

## **User Manual**

# High Voltage LFP Battery

SBR096/128/160/192/224/256



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## **About This Manual**

The manual mainly describes the product information, guidelines for installation, operation and maintenance. The manual cannot include complete information the system (i. e. the PCS), just the battery. The reader can get additional information about other devices at **www.sungrowpower.com** or on the webpage of the respective component manufacturer.

### **Validity**

This manual is valid for the following battery models:

- SBR096
- SBR128
- SBR160
- SBR192
- SBR224
- SBR256

They will be referred to as "battery" hereinafter unless otherwise specified.

### **Target Group**

This manual is intended for battery owners who will have the ability to interact with the battery and qualified personnel who are responsible for the installation and commissioning of the battery. Qualified personnel should have the following skills:

- Training for installation and commissioning of electrical system, as well as dealing with hazards
- · Knowledge of the manual and other related documents
- Knowledge of the local regulations and directives

### **How to Use This Manual**

Read the manual and other related documents before performing any work on the battery. Documents must be stored carefully and be available at all times.

Images in this manual are for reference only. The actual product received may differ.

Contents may be periodically updated or revised due to the product development. It is probably that there are changes of manual in the subsequent battery edition. The latest manual can be acquired via visiting the website at **support.sungrowpower.com**.

### **Symbols**

Important instructions contained in this manual should be followed during installation, operation and maintenance of the PCS. They will be highlighted by the following symbols.

### ▲ DANGER

Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.

### **MARNING**

Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.

### **A** CAUTION

Indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.

### **NOTICE**

Indicates a situation that, if not avoided, could result in equipment or property damage.



Indicates additional information, emphasized contents or tips that may be helpful, e.g. to help you solve problems or save time.

### Abbreviation

BMS: Battery Management System
BMU: Battery Management Unit
CAN: Controller Area Network

CMU: Battery Cluster Management Unit

LFP: Lithium iron phosphate PCS: Power Conversion System

SOC: State of Charge

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## 1 Safety Instructions

When installing, commissioning, operating, and maintaining the product, strictly observe the labels on the product and the safety requirements in the manual. Incorrect operation or work may cause:

- Injury or death to the operator or a third party.
- · Damage to the product and other properties.

### **⚠** WARNING

- Do not operate the product and cables (including but not limited to moving the product, installing the product, operating the product and cables, powering up the product, maintaining the product, and working at heights) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- In case of fire, evacuate from the building or product area and call the fire alarm.
   Re-entry into the burning area is strictly prohibited under any circumstances.
- Tighten the screws with the specified torque using tools when fastening the product and terminals. Otherwise, the product may be damaged. And the damage caused is not covered by the warranty.
- Learn how to use tools correctly before using them to avoid hurting people or damaging the device.

### **NOTICE**

Maintain the device with sufficient knowledge of this manual and use proper tools.

 The safety instructions in this manual are only supplements and cannot cover all the precautions that should be followed. Perform operations considering actual onsite conditions.



- SUNGROW shall not be held liable for any damage caused by violation of general safety operation requirements, general safety standards, or any safety instruction in this manual.
- When installing, operating, and maintaining the product, comply with local laws and regulations. The safety precautions in this manual are only supplements to local laws and regulations.

1 Safety Instructions User Manual

### 1.1 Notices for Safe Use

Read all safety instructions carefully prior to any work and observe them at all times when working on or with the battery. Failure to observe the precautions described in this section can cause serious injury to persons or damage to property.

### **A** DANGER

### Risk of explosion

- · Do not subject the battery to any strong force.
- Do not mechanically damage the battery (pierce, deform, strip down, etc.)
- · Do not heat the battery or dispose of the battery in a fire.
- Do not install the battery in potentially explosive environments.
- Do not place the battery in water or other liquids.

### **A** DANGER

#### Risk of fire

- Do not place the battery near a heat source, such as direct sunlight, a fireplace, a thermally uninsulated wall exposed to sunlight, hot water, or a heater.
- Keep sources of ignition such as sparks, flames, and smoking materials away from the battery.

### **A** DANGER

### Risk of electric shock

- Do not disassemble the battery.
- Do not handle a wet battery or use wet tools.
- Do not soak the battery in water or expose it to moisture or liquids.
- · Keep the battery away from children and animals.
- Wear suitable clothing, guards and gloves to prevent you from direct contact with the DC voltage.
- Use insulated tools during working with battery.
- Set aside metal jewelry before working on the DC circuit.

## 1.2 Battery Handling Information

### NOTICE

Follow local standards to use the battery.

User Manual 1 Safety Instructions

Any man-made damage will void the limited warranty for the battery. Handle the battery with care to protect it from damage.

- · Use the battery only as intended and designed.
- The battery must only be installed at a suitable location.
- · Make sure the battery is well connected to ground before use.
- Do not use the battery if it is defective, appears cracked, broken or damaged, or fails to operate.
- Do not use the battery together with other types of batteries.
- · Do not pull, drag or step on the battery.
- Do not leave any foreign objects inside the battery.
- Do not repair or modify the battery. It is not user serviceable.
- Do not pull out any cables when the battery is powered on.
- Do not damage the sheath of cables, wire harness and connectors.
- While the battery is charged, used and stored, keep it away from materials that are prone
  to electric discharge, including static discharge.
- · Keep the battery away from babies and children to avoid any accidents.
- · Cover terminals with insulating tape before proper disposal.
- Avoid direct contact with rain, snow, and water, and prevent the battery from falling and mechanical impact during battery transportation.

## 1.3 Emergency Situations

### 1.3.1 Leaking Batteries

Abuse/misuse/damage of the battery may cause increasing of internal pressure in the battery cells. It may result in the electrolyte venting. In the event that battery electrolyte is released:

- Do not enter the room under any circumstance.
- Avoid contact with the leaking liquid or gas.
- · Call the Local Emergency number or Fire Brigade if necessary.

If one is exposed to the leaking substance, follow the suggestions below to minimize the chance of injury:

- Inhalation: Evacuate the contaminated area, and seek medical aid.
- Eye contact: Rinse eyes with copious amounts of water for at least 15 minutes, and seek medical aid immediately.
- Skin contact: Wash the affected area thoroughly with plenty of water for at least 15 minutes. If possible, remove or saturate contaminated clothing with water. Seek medical aid if the patient is distressed.

