



Installation instructions | for authorised electricians
sonnenProtect 2500
for sonnenBatterie hybrid 9.53

IMPORTANT

- Read this documentation carefully before installation / operation.
- Retain this document for reference purposes.

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1 Information about this document

This document describes the installation of the sonnenProtect 2500 in connection with the sonnenBatterie hybrid 9.53 storage system.

- Read this document in its entirety.
- Keep this document in the vicinity of the sonnenBatterie.

1.1 Target group of this document

This document is intended for authorised electricians. The actions described here must only be performed by authorised electricians.

1.2 Designations in this document

The following designations are used in this document:

Complete designation	Designation in this document
sonnenProtect 2500	sonnenProtect
sonnenBatterie hybrid 9.53	Storage system

1.3 Explanation of symbols


DANGER

Extremely dangerous situation leading to certain death or serious injury if the safety information is not observed.


WARNING

Dangerous situation leading to potential death or serious injury if the safety information is not observed.


CAUTION

Dangerous situation leading to potential injury if the safety information is not observed.

NOTICE

Indicates actions that may cause material damage.



Important information not associated with any risks to people or property.

Symbol	Meaning
►	Work step
1. 2. 3. ...	Work steps in a defined order
✓	Condition
•	List

Table 1: Additional symbols

2 Safety

2.1 Intended use

The sonnenProtect 2500 is an emergency power unit designed to supplement the sonnenBatterie hybrid 9.53. The sonnenProtect- in conjunction with the appropriate storage system of the sonnen GmbH - serves to supply power in the event of a power failure. Any other use is considered improper use.

Improper use poses a risk of death or injury to the user or third parties as well as damage to the product and other items of value. The following points must therefore be observed in order to comply with the intended use of the product:

- Only operate the sonnenProtect together with the right storage system.
- The sonnenProtect must be installed by an authorised electrician.
- The sonnenProtect must only be connected to the storage system as described here.
- Generators (e. g. a PV system) must never be connected after the output of the sonnenProtect.
- Intended use includes observing this document as well as all accompanying product documentation of the appropriate storage system.
- The sonnenProtect must only be used at suitable installation location.
- The transport and storage conditions must be observed.

Especially the following uses are not permissible:

- Operation in flammable environments or areas at risk of explosion.
- Operation in locations at risk of flooding.
- Operation outdoors.



Failure to comply with the conditions of the warranty and the information specified in this document invalidates any warranty claims.

2.2 Requirements for the electrician

Improper installation can result in personal injury and/or damage to components. For this reason, the sonnenProtect must only be installed and commissioned by authorised electricians. Authorised electricians must meet the following criteria:

- The electrician must be a person with a technical knowledge or sufficient experience to enable him/her to avoid dangers which electricity may create.
- The company for which the electrician works must be certified by sonnen GmbH.
- The electrician must have successfully complete sonnen GmbH certification training for the product.

2.3 Operating the product

Incorrect operation can lead to injury to yourself or others and cause damage to property.

- The sonnenProtect must only be operated as described in the product documentation.
- This device can be used by children from the age of eight (8) years old and individuals with impaired physical, sensory or mental capabilities or individuals with limited knowledge and/or experience of working with the device, as long as they are supervised or

have been trained to safely use the device and understand the resulting risks of doing so. Children must not play with the device. Cleaning and user maintenance must not be carried out by children without supervision.

2.4 Product modifications or changes to the product environment

- The sonnenProtect must only be used in its original state without any user modifications and only when in perfect working order.
- Safety devices must never be overridden, blocked or tampered with.
- The interfaces of the sonnenProtect and the storage system must be wired in accordance with the product documentation.
- All repairs on the sonnenProtect must be performed by authorised service technicians only.

2.5 Voltage inside the sonnenProtect



The sonnenProtect contains live electrical parts, which poses a risk of electrical shock. The storage system inverter also contains capacitors which carry voltage even after the storage system is switched off. As the sonnenProtect is connected to the inverter of the storage system, this means that the voltage from the inverter also flows into the sonnenProtect. Therefore:

- Disconnect the sonnenProtect and the storage system from the power supply (see Disconnecting the sonnenProtect from the power supply).

Only then can the sonnenProtect be opened.

3 Product description

3.1 Technical data

sonnenProtect 2500	
System data	
Nominal power	2,500 W
Maximum power (30 sec.)	3,000 W
Output voltage	230 VAC +/- 10 %
Nominal frequency	50 Hz
Network configuration in emergency operation	TN
Mains connection	single-phase, L / N / PE
Mains connections fuse	Miniature circuit breaker Type B 20 A
Operating concept	Single-phase power supply via emergency circuit(s). The switch to emergency operation takes place automatically through the storage system.
Switchover time	max. 15 seconds
Threshold power	none (starting from 0 W)
Dimension/Weight	
Dimesion (H/W/D) in mm	230/200/122
Weight in kg	4.3
Safety / Protective devices	
Protection class	I / PE conductor
Degree of Protection	IP30
Overvoltage category	III
Protective functions	Overcurrent protection, fault current protection
Residal current device	integrated (Type A 30 mA)
Ambient conditions	
Environment	indoor (conditional)
Ambient temperature range	-5 °C ... 45 °C
Max. rel. humidity	90 %, non-condensing
Permissible installation altitude	2,000 m above sea level
Additional ambient conditions	The ambient conditions prescribed for the storage system apply.

