Operating instructions | for Operators

sonnenBatterie hybrid 9.53

EN

IMPORTANT

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

Publisher	
sonnen GmbH	
Am Riedbach 1	
D-87499 Wildpoldsried	
Service number	+61 13 7666
Email	info@sonnen.com.au

Document	
Document number / Version	564 / 03
Part number / Revision	1001821 / 02
Valid for	AU, NZ
Publication date	11/08/2022
The latest version can be accessed at	my.sonnen.de (in the Downloads section)

36028797279441931

Table of contents

1 Information about this document

This document describes the operation of the sonnenBatterie hybrid 9.53.

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

1.1 Target group of this document

This document is intended for the storage system operator.

1.2 Designations in this document

The following designations are used in this document:

Complete designation	Designation in this document
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

2 Safety

2.1 Intended Use

The sonnenBatterie hybrid 9.53 is a battery storage system which can be used to store electrical energy. Improper use of this system 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 prouct:

- The storage system must not be installed in any kind of combination.
- The storage system must be fully installed in accordance with the installation instructions.
- The storage system must be installed by a licensed electrician. Country-specific regulations concerning electrical installations must be observed at all times.
- The storage system is only allowed to be operated with PV generators of Class A rating according to IEC 61730.
- The storage system must only be used at a 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.
- Operation of the battery modules outside of its storage system.

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

2.2 Operating the storage system

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

- The storage system 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.

2.3 Product modifications or changes to the product environment

- Only use the storage system in its original state - without any unauthorised modifications - and when it is in proper working order.
- Safety devices must never be overridden, blocker or tampered with.
- The interfaces of the storage system must be wired in accordance with the product documentation.
- An appropriate and readily accessible disconnect device shall be incorporated in the fixed wiring.
- All repairs on the storage system must be performed by authorised service technicians only.

- The replacement of battery modules must be performed by authorised service technicians only. When replacing batteries, replace with the same type and number of batteries or battery modules.

2.4 Voltage in and on the storage system

The storage system contains live electrical parts, which poses a risk of electrical shock.

Therefore:

▶ Do not open the storage system.

The plug-in connectors on the top side of the storage system are directly connected to the PV generator of the PV system. This means, there is voltage present on the PV plug-in connectors when the PV system generates electricity, even if the PV disconnector has been switched off.

Therefore:

▶ Do not disconnect the PV plug-in connectors at the top of the storage system.

2.5 Handling the battery modules

The battery modules installed in the storage system are protected by multiple protective devices and can be operated safely. Despite their careful design, the battery cells inside the battery modules may corrode or experience thermal runaway in the event of mechanical damage, heat or a fault.

This can have the following effects:

- High heat generation on the surface of the battery cells.
- Electrolyte may escape.
- The escaping electrolyte may ignite and cause an explosive flame.
- The smoke from burning battery modules can irritate the skin, eyes and throat.

Therefore, proceed as follows:

▶ Do not open the battery modules.

▶ Do not mechanically damage the battery modules (pierce, deform, strip down, etc.)

▶ Do not modify the battery modules.

▶ Do not allow the battery modules to come into contact with water (except when extinguishing a fire in the storage system).

▶ Do not heat the battery modules. Operate them only within the permissible temperature range.

▶ Keep the battery modules well away from sources of ignition.

▶ Do not short-circuit the battery modules. Do not allow them to come into contact with metal.

▶ Do not continue to use the battery modules after a short circuit.

▶ Do not deep-discharge the battery modules.

In the event that module contents are released:

▶ Do not enter the room under any circumstance.

▶ Avoid contact with the escaping electrolyte.

▶ Contact the fire services.

2.6 Conduct in case of a fire

Fire may occur with electrical equipment despite its careful design. Likewise, a fire in the vicinity of the equipment can cause the storage system to catch fire, releasing the contents of the battery modules.

In the event of a fire in the vicinity of the product or in the storage system itself, proceed as follows:

- ▶ Only firefighters with appropriate protective equipment (safety gloves, safety clothing, face guard, breathing protection) are permitted to enter the room where the burning storage system is located.

There is a danger of electrocution when extinguishing fire while the storage system is switched on. Therefore, before starting to extinguish the fire:

- ▶ Switch off the storage system to electrically isolate it.
- ▶ Switch off the mains fuses in the building.

If the storage system and/or mains fuses cannot be safely switched off:

- ▶ Observe the minimum distances specified for the extinguishing agent used. The storage system works with an output voltage of 230 V (AC) and is therefore considered a low-voltage system. However, the voltage of the PV system that is connected to the storage system (through the PV connectors on the top of the storage system) can be up to 750 V (DC).

- A storage system fire can be extinguished using conventional extinguishing agents.
- Water is recommended as an extinguishing agent in order to cool the battery modules and therefore prevent thermal runaway in battery modules which are still intact.

Information on the battery modules:

- The battery modules have a nominal voltage of 48 V (DC) and therefore fall into the range of protected extra-low voltage (under 60 V DC).
- The battery modules do not contain metallic lithium.

