

USER MANUAL

CBS5000-H4-H12

CBS5000-H4-H-H12-H



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CONTENT

1	About this manual	1
1.1	Copyright declaration	1
1.2	Presentation of warnings	2
1.3	Presentation of action instructions	3
1.4	Note	3
2	Basic safety information	4
2.1	Requirement for Installation and Maintenance	5
2.2	Description of safety information symbols	11
3	Product Introduction	13
3.1	Product overview	13
3.2	Product Model Description	14
3.3	Product Appearance	15
3.4	Product label	18
3.5	System capacity expansion description	19
3.6	Working Modes	20
4	Product Installation	21
4.1	Checking Before Installation	21
4.2	reparation for Installation Tools	22
4.3	Installation space	23
4.4	Battery system installation	24
5	Electrical connections	28
5.1	Preparation of Connection Cables	29

5.2	Electrical Connection for Internal System	30
5.3	External Electrical Connection	30
6	Commissioning	37
6.1	Check Before Power-On	37
6.2	Electrify for the First Time	37
6.3	Indicator lights description	37
6.4	Software Update	39
6.5	Battery Powered Off	41
7	Trouble shooting and maintenance	42
7.1	Troubleshooting	42
7.2	Daily Maintenance	45
8	Emergency Treatment	46
9	Datasheet	49

1 About this manual

This Installation and user manual (hereinafter referred to as the manual) describes the installation, electrical connection, commissioning, maintenance and fault elimination procedures of following products:

CBS5000-H4-H12, CBS55000-H4-H-H12-H

- ▶ Carefully read this manual before use!
- ▶ Treat this manual as an integral component of the device.
- ▶ Keep this manual in close proximity to the device, including when it is handed over to another user or moved to a different location.

This manual contains important safety information on installation, operation and maintenance of the device.

- ▶ Read and observe all given safety information.

The products, services or features you purchased shall be subject to the company's commercial contracts and terms. All or part of the products and services described in this document may not within the scope of your purchase. Unless additional terms and conditions in your contract, the company does not make any statement or guarantee on the contents of this document.

1.1 Copyright declaration

The copyright of this manual is owned by SOFAR. It may not be copied – neither partially nor completely – by companies or individuals (including software, etc.) and must not be reproduced or distributed in any form, or with the appropriate means.

SOFAR reserves the right to final interpretation. This manual may be amended following feedback from users or customers.

Consult our website at: <https://www.SOFAR.com> for the latest version.

1.2 Presentation of warnings

This manual contains information on safe operation and uses symbols to ensure the safety of persons and property as well as the efficient operation of the inverter.

- Read through the following symbol explanations carefully in order to prevent injury or property damage.

1.2.1 Warnsymbol

	The general danger symbol warns of risk of serious injury when used with the signal words CAUTION, WARNING, and DANGER.
---	--

1.2.2 Signalwords

DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a danger that results in damage to or destruction of the inverter.

1.2.3 Sectional warnings

Sectional warnings refer to a complete section and are structured as follows:

 WARNING
Type and source of danger Consequences for non observance ► Avoiding the danger

1.2.4 Embedded warnings

Embedded warnings are part of an action sequence and are placed right before the dangerous step.

WARNING Combination of type/source of danger, consequences for non observance and avoiding the danger.

1.3 Presentation of action instructions

This table shows the sequence of Action steps:

Symbol	Function
✓	This describes an action requirement
1. 2. 3.	This is the sequence of action steps that must be followed step by step
▶	This is a single action step
↩	This describes the result of the action

1.4 Note

Notes are presented in a grey bar.

- ▶ Provides tips essential to the optimal operation of the product.

2 Basic safety information



- ▶ If you have any questions or problems after reading the following information, please contact SOFAR

Please read the instruction carefully. Faulty operation may cause serious injury or death.



DANGER

High voltage of battery may be harmful to health!

- ▶ Only certified engineer can operate the product; Juveniles, Disable, should not use this product;
- ▶ Keep this product out of the reach of children;



CAUTION

Caution of burn injuries due to hot enclosure!

- ▶ Only touch the screen and pressing key of the product while it is working.

NOTICE

Implement earthing!

- ▶ Batteries should be grounded in accordance to the requirements of the local electrical grid company.

**WARNING****Damage due to overvoltage**

- ▶ To ensure that the battery is used in the equipment system authorized by SOFAR, and the battery is damaged or other losses caused by illegal use or unauthorized use of the equipment by SOFAR. SOFAR has the right not to do warranty, not to bear joint liability.

- ▶ If you have any questions or problems after reading the following information, please contact SOFAR

2.1 Requirement for Installation and Maintenance

The installation of CBS5000 series intelligent battery system must be in full compliance with national and local laws and regulations.

Read and understand all instructions contained in this manual and familiarize yourself with safety symbols before installing and commissioning the device.

For any maintenance or repair, please contact the nearest authorized repair center. For information about the nearest authorization center, contact your reseller. Do not repair by yourself, which may cause personal injury or property injury.

Before installing and maintaining the device, disconnect the device from the external device using the DC switch. Otherwise, the high voltage may cause serious injury.

SOFAR will not be responsible for any personal injury or property injury caused by improper use.

2.1.1 Installation And Maintenance Personnel Requirements

The personnel responsible for installation and maintenance of the equipment for the first voyage must first receive strict training, understand various safety precautions and master correct operation methods.

- ▶ Only qualified professionals or trained personnel are allowed to install, operate, and maintain the device.
- ▶ Only qualified professionals are allowed to remove safety facilities and repair devices.
- ▶ The personnel, including the operators, trained personnel, and professional personnel, who operate the equipment should have the special operation qualification required by the local state, such as the qualification of high voltage operation, height climbing, and special equipment operation.
- ▶ Only professional or authorized personnel can replace equipment or components (including software).
- ▶ Only personnel who need to work on the equipment are allowed to access the equipment.

Voiding of guarantee

- ▶ Professional personnel: those who have the training or operation experience of equipment and are able to understand the potential sources and magnitude of hazards in the process of equipment installation, operation and maintenance.
- ▶ Trained personnel: personnel who have received the appropriate technical training and have the necessary experience are aware of the risks that may be posed to them in performing a certain operation and can take measures to minimize the risks to themselves or other personnel.
- ▶ Operators: operators who may have access to the equipment except trained and professional personnel.

2.1.2 Assembly Condition

Assemble the CBS5000 intelligent battery system as detailed in the following sections of this manual. Place the battery in a position that can be fixed on the edge and ensure that it is placed vertically. A suitable place for installation of electrical equipment should be selected to ensure sufficient space for fire escape for maintenance in case of failure. Maintain proper ventilation to ensure adequate air circulation for cooling, and air humidity is recommended to be less than <90% during assembly.

2.1.3 Transport Requirements

The Batteries are in the good electrical and physical condition when it ship out from factory. During transport, battery module must be placed in its original package or other proper package. Transportation company should responsible for any damage during transport period. Please check the battery thoroughly when taking delivery. If you find any packing problems that may cause the damage of battery or any visible damage, please notice the responsible transportation company immediately. You can ask your installer or SOFAR for help is necessary.

This product contains battery module through UN38.3, belongs to the ninth category of dangerous goods. Therefore, loading and unloading must comply with local laws and regulations and industry standards during transportation. Rough loading and unloading may cause short circuit or damage to batteries in containers, which may result in battery leakage, breakage, explosion, or fire. Requirement during the transportation:

- ▶ Shipping complies with the IMDG CODE and the International Maritime Dangerous Goods CODE.
- ▶ For land transportation, comply with ADR or JT T617 shipping requirements
- ▶ Meet the regulatory requirements of the transport regulatory authorities of the country of origin, route and destination.
- ▶ Comply with international regulations for the transport of dangerous goods and the supervision requirements of the corresponding national transport regulatory authorities.

2.1.4 Battery Module Storage Requirements

- ▶ Environment temperature: -10 °C ~45 °C , Recommended storage temperature: 25°C~35°C.
- ▶ Storage relative humidity range: 5%~70%.
- ▶ Store in a dry, clean, and ventilated environment, away from direct sunlight.
- ▶ When storing the battery module, place it correctly. Do not put the battery module upside down or on its side.
- ▶ If the battery module is stored for a long time, replenish the power supply periodically.