Table 2: Technical data

3.2 System components of the sonnenProtect

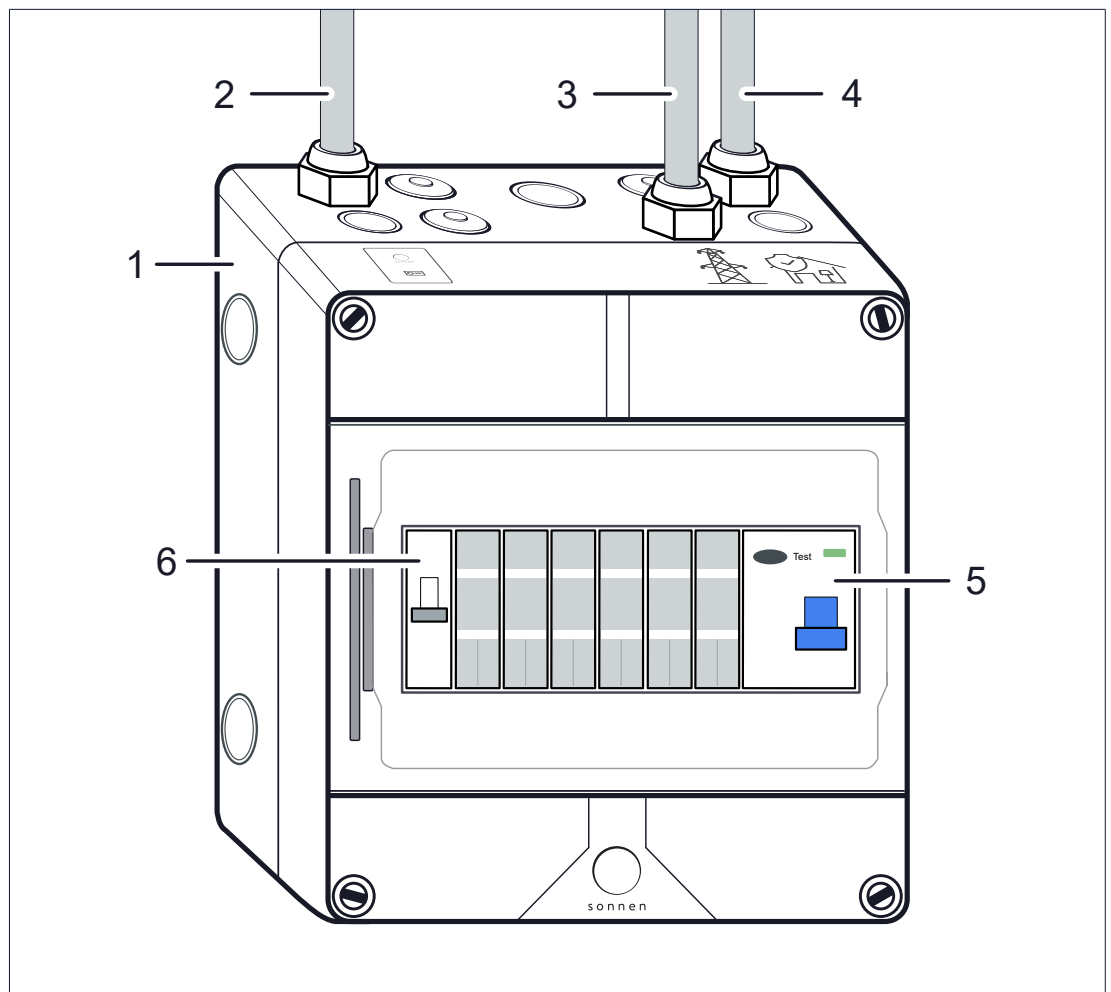


Illustration 1: System components of the sonnenProtect

- | | | | |
|---|----------------------------------|---|----------------------------------|
| 1 | sonnenProtect | 4 | Line to emergency circuit |
| 2 | Line from storage system | 5 | Residual current device (F4.P) |
| 3 | Line from electrical distributor | 6 | Miniature circuit breaker (F3.P) |


3.3 Type plate






The type plate is located on the outer surface of the sonnenProtect. The type plate can be used to uniquely identify the sonnenProtect. The information on the type plate is required for the safe use of the system and for service matters.

The following information is specified on the type plate:

- Item designation
- Item number
- Technical data

3.4 Symbols on the outside of the sonnenProtect

Symbol	Meaning
	Warning: electrical voltage.

Symbol	Meaning
	Warning: electrical voltage. Wait five minutes after switching off (capacitor de-energising time).
	CE mark. The product meets the requirements of the applicable EU Directives.
 	WEEE mark. The product must not be disposed of in household waste, dispose of it through environmentally friendly collection centres.
	Observe the documentation. The documentation contains safety information.

3.5 Storage and transport

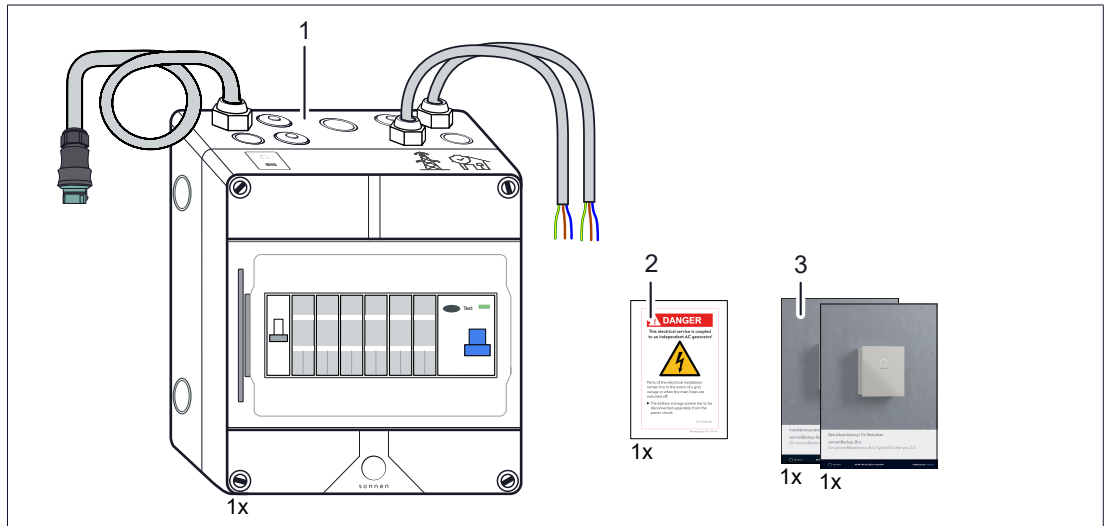
Storage and transport conditions are defined in the product documentation of the storage system.

