



Manual | for Electricians

Cascade

sonnenBatterie 10 / sonnenBatterie 10 performance

IMPORTANT

- ▶ This entire document must be read carefully.
- ▶ This document must be kept for reference purposes.

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1 Information about this document

These instructions describe how to install a sonnenBatterie 10 and sonnenBatterie 10 performance cascade.

- ▶ Make sure you read this entire document carefully.
- ▶ Keep this document for reference purposes.

1.1 Using this document

These instructions describe how to install the cascade, which comprises two to nine identical sonnenBatterie 10 or sonnenBatterie 10 performance storage systems.

- ▶ The complete description of the installation process can be found in the installation instructions for the storage system in question.
- ▶ Always observe the product documentation for the relevant storage system.

1.2 Target group of this document

This document is intended for operators and installers of the sonnenBatterie cascade.

Sections marked with the following note must only be carried out by individuals who belong to the target group specified therein.

NOTICE

Target group: authorised electricians

The actions described in this section must only be carried out by this target group.

1.3 Designations in this document

The following designations are used in this document:

Complete designation	Designation in this document
sonnenBatterie 10 / sonnenBatterie 10 performance	Storage system
Authorised electrician	Electrician performing the installation/Installer
Customer who purchased the storage system	Operator

1.4 Cascade product designation

The designation is composed of the following components: *sB10K* (sonnenBatterie 10 cascade) or *sB10pK* (sonnenBatterie 10 performance cascade), the number of storage systems and the total capacity. The total capacity is the sum of the individual capacities of the storage systems.

Example:

3 × sonnenBatterie10/11 (4 × 2.75 kWh) = **sB10K 3/33**

1.5 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

2 Product description

2.1 Technical data and cascade options for the sonnenBatterie 10



The technical data can be found in the relevant operating and installation instructions for the storage system in question. The data that changes when a cascade is formed is provided in the following.

Storage capacity and output of a sonnenBatterie 10 cascade

Cascade	Capacity [kWh]			Number of cabinets	Output [kW]
	Main cabinet	Extension cabinet	Total		
2 storage systems	2 × 5.5	-	11	2	6.8
	2 × 11	-	22	2	9.2
	2 × 11	2 × 11	44	4	9.2
3 storage systems	3 × 5.5	-	16.5	3	10.2
	3 × 11	-	33	3	13.8
	3 × 11	3 × 11	66	6	13.8
6 storage systems	6 × 5.5	-	33	6	20.4
	6 × 11	-	66	6	27.6
	6 × 11	6 × 11	132	12	27.6
9 storage systems	9 × 5.5	-	49.5	9	30.6
	9 × 11	-	99	9	41.4
	9 × 11	9 × 11	198	18	41.4

Weight of sonnenBatterie 10 cascade

Cascade	Capacity [kWh]		Total weight [kg]
	Main cabinet	Extension cabinet	
2 storage systems	2 × 5.5	-	196
	2 × 11	-	276
	2 × 11	2 × 11	435
3 storage systems	3 × 5.5	-	294
	3 × 11	-	414
	3 × 11	3 × 11	612
6 storage systems	6 × 5.5	-	588
	6 × 11	-	828
	6 × 11	6 × 11	1,144
9 storage systems	9 × 5.5	-	882
	9 × 11	-	1,242
	9 × 11	9 × 11	1,675

2.2 Technical data and cascade options for the sonnenBatterie 10 performance



Cascading of storage systems with different outputs is not recommended as the complete range of functions cannot be guaranteed.

Storage capacity and output of a sonnenBatterie 10 performance cascade

Cascade	Capacity [kWh]			Number of cabinets	Output ¹ [kW]
	Main cabinet	Extension cabinet	Total		
2 storage systems	2 x 11	-	22	2	14
	2 x 22	-	44	2	19.8
	2 x 22	2 x 11	66	4	19.8
	2 x 22	2 x 22	88	4	19.8
	2 x 22	2 x 33	110	4	19.8
3 storage systems	3 x 11	-	33	3	21
	3 x 22	-	66	3	29.7
	3 x 22	3 x 11	99	6	29.7
	3 x 22	3 x 22	132	6	29.7
	3 x 22	3 x 33	165	6	29.7
4 storage systems	4 x 11	-	44	4	28
	4 x 22	-	88	4	39.6
	4 x 22	4 x 11	132	8	39.6
	4 x 22	4 x 22	176	8	39.6
	4 x 22	4 x 33	220	8	39.6
5 storage systems	5 x 11	-	55	5	35
	5 x 22	-	110	5	49.5
	5 x 22	5 x 11	165	10	49.5
	5 x 22	5 x 22	220	10	49.5
	5 x 22	5 x 33	275	10	49.5
6 storage systems	6 x 11	-	66	6	42
	6 x 22	-	132	6	59.4
	6 x 22	6 x 11	198	12	59.4
	6 x 22	6 x 22	264	12	59.4
	6 x 22	6 x 33	330	12	59.4
7 storage systems	7 x 11	-	77	7	49
	7 x 22	-	154	7	69.3
	7 x 22	7 x 11	231	14	69.3
	7 x 22	7 x 22	308	14	69.3
	7 x 22	7 x 33	385	14	69.3