2.1.5 Environmental Requirements

Before installation, determine the proper position for installing the CBS5000 series intelligent battery system.

The following requirements must be met:

- ▶ The installation and usage environment must meet relevant International, national, and local standards for lithium batteries, and are in accordance with the local laws and regulations. The user is obliged to protect CBS5000 against fire or other hazards.
- ▶ Keep the ESS out of the reach of children and away from daily working or living areas, including but not limited to the following areas: studio, bedroom, lounge, living room, music room, kitchen, study, game room, home theater, sunroom, toilet, bathroom, laundry, and attic.
- ▶ Install the ESS in a sheltered place or install an awning over it to avoid direct sunlight or rain.
- ▶ Choose a dry, clean, neat and convenient location for installation.
- ▶ Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- ▶ Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- ▶ Ensure that the site complies with local laws, regulations, and related standards.

- ▶ Machine ambient temperature: $-20^{\circ}\text{C}\sim 50^{\circ}\text{C}$.
- ▶ Relative humidity: 5-95% (non-condensing).
- ▶ The product should be placed in a well-ventilated place.
- ▶ There are no inflammable and explosive objects near the installation position of the product.
- ▶ The highest altitude of the installation environment is 4000m.

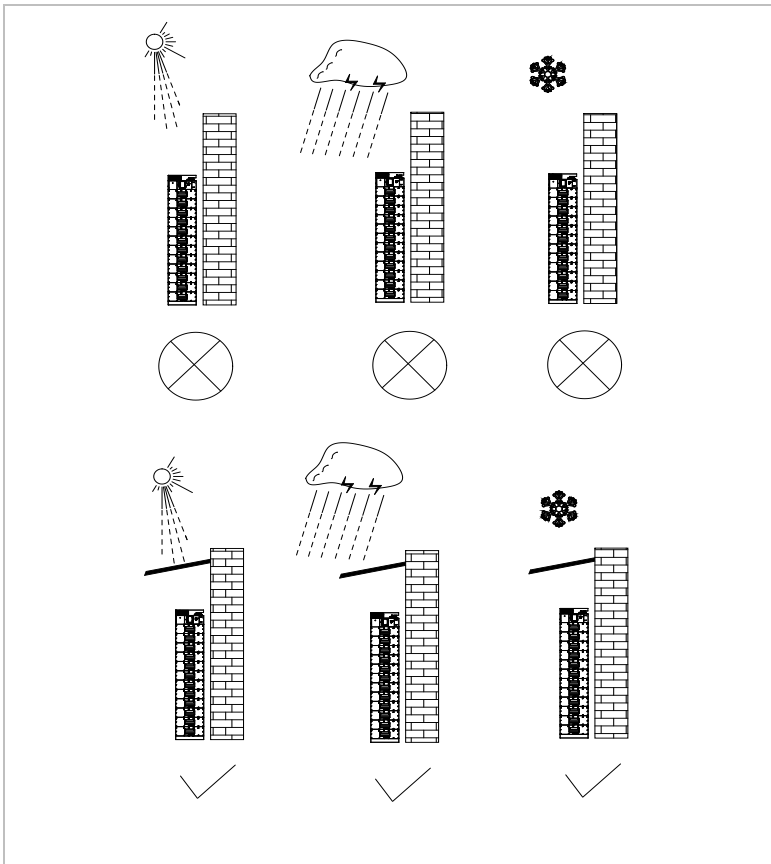


Figure 2-1 Installation Environment Diagram

2.1.6 Battery Charge

Recharge Requirements During Normal Storage

When the battery is stored for a long time, you need to perform regular maintenance. If the storage time is close to that shown in the following table, arrange supplementary power supply in time.

Table 2-1 Recharge conditions when in storage

Storage Environment Temperature	Relative Humidity of Storage Environment	Storage Time	SOC
< -10℃	/	Prohibited	/
-10℃ ~ 45℃	5%~70%	≤24 months	30%≤SOC≤60%
> 45℃	/	Prohibited	/

Recharge Requirements When Over Discharged

Recharge the battery within the time range specified in the following table (90%DOD). Otherwise, the over discharged battery module will be damaged.

Table 2-2 Recharge conditions when battery is over discharged

Storage Environment Temperature	Storage Time	SOC
-10℃ ~ 25℃	≤15 days	/
25℃ ~ 45℃	≤7 days	30%≤SOC≤60%
-10℃ ~ 45℃	≤12 hours	/

2.2 Description of safety information symbols

2.2.1 Symbols on the battery module

The battery module carries a number of safety related labels. Make sure to read and understand the labels carefully before installing the device.

Symbol	Name	Description
	Danger	Please pay attention to the following dangerous situations when using this product.
	Caution of high voltage and electric shock	The battery module operates at high voltages. Prior to performing any work on the product, disconnect the product from voltage sources. All work on the product must be carried out by qualified persons only.
	Caution of hot surface	The battery module can get hot during operation. Avoid contact during operation.
	Inflammable Materials	The battery module is flammable, please place it in a safe area.
	Presence of toxic substances or hazardous chemicals	The battery module is a hazardous chemical. If there is a leakage of the battery, the electrolyte is a toxic substance. Please pay attention to safety.
	No children will be admitted	out of reach of children to avoid high voltage hazards.
	Do Not Extinguish With Water	Do not use water directly to extinguish fires. Please contact firefighters as soon as possible.
	No fire	Keep the CBS5000 away from fire and heat sources.
	Grounding Terminal	Connect the battery module to the ground bar for grounding protection.
	Observe the documentation	Read all documentation supplied with the product before install.

2.2.2 Symbols on the battery control unit

The battery distribution unit carries a number of safety related labels. Make sure to read and understand the labels carefully before installing the device.

Symbol	Name	Description
	This is a residual voltage in the battery module!	There is a high voltage, when the battery is powered on. After the battery is powered off, the internal capacitor is still charged, operator should wait for 5 minutes to ensure the capacitor is completely discharged.
	Caution of high voltage and electric shock	The battery module operates at high voltages. Prior to performing any work on the product, disconnect the product from voltage sources. All work on the product must be carried out by qualified persons only.
	Caution of hot surface	The battery module can get hot during operation. Avoid contact during operation.
	Grounding Terminal	Connect the battery module to the ground bar for grounding protection.
	Observe the documentation	Read all documentation supplied with the product before install.

3 Product Introduction

3.1 Product overview

CBS5000 series intelligent battery system is mainly composed of battery module and battery control unit. The input and output voltages are high DC voltage. The system adopts modular design and stacked installation method. The capacity can be flexibly configured based on actual requirements. The capacity ranges are 20.48kWh ~ 61.44kWh.

The main features are as follows:

- ▶ Full modular design, easy to install and transport.
- ▶ Current balance between battery modules, higher battery available capacity.
- ▶ Capacity expansion by Stages.
- ▶ Low power consumption of battery.
- ▶ One key activate/shutdown.