- Observe the same storage and transport conditions for the sonnenProtect.

4 Mounting

4.1 Scope of delivery

- Check the following scope of delivery to ensure it is complete.



- 1 sonnenProtect incl. connection cables (each about 4.75 m)
- 2 Safety label
- 3 Installation and operating instructions

4.2 Additional parts required

- The following components are not included in delivery and must be selected and ordered by the qualified electrician accordingly:
 - **Earthing cable** (for 'Connecting earthing cable to storage system [P. 18]')
 - Cable cross-section: 10 mm² (CU cross-section)
 - **Miniature circuit breaker** (for 'Positioning components in the electrical distributor [P. 15]')
 - Tripping characteristics: B
 - Nominal current: 20 A
 - Components for forming the emergency circuit(s) (for 'Installing the emergency circuit(s) [P. 14]')
 - This includes all electrical lines, necessary circuit breakers and any possibly necessary components such as distributor housings.

4.3 Selecting the installation location

4.3.1 Requirements for the installation location

- Observe the required ambient conditions (see Technical data [P. 8]).

4.3.2 Observe minimum distances

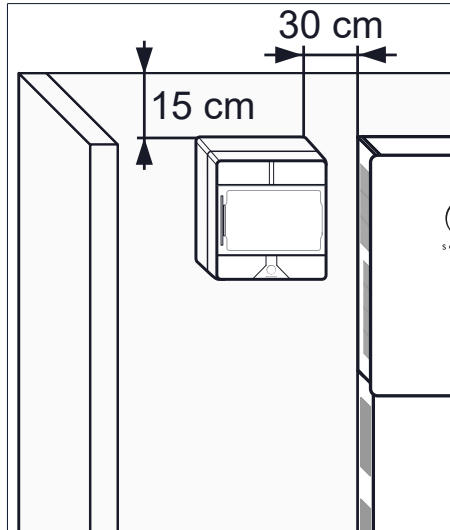


Illustration 2: Minimum distances

The minimum distances ensure that

- the sonnenProtect can be easily reached and
- there is sufficient space for installation and maintenance work.

- Observe the specified minimum distances between the device and the storage system and neighbouring objects.
- Install the sonnenProtect at the same level as the top edge of the storage system, if possible. This keeps the cable length as short as possible.

4.4 Mounting the sonnenProtect

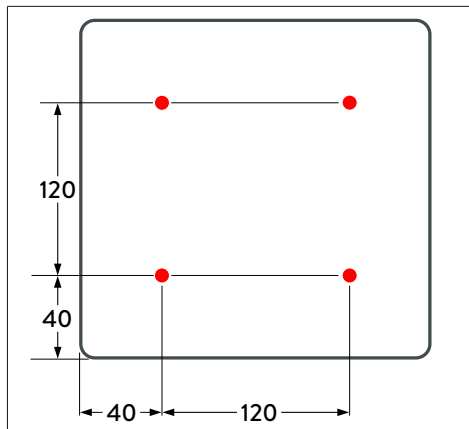


Illustration 3: Drill template for sonnenProtect
(figure is not to scale - all specifications are in millimetres)

- Drill the holes shown in red in the illustration on the left.
- Secure the sonnenProtect using appropriate fastening material.

5 Electrical installation

DANGER

Electrical work on the storage system and electrical distributor

Danger to life due to electrocution!

- ▶ Switch off the storage system to electrically isolate it.
- ▶ Disconnect the relevant electrical circuits.
- ▶ Secure against anyone switching on the device again.
- ▶ Wait five minutes so the capacitors can discharge.
- ▶ Check that the device is disconnected from the power supply.
- ▶ Only authorised electricians are permitted to carry out electrical work.



Due to the extension of the storage system hybrid 9.53 by a sonnenProtect 2500, the system is ready for emergency power as well as operation in islanding mode. These are functionalities that may need to be specified when registering a storage system with the distribution system operator (DSO).

This means that under certain circumstances it may be necessary to change information on the storage system at the DSO or to re-register it.

Recommended procedure for the electrical installation

Carry out the steps in the following order to ensure the smooth electrical installation of the sonnenProtect:

1. Read sections 'Electrical consumers in emergency operation [P. 14]' and 'Implementing the emergency circuit(s) [P. 14]' and, together with the operator of the storage system and the sonnenProtect, define how the emergency circuit or circuits are to be set up. The on-site circumstances must always be taken into account during this process, because with electrical installations where there are few separate circuits, it can be difficult to integrate all of the desired electrical consumers in the emergency circuit or to integrate only the consumers which should be supplied with backup power.
2. Carry out the necessary revision work on the distributor in the building. It is essential to ensure that all electrical cables meet local and national regulations in terms of their dimensioning.
3. If the emergency circuit or circuits are installed accordingly, the sonnenProtect can be connected and the necessary additions can be made to the storage system (see the following sections).
4. When all steps have been implemented and the electrical installation is complete, continue with section 'Commissioning [P. 20]'.

