doors of the inverter cabinet.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

⚠ CAUTION

Risk of burns due to hot heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating without protective gloves.

- Do not touch heating with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating elements.

Low humidity

If the humidity is below 50%, you will not be able to perform the function test since the minimum value of the hygrostat is 50%.

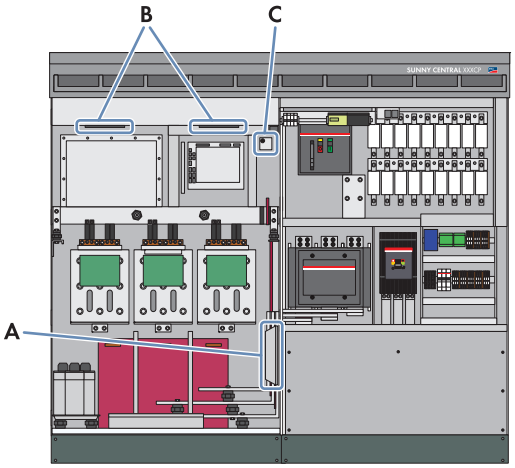


Figure 42: Position of the heating, hygrostat and fan

Position	Designation
A	Heating element
B	Fans
C	Hygrostat

Requirement:

☐ There are no problems.

Procedure:

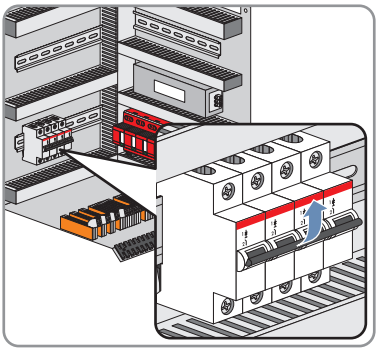
1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Connect the control voltage (see section 8).
3. Open the inverter doors.

4. Switch on the miniature circuit-breaker of the voltage supply in the inverter.
   ☑ The internal fan and the fan of the inverter bridge start up for a short time.
   ✖ The internal fan and fan of the inverter bridge do not start?
   - Contact the SMA Service Line.



5. Set the hygrostat to the minimum value. Tip: the hygrostat is adjusted correctly if the relay clicks audibly.
6. Check whether the heating in the inverter radiate heat after a delay time of five minutes.
   If the heating does not radiate heat, contact the SMA Service Line.
7. Reset the hygrostat to the initial value. The initial value is included in the circuit diagram.
8. Close the inverter doors.

9.1.3 Inverter with Low-Temperature Option: Checking the Heating

⚠ DANGER

Danger to life due to electric shock when opening the inverter cabinet

There are live components behind the doors of the inverter cabinet.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

⚠ CAUTION

Risk of burns due to hot heating elements

During the functional test, the heating becomes hot. There is a risk of burns if you touch the heating without protective gloves.

- Do not touch heating elements with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating elements.

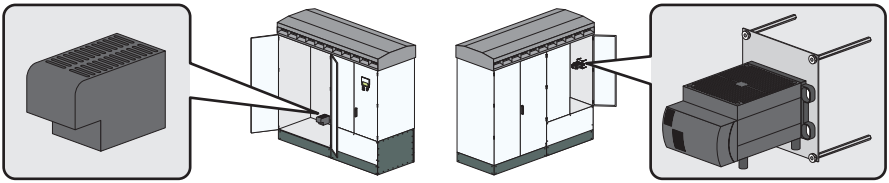


Figure 43: Position of the heating and the controller of the low-temperature option

Requirements:

☐ There are no problems.

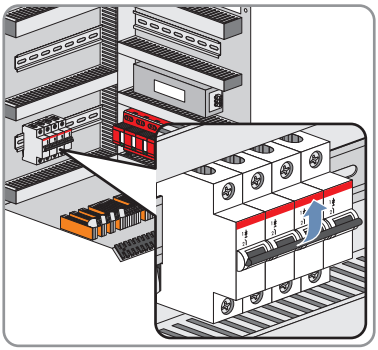
Procedure:

1. **⚠ DANGER**

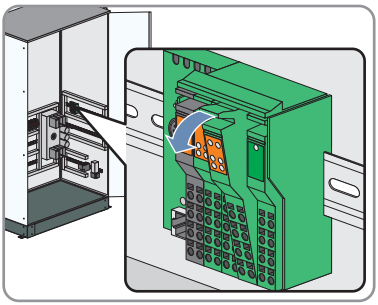
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Connect the control voltage (see section 8).
3. Open the inverter doors.
4. Switch on the miniature circuit-breaker of the voltage supply in the inverter.