3 Product description

3.1 Technical data

sonnenBatterie hybrid	9.53/2,5	9.53/5	9.53/7,5	9.53/10	9.53/12,5	9.53/15
System data (AC)						
Nominal voltage	230 V					
Nominal frequency	50 Hz					
Nominal power	4,600 W					
Rated current	20 A					
Rated apparent power	4,600 VA					
Charging / Discharging power	1,100 W	2,500 W	3,300 W	3,300 W	3,300 W	3,300 W
Charging / Discharging current	4.8 A	10.9 A	14.3 A	14.3 A	14.3 A	14.3 A
Power factor range	0.8 capacitive ... 0.8 inductive					
Max. efficiency (battery to grid)	95 %					
Max. efficiency (PV to grid)	97.5 %					
Max. Impedance (Z_{MAX})	0.35 Ω + j0.22 Ω					
Current (Max. continous)	20 A					
Short-circuit current (I_{SC})	40 A (< 0.2 s)					
Max. output fault current	120 mA					
Inrush current	0 A (0 s)					
Mains connection	single-phase, L / N / PE					
Max. ext. overcurrent protection	25 A, 1ph					
Mains topology	TN / TT					
Mains connection fuse	Miniature circuit breaker | Type B | 20 - 25 A					
Island detection mode	Active method with frequency shift					
Photovoltaic (PV) input (DC)						
Number of PV inputs / MPP Tracker	2					
Min. input voltage	75 V					
Max. input voltage	750 V					
Initial input voltage	100 V					
MPP voltage range	75 V ... 600 V					
Max recommended PV input[1]	6,500 W					
Max. input current	13 A					
Backfeed current to array	0 A					
Short-circuit current (I_{SC})	15 A					
Battery data (DC)						
Cell technology	lithium iron phosphate (LiFePO4)					
Nominal capacity	2.5 kWh	5.0 kWh	7.5 kWh	10.0 kWh	12.5 kWh	15.0 kWh
Usable capacity	2.25 kWh	4.5 kWh	6.75 kWh	9.0 kWh	11.25 kWh	13.5 kWh
Nominal voltage	48 V					
Battery input voltage	44 – 54 V					

[1] Any oversizing of the PV input may cause a thermal derating of the inverter.

Current (Max. continous)	75 A					
Short-circuit current (I_{SC})	90 A					
Max. efficiency (battery)	98 %					
Min. number of battery modules	1					
Max. number of battery modules	6					
Dimensions / weight without extension cabinet (from 2.5 up to 5 kWh)						
Dimensions (H/W/D) in cm	88/67/23		-	-	-	-
Weight in kg	58	81	-	-	-	-
Dimensions / weight with extension cabinet (from 2.5 up to 15 kWh)						
Dimensions (H/W/D) in cm	186/67/23					
Weight in kg	85	108	131	154	177	200
Safety						
Protection class	I / PE conductor					
Required fault current monitoring	Residual current device (RCD) | Type B | 30 mA					
Degree of Protection	IP30					
Overvoltage Category AC port	OVC III					
Overvoltage Category PV port	OVC II					
Rated short-withstand current (I_{CW})	10 kA					
Separation principle PV -> AC	no galvanic isolation, transformer-less					
Separation principle Batt. -> AC	galvanic isolation (functional insulation)					
Power meter						
Voltage measurement inputs	Nominal voltage (AC): 230 V (L-N), 400 V (L-L) | max. connectible conductor cross-section: 1.5 mm²					
Clamp-on current transformer	Max. measurable current: 60 A (standard), optional up to 400 A					
Ambient conditions						
Environment	Indoor (conditional)					
Operating temperature range[2]	-5 °C ... 45 °C					
Storage temperature range	0 °C ... 40 °C					
Transport temperature range	-15 °C ... 50 °C					
Max. rel. humidity	90 %, non-condensing					
Permissible installation altitude	2,000 m above sea level					
Pollution degree	2					

Additional ambient conditions:

- The installation location must not be at risk of flooding.
- Installation room should be ventilated.
- The currently applicable building codes must be observed.
- Even floor, suitable for heavy loads.
- Observe fire control standards.
- Free from corrosive and explosive gases (ammonia content max. 20 ppm).
- Free from dust (especially flour dust or sawdust).
- Free from vibrations.
- Free access to the installation location.
- No direct sunlight.

[2] Optimal: 5 °C ... 30 °C | Derating possible below 5 °C / above 30 °C.

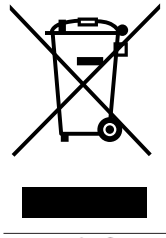
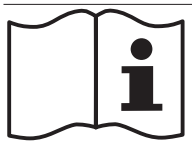
3.2 Type plate

The type plate for the storage system is located on the outer surface of the system. The type plate can be used to uniquely identify the storage system. 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 of the storage system

3.3 Symbols on the outside of the storage system

Symbol	Meaning
	Warning: flammable materials.
	Warning: hazards due to batteries.
	Warning: electrical voltage. Wait five minutes after switching off (capacitor de-energising time).
	Warning: product is heavy.
	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.
	RCM mark. The product meets the requirements of the applicable regulations.