5.1 Installing the emergency circuit(s)

5.1.1 Electrical consumers in emergency operation

Before installation, the installer must explain or clarify with the operator the following points:

- Emergency operation does not offer the same output as grid operation.
- Three-phase current is not available during emergency operation (as only one phase is supplied with power).
- **Which electrical consumers should be supplied with power in emergency operation?** The current paths in the building network must be installed in such a way that the consumers which are relevant in the event of a grid outage are connected to an independent circuit (emergency circuit). The electrical consumers which are crucial for the operator in emergency operation are relevant here. Different consumers which may be important during a grid outage are specified in the sample calculation presented below.
- **How much capacity of the storage system should be reserved as an backup buffer?** The following example, in which a utility room and other important functions within a single-family home are to be supplied with power, can be used to determine this. This example is based on a grid outage lasting one hour (the individual power consumption values are estimated values).

Electrical consumer	Power consumption [W]	Active during grid outage [h]	Electrical work [kWh]
Lighting	500	1	0.5
Freezer	600	0.25	0.15
Heating	700	0.25	0.175
Router, telephone	10	1	0.01
Refrigerator	600	0.25	0.15
Alarm system, grid-connected smoke detector	50	1	0.05
Total			1.04

In this example the total power requirement for a grid outage lasting one hour is approx. 1.1 kWh, in order to maintain the function of all the listed consumers.

- Use this calculation to determine with the operator which emergency buffer should be set, taking the total capacity of the storage system and other requirements (e.g. from sonnenFlat tariff) into account (see Setting the backup buffer [P. 20]).

5.1.2 Implementing the emergency circuit(s)

Basics for the formation of the emergency circuits:

- For systems with emergency power capability, the power distribution must be separated into emergency power authorised and not emergency power authorised parts.
- All components within the emergency power authorised part must be clearly identified by lettering (or graphic symbols).
- **At any time observe further local and national requirements and guidelines regarding emergency power supply!**

When undertaking electrical work on the distributor in the building, the following must be taken into account, among other things:

1. How is the wiring set up to the desired backup consumers?
 - Is independent wiring already in place?
 - Do the existing circuits include electrical consumers that should not be supplied with power in backup operation?
 - Can the existing wiring be split?
 - If the circuits cannot be split, the connected wattage of the consumers which should not be supplied with backup power needs to be taken into account. If loads are too high, the circuit breaker for the sonnenProtect will trip, and then none of the electrical consumers in the backup circuit will be supplied with power.
2. Can the electrical distributor in the building be adapted to suit the new circumstances?
 - Is there enough space to install the necessary circuit breakers and other components in the distributor?

5.2 Positioning components in the electrical distributor

The following components must be installed in the electrical distributor for the sonnenProtect:

- **Miniature circuit breaker (MCB) | type B | 20 A**

A miniature circuit breaker with type B tripping characteristics and a nominal current of 20 A must be installed *upstream of the input* for the sonnenProtect.

5.3 Wiring components in the electrical distributor

Condition:

- ✓ The emergency circuit has been properly installed. The information in section Installing the emergency circuit(s) [P. 14] was observed at all times.
- Wire the sonnenProtect and the other components in the electrical distributor as shown in the following figure.

Note:

- The figures ‘Circuit diagram overview - electrical connection at single-phase mains [P. 16]’ and ‘Circuit diagram overview - electrical connection at three-phase mains [P. 17]’ show the installation of a sonnenBatterie hybrid 9.53 as an example, which has been installed in a single- or three-phase network in accordance with the specifications in the product documentation and to which a sonnenProtect has been added (grey marked area).

