Central inverter

Sunny Central and accessories

Maintenance Manual

SCWAR-WEN093012 | 98-4005812 | Version 1.2

EN

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1 Notes on this Manual

1.1 Symbols Used

The following four types of warnings and general information appear in this document as described below:

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 indicates a situation that could result in property damage if not avoided.

Information

Information provides tips that are valuable for the optimal installation and operation of your product.

1.2 Target Group

This documentation is intended for Sunny Central installers and operators. It includes a description of Sunny Central maintenance and the maintenance work intervals.

1.3 Applicability

This documentation describes how to maintain the following Sunny Central indoor central inverters, MV stations, and accessory devices:

- Sunny Central 100LV
- Sunny Central 125LV
- Sunny Central 150
- Sunny Central 200
- Sunny Central 200HE
- Sunny Central 250
- Sunny Central 250HE
- Sunny Central 350
- Sunny Central 350HE
- Sunny Central 500HE
- Sunny Central 560HE
- Sunny Central 400MV
- Sunny Central 500MV
- Sunny Central 700MV
- Sunny Central 1000MV
- Sunny Central 1200MV
- Sunny String Monitor
- Sunny String Monitor-Cabinet
- Sunny Main Box

1.4 Documentation

The documents listed below are included in the delivery of your Sunny Central. These documents contain the following information.

• Installation guide:	Setup and installation of the Sunny Central
• User manual:	How to operate the Sunny Central and the Sunny Central Control
• Wiring diagrams:	The Sunny Central's wiring diagrams
• Technical data sheets:	Technical data pertaining to the Sunny Central
• Commissioning report	Checklist for commissioning

2 Safety Precautions

DANGER!

Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Do not touch the live components of the Sunny Central or medium-voltage grid.
- Observe all safety regulations which apply to activity that involves the medium-voltage grid.

WARNING!

Risk of lethal electric shock!

High voltages are present in the device.

- All work on the Sunny Central must only be carried out by a trained and qualified electrician!
- Work on the Sunny Central is only to be performed as described in the following sections!
- Observe all safety precautions listed!
- Follow all safety precautions included in the Sunny Central's installation guide!

WARNING!

Danger to life due to damages to the Sunny Central!

Damage to the Sunny Central, e.g. defective cables, or a damaged housing, can lead to death by electric shock or fire!

- Only use the Sunny Central when it is safe to do so!
- Only operate the Sunny Central if there is no visible damage!
- Check the Sunny Central regularly for visible damage!
- Ensure that all external safety features are freely accessible at all times, and that they are regularly tested for correct functionality!

NOTICE!

Electrostatic discharges can damage the Sunny Central!

- When working on the Sunny Central and handling the module assemblies, observe all ESD safety regulations!
- Discharge any electrostatic charge by touching the grounded Sunny Central housing!
- Only then is it safe to touch any electronic components!

Storage of handbooks

This user manual, the installation guide, the data sheets, the operating manuals of the installed components, and the wiring diagrams must be kept in the immediate vicinity of the Sunny Central. They must be available to operators and maintenance staff at all times.

3 Time Intervals for Maintenance Work

The central inverter, string monitoring units, and fuse sub-distribution boxes must be maintained at regular intervals. Maintenance includes:

- Inspection of wearing parts, and replacement thereof if necessary
- Functionality test of components
- Inspection of contact joints
- Cleaning of cabinet interior, if necessary

The maintenance interval depends on the location and the ambient conditions. A device installed in an environment with very dusty ambient air requires more frequent maintenance than indicated in the following table.

3.1 Sunny Central Maintenance Work

Maintenance work	Maintenance interval (recommended)
Read out long-term data and error memory.	1 month * (depending on system size)
Clean or replace the filter material in the air inlet filters.	12 months *
Clean the insect guards at the air inlets and outlets.	12 months *
Clean the heatsink power module	12 months *
Check the inside of the cabinet and the EVR resistor for heavy dust deposits, dirt, moisture, and water penetration from outside. If necessary, clean the Sunny Central and employ suitable corrective measures.	12 months
Check all power cable connections for looseness and tighten them if necessary. Check the connectors and insulation for discoloration or degradation. Replace any damaged connectors or corroded contacts.	12 months
Check the adhesive warning labels and replace them if necessary.	12 months
Cooling fans functionality test Check all cooling fans for functionality and operating noise. The fans can be switched on by adjusting the thermostats. If present: switch cabinet fan, heatsink fan(s), internal circulation fan(s), diode fan, heating fan	12 months
Heating functionality test	12 months

Maintenance work	Maintenance interval (recommended)
Functionality test of all protective equipment present • Residual current breaker • Line circuit breaker • Power switch • Motor overload switch by means of manual activation or by pressing the test button (if applicable)	12 months
Visually check all fuses and disconnectors, and lubricate the contacts if necessary	12 months
Check overvoltage protectors	12 months *
Check the 230 V und 24 V control and auxiliary voltages	12 months
Overheating functionality test Check the overtemperature safety circuit	12 months
Emergency shutdown functionality test Check the function of the internal and external emergency shutdown switches	12 months
Check the function of the door contacts	12 months
Insulation monitoring / GFDI functionality test Check the function and the signaling	12 months
Preventative replacement intervals for components, e.g. fans, heating	12 months
Check the covers and function of the locks	12 months
Check the overvoltage protectors for deterioration and replace them if necessary	12 months
Check concrete substation - chamber and air ducts Is there a filter installed in the door?	12 months

* The maintenance interval may need to be shortened, depending on the location or ambient conditions.

Regular Data Backups

Backup and archive the Sunny Central Control data regularly using Sunny Data Control. This can occur by means of remote querying, or during routine maintenance.

3.2 Sunny String Monitor Maintenance Work

Maintenance work	Maintenance interval (recommended)
Check all power cable connections for looseness and tighten them if necessary. Check the connectors and insulation for discoloration or degradation. Replace any damaged connectors or corroded contacts.	12 months
Check all string cable connections for looseness and replace them if necessary. Check the connectors and insulation on the module assembly and busbars for discoloration or degradation.	12 months
Check all power cable connections of the optional DC main switch for looseness and tighten them if necessary. Check the insulation and the switch for discoloration or degradation.	12 months
Check that the Sunny String Monitor is mounted correctly, i.e. horizontal installation	12 months
Check the cover locks	12 months
Check that the screw fittings are tightly fastened and properly sealed, and replace them if necessary	12 months
Check whether there is condensation water in the device	12 months
Check the shield connection	12 months
Check the ground connection or the contact resistance to the ground rod	12 months
Check the pressure adjusting screw for dirt and replace if necessary	12 months
Check the installation location for accessibility, combustible materials, and that the device is securely positioned	12 months
Check that the Plexiglas covers are attached properly	12 months
Check the adhesive warning labels and replace them if necessary.	12 months
Visually check all existing fuses and tension springs on the fuse holders	12 months
Check overvoltage protectors	12 months
Check the auxiliary supply +55 V DC at the connection terminals	12 months

3.3 Sunny String Monitor-Cabinet Maintenance Work

Maintenance work	Maintenance interval (recommended)
Check all power cable connections for looseness and tighten them if necessary. Check the connectors and insulation for discoloration or degradation. Replace any damaged connectors or corroded contacts.	12 months
Check all string cable connections for looseness and replace them if necessary. Check the insulation, the disconnectors, the assembly, and busbars for discoloration or degradation.	12 months
Check all power cable connections of the optional DC main switch for looseness and tighten them if necessary. Check the insulation and the switch for discoloration or degradation.	12 months
Check that the inlets for the connecting cable are properly sealed	12 months
Check whether there is condensation water in the device	12 months
Check the shield connection	12 months
Check the ground connection or the contact resistance to the ground rod	12 months
Check the filter material for dirt and replace it if necessary	12 months
Check the installation location for accessibility, and that the device is securely positioned (open the top front plate)	12 months
Check that the Plexiglas covers are attached properly	12 months
Check the adhesive warning labels and replace them if necessary.	12 months
Visually check all existing fuses and tension springs on the fuse holders	12 months
Check overvoltage protectors	12 months
Check the auxiliary supply +55 V DC at the connection terminals	12 months