1 Safety Instructions User Manual

· Ingestion: Induce vomiting, and seek medical aid immediately.

Wipe out the contacted area with a sponge or cloth that is soaked in water until you obtain medical aid. These materials can damage skin and eyes, causing blindness.

#### 132 Fire

Fire may occur with the battery despite its careful design. Likewise, a fire or unusually high temperatures near the battery can cause it to catch fire.

### **Protective equipment**

A respirator is not required during normal operations.

In the event of a fire, hazardous fumes including carbon monoxide, carbon dioxide, and/or various hydrocarbons may be emitted. To comply with the Personal Protective Equipment Directive (89/686/EEC), use a full-face self-contained breathing apparatus (SCBA) with full protective gear during fire fighting.

### Fire fighting

#### NOTICE

In the event of a fire, only qualified firefighters with appropriate protective equipment are permitted to enter the room where the battery is located.

It may take a long time to completely extinguish the fire. Consider allowing the system to burn. Smoke indicates that the battery is still burning. Always note that there is a risk of the battery re-igniting.

Proceed as follows for fire-fighting.

- 1 Shut off any connected power system or electronics such as the battery, battery isolator, PV DC isolator(s), AC isolator, solar supply main switch and normal supply main switch.
- 2 Perform an adequate knock down on the fire before entering the incident's hot zone.
- 3 If the battery catches on fire, use fire-fighting sand, CO<sub>2</sub> extinguisher, or other emergency fire extinguishing equipment approved by fire fighters to extinguish the fire.
- 4 If the fire is not from the battery and has not spread to it yet, use an ABC fire extinguisher to extinguish the fire. Remove batteries and other ignition sources from the scene of a fire.

#### 1.3.3 Wet Batteries

If the battery is submerged in water, do not let people access it, and then contact Sungrow or an authorized service partner for technical support.

If a battery is submerged in water or flooded, first, switch off all circuit breakers in the system to cut off the power supply to the battery. Wait until floodwaters subside and do not approach near battery. If someone needs to go into the flooded water, wear insulated full length rubber boots and gloves.

User Manual 1 Safety Instructions

Do not use a flooded battery again.

### 1.3.4 Damaged Batteries

The battery consists of lithium-ion cells. These are considered dry cell batteries. If the battery is damaged, only a small amount of battery fluid can leak.

A damaged battery can cause rapid heating of the battery cells. If you notice smoke coming from the battery area, assume that the battery is burning and take appropriate action as described in "1.3.2 Fire".

Damaged batteries are dangerous and must be handled with extreme caution. They are not fit for use and may pose a danger to people or property. If a battery seems to be damaged:

- 1 Pack it in its original container.
- 2 Store it in a separated room like the installation place.
- 3 Contact SUNGROW.

### **▲** DANGER

A damaged battery may release dangerous material and a flammable gas mixture. Never try to repair the battery even if you are a qualified electrician.

## 2 Product Description

### 2.1 Product Introduction

### **Brief Introduction**

The battery is designed for residential energy storage systems. The inbuilt battery management system monitors its operation and prevents the battery from operating beyond the specified limitations.

This product is a high-voltage battery system with an operating voltage range between 150 V  $\sim$  584 V. A battery system consist of 3 to 8 individual battery modules connected in series. Max.4 batteries can be connected in parallel to compatible PCS. Please refer to PCS man-

Max.4 batteries can be connected in parallel to compatible PCS. Please refer to PCS manual for the compatibility details.

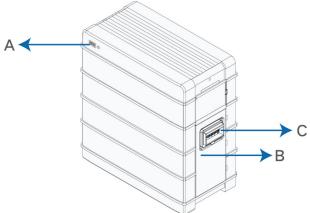


figure 2-1 Product overview



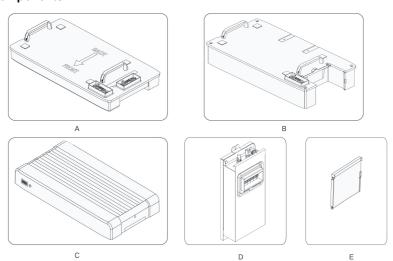
Images are for reference only. The actual products received may differ.

User Manual 2 Product Description

table 2-1 Design of the product

Position	Designation	
	LED Indicator	
	LED indicator include the SOC indicator and the status indicator. The status	
Α	indicator is also used as the power button.	
	LED indicator indicates the SOC value and status of the battery.	
	Nameplate	
	The nameplate clearly indentifies the product. The nameplate must remain	
	permanently attached to the product. You will find the following information	
В	on the nameplate:	
Б	SUNGROW logo and product model	
	Technical data	
	Product symbol	
С	DC circuit breaker	

### **Major Components**





Images are for reference only. The actual products received may differ.

Name	Designation	Designation		
A	Base			
В	Battery module			
С	Top cover			
D	Switch gear			
E	Side cover			

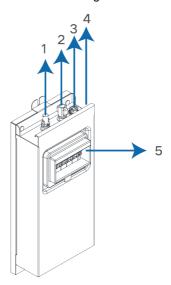
2 Product Description User Manual

table 2-2 Configuration Table

No.	Model	Base	Battery module	Top cover	Switch gear	Side cover
1	SBR096	1	3	1	1	-
2	SBR128	1	4	1	1	1
3	SBR160	1	5	1	1	2
4	SBR192	1	6	1	1	3
5	SBR224	1	7	1	1	4
6	SBR256	1	8	1	1	5

## 2.2 Terminal Description

All electrical terminals are located at the switch gear.





Images are for reference only. The actual products received may differ.

