



Operating instructions | for operators

sonnenBatterie hybrid 8.1

IMPORTANT

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

Publisher

sonnen GmbH

Am Riedbach 1

87499 Wildpoldsried

Service number +49 8304 92933 444

E-Mail info@sonnen.de

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1 Information about this document

This document describes the operation of the sonnenBatterie hybrid 8.1.

- ▶ 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:

Complete designation	Designation in this document
sonnenBatterie hybrid 8.1	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.

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

Table 1: Additional symbols

2 Safety

2.1 Intended Use

The sonnenBatterie hybrid 8.1 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 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 an licensed electrician.
- 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 module 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.

- 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.

- The storage system must only be operated as described in the product documentation.

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.
- An appropriate and readily accessible disconnect device shall be incorporated in the fixed wiring.
- Safety devices must never be overridden, blocked or tampered with.
- The interfaces of the storage system must be wired in accordance with the product documentation.
- 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 inside the storage system



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

- ▶ Do not open 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 400 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 1,000 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 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.

3 Product description

3.1 Technical data

sonnenBatterie hybrid 8.1-5.5	8.1/6	8.1/8	8.1/10	8.1/12	8.1/14	8.1/16
AC output						
Nominal voltage	400 V					
Nominal frequency	50 Hz					
Nominal power	5,500 W					
Nominal current	8 A					
Charging / Discharging power	3,000 W			3,300 W		
Charging / Discharging current	4.5 A			4.8 A		
Power factor range	0.9 cap. ... 0.9 ind.					
Current (Max. continuous)	8 A					
Max. output fault current	120 mA					
Inrush current	0 A					
Mains connection	three-phase, L1 / L2 / L3 / N / PE					
Max. ext. overcurrent protection	16 A, 3ph					
Mains topology	TN / TT					
Mains connection fuse	Miniature Circuit Breaker Type B 10 A - 16 A					
Photovoltaic (PV) input						
Number of PV inputs / MPP Tracker	1					
Min. input voltage	250 V					
Max. input voltage	1,000 V					
MPP voltage range	250 V ... 800 V					
Max. input power	5,620 W					
Max. recommended nominal power of the PV system	6.4 kWp					
Max. input current	11 A					
Backfeed current to array	0 A					
Short-circuit current (I_{SC})	15 A					
Battery (DC)						
Cell technology	lithium iron phosphate (LiFePO ₄)					
Usable capacity	6.0 kWh	8.0 kWh	10.0 kWh	12.0 kWh	14.0 kWh	16.0 kWh
Nominal voltage	51.2 V					
Current (Max. continuous)	75 A					
Short-circuit current (I_{SC})	80 A					
Min. number of battery modules	3					
Max. number of battery modules	8					

sonnenBatterie hybrid 8.1-5.5	8.1/6	8.1/8	8.1/10	8.1/12	8.1/14	8.1/16
Safety						
Protection class	I / PE conductor					
Required fault current monitoring	Residual current device (RCD) Type B 30 mA					
Degree of Protection	IP30					
Rated short-time withstand current (I_{CW})	10 kA					
Separation principle	no galvanic isolation, transformer-less					
Dimensions / weight with small extension cabinet (from 6 kWh up to 10 kWh)						
Dimensions (H/W/D) in cm	137/67/23			-	-	-
Weight in kg	133	160	187	-	-	-
Dimensions / weight with big extension cabinet (from 6 kWh up to 16 kWh)						
Dimensions (H/W/D) in cm	187/67/23					
Weight in kg	144	171	198	225	252	279
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 (standard), optional up to 400 A					
Ambient conditions						
Environment	indoor (conditional)					
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 %, non-condensing					
Permissible installation altitude	2,000 m above sea level					
Pollution degree	2					
Additional ambient conditions	<ul style="list-style-type: none"> • 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. 					

Table 2: 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
- 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.
	Warning: electrical voltage. Wait five minutes after switching off (capacitor de-energising time).
	Warning: product is heavy.
	Warning: Equipment with multiple sources of supply (PV generator, AC mains and battery).
	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.

3.4 Functional description

3.4.1 Basic principle

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

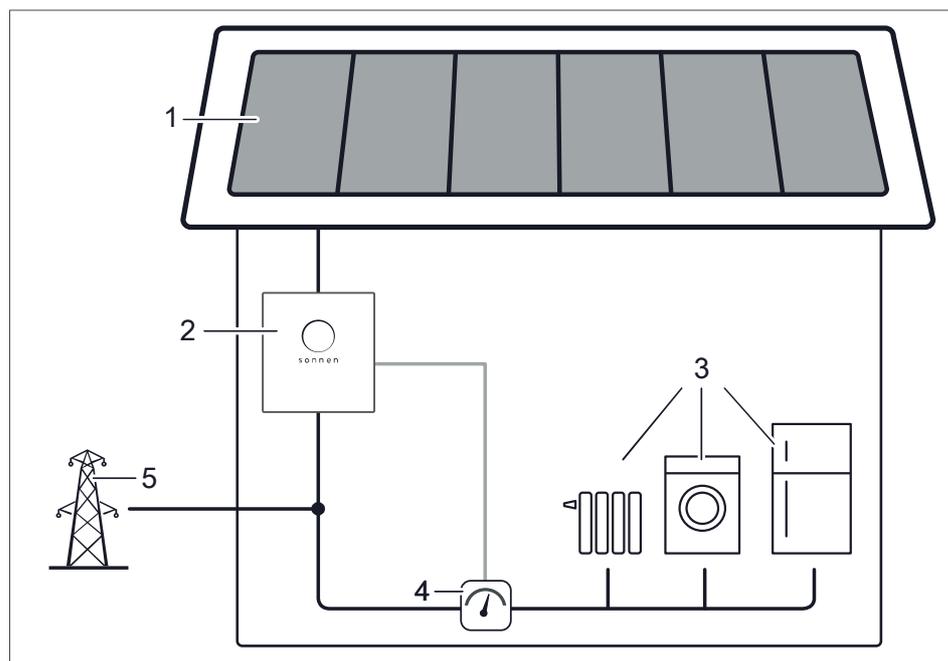


Figure 1: sonnenBatterie function

The storage system (2) is connected to the PV system (1) and the public electrical mains (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 electrical 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 electrical grid.