3.4 Function

3.4.1 Basic principle

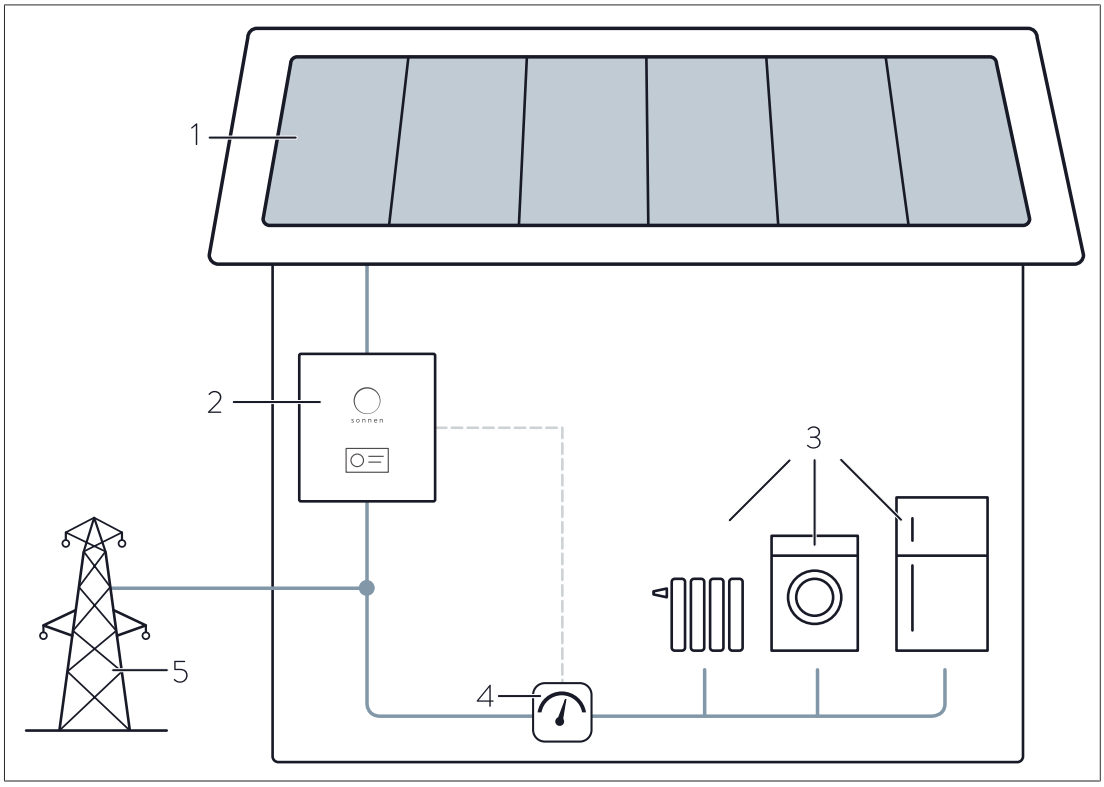


Illustration 1: sonnenBatterie function

1	PV system	4	Measurement of consumption
2	Storage system	5	Public electricity grid
3	Consumers in building (e. g. washing machine, hob, lamps, refrigerator, etc.)		

The storage system (2) is connected to the PV system (1) and the public electricity grid (5). Furthermore the current consumption of the consumers in the building (3) is constantly measured (4).

Generation > Consumption

If the generation of power is greater than the consumption, there is a surplus of electrical energy. In this case as much as possible of this surplus is used to charge the battery of the storage system.

If the entire portion of the surplus can not be charged into the battery, the remaining surplus is fed into the public electricity grid.

Consumption > Generation

If the consumption is greater than the generation of power, there is a deficit of electrical energy. In this case the battery is discharged to even out as much of the deficit as possible.

If the entire deficit can not be compensated by discharging the battery, the remaining deficit is covered by the public electricity grid.

3.4.2 Feed-in limit

PV systems are subject to a feed-in limit in some circumstances. The feed-in limit restricts the PV system's feed-in power at the mains connection point.

Example

- Nominal power of PV system: 10 kWp
- Power limit: 50 %
- Maximum feed-in power: 5 kW

In this example, the feed-in power of 5 kW must not be exceeded. The following figure shows an example of the PV system's production over the course of a day.

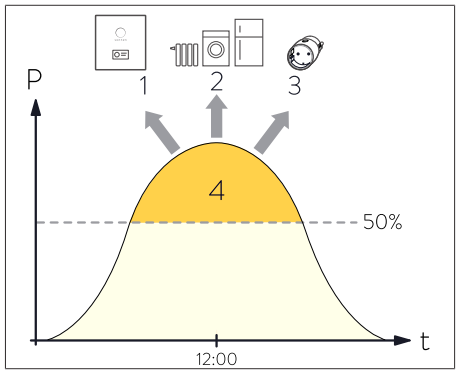


Illustration 2: Example: feed-in limit at 50% of nominal power

1 Charging of storage system
2 Switch-on of consumers via self-consumption switch
3 Switch-on of consumers via sonnenSmart plug
4 Midday peak, which must not be fed into the electrical mains

To prevent production reduction – and therefore energy loss – the excess energy is first stored in the storage system (1) and consumption is increased by switching on consumers (2, 3). Production is only reduced if these measures do not lead to the desired limit.