Cascade	Capacity [kWh]			Number of cabinets	Output ¹ [kW]
	Main cabinet	Extension cabinet	Total		
8 storage systems	8 x 11	-	88	8	56
	8 x 22	-	176	8	79.2
	8 x 22	8 x 11	254	16	79.2
	8 x 22	8 x 22	352	16	79.2
	8 x 22	8 x 33	440	16	79.2
9 storage systems	9 x 11	-	99	9	63
	9 x 22	-	198	9	89.1
	9 x 22	9 x 11	297	18	89.1
	9 x 22	9 x 22	396	18	89.1
	9 x 22	9 x 33	495	18	89.1

Weight of sonnenBatterie 10 performance cascade

Cascade	Capacity [kWh]		Total weight [kg]
	Main cabinet	Extension cabinet	
2 storage systems	2 x 11	-	322
	2 x 22	-	482
	2 x 22	2 x 11	668
	2 x 22	2 x 22	748
	2 x 22	2 x 33	828
3 storage systems	3 x 11	-	483
	3 x 22	-	723
	3 x 22	3 x 11	962
	3 x 22	3 x 22	1,042
	3 x 22	3 x 33	1,122
4 storage systems	4 x 11	-	644
	4 x 22	-	964
	4 x 22	4 x 11	1,256
	4 x 22	4 x 22	1,336
	4 x 22	4 x 33	1,416
5 storage systems	5 x 11	-	805
	5 x 22	-	1,205
	5 x 22	5 x 11	1,550
	5 x 22	5 x 22	1,630
	5 x 22	5 x 33	1,710
6 storage systems	6 x 11	-	966
	6 x 22	-	1,446
	6 x 22	6 x 11	1,844
	6 x 22	6 x 22	1,924
	6 x 22	6 x 33	2,004

¹ Power module (9.9 kW)

Cascade	Capacity [kWh]		Total weight [kg]
	Main cabinet	Extension cabinet	
7 storage systems	7 × 11	-	1,127
	7 × 22	-	1,687
	7 × 22	7 × 11	2,138
	7 × 22	7 × 22	2,218
	7 × 22	7 × 33	2,298
8 storage systems	8 × 11	-	1,288
	8 × 22	-	1,928
	8 × 22	8 × 11	2,432
	8 × 22	8 × 22	2,512
	8 × 22	8 × 33	2,410
9 storage systems	9 × 11	-	1,449
	9 × 22	-	2,169
	9 × 22	9 × 11	2,726
	9 × 22	9 × 22	2,806
	9 × 22	9 × 33	2,886

2.3 Overview of function and installation



These cascading instructions are additional to the applicable product documentation for the storage system. The product documentation, above all the installation instructions, must always be observed.