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 electrical grid is interrupted. For storage systems with emergency power function only*: storage system is in emergency operation.
Orange	Pulsing	No internet connection. For storage systems with emergency power function only*: an overload has been detected in emergency operation.
Red	Constant	Problem detected. ► Contact the installer of the storage system or the sonnen service team!

*Optional accessories sonnenBackup-Box.

Further troubleshooting procedures can be found in the Troubleshooting (see 9–p. 27) section.

4 Switching on the storage system

To switch the storage system on, several switches have to be operated.



The storage system can only be switched on if the public network voltage has been switched on first.

4.1.1 Switching on the grid voltage

► Switch on the grid voltage using the AC miniature circuit breaker.

4.1.2 Switching on the PV disconnecter SPV

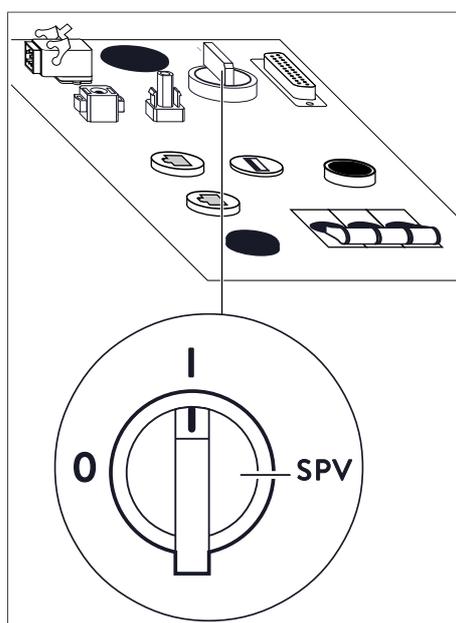


Figure 2: Switching SPV on

The PV disconnecter (SPV) makes the connection between the PV system and the inverter.

► Switch the PV disconnecter (SPV) on.

If there are external DC isolating switches:

► Switch these on too.

4.1.3 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.
- Notify the service team!

Further attempts can damage the battery modules.

Fuse switch F1 establishes the connection between the battery and the inverter. To be able to switch on fuse switch F1, switch S1 must also be pressed.

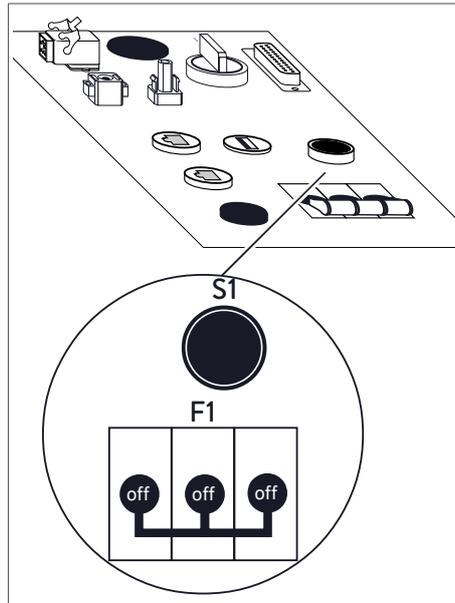


Figure 3: Fuse switch F1 and switch S1 at the top side of the storage system

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.

When the storage system has started up and is running in normal operation, the sonnen Eclipse pulses white (see 3.5 – p. 14).

5 Using the optional display



The storage system is not delivered with a display as standard. Retrofitting the display is not possible.

The installed display is a multi-touch screen. It can be controlled with movements of the hand (like a standard smartphone).

5.1 Activating the display

When the display is not touched for a longer period of time, the screen goes dark.

► Touch the display anywhere to reactivate the screen.

5.2 Home screen

The home screen displays the most important current data for the storage system.

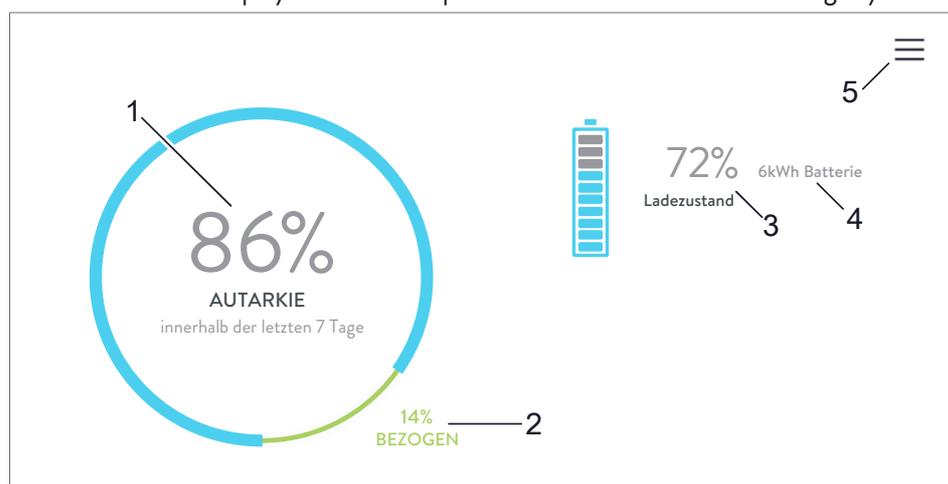


Figure 4: Home screen

No.	Description
1	Display of Autarky: Indicates the proportion of total consumption over the last 7 days which was self-generated.
2	Display of Usage: Indicates the proportion of total consumption over the last 7 days which was drawn from the public grid.
3	State of charge of the storage system: Indicates the proportion of total capacity that is currently available.
4	Total capacity: Indicates the power that can be taken from a fully charged battery.
5	Main menu button. ► Press the button to switch to the main menu.

