



Operating instructions sonnenBatterie eco 8.2 – for operators –

IMPORTANT

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

Publisher

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This document relates to the following product:

Product designation sonnenBatterie eco 8.2

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1 Information about this document

This document describes the operation of the sonnenBatterie eco 8.0.

Observe the following points:

- ▶ Read this document in its entirety before beginning operation.
- ▶ Keep this document in the vicinity of the sonnenBatterie.

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:

Table 1:
Designations in this document

Complete designation	Designation in this document
sonnenBatterie eco 8.0	storage system

1.3 Explanation of symbols



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



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



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



Indicates actions that may cause material damage.



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

Table 2:
Additional symbols

Symbol	Meaning
▶	Work step
1. 2. 3. ...	Work steps in a defined order
•	List

2 Safety

2.1 Intended Use

The sonnenBatterie eco 8.0 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 product:

- The storage system must be fully installed in accordance with the installation instructions.
- The storage system must be installed by a certified electrician.
- The storage system must only be used at a suitable installation location.
- The transport and storage conditions must be observed.



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

The storage system must only be installed and commissioning by authorised electricians. Authorised electricians must meet the following criteria:

- The company for which the electrician works must be certified by sonnen GmbH.
- The electrician must be considered an electrician as per standard DIN VDE 1000-10 (VDE 1000-10):2009-01.
- The electrician must have successfully complete sonnen GmbH certification training for this product.

2.3 General safety information

- ▶ Only use the storage system in its original state – without any unauthorised modifications – and when it is in proper working order.
- ▶ Ensure that all protective devices are working properly.

2.3.1 Danger due to incorrect operation

Incorrect operation puts you and others at risk and could cause material damage.

- ▶ Read through this document and all further applicable documents carefully, paying special attention to the chapters on safety and warnings.

2.3.2 Danger to life due to explosive and flammable materials

- ▶ Do not use the storage system in potentially explosive environments.

2.3.3 Danger to life due to product modifications or changes to the product environment

- ▶ Never block or bypass the protective devices.
- ▶ Never modify the protective devices.
- ▶ Do not make changes to the storage system.
- ▶ Do not make changes to the electrical and data supply lines.

2.3.4 Danger of injury and risk of material damage due to improper repairs

- ▶ Never attempt to repair the storage system yourself.
- ▶ Have faults and damage fixed by the sonnen service team.

2.3.5 Conduct in case of a fire / Important information for fire services

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.

- ▶ Observe the warnings about the risk of injury/burns due to the escape of electrolyte (see section 2.5 – pg. 8).

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.
- ▶ 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 in DIN VDE 0132 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.

- ▶ 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 51.2 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.



Further information can be found in the following document: *Merkblatt für Einsatzkräfte – Einsatz an stationären Lithium Solarstromspeichern* (Information sheet for electricians – Use on stationary lithium solar energy storage systems, published by the German Solar Association, or BSW – Bundesverband der Solarwirtschaft e.V.)

2.4 Regulations (directives, laws, standards)

- ▶ Observe all relevant, currently applicable national regulations, especially the following:
 - Regulations of the local power supply companies.

This list presents only a selection and does not claim to be exhaustive. The authorised electrician is responsible for knowing and observing all of the regulations relevant to their work.

2.5 Warnings

This section contains specific warnings that must always be observed when working with the product.

 **GEFAHR**

Danger to life due to electrocution!

Touching components inside the storage system poses a danger to life due to electrocution.

- ▶ Do not touch any components.
 - ▶ Do not remove any plastic covers.
 - ▶ Never reach below covers.
-

! WARNUNG**Risk of injury and burns due to the escape of electrolyte**

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.
- ▶ 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.

Hinweis**Damage to battery modules due to deep-discharge!**

Without a connection to the public electrical mains, the battery modules may be damaged due to being deep-discharged.

- ▶ Do not disconnect the storage system from the public electrical mains for an extended period of time.