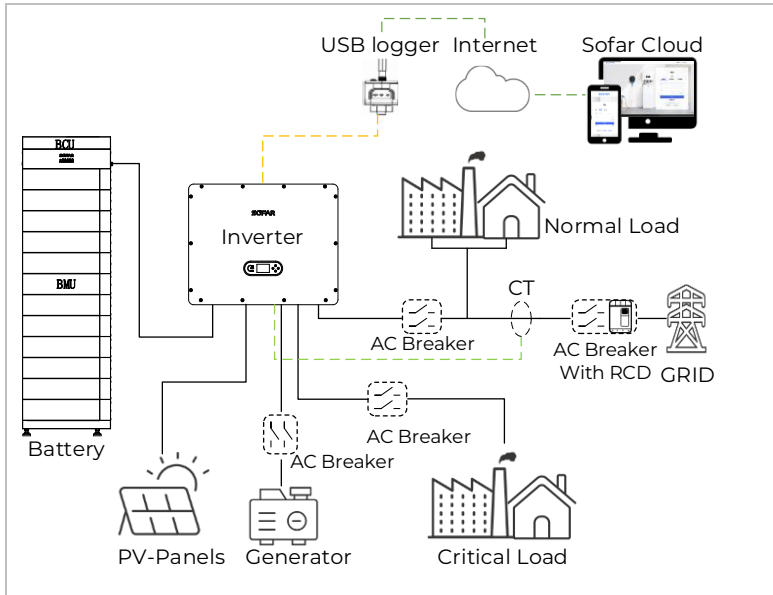


Figure 3-1 CBS5000 series application principle diagram

3.2 Product Model Description

3.2.1 Battery module

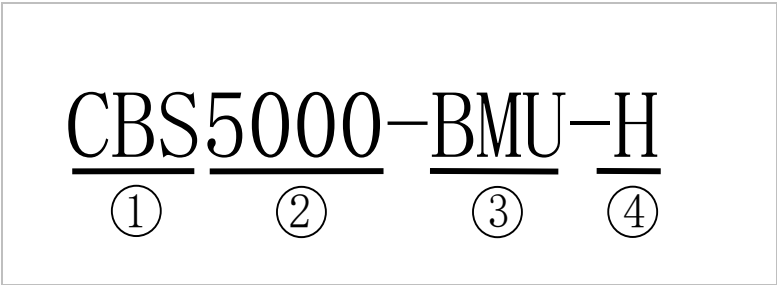


Figure 3-2 Battery module model identifiers

Table 3-1 Battery module model demonstration

Identifiers	Meaning	Specification
①	Product series name	SOFAR CBS series battery module name
②	Battery module energy grade	5000: Battery module nominal energy is 5.12kWh
③	Battery module name	BMU
④	Heating function	H: with heating function

3.2.2 Battery power distribution unit

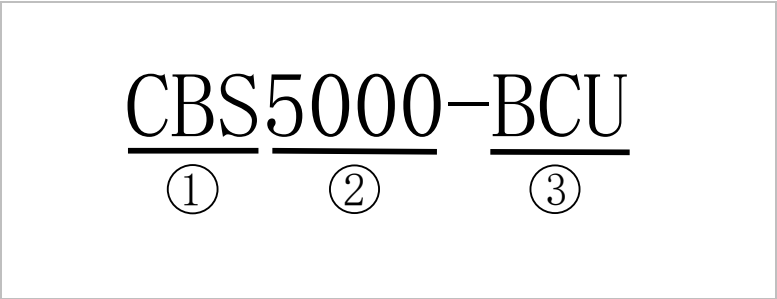


Figure 3-3 Battery control unit model identifiers

Table 3-2 Battery control unit model demonstration

Identifiers	Meaning	Specification
①	Product series name	SOFAR CBS series battery module name
②	Battery module energy grade	5000: Battery module nominal energy is 5.12kWh
③	Power conversion unit name	BCU

3.3 Product Appearance

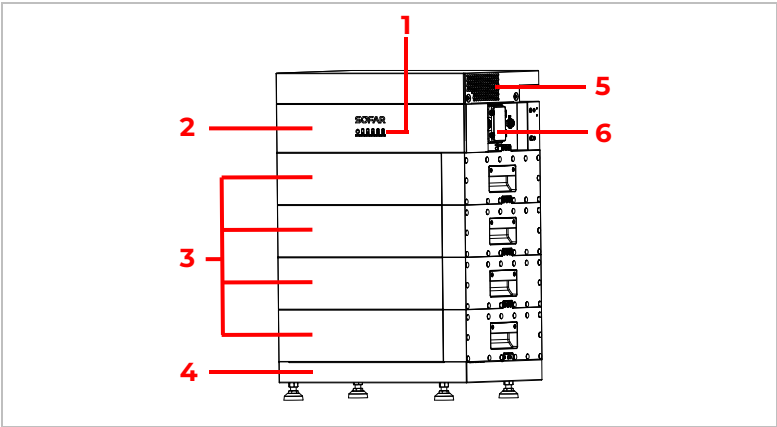


Figure 3-4 System appearance diagram

Table 3-3 System appearance diagram

No	Definition	No	Definition
1	Indicator light	4	Base
2	Battery control unit	5	Upper cover
3	Battery module	6	Circuit breaker

Battery control unit:

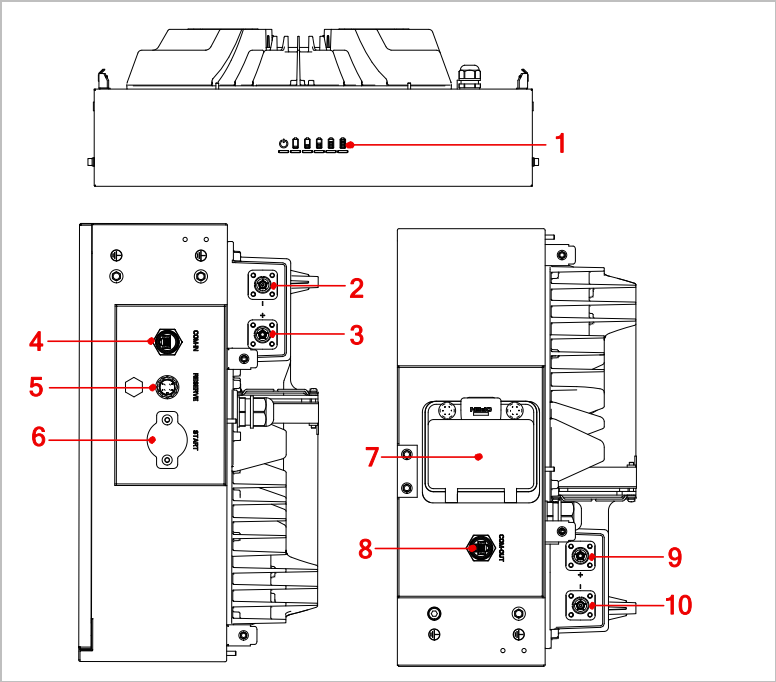


Figure 3-5 Schematic diagram of battery control unit ports

Table 3-5 Interface definition of battery control unit

No	Definition	No	Definition
1	Battery control unit	6	Black start switch
2	Input terminals P-	7	Circuit breaker
3	Input terminals P+	8	Communication connection COM-OUT
4	Communication connection COM-IN	9	Input terminals P+
5	Reserve terminals	10	Input terminals P-

Battery module

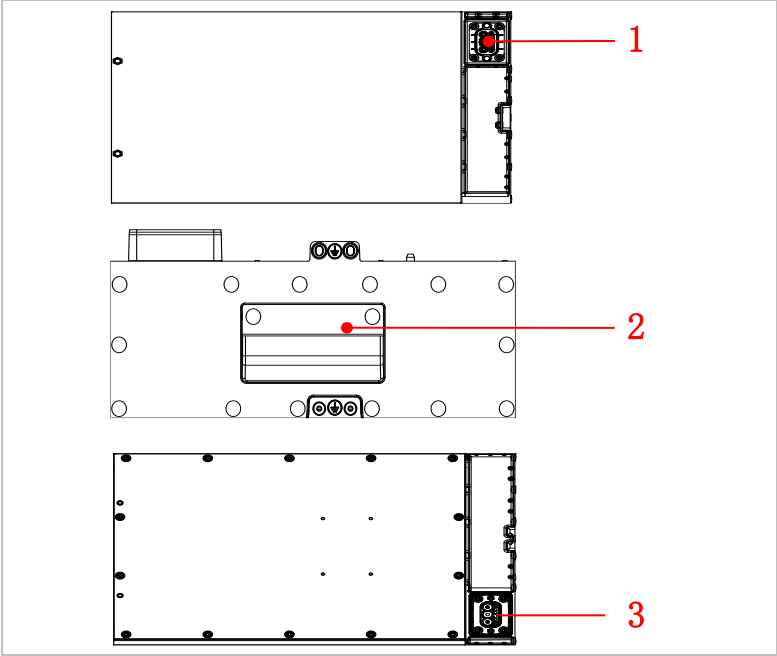


Figure 3-6 Battery module port diagram

Table 3-4 Battery module interface definition

No	Definition	No	Definition
1	Stacked terminals	3	Stacked terminals(top)
2	Handle		

3.4 Product label

Battery control unit:



Figure 3-7 Battery control unit label

Battery module:

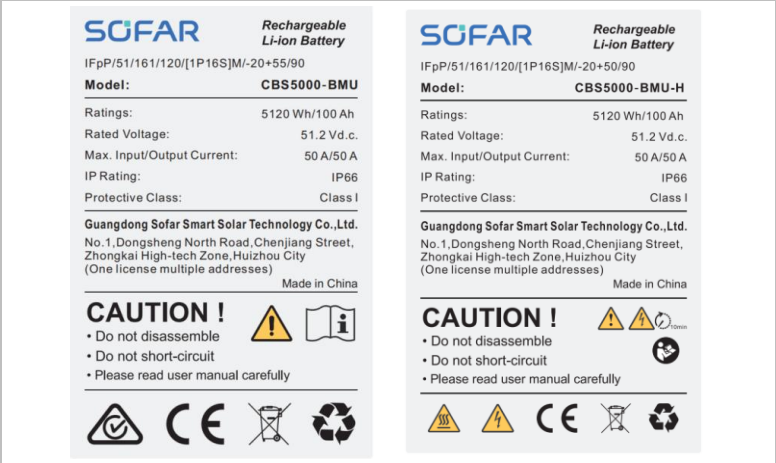


Figure 3-8 Battery module label

► The picture is for reference only, please refer to the actual product.