Table 3: Description of the home screen components

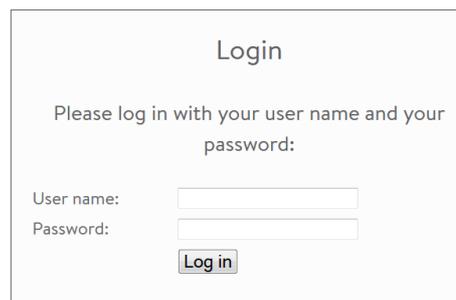
6 Internet portal

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

6.1 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>
2. The login window shown here opens:



Login

Please log in with your user name and your password:

User name:

Password:

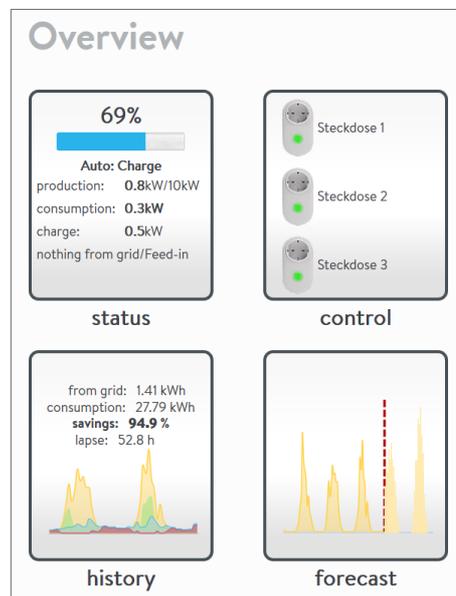
Log in

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

6.2 Using the overview page

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

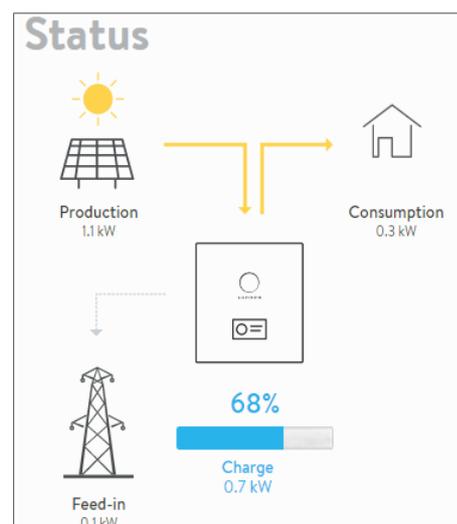
► You can click on the **status**, **control**, **history** and **forecast** buttons in order to open the specific page.



6.3 Using the status page

The status page shows the following current measured values:

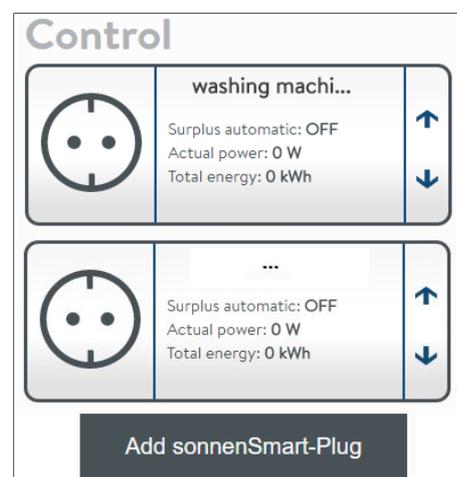
- Current generation
- Current consumption
- Current usage/current feed-in
- Current charging status



6.4 Using the control page

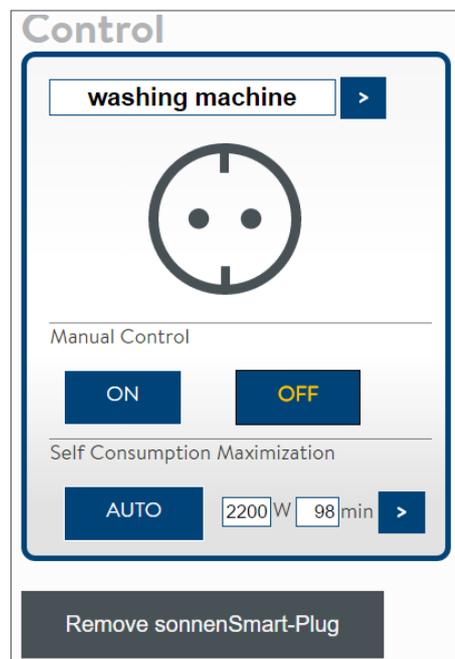
The control page contains an overview of the connected sonnenSmart-Plugs.

- ▶ Click on the relevant button to select a smart plug (e.g. washing machine).
- ▶ Click on the ↑ or ↓ button to change the order of the Smart-Plugs.



- ▶ Click on **Add sonnenSmart-Plug** to set up a new Smart-Plug. The program guides you through the necessary steps.

- ▶ The name of the smart plug can be selected and replaced. Click on > to confirm the new name of the Smart-Plug.
- ▶ Click on the **ON** or **OFF** button to activate or deactivate the smart plug (manual control).
- ▶ To have the storage system automatically activate or deactivate the smart plug, click on the **AUTO** button.
- ▶ Under 'Self Consumption Maximization', set the excess energy level at which the consumer should be activated and the minimum duration for which the consumer should stay activated (minimum activation time). These parameters must be adapted to suit the connected consumer.
- ▶ Click on the **Remove sonnenSmart-Plug** button to remove the selected smart plug from storage system control.



Example: Your washing machine has a nominal power of 2200 watts. Your selected washing programme takes one hour and 38 minutes to complete. Enter the following values under 'Self Consumption Maximization': 2200 W; 98 minutes.

- ▶ Confirm the values by clicking on >.

6.5 Using the history page

The history 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.