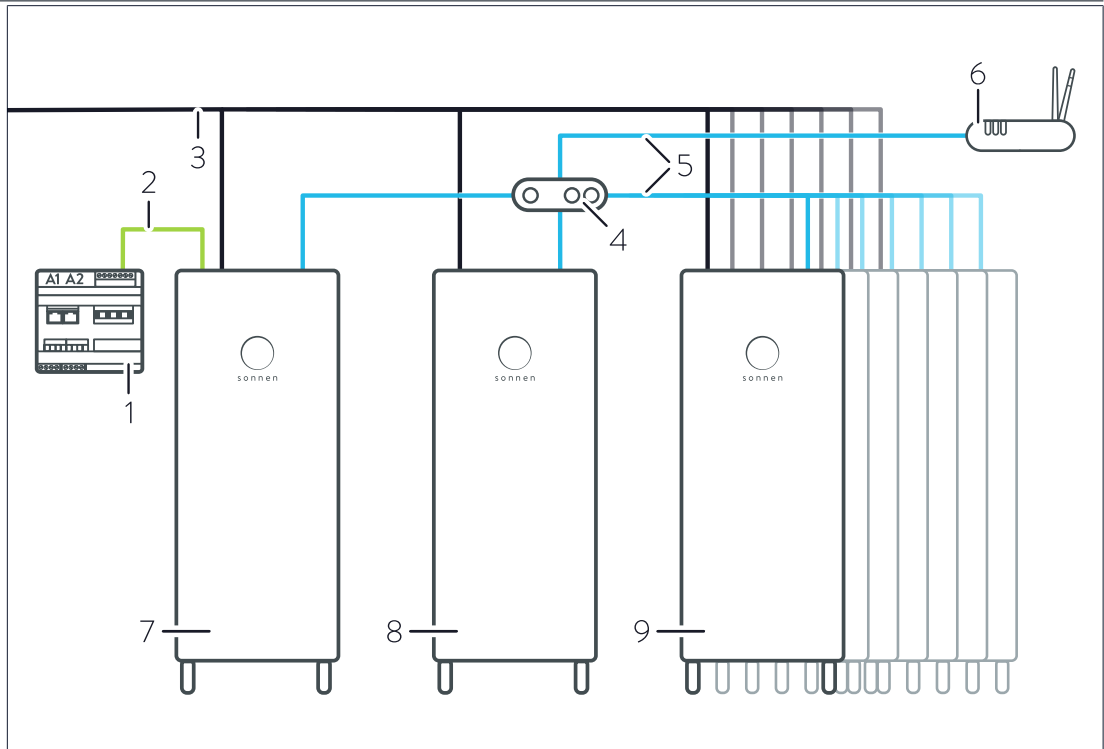


Illustration 1: System components

- | | |
|--------------------------------|------------------------------|
| 1 Power meter WM271 | 2 Modbus line * |
| 3 Mains line* | 4 Switch* |
| 5 Ethernet line * | 6 Home network router* |
| 7 Primary storage system | 8 Secondary storage system 1 |
| 9 Secondary storage system 2-8 | |

*not included in scope of delivery

- A cascade consists of at least two and no more than nine individual sonnenBatterie 10 or sonnenBatterie 10 performance storage systems.
 - All storage systems are the same type and have identical capacities (number of battery modules) installed.
- During installation one storage system is designated as the primary storage system while the others (up to eight) are designated as secondary storage systems. The primary storage system controls the secondary storage systems after installation is complete.
- All communication lines (e. g. Modbus line, signal line) are connected to the primary storage system.

- The storage systems are connected to each other by Ethernet line. An external switch is installed for this purpose, to which all storage systems are connected. The switch is connected to the home network router.
 - The external switch can be omitted if a router with a sufficient number of free slots is available.
- Backup power function (optional): A sonnenProtect (sonnenProtect 4000 or sonnenProtect 8000, depending on the storage system) can be added to the primary storage system and optionally the secondary storage systems within the cascade. The sonnenProtect is installed and connected as described in the relevant installation instructions.

3 Mounting

3.1 Selecting the installation location



The heavy floor load applied by the storage system must be taken into account when selecting the installation location. The specified weight for the entire system can be found in the section Product description [P. 6]. Applicable building codes must be observed in each case!

3.2 Observing minimum distances

- Observe the specified minimum distances to neighbouring objects, walls and ceilings.