Measures for limiting feed-in are explained in detail in the following. The individual measures are carried out one after the other. Only when one measure does not achieve the desired reduction is the next measure introduced.

1. Charging of battery

Excess energy is directed to the storage system battery. In order for this to occur, there must be sufficient storage capacity available in the battery.

2. Activation of the self-consumption switch

Consumers connected to the permanently wired switch output are switched on here.

3. Switch-on of consumers (via sonnenSmart plug)

The consumers are activated as soon as the feed-in limit is exceeded. The consumers are deactivated again once the level has dropped below the limit and stayed there for at least three minutes.

4. Reduction of PV power

Production is reduced via an integrated switch contact on the inverter. This limited the PV inverter to a set power output. In order for this to occur, the inverter must support power reduction using a switch contact or an external solution (e.g. a solar datalogger). Configuration and connection are carried out by the electrician.

3.5 Function of the sonnen Eclipse

The sonnen Eclipse (light ring in the sonnen logo on the front of the storage system) indicates the current status of the storage system when it is switched on.

The following operating statuses may be indicated:

Colour	Mode	Operating status
White	Pulsing	Storage system is in normal operation.
Green	Pulsing	The connection to the public electricity grid is interrupted. If there is still no connection to the public electricity grid after about five minutes, the sonnen Eclipse switches off.
		For storage systems with backup power function only*: storage system is in backup operation.
Orange	Pulsing	No internet connection.
		For storage systems with backup power function only*: an overload has been detected in backup operation.
Red	Constant	Problem detected. ▶ Contact the installer of the storage system or the sonnen service team!

*Optional accessories sonnenProtect.

4 Switching on the storage system

4.1 Switching on the PV disconnector SPV

The external PV disconnector switch establishes the connection between the PV system and the inverter of the storage system.

- ▶ Switch on the PV disconnector switch.

4.2 Switching on the fuse switch F1

NOTICE

If the storage system can't be switched on:

- ▶ Do not attempt switching on the storage system more than three times.
- ▶ Contact the service!
  - ⇨ Further attempts can damage the battery modules.

Fuse switch F1 establishes the connection between the battery and the inverter.

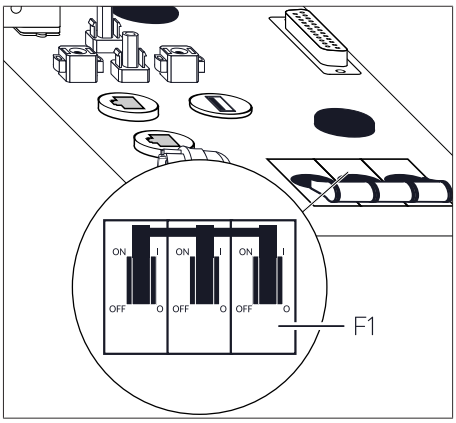


Illustration 3: Fuse switch F1 at the top side of the storage system

- ▶ Switch on fuse switch F1.

The storage system then starts up and performs a self-test. Once the self-test is successful, the storage system is ready to operate.

When the storage system is in normal operation, the sonnen Eclipse pulses white (see Function of the sonnen Eclipse [P. 13]).

4.3 Switching on the grid voltage

- ▶ Switch on the grid voltage using the AC miniature circuit breaker.

5 Digital sonnen world

By purchasing the storage system you receive access to sonnen digital products. To monitor the storage system and other sonnen products in real time and configure settings, you have several options:

my.sonnen.de

You can access the **online portal** at any time. In addition to an overview of your products and contracts, you will also find interesting information on the sonnenCommunity and sonnen's energy services.

Find out more here: Using the online portal [P. 16].

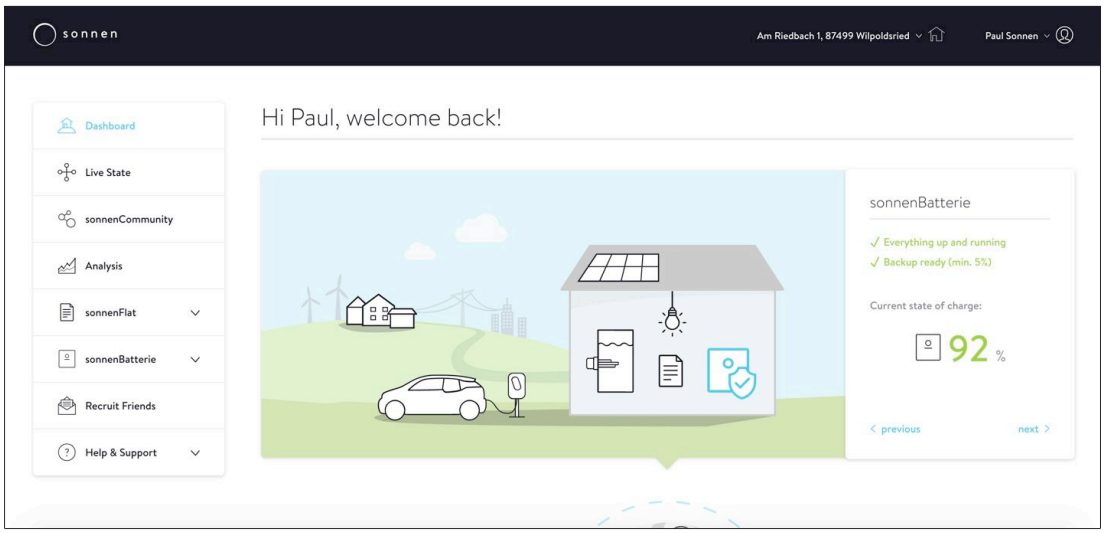
find-my.sonnen-batterie.com

You can access the **web interface of the storage system** via a network connection. The web interface allows you to access specific information on your storage system and adjust settings for special functions.