3.5 System capacity expansion description

The CBS5000 series intelligent battery system supports capacity expansion. Up to 12 battery modules are managed by one BCU and supports up to 4 BCU in a communication network. The expandable capacity of the single-cluster battery system ranges from 20.48kWh ~ 61.44kWh.

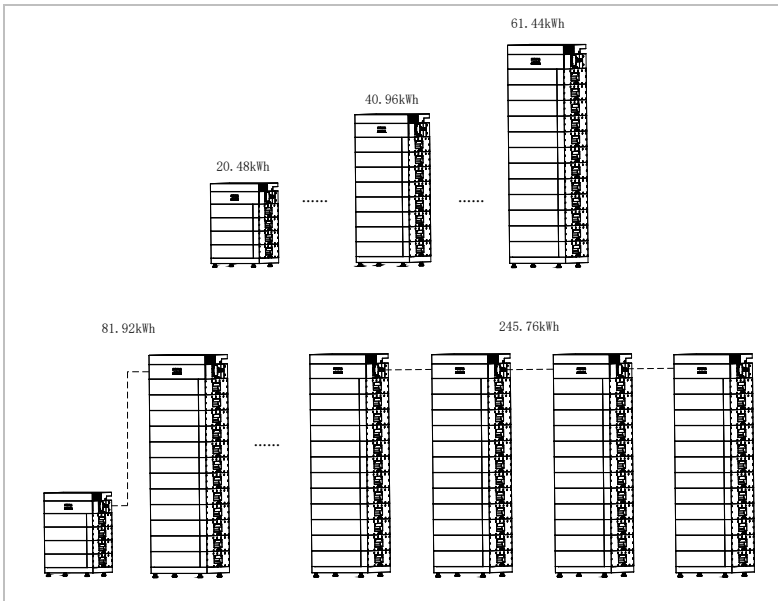


Figure 3-9 Schematic diagram of system capacity expansion

3.6 Working Modes

CBS5000 converts high-voltage DC power generated by PV strings to low voltage DC power and stores the low-voltage DC power in the Energy Storage Module. CBS5000 also converts low-voltage DC power from the Energy Storage Module to high-voltage DC power which is then converted to AC power through the inverter.

CBS5000 works in hibernation, standby, or operating mode.

Table 3-5 Working modes

Working Modes	Description
Hibernation mode	CBS5000's internal auxiliary power source and the power unit do not work.
Loss reduction mode	CBS5000 internal auxiliary power supply operates at extremely low loss, but the power unit does not work.
Standby mode	CBS5000's internal auxiliary power source works, but the power unit does not work.
Operating mode	CBS5000's internal auxiliary power source works, and the power unit charges or discharges

4 Product Installation

Announcement

 DANGER
Fire hazard ▶ Do not install batteries on flammable materials. ▶ Do not install batteries in places where flammable or explosive materials are stored.

 CAUTION
Burning hazard ▶ The enclosures and fins are very hot when battery modules is operated, so do not install battery systems where you may inadvertently come into contact with them.

NOTICE
Weight of the device ▶ Consider the weight of the battery module when transporting and moving it. Select suitable mounting position and surface. At least two persons are required to install battery modules.

4.1 Checking Before Installation

Checking Outer Packing Materials

Packing materials and parts can be damaged in transit. Therefore, check the packing materials of battery modules and BCU before installing them. Check whether the outer packing materials are damaged, such as holes and cracks. If any damage is found, please do not open the package and contact the distributor as soon as possible. It is recommended that you remove packing materials within 24 hours before installation.

Checking packing list

After the battery modules and BCU are unpacked, check whether the packaging and accessories are intact. If any damage is found or any components are missing, contact the distributor.

- Please check the assembly list in the box.

4.2 reparation for Installation Tools

Prepare tools for installation and electrical connections.

Table 4-1 Prepare tools for installation and electrical connections.

No.	Tool	Model	Function
1		Hammer drill Recommend Drill @ $\Phi 8\text{mm}$	Used to drill holes on the wall.
2		4mm Screwdriver	Remove and install screws and wires
3		Allen driver	Remove and install screws
4		Sleeve	Install Fixed support rack
5		Wire stripper	Used to peel cable
6		Crimping tools	Used to crimp OT connector
7		Multi meter	Check whether the cable connection is correct, the positive and negative terminals of the battery are correct, and the grounding is reliable
8		Marker	Mark signs

No.	Tool	Model	Function
9		Measuring tape	Measure distance
10		Level	Ensure the rear panel is properly installed
11		ESD gloves	Installer wear when installing product
12		Safety goggles	Installer wear when drill holes
13		Mask	Installer wear when drill holes

4.3 Installation space

To ensure sufficient space for installation and heat dissipation, reserve enough space around the CBS5000 series battery system. The requirements are as follows:

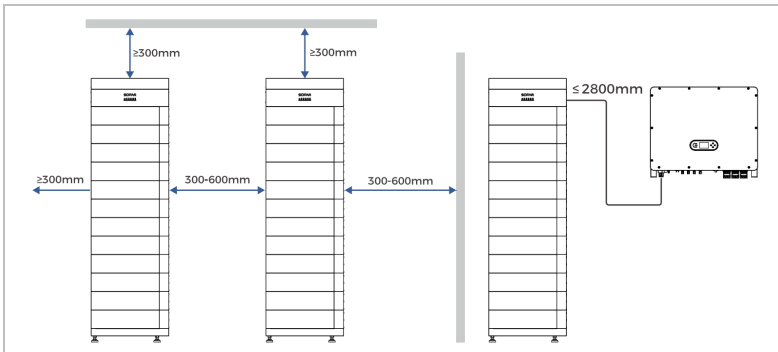


Figure 4-1 Installation space diagram

4.4 Battery system installation

4.4.1 Installation dimensions diagram

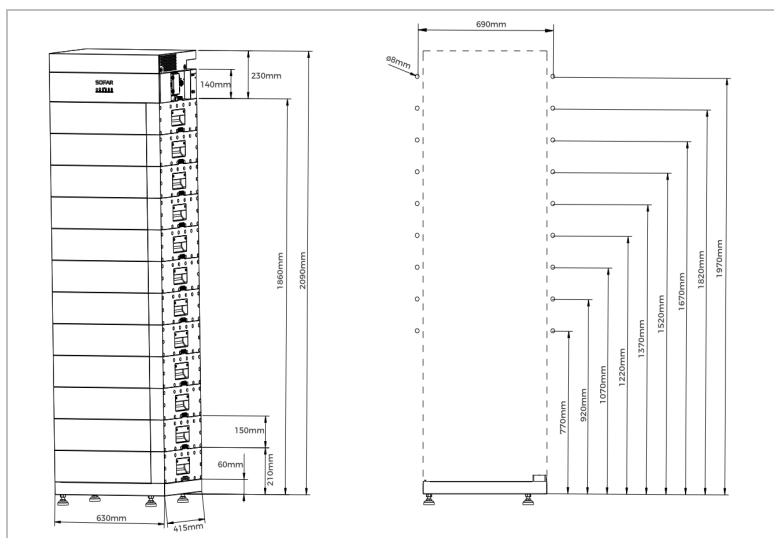


Figure 4-2 System installation dimensions diagram

4.4.2 Base installation

Procedure:

1. Please install the four support feet on the back of the base.
2. Remove the installation cardboard and place it on the base as shown in Figure 3-4.
3. Please fold the cardboard tightly against the wall and adjust the base according to this position. At this point, the base should be 45mm away from the wall.