5. Open the Control & Supply Panel.
6. Unplug the connection plug of the temperature control in the Control & Supply Panel.



7. Close the Control & Supply Panel

   ☑ A contactor audibly switches off the inverter. After about two minutes, another contactor audibly switches off the control voltage.

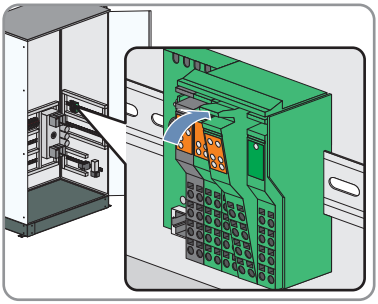
   ✖ The switching of the contactors is not audible?

   - Contact the SMA Service Line.

8. Check whether the heating in the inverter radiate heat after a delay time of five minutes.

   If the heating does not radiate heat, contact the SMA Service Line.

9. Close the inverter doors.
10. Open the Control & Supply Panel.
11. Plug in the connection plug of the temperature control in the Control & Supply Panel.



12. Close the Control & Supply Panel

    ☑ A contactor audibly switches on the control voltage. After about two minutes, another contactor audibly switches on the inverter.

    ✖ The switching of the contactors is not audible?

    - Contact the SMA Service Line.

9.2 Sunny Central CP-US

9.2.1 Safety

⚠ WARNING

High voltages that can cause fatal electric shocks are present in the live components of the inverter.

- Switch the inverter key switch to the **Stop** position and ensure that the device cannot be accidentally reconnected.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

9.2.2 Checking the Heating, Hygrostat and Fan

⚠ DANGER

Danger to life due to electric shock when opening the inverter cabinet

There are live components behind the doors of the inverter cabinet.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

⚠ CAUTION

Risk of burns due to hot heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating without protective gloves.

- Do not touch heating with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating elements.

Low humidity

If the humidity is below 50%, you will not be able to perform the function test since the minimum value of the hygrostat is 50%.

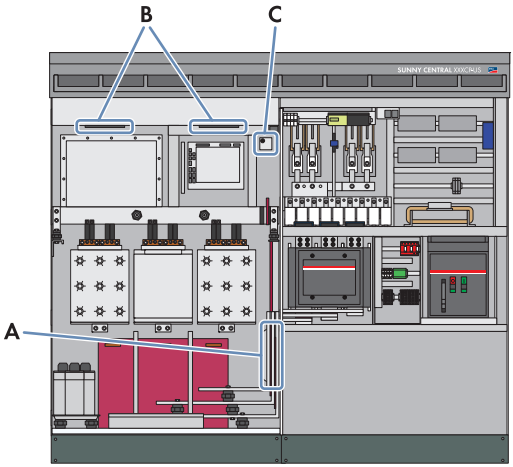


Figure 44: Position of the heating, hygrostat and fan

Position	Designation
A	Heating element
B	Fans
C	Hygrostat

Requirement:

☐ There are no problems.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

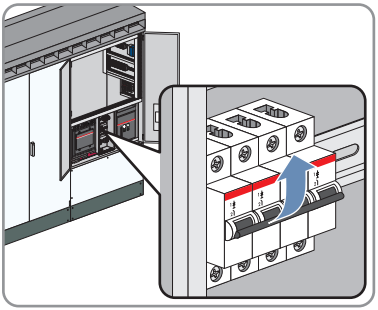
   - Disconnect the inverter (see Section 5.6).

2. Connect the control voltage (see section 8).
3. Open the inverter doors.
4. Switch on the miniature circuit-breaker of the voltage supply in the inverter.

   ☑ The internal fan and the fan of the inverter bridge start up for a short time.

   ✖ The internal fan and fan of the inverter bridge do not start?