6.5.1 Elements of the power graph

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

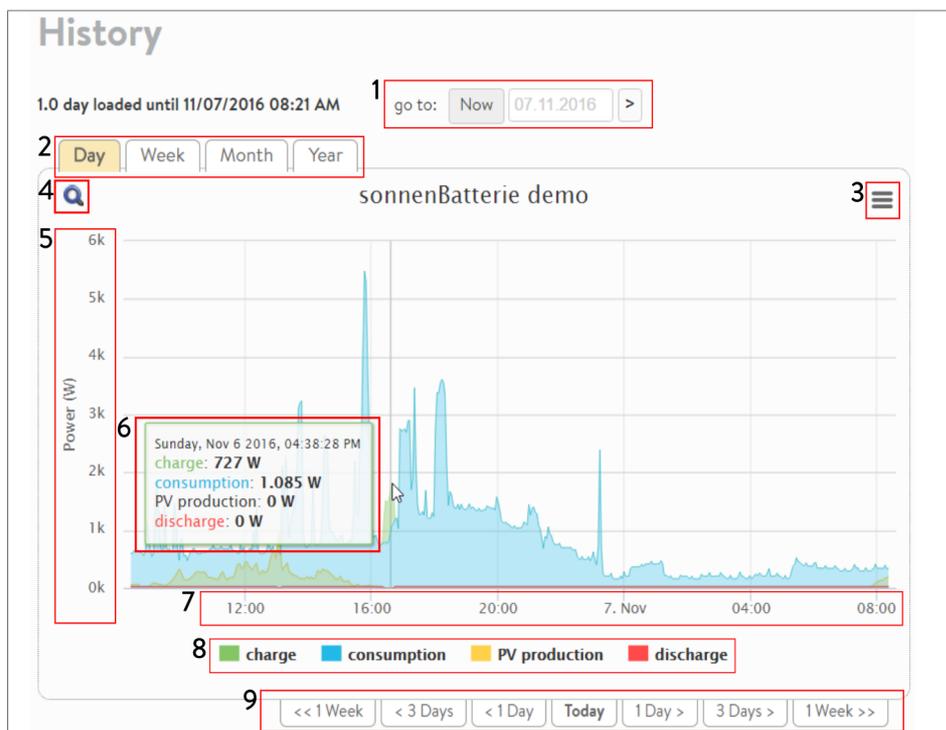


Figure 5: Power graph on the history page

No.	Description
1	<ul style="list-style-type: none"> ▶ Clicking on the input field to the right of go to allows you to select a date. ▶ Clicking on the button > confirms the date selection.
2	<ul style="list-style-type: none"> ▶ Clicking on the day, week, month or year button defines the time frame shown in the graph.
3	<ul style="list-style-type: none"> ▶ Clicking on the button provides the option of printing out the displayed graph.
4	<ul style="list-style-type: none"> ▶ Clicking on the magnifying glass activates or deactivate full-screen mode.
5	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.
6	<ul style="list-style-type: none"> ▶ 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 time frame in the graph.
7	Time is shown on the x-axis (in the above example, the time frame shown on the x-axis is one day).
8	<p>This legend shows which energy flows are displayed in which colour in the graph (consumption is shown in blue, for example).</p> <ul style="list-style-type: none"> ▶ Clicking on the desired energy flow (e.g. consumption) shows or hides this flow in the graph.
9	<ul style="list-style-type: none"> ▶ Clicking on one of the buttons below the graph allows you to navigate to previous or later time frames.

Table 4: Description of the power graph elements

6.5.2 Analysis of power diagram

Given the high density of information, analysis of a power diagram is not too

simple. For better understanding, some points in time of a power diagram are analysed in what follows.



The example below shows how it works in a facility with limitation of the feed-in to the public grid. This power limitation is a special feature that is used only in cases where the network owner demands it. If requirements are imposed on such an feed-in limitation, it can be controlled by the storage system.

Additional information:

- Nominal Power PV system: 5 kWp
- Feed-in Limitation: 50 % of the nominal power (here: 2.5 kW)

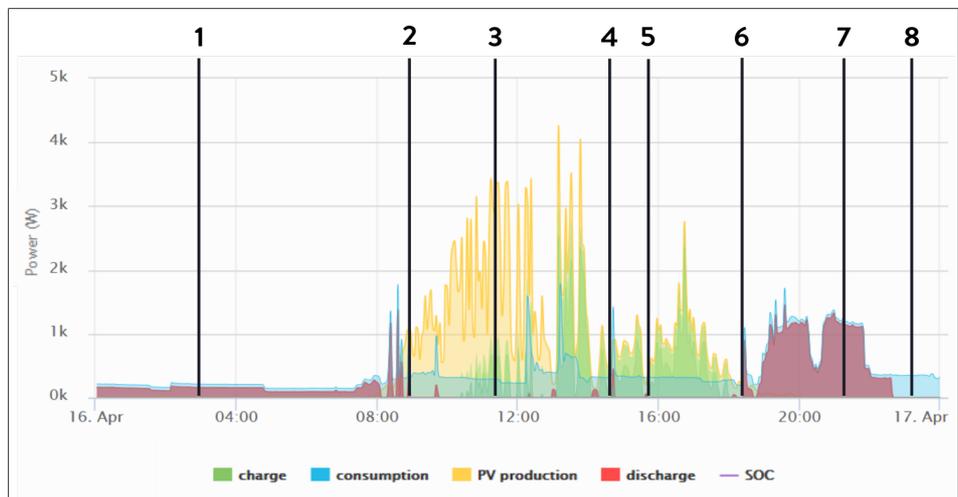


Figure 6: Analysis of power diagram

No. Description

- 1 It is dark (no generation (yellow)). Consumption (blue) and discharging (red) have the same value. Consumption is therefore covered by the discharging of the storage system.
- 2 Generation (yellow) is approx. 1000 watts. This is used to cover consumption (blue). The intelligent charging management system has postponed charging; the charging buffer is needed to avoid breaching the feed-in limit. The energy that is not required is fed into the grid.
- 3 Generation has increased to approx. 3300 watts. This is used to cover consumption (blue) and charge the storage system (green) at a minimal level. Charging with higher power is prevented by the intelligent charging management system. This function ensures that storage capacity is kept free in order to store part of the midday peak in the storage system later.
- 4 Consumption (blue) exceeds generation and must be supplemented by the storage system.
- 5 A breach of the feed-in limit is no longer expected. PV generation covers consumption (blue) and the surplus is stored in the battery (green) so that it will be fully charged by evening.
- 6 From this point PV generation is no longer sufficient to cover consumption. The difference is discharged from the storage system.
- 7 The storage system discharge (red) covers total consumption.
- 8 The storage system is discharged and consumption is covered by usage from the public grid.