3.4 Sunny Main Box Maintenance Work

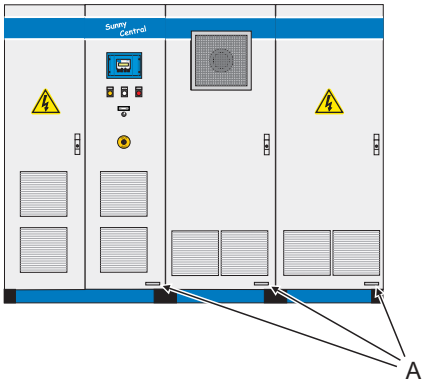
Maintenance work	Maintenance interval (recommended)
Check all string cable connections for looseness and replace them if necessary. Check the insulation, the disconnectors, the assembly, and busbars for discoloration or degradation.	12 months
Check that the inlets for the connecting cable are properly sealed	12 months
Check whether there is condensation water in the device	12 months
Check the adhesive warning labels and replace them if necessary.	12 months
Check that the Sunny Main Box (SMB) is mounted correctly, i.e. horizontal installation	12 months
Check the filter material for dirt and replace it if necessary	12 months
Check the installation location for accessibility, combustible materials, and that the device is securely positioned	12 months

4 Maintenance Work on the Central Inverter

4.1 Identifying the Sunny Central

You can identify the Sunny Central using the type label. The type label is located on the inside of the Sunny Central's door.

In addition, the series number is located on the front side of device models produced beginning at the end of 2008.



A Series number of the Sunny Central

4.2 Reading out Long-term Data and Error Memory.

To ensure smooth system operation, all system components must be optimally matched to each other. Systems not operating at optimum levels produce lower yields, which, in turn, reduces system profitability.

Even if several functions warn the operator of the failure of individual strings or the malfunctioning of inverters, depending on the system communication, system operation must be regularly inspected to detect any minor malfunctions that are not equipped with an alarm function. In addition, system operation can, under certain circumstances, be improved by analyzing the system data.

Depending on the system size, the central inverter error memory and the long-term data of the data logger must be read out at least once a month. Proceed as described in the user manual.

4.3 Cleaning Power Electronics

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

The power electronics of the Sunny Central central inverter are extremely well protected and are designed as maintenance-free as possible. Only visually inspect and clean the circuit board using a fine brush or vacuum with a soft attachment if there are any visible deposits. The cleaning agents used must be antistatic and ESD-compliant. Do not use any hard or coarse brushes. Using pressurized air is prohibited.

4.4 Maintaining the Air Inlet Filters

Cleaning or replacing the filter material in the air inlet filters

This section will explain how to remove the air grills and how to clean the corresponding air filter material. The Sunny Central 100 is only equipped with air grills that have no air filter material.

Depending on the switch cabinet and the design, up to eight air grills equipped with filter material must be maintained. The filter material must be cleaned and replaced depending on the degree of contamination.

4.4.1 Removing the Air Grills

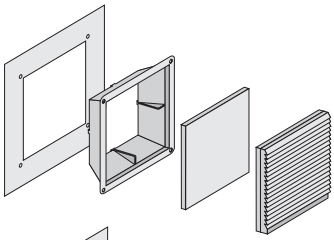
Removing the air grills with the corresponding filter material

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

Remove the air grill by lightly lifting the attachment at the intended location using a screwdriver and pull it forwards. The air grill frame is securely connected to the switch cabinet door.

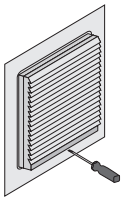
The filter material is located in a cutout in the air grill frame.



If the filter material must be replaced, it can ordered from SMA.

Article number: 65-102011

There is no separate article number for the small filter material installed in the older Sunny Central 500 models. It must be cut out of the larger filter material.



4.4.2 Cleaning the Air Grills and Filter Material

Cleaning the filter material

- Rinse using water (up to approximately 40 °C, you can also use any commercially available mild detergent).
- Tap or vacuum the filter material, or carefully use pressurized air to remove the contamination.
- In case of greasy dust, the filter material should be rinsed using warm water and grease remover. The air filter material must not be cleaned using a sharp water stream or wrung out.
- After cleaning and drying the air filter material, place it back into the frame.
- Air grills and filter material should always be cleaned when disassembled.

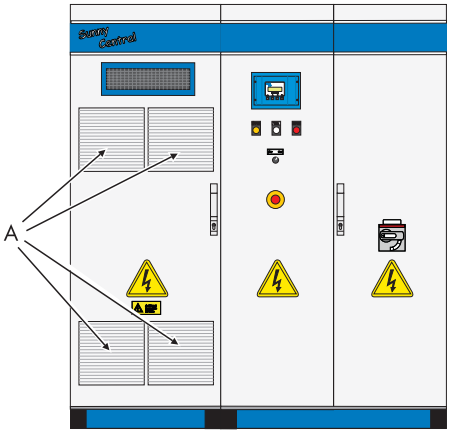
Cleaning the air grills

- The grills can be cleaned using a paintbrush, vacuum, or applying pressurized air

The exact position and size of the air grills are displayed below using several example cabinets.

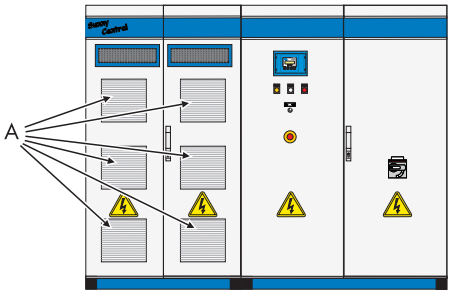
4.4.3 SC100LV / SC150 / SC125LV / SC200 /200HE

The switch cabinets of the SC100LV, SC150, SC125LV, and SC200 models were designed as identical as possible and are equipped with four large air inlet filters (A).



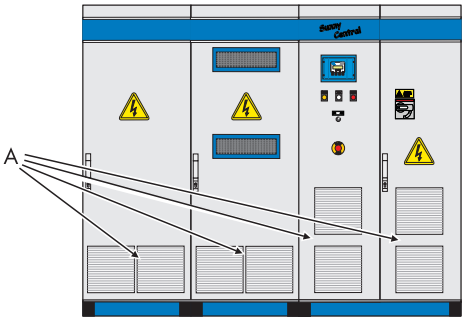
4.4.4 SC250 /250 HE

The switch cabinet of the SC250 model is equipped with six large air inlet filters (A).



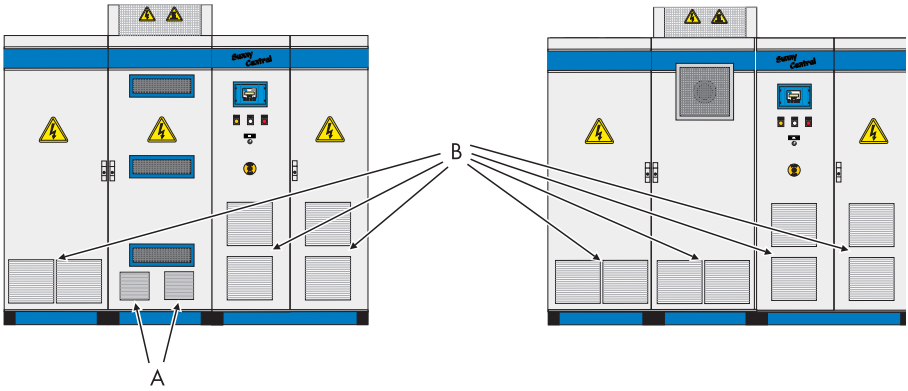
4.4.5 SC350 / SC350 HE

The switch cabinet of the SC350 model is equipped with eight large air inlet filters (A).