The commissioning assistant, which is used by the electrician performing the installation to configure and commission the storage system, can also be accessed here (installer's login required).

Find out more here: Using the web interface [P. 18].

5.1 Using the online portal



5.1.1 Logging into the online portal

To use the online portal, you need a sonnen account. If you already have a sonnen account, you can log into the online portal directly. If not, you can create a personal sonnen account as follows:

- Enter the following address into an internet browser: **my.sonnen.de**

Alternatively, you can used the code here on your smartphone to access the online portal.

- Scan the code with a QR reader. You can download a QR reader from the app store for your particular device.

The login window opens.

- Click on the corresponding button to register and create a sonnen account.

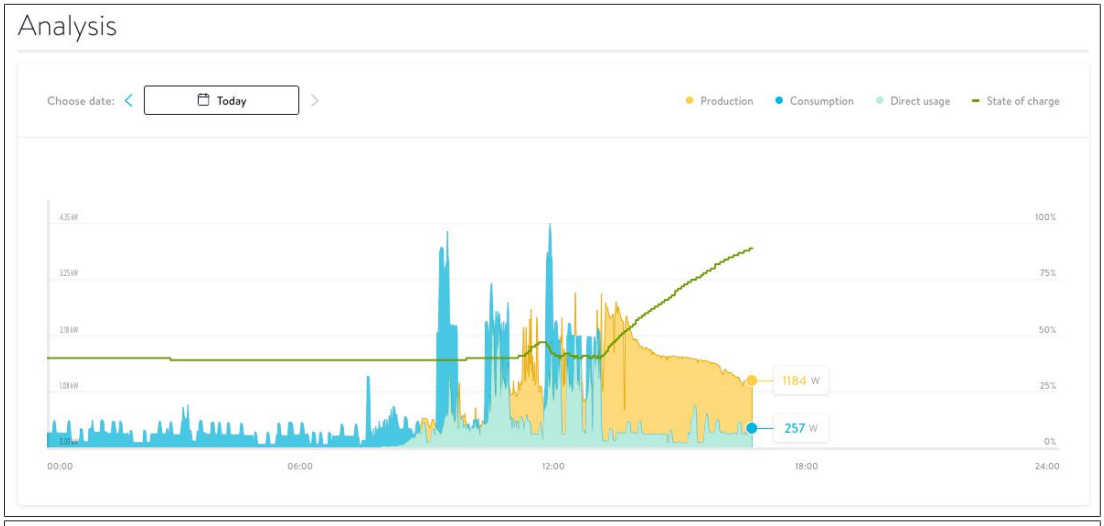
After creating the sonnen account you can use this in future to log in and access all sonnen digital products.

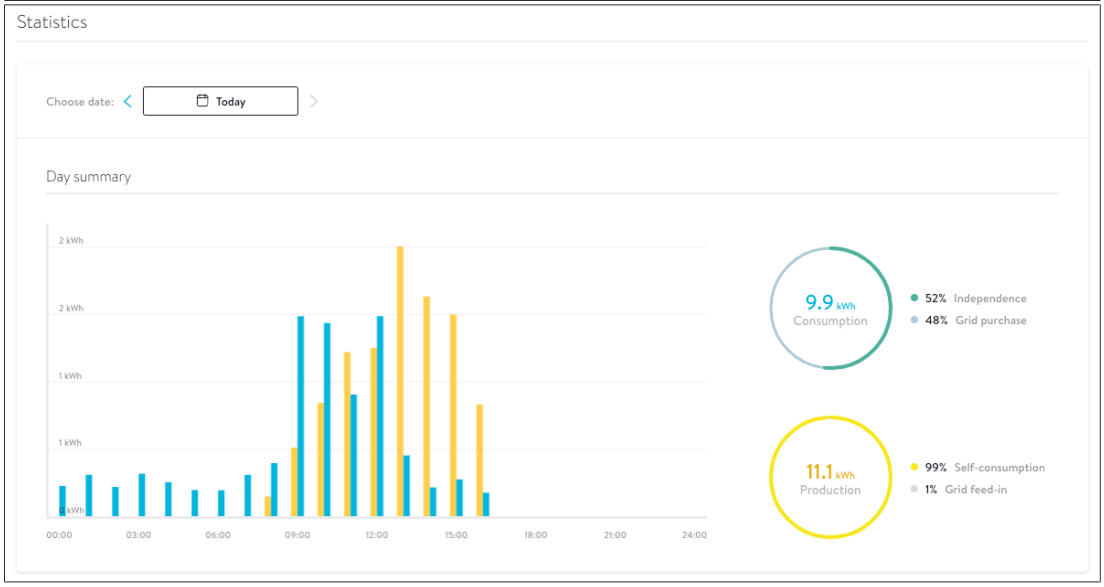
5.1.2 Visualising measurement data

A fundamental part of the online portal is the graphic display of the data from your storage system and of processes within your building.