No.	Label	Description
1	P-	The system negative terminal, connected to the PCS nega-
	i -	tive terminal
2	P+	The system positive terminal, connected to the PCS positive
Z FT		terminal
3	COMM	To enable the communication between the PCS and the
3	COMM	battery
4	<u></u>	Grounding terminal, connected to the ground
5	DC circuit	To connect/disconnect the DC circuit, for power-on, power-off,
<u> </u>	breaker	and short-circuit protection

User Manual 2 Product Description

## 2.3 Symbols on the Product

Symbol	Explanation
$\wedge$	Pay attention to the danger. Do not operate this product in the live
<u></u>	status!
	No open flames
	Do not expose to flame, incinerate, puncture, or impact.
$\wedge$	Electric shock hazard
7	Serviced by qualified personnel only. Out of reach from children.
TÜVRheicland CERTIFIED	TÜV mark of conformity
TUV	TÜV mark of conformity
C€	CE mark of conformity
76	EU/EEA Importer
UK CA	UKCA mark of conformity
A	Do not dispose in trash.
<b>/</b> 2%	Compacting a lithium ion battery is dangerous as it can explode.
	Please recycle this lithium ion battery. Do not discard.
i	Read the user manual before maintenance!
	This is a protective grounding terminal, which should be grounded se-
	curely to protect the safety of operators.

### 2.4 LED Indicator

LED indicators include the SOC indicator and the status indicator. The status indicator is also used as the power button.

### **SOC Indicator**

The SOC indicator indicates the current SOC value of the battery. One bar indicates the SOC value of 10%.



### **Status Indicator**

The Status indicator indicates the current state of the battery.

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LED color	LED indicator	LED state	Definition
		ON	Normal operation (without fault)
		Slow blink	The battery is at power-on or standby state
(())	Blue	Period: 2 s	or firmware update state(without fault).
		Fast blink	Battery self-test in process.
		Period: 0.5 s	Duttery sen-test in process.
		ON	A system fault has occured.
Red	Red	- DI' I	The battery is at power-on or standby state
		Blink	(with primary fault).



Images are for reference only. The actual products received may differ.

The status indicator can be used to power on the battery.

Operation	Definition
Press and hold for less than 2 seconds	To power on the battery*

### NOTICE

\*The start mode is black start, please refer to "5.2 Commissioning Procedure" for details.

## 3 Unpacking and Storage

### 3.1 Unpacking and Inspection

The product is thoroughly tested and strictly inspected before delivery. Nonetheless, damage may still occur during shipping. For this reason, please conduct a thorough inspection after receiving the product.

- · Check the packing case for any visible damage.
- · Check the scope of delivery for completeness according to the packing list.
- · Check the inner contents for damage after unpacking.

Contact SUNGROW or the transport company in case of any damage or incompleteness, and provide photos to facilitate services.

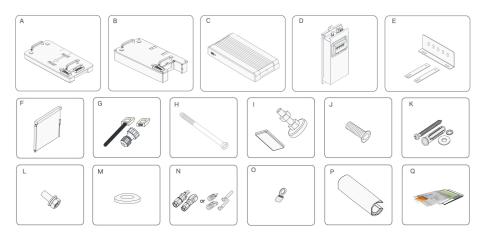
Do not dispose of the original packing case. It is recommended to store the device in the original packing case when the product is decommissioned.

### **NOTICE**

After receiving the product, check whether the appearance and structural parts of the device are damaged, and check whether the packing list is consistent with the actual ordered product. If there are problems with the above inspection items, do not install the device and contact your distributor first. If the problem persists, contact SUNGROW in time.

If any tool is used for unpacking, be careful not to damage the product.

## 3.2 Scope of Delivery



Item	Name	Quantity
A	Base	1
В	Battery module	3 - 8
С	Top cover	1
D	Switch gear <sup>1</sup>	1
E	Bracket	1
F	Side cover	3 - 8
G	Communication connector	1
Н	M5*125 hex socket screw (optional)	1
I	Foot	4
J	M5*14 hex socket screw <sup>2</sup>	14 - 24
K	Expansion plug set	2
L	M5 screw sets <sup>2</sup>	6
M	M6 fender washer <sup>2</sup>	5
N	SUNCLIX connector or MC4	1
IN	Connector	ı
0	OT terminal	1
Р	Communication cable fastening tool	1
Q	Documents	1



- 1. Images in this manual are for reference only. The actual product received may differ.
- 2. The number of parts marked with "2" is greater than required. Please refer to the installation steps for the specific quantity needed.

## 3.3 Storage

Proper storage is required if the battery is not installed immediately.

- · Store the battery in the original packing case with the desiccant inside.
- Preferably, keep the temperature in the range of 15°C 25°C. Store the battery within the temperature range of -10°C to 35°C for no more than 6 months.
- The storage relative humidity must be always between 0 and 95%, non-condensing.
- Store the battery in a clean and dry place, without exposure to sunlight and rain. The
  storage location must be free of harmful gases, flammable/explosive products and corrosive chemicals. The battery should be prevented from mechanical impact, high pressure,
  high-intensity magnetic field and direct exposure to sunlight.
- Pay attention to the harsh environment, such as sudden cooling/heating and collision, to avoid damage to the battery.
- The number of stacking layers of battery modules with package must not exceed 6. It is strictly forbidden to directly stack batteries without package.
- Regularly inspect the package for damage and insect bites. If any damage is found, the product should be replaced immediately.

User Manual 3 Unpacking and Storage

- The packing should be upright.
- If stored for more than 6 months under the specified conditions, the battery needs to be charged once, until the system SOC is 50% 80%. Preferably, use an PCS for forced charging.



If the battery is stored over one year, 5% - 10% of the capacity may lose irreversibly.



## 4 Mounting

### 4.1 Safety during Mounting

### **MARNING**

This product or system must be operated by professionals!

Failure to follow the safety instructions in this manual or operation of this product or system by non-professionals may cause severe personal injury or major property damage.

### **M** WARNING

Strictly follow local relevant standards and requirements in the whole process of installation.

### 4.2 Location Requirements

Select an optimal mounting location for safe operation, long service life and expected performance.

The battery with IP55 can be installed both indoors and outdoors.

Install the battery in a place convenient for electrical connection, operation, and maintenance.

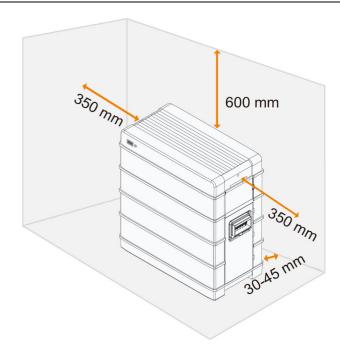
## 4.3 Installation Environment Requirements

- The installation environment must be free of inflammable or explosive materials.
- The location should be not accessible to children.
- The ambient temperature is recommended to be between 10°C and 30°C. Please refer to "9.1 Technical Data" for the maximum operation temperature range.
- The relative humidity must be always between 0 and 95%, non-condensing.
- · Avoid direct exposure to sun, rain and snow.
- The battery should be well ventilated. Ensure air circulation.