4.4.6 SC500HE / 560HE

Depending on the design, the switch cabinet of the SC500HE model is equipped with two small air inlet filters (A) and six large air inlet filters, (B), or only with eight large air inlet filters (B). The switch cabinet of the SC560HE model is only available with eight large air inlet filters.



4.5 Cleaning the Insect Guards

Clean the insect guards at the air inlets and outlets.

This section describes how to clean the insect guards at the air inlets and outlets.

Replacing the safety guards

The safety guards only need to be replaced if they are damaged.

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

Depending the switch cabinet type and design, the insect guards located in the roof, socket area, and the doors of the inverter cabinets as well as its rear, through which the air required for cooling the power modules is drawn in and discharged, must be cleaned.

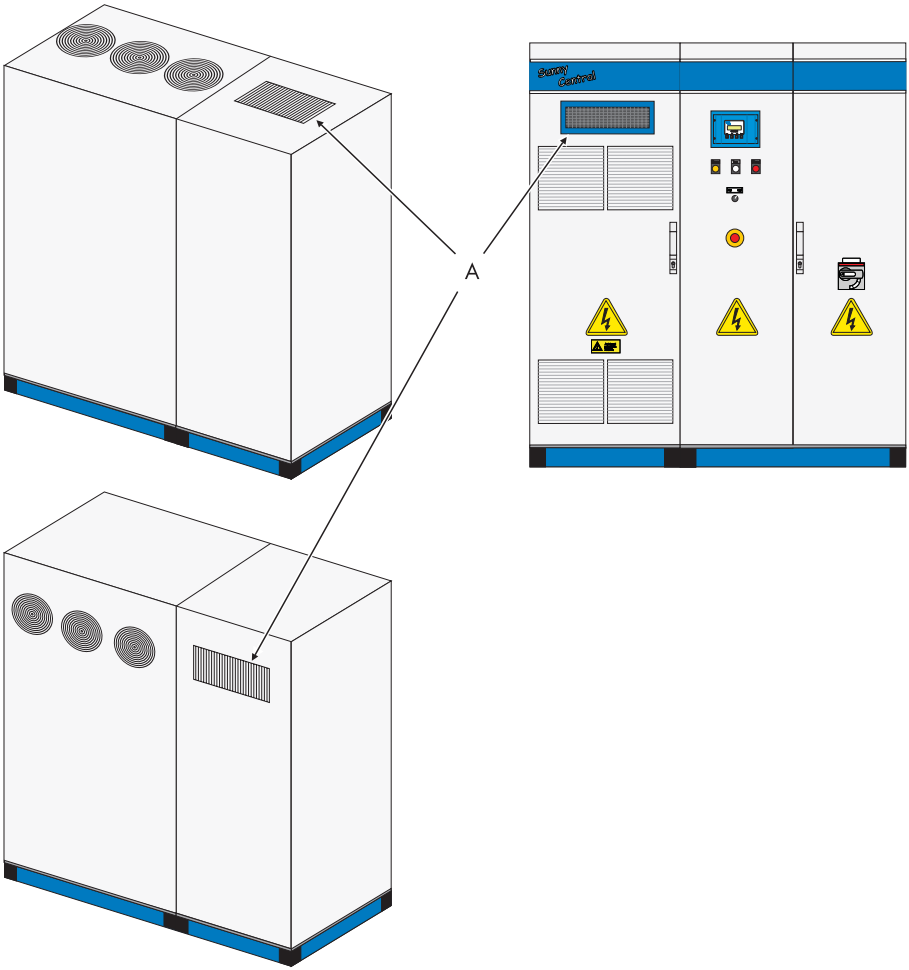
The guards can be cleaned using a paintbrush, or handheld brush or by vacuuming, or applying pressurized air.

Cleaning fine guards using pressurized air is prohibited. They are designed thinner and are used for finger protection. Such safety guards are located on the rear of the switch cabinets.

The exact position and size of the individual safety guards are displayed below using several example cabinets.

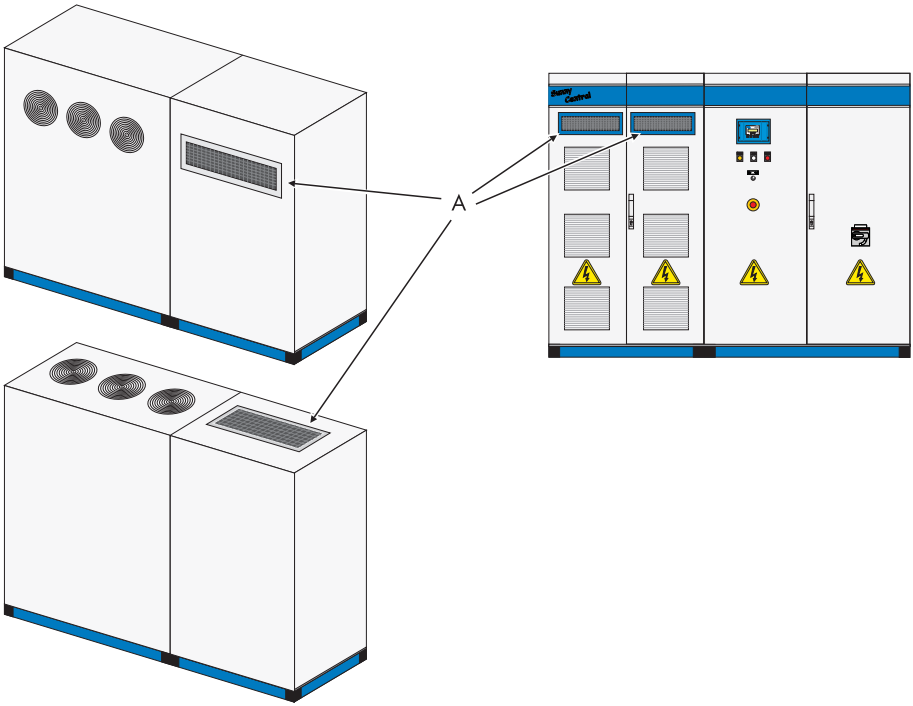
4.5.1 SC100LV / SC125LV / SC150 / SC200 /200HE

The switch cabinets of the SC100LV, SC150, SC125LV, and SC200 models were designed as identical as possible and equipped with a safety guard (A) on the front. The exhaust air can either be discharged through either the top or the rear. To do this, the inverter must be equipped with a safety guard (A) in the roof or on the rear.



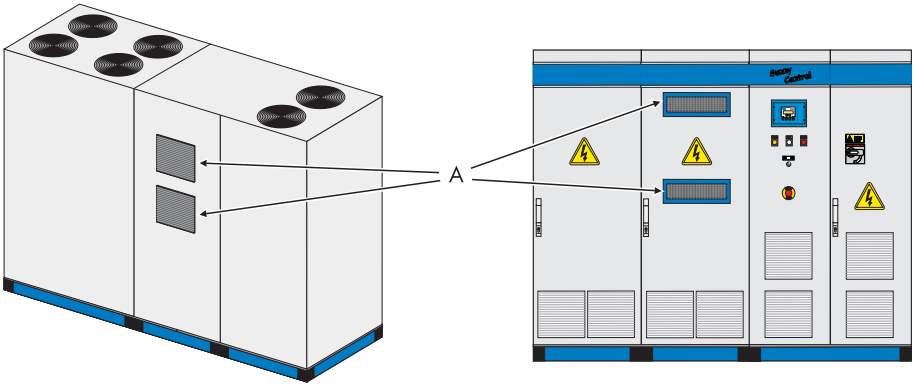
4.5.2 SC250 / SC250 HE

The switch cabinet of the SC250 / 250HE model is equipped with two safety guards (A) in the front of the inverter cabinet. The exhaust can be discharged through either the top or the rear. Thus, this device is equipped with either a guard (A) on the rear or in the roof.