Table 5: Description of the power graph elements

6.5.3 Analysing pie charts

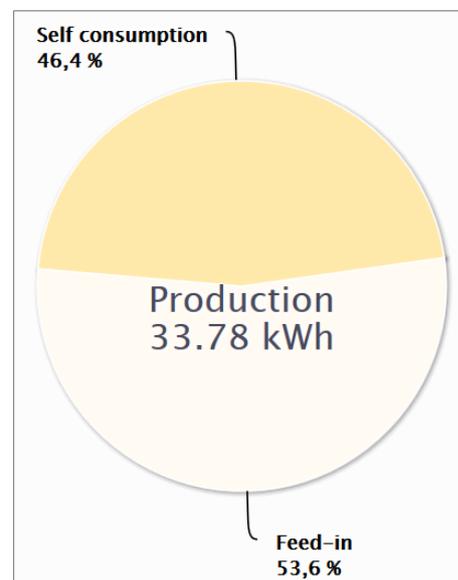
Two pie charts are shown below the power graph. The pie charts always refer to the time frame shown in the power graph.

Production pie chart

Production, shown in yellow, symbolises the electrical power gained by the generator in the analysed time frame.

The feed-in power is marked white in the chart.

The 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.

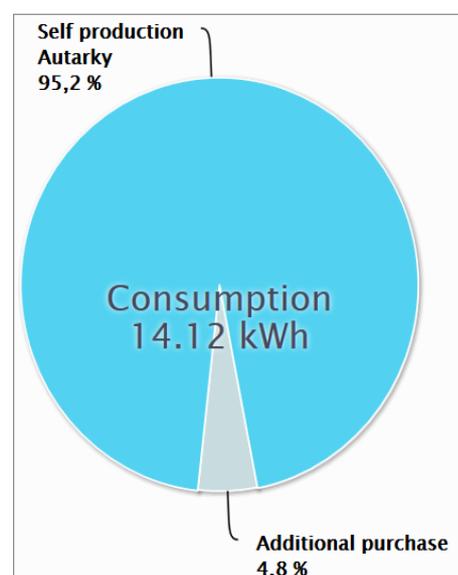


Consumption pie chart

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

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.



6.6 Using the forecast page

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

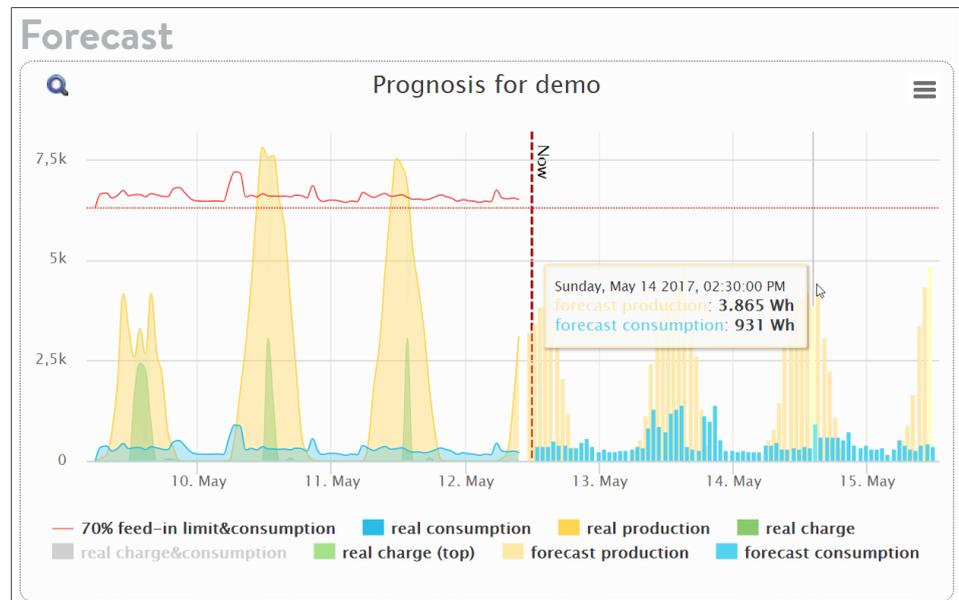


Figure 7: Forecast page

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 production forecast (yellow).

7 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.

7.1 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 6: Checking function

7.2 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.

8 Switching off the storage system

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.