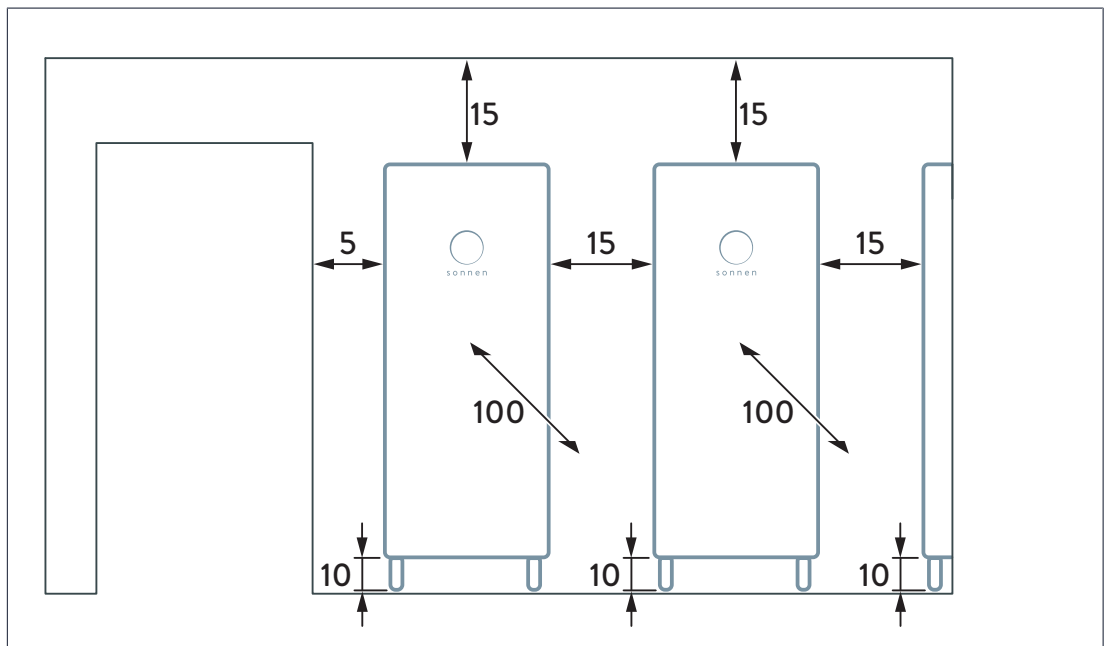


Illustration 2: Minimum distances

The minimum distances ensure that the following conditions are met:

- Sufficient heat dissipation.
- Easy opening of the storage system.
- Sufficient space for installation and maintenance work.

3.3 Installing the storage systems

- Install the storage systems in a suitable location as described in the relevant installation instructions.

4 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 licensed electricians are permitted to carry out electrical work.

NOTICE

Connection lines too long

- ▶ Ensure that the mains line and signal line connected to the storage system do not exceed a maximum length of **30 m**.

NOTICE

Communication lines too long

- ▶ The Ethernet line connected to the storage system must not exceed a maximum length of **100 m**.
- ▶ The Modbus line connected to the storage system must not exceed a maximum length of **150 m**.

4.1 General information about installation

- ▶ Always observe the specifications in the installation instructions for the storage system.

Important note: The conditions described in the installation instructions for the relevant storage system apply to the installation of the residual current device (RCD) marked in figure 'Overview circuit diagram – electrical connection of sonnenBatterie 10 cascade (with 3 storage systems) [P. 15]'.

If an RCD of the required type is already installed, it is not necessary to install an additional RCD.

4.2 Selecting the measurement concept

- The standard measurement concept (also known as the consumption measurement or CP measurement concept) is recommended for measuring the performance of a sonnenBatterie 10 or sonnenBatterie 10 performance cascade. This matches the setup of the installation described in the following section (Wiring components [P. 14]).
- The Grid measurement concept (also referred to as GP measurement concept) should only be used if the standard measurement concept can't be implemented or if the individual components for the power measurement are already installed as the Grid measurement concept and elaborate conversion is to be avoided. Please note that the Grid measurement concept can lead to a lower efficiency of the storage system.

- If multiple sonnenBatterie 10 or sonnenBatterie 10 performance cascades are connected in parallel, and all are connected to the same production system (e.g. PV system), the GP measurement concept (mains linking measurement) must not be used.

4.3 Electrical connection

4.3.1 Wiring components

- The following circuit diagram overviews show an example of how to electrically connect a sonnenBatterie 10 cascade (single-phase storage systems) and a sonnenBatterie 10 performance cascade (three-phase storage systems), comprising three storage systems each.
- ▶ During installation, note the information and overview circuit diagrams in the installation instructions for the storage system in question.



Note that for the sonnenBatterie 10 cascade (single-phase), the separate storage systems may need to be distributed individually on the three phases of the building mains. Specifications from the DNO in charge concerning the connection must be followed at all times.