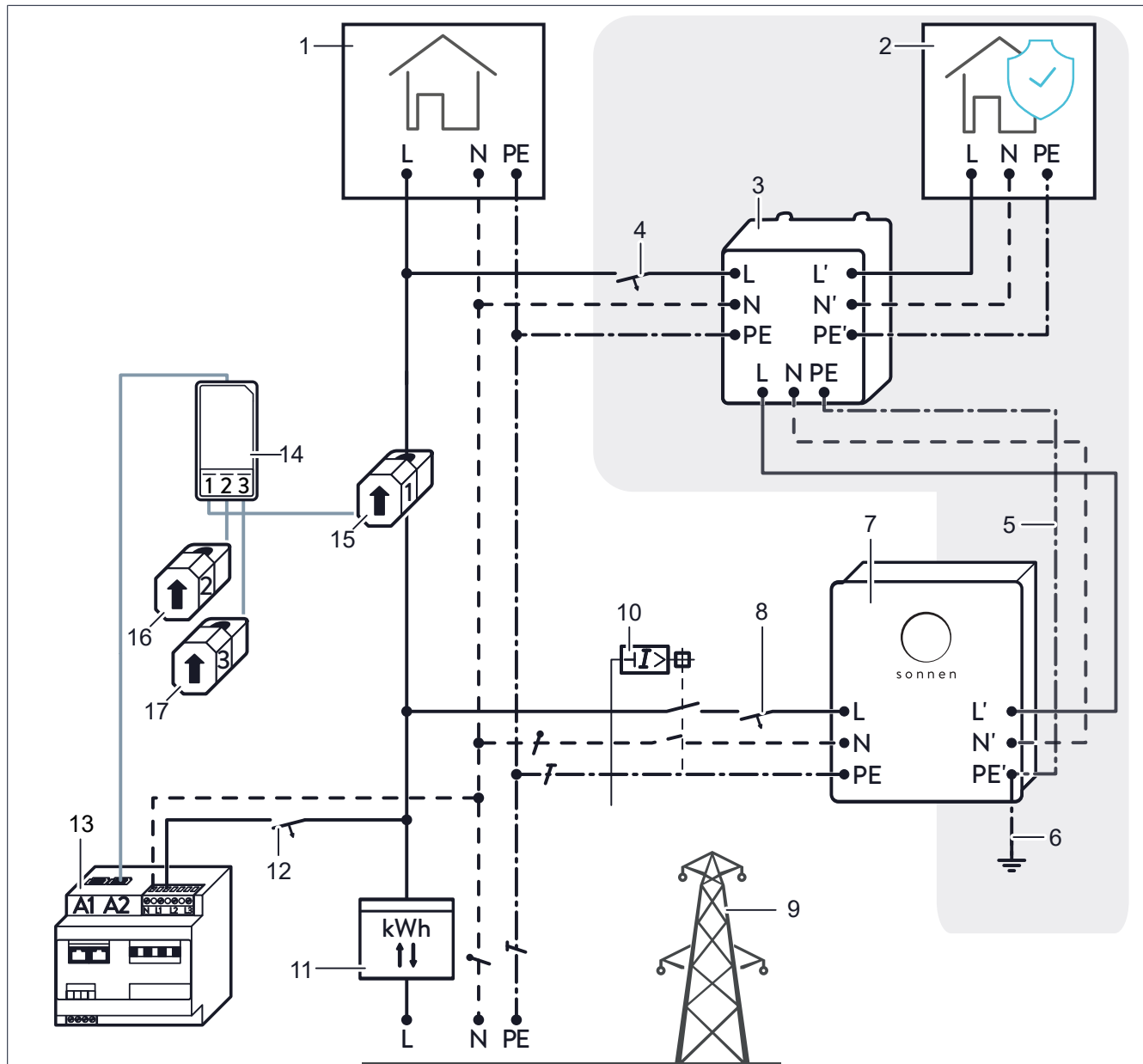


Illustration 4: Circuit diagram overview - electrical connection at single-phase mains

- | | | | |
|---|-----------------------------------|----|--|
| 1 | Consumers in building | 10 | RCD Type B 30 mA |
| 2 | Consumers in emergency circuit | 11 | Bidirectional counter |
| 3 | sonnenProtect with integrated RCD | 12 | Power meter MCB |
| 4 | MCB ¹ Type B 20 A | 13 | Power meter |
| 5 | Line from storage system | 14 | Transformer interface consumption (A2) |
| 6 | Earth connection | 15 | Current transformer for consumption - L1 |
| 7 | Storage system | 16 | Current transformer for consumption - L2 |
| 8 | Storage system MCB | 17 | Current transformer for consumption - L3 |
| 9 | Public electrical mains | | |