3 Product description

3.1 Technical data

sonnenBatterie	eco 8.2/2	eco 8.2/4	eco 8.2/6	eco 8.2/8	eco 8.2/10	eco 8.2/12	eco 8.2/14	eco 8.2/16
System data (AC)								
Nominal voltage	230 V							
Nominal frequency	50 Hz							
Nominal power	1,500 W	2,000 W	2,500 W	2,500 W	2,500 W	2,500 W	2,500 W	2,500 W
Nominal current	6.5 A	8.7 A	13.0 A	13.0 A	13.0 A	13.0 A	13.0 A	13.0 A
Mains connection	three-phase, L / N / PE							
Mains topology	TN / TT							
Mains connection fuse	miniature circuit breaker type B 16 A							
Battery data (DC)								
Cell technology	lithium iron phosphate (LiFePO ₄)							
Useful capacity	2.0 kWh	4.0 kWh	6.0 kWh	8.0 kWh	10 kWh	12 kWh	14 kWh	16 kWh
Nominal voltage	51.2 V							
Dimensions / weight with small extension cabinet (from 2 kWh up to 10 kWh)								
Dimensions (H/B/T) in cm	70/64/22	137/64 /22	137/64 /22	137/64 /22	137/64 /22	-	-	-
Weight in kg	53	88	115	142	169	-	-	-
Dimensions / weight with big extension cabinet (from 2 kWh up to 16 kWh)								
Dimensions (H/B/T) in cm	70/64/22	184/64 /22	184/64 /22	184/64 /22	184/64 /22	184/64 /22	184/64 /22	184/64 /22
Weight in kg	53	93	120	147	174	201	228	255
Power meter								
Voltage measurement inputs	Nominal voltage (AC): 230 V (L-N), 400 V (L-L) max. connectible conductor cross-section: 1.5 mm ²							
Clamp-on current transformer	Max. measurable current: 60 A							
Safety								
Protection class	I (PE conductor)							
Degree of protection	IP21							
Ambient conditions								
Ambient temperature range	5°C ... 30°C							
Storage temperature range	0°C ... 40°C							
Transport temperature range	-15°C ... 40°C							
Max. rel. humidity	90%							
Permissible installation altitude	2000 m above sea level							
Additional ambient conditions	<ul style="list-style-type: none"> • Installation room can be ventilated • Free from vibrations • Free from dust (especially flour dust or sawdust) • Free from corrosive and explosive gases (ammonia content max. 20 ppm) • No direct sunlight • Even floor, suitable for heavy loads • Free access to the installation location • The currently applicable building codes must be observed 							

Tabular 3: Technical data

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
- Version (hardware version)
- Technical data of the storage system

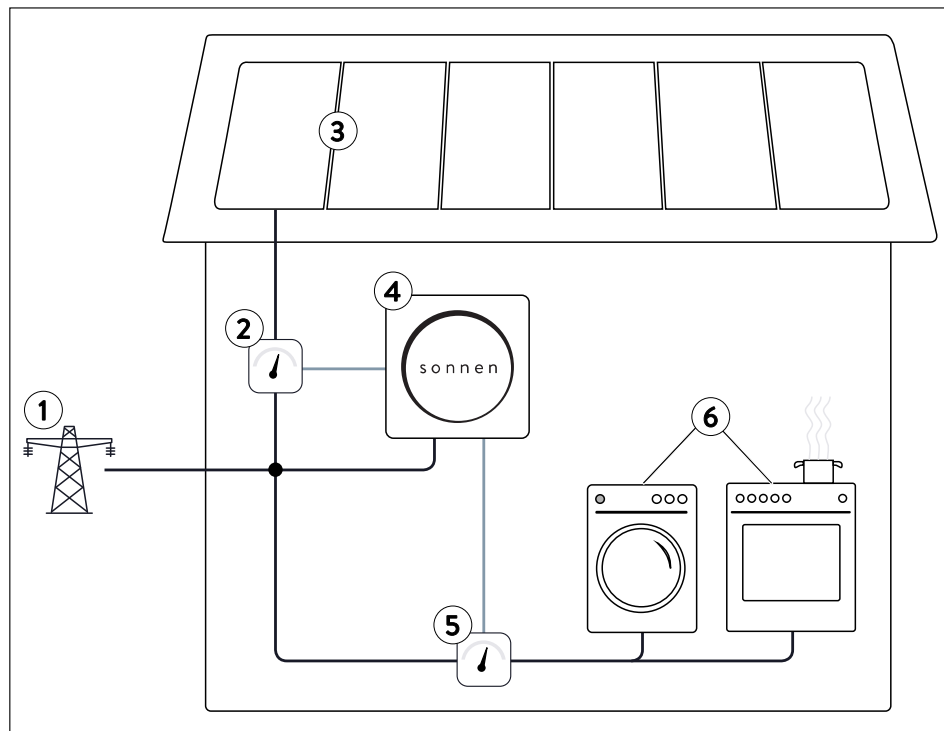
The nominal power and battery capacity of the storage system differ depending on the number of battery modules installed. For this reason the nominal power and battery capacity must be entered on the type plate by the electrician installing the system.