### 4.4 Installation Clearance Requirements

• Reserve enough clearance around the battery to ensure sufficient space for heat dissipation.

User Manual 4 Mounting



• In case of multiple batteries, reserve specific clearance between the batteries.



## 4.5 Installation Tools

Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site.

table 4-1 Tool specification







Dust mask



Protective gloves



Insulated shoes

4 Mounting User Manual



## 4.6 PE Cable Preparation

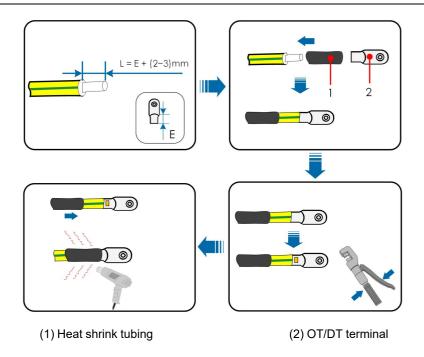
Additional grounding cable is prepared by customers.

table 4-2 Cable requirements

Туре	Specification
Complying with 1000V and 105°C standard	4–6 mm <sup>2</sup>

Prepare the cable and OT/DT terminal.

User Manual 4 Mounting



## 4.7 Assembling the SUNCLIX Connector

### NOTICE

During assembly, be careful not to contaminate, pull out, or shift, the seal in the cable gland. A contaminated or shifted seal impairs strain relief and leak tightness.

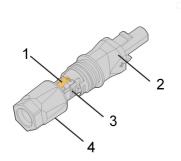
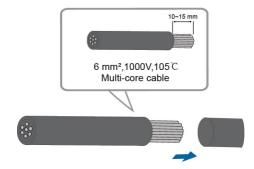


figure 4-1 SUNCLIX Connector Components

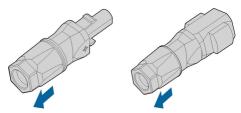
- 1: Spring
- 2: Sleeve
- 3: Insert
- 4: Cable gland

step 1 Strip the insulation from the cable by 10mm - 15 mm.

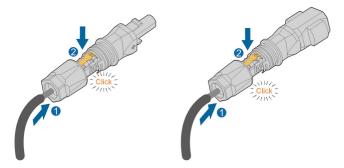
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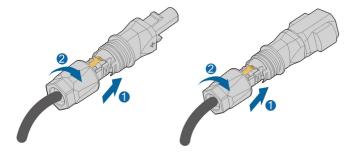
step 2 Pry the connection open and pull the sleeve and the insert apart.



step 3 Insert the stripped cable into the cable gland up to the stop. The stranded wire can be seen inside the spring. Press the spring down until it audibly snaps into place.



step 4 Push the insert into the sleeve and tighten the cable gland (torque 2 N·m).



- - End

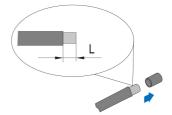
## 4.8 Assembling the MC4 Connectors (Optional)



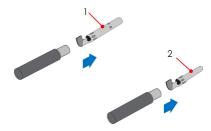
To ensure IP65 protection, use only the supplied connector.

User Manual 4 Mounting

step 1 Strip the insulation from the cable by 7 mm - 8 mm.



step 2 Assemble the cable ends with the crimping pliers.



1: Positive crimp contact

2: Negative crimp contact

step 3 Lead the cable through cable gland, and insert the crimp contact into the insulator until it snaps into place. Gently pull the cable backward to ensure firm connection. Tighten the cable gland and the insulator (torque 2.5 N•m to 3 N•m).



--End

## 4.9 Assembling the Communication Connector



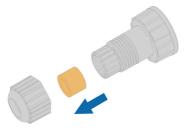
If the communication connector received is G2, please skip this step.

step 1 Unscrew the swivel nut from the connector.

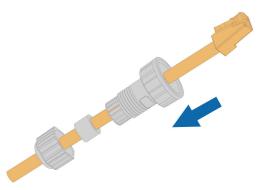
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step 2 Remove the inner rubber gasket.



step 3 Insert the RJ45 plug into the front plug connector until there is an audible click, and install the rubber gasket.



0

It is recommended that the RJ45 connector be exposed 9 - 11mm outside the communication connector.

step 4 Tighten the swivel nut.



User Manual 4 Mounting

### - - End

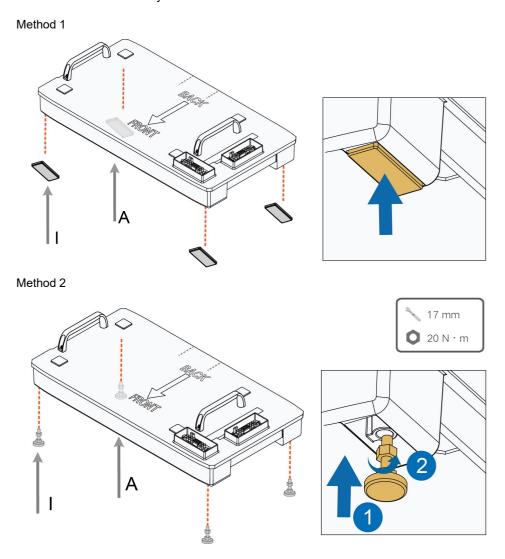
## 4.10 Installing the Battery



Assemble the battery on a flat surface.

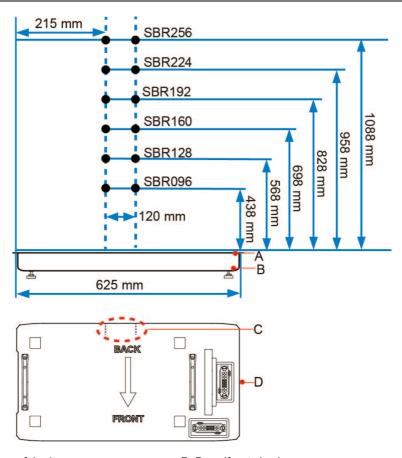
The SBR128 mounting will be used as an example.

step 1 Install the feet of the battery.



step 2 Align the base with the wall, and keep a distance of 30 mm to 45 mm between the base and the wall. Mark the hole positions of the mounting bracket with a marker according to the required layout of holes.