¹ Miniature Circuit Breaker

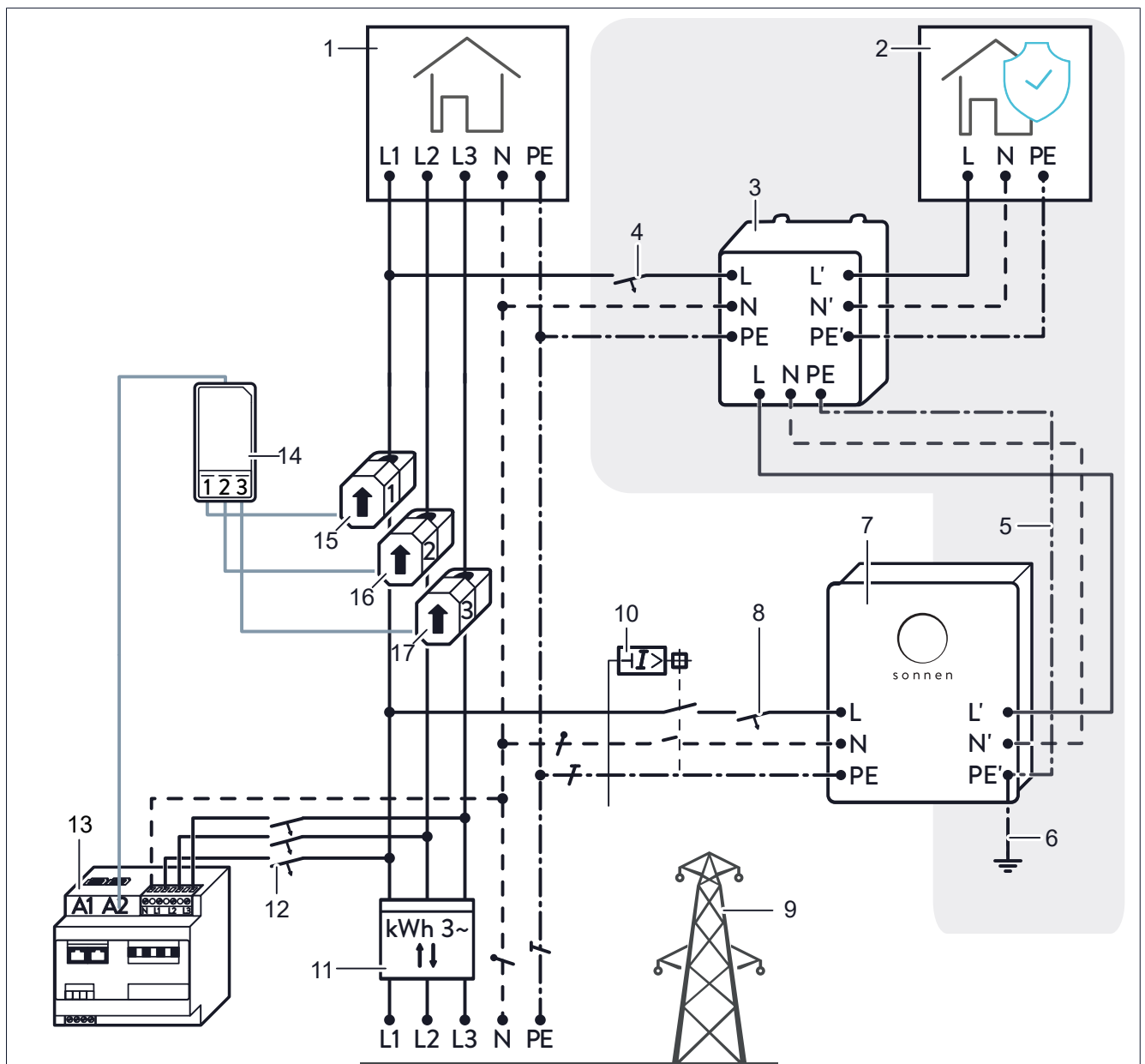


Illustration 5: Circuit diagram overview - electrical connection at three-phase mains

- | | | | |
|---|-----------------------------------|----|--|
| 1 | Consumers in building | 10 | RCD Type B 30 mA |
| 2 | Consumers in emergency circuit | 11 | Bidirectional counter |
| 3 | sonnenProtect with integrated RCD | 12 | Power meter MCB |
| 4 | MCB ² Type B 20 A | 13 | Power meter |
| 5 | Line from storage system | 14 | Transformer interface consumption (A2) |
| 6 | Earth connection | 15 | Current transformer for consumption - L1 |
| 7 | Storage system | 16 | Current transformer for consumption - L2 |
| 8 | Storage system MCB | 17 | Current transformer for consumption - L3 |
| 9 | Public electrical mains | | |

² Miniature Circuit Breaker

5.4 Connecting earthing cable to storage system

An earthing conductor with a cross-section of 10 mm² (CU cross-section) must be installed between the storage system and the main earthing terminal.

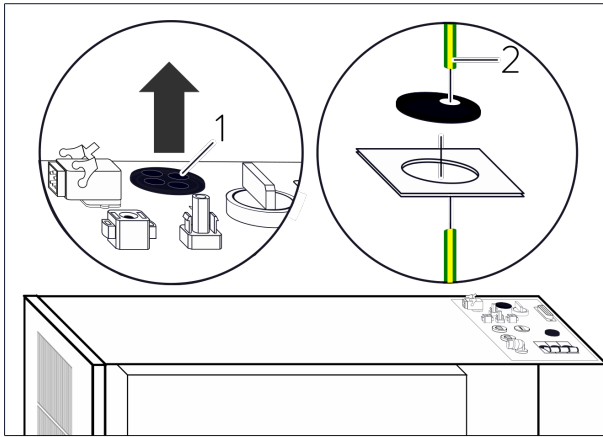


Illustration 6: Connecting earthing line to storage system

Direct a corresponding earthing cable through the designated cable gland (1) into the storage system.

- ▶ Connect the earthing cable (2) to terminal 5 of terminal strip X1.
- ▶ Connect the earthing cable to the main earthing terminal of the building.

5.5 Connecting sonnenProtect to storage system

- ▶ Connect the line of the sonnenProtect to the socket of the storage system (2) using the pre-mounted plug (1).

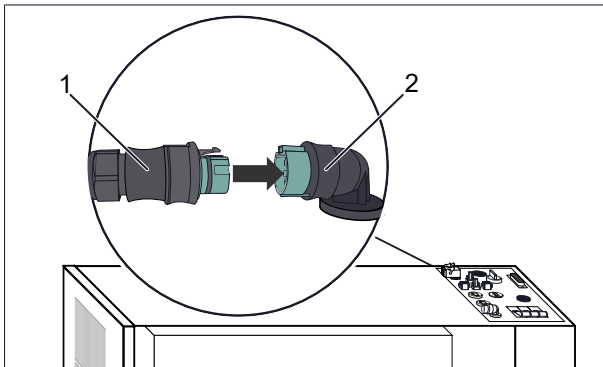


Illustration 7: Connecting sonnenProtect and storage system

5.6 Attaching safety label to the distributor

DANGER

Electrical installation remains live in event of grid outage

Danger to life due to electrocution!

To warn electricians:

- Attach the safety label shown below (included in scope of delivery) to the relevant electrical distributor.

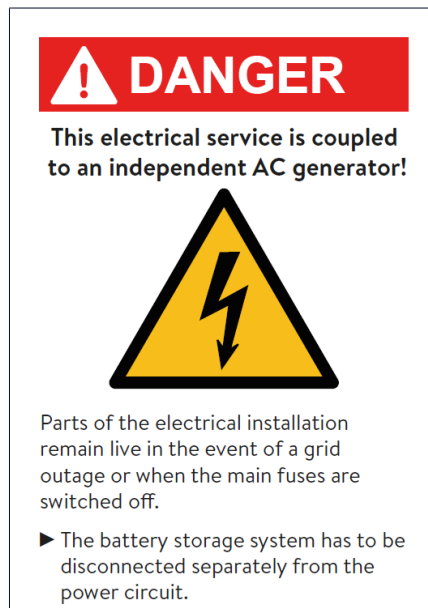


Illustration 8: Label for attachment to the electrical distributor

6 Commissioning

6.1 Commissioning checklist

Check the following points before switching on the storage system and therefore also the sonnenProtect:

- ✓ The sonnenProtect is mounted in a suitable installation location.
- ✓ All cables are completely and correctly connected.
- ✓ A miniature circuit breaker (type B - 20 A) is installed upstream of the input for the sonnenProtect.
- ✓ The electrical cables meet the requirements of all local and national guidelines for cable dimensions.
- ✓ The additional earth connection between the storage system and the main earthing terminal is in place and has a cross-section of 10 mm² (CU cross-section or equivalent).

