



Installation and Operating Manual sonnenBatterie ecoLinx

This manual refers to:

Hardware version: 2.00

Software version: 8.0.5674

Latest revision: 10/09/19

Version: 1.0

If you need help or service, contact the company that commissioned your storage system.

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About this manual

This manual describes the installation and operation of the sonnenBatterie ecoLinX storage system. Read this manual carefully before beginning work and keep it near the storage system.

Target audience

This document is intended for the following audiences:

- Operator and end user of the storage system
- Trained and certified electrician

Some actions described in this document must only be performed by a trained and certified electrician. These actions are marked as follows:

Trained, electrically qualified person only!

Trained, electrically qualified persons are:

- Service partners authorized by sonnen, Inc.
- Trained, electrically qualified persons with knowledge of all applicable regulations and standards.
- Trained, electrically qualified persons who have attended the training provided by sonnen.

Terminology

This document refers to the sonnenBatterie ecoLinX as a storage system.

This manual refers to the building being serviced by the storage system as a “house,” but the sonnenBatterie ecoLinX can be installed in any number of buildings or sites powered by AC electricity.

For a full glossary of terms used in this manual, see page 48.

Symbols used

Warnings

WARNING WORD



Warnings are indicated by this symbol and a warning word, which indicates the severity of the danger. Along with the warning are instructions for avoiding the danger.

The following warning words are used:

- **CAUTION** indicates a possible hazardous situation which could result in minor or moderate injury.
- **WARNING** indicates a possible hazardous situation which could result in death or serious injury.
- **DANGER** indicates an imminent hazardous situation which will result in death or serious injury.

Material damage

Attention

Possible material damages are indicated in this document with the warning word “Attention.”

Important information



Important information without danger to injury, death, or material damage is indicated by this symbol.

Actions

Actions to be taken are marked with a ►. For example:

- Read this manual thoroughly before operating the storage unit.

Electrical symbols



⏏ indicates protective earth (ground).

N indicates the connection for the neutral conductor on permanently installed equipment.

Safety

Intended use

Any use of the system other than the intended use can cause serious injury, death, and damage to the product or other assets.

- The storage system must only be used to store electrical power.
- The storage system must only be used with the battery modules provided.
- The storage system is intended for indoor use only.
- The intended use includes knowledge and application of the information in this installation and operating manual as well as all delivered product documentation.



Failure to comply with the warranty conditions and the information listed in this installation and operating manual will void any warranty claims.

Prohibited uses

DANGER

Danger to life due to electric shock!



Even if the utility grid fails, the storage system will continue delivering power. Before servicing the storage system:

- ▶ Turn off the storage system.
- ▶ Turn off the main disconnect circuit breaker.

Only authorized electrically qualified persons can perform work on electrical parts.

- Do not use the storage system in vehicles.
- Do not use the storage system in wet locations.
- Do not use the storage system in areas at risk of explosion (flour dust, sawdust, etc.).
- Do not expose the storage system to direct sunlight.
- Do not use the storage system in areas where

the ammonia content of the air exceeds 20 ppm.

- Do not use the storage system when corrosive gases are present.
- Do not use the storage system higher than 9,842 feet (3,000 meters) above sea-level.
- Do not operate the storage system at temperatures outside of the allowed ambient temperature range of 41°F - 113°F (5°C - 45°C).
- Do not operate the storage system at a humidity higher than 90%.

General warnings

Attention

Damaging of the battery modules by deep discharge!

If the battery modules are disconnected from a power source for longer than six months, they can be damaged by excessive discharge.

- ▶ If the storage system has been disconnected from the utility grid for six months, connect it to the utility grid and allow it to charge the battery modules to 100%.

General safety instructions

- Do not modify the storage system.
- Do not use the storage system if it has been damaged.
- Ensure the following regulations are observed in the installation and connection of the storage system and the PV system:
 - Local, regional, national, and international regulations and guidelines
 - National Electric Code
 - ANSI/NFPA 70
 - Requirements of the servicing utility
- Ensure that all safety systems are in perfect working order.
- Read this installation and operating manual with care.

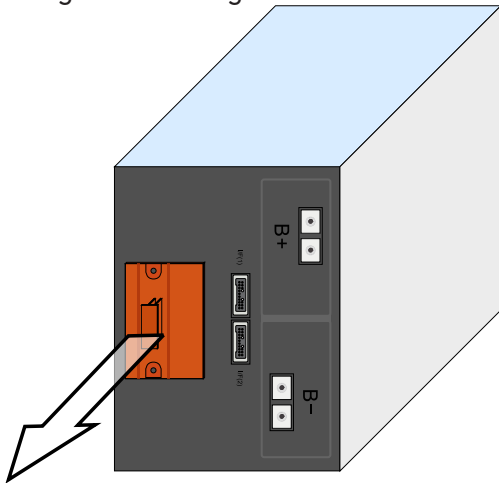
- When installing and maintaining the storage system, wear personal protective equipment, including safety glasses, insulated gloves, and steel-toe shoes.

WARNING

Risk of burns!



The orange safety plugs must be removed before working on or with the battery modules. As long as the plug is inserted in the battery, it is capable of producing potentially dangerous voltages.



When working on the storage system:

- ▶ Take off metallic jewelry.
- ▶ Turn off the storage system.
- ▶ Turn off the main disconnect.
- ▶ Remove all orange safety plugs from the battery modules.
- ▶ Use insulated tools
- ▶ Wear personal protective equipment, including safety glasses, insulated gloves, and steel-toe shoes.

Fire-related instructions

CAUTION

Risk of injury from escaping electrolyte



The battery modules in the storage system are protected by a number of security devices for safe operation. Despite diligent construction, cells inside the battery modules can still degrade or catch fire in the event of mechanical damage, heat, or a fault. Possible effects include:

- Heating of battery modules.
- Escaping electrolyte, which can ignite and produce an explosive flame.
- Smoke, which can irritate skin, eyes, and throat.

Consequently:

- Do not open battery modules.
- Do not physically damage battery modules (puncture, deform, disassemble, etc).
- Do not modify battery modules.
- Keep battery modules away from water (except to extinguish a fire in the storage system).
- Do not allow battery modules to heat up.
- Only operate battery modules in the allowed temperature range.
- Do not short circuit battery modules or bring them into contact with metal.
- Do not use a battery module after it has short-circuited.
- Do not exhaustively discharge battery modules.

If contents escape:

- Do not enter the room.
- Avoid contact with the escaping electrolyte.
- Contact your fire department.

Despite all of the care that goes into the design of the storage system, fires are still possible. A fire

can release substances contained in the battery modules.

In the event of a fire in the storage system or its surroundings:

- Only fire fighters wearing proper protective clothing (including gloves, masks, and breathing apparatus) may enter the room with the burning storage system.
- A fire in the storage system can be extinguished by conventional agents.
- The use of water is advisable to cool the battery

modules and thus prevent the thermal runaway of modules that are still intact.

Battery module information

Pertinent information on battery modules include:

- The battery modules have a rated voltage of 51.2 VDC and are thus in the range of protective extra-low voltage (below 60 VDC).
- The battery modules contain no metallic lithium.

Specifications

ecoLinx model	10	12	14	16	18	20
Usable capacity (100% DOD)	10 kWh	12 kWh	14 kWh	16 kWh	18 kWh	20 kWh
Continuous power output (at 25 deg C)	7kW	8 kW	8 kW	8 kW	8kW	8kW
Dimensions W"/H"/D" (approx.)	26x 84x 16	26x 84x 16	26x 84x 16	26x 84x 16	26x 84 x 16	26x 84 x 16
Weight (approx.)	622 lbs.	683 lbs.	741 lbs.	800 lbs.	850 lbs.	900 lbs.
Nominal current	33.3A					
Cell chemistry	Lithium iron phosphate (LiFePo ₄)					
Nominal voltage	120/240VAC					
Device protection	Short circuit, overload, over temperature					
Ambient temperature	41°F - 113°F (5°C - 45°C)					
Maximum Humidity	90%, non-condensing					
Applications	Self-Consumption, Backup, Time of Use, Home Automation Integration					
Grid integration	AC coupled					
On-grid specifications						
Nominal power	7kW	8kW	8kW	8kW	8kW	8kW

Table 1 Specifications

ecoLinx model	10	12	14	16	18	20
Nominal AC current (amps)	29.16	33.33	33.33	33.33	33.33	33.33
Grid-outage specifications						
Nominal power	7kW	8kW	8kW	8kW	8kW	8kW
Nominal AC current (amps)	29	33.33	33.33	33.33	33.33	33.33
Max power	100 ms – 17KVA 5s – 12KVA 30m – 9KVA					
Max AC current (charge/discharge)	1 ms – 100A 100 ms – 70.7A 5s – 50A 30m – 37.5A					
Overcurrent protection needed	50A					
General specifications						
Transfer switch	Automatic, integrated, Transfer time < 100 ms					
Backup capacity	2 kilowatt-hours per battery module, up to 20 kilowatt-hours					
Certifications	Certified to UL 9540 Standards. UL certified components: Battery modules –UL1973; Inverter – UL1741; ATS – UL1008; AC Breaker – UL489					
Warranty	15 years or 15,000 cycle warranty on inverter, battery modules, cabinet and components					
Inverter efficiency	92.5% CEC weighted, 95.0% peak					
Roundtrip Eff% (Grid <> Battery)	>= 86%					
Comm. ports	Serial, Ethernet					

ecoLinx model	10	12	14	16	18	20
Comm. protocols	Modbus					
Comm. and control standards	Control4 and Crestron Drivers Included					
EMC / EMI protection	FCC Part 15B					
Total harmonic distortion	<5% L1-L2, <2% L-N					
Cooling Method	Forced air					
Noise emission	< 35dBA					
AC Specifications						
AC input rated current	Pass through: 200 amps @ 240VAC Power plant: 33.33 amps @ 240VAC					
AC output voltage	120/240 volts					
AC grid voltage	120/240 volts					
Nominal frequency	60 Hz					
Adjustable frequency range	+/- 0.7 Hz from nominal					
Metering capability	Power meter for load and PV production; +/- 0.5 RDG (current/voltage)					
Tare losses (W)	60 watts					
Transient protection	IEEE C62.41 Class B					
Transfer switch specifications						
Current rating	200 amps switching and overcurrent protection					
Voltage rating	120/240 VAC					
Contacts	Silver-plated					

Transfer switch specifications

Certification	Certified to UL Standards
Fault Current @ 240VAC	22,000 amps

Battery specifications

Voltage	48-56 VDC
Capacity	10-20kWh (2 kWh per module)
Charge current	30A per module nominal, 70A per module max
Cell discharge	100% DoD
Overcharge Protection	Fuse protection

Sizing requirements in relation to PV inverter

ecoLinx	Minimum PV size	Ideal PV size
10	4 KW	8 KW
12	4.8 KW	8 KW
14	5.6 KW	8 KW
16	6.4 KW	8 KW
18	6.4 KW	8 KW
20	6.4 KW	8 KW

Dimensions

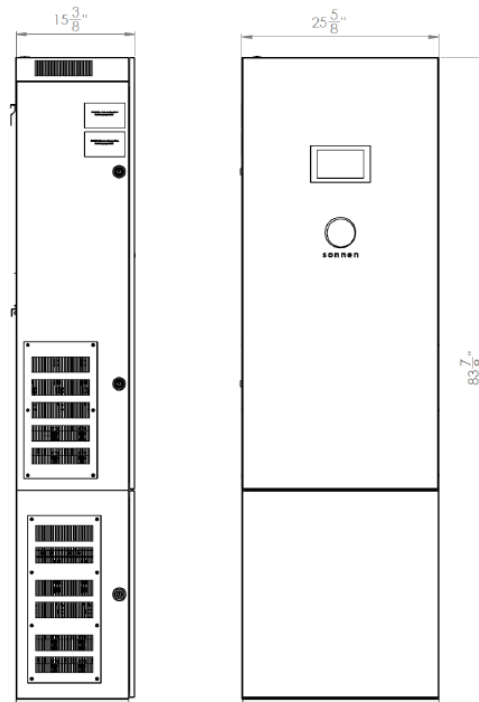


Fig. 1 Storage system dimensions

Key components

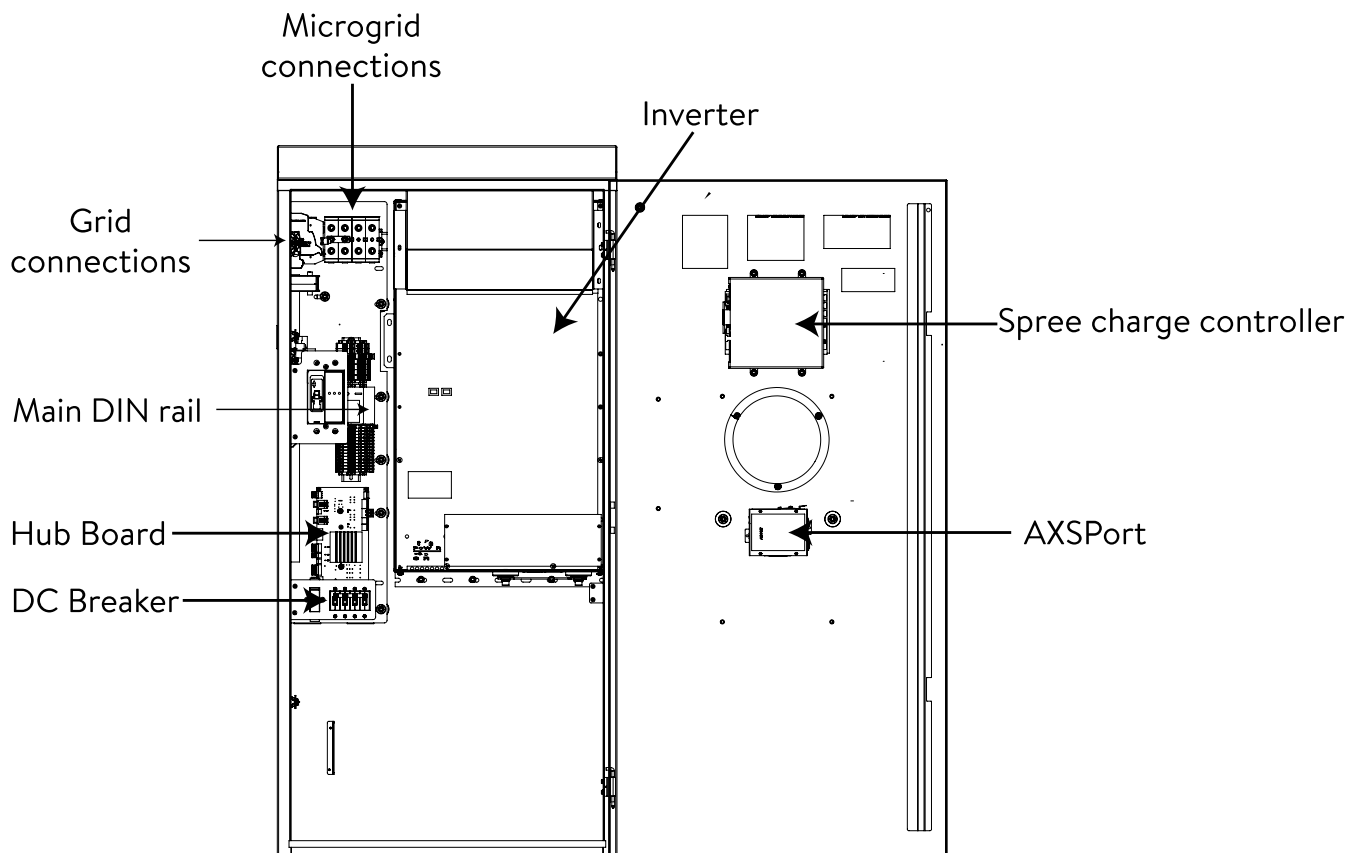


Fig. 2 ecoLinX key components

Description of use

The sonnenBatterie ecoLinX is an intelligent storage system that monitors and controls energy production, consumption, and storage in the house.

The sonnenBatterie ecoLinX can work with existing or newly installed PV systems. The solar inverter and ecoLinX storage system connect to the same distribution panel. Solar modules do not connect to the sonnenBatterie directly.

The storage system uses two power meters to monitor solar power production and energy consumption. When production is higher than consumption, such as at midday, the ecoLinX stores the excess energy in its lithium iron phosphate (LiFePo₄) battery modules. When consumption is higher than production, such as in the evening, the storage system releases the energy. In doing so, the storage system allows you to use solar power at night, reducing your power bill and increasing the value of your investment in renewable energy.

The storage system also acts as a backup power supply, meaning that if the utility grid goes out, your appliances will be powered by the unit's stored energy.

The illustration below shows how the storage system manages solar power (1) and power from the utility grid (2) to maximize your energy independence and savings on your power bill.

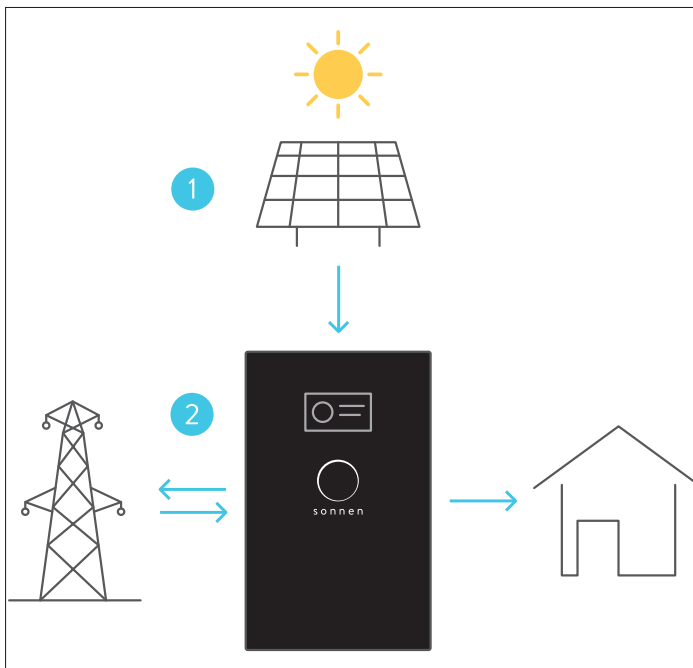


Fig. 3 Energy flow

Modes of operation

The sonnenBatterie ecoLinX offers three complementary modes of operation: Self-consumption, Backup, and Time of Use. Self-consumption mode ensures that you are using the power you generated even when utility grid power is available; backup mode makes that self-generated power available in the event of a grid power outage.

Many utility companies are moving to a Time of Use-based billing scheme, in which electricity costs more during high-demand time periods. The sonnenBatterie ecoLinX can maximize your cost savings by using your stored battery power during the high-cost part of the day and recharging from solar and optionally with electricity purchased from the grid at the lowest offered rates.