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A: Upper surface of the base

B: Base(front view)

C: Measurement baseline

D: Base(top view)



Mark the hole positions along a line vertical to the measurement baseline.

The feet of the base have been installed already.

step 3 Drill the holes according to the marked positions, and install the expansion sleeves.

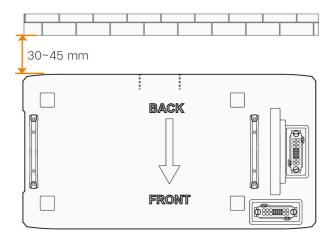


### **NOTICE**

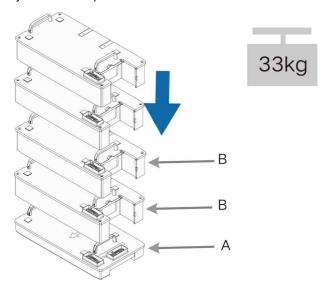
Goggles and gloves are necessary when drilling holes for protection. Shield the battery during drilling. After drilling, clean up debris in time.

step 4 Position the base maintaining the required distance from the wall.

User Manual 4 Mounting



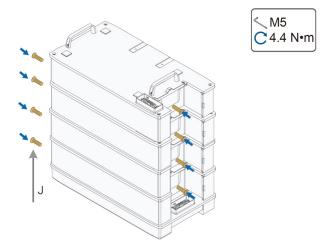
step 5 Place each battery module on top of the base.



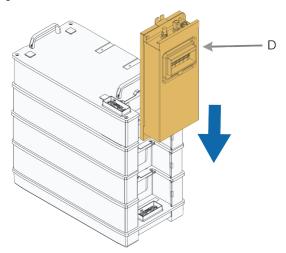
When carrying the battery module, always be aware of its weight of 33 kg.

step 6 Fix the battery modules with the included screws.

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step 7 Connect the switch gear to the base.

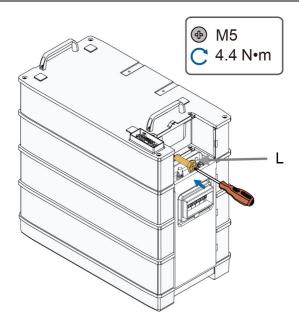


1

Ensure that the DC circuit breaker is disconnected.

step 8 Fix the switch gear with the provided M5 screw or stud.

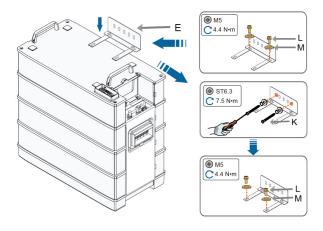
User Manual 4 Mounting



1

When 4 or more than 4 battery modules are installed in one base, M5 screw set is required to secure the switch gear. The stud is mounted on the top of battery module.

step 9 Fix the battery to the wall.



The bracket is mounted on the top battery module.

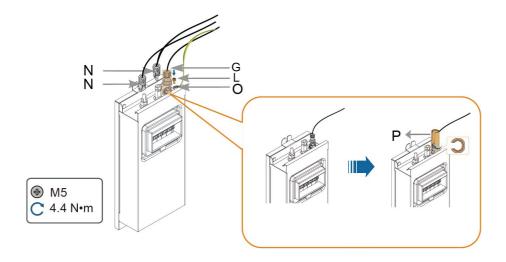


The mounting position can be fine-tuned through oval holes in the back.

Goggles and gloves are necessary when drilling holes for protection. Shield the battery during drilling. After drilling, clean up debris in time.

step 10 Connect the harness.

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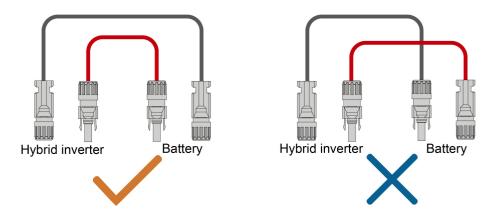
For communication between the battery and the PCS, after connecting the communication cable to the COMM port, use the communication cable fastening tool to tighten the cable clockwise. Then connect to the PCS using the other end of the communication cable. Strip the insulation layer of the communication cable with a wire stripper, and lead the corresponding CAN1\_H/CAN1\_L signal cable out. Cut off the redundant signal cable and warp it with a heat-shrink tubing. Signal cable 1 white and orange cable is used as CAN1\_H; and signal cable 2 orange cable is used as CAN1\_L.



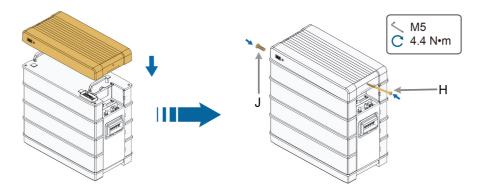
### NOTICE

Please ensure that the MC4 cable are connected to same terminals, as shown below.

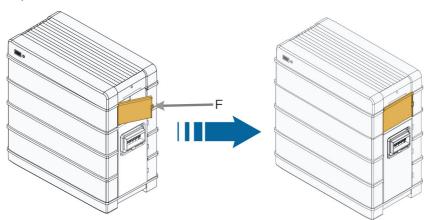
User Manual 4 Mounting



step 11 Place the top cover and fix it with the screws provided.



step 12 (Optional) Install the side covers.



1

When 4 or more than 4 battery modules are installed in one base, side covers are required.

- - End

## 5 Commissioning

### 5.1 Inspection before Commissioning

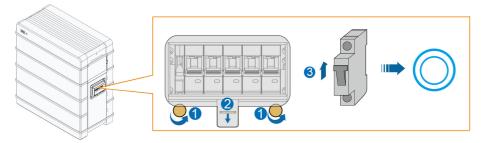
Check the following items before starting the battery:

- · Check that the battery system has been installed completely.
- Check that the appearance of the battery system is intact.
- Check that the battery system output wiring harness is correctly connected to the positive and negative terminals of the battery and PCS to avoid misconnection and reverse connection.
- If a combiner box is used, check whether the connection between the battery and the combiner box and the connection between the combiner box and the PCS is complete, and whether the positive and negative terminals are correctly connected.