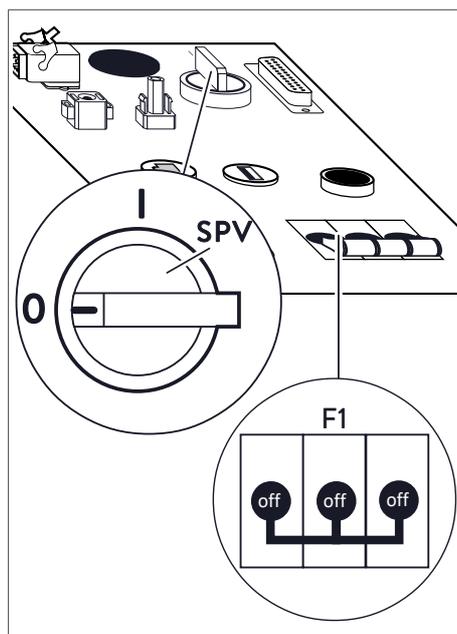


Figure 8: F1 and SPV on top of the storage system

1. Switch off fuse switch F1.
2. Switch the PV disconnect (SPV) off.

9 Troubleshooting

Disturbance	Reason	Correction																				
No access to the internet portal https://my.sonnen-batterie.com	No connection between the storage system and the server.	<ul style="list-style-type: none"> ▶ 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: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TCP-Port</th> <th>Service</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>ssh</td> </tr> <tr> <td>80</td> <td>http</td> </tr> <tr> <td>8080</td> <td>http</td> </tr> <tr> <td>443</td> <td>https</td> </tr> <tr> <td>3333</td> <td>debug</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>UDP-Port</th> <th>Service</th> </tr> </thead> <tbody> <tr> <td>1194</td> <td>VPN</td> </tr> <tr> <td>123</td> <td>NTP</td> </tr> <tr> <td>1196</td> <td>VPN</td> </tr> </tbody> </table>	TCP-Port	Service	22	ssh	80	http	8080	http	443	https	3333	debug	UDP-Port	Service	1194	VPN	123	NTP	1196	VPN
TCP-Port	Service																					
22	ssh																					
80	http																					
8080	http																					
443	https																					
3333	debug																					
UDP-Port	Service																					
1194	VPN																					
123	NTP																					
1196	VPN																					
The sonnen Eclipse of the storage system pulses orange.	The internet connection to the storage system has been interrupted.	<ul style="list-style-type: none"> ▶ Check whether the home network router is able to establish an internet connection. <p>If so:</p> <ul style="list-style-type: none"> ▶ Ensure that the network cable 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.	<ul style="list-style-type: none"> ▶ Please contact the sonnen service team to get help resolving the problem. 																				
The sonnen Eclipse of the storage system pulses green.	The storage system is not connected to the public electricity grid.	<ul style="list-style-type: none"> ▶ Check that the circuit breaker in the supply line of the storage system is switched on. <p>If so: The public electricity grid does not provide any electrical energy (grid outage).</p> <ul style="list-style-type: none"> ▶ It can only be waited until the public electrical grid supplies energy again. Thereafter, the storage systems resumes normal operation. 																				
	Storage system with emergency power function only*: The storage system is not connected to the public electricity network and is in emergency operation.	No troubleshooting necessary.																				

*Optional accessories sonnenBackup-Box.

10 Uninstallation and disposal

10.1.1 Uninstallation

DANGER

Improper uninstallation of the storage system

Danger to life due to electrocution!

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

10.1.2 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.

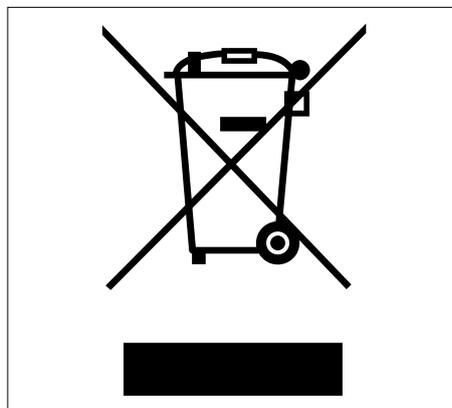


Figure 9: WEEE symbol

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

- ▶ Dispose of the storage system and the batteries it contains in an environmentally friendly way through suitable collection systems.

11 Annex

11.1 Warranty

You can find the manufacturer's warranty in the annex of this document.

11.2 Safety data sheet

You can find the safety data sheet in the annex of this document.



Manufacturer's Warranty

sonnen Australia Pty Limited ACN 611 337 54

- 1.1 In this warranty, terms have the following meanings:
- (a) **Authorised Partner:** partners or distributors authorised by sonnen to sell, install and/or repair the sonnenBatterie;
 - (b) **Customer:** the purchaser of the sonnenBatterie, for whose benefit the sonnenBatterie is brought into service and where the purchase is not for the purpose of resupply;
 - (c) **Installation Certificate:** the sticker and/or certificate recording the serial number of the sonnenBatterie, Authorised Partner number and date on which the sonnenBatterie is brought into service, which is provided to the Customer by sonnen or the Authorised Partner;
 - (d) **sonnen:** sonnen Australia Pty Limited ACN 611 337 547;
 - (e) **sonnenBatterie:** the product as first delivered to you, or any replacement or repaired product provided to you under the terms of this warranty.
- 1.2 This warranty is given by sonnen to the Customer in respect of the sonnenBatterie. To the extent permitted by law, the warranty will not transfer to any subsequent purchasers of the sonnenBatterie without the prior written consent of sonnen.
- 1.3 If the Customer subsequently purchases additional sonnenBatteries, sonnen or its Authorised Partner will issue a separate Installation Certificate in respect of each sonnenBatterie, which will be subject to the warranties contained therein.
2. *Warranty details*
- 2.1 If the sonnenBatterie develops a fault or defect during the warranty period, and subject to the terms below, sonnen or its Authorised Partner will repair it or replace it. It may be replaced by a refurbished sonnenBatterie of the same type rather than being repaired. Refurbished parts may be used to repair the sonnenBatterie.
- 2.2 sonnen offers this warranty on top of any guarantees imposed by the *Competition and Consumer Act 2010* and any other applicable State or Territory legislation.
- 2.3 The warranty period commences on the date on which the sonnenBatterie is first brought into service as recorded on the Installation Certificate. The warranty period ends on whichever date occurs first:
- (a) 10 years from the date of commencement of the warranty period; or
 - (b) 10,000 complete recharge cycles of the sonnenBatterie.