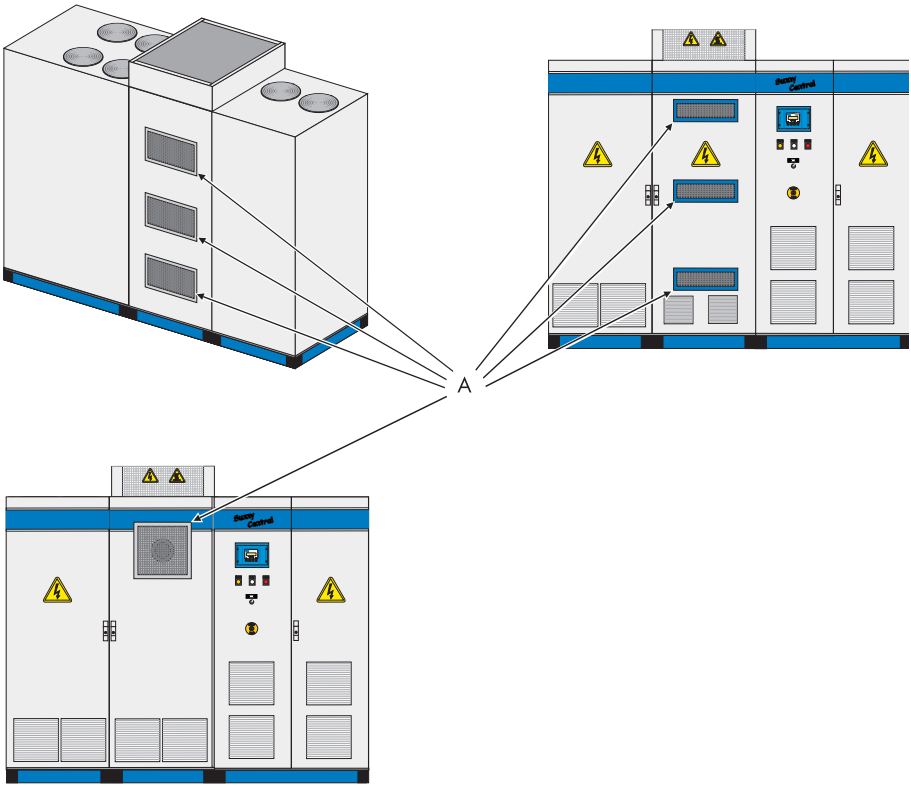
4.5.3 SC350 / SC350 HE

The switch cabinet of the SC350 model is equipped with two safety guards (A) in the front and the rear of the inverter cabinet.



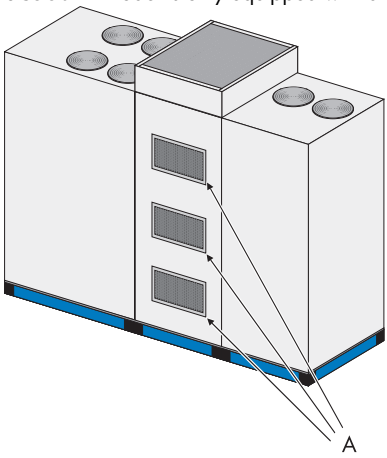
4.5.4 SC500 / 560HE

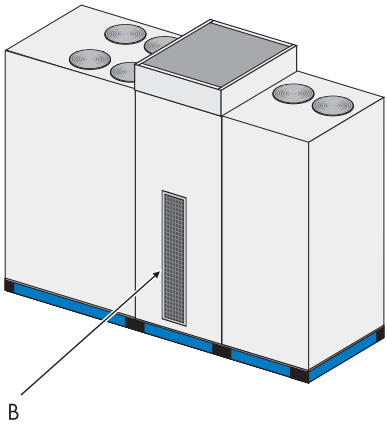
Depending on the design, the switch cabinet of the SC500HE model is equipped with two safety guards (A), or one individual safety guard in the front of the inverter cabinet. The SC500HE model is equipped with three safety guards in the front as well as three safety guards in the rear panel. The switch cabinet of the SC560HE model is only delivered with one individual safety guard (A) in the front.



The devices are maintenance-free to the greatest extent possible. However, due to the ventilation system of the stacks positioned one above the other, dirt from the lowest stack can remain in the switch cabinet. To clean the switch cabinet, the lowest stack must be disassembled and the chamber behind it must be vacuumed.

Depending on the design, the rear of the switch cabinet of the SC500HE model is equipped with three safety guards (A), or an individual longitudinal ventilation duct (B). The switch cabinet of the SC560HE model is only equipped with an individual ventilation duct without grills.