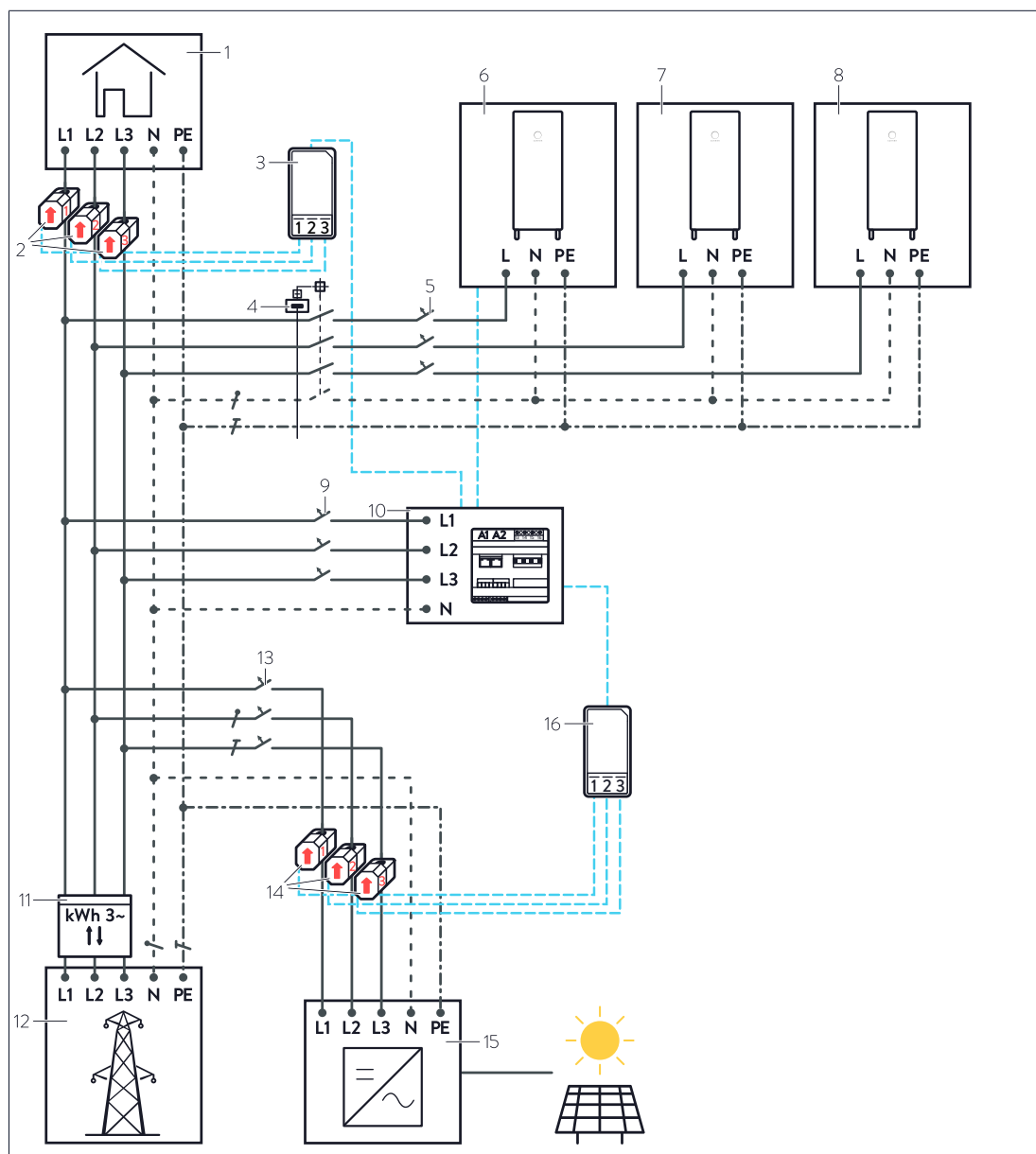


Illustration 3: Overview circuit diagram – electrical connection of sonnenBatterie 10 cascade (with 3 storage systems)

- | | |
|--|--|
| 1 Consumers in building | 9 MCB ² |
| 2 CT for consumption – L1, L2, L3 | 10 Power meter WM271 |
| 3 Transformer interface for consumption (A2) | 11 Bidirectional counter |
| 4 RCD (in TT networks ³) | 12 Public electrical mains |
| 5 MCB | 13 MCB for PV inverter |
| 6 Primary storage system | 14 CT for production – L1, L2, L3 |
| 7 Secondary 1 storage system | 15 PV inverter |
| 8 Secondary 2 storage system | 16 Transformer interface for production (A1) |

² Fuse protection of line must be ensured.

³ Nominal differential current of 300 mA, 100 mA or 30 mA. Type of RCD depends on local conditions. Observe country-specific requirements.