3.3 Functional description

3.3.1 Basic principle

Figure 1:
sonnenBatterie function

1	Public electrical mains
2	Measurement of generation
3	PV system
4	Storage system
5	Measurement of consumption
6	Consumers in the building (e.g. washing machine, hob, lamps, refrigerator, etc.)



The storage system (4) constantly measures the current power generation (2) of the PV system¹ (3) and the ongoing consumption (5) in the building.

Generation > consumption

If the generation of power is greater than the consumption, the surplus power (difference between generation and consumption) is stored in the storage system. The battery is charged.

For example, if 3000 watts are generated and 1700 watts are consumed, the battery is charged with a power of 1300 watts.

Consumption > generation

If the consumption is greater than the generation of power, the deficit (difference between consumption and generation) is provided by the storage system. The battery is discharged.

For example, if 3500 watts are consumed and 2000 watts are generated, the battery discharges a power of 1500 watts.

¹ or of another generator like a wind turbine or district heating plant, for example.

4 Commissioning

To switch on the storage system, the fuse switch F1 and switch S1 must be engaged in a specific order. F1 and S1 are located under the cover at the top side of the storage system.

4.1.1 Removing the cover

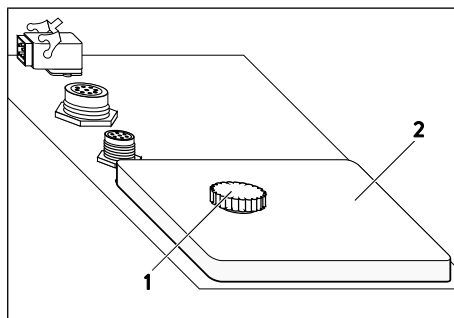


Figure 2: Removing the cover (2) at the top side of the storage system

- ▶ Remove the knurled nut (1). To do this, rotate the knurled nut (1) counterclockwise.
- ▶ Remove the cover (2).

4.1.2 Switching on the storage system

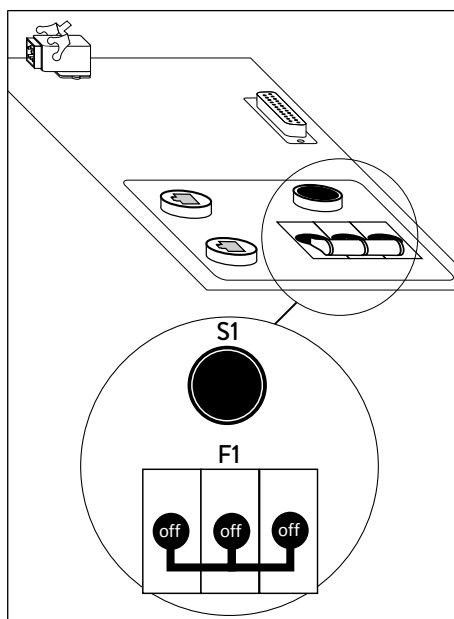


Figure 3: Fuse switch F1 and switch S1 at the top side of the storage system

- 1 Press switch S1 and hold it down while the following steps are carried out.
- 2 Switch on fuse switch F1.
- 3 Keep switch S1 held down for at least another 5 seconds.
- 4 Release switch S1.

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

- ▶ Mount the previously removed cover.

5 Internet portal

You can access current and saved data for your storage system on the internet portal.