Self-consumption mode

The following images illustrate the interaction between the storage system, the PV system, and the utility grid in self-consumption and backup modes:

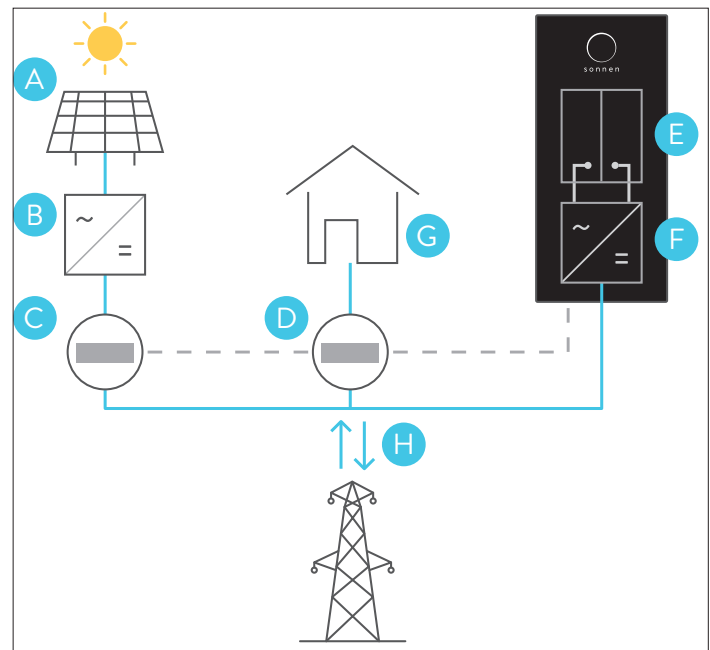


Fig. 4 Self-consumption mode

The DC power that is generated by the PV array (A) is converted to AC power by means of an inverter (B). The meters (C) and (D) measure the current electrical power in watts. The production meter (C) measures the power production, the

consumption meter (D) measures the power consumption in the house. If the production is higher than the consumption, the surplus will be stored in the battery modules (E). The storage system's inverter (F) converts the AC power to DC power while the battery modules (E) are charging. When the production is lower than the consumption, electric power will be released from the battery modules to power the loads. The storage system's inverter (F) converts the DC power of the battery modules (E) to AC power. The utility's power meter (G), measures the power supply and the power fed back to the grid (H) by the PV array (if applicable). The storage system will not discharge its batteries to the grid in normal operation.

Backup mode

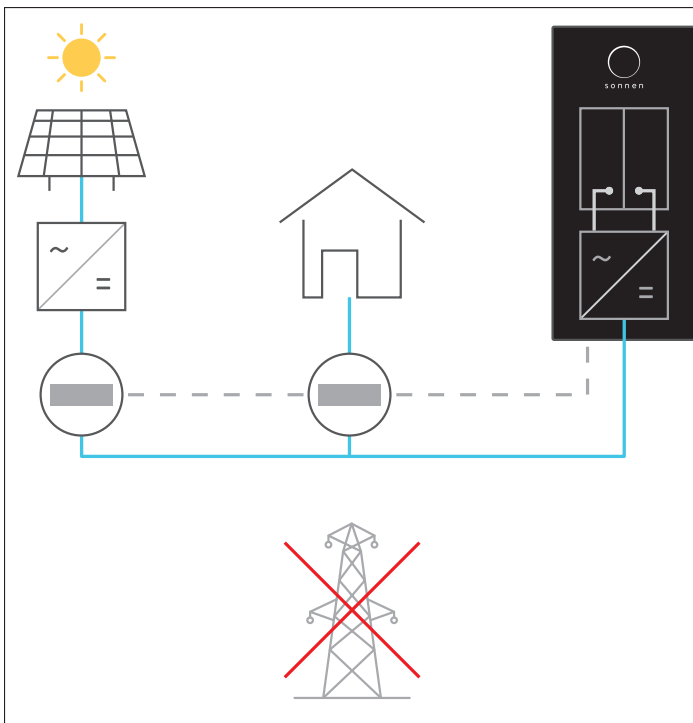


Fig. 5 Backup mode

In backup mode, the storage system remains at a constant state of charge until there is a utility grid failure. In the event of a grid failure, the house is powered by the energy stored in the battery modules and generated by the PV array. During that time, the power from the PV array powers the house or charges the battery modules, depending on production and consumption levels. The storage system can also turn the PV array off if the battery modules become fully charged.

In backup mode operation, 10-, 12-, 14-, and 16-kilowatt models of the storage unit will isolate the microgrid from the utility grid using a 200A automatic transfer switch. When this occurs, the storage unit will produce grid-quality voltage and frequency so that any grid-tied PV inverters in the microgrid will continue to operate. The PV array will first power the loads on the AC panel, with any excess energy charging the batteries in the storage unit. If there is insufficient PV to cover the loads, the storage unit will discharge its batteries to meet demand.

To prevent battery overcharging while in backup mode, the storage unit will perform a frequency shift to 60.9 Hz when its state of charge reaches 95 percent. Because the PV inverter is still subject to UL1741 conditions, it will think that the "grid" is out of spec for the frequency threshold (59.3 - 60.5 Hz) and will disconnect from the microgrid. When the storage unit's state of charge drops to 89 percent, it will reduce the frequency to 60 Hz. The PV inverter will see that the frequency is within the UL1741 range and start its 5-minute countdown before it attempts to reconnect to the microgrid and produce power.

If the loads are small and the PV production is high, then this behavior could occur multiple times per day.

Attention

Altering a PV inverter's frequency could damage the PV inverter, the storage system, and the installation site.

It is the installer's responsibility to ensure the PV inverter is suitable for use with the sonnenBatterie storage system.

Generator autostart functionality

The sonnenBatterie ecoLinx can provide a start signal for a generator to provide power in the event that the storage system has reached a low state of charge, the grid is unavailable, and the PV system is not producing power. When these criteria are met, the storage system will start the generator and keep it running until the battery modules have reached a pre-configured state of charge, the grid becomes available, or the PV system begins producing power.

NEC 705.12(D)(2) calculation

Because residential energy storage is a new and emerging technology, some installers and inspectors are unfamiliar with how to take the sonnenBatterie ecoLinx storage system into account when sizing distribution panels in regards to NEC 705.12(D)(2), the 120% rule. Because the storage system has dedicated grid and microgrid ports, only load centers located on the microgrid side need to take the output of the sonnenBatterie ecoLinx into consideration.

The storage system only discharges energy when loads are present “downstream”; that is, on the protected load panel. This is in contrast to a PV system, which supplies energy whenever grid voltage is present. Because of this, the main service panel should be sized for only grid and PV, if applicable. The protected load panel, however, needs to take the grid supply overcurrent protection device, PV, and the storage system into account for proper rating.

The storage system incorporates an internal power meter to measure loads. This meter uses current transformers on the microgrid side of the storage system to determine when loads are present and how much energy to discharge. Because of this design, the storage system will not discharge more energy than necessary to power loads on the microgrid. The main distribution panel, located on the grid side of the storage system, need not take the sonnenBatterie ecoLinx into consideration because the storage system will not discharge to upstream loads.

The overcurrent protection device used to supply the sonnenBatterie ecoLinx can be up to 200 amps, based on the storage system’s internal ATS and wiring, as the sonnenBatterie ecoLinx will act as a pass-through for the grid power to serve the load distribution panel. PV in excess of loads also has a path to the grid from the microgrid load distribution panel. See the example illustration below.

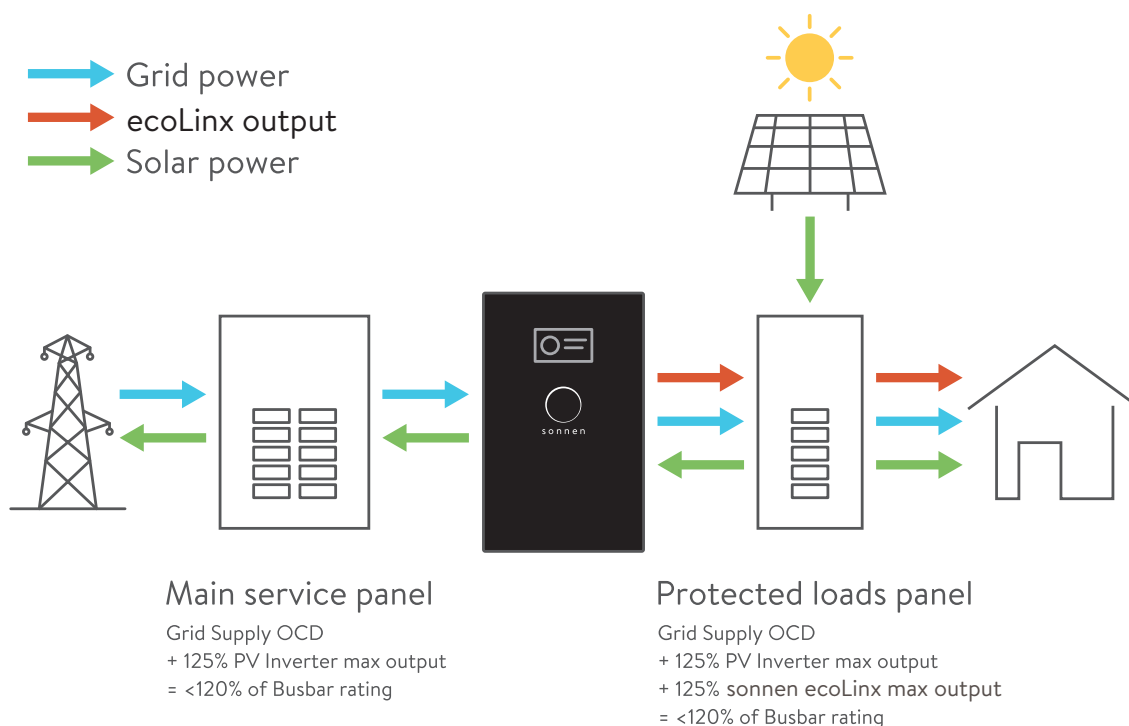


Fig. 6 NEC 705.12(D)(2) calculation example

Storage and transport

Storing the system

Trained, electrically qualified person only!

Environmental conditions

The system and battery modules must be stored under the following conditions:

- Ambient temperature must be in the range of 41°F - 113°F (5°C - 45°C)
- Humidity max. 90%
- Properly ventilated
- Maximum elevation of 9,842 feet (3,000 meters) above sea level
- Fire safety regulations observed
- Free of dust
- Free of corrosive and explosive gases
- Free of vibrations
- Plain surface that can bear heavy weights
- Location meets local building codes

Attention

Damage of the battery modules by discharge!

While in storage, the battery modules will discharge. If they reach too low of a charge, the battery modules can be damaged or destroyed.

- Charge the battery modules to at least 85% before storing them.
- After six months, install the battery modules in the storage system and charge them.
- Do not store the battery modules with the orange safety plugs installed.

Transporting the system

Environmental conditions

The following environmental conditions must be observed when transporting the storage system or the battery modules:

- Ambient temperature between 41°F - 113°F (5°C - 45°C).
- Humidity max. 90%, non-condensing
- Properly ventilated
- Fire safety regulations observed
- Free of corrosive and explosive gases
- Plain surface that can bear heavy weights

Transporting the battery modules

Lithium ion battery modules are hazardous materials. Observe the following requirements:

- ▶ Follow national and international regulations for transport.
- ▶ Consult an expert for hazardous materials.

The following data is relevant for transport:

- Hazardous material: Class 9
- UN number: UN3480 "lithium ion battery modules"
- Weight of a battery module: 60 lb (27 kg)

Detecting damages in transit

The carrier can only be held liable for damage to the storage system if the damage is proven to have happened during transport. Thus, it is important to follow the instructions of this section closely.

Losses in transit are classified as either open or concealed damages. Damage is considered open if the damage is visible on the packaging; damage is considered concealed if the packaging is intact and the contents are damaged.

Open damages must be reported to the carrier immediately. For concealed damages, the time limits of the terms of the carrier apply. While the carrier is present, review the following:

- Recipient address and number of pieces
- Possible open damages
- Possible concealed damages

Checking the battery modules

CAUTION

Risk of injury using damaged battery modules!



Damaged battery modules can leak materials that are hazardous to your health.

- ▶ Unwrap battery modules immediately after transport and review for damages.

If damage is visible (deformation, damaged enclosure, leakage of substances):

- ▶ Do not use the battery.
- ▶ Contact sonnen's service department.

Adjusting the temperature after transport

Attention

Damaging of the storage system by condensation!

If the storage system is colder than the ambient temperature, water may condense in the interior of the storage system, resulting in damage.

- ▶ Inspect the interior of the storage system before installing.
- ▶ Install the storage system only if no condensation is visible.

If the storage system was transported at temperatures below 32° F (0 °C):

- ▶ Place the storage system at a proper location (see "[Choosing a mounting location](#)" on page 15 for more information).
- ▶ Open all of the doors on the storage system.
- ▶ Leave the storage system in this state for at least 24 hours before commissioning the storage system.

Moving the storage system

WARNING

Risk of injury lifting the storage system!



The storage system is heavy.

- Wear safety boots.
- Ensure you have stable footing.
- Use hand trucks while moving the storage system up or down stairs.

The storage system must not be tilted more than 90 degrees. The touchscreen must be on top.

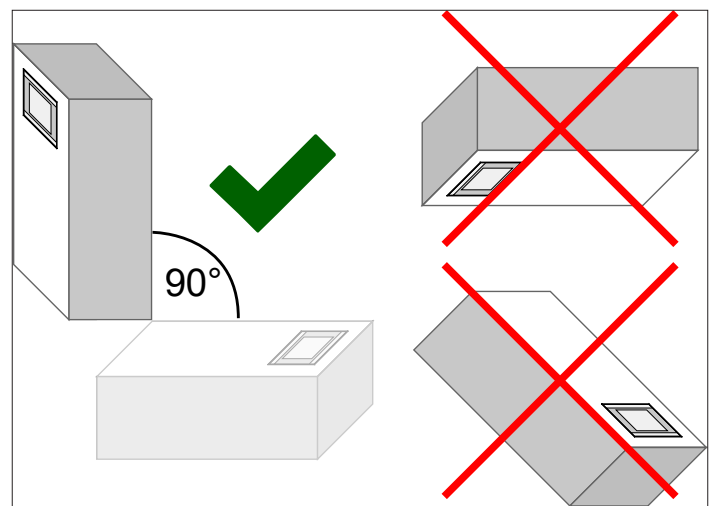


Fig. 7 Allowed tilt positions

Installation

Tools needed

- 1/2" drive ratchet
- 1/2" socket
- 10mm socket or wrench
- 3/16" bit
- 5mm hex wrench
- 7mm socket or wrench
- Drill
- Heat gun
- Laptop or other Internet-connected device
- Heat shrink tubing
- Measuring tape
- #2 Phillips screwdriver
- 1/8-inch tip screwdriver
- Spirit level
- Voltmeter
- Wire stripping tool
- Utility knife
- 6mm hex wrench

Choosing a mounting location

Select a location with the following attributes:

- Ambient temperature between 41°F - 113°F (5°C - 45°C).
- Humidity max. 90%, non-condensing
- Maximum elevation of 9,842 feet (3,000 meters) above sea-level
- Fire safety regulations observed (smoke detector recommended)
- Free of dust
- Free of corrosive and explosive gases
- Free of vibrations
- Flat surface of sufficient load-bearing capacity
- Easy access for installation team
- Compliant with all NFPA, NEC, and local building codes

Clearance requirements

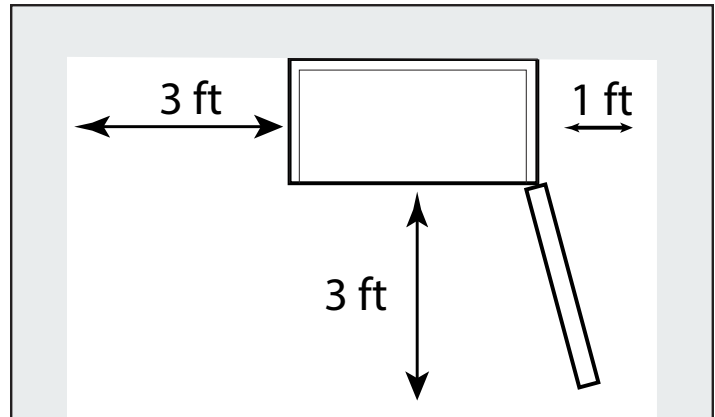


Fig. 8 Clearance requirements

Inspecting the storage system

- ▶ Inspect the system.
- ▶ If there is any suspected damage or loose parts, stop installation, photograph the affected area, and contact sonnen's service department.

Mounting the storage system

WARNING

Risk of injury lifting the storage system!



The storage system is heavy.

- ▶ Wear safety boots.
- ▶ Ensure you have stable footing.
- ▶ Mount the storage system in an upright position.

Two people are required to mount the storage system.

CAUTION

Risk of injury, cabinet may fall over!



Until the battery modules are installed, the cabinets are extremely top-heavy.

- ▶ Hold onto the storage system during installation.

1. Install the mounting cleat

Tools needed:

- Powered drill
- 3/16" bit

- ▶ Drill two holes into studs in the desired location with a 3/16" drill bit 16 inches on center. Furr out the wall as necessary. Secure the mounting cleat to the wall with at least two 5/16" lag screws driven to at least two inches of penetration. Center the screws at the following heights:

- With small battery extension cabinet: 68 5/16"
- With large battery extension cabinet: 76"

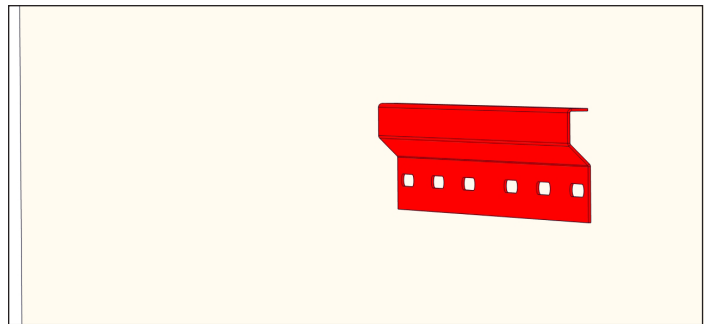


Fig. 9 Mounting cleat orientation

2. Place the leveling mat

- Clean the area where the storage system will be installed.
- Place the leveling mat where the storage system will be installed.

The leveling mat ensures a solid base for the storage system, even on unlevel surfaces.

3. Place the battery cabinet (if ordered)

ecoLinx 10, 12, 14, 16, 18, and 20 storage units require a battery cabinet.

- Place the battery cabinet on the leveling mat.

4. Mount the cabinet on the cleat

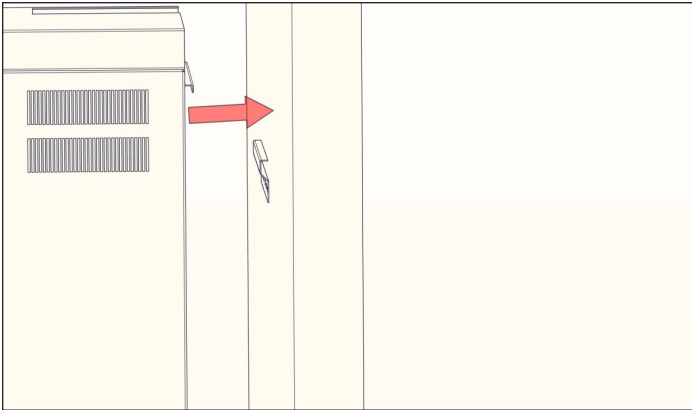


Fig. 10 Positioning the mounting bracket

- Position the cabinet so that the mounting bracket on the cabinet is above the mounting cleat on the wall.