The Live State offers a quick overview of the current distribution of electricity within your household. The different displays are always up-to-date and continuously supplied with live data.

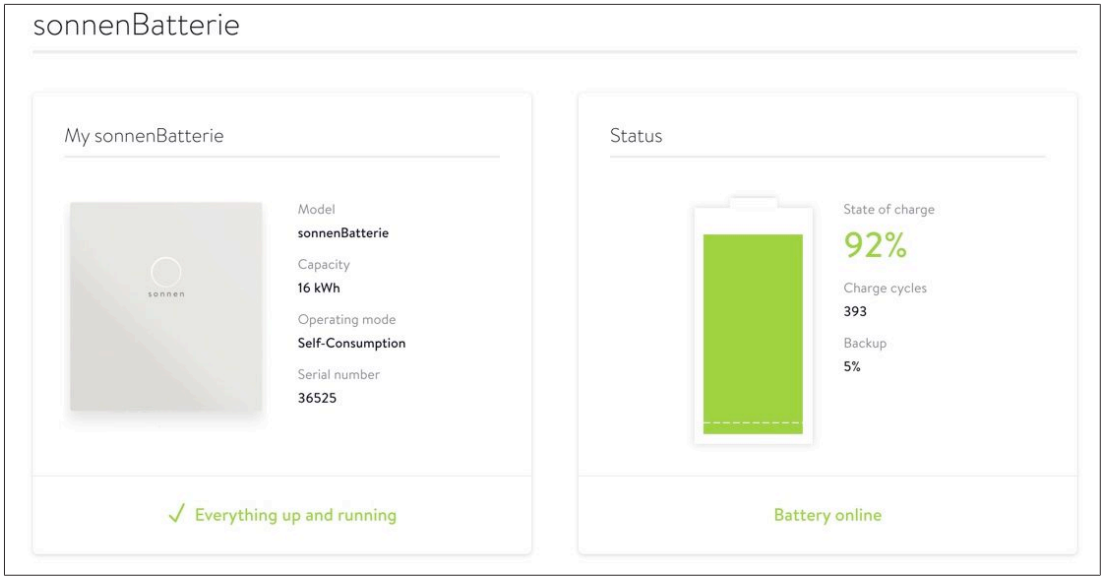
To display more details, use the Analysis page. You can easily track the activities of your household throughout the day via the two sections Analysis and Statistics. You can also create an overview of all recorded data on production and consumption over longer periods of time.

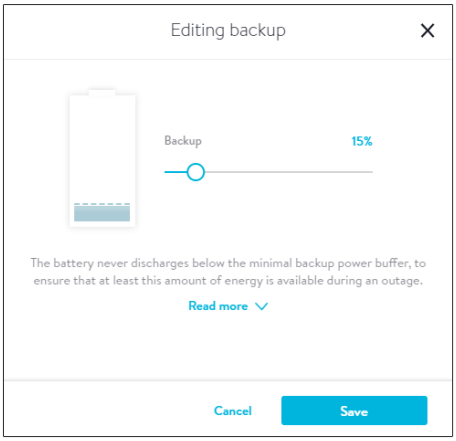




5.1.3 Overview of your sonnen products

You can find an overview of the current status of your sonnenBatterie and information on your existing sonnen accessories on the pages Overview, Details and Downloads. You can also find technical details and installation data as well documentation here.





If a sonnenProtect is installed for the storage system, click on the Overview page and set the emergency buffer via the Edit button.

5.2 Using the web interface

5.2.1 Logging into the web interface

Conditions:

✓ The storage system is connected to the router of the home network.

✓ Your laptop or PC also accesses the home network.

✓ The storage system has been set up by the electrician performing the installation using the commissioning assistant.

▶ Enter the following address into an internet browser:
https://find-my.sonnen-batterie.com

The following window appears:

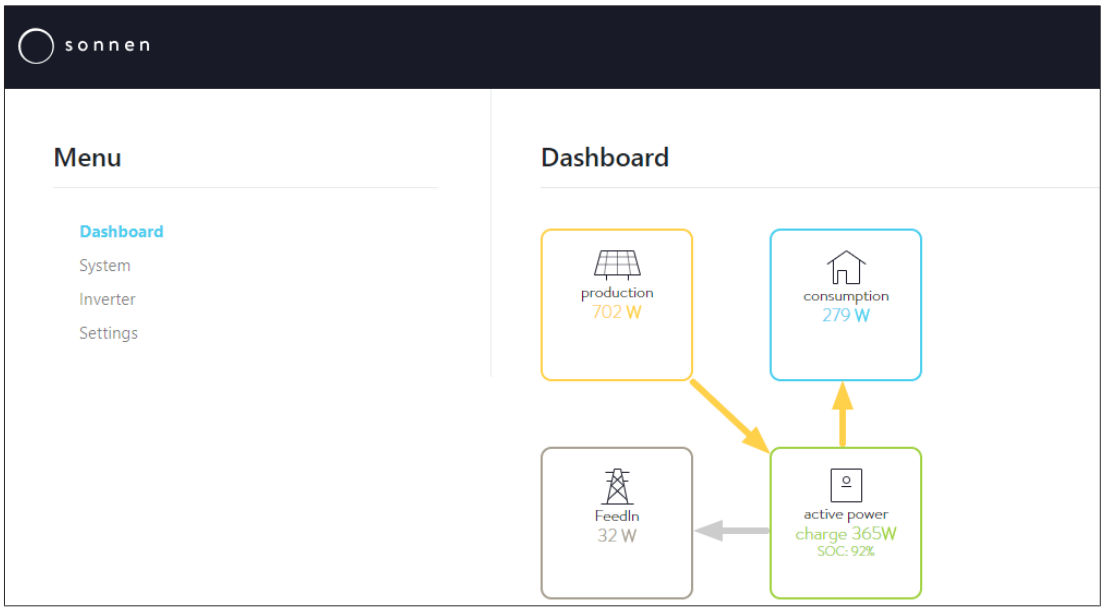
▶ Click on the blue LAN IP number.

The login page appears.

▶ Log in as user with the following password: **sonnenUser3552**

5.2.2 Dashboard page

The start page of the web interface (Dashboard) provides an initial overview of the current status of your storage system. All of the energy flows are specified there in watts and clarified with arrow indicators.



The current production of the PV system and the consumption of the electrical consumers in the building are displayed in contrast with the storage system and the public electricity grid. Usage from the public electricity grid is displayed when production and the electricity available from the storage system are not sufficient to meet the energy needs of the building. Feed-in is displayed when there is sufficient electricity available to feed some into the public grid within any existing feed-in limit.

The state of charge (SOC) of the battery modules is specified in relation to the storage system and information as to whether the storage system is storing electricity (charging) or providing electricity (discharging) is displayed.

5.2.3 System page

The System page provides technical background information on your storage system.

For example, you can see how many battery modules are installed (General Information > Capacity) and what the maximum power provided by the inverters is (General Information > Inverter Max. Power).

The other information, such as the serial number and model designation of your storage system (each under General Information), may be necessary in the event of a fault, if you contact the electrician performing the installation or the sonnen service team, for example.

5.2.4 Inverter page

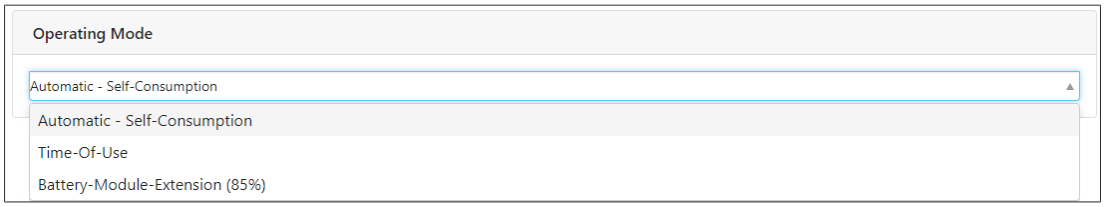
The Inverter page is where a self-test can be performed. This is necessary for inverters commissioned in certain countries (including Italy).

Since this function is only required in certain regions, the test is only displayed if a corresponding country code was selected for the inverter during commissioning.

5.2.5 Settings page

Depending on the configuration of your storage system, the following areas are displayed on the Settings page:

Operating Mode



Operating Mode Self-Consumption is normally used.

The other two operating modes (Time of Use (time linking) and Battery-Module-Extension (30%) (module extension)) are only required in certain cases and should only be set by the electrician performing the installation.

Backup-buffer

If a sonnenProtect is connected to the storage system, the Backup-buffer field is displayed. You can select the backup buffer as a percentage here. This portion of the storage capacity is then reserved for the backup supply, i.e. this portion of the capacity is not available to the storage system in normal operation.

Combined heat and power unit (CHP)

If a CHP with constant power output is connected to the storage system and has been set up appropriately by the installer, the Combined Heat and Power (CHP) field is displayed.

The Power specifies the constant power of the CHP and should not be changed after initial configuration by the installer. The lower limit of the charging state at which the CHP is activated (Charge state to start CHP) and the upper limit at which the CHP is stopped (Charge state to stop CHP) are specified as percentages.

- ▶ Contact your installer before changes are made to the settings.

6 Maintenance

For fault-free, safe, reliable and long-lasting operation of the storage system, it is essential to carry out regular function checks and cleaning.

The battery modules installed in the storage system do not require maintenance.

6.1 Checking function

Maintenance interval	Action to be taken
Every 2 weeks	▶ Check whether there is a fault with the storage system.
Every 6 months	▶ Check for changes to the charging status. If functioning properly, the storage system should be charged to 100 % on a sunny day and the charging status should drop significantly overnight.

Table 1: Checking function

6.2 Cleaning

NOTICE

Use of unsuitable cleaning agent and/or excessive water

Material damage because of scratched surfaces and/or damage caused by penetration of water!