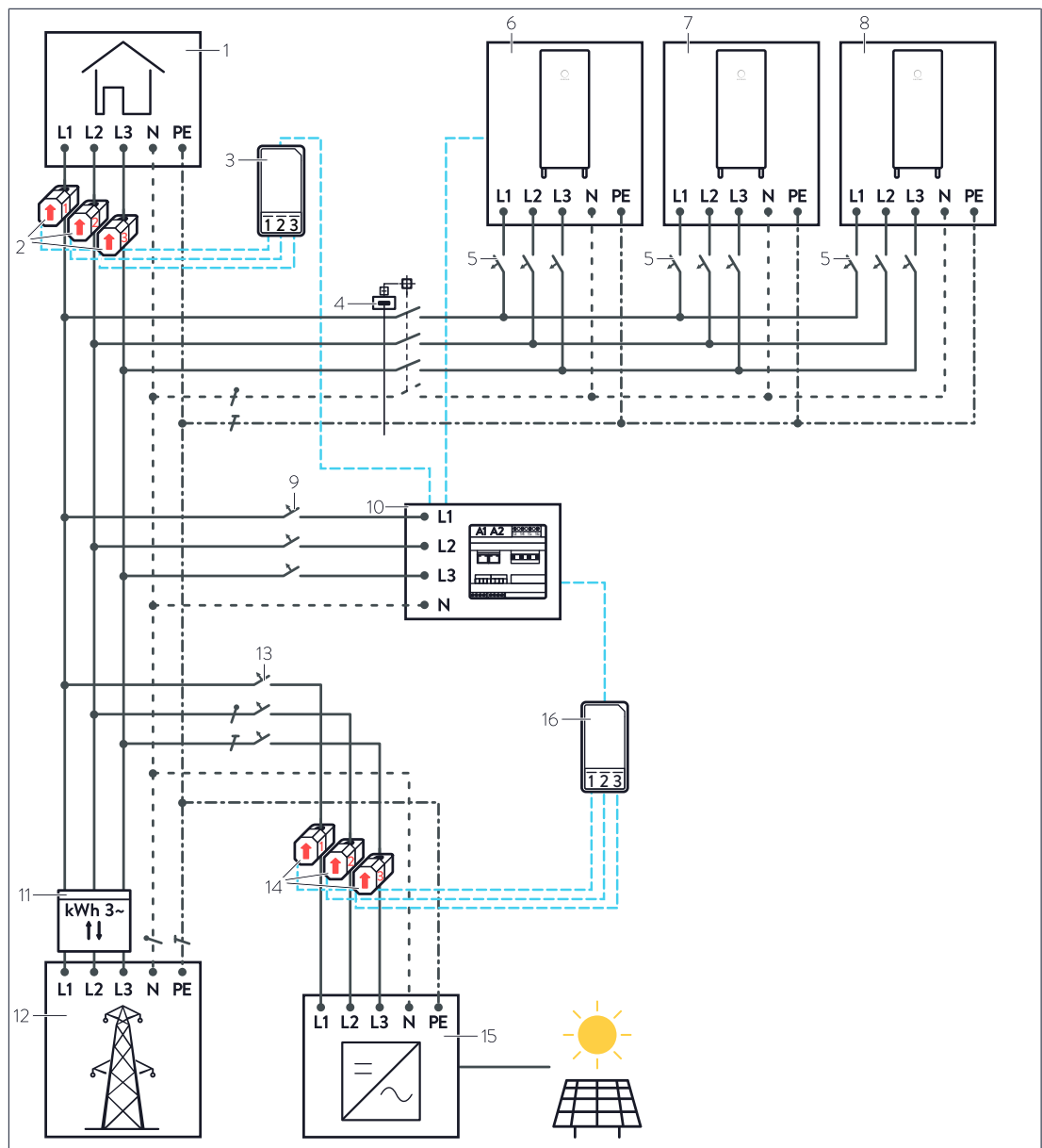


Illustration 4: Overview circuit diagram – electrical connection of sonnenBatterie 10 performance cascade (with 3 storage systems)

- | | |
|--|--|
| 1 Consumers in building | 9 MCB ⁴ |
| 2 CT for consumption – L1, L2, L3 | 10 Power meter WM271 |
| 3 Transformer interface for consumption (A2) | 11 Bidirectional counter |
| 4 RCD (in TT networks ⁵) | 12 Public electrical mains |
| 5 MCB | 13 MCB for PV inverter |
| 6 Primary storage system | 14 CT for production – L1, L2, L3 |
| 7 Secondary 1 storage system | 15 PV inverter |
| 8 Secondary 2 storage system | 16 Transformer interface for production (A1) |

⁴ Fuse protection of line must be ensured.

⁵ Nominal differential current of 300 mA, 100 mA or 30 mA. Type of RCD depends on local conditions. Observe country-specific requirements.