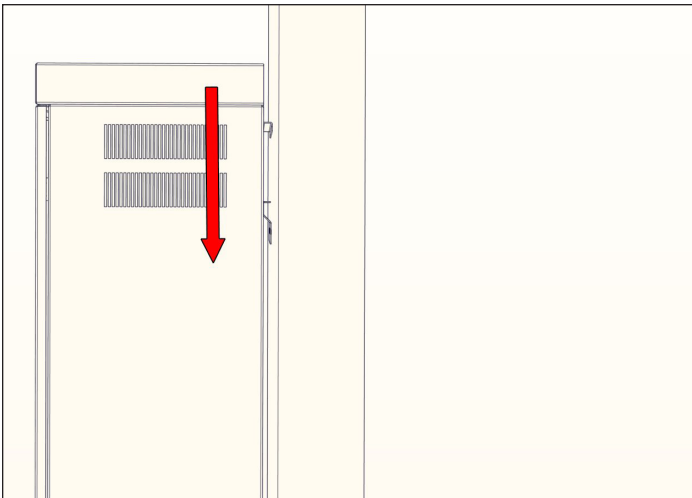


Fig. 11 Sliding the cabinet into the mounting cleat

- Slide the cabinet down so that the mounting bracket covers the cleat.

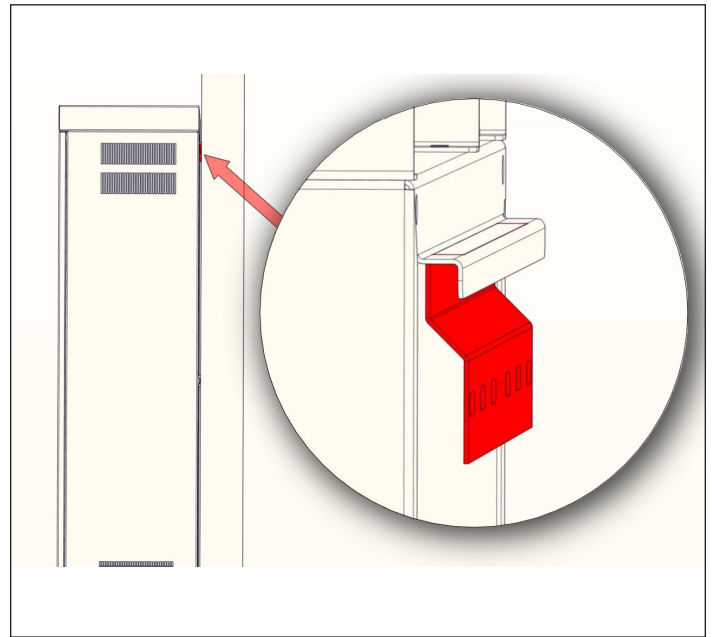


Fig. 12 Securing the mounting cleat

- Ensure the cabinet is secured before proceeding.

5. Open the door

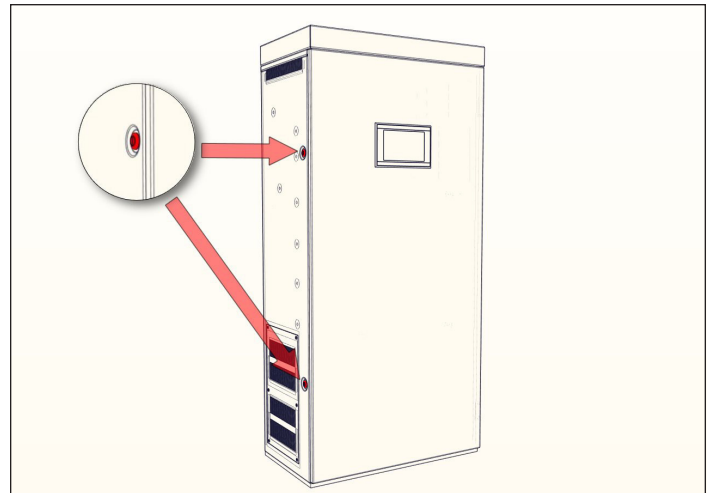


Fig. 13 Unlocking the inverter cabinet

- Using the keys shipped with the unit, open the cabinet door.

6. Remove the dead front

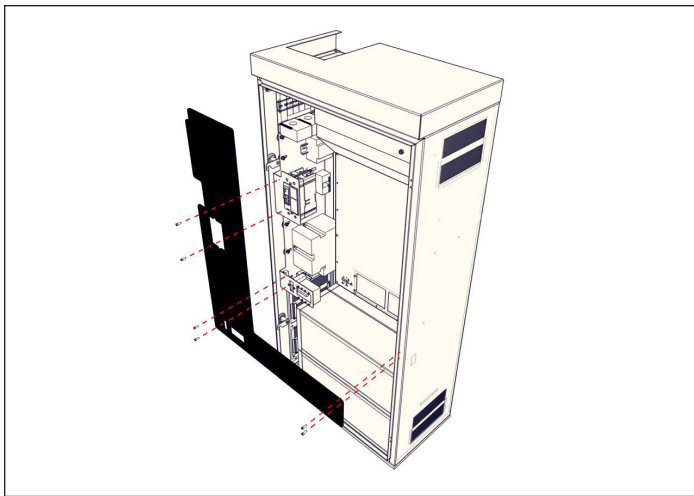


Fig. 14 Removing the dead front

- ▶ Remove the dead front to access the electrical connections.

Connecting the cabinets to each other

The main cabinet must be placed on top of the battery cabinet and secured with four bolts.

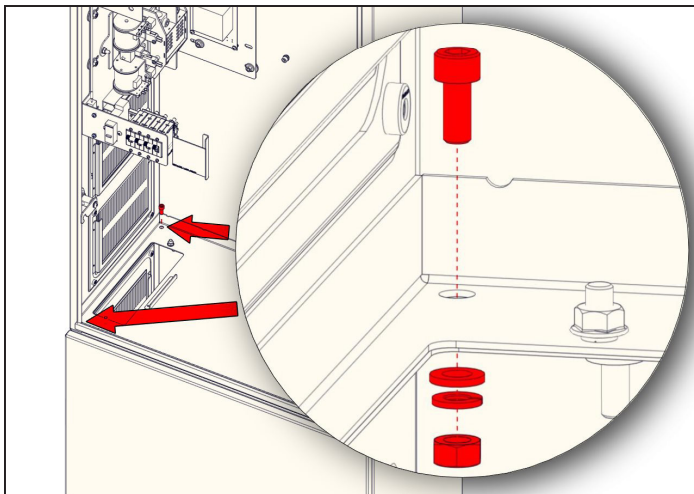


Fig. 15 Connecting cabinets (left side)

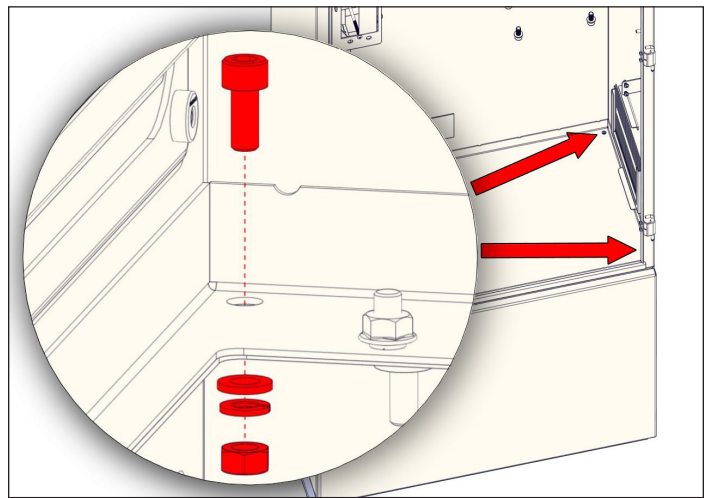


Fig. 16 Connecting cabinets (right side)

Tools needed:

- 5mm hex wrench

- ▶ Connect the main cabinet to the battery cabinet using the four 5mm bolts provided.

Connecting cabinets electrically

1. Remove the cover on the bottom of the main cabinet (if using a battery cabinet)

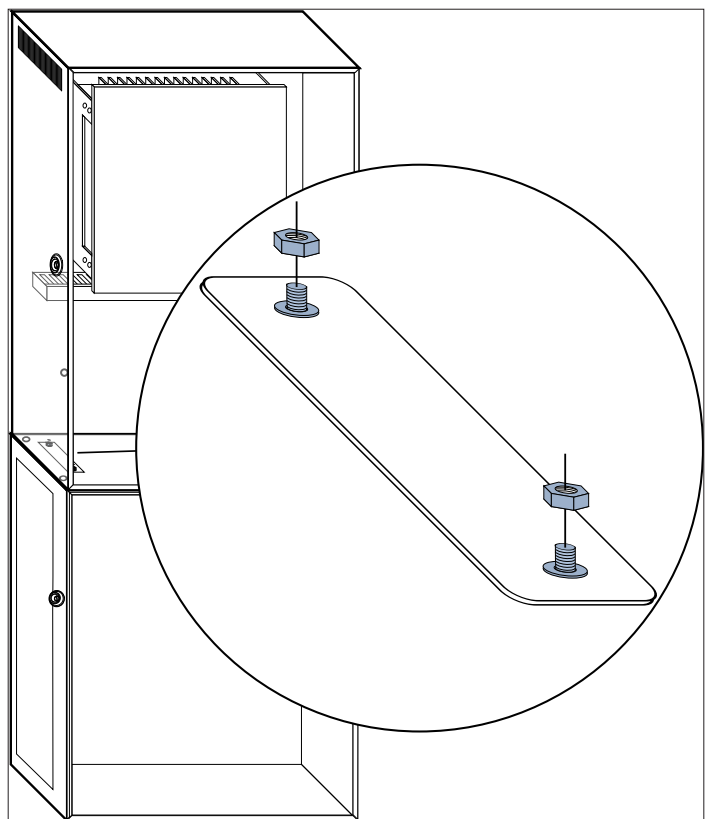


Fig. 17 Removing the cabinet cover

Tools needed:

- 10mm socket or wrench

- ▶ Remove the nuts securing the cover to the bottom of the main cabinet.
- ▶ Remove the cover.

2. Install edge protectors (if using a battery cabinet)

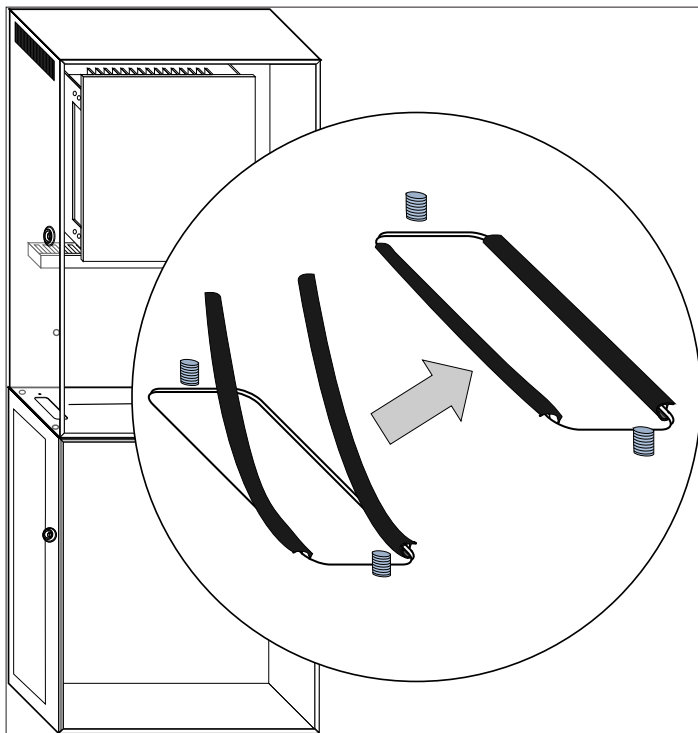


Fig. 18 Installing edge protectors

Tools needed:

- Utility knife
- ▶ Install the two edge protectors on the two long sides of the opening between the main and battery cabinets, making sure to cover the edges of both cabinets.
- ▶ Using a utility knife, trim the edge protectors to fit if necessary.

3. Connect flat band grounding strap (if using a battery cabinet)

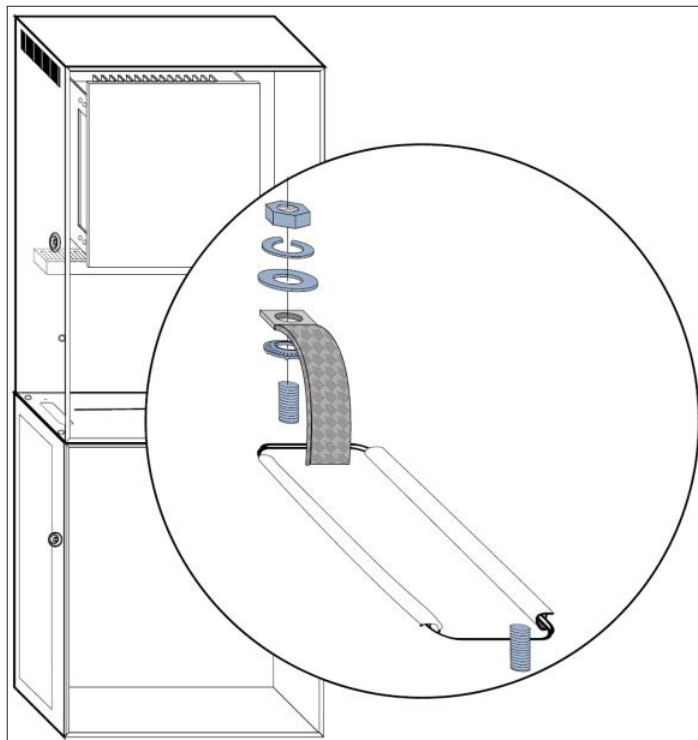


Fig. 19 Flat band grounding

Tools needed:

- 10mm socket or wrench

- ▶ Connect the flat band grounding strap to the battery cabinet and the main cabinet.

4. Place conduits

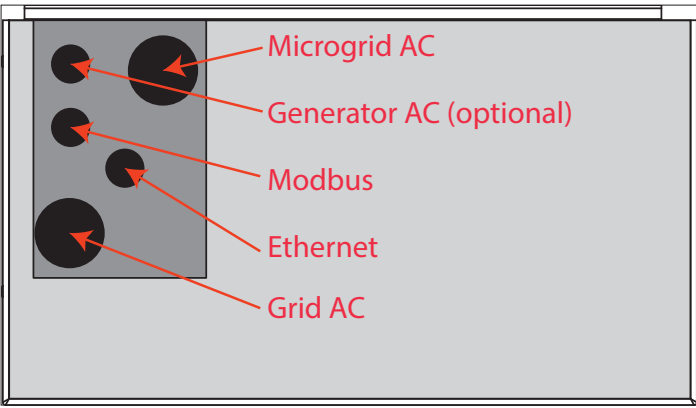


Fig. 20 Conduit entry location

- Use the holes in the top of the main cabinet to install your conduits.
- Seal unused holes with the provided caps.

Intended use	Conduit size	Wire gauge
Microgrid AC	2 inches	2 AWG - 3/0 AWG
Generator AC	1 inch	20 AWG - 8 AWG
Modbus	1 inch	24 AWG
Ethernet	1 inch	24 AWG
Grid AC	2 inches	2 AWG - 3/0 AWG

Table 2 Conduit entries and cable sizes

i Sonnen has created the appropriate number and size conduit penetrations for a typical installation. Every attempt should be made to follow this conduit legend to facilitate proper wire installation to the unit. Making new or enlarging existing conduit penetrations will void the system's warranty.

5. Remove access panel

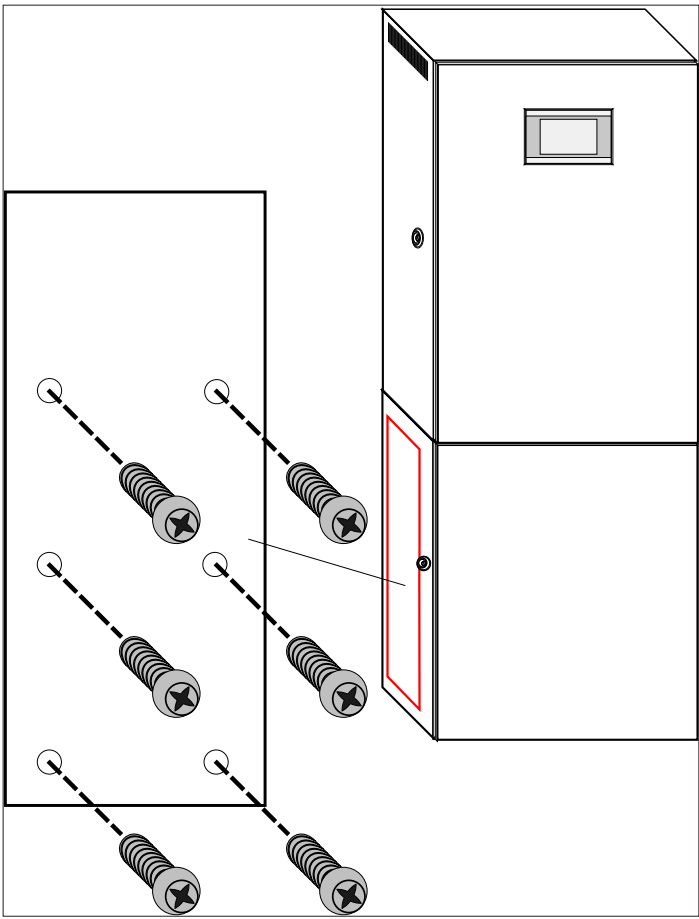


Fig. 21 Removing battery cabinet access panel cover

- Tools needed:
- Phillips screwdriver
- You can remove the access panel on the side of the battery cabinet to facilitate work on the battery module connections.
- Remove the screws using a Phillips screwdriver.
 - Mount the cover after finishing work on the storage system.

Electrical connections



Only trained, electrically qualified persons that are certified by the manufacturer are allowed to perform the installation of the storage system.

Any variation of the installation as it is described in this chapter must be arranged and approved by sonnen. Failure to comply with this condition will void any warranty claims.

DANGER

Danger to life by electric shock at improper electrical connection!



Improper attachment of the electrical connections may lead to death, injury, or material damages.

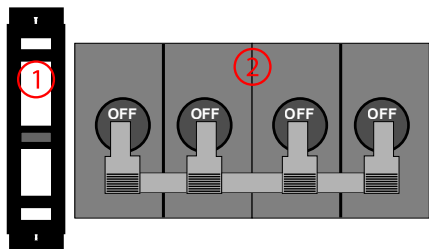
- ▶ Only trained, electrically qualified persons may perform the electrical installation.
- ▶ Observe all relevant regulations and standards.

WARNING

Danger to life by electric shock when working on the storage system or power distribution!



- ▶ Make sure no voltage is present.
- ▶ Ensure the main DC breaker is turned OFF.



WARNING

Risk of burns!



Very high short circuit currents are possible!

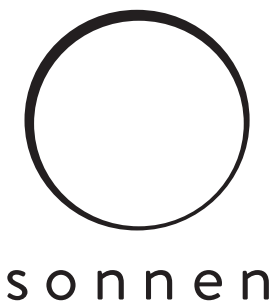
- ▶ Ensure the orange safety plugs are not installed in the battery modules until told they are needed in the installation process.
- ▶ Take off metallic jewelry.
- ▶ Turn off the storage system.
- ▶ Turn off main disconnect switch.

WARNING

Risk of fire or damage to equipment by improper subpanel wiring!



Ensure there is no electrical continuity between the main electrical panel and the protected loads panel that is intended to be powered by the storage system. This includes hot and neutral conductors.