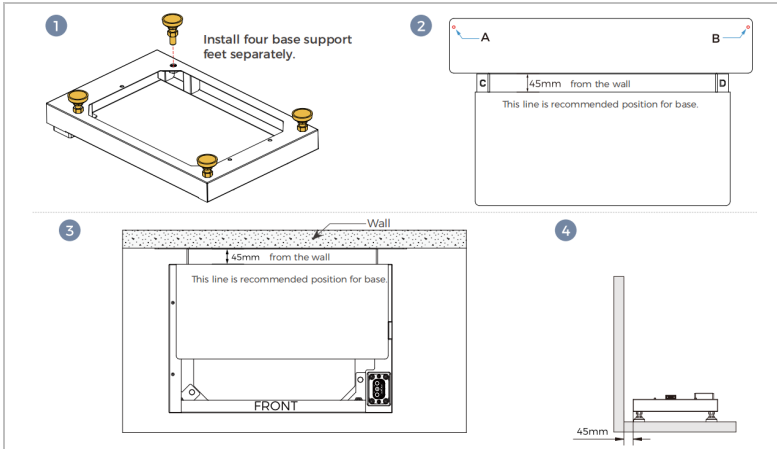


Figure 4-3 base installation diagram

4.4.3 Fixed installation between module

Procedure:

1. Place the first battery module on the base.
2. Tighten the two screws at the right connection with a screwdriver.
3. Remove the protective cover and transparent sticker from the battery stack terminal.
4. Install the remaining battery modules and BCU from bottom to top. (Before installing the next module, ensure that the screws on the right connection of the previous module are securely installed.)
5. Place the installation cardboard flat on the BMU, with the right edge of B tightly attached to C and A tightly attached to the wall.
6. Drill holes according to positions A and B, and install wall mounted fixing plates ($\varnothing$ 8mm, depth range 60-65 mm). Reposition and drill the holes, if the original one has a large deviation.

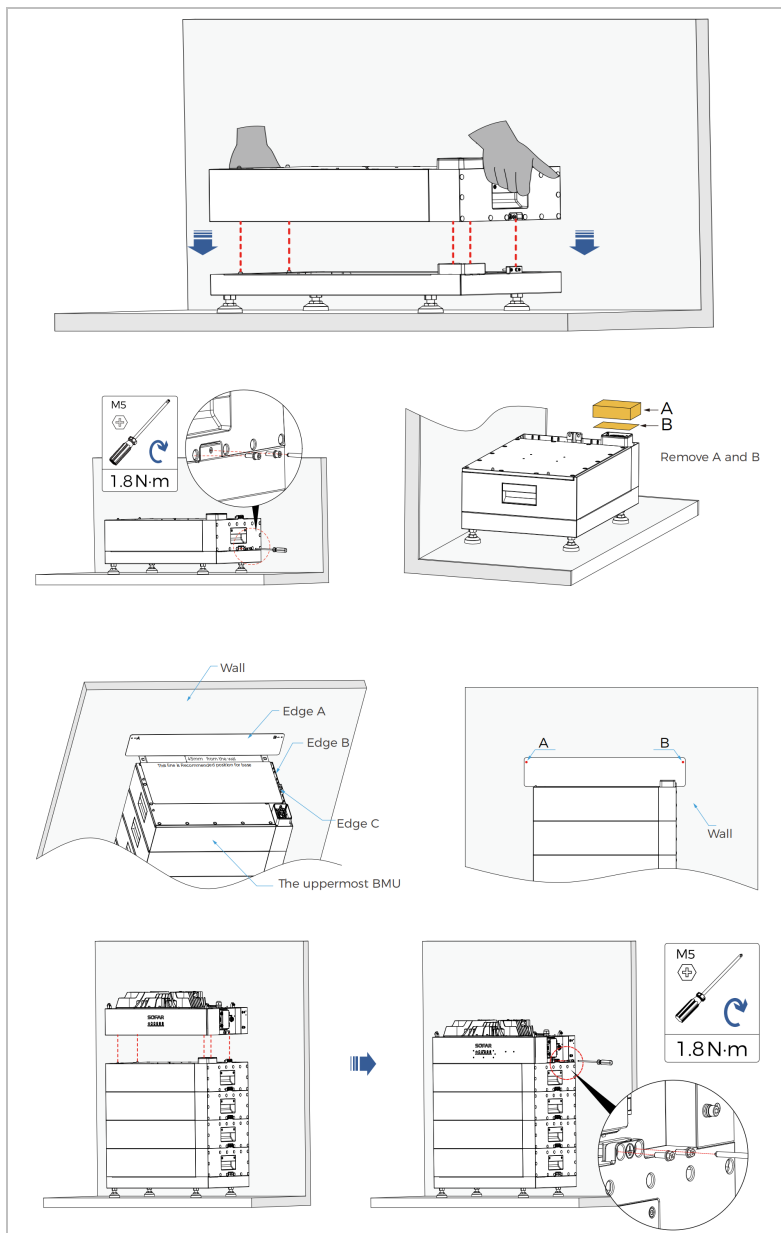


Figure 4-4 Battery module installation diagram

4.4.4 Anti-tip bracket installation

Procedure:

1. Install the anti-tip bracket on the wall, and fasten expansion bolt.
2. Adjust the anti-tilt bracket to ensure that the hole position between the anti-tilt bracket and the BCU fixing plate matches. Use screws to connect the anti-roll bracket and BCU fixing plate together.

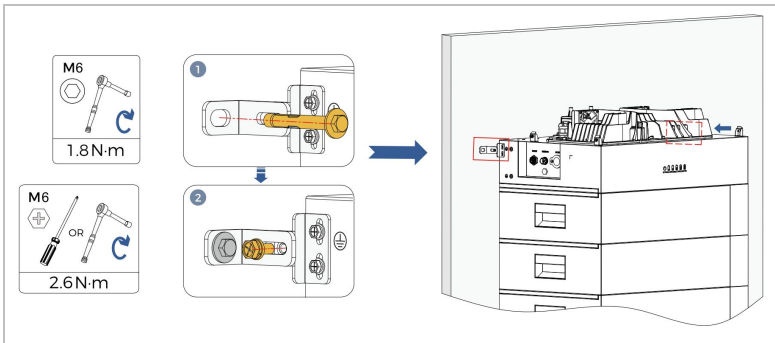


Figure 4-5 Schematic diagram of wall fixing installation

5 Electrical connections

This product is used for battery energy storage PV system. Equipment can be damaged if not used as intended.

NOTICE

- ▶ Only professional electrical engineers can install and maintain batteries.
- ▶ When making electrical connections, wear rubber gloves and protective clothing.
- ▶ When connecting the device electrically, you must first connect the protection ground cable. When removing a device, ensure that the PGND cable is removed at last.



DANGER

- ▶ · Before electrical connection, ensure that the DC switch of the BCU is OFF, the LED indicator is OFF.
- ▶ The equipment damage caused by operator's wrong wiring is not covered by the product warranty.