2.4 The warranty does not cover:

- (a) any sonnenBatterie where:
 - (i) it is not connected to the internet;
 - (ii) the lead-sealing of the battery has been damaged;
 - (iii) it has not been installed or repaired by sonnen or an Authorised Partner, as recorded on the Installation Certificate;
 - (iv) it has been used or maintained other than in accordance with the sonnenBatterie's operating instructions or as set out in the technical data specification sheet provided with the sonnenBatterie;
 - (v) regular examinations of the ordinary connection to the electricity network have not been carried out in accordance with sonnen's instructions;
 - (vi) it has been used with spare parts and accessories which do not comply with the original specifications issued by sonnen; or
 - (vii) software updates as provided by sonnen from time to time have not been performed due to circumstances beyond sonnen's control;
- (b) negligence on the Customer's part;
- (c) normal wear and tear;
- (d) faults or defects caused by third parties, including work done by unauthorised service or repair agents;
- (e) damages caused by excess voltage within the main supply power network to which the sonnenBatterie is connected;
- (f) any incidental or consequential damages, loss of profits, loss of data or any other indirect damages;
- (g) any costs or expenses incurred by the Customer for the procurement of substitute equipment or services; or
- (h) any transport or travel costs incurred by the Customer in excess of \$200.

3. *Making a warranty claim*

3.1 Warranty claims must be made:

- (a) within 6 months after the date on which the Customer became aware of the fault or defect, or after which the fault or defect became reasonably apparent; and
- (b) by no later than 3 months after the expiration of the warranty period.



- 3.2 To make a claim the Customer should first contact their Authorised Partner.
- 3.3 The Customer will then need to provide to the Authorised Partner the details in clause 6.1 below.
- 3.4 The warranty claim may be dealt with by sonnen or its Authorised Partner, as follows:
 - (a) accessing the sonnenBatterie through remote access in order to assess the warranty claim, and perform any repairs or updates to its software; and/or
 - (b) replacing or otherwise repairing the sonnenBatterie in accordance with clause 3.6.
- 3.5 The decision whether to repair or replace the sonnenBatterie is at sonnen's sole discretion unless there is a 'major failure' as defined in the Australian Consumer Law.
- 3.6 Any physical repairs, replacement or collection of the sonnenBatterie will be performed by sonnen or its Authorised Partner as follows:
 - (a) The repair, replacement or collection will be carried out from the place at which the sonnenBatterie was first delivered.
 - (b) If the claim is covered sonnen will deliver any repaired or replaced sonnenBatterie back to the Customer.
 - (c) If the claim is not covered sonnen will deliver the sonnenBatterie back to the Customer.
- 3.7 If the claim is not covered, the Customer will be responsible for any transport, travel and labour costs incurred in dealing with the claim.
- 3.8 If the claim is covered, sonnen will be responsible for any transport, travel and labour costs to a maximum amount of \$200.

4. *sonnen contact details*

Address: Level 20, Tower A, 821 Pacific Highway, Chatswood NSW 2067

Phone: 1300 867 856

Email: info@sonnen.com.au

5. *Statutory guarantees*

- 5.1 As well as the sonnen warranty, the sonnenBatterie comes with guarantees that cannot be excluded under the Australian Consumer Law. The Customer is entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. The Customer is also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.



6. *Claim details*

6.1 If the Customer is making a claim under the warranty or the statutory guarantees, sonnen will require the following information:

- (a) Name:
- (b) Address:
- (c) Product purchased:
- (d) Serial number on Installation Certificate:
- (e) Date on which sonnenBatterie was brought into service (as shown on the Installation Certificate):
- (f) Authorised Partner number (as shown on the Installation Certificate):
- (g) Description of the problem:

SAFETY DATA SHEET

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name LITHIUM ION RECHARGEABLE BATTERY CELL
Synonym(s) IJ1101M - MODEL NAME • SONNEN LITHIUM ION RECHARGEABLE BATTERY CELL

1.2 Uses and uses advised against

Use(s) BATTERIES

1.3 Details of the supplier of the product

Supplier name SONNEN AUSTRALIA PTY LTD
Address 10 Shelley Street, Sydney, NSW, 2000, AUSTRALIA
Telephone 1300 867 856
Email info@sonnen.com.au
Website <https://www.sonnen.com.au/>

1.4 Emergency telephone number(s)

Emergency 0447 080 916

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

EXEMPT FROM CLASSIFICATION ACCORDING TO AUSTRALIAN WHS REGULATIONS

2.2 Label elements

No signal word, pictograms, hazard or precautionary statements have been allocated.

2.3 Other hazards

For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage. However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS Number	EC Number	Content
LITHIUM IRON PHOSPHATE	15365-14-7	-	Not Available
ALUMINIUM	-	-	Not Available
CARBON BLACK	1333-86-4	215-609-9	Not Available
GRAPHITE	7782-42-5	231-955-3	Not Available
HEAVY METAL(S)	-	-	Not Available
LITHIUM SALT(S)	-	-	Not Available
ORGANIC SOLVENT(S)	-	-	Not Available
POLYVINYLIDENE FLUORIDE	24937-79-9	607-458-6	Not Available

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye Exposure is considered unlikely unless casing is damaged. Flush gently with running water. Seek medical attention if irritation develops.
 Exposure is considered unlikely. Due to product form / nature of use, an inhalation hazard is not anticipated.

PRODUCT NAME LITHIUM ION RECHARGEABLE BATTERY CELL

Inhalation

Skin Exposure is considered unlikely unless casing is damaged. Gently flush affected areas with water. Seek medical attention if irritation develops.

Ingestion For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting. Ingestion is considered unlikely due to product form.

First aid facilities Eye wash facilities should be available.

4.2 Most important symptoms and effects, both acute and delayed

Adverse effects not expected from this product. Exposure to battery contents may cause irritation and potential burns.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

In case of fire suitable extinguishing media: carbon dioxide or dry chemical.

5.2 Special hazards arising from the substance or mixture

Contents react with water. May explode if exposed to high temperatures due to pressure build up in battery casing. Lithium may burn in a fire situation and may be ejected from the battery. Damaged cells may evolve toxic and flammable vapours.