### 5.2 Commissioning Procedure

If all of the items mentioned above meet the requirements, proceed as follows to start up the battery for the first time.

- step 1 Connect all the switches on the AC and DC sides of the PCS.
- step 2 Manually connect the DC breaker on the right side of the battery so that the BMS enters the self-test state. The status indicator blinks in blue. Wait until the indicator is steady on in blue, which indicates that the battery system is powered on and runs normally.



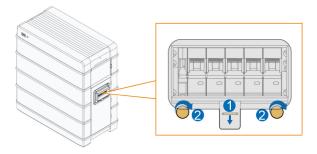
User Manual 5 Commissioning

#### Black Start:



If the communication is established for the first time between the battery and the PCS, and the PCS has no DC power supply and no AC power supply. Manually connect the DC breaker on the right side of the battery so that the BMS enters the self-test state. The status indicator blinks in blue. Ten seconds later, press and hold the status indicator for less than 2 seconds. Wait until the indicator is steady on in blue, which indicates that the battery system is powered on and runs normally.

step 3 Close the protective cover.



### - - End

### **⚠** WARNING

During commissioning, if there is a short-circuit fault in the battery system, disconnect the power cable between the switch gear and the PCS, check the battery system wiring, and eliminate the short-circuit fault point. Execute step 2, check whether there is a fault in the battery (the indicator light is red), and obtain fault information through iSolarCloud to contact SUNGROW to repair the battery system.

### 5.3 First Power-on Calibration

### **NOTICE**

The battery can only be connected to PCS produced by SUNGROW, as listed below:

- Three-phase model: SH5.0RT, SH6.0RT, SH8.0RT, SH10RT.
- Single-phase model: SH3.0RS, SH3.6RS, SH4.0RS, SH5.0RS, SH6.0RS.



Pay attention the PCS firmware version should be same that is illustrated in PCS manuals.

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When the battery works with PCS, it automatically calibrates every half year. Calibration is done automatically by batteries and PCS given that there is electricity in the grid or PV modules to charge and discharge batteries.

step 1 The battery automatically issues discharge instructions to PCS, which discharge the battery to 0% SOC at rated current.

step 2 PCS charges the battery to 100% the capacity to complete the calibration of battery capacity and SOH.

--End

### NOTICE

During calibration, the discharge cut-off function and charge-discharge current limiting function are disabled.



## 6 Decommissioning the Battery

Decommission the battery in the system after the PCS is decommissioned. Proceed as follows to decommission the battery.

- step 1 Press and hold the power button for 4 seconds until the DC breaker on the right side of the battery is disconnected.
- step 2 One minute after the DC breaker is disconnected, disconnect all cables between the battery and other devices.
  - - End



Contact SUNGROW to dispose of the battery.

### **M** WARNING

If a combiner box is used, power off the DC and AC sides of the PCS, and disconnect MCBs of all battery RACKs before operating the battery system.



## 7 Battery Augmentation

Battery charging and discharging may take a long time. So before adding new battery modules, please finish charging and discharging the battery system on site remotely referring to brief introduction of battery augmentation on the support website to avoid the installer waiting on site.

### **MARNING**

Before adding new battery modules, make sure to follow the document mentioned above to charge and discharge batteries on site by iSolarCloud App. After setting, the battery system on site will be automatically charged and discharged, so that the SOC of batteries on site will be consistent with the battery modules to be added. Otherwise, the battery system may not operate normally after the new modules are added, and the problems caused will not be covered by the warranty.

## 8 Troubleshooting and Maintenance

## 8.1 Troubleshooting

Once the battery fails, the fault information can be displayed on the App interface. If the PCS is equipped with an LCD screen, the fault information can be viewed on it. The fault codes and troubleshooting methods of all battery are detailed in the table below. The device you purchase may only contain some of the fault information, and when the battery fails, you can check the corresponding information through the fault codes from the mobile App.

Alarm ID	Alarm Name	Corrective Measures		
703, 707, 708, 711, 712, 715, 717, 732– 737, 739, 832–837, 839, 844, 864, 866– 868, 870	Battery fault	<ol> <li>In case of abnormal battery voltage, check whether the battery power cable connection is abnormal (reverse connection, loose, etc.). If so, correct it to ensure reliable connection.</li> <li>Check whether the battery real-time voltage is abnormal if the battery power cable is correctly connected. If so, contact the battery manufacturer. If not, contact SUNGROW.</li> <li>In case of abnormal battery temperature, take measures to show the ambient temperature and so improve</li> </ol>		
		ures to change the ambient temperature, such as improving heat dissipation conditions.  4. If the fault persists, contact battery manufacturer.		
932–935, 937, Battery 939, 964 alarm		Generally, the battery can automatically recover. In case the alarm persist for a long time:  1. If the alarm is caused by ambient temperature, such as over temperature alarm or low temperature alarm, take measures to change the ambient temperature, such as improving heat dissipation conditions.		
		2. If the fault persists, contact battery manufacturer.		

### 8.2 Maintenance

### NOTICE

When adding new battery modules for capacity expansion, please contact SUN-GROW and follow the instruction released by SUNGROW. Otherwise, the system performance will be affected or even cannot operate properly.

Below is the recommended maintenance cycle. The actual maintenance cycle should be adjusted according to the specific installation environment of this product.

The power station scale, installation location and on-site environment affect the maintenance cycle of this product. In sandy or dusty environments, it is necessary to shorten the maintenance cycle and increase the frequency of maintenance.

### Maintenance performed once a year

Inspection item	Inspection method		
	Check the following items. In case of nonconformity, take corrective actions immediately:		
	<ul> <li>Check the battery module and internal devices for damage or deformation.</li> </ul>		
Battery module status and cleanliness	<ul> <li>Check the internal devices for abnormal noise during operation.</li> </ul>		
	<ul> <li>Check whether the temperature inside the battery RACK is too high.</li> </ul>		
	<ul> <li>Check whether the internal humidity and dust of the battery module are within the normal ranges.</li> <li>If necessary, clean the battery module.</li> </ul>		
Warning sign	Check whether the warning sign and label are legible		
Warning sign	and dirty. If necessary, clean them.		
Wine and cable	Check whether the switch gear and PCS are con-		
Wire and cable	nected correctly.		
Corrosion	Check the battery module for internal oxidation or		
COHOSION	rust.		