6.2 Switching on the sonnenProtect and the storage system

To switch on the storage system and the sonnenProtect, the following steps must be performed in the given order:

1. Ensure, that storage system and sonnenProtect are disconnected from the power supply.
2. Ensure, that miniature circuit breaker (F3.P) and the RCD (F4.P) inside the sonnenProtect are switched on.
3. Switch on the grid voltage to the storage system and the sonnenProtect.
4. Switch on the storage system as described in the respective installation instructions.

6.3 Setting up the sonnenProtect

Conditions:

- ✓ The storage system is connected to the router of the home network.
- ✓ Your laptop or PC also accesses the home network.
 - ▶ Navigate to the following internet address: <https://find-my.sonnen-batterie.com>
 - ▶ Start the **commissioning assistant 2.0**.
 - ▶ Run through the commissioning assistant and activate the sonnenProtect at the appropriate point. The emergency buffer can also be set. This buffer can be changed at a later point as described in the following section.

6.4 Setting the backup buffer

Proceed as follows to set what percentage of the capacity of the storage system should be available for the sonnenProtect in the event of a grid outage.

- ▶ On the web interface of the storage system, navigate to the **Settings** page.
- ▶ Change the percentage for 'backup-buffer' to a desired value.

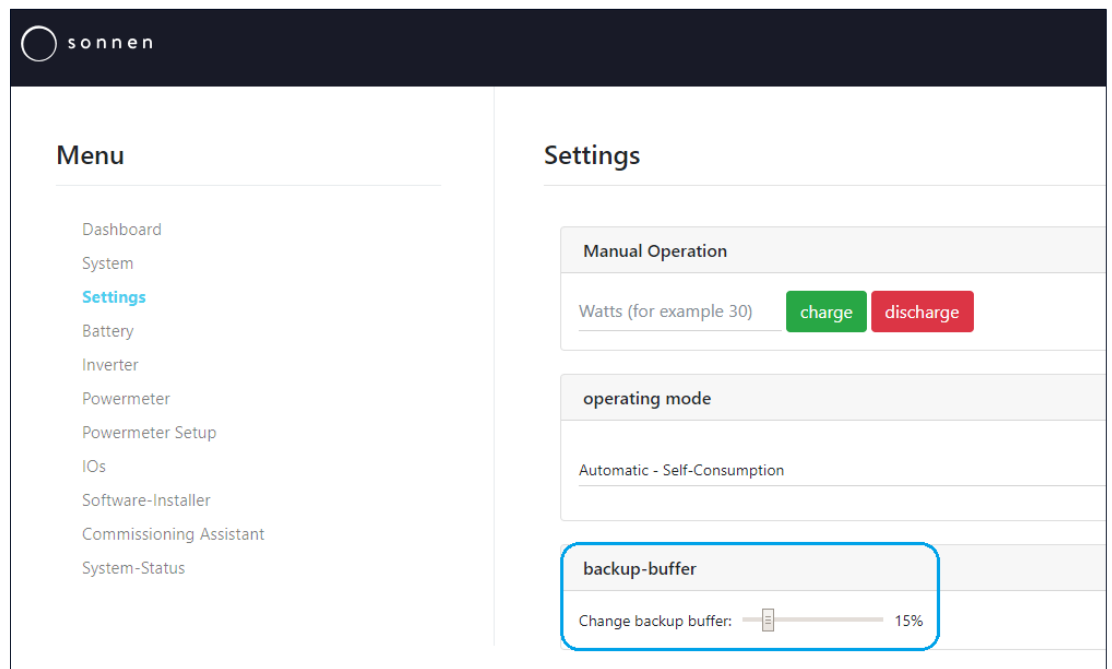


Illustration 9: Settings page

6.5 Testing emergency operation

1. Simulate a grid outage

- Switch the main fuses in the building off, so that the sonnenProtect and storage system are no longer connected to the public electrical grid. The storage system switches to emergency operation after switching off the fuses.

2. Activate a consumer in the emergency circuit

- Activate an electrical consumer connected to the emergency circuit.

3. Check emergency power supply

Emergency operation works properly when the consumer connected to the emergency circuit is receiving electrical energy.

If the emergency operation does not work:

- Check the electrical wiring (see Electrical installation [P. 13]).
- Contact sonnen customer service if the problem cannot be resolved.

7 Decommissioning

NOTICE

Deep-discharge of the battery modules

Destruction of the battery modules!

- ▶ Do not disconnect the storage system from the public grid for long periods of time.
- ▶ Never continue to operate battery modules which have been deep-discharged.

7.1 Switching off the sonnenProtect

To switch off the sonnenProtect manually, the following procedure can be carried out. In order to be able to work on the sonnenProtect safely it must be disconnected from the power supply (see next section).

1. Disconnect the power supply to the storage system as described in the relevant product documentation.
2. Wait at least five minutes until the internally stored energy inside the storage system inverter has discharged.

7.2 Disconnecting the sonnenProtect from the power supply

Before **working on** the sonnenProtect, it must be completely disconnected from the power supply.

1. Switch off the sonnenProtect by disconnecting the power supply to the storage system (as described in the relevant product documentation).
2. Switch off the grid voltage using the miniature circuit breaker for the sonnenProtect.
3. Take steps to ensure that these switches cannot be switched on again.
4. Wait at least five minutes until the internally stored energy inside the storage system inverter has discharged.

Carefully check that there is no voltage inside the sonnenProtect.