Terminal block map for installation and service

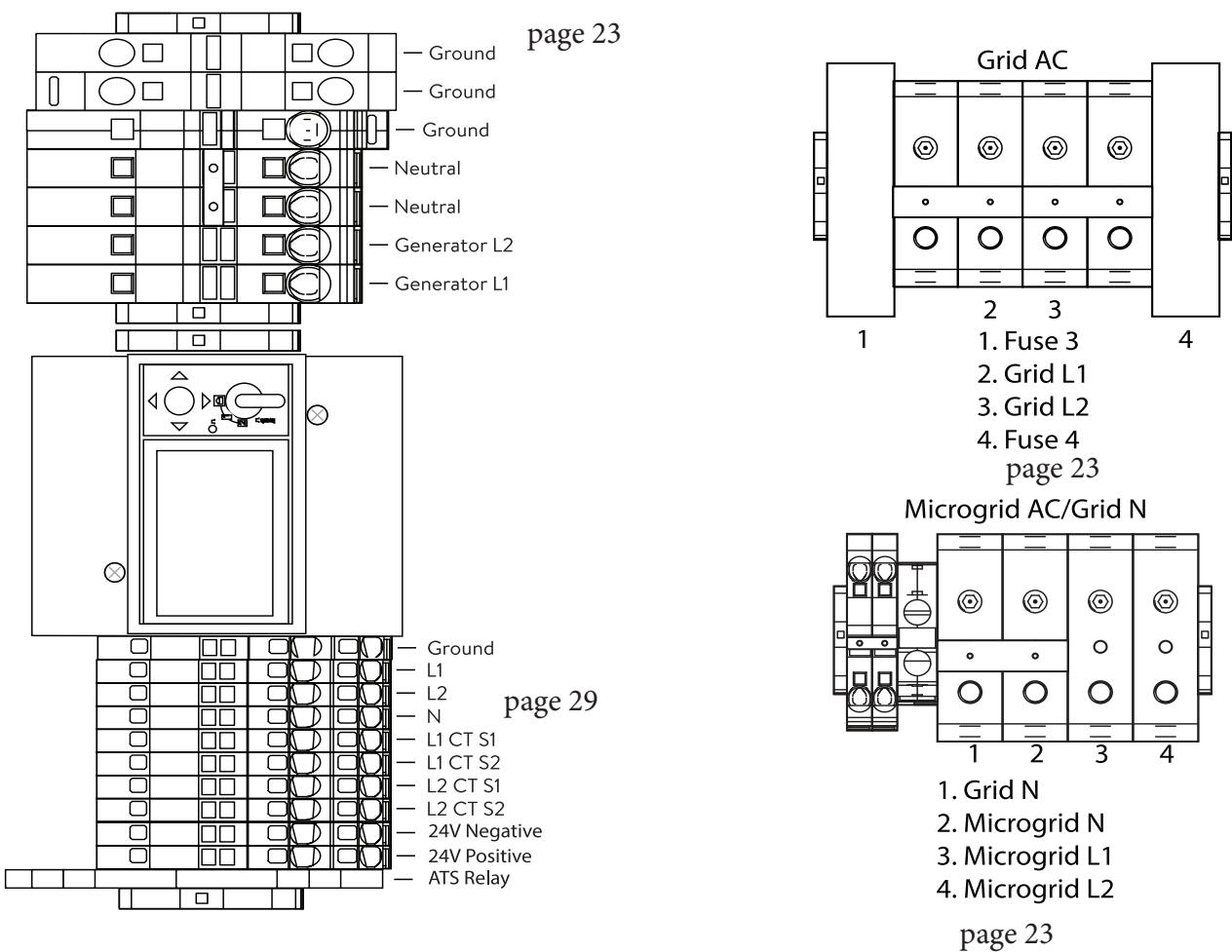


Fig. 22 Terminal map for ecoLinx

Connecting AC cables

DANGER

Danger to life by electric shock!



Touching live parts of the electrical connection may lead to death or serious injury.

- Turn off the storage system.
- Turn off the main disconnect circuit breaker.

Only trained, electrically qualified persons are allowed to perform the electrical installation.

Trained, electrically qualified person only!

The storage system has two AC primary connections: One for the utility grid and one for the microgrid. These connections must be made for the storage system to operate.

The utility grid port on the storage system must be connected to either the utility meter or the main utility panel. In either case, install a main disconnect between the storage system and the utility grid of equal or greater rating than the supply feeder connection, up to 200 amps.

If you will be using a protected loads panel, design the panel for a nominal current of 33A. The system is connected as illustrated here:

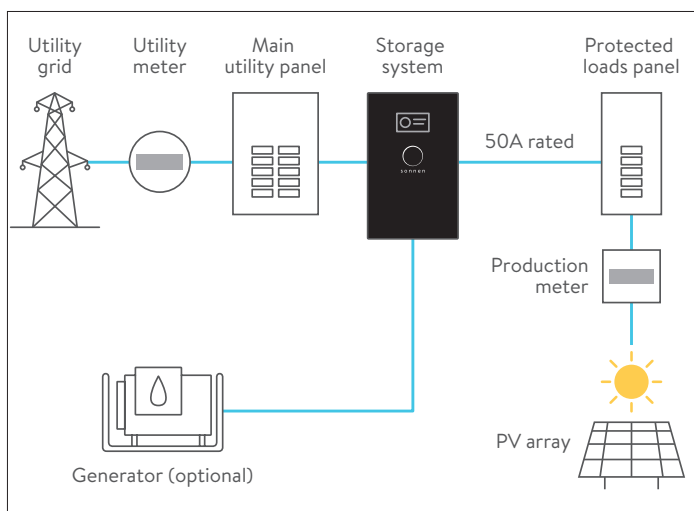


Fig. 23 Installation using protected loads panel

Special care must be taken to ensure the main panel and the protected loads panel are electrically isolated from each other when the storage system is not providing a closed circuit

between the two. L1, and L2, and N must have no connection between the two panels aside from through the storage system.

If you are not using a protected loads panel, you can use the storage system's built-in, 200-amp automatic transfer switch to provide backup power for your whole house. In that configuration, the system is installed as shown here:

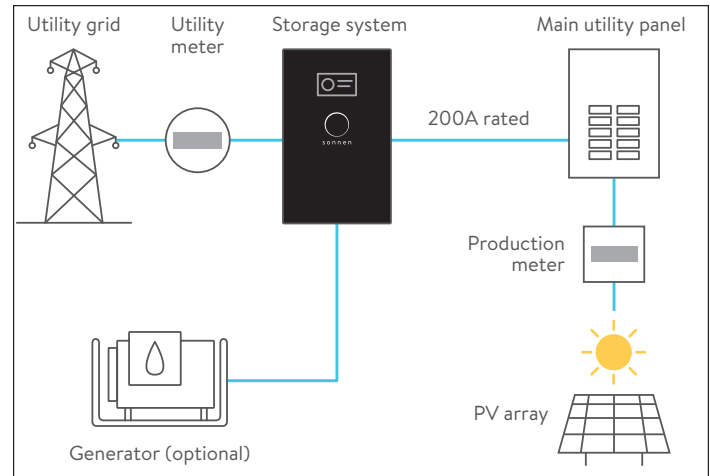


Fig. 24 Installation without protected loads panel

In either case, the load that will be powered by the ecoLinx is connected to the microgrid terminals inside the storage system. The storage system's built-in transfer switches will disconnect the utility connection should the utility grid stop providing power, and the microgrid will be powered by energy produced by the PV array and the energy stored in the ecoLinx's battery modules.

You can also connect a generator (up to 50 amps) to charge the batteries in the event they are discharged to the point that the storage system will not turn on and neither the grid nor solar power is available. Any excess generator power will go to loads.

1. Install disconnect switch

Install a disconnect switch within eyesight of the storage system to remove power from the system during installation and service.

2. Install junction box for splicers (optional)

If desired, install a junction box to house in-line splicers such as a NSI Tork ISR-1/0 to reduce the size of the cable run from the distribution panel to the storage system.

3. Run cables into the storage system

Using the holes in the top left corner of the main cabinet as shown in "Place conduits" on page 20, insert cables of the appropriate wire gauge and ampacity for the utility grid connection, the microgrid connection, and the optional generator connection.

i Sonnen has created the appropriate number and size conduit penetrations for a typical installation. Every attempt should be made to follow this conduit legend to facilitate proper wire installation to the unit. Making new or enlarging existing conduit penetrations will void the system's warranty.

4. Prepare cable and strip wires

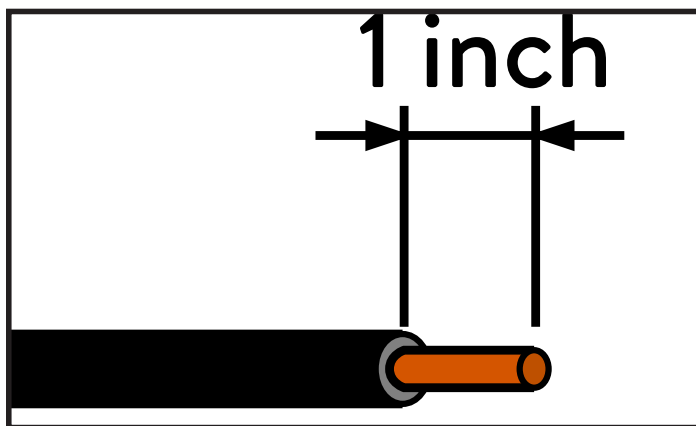


Fig. 25 Stripping cable

Strip 1 inch of insulation from the L1, L2, and N cables.

5. Confirm transfer switch has full range of movement

Using the black plastic actuator, ensure the automatic transfer switch has a full range of movement.

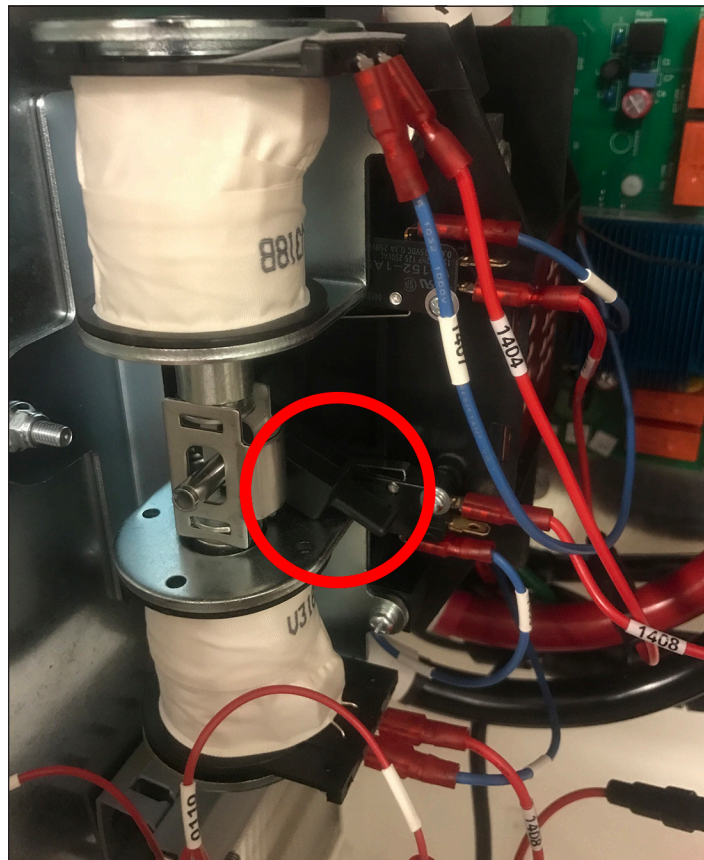


Fig. 26 Automatic transfer switch actuator

6. Connect microgrid cables to storage system terminals

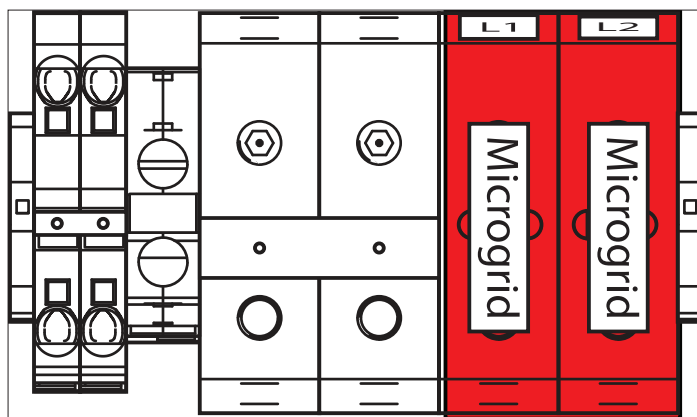


Fig. 27 Microgrid connections - ATS version

Tools needed:

- 6mm hex wrench

The microgrid connection terminals are in the top left corner of the main cabinet, in the bank on the back of the cabinet.

- Connect the microgrid L1, L2, and N cables to the storage system's terminals with the corresponding labels.

7. Connect grid cables to storage system terminals

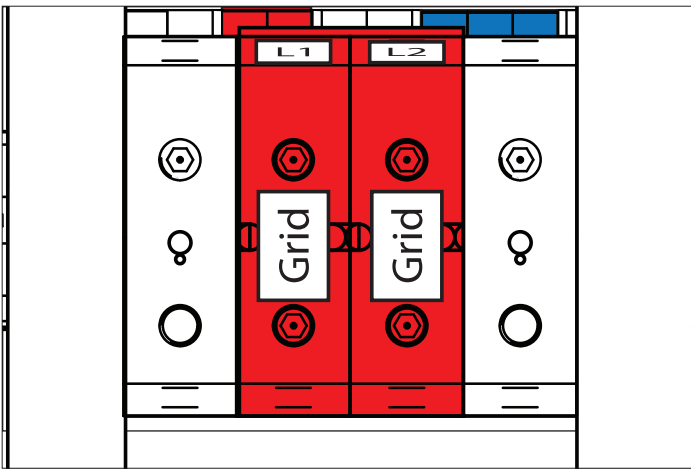


Fig. 28 Grid connections - ATS Version

Tools needed:

- 6mm hex wrench

The utility grid connection terminals are in the top left corner of the main cabinet. The L1 and L2 terminals are in the bank on the left side, and the N terminal is in the bank in the back.

- Connect the grid L1 and L2 cables to the storage system's terminals with the corresponding labels.
- Using your multimeter, ensure there is no continuity between the upstream Neutral cable and the downstream Neutral cable.
- When you have confirmed there is no continuity, connect the Neutral cable to the storage system's terminals with the corresponding label.

8. Connect ground cables

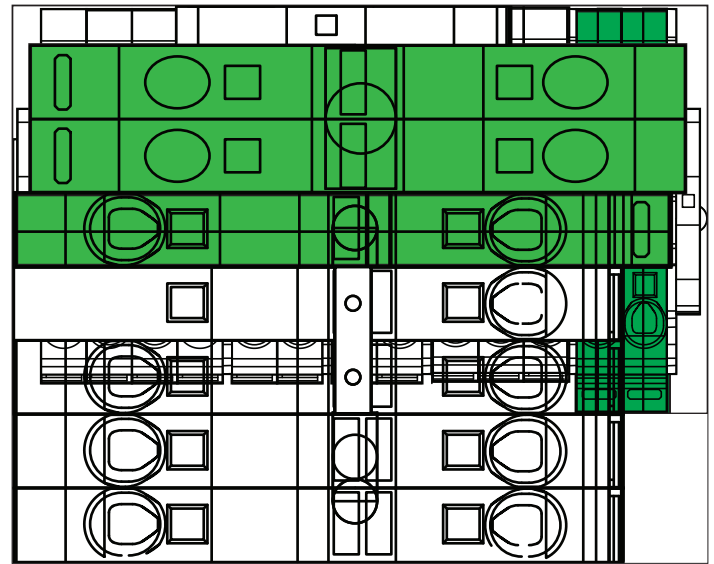


Fig. 29 Grounding connections - ATS Version

Tools needed:

- 1/8-inch tip screwdriver

- Connect your ground cables to the green ground terminals at the top of the vertical DIN rail.

Connecting a generator (optional)

CAUTION



Risk of damaging equipment by connecting three-phase generator

The sonnenBatterie storage system is compatible with any generator that produces 120v Line to Neutral and 240v Line to Line at 60Hz. Any generator that cannot provide this will not be received by the sonnenBatterie as valid AC power and therefore will not aid in battery charging.

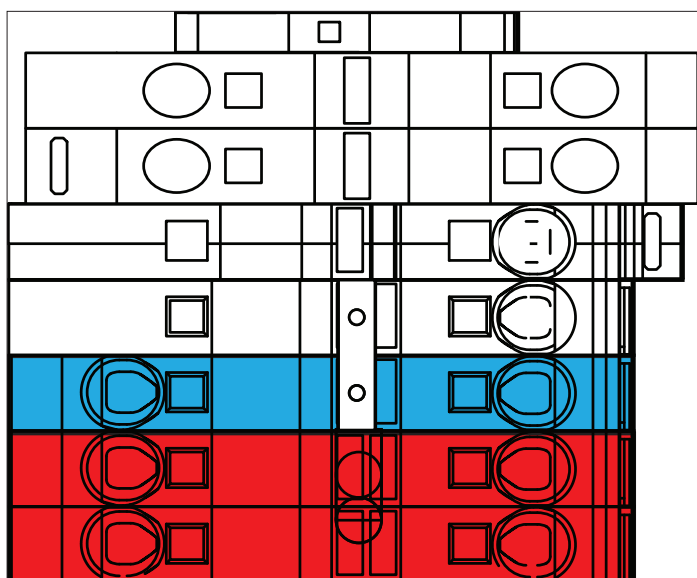


Fig. 30 Generator AC connections - ATS Version

Tools needed:

- 1/8-inch tip screwdriver

The connections are on the main connection rail, directly above the internal power meter. To connect a generator:

- Connect the generator's L1, L2, and N AC connections to the appropriately labeled terminals in the storage system.

Connecting an Ethernet cable

- Connect a shielded ethernet cable to the ethernet socket.

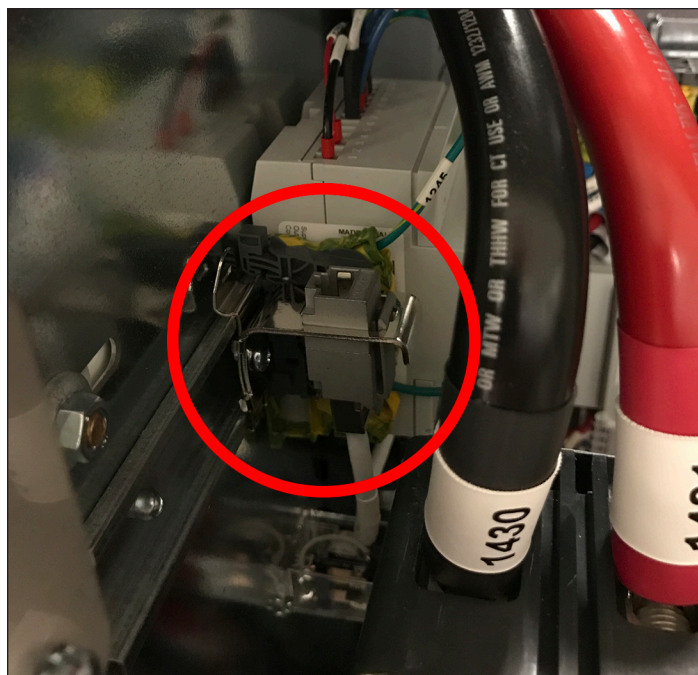


Fig. 31 Ethernet socket location - ATS version

In units with an internal ATS, the Ethernet socket is located behind the AC breaker.