## Maintenance performed once every six months

Inspection item	Inspection method		
	Check the following items. In case of nonconformity, take		
	corrective actions immediately:		
Switch gear and battery	<ul> <li>Check whether there are flammable objects around the battery module.</li> </ul>		
module	<ul> <li>Check whether the battery module is reliably fixed on the wall, and whether any fixing point is corroded.</li> </ul>		
	<ul> <li>Check the switch gear and battery module for damage, paint peeling, oxidation, etc.</li> </ul>		
	The inspection must not be carried out until all internal de-		
	vices of the battery module are powered off!		
	In case of nonconformity found in inspection, take correc-		
	tive actions immediately:		
Wire and cable layout	<ul> <li>Check the cable layout for short circuit and compliance with the specifications. If case of any abnormality, take corrective actions immediately.</li> </ul>		
	Check the battery module for internal seepage of water.		
	<ul> <li>Check whether the cables are loose, and tighten them according to the aforesaid torque.</li> </ul>		
Grounding	Check whether the grounding is correct.		
	Check whether the current, voltage and temperature in		
Function inspection	the operation record of the battery module are within the		
	operating ranges.		

### NOTICE

The battery capacity can be automatically calibrated, and it is supported only by the Sungrow PCS system.



# 9 Appendix

## 9.1 Technical Data

table 9-1 Technical parameters of high voltage LFP battery(SBR096 / SBR128 / SBR160).

Parameters	SBR096	SBR128	SBR160	
System Data				
Battery Type		LiFePO4 Prismatic Ce	ell	
Battery		3.2 kWh, 33 kg		
Module		3.2 KVVII, 33 Kg		
Energy (usa-	0.0144/5	40.01/1/1/1	40 144/15	
ble) <sup>1</sup>	9.6 kWh	12.8 kWh	16 kWh	
Nominal	400.17	050.1/	000.17	
voltage	192 V	256 V	320 V	
Operating				
voltage	150 V– 219 V	200 V– 292 V	250 V– 365 V	
Rated DC				
power	5.76 kW	7.68 kW	9.60 kW	
Max. charge/				
discharge	6.57 kW	8.76 kW	10.95 kW	
power				
Max. charging				
/ discharging				
current:		30 A		
continuous				
Max. charging				
/ discharging	42 A			
current:		1271		
Depth of				
Discharge		Max. 100% DOD(settab	oie)	
Short circuit				
current		3500 A		
Display	SOC indicator, Status indicator			
Communica-				
tion interface		CAN		
Protection				
Over / under				
voltage		Yes		
protection				

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Over current protection  Over / under temperature protection  DC breaker Yes  General Data  Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330 (W*H*D) mm mm mm  Weight 114 kg 147 kg 180 kg  Installation location  Mounting method  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling method  Warranty² 10 Years  Expansion adaptation  Over / under	Parameters	SBR096	SBR128	SBR160		
protection  Over / under temperature	Over current	Ves				
temperature protection  DC breaker  General Data  Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330 (W*H*D) mm mm mm mm  Weight 114 kg 147 kg 180 kg  Installation location  Mounting Floor stand  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity range  Max. operating altitude  Cooling Natural convection  Method Verranty² 10 Years  Expansion  Lyes 4 units in parallel ( need extra Combiner box )	protection		Yes			
DC breaker Yes  General Data  Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330  (W*H*D) mm mm mm  Weight 114 kg 147 kg 180 kg  Installation location  Mounting Floor stand  method  Operating Charge: 0 to 50°C  Degree of protection  Allowable relative humidity range  Max. operating altitude  Cooling method  Warranty² 10 Years  Expansion  Dimensions 625 * 805 * 330  625 * 805 * 330 625 * 805 * 805 * 330 625 * 805 * 805 * 805 625 * 805 * 805 * 805 625 * 805 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 805 625 * 805 * 80	Over / under					
DC breaker  General Data  Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330  (W*H*D) mm mm mm mm Weight 114 kg 147 kg 180 kg  Installation location  Mounting method Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection Allowable relative humidity range  Max. operating altitude Cooling method Warranty² 10 Years  Expansion  Description  625 * 545 * 330 625 * 675 * 330 625 * 805 * 330 625	temperature		Yes			
Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330  (W*H*D) mm mm mm  Weight 114 kg 147 kg 180 kg  Installation location  Mounting Floor stand  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling method  Warranty² 10 Years  Expansion  Weight 130 625 * 805 * 330 625 * 805 * 8	protection					
Dimensions 625 * 545 * 330 625 * 675 * 330 625 * 805 * 330  (W*H*D) mm mm mm  Weight 114 kg 147 kg 180 kg  Installation location  Mounting Floor stand  Operating Charge: 0 to 50°C  Degree of protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Max. operating altitude  Cooling method  Warranty² 10 Years  Expansion  Mm M	DC breaker		Yes			
Weight 114 kg 147 kg 180 kg  Installation location  Mounting method  Operating temperature  Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity range  Max. operating altitude  Cooling method  Natural convection  Warranty²  Light 19 to 4 units in parallel ( need extra Combiner box )	General Data					
Weight 114 kg 147 kg 180 kg  Installation Indoor / Outdoor Iocation  Mounting Floor stand  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Natural convection  Warranty² 10 Years  Expansion  Indoor / Outdoor  Indoor / Outdoo	Dimensions	625 * 545 * 330	625 * 675 * 330	625 * 805 * 330		
Installation location  Mounting method  Operating Charge: 0 to 50°C temperature Discharge: -20 to 50°C  Degree of protection Allowable relative humidity range  Max. operating altitude  Cooling method  Warranty²  Indoor / Outdoor Indoor / Outdoor  Indoor / Outdoor	(W*H*D)	mm	mm	mm		
Indoor / Outdoor  Mounting method  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection Allowable relative humidity range  Max. operating altitude  Cooling method  Warranty² Indoor / Outdoor  Floor stand  Oher sta	Weight	114 kg	147 kg	180 kg		
Mounting Mounting Method  Operating Charge: 0 to 50°C  temperature Discharge: -20 to 50°C  Degree of protection  Allowable relative humidity range  Max. operating altitude  Cooling method  Warranty²  Lip to 4 units in parallel ( need extra Combiner box )	Installation		Indon' / Outdon			
The stand	location		indoor / Outdoor			
Operating Charge: 0 to 50°C temperature Discharge: -20 to 50°C  Degree of IP55 protection IP55  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Natural convection  Warranty² 10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	Mounting	Floorestand				
temperature Discharge: -20 to 50°C  Degree of IP55  protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating 2000 m altitude  Cooling Natural convection  Warranty² 10 Years  Expansion  Discharge: -20 to 50°C  IP55  IP55  IP55  Allowable relative humidity 0% to 95% no condensing range altitude 10% to 95% no condensing range 10% to 95% no cond	method		Floor Stariu			
Degree of protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Natural convection  Warranty² 10 Years  Expansion  IP55  IP55  IP55  IP55  No condensing 2000 m  2000 m  10 Years	Operating	Charge: 0 to 50°C				
P55  protection  Allowable relative humidity 0% to 95% no condensing range  Max. operating 2000 m altitude  Cooling Natural convection method  Warranty² 10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	temperature	Discharge: -20 to 50°C				
Allowable relative humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Natural convection method  Warranty² 10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	Degree of		IDEE			
tive humidity 0% to 95% no condensing range  Max. operating altitude  Cooling Natural convection method  Warranty² 10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	protection	IPOO				
range  Max. operating altitude  Cooling method  Warranty²  To Years  Expansion  Natural convection  Natural convection  Natural convection  Up to 4 units in parallel ( need extra Combiner box )	Allowable rela-					
Max. operating altitude  Cooling method  Warranty²  10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	tive humidity	0% to 95% no condensing				
altitude  Cooling Matural convection  method  Warranty²  10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	range					
altitude  Cooling method  Warranty²  10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	Max. operating		2000 m			
Matural convection  method  Warranty²  10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	altitude	2000 m				
method  Warranty² 10 Years  Expansion  Up to 4 units in parallel ( need extra Combiner box )	Cooling		Natural convection			
Expansion Up to 4 units in parallel ( need extra Combiner box )	method	ivalural convection				
Up to 4 units in parallel ( need extra Combiner box )	Warranty <sup>2</sup>	10 Years				
adaptation	Expansion	Up to 4 units in parallel ( need extra Combiner box )				
	adaptation					