8 Uninstallation and disposal

8.1 Uninstallation

DANGER

Improper uninstallation of the sonnenProtect

Danger to life due to electrocution!

- The sonnenProtect must only be uninstalled by authorised electricians.

8.2 Disposal

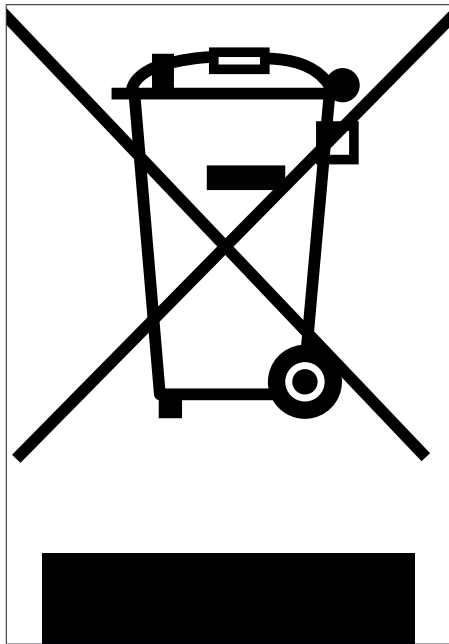


Illustration 10: WEEE symbol

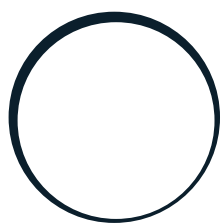
The sonnenProtect must not be disposed of as domestic waste!

- Dispose of the sonnenProtect in an environmentally friendly way through suitable collection systems.

9 Troubleshooting

Fault	Possible causes	Rectification
Grid operation (no grid outage)		
The electrical consumers in the emergency circuit are not supplied with energy in grid operation.	The lines of the emergency circuit have not been connected correctly.	Check the electrical wiring of the emergency circuit.
	The miniature circuit breaker in the supply line of the sonnenProtect is switched off.	Switch on the miniature circuit breaker in the supply line of the sonnenProtect.
	The miniature circuit breaker (F3.P) in the sonnenProtect is switched off.	Switch on the miniature circuit breaker (F3.P) inside the sonnenProtect.
	The RCD (F4.P) in the sonnenProtect is switched off.	Switch on the RCD (F4.P) inside the sonnenProtect.
Emergency operation (grid outage) - Emergency operation does not start		
Emergency operation doesn't start. The eclipse of the storage system is off .	The batteries of the storage system have discharged so much that further discharging would lead to a deep discharge state and therefore damage the batteries.	<p>If the PV system generates electrical power, the emergency operation will continue as soon as excess power is available.</p> <p>If the PV system does not generate electrical power the only thing to do is wait until the grid outage passes and the public electrical grid once again starts supplying electrical energy. Then the sonnenProtect automatically switches to grid operation.</p>
	The storage system is switched off.	Switch on the storage system.
Emergency operation doesn't start. The eclipse of the storage system is green .	The miniature circuit breaker (F3.P) in the sonnenProtect is switched off.	Switch on the miniature circuit breaker (F3.P) inside the sonnenProtect.
	The RCD (F4.P) in the sonnenProtect is switched off.	Switch on the RCD (F4.P) inside the sonnenProtect.
Emergency operation doesn't start. The eclipse of the storage system is orange .	Electrical consumers with too high power consumption are connected to the emergency circuit.	Switch off electrical consumers or reduce their power consumption.
		Only connect electrical consumers to the emergency circuit when they have a power consumption that does not exceed the nominal power or (when switching on) the maximum power of the sonnenProtect.

Fault	Possible causes	Rectification
Emergency operation (grid outage) - Emergency operation stops		
Emergency operation stops. The miniature circuit breaker and the RCD in the sonnenProtect have not switched off. The eclipse of the storage system is off .	The batteries of the storage system have discharged so much that further discharging would lead to a deep discharge state and therefore damage the batteries.	<p>If the PV system generates electrical power, the emergency operation will continue as soon as excess power is available.</p> <p>If the PV system does not generate electrical power the only thing to do is wait until the grid outage passes and the public electrical grid once again starts supplying electrical energy. Then the sonnenProtect automatically switches to grid operation.</p>
Emergency operation stops. The miniature circuit breaker (F3.P) in the sonnenProtect has switched off. The eclipse of the storage system is green .	The miniature circuit breaker detected an overload, this means electrical consumers with too high power consumption are connected to the emergency circuit.	<p>Switch off electrical consumers so that the power consumption does not exceed the nominal power or (when switching on) the maximum power of the sonnenProtect.</p> <p>Then switch on the miniature circuit breaker (F3.P) again. The storage system automatically restarts the emergency operation.</p>
Emergency operation stops. The RCD (F4.P) in the sonnenProtect has switched off. The eclipse of the storage system is green .	The RCD has detected fault currents in the emergency circuit.	<p>Check the wiring and the connected electrical consumers of the emergency circuit and correct the error.</p> <p>Then switch on the RCD (F4.P) again. The storage system automatically restarts the emergency operation.</p>
Emergency operation stops. The miniature circuit breaker and the RCD in the sonnenProtect have not switched off. The eclipse of the storage system is orange .	The control of the storage system detected an overload, this means there are electrical consumers connected to the emergency circuit with a too high power consumption.	<p>Switch off electrical consumers so that the power consumption does not exceed the nominal power or (when switching on) the maximum power of the sonnenProtect.</p> <p>The storage system automatically restarts the emergency operation. The eclipse of the storage system is green.</p> <p>If the emergency operation does not start and the eclipse stays orange, the storage system has already unsuccessfully tried three times to start the emergency operation. Then the only thing to do is wait until the connection to the public electrical grid can be restored.</p>



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