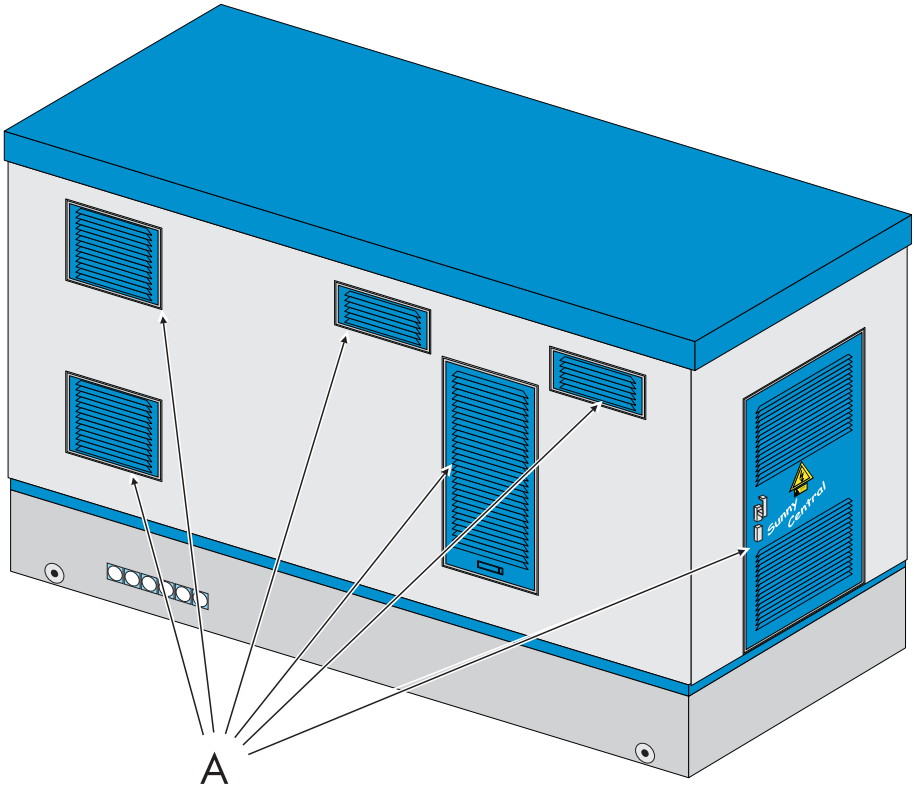


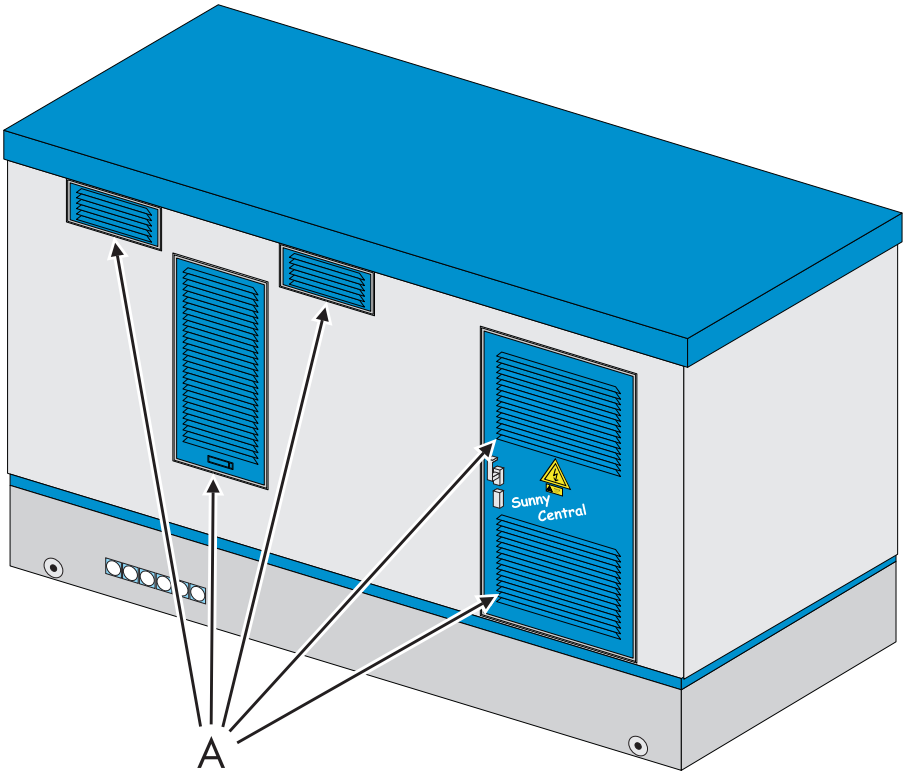


4.5.5 SC400 / 500 / 700 / 1000 / 1120MV

The central inverters of this series each consist of two HE series Sunny Centrals equipped with a common connection to a medium-voltage transformer.

The above points explain how to clean the inverters inside the stations. The stations are equipped with several doors and windows (A), which ventilate the inverters. These doors and windows are equipped with safety guards and must also be cleaned.





Door and window sizes

Depending on the station size, the shape and size of the openings may vary. It depends on the inverters used in the station.

4.6 Covers and Locks

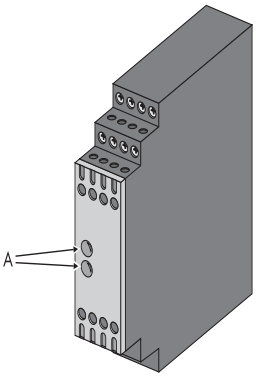
4.6.1 Checking the Emergency shutdown

➢ Check the function of the internal and external emergency shutdown switches. Refer to the equipment label and the wiring diagram provided for the exact position of the respective switch.

DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

1. Switch Sunny Central to "Stop" and open the doors.
2. Ensure that the Sunny Central is connected to a control voltage (supply voltage) and is supplied with power.
3. Ensure that the emergency shutdown on the outside of the device is not activated.
4. Mask all door contacts switches to the "On" position.
   ☑ During normal operation, both signal lights (A) of the emergency shutdown relay must illuminate.
5. If an emergency shutdown switch on the device is now activated, the signal lights of the "Off" emergency shutdown relay must switch.
   ☑ The Sunny Central Control displays the error message "206" and the error must be manually confirmed.



6. Unlock the emergency shutdown switch and confirm the error on the Sunny Central Control.
7. Release door contact switches (remove the adhesive tape)
8. Close the cabinet doors.

Inspection in case of an emergency shutdown circuit.

In a Team configuration or in systems in which several Sunny Centrals are connected in Team mode, the error must be confirmed on all Sunny Central Controls. The emergency shutdown relay in every cabinet must switch.

Connecting the emergency shutdown relay

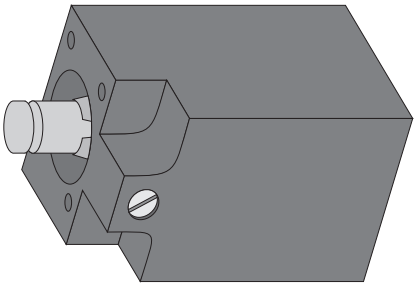
Depending on the switch cabinet design and production version, the emergency shutdown relay is installed with the signal lights on the controller.

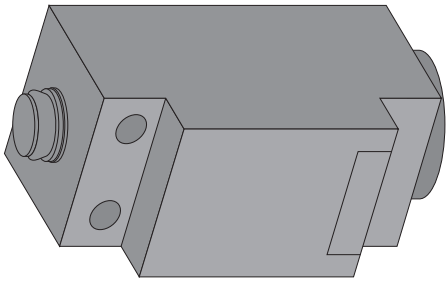
9. Check the operation of each individual emergency shutdown switch. Test the switches on the cabinet, in the stations, and the other external emergency shutdown switches.

4.6.2 Checking the Door Contact Switches

The following door contact switches produced by Rittal and IBB are installed, depending on the switch cabinet design and production version.

View of the door contact switches

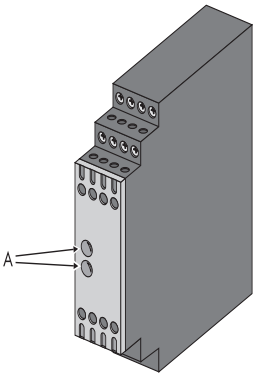




DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

1. Switch the Sunny Central to "Stop" and open the doors.
2. Ensure that the Sunny Central is connected to a control voltage (supply voltage) and is supplied with power.
3. Ensure that the emergency shutdown on the outside of the device is not activated.
4. Mask all door contacts switches to the "On" position.
   ☑ During normal operation, both signal lights (A) of the emergency shutdown relay must illuminate.
5. Consecutively switch all door contact switches off and on again by removing the adhesive tape.
   ☑ The signal lights on the emergency shutdown relay are not illuminated while the relay is switched off.
6. Release door contact switches (remove the adhesive tape)
7. Close the cabinet doors.



If a door contact switch must be replaced, it can be ordered from SMA.

4.6.3 Checking the Seals

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

Seals are located on the switch cabinet doors and on the connection between both cabinet units on Sunny Centrals consisting of two switch cabinet units.

1. Visually inspect the switch cabinet seals for tears or other damage.
   ☑ Seals near edges where pressure is applied must be completely replaced if they are damaged.
   – If the damaged seal is not located near an edge where pressure is applied, it generally still has a sufficient seal effect.
2. To prevent seals from being damaged through weather-related freezing, common agents, for example, talcum powder, Vaseline, or wax, can be used.

4.6.4 Checking the Locks and Hinges

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. Check the correct operation of the inverter cabinet locks and the cement substations by opening and closing the doors.
   ☑ Doors that are difficult to lock are sure signs of corrosion and leakage.
2. Check which parts of the lock are damaged and replace the damaged parts.
3. Check whether the door hinges can be easily moved.
4. Check the operation of the door stop. Replace the defective door stops.
5. Spray all movable closing parts and moving points with a suitable, waterless lubricant.

4.7 Maintaining the Switch Cabinet Interior

4.7.1 Checking the Switch Cabinet Interior for Dirt

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. Check the cabinet interior for heavy dust deposits, dirt, moisture, and water penetration from outside.
2. If necessary, clean the Sunny Central and employ suitable corrective measures.

4.7.2 Cleaning the Heatsink of the Power Module

Maintenance requirements of the heat sink.

The heatsink of the power module is designed as maintenance-free as possible; a visual inspection is sufficient.

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

The heatsink of the power module is generally only cleaned if problems occur with the inverter. Normally, the dirt is caught by the existing safety guards. These guards are chosen so that the hole diameter is the same size of the heat sink openings.