5.1 Preparation of Connection Cables

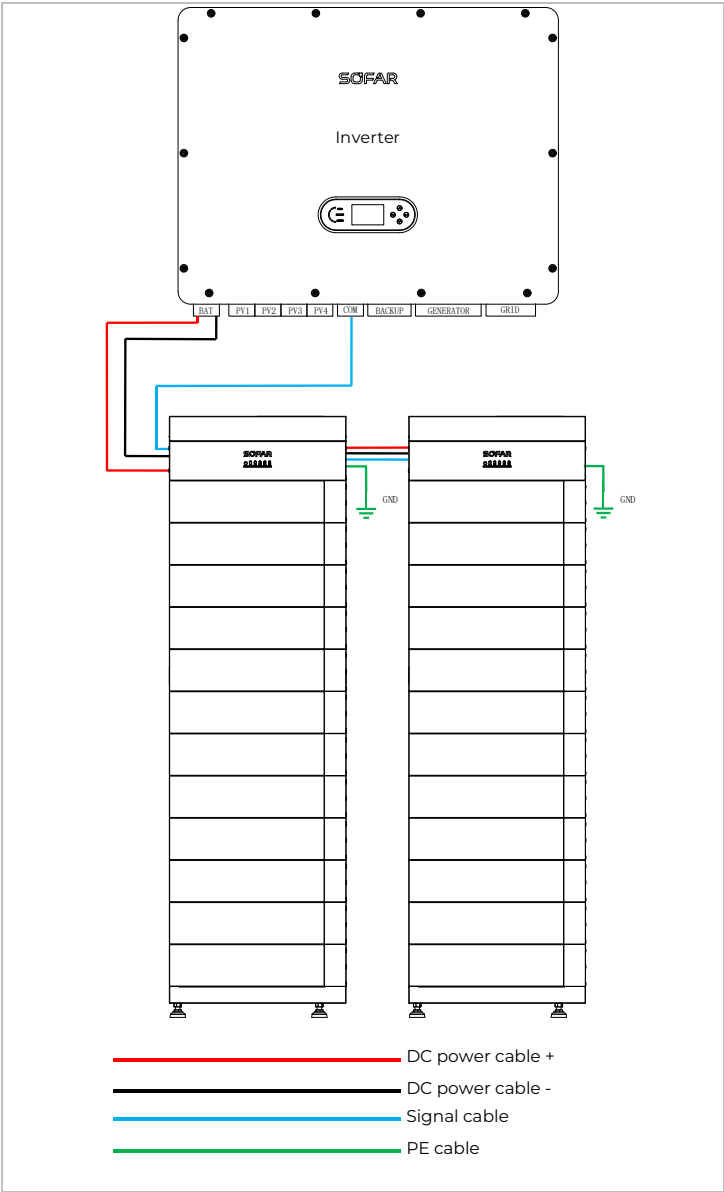


Figure 5-1 Cable connection

5.2 Electrical Connection for Internal System

As shown in Figure 4-3, connect the grounding points between the battery, BCU, and base with screws to ensure reliable connection.

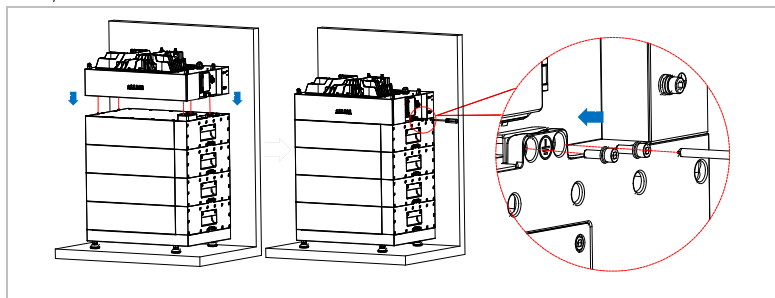


Figure 5-2 Installation diagram of grounding point

5.3 External Electrical Connection

5.3.1 External Electrical Connection

The following is an example of the SOFAR storage inverter HYD-29.9/30/40/49.9/50/60K-TI.

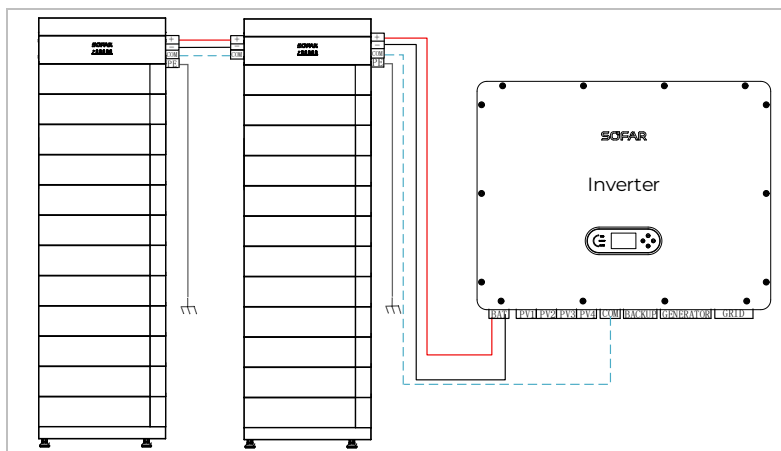


Figure 5-3 System Connection Diagram

5.3.2 External ground Connection of the PGND cable

As shown in Figure 4-4, install a protection ground cable at the ground terminal on the right of the BCU and connect it to the external ground protection point.

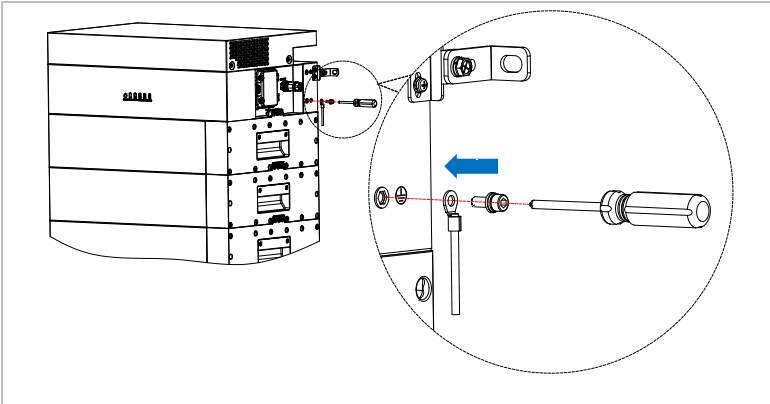
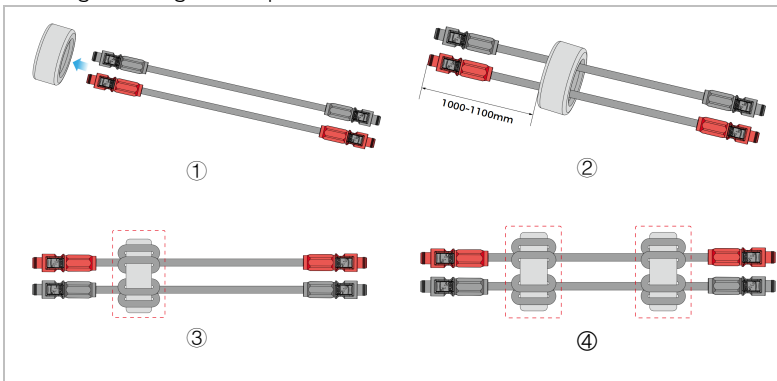


Figure 5-4 Installation diagram of the protection ground cable

5.3.3 Installation of magnetic rings on the wiring harness

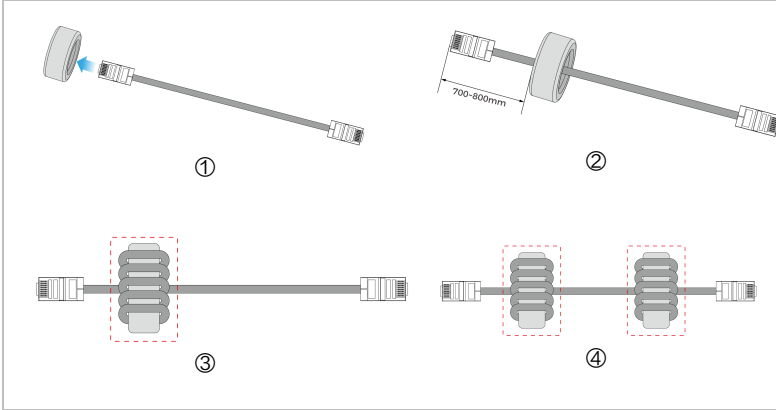
► Power line

1. Thread the wire harness through the magnetic ring and wrap it twice after passing through the magnetic ring;
2. After installing the magnetic rings on both ends of the wire harness, fix the magnetic rings with zip ties.



► **COM cable**

1. Thread the wire harness through the magnetic ring and wrap it 5 times after passing through the magnetic ring;
2. After installing the magnetic rings on both ends of the wire harness, fix the magnetic rings with zip ties.