- Proceed to "[Generator Autostart wiring \(optional\)](#)" on page 27

Generator Autostart wiring (optional)

There are 3 methods for wiring the autostart circuit, based on the requirements of the generator used:

1. 12V
2. 24V
3. Dry Contact (Continuity)

The sonnenBatterie ecoLinX storage system has ports for all three methods.

12V Signal

1. Locate the green, 2-position plug connector provided in the accessory kit.
2. Insert stripped ends of customer's 12V connection cables into the 2-position plug.
3. Ensure the positive cable is on the bottom and the negative cable is on the top.
4. Insert the plug into the J11 port on the HUB board as shown in [Fig. 32](#) below.

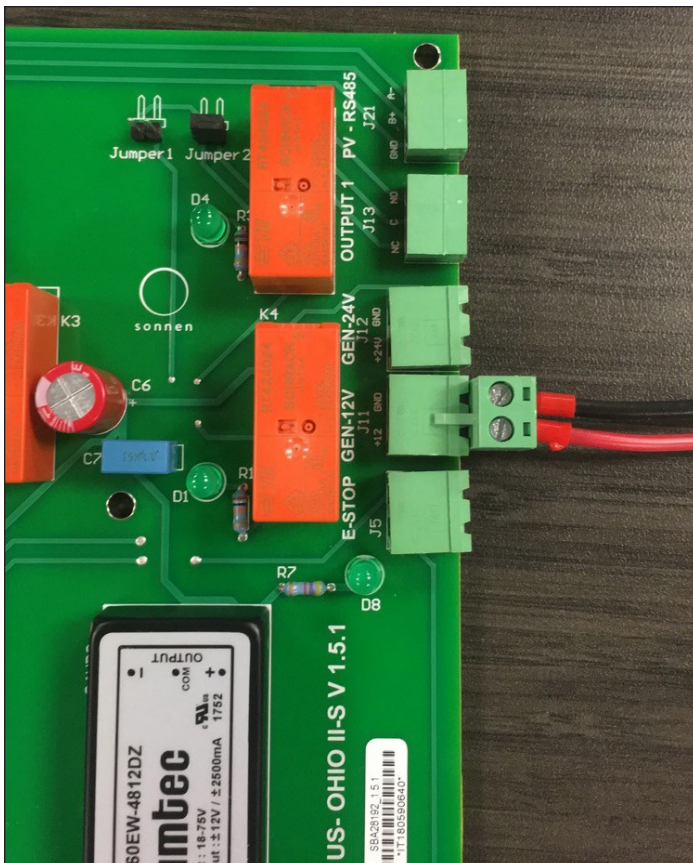


Fig. 32 12V signal connection

24V Signal

1. Locate the green, 2-position plug connector provided in the accessory kit.
2. Insert stripped ends of customer's 24V connection cables into the 2-position plug.
3. Ensure the positive cable is on the bottom and the negative cable is on the top.
4. Insert the plug into the J12 port on the HUB board as shown in [Fig. 33](#) below.

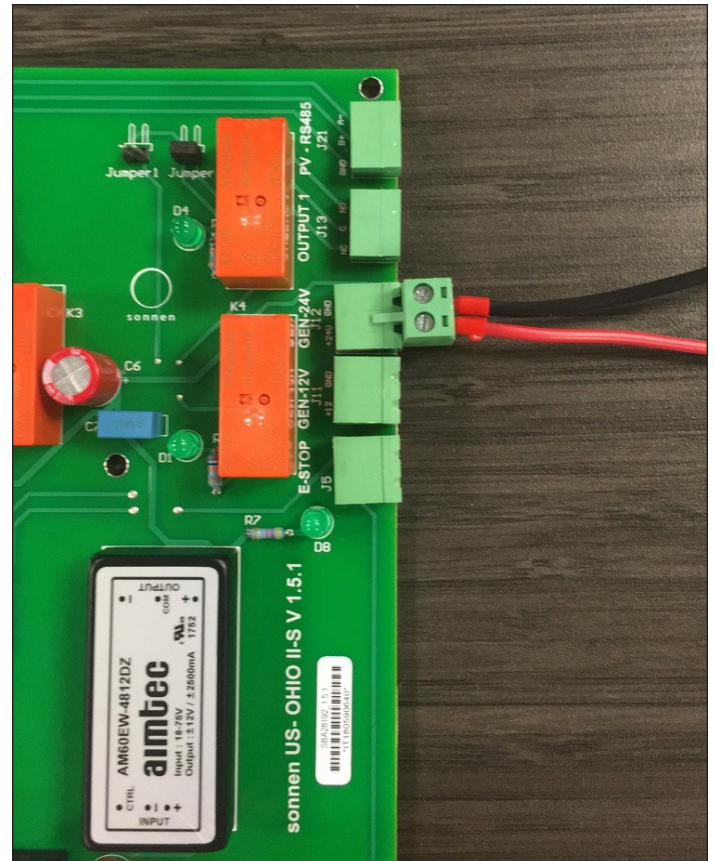


Fig. 33 24V signal connection

Dry Contact

1. Ensure that the 2-pin jumper at the top of the hub board is on jumper 2.
2. Locate the green, 3-position plug connector provided in the accessory kit.
3. Insert stripped ends of customer's dry contact connection cables into the 3-position plug.
4. Ensure the dry contact connection cables are located on the top two pins of the 3-position plug.
5. Insert the plug into the J13 port on the HUB

board as shown in Fig. 34 below.

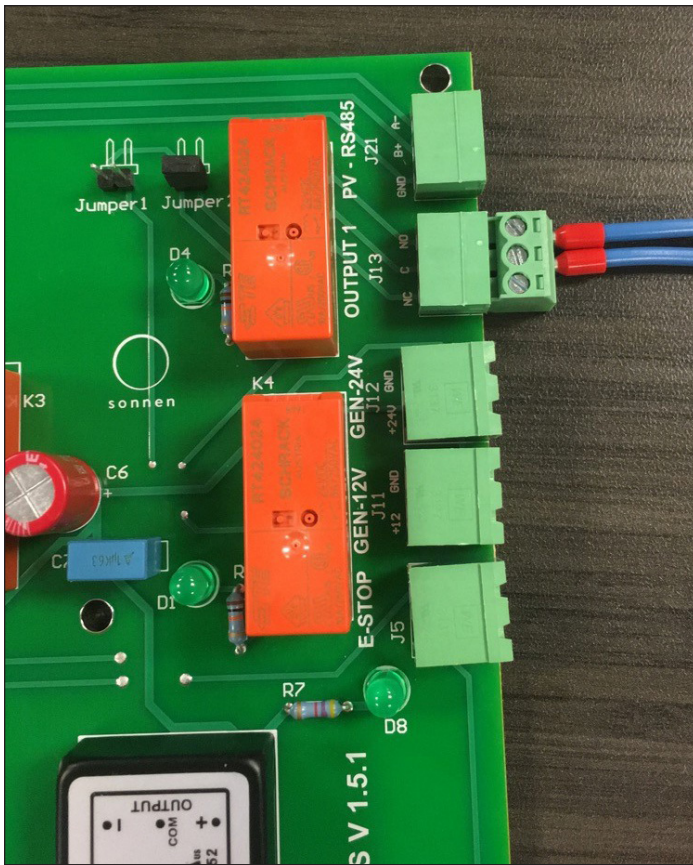


Fig. 34 Dry Contact signal connection

Emergency stop wiring (optional)

To install an emergency switch:

1. Remove the E-stop jumper (wire 0205) connected to J5 port of the hub board.
2. Disconnect and remove both ends of wire 0205 from the 2-position plug connector
3. Install a normally closed, plunger-style 24V-rated switch in an accessible location.
4. Wire the switch to the 2-position connector.
5. Insert the 2-position plug into J5 of the hub board.

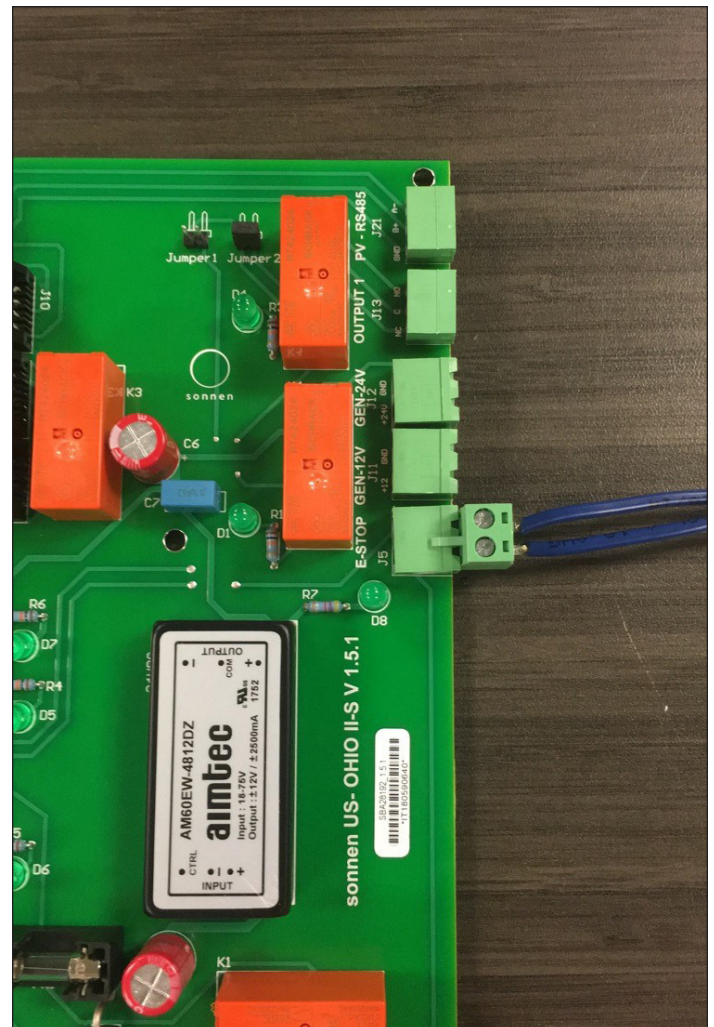


Fig. 35 Dry Contact connection

Connecting PV Production Meter

The PV production meter, which the storage unit uses to determine how much renewable AC power is available, is located inside the main cabinet on the vertical main DIN rail. The current transformers must be installed on the L1 and L2 outputs of the PV inverter.

1. Current transformers

- ▶ Mount the current transformers in a location with access to L1 and L2, no more than three meters away from the storage unit.

2. Connect current-measuring wires

The current-measuring wires are connected by one end to terminal blocks on the main vertical DIN rail. They are labeled on the unattached end as follows:

- L1 CT S1
- L1 CT S2
- L2 CT S1
- L2 CT S2

Remove any wire ties or other attachments and run them out of the top of the unit.



Fig. 36 Current transformer markings

- ▶ Run L1 through current transformer 1

The side of the current transformer with P1 and K must face the PV inverter. The side with L and P2 must face the distribution panel.

- ▶ Connect the current transformer to the meter
 - ▶ Connect the wire labeled "L1 CT S1" to the S1 connection on the top of the L1 current transformer.
 - ▶ Connect the wire labeled "L1 CT S2" to the

S2 connection on the top of the L1 current transformer.

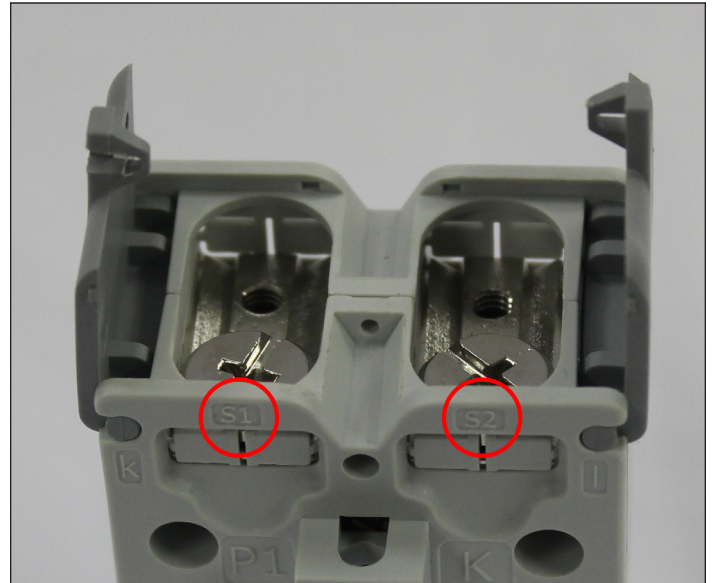


Fig. 37 Current transformers S1 and S2

- ▶ Run L2 through current transformer 2

The side of the current transformer with P1 and K must face the PV inverter. The side with L and P2 must face the distribution panel.

- ▶ Connect the current transformer to the meter.
 - ▶ Connect the wire labeled "L2 CT S1" to the S1 connection on the top of the L2 current transformer.
 - ▶ Connect the wire labeled "L2 CT S2" to the S2 connection on the top of the L2 current transformer.

Installing battery modules

WARNING

Risk of burns!



Very high short circuit currents are possible!

- ▶ Ensure the orange safety plugs are not installed in the battery modules until told they are needed in the installation process.
- ▶ Take off metallic jewelry.
- ▶ Turn off the storage system.
- ▶ Turn off main disconnect switch.

Trained electrically qualified person only!

Attention

Damage of the battery cells by short circuit!

If the battery cells short-circuit:

- ▶ Do not connect the affected modules to the storage system!
- ▶ Contact sonnen's service department.

1. Check battery module voltage

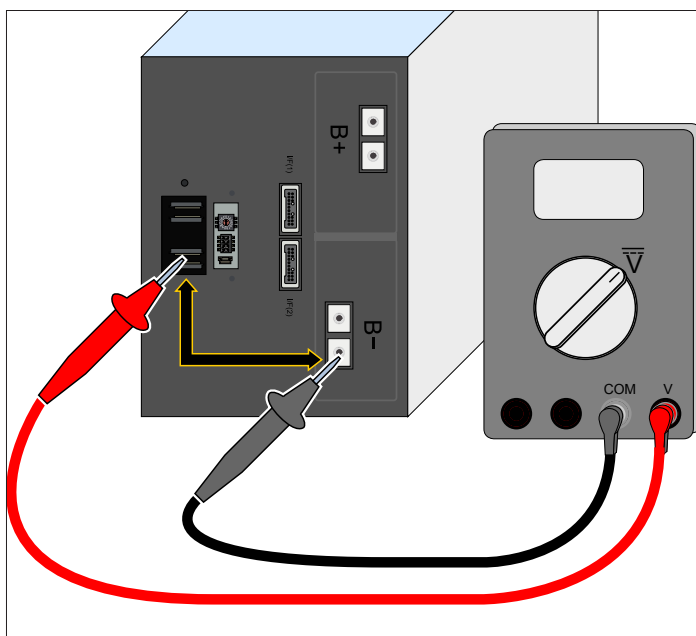


Fig. 38 Measuring voltage on battery modules

Tools needed:

- Voltmeter

- ▶ Measure and note all voltages between the internal plus pole and the negative terminal of all battery modules.

- ▶ Use the following table to record the voltages:

Module	Voltage	Module	Voltage
0		4	
1		5	
2		6	
3		7	

Table 3 Battery module voltages

- ▶ Only install the battery modules if the maximum difference between the measured voltages is less than 1V. If the difference is higher, contact sonnen's service department.

Attention

Damage of the battery modules by high balancing currents!

Differing voltages between the battery modules can lead to high balancing currents when turning on the storage system.

2. Label the battery modules

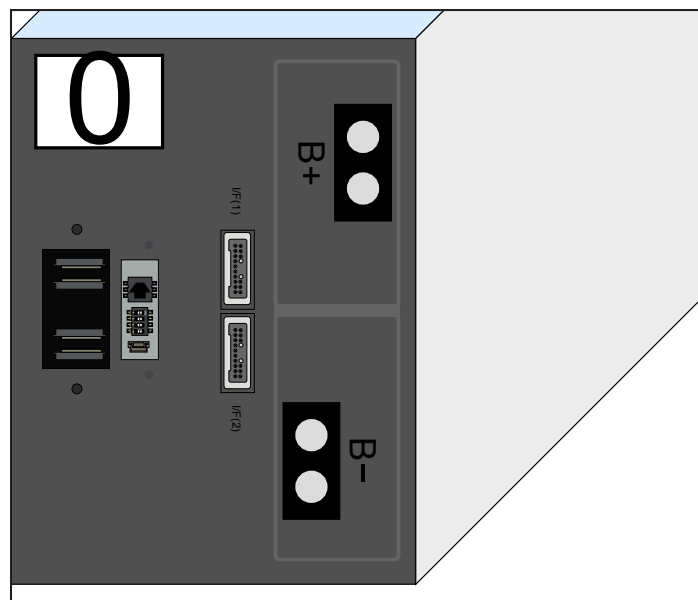


Fig. 39 Labeling battery modules

- ▶ Place the supplied stickers.

Start the numbering with zero and continue consecutively.

3. Set communication address on each module

Tools needed:

- 1/8-inch tip screwdriver
- Set the communication addresses of the battery modules by using the rotary switch to select the number placed on the module.

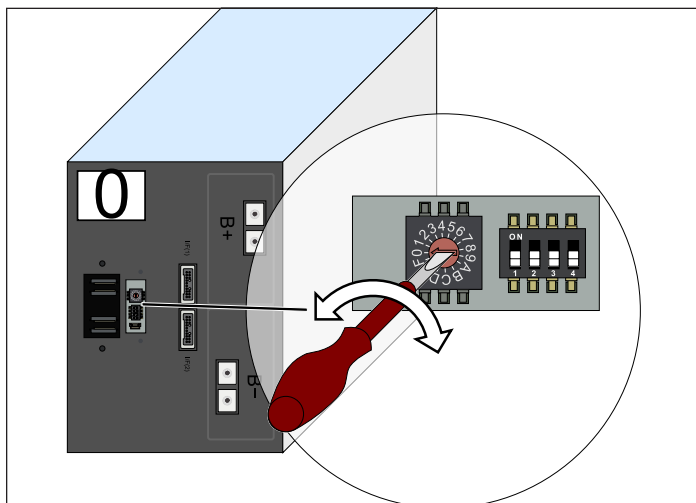


Fig. 40 Defining address of battery modules

4. Set the termination switch on highest-numbered module

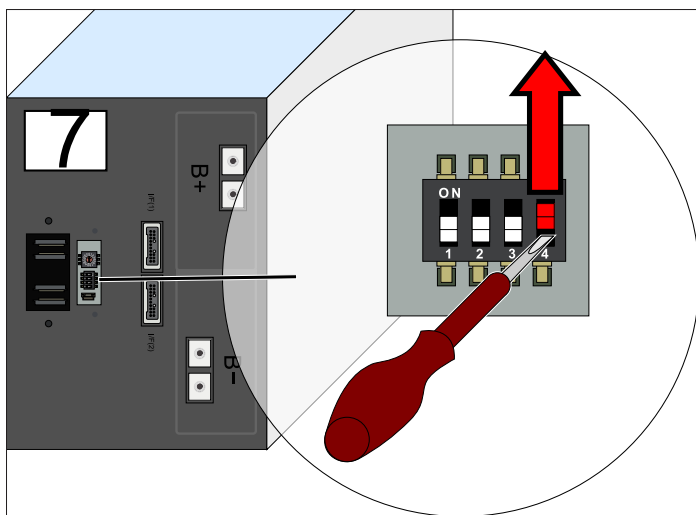


Fig. 41 Setting termination switch on final module

Tools needed:

- 1/8-inch tip screwdriver
- Set the termination switch (switch No. 4) on the highest-numbered battery module to the ON position. All other battery modules must have switch No. 4 set to OFF.