   - Contact the SMA Service Line.



5. Set the hygrostat to the minimum value. Tip: the hygrostat is adjusted correctly if the relay clicks audibly.
6. Check whether the heating element is beginning to radiate heat after approx. five minutes. If the heating element does not radiate heat, contact the SMA Service Line.
7. Reset the hygrostat to the initial value. The initial value is included in the circuit diagram.
8. Close the inverter doors.

9.3 Sunny Central 500HE-US

9.3.1 Safety

⚠ WARNING

High voltages that can cause fatal electric shocks are present in the live components of the inverter.

- Switch the inverter key switch to the **Stop** position and ensure that the device cannot be accidentally reconnected.
- Do not touch any live components in the inverter or on the medium-voltage grid. Comply with all applicable safety regulations for handling medium-voltage grids.
- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

9.3.2 Checking the AC Circuit Breaker

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

☐ Communication unit BT030

Communication Unit BT030

Maintenance of the AC circuit breaker must be performed with the external communication unit BT030. The communication unit can be connected to the AC circuit breaker during maintenance. If communication unit BT030 is not on hand, it can be ordered from SMA under item number 60-1620.

Procedure:

- Check the AC circuit breaker as described in the separate maintenance manual.

9.3.3 Checking the Heating Elements, Hygrostat and Fans

⚠ CAUTION

Risk of burns due to hot surfaces of the heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating element without protective gloves.

- Do not touch heating elements with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating elements.

Low humidity

If the humidity is below 50%, you will not be able to perform the function test since the minimum value of the hygrostat is 50%.

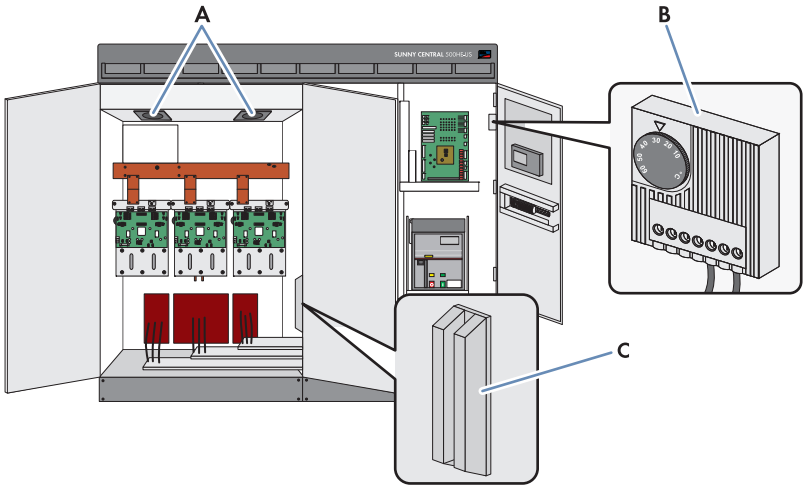


Figure 45: Position of the heating, hygrostat and fan

Item	Designation
A	Fans
B	Hygrostat
C	Heating element

Requirement:

☐ There are no problems.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Connect the control voltage (see section 8).
3. Open the doors of the connection cabinet.
4. Disassemble the heating element's protective cover.
5. Adjust the hygrostat in the interface cabinet to the minimum value so that the heating element switches on. Tip: the hygrostat is adjusted correctly if the relay clicks audibly.
6. Check whether the heating element is beginning to radiate heat after approx. five minutes. If the heating element does not radiate heat, contact the SMA Service Line.
7. Check whether the fans are starting to run. The fans rotate at low speeds.

   If the fans do not start running, contact the SMA Service Line.
8. Turn the hygrostat in the interface cabinet back to 80%. Tip: The value of the hygrostat is set correctly when the white bar on the hygrostat regulator is horizontal.
9. Mount the heating element's protective cover.
10. Close the doors of the connection cabinet.

9.3.4 Inverter with Low-Temperature Option: Checking the Heating (optional)

⚠ CAUTION

Risk of burns due to hot surfaces of the heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating element without protective gloves.

- Do not touch heating elements with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating elements.