If the heatsink is contaminated, it can be cleaned using pressurized air. Cleaning it using a vacuum is prohibited, since only a small part of the heatsink is cleaned.

4.7.3 Cleaning the EVR Resistor

Maintenance requirements of the EVR.

The EVR is designed as maintenance-free as possible; a visual inspection is sufficient.

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

The EVR resistor is an optional accessory located on the roof of the Sunny Central, or is installed inside the Sunny Central.

1. Check the EVR resistor for heavy dust deposits, dirt, and moisture.
2. If necessary, clean the EVR resistor and conduct appropriate corrective measures to prevent it from becoming contaminated again.

4.7.4 Checking the Power Cable Connections

Checking the power cable terminal and screw connections

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. Check that all power cable connections are securely fastened.
2. Check that all power cable screw connections for looseness and tighten them if necessary.
3. Check the terminals and insulation for discoloration or degradation.
4. Replace any damaged connectors or corroded contacts.

Torque

The torque of the individual connections is specified in the installation guide and in the installation requirements.

4.7.5 Checking the Safety Notices

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

Check the safety notices and labels on and in the switch cabinet and replace any missing or damaged labels.

4.7.6 Checking the Fans

DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

Depending on the switch cabinet model, the following fans are installed:

- Cabinet cooling fan
- Heatsink fan(s)
- Internal circulation fan(s)

Check all cooling fans for functionality and operating noise. The fans can be switched on by adjusting the thermostats.

1. Switch the Sunny Central to "Stop" and open the doors.
2. Ensure that the Sunny Central is connected to a control voltage (supply voltage) and is supplied with power.
3. Mask all door contacts switches to the "On" position.
4. Turn the thermostats down as far down as possible.
   ☑ The cooling fans begin operating as soon as the temperature drops below the set temperature.
5. Once the function of the cooling fans has been checked, adjust the thermostats back to the initial setting. The value is specified with an adhesive label on the thumb wheel and in the wiring diagram.
6. Release door contact switches (remove the adhesive tape)
7. Close the cabinet doors.

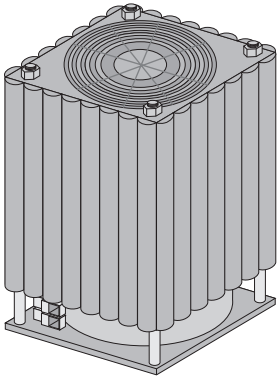
4.7.7 Checking the Heating

One or several heating models produced by Rittal, Stego, or Heine are installed, depending on the switch cabinet design and production version.

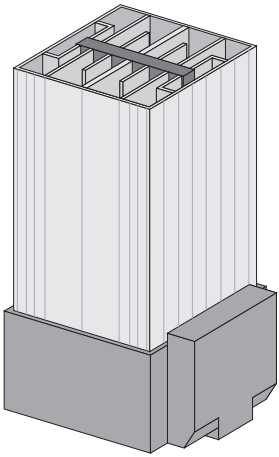
You can locate the exact position, number of heaters, and the corresponding hygrostats using the reference designator of the components in the provided wiring diagram.

View of the installed heaters and hygrostats.

Rittal heater (300 W)



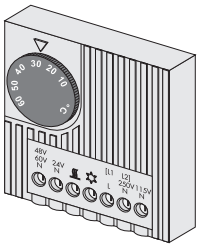
Stego heater (300 / 400 W)



Various designs

Heine heaters with similar designs have also been installed in a few switch cabinets.

View of hygrostat



Procedure for checking the heating

DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

1. Switch the Sunny Central to "Stop" and open the doors.
2. Ensure that the Sunny Central is connected to a control voltage (supply voltage).
3. Mask the door contact switches to the "On" position.
4. Turn the hygrostat down as far down as possible.
   ☑ If the value is less than the current humidity, the heater begins operating.

Insufficient humidity

If the humidity is insufficient, the function of the heater cannot be checked. In this case, the hygrostat does not switch on, even if it is set to the minimum value.

CAUTION!

Danger of burn injuries due to hot heater parts

- Do not touch any parts other than those described in the guide.

   ☑ If the hygrostat has been switched through, the heater fans must start and the air blown through the heatsink must heat up.
5. Once the function of the heater has been checked, adjust the hygrostat back to the initial setting. The value is specified with an adhesive label on the thumb wheel and in the wiring diagram.
6. Release door contact switches (remove the adhesive tape)
7. Close the cabinet doors.

4.8 Checking the Protective Equipment

Depending on the switch cabinet design and production version, the central inverters are equipped with a number of circuit breakers. The function of these circuit breakers must be checked at regular intervals.

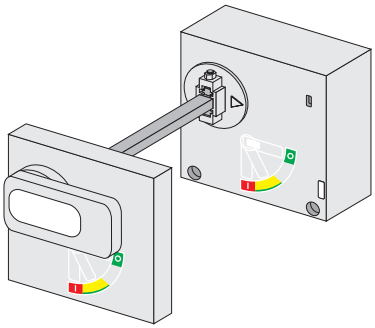
You can locate the exact position and the number of circuit breakers using the reference designators of the components in the provided wiring diagram.

Depending on the switch cabinet model, the following circuit breakers are installed:

- Residual current breaker
- Line circuit breaker
- Power switch
- Motor overload switch

4.8.1 Checking the AC Power Switch

The AC power switch is connected to the door by an extension spindle. The door itself has no contacts, since it cannot be opened when the switched is activated.

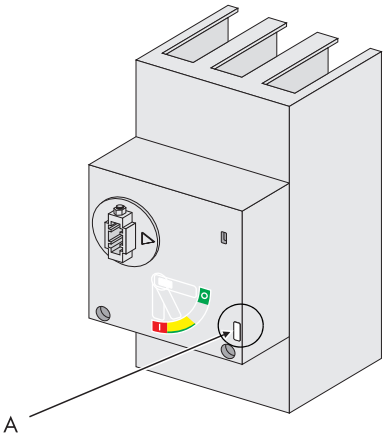


DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

1. Switch the Sunny Central to "Stop" and open the doors.
2. To open the door of the Sunny Central when the cabinet is switched on, remove the handle from the extension spindle that connects the switch to the handle. Insert a screwdriver into the lateral opening on the switch and manually unlock the switch. Afterwards, the door can be opened.

3. Trigger the AC power switch by pressing the function test key (A).
   ☑ The switch is triggered and the knob switches into position.
4. Switch off the switch.
5. Close the cabinet doors.
6. Switch on the switch.



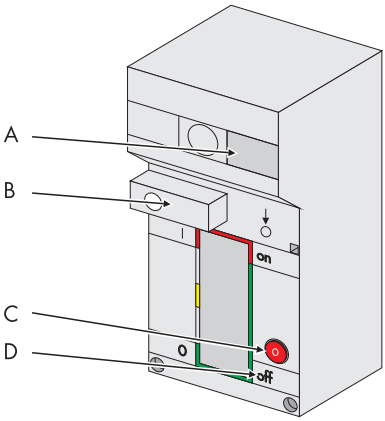
4.8.2 Checking the DC Power Switch

Depending on the design and the power class, two different motor-driven power switches, installed on the DC side, are used in the Sunny Central.

DC motor-driven power switch (spring power storage device)

This switch is equipped with a power switch (A), a spring power storage device (B), an off key, (C) and a position display (D). It is used in the following Sunny Centrals:

- SC100LV
- SC125LV
- SC150
- SC200 / 200HE
- SC250 / 250HE
- SC350 / 350HE
- SC500HE
- SC560HE



Procedure for Testing the DC Power Switch

DANGER!
Death resulting from electric shock and burning upon touching the medium-voltage grid's live components.

- Do not touch any parts other than those described in the guide.