- 1: Test conditions: 25°C,100% depth of discharge (DOD), 0.2C charge and discharge.
- 2: Refer to battery warranty card for conditional application.

table 9-2 Technical parameters of high voltage LFP battery(SBR192 / SBR224 / SBR256).

Parameters	SBR192	SBR224	SBR256
System Data			
Battery Type	LiFePO4 Prismatic Cell		
Battery Module		3.2 kWh, 33 kg	
Energy (usable)1	19.2 kWh	22.4 kWh	25.6 kWh
Nominal voltage	384 V	448 V	512 V
Operating voltage	300 V – 438 V	350 V – 511 V	400 V – 584 V
Rated DC power	11.52 kW	13.44 kW	15.36 kW
Max. charge/dis-	13.14 kW	15.33 kW	17.52 kW
charge power	13.14 KVV	13.33 KW	II.JZ KVV

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Parameters	SBR192	SBR224	SBR256	
Max. charging / dis-				
charging current:		30 A		
continuous				
Max. charging / dis-		40.4		
charging current:		42 A		
Depth of Discharge	ľ	Max. 100% DOD(settabl	e)	
Short circuit current		3500 A		
Display	SC	C indicator, Status indic	cator	
Communication		CAN		
interface		CAN		
Protection				
Over / under voltage		Yes		
protection		165		
Over current		Yes		
protection		res		
Over / under tem-				
perature protection		Yes		
DC breaker		Yes		
General Data				
Dimensions	625 * 935 * 330	625 * 1065 * 330	625 * 1195 * 330	
(W*H*D)	mm	mm	mm	
Weight	213 kg	246 kg	279 kg	
Installation location		Indoor / Outdoor		
Mounting method		Floor stand		
Operating	Charge: 0 to 50°C			
temperature		Discharge: -20 to 50°C	;	
Degree of protection	IP55			
Allowable relative	0% to 95% no condensing			
humidity range				
Max. operating				
altitude	2000 m			
Cooling method	Natural convection			
Warranty <sup>2</sup>	10 Years			
Expansion	The As Asserted in a smalled ( as the Country of th			
adaptation	Up to 4 units in parallel(need extra Combiner box)			
<u>'</u>				

<sup>1:</sup> Test conditions: 25°C,100% depth of discharge (DOD), 0.2C charge and discharge.

<sup>2:</sup> Refer to battery warranty card for conditional application.

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### 9.2 Quality Assurance

When product faults occur during the warranty period, SUNGROW will provide free service or replace the product with a new one.

#### **Evidence**

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, SUNGROW has the right to refuse to honor the quality guarantee.

#### **Conditions**

- · After replacement, unqualified products shall be processed by SUNGROW.
- The customer shall give SUNGROW a reasonable period to repair the faulty device.

#### **Exclusion of Liability**

In the following circumstances, SUNGROW has the right to refuse to honor the quality quarantee:

- The free warranty period for the whole machine/components has expired.
- The device is damaged during transport.
- · The device is incorrectly installed, refitted, or used.
- The device operates in harsh conditions beyond those described in this manual.
- The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from SUNGROW.
- The fault or damage is caused by the use of non-standard or non-SUNGROW components or software.
- The installation and use range are beyond stipulations of relevant international standards.
- The damage is caused by unexpected natural factors.

For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of SUNGROW.

### 9.3 Contact Information

In case of questions about this product, please contact us.

We need the following information to provide you the best assistance:

- · Model of the device
- · Serial number of the device
- Fault code/name
- · Brief description of the problem

For detailed contact information, please visit: https://en.sungrowpower.com/contactUS.