4.3.2 Connecting the mains lines

Observe the following points:

- The mains connection of the individual storage systems be fuse-protected as specified in the following:
 - sonnenBatterie 10: miniature circuit breaker, type B, 20 A or 25 A
 - sonnenBatterie 10 performance: miniature circuit breaker, type B, 16 A
- The cable cross-section from the miniature circuit breaker to the electrical consumer must be adapted to suit the larger loads if necessary.
- ▶ Connect the mains lines as described in the installation instructions for the storage system in question (section ‘Connecting the mains line’).

4.3.3 Connecting the Ethernet lines

The connection to the customer router is established via a switch. If the customer router has a sufficient number of free slots, the storage systems can be connected directly to the router. A switch is not necessary in this case.

- ▶ Connect the Ethernet lines as shown in figure System components [P. 10]. Note that the Ethernet lines, switch and router are not included in scope of delivery.
- ▶ The required output type can be found in section ‘Establishing an internet connection’ in the storage system installation instructions.

4.3.4 Connecting the Modbus line

- ▶ Connect the Modbus line to the primary storage system as shown in figure System components [P. 10].

4.3.5 Connecting the signal line

- ▶ Connect the signal line to the primary storage system as described in the storage system installation instructions.

5 Commissioning



Ensure that the TCP or UDP ports for the following services are released for outgoing connections in the internet router on the home network: TCP ports: 443 (https), 18883 (MQTT-TLS); UDP ports: 123 (NTP), 1196 (VPN)



Emergency buffer (optional sonnenProtect): The emergency buffer set on the primary storage system automatically applies to the secondary storage systems as well. This means that the selected storage capacity will be reserved for all storage systems, regardless of whether a sonnenProtect is connected or not.

5.1 Commissioning after first-time installation

Conditions:

- ✓ All storage systems are in operation (Eclipse is pulsing white).
- ✓ All storage systems are connected to the network.
- ✓ All storage systems have software version 1.2.0 or higher.
- ▶ Check each storage system individually to ensure that the appropriate software version is installed.
- ▶ If not, perform the update manually.
- ▶ Proceed as follows to configure and commission the sonnenBatterie 10/ sonnenBatterie 10 performance cascade.
- ▶ Establish the connection between the laptop/PC and primary storage system, as described in the relevant installation instructions.
- ▶ Switch to the Commissioning - System selection page of the commissioning assistant, as described in the relevant installation instructions. If the page is not displayed: ensure that the first page of the commissioning assistant is displayed.



- ▶ On the Commissioning - System selection page, select the sonnenBatterie pro button. Ensure that the Initial commissioning button is selected.

► Enter the system data:

The screenshot shows a web-based commissioning interface for Sonnen storage systems. At the top, it says 'Setup (1- or 3-phase)' with two radio buttons: '1~' (unchecked) and '3~' (checked). Below this is a checkbox for 'Enable phase balance' which is also unchecked. The main section is divided into two columns. The left column is for 'Serial number for the primary storage system' with a text input field containing '12345'. The right column is for 'Node phase' with a dropdown menu showing 'Phase 1'. Below these, there is a section for 'Serial numbers for the secondary storage systems' with two text input fields containing '67890' and '12345'. To the right of these fields are two dropdown menus for 'Node phase' showing 'Phase 2' and 'Phase 3', each with a red 'Remove' button next to it. At the bottom left of this section is a blue '+ Add system' button. At the bottom right of the entire form is a blue 'Start pairing' button.

Required entries:

- Setup (1 or 3-phase): the building connection phases must be specified in order to ensure the correct function of the cascade.
 - Activate phase compensation: needed for sonnenBatterie 10 (single-phase) in order to prevent an unbalanced phase load when there are output differences between the individual storage systems. Relevant for all counties with unbalanced phase load limitation.
 - Primary serial number: enter the serial number of the primary storage system.
 - Secondary serial number: enter the serial number(s) of the secondary storage system(s).
 - Node phase (connection phase): the connection phase for the respective storage system must be specified in order to ensure correct phase compensation.
- Click on 'Start pairing'.
- Run the commissioning assistant until it is fully completed.