1. Switch the Sunny Central to "Stop" and open the doors.
2. Ensure that the Sunny Central is connected to a control voltage (supply voltage) and is supplied with power.
3. Mask the door contact switches to the "On" position.
4. Switch the Sunny Central to "Start".
   ☑ DC switch is switched on and switches to the "On" position.
5. Switch the Sunny Central to "Stop".
   ☑ The DC switch is triggered and switches to the "Off" position.
6. Release door contact switches (remove the adhesive tape)
7. Close the cabinet doors.

4.8.3 Testing the Fuses and Disconnectors

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. Visually check the existing fuses and tension springs on the fuse holders.
2. If necessary, grease the contact points of the fuse holders.

☑ The checking procedure for the fuses and disconnectors is now complete.

4.8.4 Checking the Overvoltage Protectors

Depending on the switch cabinet design and production version, the central inverters are equipped with a number of overvoltage protectors. The function of these overvoltage protectors must be checked at regular intervals.

You can locate the exact position and number of overvoltage protectors using the reference designator of the components in the provided wiring diagram.

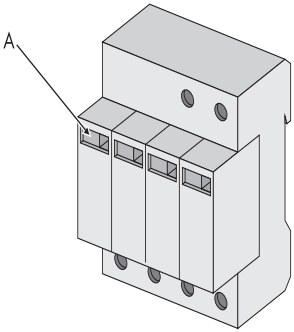
The overvoltage protectors are checked by conducting a visual inspection (annually) and by taking measurements (every two years).

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

Visual Inspection

Check the operational readiness of the overvoltage protector using the protective path's function and fault signaling (A), which are free of operational current.



Green display	Overvoltage protectors are ready for operation
Red display	Overvoltage protectors are defective

Measurements

A suitable testing device must be used to provide exact information on the state of the overvoltage protector. The suitable testing device is the PM20 from Dehn + Söhne GmbH &Co.KG. The measurements are described in the device's user manual and must be performed by a qualified electrician.

4.9 Additional Notes on MV Stations

4.9.1 Checking the Cable Guides of the Cement Substations

DANGER!
Death resulting from burning and electric shock upon touching the medium-voltage grid's live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. Check the chamber and the air ducts of the concrete substations for contamination or damage.
   ☑ The cable chamber must be dry and dust-free. It must be ensured that no insects or animals can enter the chamber. If this is not the case, carry out suitable corrective measures.
2. Check the ventilation. Optimal ventilation of the inverter must be ensured at all times.
3. Feeding is carried out by a medium-voltage transformer, which is designed as maintenance-free as possible. The medium-voltage transformer must be checked for oil leaks at regular intervals.

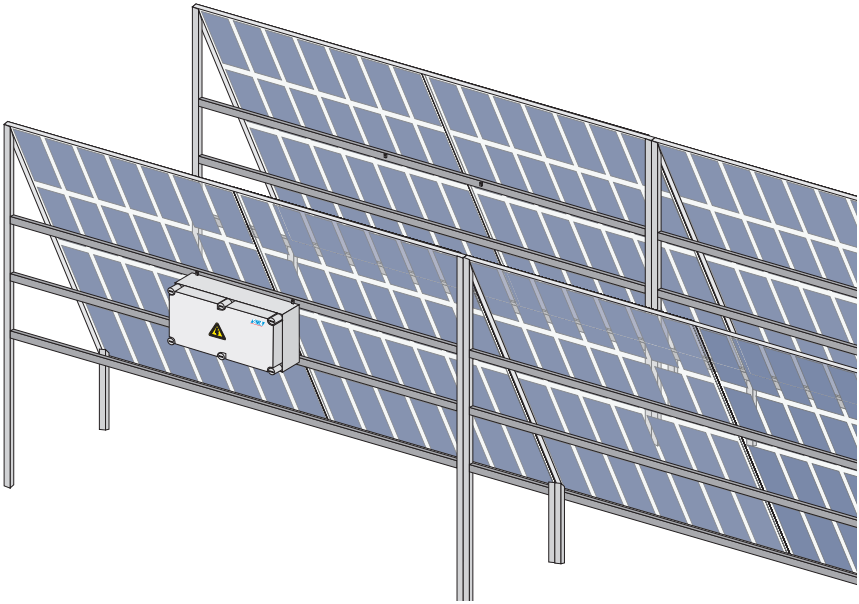
5 Maintaining Sunny String Monitors

The string monitors are usually installed outdoors near the modules. Depending on the system size, a large number of string monitors are required. This must be taken into consideration when maintenance work is required. The section below describes a series of steps used to carry out the maintenance work.

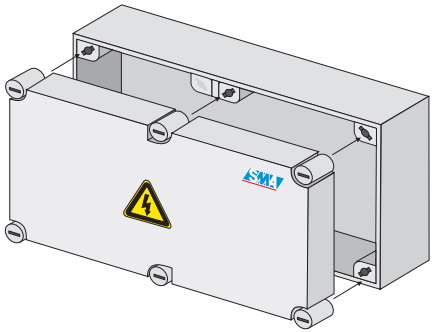
DANGER!
Death resulting from burning and electric shock upon touching the live components.

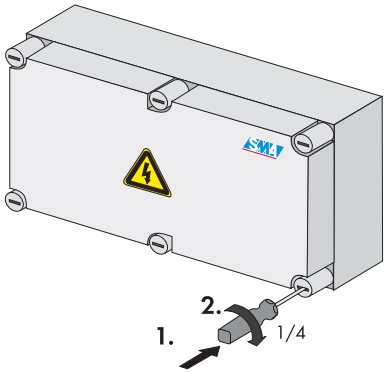
- Only work on this device when it is switched off and under voltage-free conditions.

1. First check the installation location for accessibility, combustible materials, and that the device is positioned securely. Then check whether the Sunny String Monitor is installed horizontally and that there is a sufficient sun shading system, for example, through an installation in the PV array.



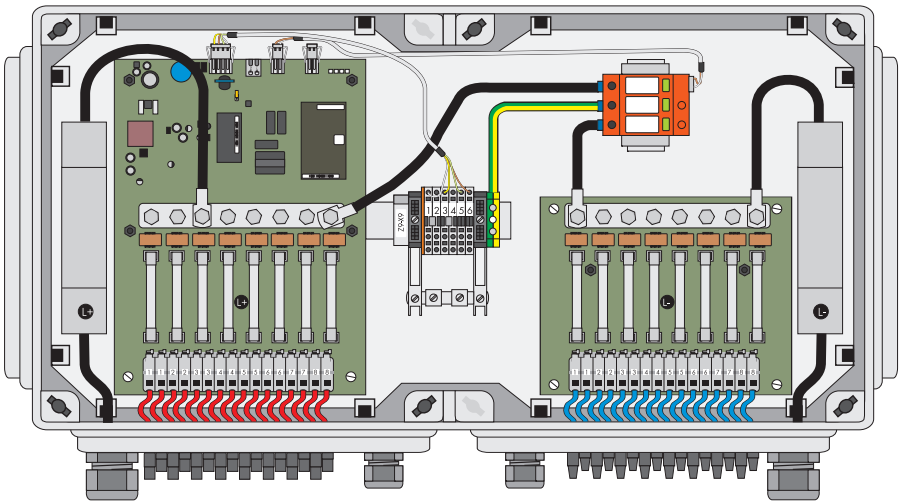
2. Check the housing for damage and that it is sealed properly.
3. Check that the cover is positioned securely and properly sealed. In doing so, make sure that the cover locks close properly. They are closed by applying light pressure with a screwdriver until they lock into place (1/4 turn).





Maintenance inside the Sunny String Monitor

All additional maintenance steps are performed inside the Sunny String Monitor or involve the cabling that runs inside the device.