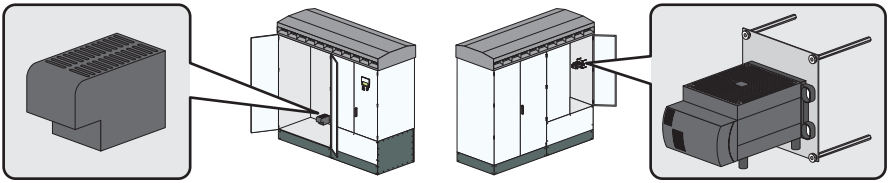


Figure 46: Position of the heating elements:

Requirements:

☐ There are no problems.

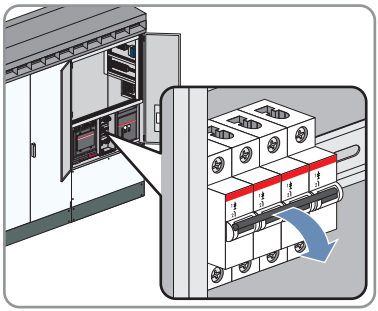
Procedure:

1. **⚠ DANGER**

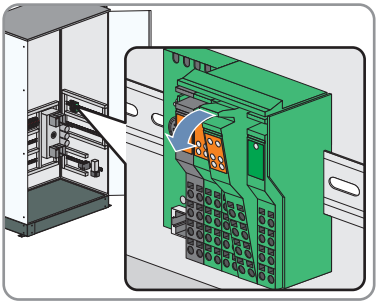
   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the inverter (see Section 5.6).

2. Connect the control voltage (see section 8).
3. Open all inverter doors.
4. Remove the protective covers of the heating.
5. Switch on the miniature circuit-breakers of the voltage supply in the inverter.



6. Open the Control & Supply Panel.
7. Unplug the connection plug of the temperature control in the Control & Supply Panel.



8. Close the Control & Supply Panel

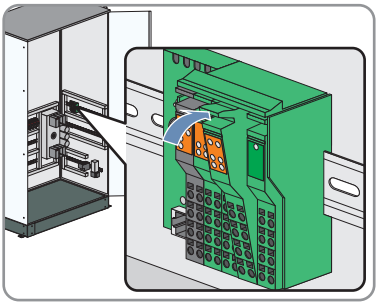
   ☑ A contactor audibly switches off the inverter. After about two minutes, another contactor audibly switches off the control voltage.

   ✖ The switching of the contactors is not audible?

   - Contact the SMA Service Line.

9. Check whether the heating element in the inverter is beginning to radiate heat after approx. five minutes. If the heating element does not radiate heat, contact the SMA Service Line.
10. Close all inverter doors.

11. Open the Control & Supply Panel.
12. Plug in the connection plug of the temperature control in the Control & Supply Panel.



13. Close the Control & Supply Panel
    ☑ A contactor audibly switches on the control voltage. After about two minutes, another contactor audibly switches on the inverter.
    ✖ The switching of the contactors is not audible?
    - Contact the SMA Service Line.

9.4 Control & Supply Panel

9.4.1 Safety

⚠ WARNING

High voltages that can cause lethal electric shocks are present in the live components of the Control & Supply Panel.

- Do not touch live components. Observe all applicable safety precautions.
- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

9.4.2 Checking the Heating Element and the Hygrostat

⚠ CAUTION

Risk of burns due to hot surfaces of the heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating without protective gloves.

- Do not touch heating with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating.

Low humidity

If the humidity is below 50%, you will not be able to perform the function test since the minimum value of the hygrostat is 50%.

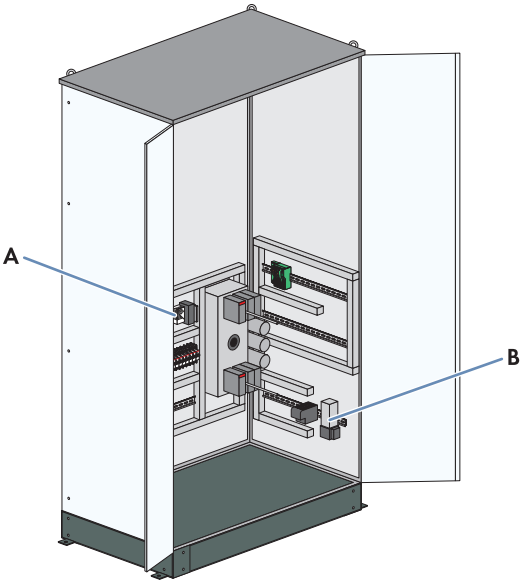


Figure 47: Position of the heating and hygrostat

Item	Designation
A	Hygrostat
B	Heating element

Requirement:

☐ There are no problems.