5.3.4 DC power cable installation

Procedure:

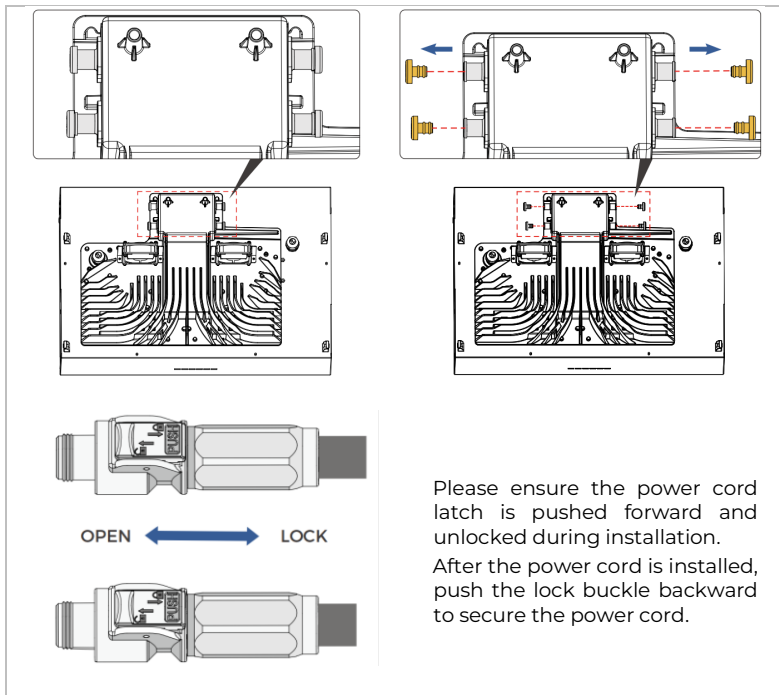
Before installing the power cord, please unplug the dust plug at the terminal first.

Connect the DC terminal connector to the +/- input terminal on the battery control unit, and connect the other end to the inverter side. Ensure that the connection is secure.

The CBS series battery supports expansion up to four battery clusters. Power cables are connected to the inverter through the BCU, as shown in Figure 4-6 (Taking two clusters of batteries as an example.) .

Notice during installation:

- ▶ Before assembling the DC connector, ensure that the polarity of the cable is correct.
- ▶ Before assembling the DC connector, ensure that the polarity of the cable is correct.
- ▶ If only one cluster of batteries is connected, please remove the two dust plugs on one side to connect the wiring harness.
- ▶ If two clusters of batteries need to be connected in parallel, please remove the four dust plugs from both sides.
- ▶ If the port is not connected to the wiring harness, please make sure to securely plug in the dust plug.



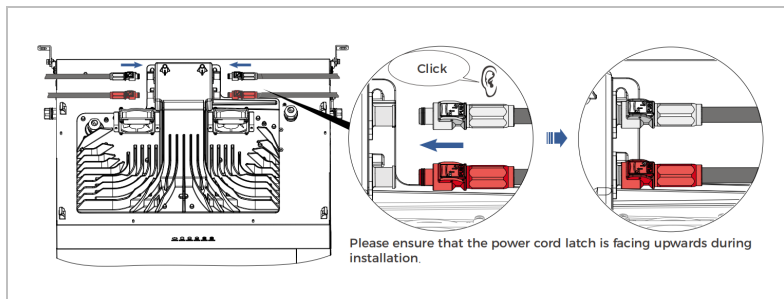


Figure 5-5 Battery power cable Installation diagram

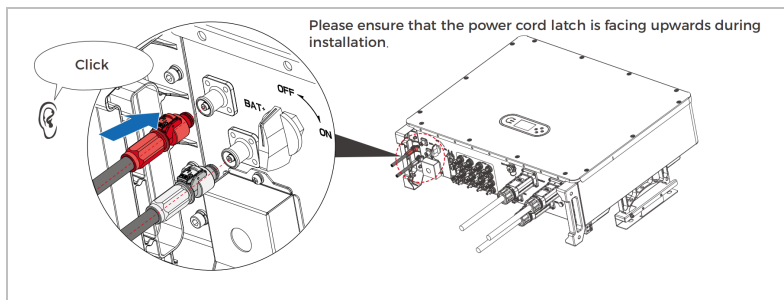


Figure 5-6 Inverter power cable Installation diagram

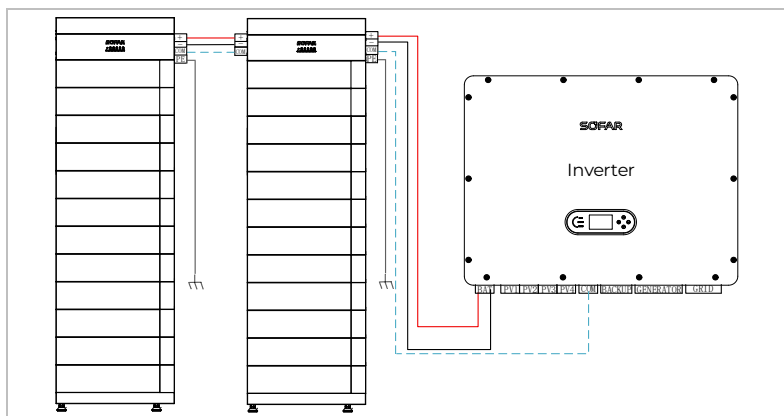


Figure 5-7 Diagram of battery parallel installation

5.3.5 BMS communication cable installation

Install the communication cable delivered with the accessories to the COM port of the battery control unit, and connect the other end to the BMS COM ports of the inverter according to the label definition.

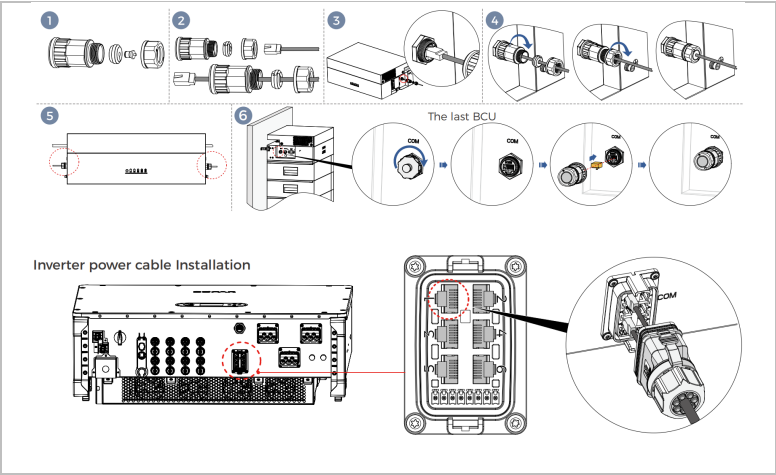


Figure 5-8 BMS diagram of communication connection cable installation

The COM port pins of the battery control unit(BCU) are defined as follows:

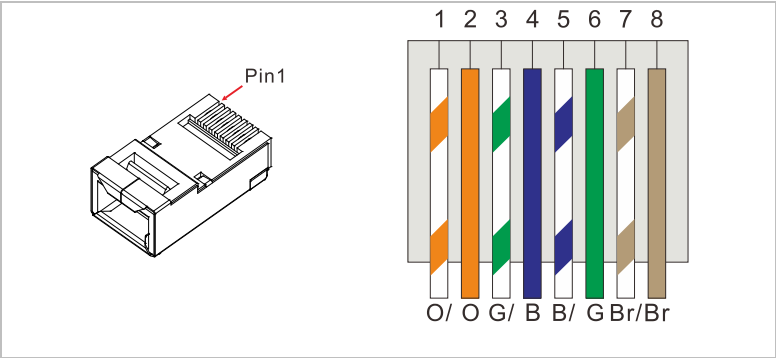


Figure 5-9 COM port pin definition for battery control unit

Table 5-1 Communication cable pin definition

Pin	Wire color	Definition
PIN1	Orange White	
PIN2	Orange	
PIN3	Green White	CAN1 H
PIN4	Blue	CAN2-H
PIN5	Blue White	CAN2-L
PIN6	Green	CAN1 L
PIN7	Brown White	RES+
PIN8	Brown	RES-

6 Commissioning

6.1 Check Before Power-On

Please double check the following items before running:

- ▶ Each battery module, BCU, and screw on the right side of the base are securely connected.
- ▶ The Circuit breaker of the BCU is OFF.
- ▶ Ensure that the communication cable is securely connected to the power cord.
- ▶ Install sealing plugs on unused terminals or interfaces.
- ▶ Cable is arranged reasonably, and the cable is tidy and without damage.