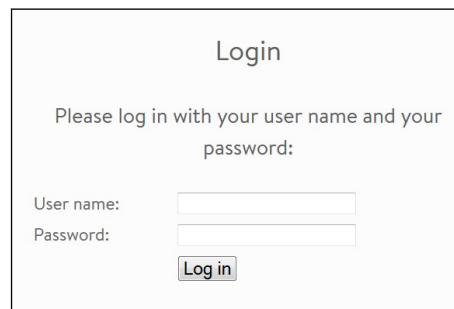
5.1 Logging into the internet portal

To log into the internet portal, proceed as follows:

1. Enter the following web address in the browser:

<https://my.sonnen-batterie.com>

The login window shown here opens:



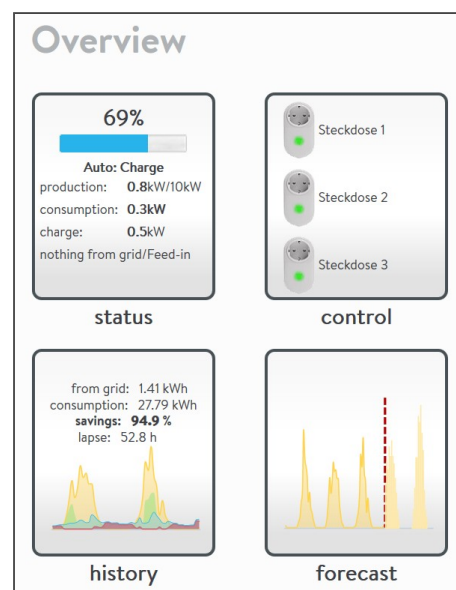
The screenshot shows a login window titled "Login". Below the title, it says "Please log in with your user name and your password:". There are two input fields: "User name:" and "Password:". Below the "Password:" field, there is a "Log in" button.

2. Enter your access data, which was provided as part of the scope of delivery.
3. Click on the *Log in* button.

5.2 Using the overview page

The overview page shows a summary of all of the information which can be seen on the portal.

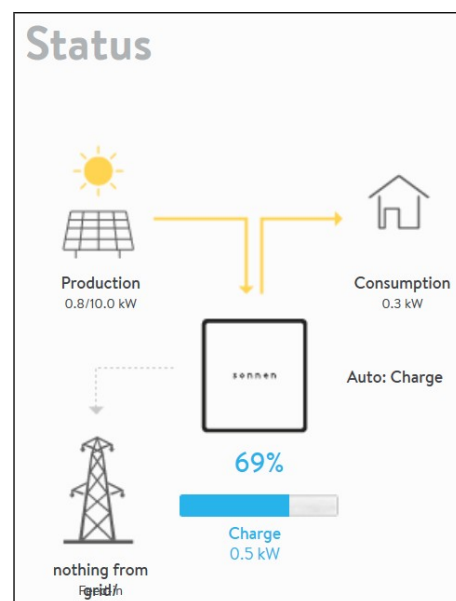
You can click on the *Status*, *Control*, *Graph* and *Forecast* buttons (see figure shown here) in order to open the specific page.



5.3 Using the status page

The status page (shown in the figure on the right) shows the following current measured values:

- Current generation
- Current consumption
- Current usage/current feed-in
- Current charging status