Procedure:

1. **⚠ DANGER**

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Open the Control & Supply Panel.
3. Set the hygrostat to the minimum value. Tip: the hygrostat is adjusted correctly if the relay clicks audibly.
4. Check whether the heating begins to radiate heat after approximately five minutes.

   If the heating is not switched on, contact the SMA Service Line.
5. Reset the hygrostat to the initial value. The initial value is included in the circuit diagram.
6. Close the Control & Supply Panel

9.4.3 Control & Supply Panel with Low-Temperature Option: Checking the Heating

⚠ DANGER

Danger to life due to electric shock when opening the inverter cabinet

There are live components behind the doors of the inverter cabinet.

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.

⚠ CAUTION

Risk of burns due to hot heating elements

During the functional test, the heating element becomes hot. There is a risk of burns if you touch the heating without protective gloves.

- Do not touch heating with bare hands.
- Wear personal protective equipment.
- Always maintain a suitable distance when checking the function of the heating.

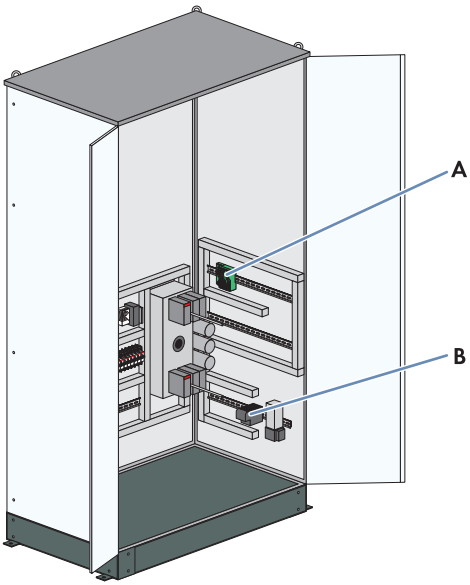


Figure 48: Position of the heating and the temperature control

Position	Designation
A	Temperature control
B	Heating element

Requirements:

☐ There are no problems.

Procedure:

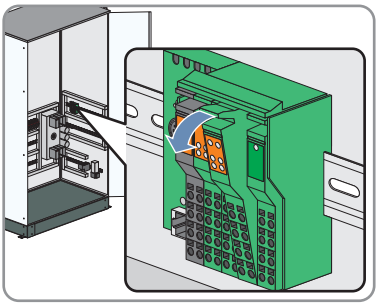
1. ⚠ DANGER

   Danger to life due to electric shock or electric arc by touching live components

   - Disconnect the Control & Supply Panel (see Section 5.5).

2. Open the Control & Supply Panel.

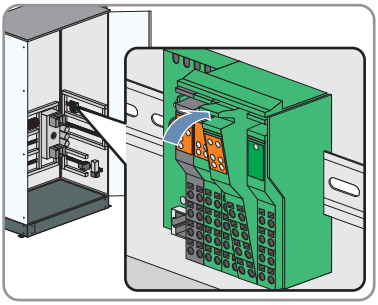
3. Unplug the connection plug of the temperature control in the Control & Supply Panel.



4. Close the Control & Supply Panel
5. Wait at least ten minutes.
6. Open the Control & Supply Panel.
7. Check whether the heating has radiated heat.

   If the heating has not radiated heat, contact the SMA Service Line.

8. Plug in the connection plug of the temperature control in the Control & Supply Panel.



9. Close the Control & Supply Panel

10 Contact

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

- Device type
- Serial number of the MV Power Platform
- Serial number of the component
- Type and number of the PV modules connected
- Type of communication
- Error number and error message

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