5. Place battery modules

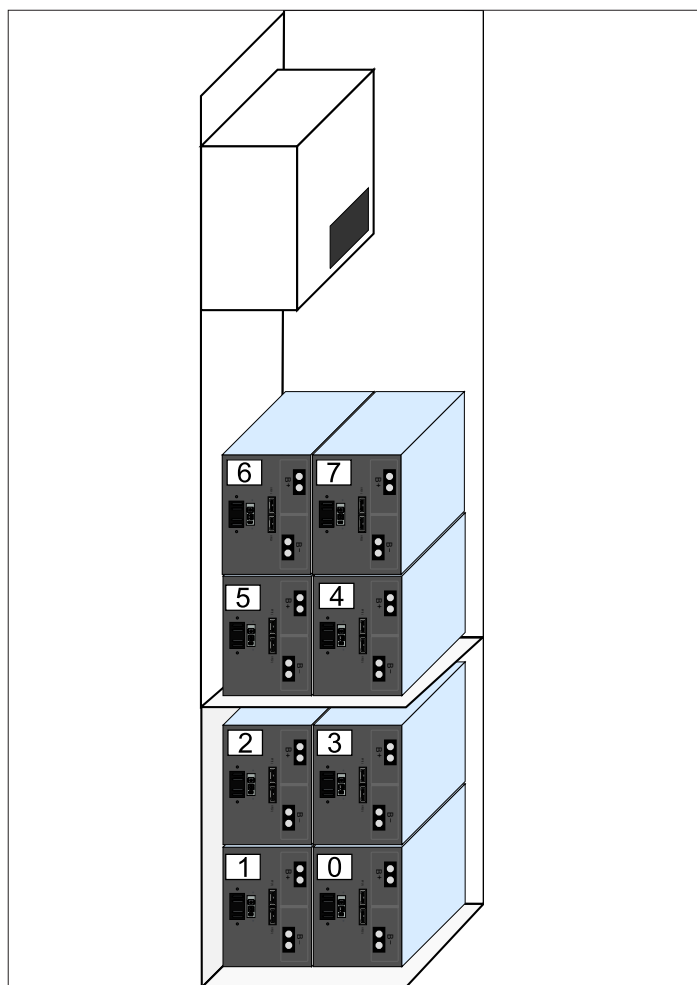


Fig. 42 Placing battery modules

- Stack the battery modules so the battery modules designated No. 0 and No. 7 are closer to the access door.

Keeping battery modules No. 0 and No. 7 accessible makes the rest of the installation process easier and safer.

6. Insert set screws

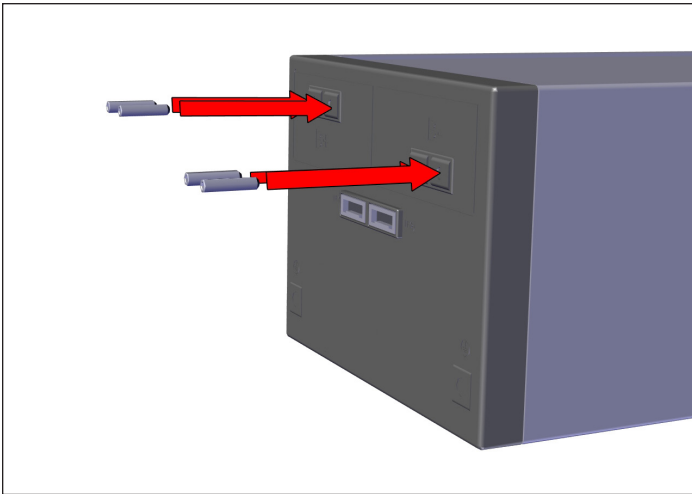


Fig. 43 Inserting set screws

Four set screws come in each battery box.

- Insert the set screws into the battery modules. The set screws should be finger-tight.

DANGER

Danger to life by electric shock by improper DC connection!



Connecting the battery modules in series can cause life-threatening voltages.

- Connect the battery modules in parallel; i.e., connect all of the positive poles of the battery modules to each other and all of the negative poles of the battery modules to each other.

7. Install horizontal battery connections

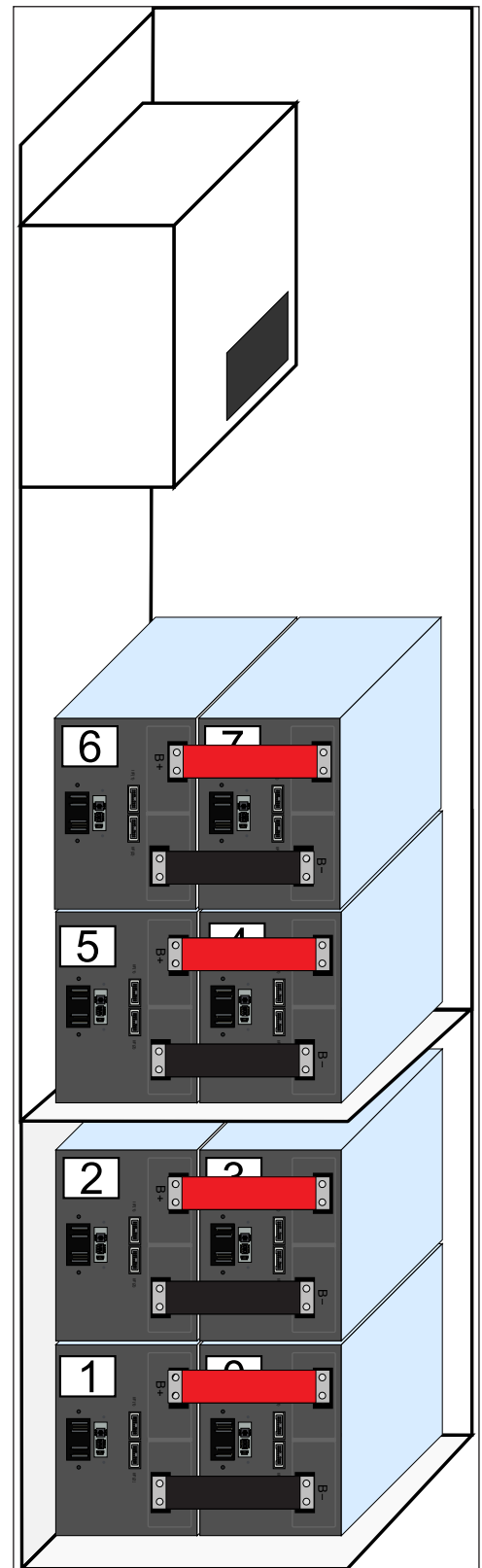


Fig. 44 Installing horizontal battery connections

- Place the wider, flat red bus bars on the positive terminal set screws.
- Place the wider, flat black bus bars on the negative terminal set screws.

8. Install vertical battery connections

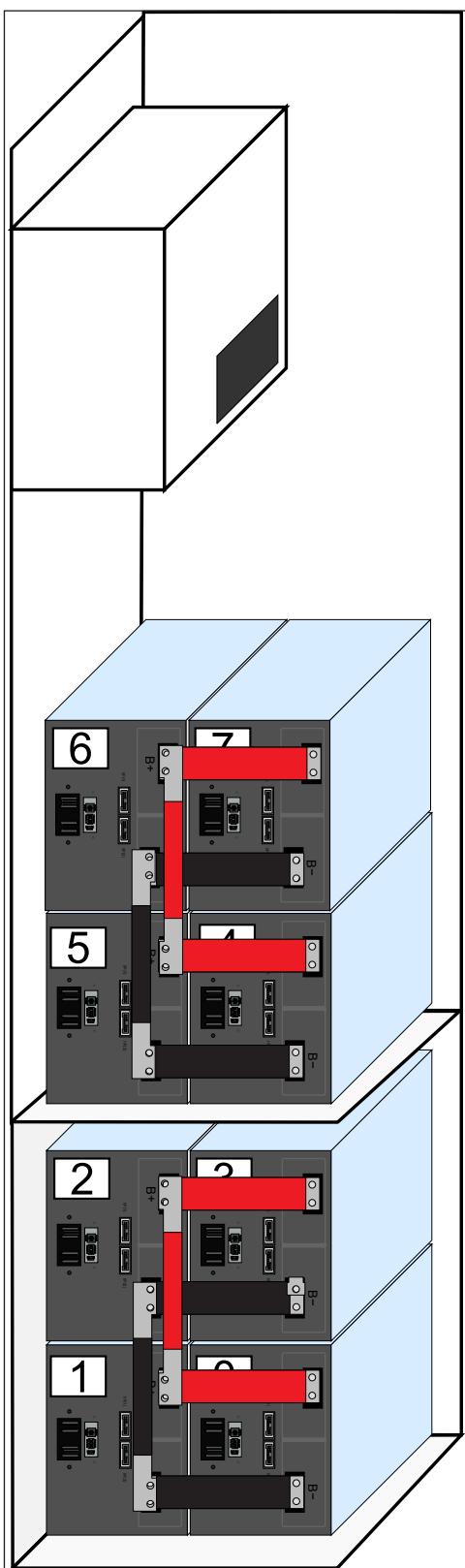


Fig. 45 Installing vertical battery connections

- Place the narrower, handle-shaped red bus bars on the positive terminal set screws.
- Place the narrower, handle-shaped black bus bars on the negative terminal set screws.

9. Connect jumper cables

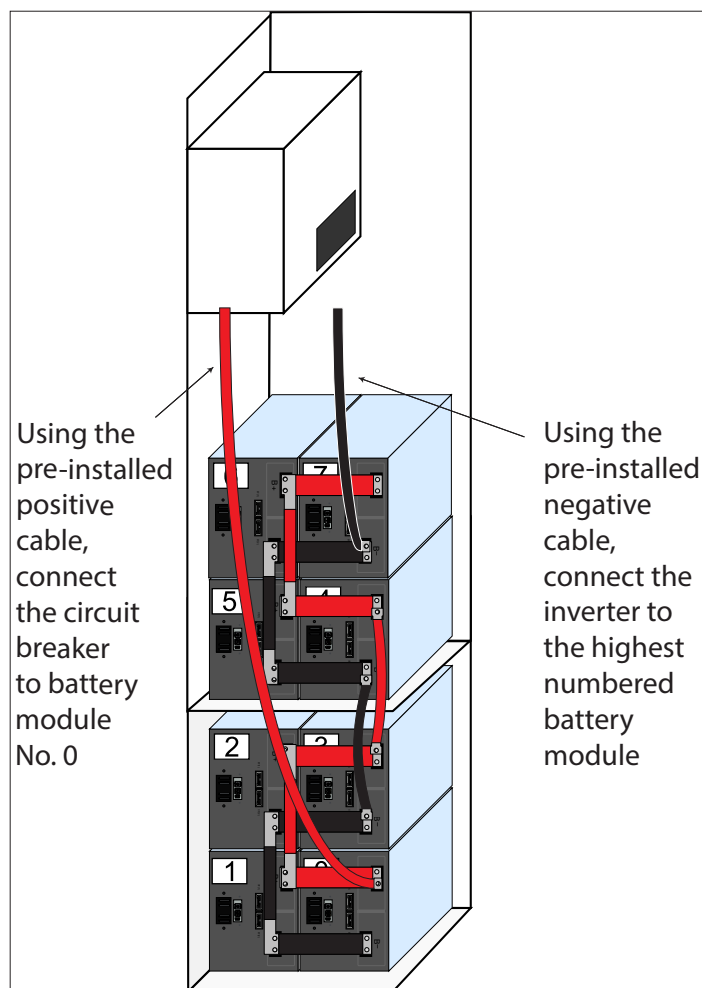


Fig. 46 Installing jumper cables

- If applicable, connect battery module No. 3 in the battery cabinet to battery module No. 4 in the main cabinet using the supplied red and black 2/0 jumper cables.

For your convenience, the ecoLinx has two 2/0 “home run” cables pre-installed.

- Connect the red cable to battery module No. 0.
- Connect the black cable to the highest-numbered battery module.

10. Install nuts

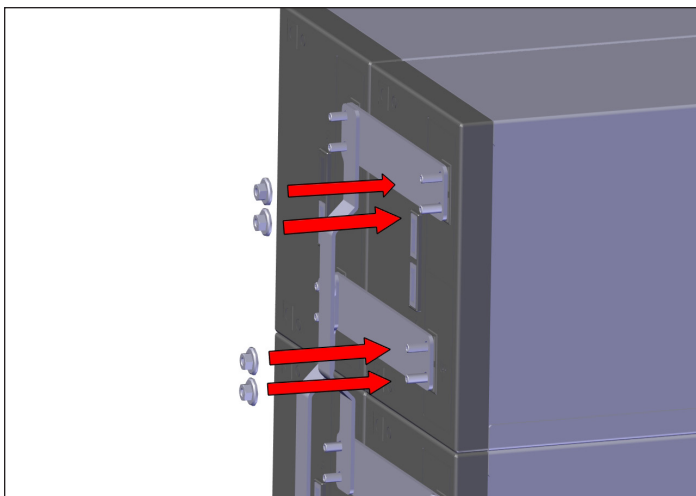


Fig. 47 Installing flange nuts

- ▶ Install the flange nuts onto the set screws.
- ▶ Torque the flange nuts to 3 ft lb.

WARNING

Possible fire hazard by high contact resistances and short circuit!



Incorrectly torqued DC wires and bus bars can lead to short circuit and excessive heating. This can cause a fire, personal injury, and damage to the battery modules.

- ▶ Check all DC connections. Only red DC cables and bus bars are permitted to be connected to positive connections on the battery modules. The black DC cables and bus bars are only permitted to be connected to negative connections of the battery modules.
- ▶ Torque all DC cables and bus bars to 3 lb ft (4 Nm).

11. Connect BMS communication cables

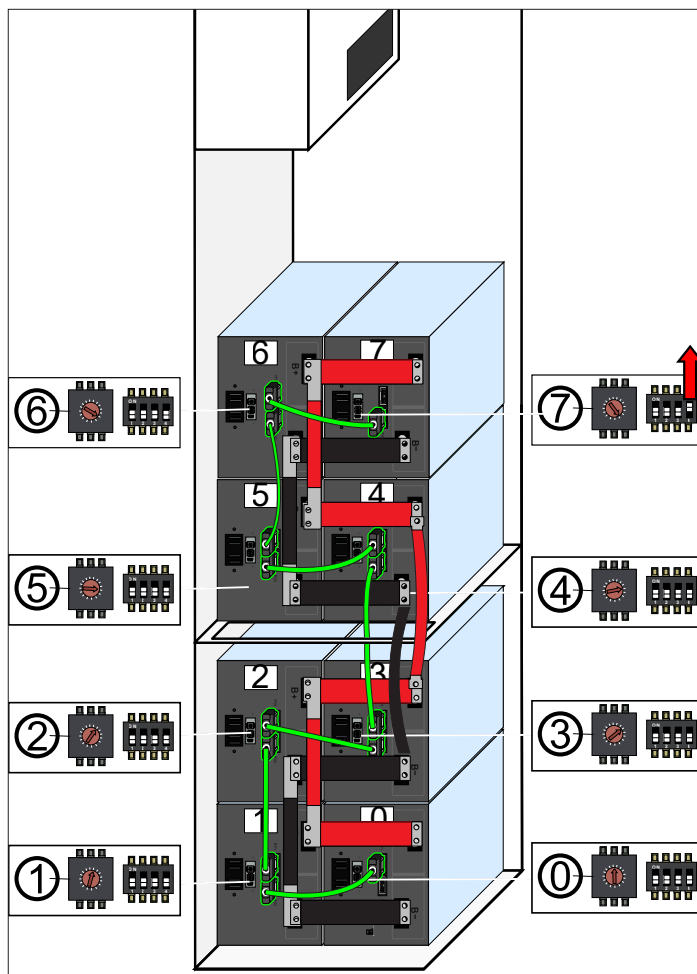


Fig. 48 Connecting BMS communication cable

- ▶ Plug one end of the long, pre-installed BMS communication cable into battery module No. 0.
- ▶ Starting with battery module No. 0, daisy-chain the battery modules using the communication cables in sequence (i.e., module 0 to module 1, module 1 to module 2, etc.) The communication wire must click into place.

If you must unplug a BMS communication cable:

- ▶ Press the nose on the plug.
- ▶ Remove the BMS communication cable.

12. Check wiring

- ▶ Check DC connections.
- ▶ Make sure the modules are connected in parallel.
- ▶ Ensure all battery connections have been torqued correctly.

13. Insert safety plugs

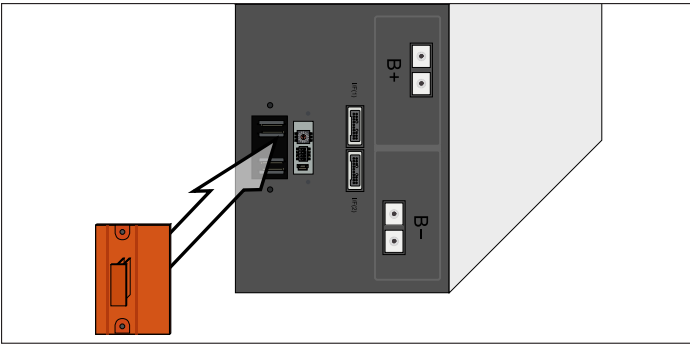


Fig. 49 Inserting safety plug

- Insert the orange safety plugs into all battery modules. Be very careful, as the battery modules are now voltage sources.

WARNING**Risk of burns!**

When the orange safety plug is inserted into the battery module, the battery module is capable of producing potentially dangerous voltages.

14. Reinstall access panels

15. Reinstall dead front

16. Verify protected load panel isolation

Attention

Damages caused by improper wiring are not covered by your warranty.

- Manually move the automatic transfer switch to the "offgrid" (down) position.
- Ensure the storage system's breaker in the main distribution panel is in the open position.
- Ensure there is no voltage present on the storage system's Microgrid terminals and in the Protected Load Panel.

These measurements should read 0V. If voltage is present at any location in the Protected Load Panel or on the storage system's microgrid terminals, you must correct the problem before turning on the unit.

17. Begin the commissioning process on page 36

Commissioning

This chapter describes the commissioning process.

The commissioning process is accomplished using the storage system's internal web server. Therefore, an Internet connection is required for commissioning the unit.

If Internet service to the house has not been installed, you can create a network using a wireless router or network extender and pairing it with a smartphone.

If a network connection has not been established, the commissioning process cannot be completed.

Commissioning checklist

- The following items should be checked before starting the system.

Prerequisites

- | | |
|--------------------------|---|
| ☐ | The mounting location fulfills the requirements listed on page 15. |
| ☐ | All DC bus bars and wires are connected properly. |
| ☐ | All Modbus cables are connected properly. |
| ☐ | The overcurrent protection of the storage system is sized properly. |
| ☐ | The electrical connections fulfill all requirements of local, regional, and national regulations. |
| ☐ | The main distribution panel and protected loads panel are electrically isolated |
| ☐ | The electrical connections of the storage system have been performed correctly. |
| ☐ | The storage system has been connected to the Internet. |

Turn on the storage system

The main DC circuit breaker F1 and the switch S1 are located in the interior of the main cabinet.