5.4 Using the graph page

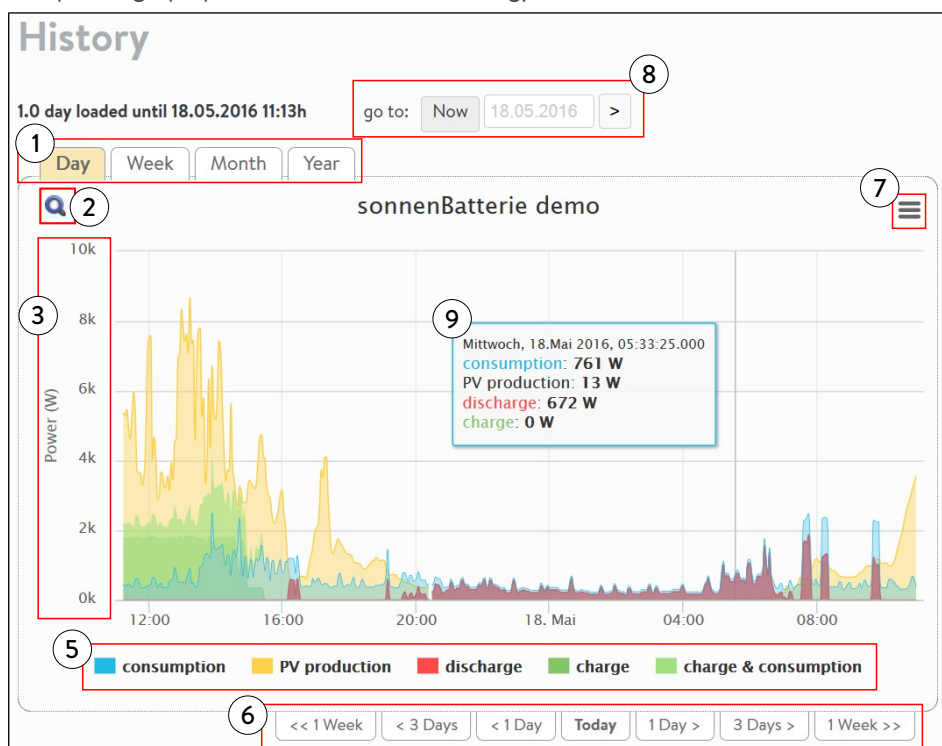
The graph page shows all relevant energy flows in a graph.



The values displayed are subject to measuring instrument tolerances and rounding errors. The only information that is relevant in terms of your energy bills is the data taken from the utility company's meters.

5.4.1 Elements of the power graph

The power graph presents the different energy flows in relation to time.



- 1 ▶ Clicking on the day, week, month or year button defines the timeframe (4) shown in the graph.
- 2 ▶ Clicking on the magnifying glass activates or deactivate full-screen mode.
- 3 The power is shown in watts (W) on the y-axis.
The abbreviation 'k' stands for the prefix 'kilo'. 3,0 k therefore corresponds to 3,0 kilowatts or 3000 watts.
- 4 Time is shown on the x-axis (in the above example, the timeframe shown on the x-axis is one day).
- 5 This legend shows which energy flows are displayed in which colour in the graph (consumption is shown in blue, for example).
▶ Clicking on the desired energy flow (e.g. consumption) shows or hides this flow in the graph.
- 6 ▶ Clicking on one of the buttons below the graph allows you to navigate to previous or later timeframes.
- 7 ▶ Clicking on the button provides the option of printing out the displayed graph.
- 8 ▶ Clicking on the input field to the right of *goto* allows you to select a date.
▶ Clicking on the button > confirms the date selection.
- 9 ▶ Positioning the mouse cursor over the graph shows the exact values for the energy flows at this time.
▶ By clicking and dragging, you can select a smaller timeframe in the graph.

5.4.2 Analysing pie charts

Two pie charts are shown below the power graph.

The pie charts always refer to the timeframe shown in the power graph.

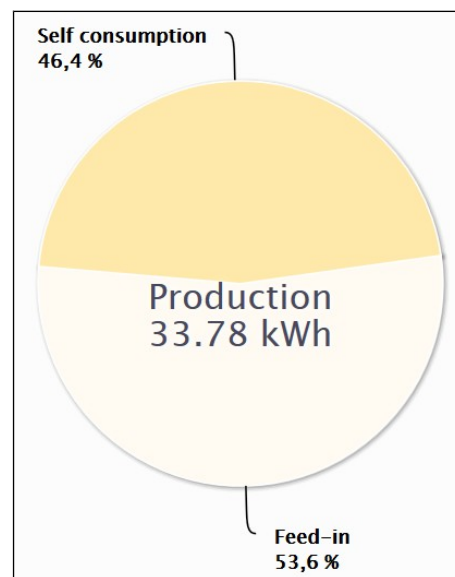
Generation pie chart

Generation, shown in yellow, symbolises the electrical power gained by the generator in the analysed timeframe.

The fed-in power is marked in light yellow in the chart.

The dark yellow part represents self-consumption.

Self-consumption is the part of the generated power that has not been fed-in, but has instead been stored temporarily in the battery or consumed.