5.2 Commissioning existing storage systems

In the case of storage systems that were previously multiple storage systems connected in parallel, proceed as follows:

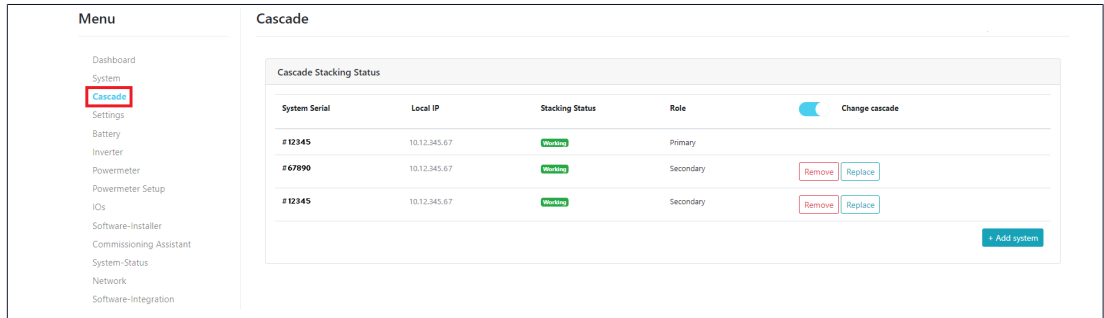
1. Disconnect the power supply to all storage systems (see section 'Decommissioning' in the relevant installation instructions).
2. Define which storage system will be the primary storage system and which will be the secondary storage systems.
3. Carry out all necessary installation changes (see Electrical installation [P. 13]).
4. Uninstall and remove superfluous power meters for the secondary storage systems.
5. Recommission the storage systems.
6. Carry out the commissioning as described in section Commissioning after first-time installation [P. 18].

6 Completing installation

6.1 Checking the cascade

Proceed as follows to check the status of the individual storage systems in the cascade:

- On the web interface of the storage system, navigate to the Cascade page.
- Check the status of the individual storage system in the overview.



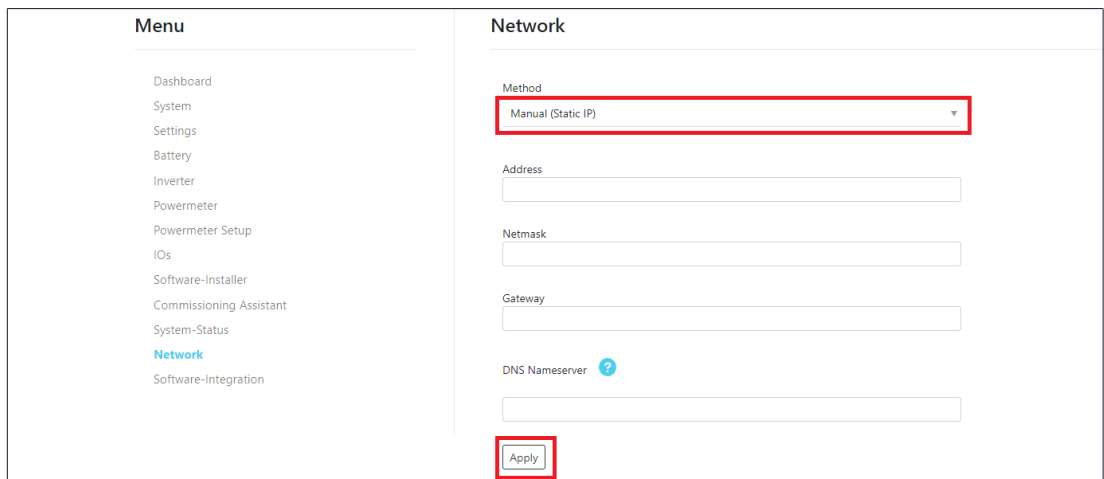
The Cascade option can be used to add more secondary storage systems, replace systems or remove them.

6.2 Changing the IP address allocation method (optional)

In some IT networks it is necessary to allocate static IP addresses to individual network subscribers in order to avoid addressing conflicts. Frequent reallocation of network addresses can lead to cascade malfunctions.

Proceed as follows to change the IP address allocation method from Automatic (DHCP) to Manual (Static IP):

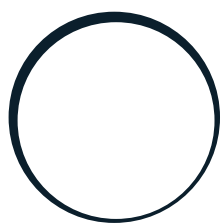
- On the web interface of the storage system, navigate to the Network page.



- Under Method, select Manual (Static IP) from the dropdown menu.
- Enter the rest of the information and save this by clicking on Apply.

7 Display on the internet portal

- The online portal presents current information and data for the storage system.
 - The description of the individual operating steps, the displays and diagrams and the registration process can be found in the operating instructions for the relevant storage system.
- To view the data for the cascade, the system must be registered with the **serial number of the primary storage system**. The data for the entire system, such as the PV production, consumption and discharge, is displayed on the internet portal for the primary storage system.
- In theory it is also possible to log in using the serial number of one of the secondary storage systems, but please note that in this case not all data will be displayed after the cascade is configured, not even for the individual storage systems.



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