4. Check whether any condensation water has accumulated in the device.
   ☑ Wipe the Sunny String Monitor clean. Find out where the water entered the device and remedy any defects.
5. Check the pressure adjusting screw for dirt or damage and replace it if necessary.
6. Check that the Plexiglas covers over the string fuses are attached properly.
7. Check the safety notice labels on and in the device and replace them if they are damaged or no longer legible. You can order new labels from SMA Solar Technology AG.
8. Visually check the existing fuses and tension springs on the fuse holders.

9. In addition, check that the auxiliary voltage +55 V at the connection terminal and the plug connectors is at least +30 V.
10. Check all power cable connections for looseness and tighten them if necessary. Check the connectors and insulation for discoloration or degradation. Replace any damaged connectors or corroded contacts.
11. Check all string cable connections for looseness and tighten them if necessary. Check the connectors and insulation on the module assembly and busbars for discoloration or degradation.
12. Check all power cable connections of the optional DC main switch for looseness and tighten them if necessary. Check the insulation and the switch for discoloration or degradation.
13. Using only your hand, ensure that the communication shield connection is fastened hand-tight. Do not use a screwdriver.
14. Check the ground connection and the contact resistance to the ground potential.
15. Check the overvoltage protector; the display must be green.

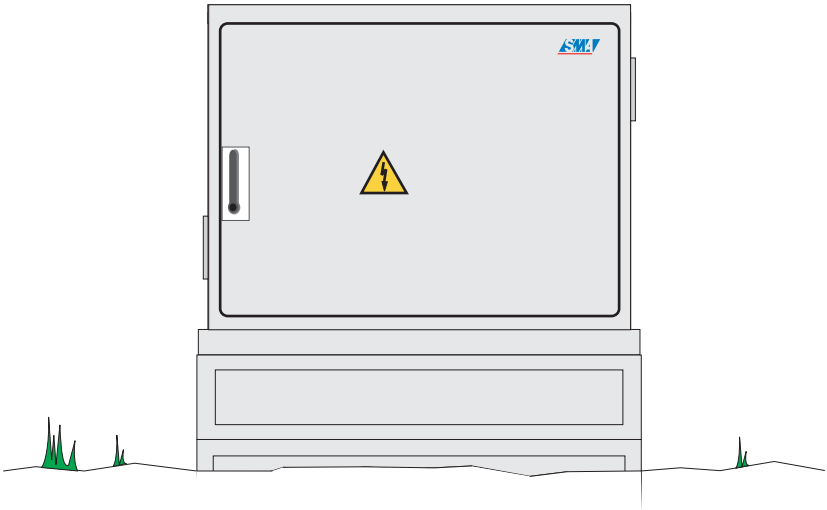
6 Sunny String Monitor-Cabinet Maintenance

The string monitors are usually installed outdoors near the modules. Depending on the system size, a large number of string monitors are required. This must be taken into consideration when maintenance work is required. The section below describes a series of steps used to carry out the maintenance work.

DANGER!
Death resulting from burning and electric shock upon touching the live components.

- Only work on this device when it is switched off and under voltage-free conditions.

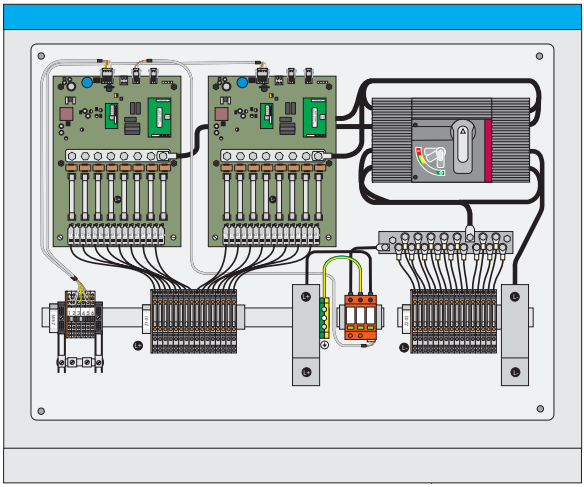
1. First check the installation location for accessibility, combustible materials, and that the device is positioned securely. Then check whether the Sunny String Monitor-Cabinet is installed horizontally and that there is a sufficient sun shading system, for example, through an installation in the PV array.



2. Check the housing for damage and that the cabinet doors and the door mechanism are securely fastened and sealed properly.

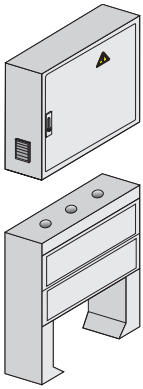
Maintenance in the Sunny String Monitor-Cabinet

All additional maintenance steps are performed inside the Sunny String Monitor-Cabinet or involve the cabling that runs inside the device.



3. Check whether any condensation water has accumulated in the device.
   ☑ Wipe the Sunny String Monitor-Cabinet clean. Find out where the water entered the device and remedy any defects.
4. Check the Plexiglas covers over the string fuses for damage and that they are securely fastened.
5. Check the safety notice labels on and in the device and replace them if they are damaged or no longer legible. You can order new labels from SMA Solar Technology AG.
6. Visually check the existing fuses and the fuse holders.
7. In addition, check that the auxiliary voltage +55 V at the connection terminal and the plug connectors is at least +30 V.

8. Check the connecting cable inlets for dirt, damage, and that they are sealed properly.



9. Check all power cable connections for looseness and tighten them if necessary. Check the connectors and insulation for discoloration or degradation. Replace any damaged connectors or corroded contacts.
10. Check all string cable connections for looseness and tighten them if necessary. Check the connectors and insulation on the module assembly and busbars for discoloration or degradation.
11. Check all power cable connections of the optional DC main switch for looseness and tighten them if necessary. Check the insulation and the switch for discoloration or degradation.
12. Check communication lines of the shield connection. It must be fastened hand-tight.
13. Check the ground connection and the contact resistance to the ground potential.
14. Check the overvoltage protectors. The display must be green.
15. Check the filter material of the ventilation plates for contamination and clean them or replace it if necessary. Replacement filter material can be ordered from SMA Solar Technology AG.

7 Sunny Main Box Maintenance Work

The Sunny Main Box is used to connect the strings outside of the Sunny Central switch cabinet. The devices are usually installed outdoors near the modules or in a building. Depending on the system size, several devices are required. This must be taken into consideration during maintenance. The section below describes a series of steps used to carry out the maintenance work.

DANGER!
Death resulting from burning and electric shock upon touching the live components.

- Only work on this device when it is switched off and under voltage-free conditions.

1. First check the installation location for accessibility, combustible materials, and that the device is positioned securely. Then check whether the Sunny Main Box is installed horizontally and that there is a sufficient sun shading system.
2. Check the housing for damage and that the cabinet doors and the door mechanism are securely fastened and sealed properly.
3. Check the connecting cable inlets for dirt, damage, and that they are sealed properly.
   ☑ The Sunny Main Box cabling is securely fastened.
   ☑ The Sunny Main Box cabling is completely laid in foam near the base plate. Make sure that the foam is not porous.
   ☑ Check the strain relief of the entire cabling.
4. Check whether any condensation water has accumulated in the device.
5. Check that the Plexiglas covers over the string fuses are attached properly.
6. Check the safety notice labels on and in the device and replace them if they are damaged or no longer legible. You can order new labels from SMA Solar Technology AG.
7. Visually check the existing fuses and tension springs on the fuse holders.
8. Check all power cable connections for looseness and tighten them if necessary. Check the insulation and busbars for discoloration or degradation. Replace any damaged connectors or corroded contacts.
9. Check the filter material of the ventilation plates for contamination and clean them or replace it if necessary.

8 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:

- Inverter type
- Type and number of modules connected
- Communication type
- Series number of the Sunny Central
- Error or warning number of the Sunny Central
- Sunny Central display message

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www.SMA.de

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- Operating the product in an unintended environment
- Operating the product whilst ignoring relevant, statutory safety regulations in the deployment location
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
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