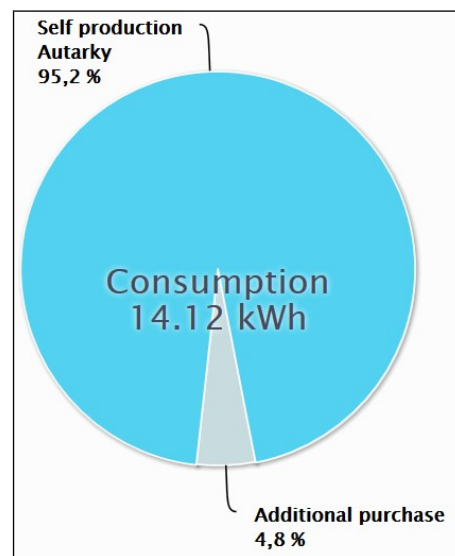


Consumption pie chart

Consumption, shown in blue, symbolises the power that was required in the building during the analysed timeframe.

Purchased power (taken from the mains) is marked in light blue in the chart. The dark blue part represents self-production.

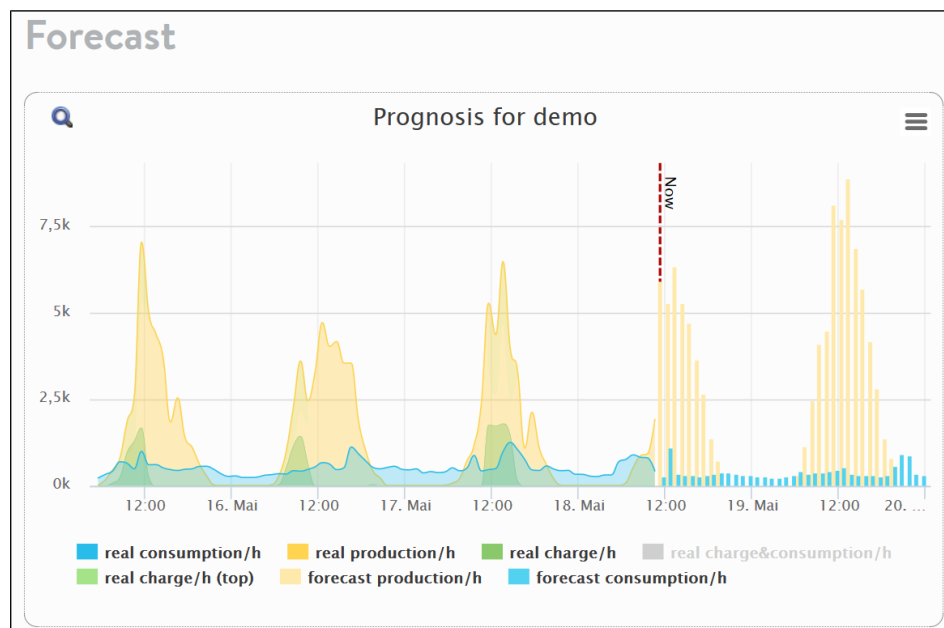
Self-production is the part of the consumed energy that was not taken from the mains.



5.5 Using the forecast page

The forecast page shows the probable course of consumption and generation in future.

Figure 4:
Forecast



The storage system is able to forecast consumption in the near future (blue) based on previous consumption trends. Accessing weather data can also produce a generation forecast (yellow).

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

Table 4:
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.

6.2 Cleaning

Hinweis

Risk of material damage due to use of unsuitable cleaning agent and excessive water

Unsuitable cleaning agents can scratch the surfaces. Furthermore, if cleaning is not carried out properly, water can get inside the storage system and cause damage. For this reason:

- ▶ Do not use scouring cloths, sponges or cleaning agent.
- ▶ Take particular care when cleaning the screen (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 Troubleshooting

disturbance	reason	correction
-------------	--------	------------

No internet connection (the storage system is not displayed at the Internet portal <https://meine.sonnenbatterie.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-Port	Service
22	SecureShell (ssh)
37	Time Server (ntp)
80	Online-Check (http)
222	VPN (Serververbindung ssl)
232	VPN (backup)
443	App-Steuerung (https)
UDP-Port	Service
1196	(Serververbindung, ssl)