5.3 Advice for firefighters

Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

5.4 Hazchem code

4W

4 Dry Agent (water MUST NOT be allowed to come into contact with substance).

W Risk of violent reaction or explosion. Wear liquid-tight chemical protective clothing and breathing apparatus. Contain spill and run-off.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

If spilt, collect and reuse where possible. If battery is broken or damaged, absorb liquid with sand or similar. Contain spillage, then collect and place in suitable containers for disposal. CAUTION: Avoid exposure to contents.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Store tightly sealed in a cool, dry, well ventilated area, removed from water, incompatible substances, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Store within the recommended limit of -20°C to 45°C. Do not expose to high temperature (60°C). Since short circuit can cause burn hazard or safety vent to open, do not store with metal jewelry, metal covered tables, or metal belt.

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Carbon black	SWA (AUS)	--	3	--	--
Fluorides, as F	SWA (AUS)	--	2.5	--	--
Graphite (all forms except fibres)	SWA (AUS)	--	3	--	--

Biological limits

Ingredient	Determinant	Sampling Time	BEI
POLYVINYLIDENE FLUORIDE	Fluoride in urine	Prior to shift	2 mg/L
	Fluoride in urine	End of shift	3 mg/L

Reference: ACGIH Biological Exposure Indices

8.2 Exposure controls

Engineering controls Avoid inhalation. Use in well ventilated areas.

PPE

- Eye / Face** Not required under normal conditions of use.
- Hands** Wear PVC or rubber gloves.
- Body** Not required under normal conditions of use.
- Respiratory** Not required under normal conditions of use.



9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	BATTERY CELL
Odour	ODOURLESS
Flammability	NON FLAMMABLE
Flash point	NOT RELEVANT
Boiling point	NOT AVAILABLE
Melting point	NOT AVAILABLE
Evaporation rate	NOT AVAILABLE
pH	NOT AVAILABLE
Vapour density	NOT AVAILABLE
Specific gravity	NOT AVAILABLE
Solubility (water)	REACTS
Vapour pressure	NOT AVAILABLE
Upper explosion limit	NOT RELEVANT
Lower explosion limit	NOT RELEVANT
Partition coefficient	NOT AVAILABLE
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Explosive properties	NOT AVAILABLE
Oxidising properties	NOT AVAILABLE
Odour threshold	NOT AVAILABLE

10. STABILITY AND REACTIVITY

PRODUCT NAME LITHIUM ION RECHARGEABLE BATTERY CELL

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization will not occur.

10.4 Conditions to avoid

Heat above 70°C or incinerate. Deform. Mutilate. Crush. Pierce. Disassemble. Recharge. Short circuit. Expose over a long period to humid conditions.

10.5 Incompatible materials

Battery contents are incompatible with water (evolving flammable gas), oxidising agents (e.g. hypochlorites), acids (e.g. nitric acid), alkalis (e.g. sodium hydroxide), heat and ignition sources.

10.6 Hazardous decomposition products

May evolve hydrogen and lithium oxides when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Information available for the product:

No specific acute toxicity data exists for this product. Batteries consist of a hermetically sealed metallic container containing a number of chemicals and materials of construction that may be hazardous upon release. Over exposure considered unlikely unless battery ruptures and contact with contents occurs. Contents may be harmful.

Information available for the ingredient(s):

Ingredient	Oral Toxicity (LD50)	Dermal Toxicity (LD50)	Inhalation Toxicity (LC50)
CARBON BLACK	> 8000 mg/kg (rat)	--	--

Skin Not classified as a skin irritant unless the battery ruptures. Contact with contents may cause irritation, redness, dermatitis and possible burns with prolonged contact.

Eye Not classified as an eye irritant unless the battery ruptures. Contact with contents may cause irritation, redness and possible burns with prolonged contact.

Sensitisation Not classified as causing skin or respiratory sensitisation.

Mutagenicity No evidence of mutagenic effects.

Carcinogenicity No evidence of carcinogenic effects.

Reproductive No relevant or reliable studies were identified.

STOT – single exposure Not classified as causing organ damage from single exposure. Due to the product form and nature of use, exposure to internal contents is not anticipated unless the battery ruptures. Exposure to contents may cause respiratory irritation.

STOT – repeated exposure Not expected to cause organ effects from repeated exposure. Due to the product form and nature of use, exposure to internal contents is not anticipated unless the battery ruptures.

Aspiration Not relevant.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

This product may be hazardous to the environment.

12.2 Persistence and degradability

This product is not readily biodegradable.

12.3 Bioaccumulative potential

Limited information was available at the time of this review.

12.4 Mobility in soil

This product has low mobility in soil.

PRODUCT NAME LITHIUM ION RECHARGEABLE BATTERY CELL

12.5 Other adverse effects

No information provided.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal Reuse or recycle where possible. Return to manufacturer/supplier. Contact your state EPA or the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE



	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
14.1 UN Number	3480	3480	3480
14.2 Proper Shipping Name	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	LITHIUM ION BATTERIES (including lithium ion polymer batteries)
14.3 Transport Hazard Class	9	9	9
14.4 Packing Group	II	II	II

14.5 Environmental hazards No information provided

14.6 Special precautions for user

Hazchem code 4W

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Poison schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

Hazard codes None allocated.

Risk phrases None allocated.

Safety phrases None allocated.

Inventory listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

16. OTHER INFORMATION

Additional information

PRODUCT NAME LITHIUM ION RECHARGEABLE BATTERY CELL

EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: Strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

WORKPLACE CONTROLS AND PRACTICES: Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:

It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonized System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m ³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

Report status

This document has been compiled by RMT on behalf of the manufacturer, importer or supplier of the product and serves as their Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer, importer or supplier or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer, importer or supplier.

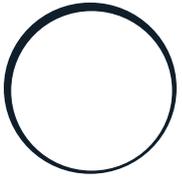
While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared by

Risk Management Technologies
5 Ventnor Ave, West Perth
Western Australia 6005
Phone: +61 8 9322 1711
Fax: +61 8 9322 1794
Email: info@rmt.com.au
Web: www.rmt.com.au.

PRODUCT NAME LITHIUM ION RECHARGEABLE BATTERY CELL

[End of SDS]



sonnen