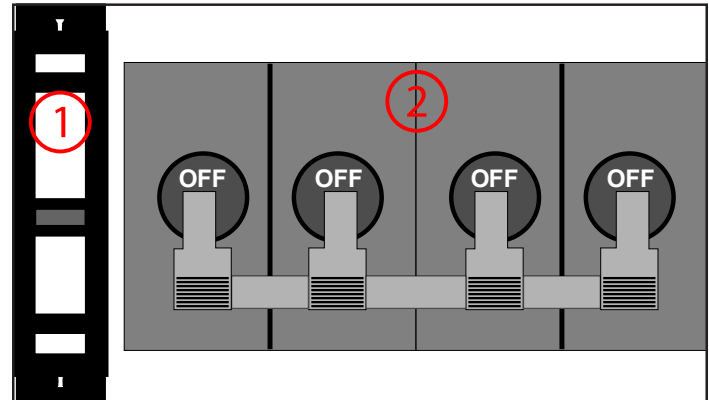


Fig. 50 Switch and circuit breaker

(1) Switch

(2) Main circuit breaker

Attention

Damage of the storage system by high currents!

High currents can damage components of the storage system if the process is not followed properly.

- Turn on the storage system only according to the steps below.

1. If an emergency switch is installed, ensure it is not activated. See page 28 for more information.
2. Press switch S1 for at least 7 seconds and keep it pressed for the next step.
3. Turn on main circuit breaker F1 of the main cabinet.
4. Release switch S1.

Table 4 Commissioning prerequisites

Commissioning assistant

1. Identify the storage system



Fig. 51 Identifying the storage system

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

This website will list all of the units on the network. Identify the system you are commissioning and press the "Configure" button.

The storage system will also display its IP address on the screen for direct access.

2. Log in to the storage unit

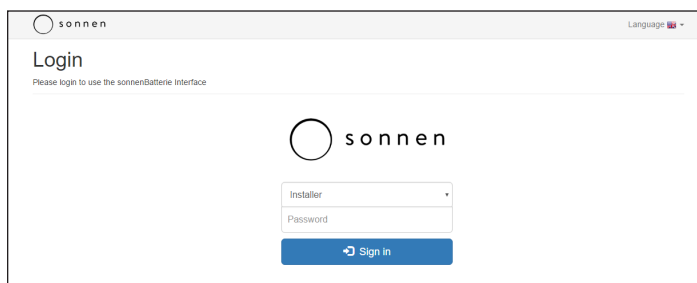


Fig. 52 Logging in to the storage system

- To begin the commissioning process, log in to the storage unit.
- Use the following login information to access the storage unit.

Account: Installer

Password: Sonnen@Installer2016

- Press start to begin the Commissioning Assistant.



The Commissioning Assistant has 11 steps that must be completed before the unit can be used.

3. Install system updates

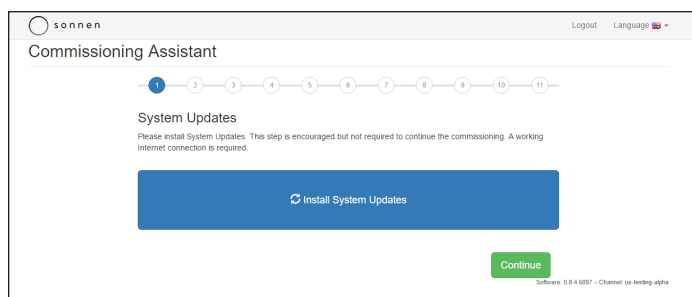


Fig. 53 Installing system updates

- Press the "Install System Updates" button.
This step is not required but is highly encouraged.
- Press Continue.

4. Set installation location

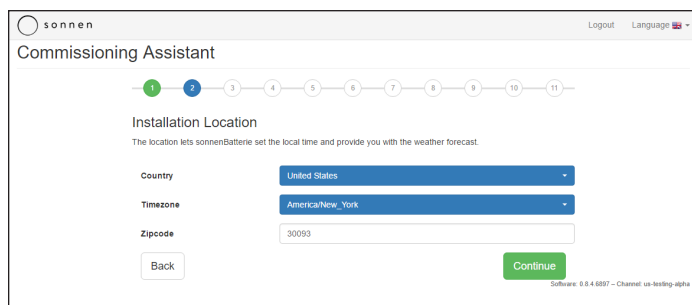


Fig. 54 Setting installation location

- Select the installation location and time zone.
- Press Continue.

5. Verify date and time

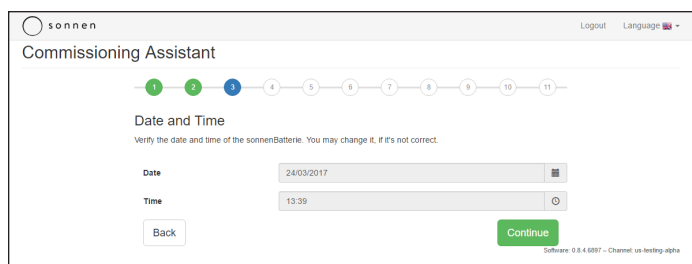


Fig. 55 Verifying the date and time

- Verify the date and time.
- Press Continue.

6. Enter PV system information

sonnen
Commissioning Assistant

1 2 3 4 5 6 7 8 9 10 11

PV System
The sonnenBatterie needs to know more about the PV system it will work with.

PV Size Watt Peak
The maximum power of the system (peak power).

Back Continue

Software: 0.8.4.0397 - Channel: us-testing-alpha

Fig. 56 Entering PV system information

- Enter the maximum power of your PV system, as measured in watts.
- Press Continue.

7. Enter Generator Autostart information

sonnen
Commissioning Assistant

1 2 3 4 5 6 7 8 9 10 11

Generator Autostart
Please enter generator values.
Not in US unless installing Generator
Please note: This form is not required for installations in the US, Canada, and the Caribbean unless combined with a generator*

Generator power used for charging sonnenBatterie eco Watts

Minimum SOC %

Maximum SOC %

Back Continue

Software: 0.8.4.0397 - Channel: us-testing-alpha

Fig. 57 Generator Autostart information

The sonnenBatterie ecoLinx can provide a start signal for a generator to provide power in the event that the storage system has reached a low state of charge, the grid is unavailable, and the PV system is not producing power. When these criteria are met, the storage system will start the generator and keep it running until the battery modules have reached a pre-configured state of charge, the grid becomes available, or the PV system begins producing power.

- Enter the following information:
 - **Power:** Set this value to 6000 watts for ecoLinx 10, 12, 14, 16, 18, and 20 units. Set to 0 if you won't be using a generator. This setting dictates only the power that will be used to charge the battery modules. Any additional power the generator produces will go to loads.
 - **Minimum SOC:** Set this to the state of charge at which the generator should start. Most users will not want this value to be less than 10 percent. Set to 0 if you won't be using a

generator.

- **Maximum SOC:** Set this to the state of charge at which the generator should stop providing power. Set to 0 if you won't be using a generator.
- Press Continue.

8. Enter Time of Use settings

sonnen
Commissioning Assistant

1 2 3 4 5 6 7 8 9 10 11

Time of Use
Configure time of use. Time of Use operating mode can be selected on the last page of the commissioning wizard.

Grid Enable

Peak Hour Start Time

Peak Hour End Time

Low Tariff Charge Time

Back Continue

Software: 0.8.4.0397 - Channel: us-testing-alpha

Fig. 58 Time of Use information

Many utility companies are moving to a Time of Use-based billing scheme, in which electricity costs more during high-demand time periods. The storage system can maximize your cost savings by using your stored battery power during the high-cost part of the day and recharging from solar and optionally with electricity purchased from the grid at the lowest offered rates.

If you enable Time of Use, the storage system will only discharge during the high-tariff time. The rest of the day, it will charge its batteries.

- Before entering these values, obtain information from the utility provider about their time of use scheme, if applicable.
- Enter the following information:
 - **Grid Enable:** If you set it to “No,” the storage unit will not purchase power from the utility to charge its batteries even during low-tariff times; instead, it will only charge the batteries from solar power generation. If you set it to “Yes,” it will purchase power to charge the batteries from the grid during low-tariff times only to ensure the system receives a full charge.
 - **Peak Hour Start Time:** When the high-tariff (or high-cost) period begins.
 - **Peak Hour End Time:** When the high-tariff period ends.

- Low Tariff Charge Time: If your utility has a low-tariff period, the storage system will charge from the grid during this time if Grid Enable is set to Yes.
- Press Continue.

9. Configure Microgrid "wake-up" times

Fig. 59 Configuring Microgrid "wake-up" times

If the storage system reaches too low of a charge to remain active until it can charge from the PV array, it can stop providing power until preset times to attempt to charge. When these times occur, the storage system will re-enable the microgrid – or output – for seven minutes to attempt charging from solar power.

- Enter the following information:
- Reenable Microgrid: Select Yes to enable this feature, or not to leave it disabled.
 - User Input Time One: Set this to the earliest time you want to attempt charging.
 - User Input Time Two: Set this to the next time you want to attempt charging.
 - User Input Time Three: Set this to the final time you want to attempt charging.
- Press Continue.

10. Configure meters

Fig. 60 Configuring meters

- On this step, configure the meter(s) you have installed.
- Select WM63-M/WM10 if you are using an EM24 meter (default).
- Select whether the meter is a production or consumption meter.
- Select a unique Modbus ID: 4 for production or 5 for consumption.
- Select channel 1.
- Select your metering setup.
1. Upstream PV meter (rare)
 2. Not used
 3. Downstream PV meter (factory default)

4. Whole-home self-consumption (common)
5. Additional upstream renewable source production meter (rare)
6. Additional downstream renewable source production meter (rare)

► Press Continue.

11. Provide information about owner

Owner
Fill in who owns the sonnenBatterie. This person will also be granted access to live data, statistics and control to the system.

Gender: Mr.
First Name: Sonnen
Last Name: Battery
Address Line 1: Oakbrook Parkway
Address Line 2: 5680
Zipcode: 30093
City: Norcross
State: GA
Country: United States
Phone: 180
Email: dntemali@gmail.com

Back Continue

Software: 0.8.4.6897 - Channel: us-testing-alpha

Fig. 61 Inputting owner information

- Enter the owner's information.
- Press Continue.

12. Provide information about installer

Installer
Installer's name and confirmation of correct installation.

Gender: Mr.
First Name: sonnen
Last Name: battery
Company: sonnen
Email: sonnen@sonnen.com

You must confirm the following to finish installation:

- The installation was performed and completed according to the installation manual.
- The battery system is located at an appropriate installation site.
- The information I entered in this assistant is correct.
- I explained the operating principle of the battery system to the customer.

☐ I hereby confirm the correctness of all of the points above.

Back Continue

Software: 0.8.4.6897 - Channel: us-testing-alpha

Fig. 62 Providing information about installer

- Input information about the installer.
- Check the confirmation box at the end.
- Press Continue.

13. Select Operating Mode

Commissioning Assistant

Launch
Click on the button to start your energy future now!

Please select the sonnenBatterie's Operating Mode: Self Consumption

☐ I hereby confirm that I am the owner of the sonnenBatterie and that I have received the warranty conditions.

Back Launch my sonnen Batterie

Software: 0.8.4.6897 - Channel: us-testing-alpha

Fig. 63 Selecting Operating Mode

- Select the desired operating mode. Your choices are:
 - Manual: Charge and discharge the unit manually
 - Backup power: Use the storage unit to provide power when the grid is unavailable
 - Self-consumption: Use stored energy when solar production is less than household consumption
 - Time of Use: Use stored energy only during specified high-tariff times.
- Press "Launch my sonnen Batterie."

14. System check

The following commissioning protocol will ensure all aspects of your storage system are working as expected.

1. Verify that the batteries are at 100% SOC and that the solar inverter is producing good power.
2. Shut down the grid feed into the storage system.
3. Verify the automatic transfer switch switches over to microgrid.
4. Verify all protected loads are being powered by the storage system.
5. Verify the frequency shift occurs and grid tie inverter shuts down. You should see the following error message on the storage system "High SOC: Disable microgrid power production".
6. Allow the state of charge to drop to 89%.
7. Verify the storage system resets the frequency to 60 Hz and the solar inverter restarts.
8. Monitor the SOC with solar contribution and verify that when SOC reaches 95% the storage system frequency shift occurs and the grid tie inverter shuts down.
9. Restore the grid feed in to the sonnen.
10. Verify the automatic transfer switch switches back to grid.
11. Verify the solar inverter restarts.
12. Verify all protected loads are operational.

Decommissioning

Attention

Damage of the battery cells by deep discharge!

If the storage system is not connected to the utility grid, the battery modules can be damaged by excessive and prolonged discharge.

- ▶ Do not leave the storage system disconnected for longer than six months (see ["Storing the system" on page 13](#) for more information.)

Shutting the storage system down

Attention

Damage of system parts by forced disconnect!

If there is no emergency:

- ▶ Shut the storage system down.

If there is no emergency, do not turn off the storage system by forcibly removing power, by turning off the DC circuit breaker, or by using the battery emergency switch, as these methods may result in undesirable behavior.

Shut down the storage system

Follow these steps to shut the storage system down properly:

1. Press "Shutdown" button

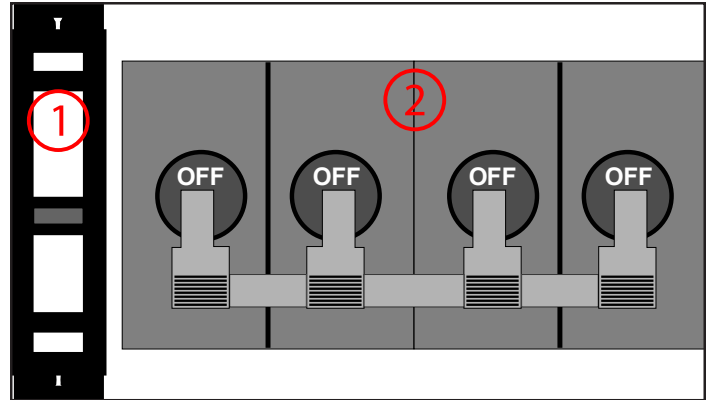
- ▶ Press the grid of six dots in the upper right corner of the screen.
- ▶ Press the "Settings" icon.
- ▶ Press "Shutdown" button.

2. Confirm shut-down

- ▶ Press "Yes" to confirm shut-down.
- The shut down takes approximately 60 seconds.

Emergency switch-off

In case of an emergency, the storage system can be switched off by the main circuit breaker F1 or the external emergency switch (if installed).



- ▶ In case of an emergency, switch off the main circuit breaker F1 in the interior of the main cabinet or the external emergency switch (if installed).
- ▶ Only switch off the main circuit breaker F1 if it can be reached without danger.

Recycling and certificates

This battery system complies with RoHS and contains none of the following substances: lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE).

- ▶ To dispose of the storage system:
 - Do not dispose of the storage system and its battery modules in your household refuse!
 - Contact service or the company that installed your storage system and commission them to disassemble and dispose of the storage system.
 - You can also call Call2Recycle at (877) 723-1297.

Your battery modules will be recycled and disposed of in an environmentally friendly manner.

Internet access



Internet access is a condition of warranty coverage.

The ecoLinX must connect to sonnen's servers to enable control of the storage system via the Web portal and smartphone app. This connection is protected by industry-standard security against unauthorized access. SonnenBatterie and service partners will only access the storage system for maintenance and monitoring.

A anonymized evaluation of log data enables further improvements and monitoring of hardware and software.

Establish connection to the Internet

- ▶ Connect the storage system's Ethernet cable to your router.
- ▶ Make sure your router acts as a DHCP server and configures newly connected network devices automatically.
- ▶ Ensure the following outbound TCP and UDP ports are permitted for the following services in the router:



The listed ports are generally preconfigured on the routers.

TCP Port	Service
22	SecureShell (ssh)
37	Time Server (ntp)
80	Online Check (http)
222	VPN (Server connection, ssl)
232	VPN (backup)
443	App control (https)

UDP Port

Service

1196

(Server connection, ssl)

Table 5 Required open ports for storage system

The storage system connects automatically with the Internet. There are no further steps required.

Internet portal

You can observe real-time and historical data regarding your storage system via the Internet portal.

▶ Log in to the portal

1. Type the following address to your Internet browser: <https://my.sonnen-batterie.com/>

The following login window will appear:

Fig. 64 Login window

2. Enter the login information that you received with your delivery.
3. Click on the Log in button.



For demo mode, use 'demo' as user name and password.

Maintenance and care

To ensure failure-free operation, safety, reliability and longevity, you must perform periodic cleaning and function control of the storage system.

Function control

Every two weeks, check if messages are shown on the screen.

Care of the storage system

Attention

Risk of damage by improper cleaning utensils!

- Only use cleaning solutions and tools listed in this chapter.
- Do not use high-pressure cleaning equipment.
- Do not use abrasive cleaners.

Cleaning the screen

- ▶ When the screen appears dirty, clean it with a damp cloth with a small amount of dish liquid.

Cleaning the enclosure

- ▶ When the cabinet appears dirty, clean the exterior with a soft, damp cloth. Do not clean the interior of the cabinet.

Checking the storage unit

Monthly:

- ▶ Check the area around storage unit for safety hazards or potential maintenance issues, including debris and chemical vapors that can degrade electrical insulation.

Annually:

Trained electrically qualified person only!

- ▶ Wear personal protective equipment, including safety glasses, insulated gloves, and steel-toe shoes.
- ▶ Turn off the main AC disconnect.
- ▶ Open the cabinet.
- ▶ Turn off the DC breaker.
- ▶ Remove the orange safety plugs from the battery modules.

- ▶ Check for and tighten any loose electrical connections, which can present a fire hazard. Look for cracked, blistered, or discolored insulation, which can indicate poor electrical connections.
- ▶ Check for pitting or cracking on contactors.
- ▶ Check for and tighten any loose mechanical connections.
- ▶ Using a multimeter with a continuity test function, open and close the AC breaker and ensure that the circuit is opened and closed correctly.

Appendix 1. Nameplates

Manufacturer
Sonnen, Inc.
2048 Weems Road
Tucker, GA 30084

Product name: sonnenBatterie ecoLinX
SKU: 38488
Version: _____
Rated feed-through current: 200A
Mains voltage/frequency/ph: 120/240 VAC 60Hz/split phase
Backup output current: 33A
DC short circuit rating: 10kA
Active power: max.8000W
Protection class / protection: NEMA 12
Battery voltage: nom. 51.2V
Power factor: -1 to 1
Battery manufacturer: Murata
Battery catalogue number: U1101M
Number of batteries: 5 6 7 8 9 10
Total battery capacity (KWH): 10 12 14 16 18 20
Ambient Temperature Range: 41°F - 113°F (5°C - 45°C)
Environment: Indoor only



Certified To ANSI/CAN/UL STD 9540

Intertek
5005340

Part No. 28231 Rev. 1

Made in North America

Quality Control

Serial Number _____

Model Number _____

Functions and safety

Conducted by _____

Date _____

Final Inspection

Conducted by _____

Date _____



Part No. 28028 Rev. 2

Safety Instructions

1. Switching off

The storage system can be switched off via the display or via the main safety switch F1, which is in the main cabinet.

2. Batteries used

The LiFePO4 lithium-ion batteries used contain no metallic lithium.

3. Voltage

The storage system is a low-voltage system with 120/240 volt output voltage. Setting the main safety switch F1 to off deactivates the storage system as an energy source. The battery modules run on max. 60 volt DC safety extra-low voltage. The battery contacts can be de-energized by removing the orange fuse plug on all battery modules.

4. Information for the fire department

Fires in the vicinity of the storage system and battery fires must be fought with conventional extinguishing agents. Storage system and battery cell fires can generally be extinguished with water.