8 Decommissioning

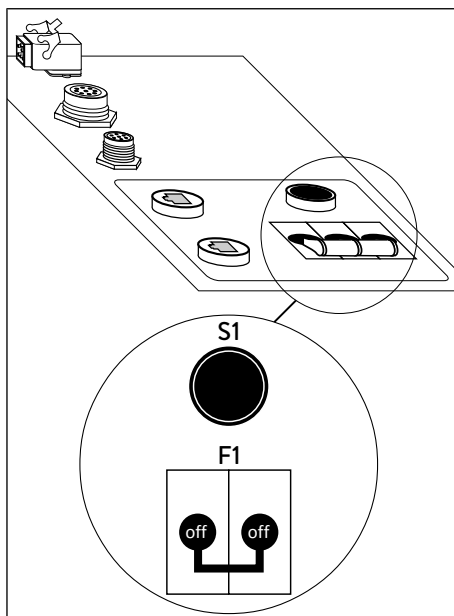
Hinweis

Damage to battery modules due to deep-discharge!

Without a connection to the public electrical mains, the battery modules may be damaged due to being deep-discharged.

► Do not disconnect the storage system from the public electrical mains for an extended period of time.

Figure 5:
Fuse switch F1 and switch S1 at the top
side of the storage system

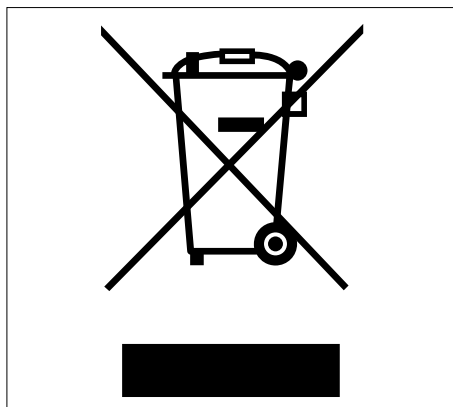


► Remove the cover at the top side of the storage system (see chapter 4 – p. 13).

► Switch off F1.

9 Disposing of the storage system

Figure 6:
WEEE symbol



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

► Contact the service team or the installation company that installed your storage system and commission them to properly dismantle and dispose of the storage system.

10 Annex

10.1 EU-declaration of conformity

You can find the EU-declaration of conformity on the following page.

10.2 Guarantee conditions

You can find the Guarantee conditions on the following pages.

EU Declaration of Conformity

1	Document number	KD-231								
2	Manufacturer	sonnen GmbH Am Riedbach 1 87499 Wildpoldsried								
3	This declaration of conformity is issued under the sole responsibility of the manufacturer.									
4	Object of declaration	sonnenBatterie eco 8.2/2, 8.2/4, 8.2/6, 8.2/8, 8.2/10, 8.2/12, 8.2/14, 8.2/16								
5	The object of the declaration described above is in conformity with the relevant Union harmonisation legislation: DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits ¹ – short: Low Voltage Directive DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility ² – short: EMC Directive									
6	References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared: <table border="1"><thead><tr><th>Harmonized standards</th><th>Harmonized standard for</th></tr></thead><tbody><tr><td>EN 62040-1:2008 + A1:2013</td><td>Low Voltage Directive</td></tr><tr><td>EN 61000-6-1:2007</td><td>EMC Directive</td></tr><tr><td>EN 61000-6-3:2007 + A1:2011</td><td>EMC Directive</td></tr></tbody></table> Other technical specifications VDE-AR-E 2510-2 VDE-AR-N 4105:2011-08		Harmonized standards	Harmonized standard for	EN 62040-1:2008 + A1:2013	Low Voltage Directive	EN 61000-6-1:2007	EMC Directive	EN 61000-6-3:2007 + A1:2011	EMC Directive
Harmonized standards	Harmonized standard for									
EN 62040-1:2008 + A1:2013	Low Voltage Directive									
EN 61000-6-1:2007	EMC Directive									
EN 61000-6-3:2007 + A1:2011	EMC Directive									

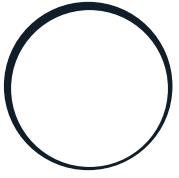
Wildpoldsried, 17.05.2016



Hermann Schweizer (CTO)

¹ Published in the Official Journal of the European Union L 96/357

² Published in the Official Journal of the European Union L 96/79



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