- ▶ Do not use scouring cloths, sponges or cleaning agent.
- ▶ Take particular care when cleaning the display (if applicable) and the LED ring, since these can easily be scratched.
- ▶ Use only moist cloths, not wet cloths, to clean the system.
- ▶ Do not use water jets.

- ▶ Carefully clean the outside of the storage system with a clean, moist cloth. For tougher dirt, use a small amount of household dishwashing detergent on a moist cloth.

7 Decommissioning

NOTICE

Deep-discharge of the battery modules

Destruction of the battery modules!

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

7.1 Switching the storage system off

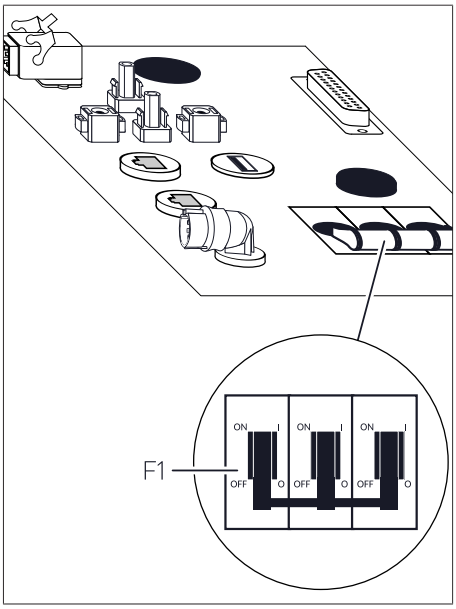


Illustration 4: Fuse switch F1 and PV disconnector

- Switch off fuse switch F1.
- Switch off the external PV disconnector switch.
- Switch off the grid voltage using the AC miniature circuit breaker.

8 Troubleshooting

Disturbance	Possible reason(s)	Correction
No connection to the web interface of the storage system (https://find-my.sonnen-batterie.com) or to the internet portal (my.sonnen.de).	No connection between the storage system and the server.	▶ Make sure that the Ethernet line between the storage system and the Router of the home network is correctly connected.
		▶ Make sure that the Router of the home network allows connections on the following ports: **TCP ports:** 443 (https); 18883 (MQTT-TLS) **UDP ports:** 123 (NTP); 1196 (VPN)
The sonnen Eclipse of the storage system pulses orange.	The internet connection to the storage system has been interrupted.	▶ Check whether the home network router is able to establish an internet connection. If so: ▶ Ensure that the network line for the storage system is connected to the home network router.
The sonnen Eclipse of the storage system illuminates red.	The storage system has detected a problem that is preventing normal operation or may cause damage to the storage system.	▶ Contact your installer or the sonnen service team to get help resolving the problem.
The sonnen Eclipse of the storage system pulses continuously green or pulses green and turns off after about 5 minutes.	The storage system is not connected to the public electricity grid.	▶ Check that the circuit breaker in the supply line of the storage system is switched on. If so: The public electricity grid does not provide any electrical energy (grid outage). ▶ It can only be waited until the public electricity grid supplies energy again. Thereafter, the storage systems resumes normal operation.
	Storage system with backup power function only[3]: The storage system is not connected to the public electricity grid and is in backup operation.	No troubleshooting necessary.

[3] Optional accessories sonnenProtect.

9 Uninstallation and disposal

9.1 Uninstallation

⚠ DANGER **Improper uninstallation of the storage system**

Danger to life due to electrocution!

- ▶ The storage system must only be uninstalled by licensed electricians.

9.2 Disposal

⚠ CAUTION **Improper transport of battery modules**

Fire outbreak at battery modules or emission of toxic substances!

- ▶ Transport the battery modules in their original packaging only. If you no longer have the original packaging, new packaging can be requested from sonnen GmbH.
- ▶ Never transport damaged battery modules.

⚠ CAUTION **Improper disposal of battery modules**

Explosion or fire outbreak at battery modules or emission of toxic substances!

- ▶ Do not dispose of batteries in fire.

The storage system and the batteries it contains ***must not*** be disposed of as domestic waste!

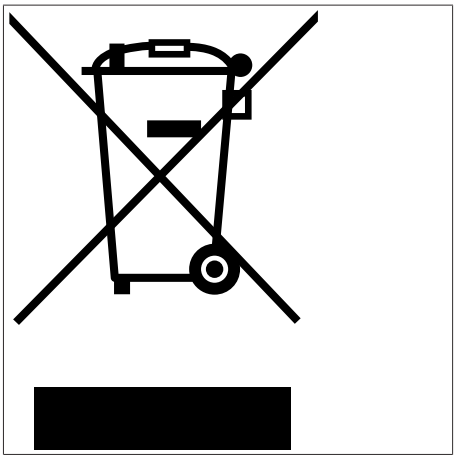


Illustration 5: WEEE symbol

- ▶ Dispose of the storage system and the batteries it contains in an environmentally friendly way through suitable collection systems.
- ▶ Contact sonnen GmbH to dispose of old batteries.

sonnen

energy is yours

sonnen GmbH
Am Riedbach 1
D-87499 Wildpoldsried