5. Measures in the event of the accidental release of substances

In the event of the release of electrolytes: Avoid contact with eyes and skin, leave the room as quickly as possible, and ensure adequate ventilation if possible.

More information can be found in the operating and installation instructions.

Part No. 28023 Rev. 2

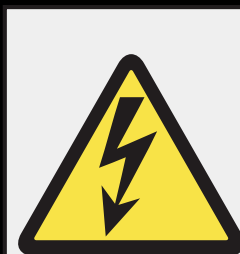
Fuse replacement chart

F1 - F2: 2A, 690V, 200KAIC
5017906.2

F3-F4: 50A, 690V, 200KAIC
5012406.50

F5-F6: 2.5A, 250V, 35AIC
5ST 2.5-R

F7-F8: 2A, 250V, 35AIC
0218002.MXP



WARNING

Replace only with the same ratings and type of fuse.



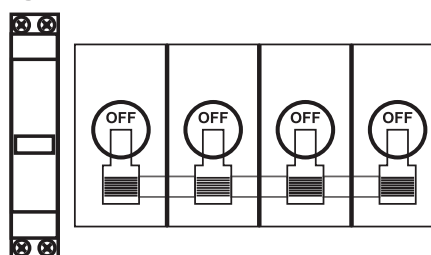
AVERTISSEMENT

N'utiliser que des fusibles de même calibre et de même type que le fusible d'origine.

Part No. 28092 Rev. 2

S1

F1



Turning on the storage system

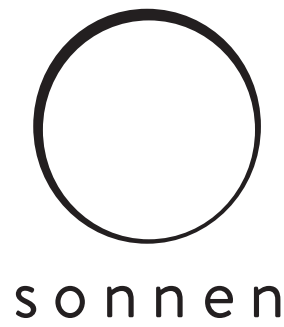
1. Press and hold button S1 for at least 7 seconds
2. Turn circuit breaker F1 on
3. Release S1

Emergency shutoff

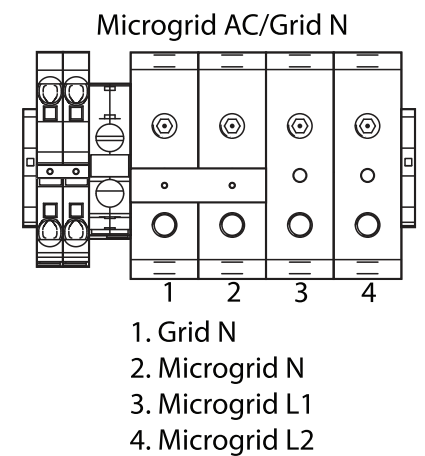
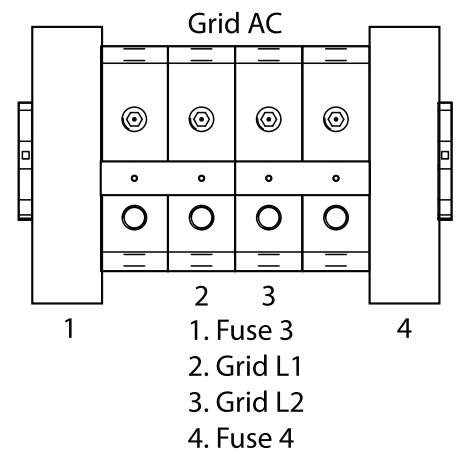
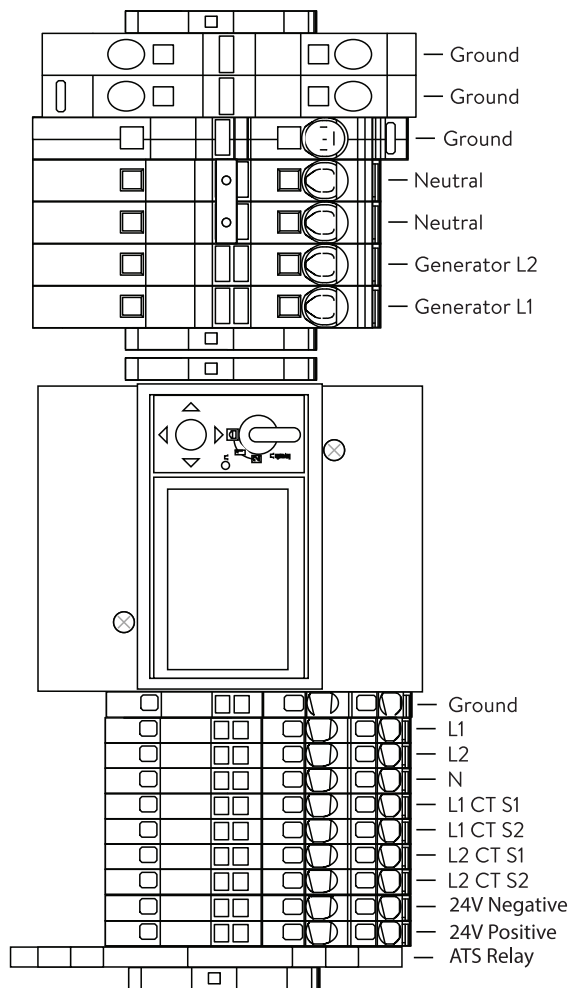
- Turn circuit breaker F1 off

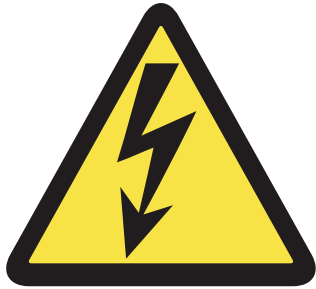
If there is no emergency, shut down the storage system using the touchscreen.

Part No. 28032 Rev. 2



Terminal block map for installation and service



	 WARNING
	RISK OF ELECTRIC SHOCK. Hazardous live parts inside this power supply are energized from the battery supply even when the input AC power is disconnected.
	 AVERTISSEMENT
RISQUE DE CHOC ÉLECTRIQUE. Risque de choc électrique. Ce bloc d'alimentation comporte des pièces sous tension dangereuse alimentées par les piles même lorsqu'il est débranché du secteur.	

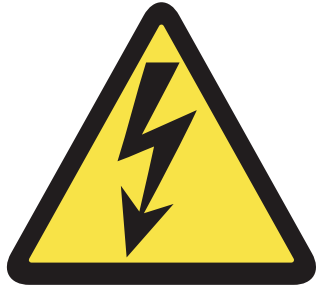
Part No. 28119 Rev. 2

	 WARNING
	HAZARDOUS VOLTAGE To reduce the risk of injury, read all instructions.
	 AVERTISSEMENT
TENSION DANGEREUSE Pour réduire le risque de blessure, lire toutes les instructions.	

Part No. 28114 Rev. 2

	 WARNING
	RISK OF ELECTRIC SHOCK. More than one live circuit. See diagram.
	 AVERTISSEMENT
RISQUE DE CHOC ÉLECTRIQUE. Cet appareil est alimenté par plusieurs circuits sous tension. Voir le schéma.	

Part No. 28115 Rev. 2

	 WARNING
	HAZARDOUS VOLTAGE Contact will cause electrical shock or burn Remove orange plugs from battery modules before servicing
	 AVERTISSEMENT
TENSION DANGEREUSE Contactez pourrait provoquer un choc électrique ou des brûlures Retirer les bouchons orange des modules de batterie avant l'entretien	

Part No. 28116 Rev. 2



Quick Guide:

1. Measure and note all module voltages
2. Proceed with installation only when the module voltage difference is less than 1 V. If greater than 1 V refer to the manual
3. Determine the module number and set up the communication addresses and terminal switches
4. Install the batteries in the appropriate order
5. Connect the DC cables +/-
6. Connect the communication cables
7. IMPORTANT: The orange safety plug must be installed as the last step!

Guide rapide :

1. Mesurez et notez toutes les tensions de module
2. N'effectuez l'installation que lorsque la différence de tension de module est inférieure à 1 V (si elle est supérieure à 1 V, voir le manuel)
3. Déterminez le numéro du module et mettez en place les adresses de communication et les commutateurs de borne
4. Installez les piles dans l'ordre approprié
5. Branchez les bornes +/- des câbles à courant continu
6. Branchez les câbles de communication
7. IMPORTANT : La prise de sécurité orange doit être installée en dernier!

CAUTION

This module is specifically designed for Sonnenbatterie and therefore may only be used with Sonnenbatterie products. Other battery modules are not to be used with Sonnenbatterie products.

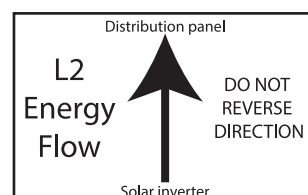
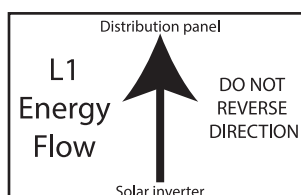
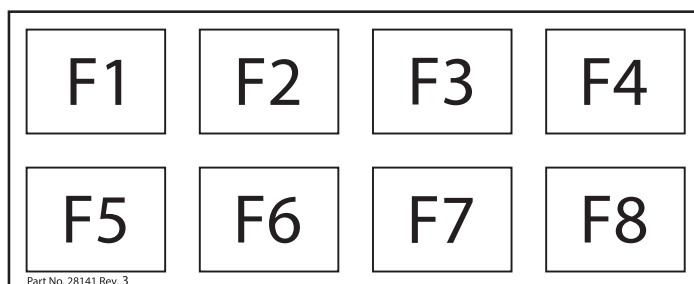
The system must be disconnected by the main switch and all orange safety plugs of the battery modules must be removed before working on the system.

ATTENTION

Ce module est spécialement conçu pour sonnen et ne doit être utilisé qu'avec des produits sonnen. Les autres supports de batterie ne doivent pas être utilisés avec les produits sonnen.

Le système doit être débranché par le commutateur principal et toutes les prises de sécurité orange des supports de batterie doivent être retirés avant de travailler sur le système.

Part No. 28025 Rev. 2



Appendix 2. Glossary

Appliances: Devices that consume power. These may include small appliances, such as a blender, or large ones, such as a water heater.

Autonomy: A measurement of how little you rely on the grid for energy. The more renewable energy you produce and consume, the higher your autonomy.

Backup mode (or offgrid mode): A mode of operation in which the sonnenBatterie ecoLinX provides power stored in its battery modules when the utility grid power is unavailable.

Backup readiness: When the storage system emphasizes backup readiness, it maintains a specified state of charge, such as 85%, in its battery modules to provide power in the event of an outage.

Battery modules: The energy storage modules in the sonnenBatterie ecoLinX.

Capacity: The amount of energy that can be stored in the sonnenBatterie ecoLinX, measured in kilowatt-hours.

Consumption: The amount of power being used by appliances.

Deep discharge: Bringing the battery module's charge to such a low level that it damages the battery. For the modules used by the ecoLinX, this requires leaving a module at an extremely low level (0%-1%) for weeks or months.

Discharge: When the storage system provides power to your house or building.

Feed-In: When the storage system provides power to the utility grid.

Grid: The power source provided by utility companies, as opposed to self-generated power.

Kilowatt-hour: A measurement of energy equal to one kilowatt delivered for one hour.

Load-shedding: The method of removing power to appliances either to keep the load within power requirements or to maximize battery time.

Main disconnect circuit breaker: A circuit breaker that cuts all power to and from the storage system when opened.

Main service panel: The main panel to which all appliances are connected.

Microgrid: The grid created by your power generation system, as opposed to the utility grid.

Modbus: A serial protocol that enables communications between smart devices.

Photovoltaic: A photovoltaic system of solar-power panels.

Production: The power generated by your solar panels.

Protected loads panel: A panel providing power to the most important appliances in the house or building, such as a refrigerator, freezer, or heater. This subpanel is isolated from the main service panel by a switch to prevent electrical feedback.

Self-consumption: The method of using solar power to power appliances rather than using grid power.

State of charge: The percentage of charge available in the storage system's battery modules.

Storage system: The sonnenBatterie ecoLinX, which combines an inverter, battery modules, and other hardware and proprietary algorithms to make solar power an even more cost-effective power source.

Transfer switch: A switch, either manual or automatic, that changes the power source from the utility grid to self-generated power in the event of a loss of power.

Appendix 3. Torque values

Item	Imperial	Metric
Battery terminals	3 ftlbs	4Nm
3/0 AC Input and Output Terminals	81.7 inlbs	9.25Nm
Inverter DC cables	60 inlbs	6.9Nm
Inverter ground wire	25 inlbs	2.8Nm
Cabinet connections	31 inlbs	3.5Nm
Access panel	25 inlbs	2.8Nm
Grounding strap	40 inlbs	4.5Nm
Dead front	12 inlbs	1.4Nm

Appendix 4. Warranty

This warranty is provided for reference only. The warranty provided at <https://www.sonnenbatterie.de/en-us/node/974> overrides this and any printed versions of sonnen's warranty.

I. WARRANTY

1. Warrantor.

Warrantor is sonnen, Inc. (formerly "sonnenBatterie"), 10800 Burbank Blvd., Suite #C, Los Angeles, CA, 91601

2. Products.

The following limited warranty terms and conditions (collectively, the "Factory Warranty") apply exclusively to sonnen, Inc.'s products of the following types ("Covered Products"):

- US eco 2.0 (or higher), installed after July 31, 2015,
- US pro 1.0 (or higher), installed after January 1, 2016,

which:

- were manufactured by and bear the original manufacturing label of sonnenBatterie or sonnen, Inc.
- were sold by sonnen, Inc. directly or through a certified sonnenBatterie dealer ("Authorized Dealer") as new products in the United States and Canada;
- were installed and commissioned by an Authorized Dealer within the United States and Canada.

1. Product Warranty.

For Covered Products, sonnen, Inc. covers all defects in workmanship and materials during the Warranty Period under normal application, installation, use and service conditions as specified in sonnen,

Inc.'s standard product documentation, and subject to the conditions listed below ("Product Warranty"). The Product Warranty is not intended to be a durability warranty, as end-user conditions and usage is variable.

2. Performance Warranty.

sonnen, Inc. guarantees that the actual storing capacity of the original battery pack included in the Covered Product ("Battery Pack") will be not less than 70% of the labeled storing capacity.

3. Warranty Obligations.

- (a). During the Warranty Period, sonnen, Inc. will, at its option, repair the defective parts (if economically feasible) or replace the defective part free of charge, provided that you properly notify sonnen, Inc. of the product defect within the Warranty Period, and provided that sonnen, Inc., through inspection, establishes the existence of a defect covered by this Limited.
- (b). sonnen, Inc. will, at its option, use new and/or reconditioned parts in building replacement parts. sonnen, Inc. reserves the right to use parts or products of original or improved design in the repair or replacement of your product. If sonnen, Inc. repairs or replaces a product part, its warranty continues for the remaining portion of the Warranty Period or 90 days from the date of the repair or replacement, whichever is greater.
- (c). This Factory Warranty covers sonnenBatterie costs for materials necessary to reestablish trouble free operation of the Covered Product. This Factory Warranty does NOT cover, however, costs of installation,

cost of removal, cost of labor for repair, cost of shipping or cost of reinstallation of a Covered Product or parts thereof.

- (d). EXCEPT AS OTHERWISE PROVIDED BY APPLICABLE LAW, THE FOREGOING REMEDIES STATE SONNEN'S SOLE AND EXCLUSIVE OBLIGATION AND YOUR SOLE AND EXCLUSIVE REMEDY FOR A BREACH OF THE FOREGOING LIMITED WARRANTY.

5. Warranty Term.

- (a). The warranty period ("Warranty Period") for the Covered Product commences upon the initial purchase from sonnen, Inc. or an Authorized Dealer (as evidenced by the purchase invoice date).
- (b). The Warranty Period for the Product Warranty (Section 3) terminates upon the earlier of (i) 123 months after purchase of the Covered Product, or (ii) 120 months after installation of the Covered Product by an Authorized Dealer.
- (c). The Warranty Period for the Performance Warranty (Section 4) terminates upon the earlier of (i) 123 months after purchase of the Covered Product, or (ii) 120 months after installation of the Covered Product by an Authorized Dealer, or (iii) 10,000 full (100%) charging cycles of the Battery Pack.

4. Persons Entitled to Make Warranty Claims.

Warranty claims may only be made by the original purchaser of a Covered Product, if the Covered Product has been registered through sonnen's product registration website during the installation process by the Authorized Dealer, or a person to whom the title to the Covered Product has been transferred, provided that the Covered

Product remains in its original location and configuration (including, without limitation, a purchaser of a building, who acquires the covered product as a fixture to the building).

5. Claim Notice.

- (a). If you believe that you have a justified claim covered by this Factory Warranty, you must submit the claim in writing ("Claim Notice") to sonnen, Inc. within the applicable Warranty Period to sonnen, Inc.'s address set forth above, or such future address as sonnen, Inc. may provide from time to time. Any Claim Notice must include the following information:
- the serial number of the Covered Product for which a Claim Notice is being sent;
 - a copy of the dated purchase receipt for the Covered Product;
 - a copy of the installation protocol for the Covered Product signed by an Authorized Dealer;
 - information about the use of the Covered Product in reasonable detail;
 - information about the defect in reasonable detail.
- (b). Upon receipt of your Claim Notice sonnen, Inc. may ask for further information or claim verification from you, receipt of which will be required prior to processing the claim.
- (c). Upon acceptance of your warranty claim, sonnen, Inc. may require that you send the Covered Product at your own costs to a sonnen, Inc. warranty claim center located in the United States.

IV. WARRANTY LIMITATIONS

1. Excluded Warranty Claims

- (a). sonnen, Inc. makes no warranties, either expressed or implied, orally, or in writing, with respect to any other warranty coverage except those expressly stated in this limited Factory Warranty
- (b). The Factory Warranty does not cover damages that occur due to:
 - Transport damage;
 - Installation or commissioning through any person which is not an Authorized Dealer;
 - Failure to observe the user manual, maintenance regulations and intervals;
 - Modifications, changes, or attempted repairs, except as conducted by an Authorized Dealer;
 - Incorrect use or inappropriate operation;
 - Insufficient ventilation of the Covered Product;
 - Failure to observe the applicable safety regulations;
 - Force majeure.
- (c). This factory warranty does not cover cosmetic defects which do not directly influence energy production, or degrade form, fit, and function.
- (d). Claims that go beyond the scope of this limited Factory Warranty, in particular claims for compensation for direct or indirect damages arising from the defective device, for compensation for costs arising from disassembly and installation, or loss of profits, are expressly NOT covered by this Factory Warranty.
- (e). In no event will sonnen, Inc. be held responsible or liable for any personal injuries resulting from the use of the system, or for any other damages,

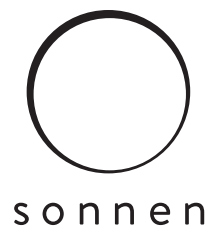
whether direct, indirect, incidental, or consequential; even if sonnen, Inc. has been advised of such damages.

6. Internet Connectivity.

As a condition to this limited Factory Warranty, sonnen, Inc. requires continuous online access to the Covered Product via internet connection. This Factory Warranty requires that the Covered Product will be properly connected to the internet through your internet provider and expressly excludes any defects resulting from your acts or omissions that prevent sonnen, Inc. from accessing the Covered Product online as may be required for software upload or performance data download.

VII. GENERAL.

This limited Factory Warranty and the terms contained herein supersede all statements contained in any and all user manuals, installation manuals, other equipment literature or catalogs, or orally with respect to any product or performance warranty for Covered Products.



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