6.2 Electrify for the First Time

1. Set the Circuit breaker of the BCU to ON.
2. Press the black start switch on the BCU to power on the battery for the first time. Observe the LED indicator on the BCU to check the running status.

6.3 Indicator lights description

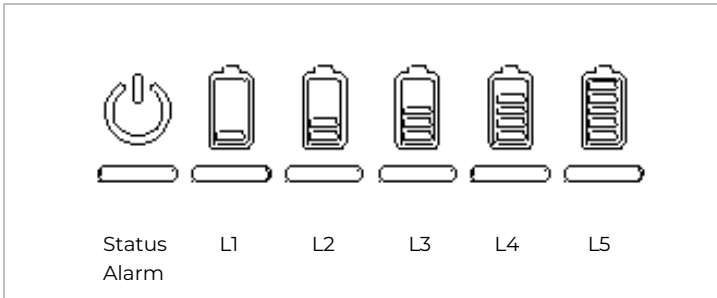


Figure 6-1 Indicator diagram

Normal status indicator light:

Table 6-1 Normal status indicator light definition

Status	Status light	Alarm light	SOC light				
			L1	L2	L3	L4	L5
Shutdown							
Standby	Light		Display according to the battery SOC value				
Updating	Fast flashing						
Charge	Light						
Discharge	Light						

SOC Indicator light definition:

Table 6-2 SOC indicator light definition while charging

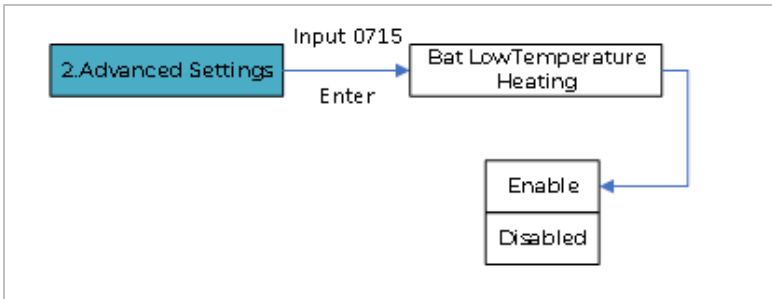
SOC Value	SOC light				
	L1	L2	L3	L4	L5
0%~20%	 (t=0.5s)				
21%~40%		 (t=0.5s)			
41%~60%			 (t=0.5s)		
61%~80%				 (t=0.5s)	
81%~100%					 (t=0.5s)

Table 5-3 SOC indicator light definition while discharging

SOC Value	SOC light				
	L1	L2	L3	L4	L5
0%~20%	●				
21%~40%	●	●			
41%~60%	●	●	●		
61%~80%	●	●	●	●	
81%~100%	●	●	●	●	●

6.4 BAT heating function

For the CBS5000 with heating function, the pack can be warmed up to prevent insufficient charging and discharging due to excessively cold temperatures. Before using the function, please check the menu of inverter and ensure that the “Bat Low Temperature Heating” has been set to Enable.



- ▶ The maximum operating temperature range applicable to the equipment is -20℃ to 55℃, and the recommended optimal operating temperature range is 10℃<T<35℃.
- ▶ When the battery pack temperature is below 0℃, immediate charging is not possible, and the battery pack(the built-in heating module can be automatically enabled)will activate the heating feature automatically. The best charging performance of the battery

can be achieved after heating for less than 3h. The heating feature will consume power.

- ▶ In the same system, if both non heated and heated batteries are equipped, the system does not support heating.

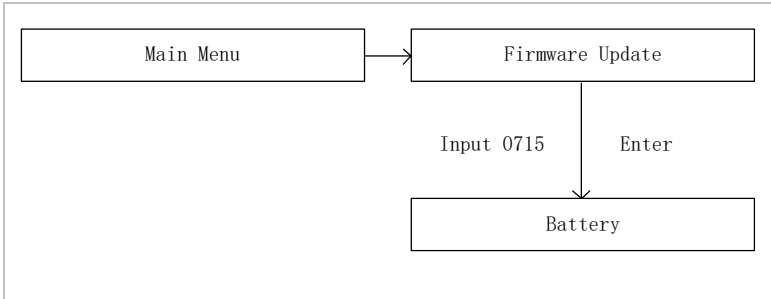
6.5 Software Update

The product can be upgraded through the software of SOFAR HYD series energy storage inverters to maximize the performance of the product and avoid the abnormal operation of the product caused by software bugs.

Before upgrading the software, check that the communication cables of the system and the DC power cables of the battery are properly connected, and ensure that the system has reliable power supply from utility or PV during the upgrade.

Procedure:

1. Insert the USB drive into the computer.
2. The upgrade file folder is named firmware. After receiving the upgrade file, decompress it and save it in a USB disk.
3. Insert the USB disk into the WI-FI/4G interface of the energy storage inverter.
4. Set the Circuit breaker of the battery control unit to "ON state", press the black start switch, and the energy storage inverter and battery start up and run.
5. Perform the following operations on the LCD of SOFAR HYD series energy storage inverter.



6. If an error message occurs, upgrade again. If this situation persists for several times, contact technical support for help.
7. After the upgrade is complete, you can view the current software version in Firmware Update >> Battery.

6.6 Battery Powered Off

1. Long press 3s the black start switch of BCU. All the LED indicators on the battery control unit are OFF.
2. Set the Circuit breaker of the BCU to OFF. After the system is powered OFF for five minutes, ensure that the remaining battery charges are discharged before performing maintenance.

7 Trouble shooting and maintenance

7.1 Troubleshooting

This section describes the potential errors for this product. Please read carefully for the following tips when doing the troubleshooting:

1. For details about the warning or error information displayed on the BCU status indicator, see 5.3 Description of Battery Status Indicators.
2. When the battery generates an alarm or error message, the alarm report is uploaded to the inverter. You can determine the cause of battery alarms or faults by viewing the inverter display or the monitoring system.

If the SOFAR HYD series hybrid energy storage inverter is used, you can view the recorded fault information by following the following steps: Press "Back" on the home screen to enter the main menu, select "Event List" and press "OK" to enter.

Fault information list of SOFAR HYD series energy storage inverter:

Table 7-1 Fault information list of the energy storage inverter

ID No.	Event Name	Solution
177	BMS OVP	Check whether the communication cable or port of the battery module is faulty. The lithium battery is faulty. Shut down the inverter and lithium battery. Wait for 5 minutes and start the inverter and lithium battery. Check whether the fault is rectified. If not, contact technical support.
178	BMS UVP	
179	BMS OTP	
180	BMS UTP	
181	BMS OCP	
182	BMS Short	
186	BatDischargeHTP	
187	BatDischargeLTP	
188	BatChargeHTP	
190	BatChargeLTP	
183	BMS VerFault	Please contact technical support.
184	BMS CAN VerFault	
185	BMS CAN VerLow	
189	AFCICommLose	

ID No.	Event Name	Solution
191	PID Output Fail	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
192	PLC Com Fail	
864	HS1OverTempFault	Please make sure the battery is installed in a cool well-ventilated place. If The battery is installed correctly, please contact technical support .
865	OverTempFault_Env	
869	HS2OverTempFault	
909	HeatsinkLowTempFault	
910	EnyLowTempFault	
866	SciCommFault	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
867	Can1CommFault	
870	Can2CommFault	
908	PCSCanCommFault	
868	Relay1Fail	
871	Relay2Fail	
872	SwBusInstantOVP	
873	SwBusInstantUVP	
874	SwBatInstantOVP	
875	SwBatInstantUVP	
876	SwBatInstantOCP	
905	StartupBusSCP	
906	BusAvgUVP	
877	FlyingCap1OVP	
878	FlyingCap2OVP	
884	FlyingCap3OVP	
885	FlyingCap4OVP	
886	FlyingCap1UVP	
887	FlyingCap2UVP	
890	FlyingCap3UVP	
891	FlyingCap4UVP	
879	HwOCP	

ID No.	Event Name	Solution
880	unrecoverBusAvgOV	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.
881	unrecoverBatAvgUV	
882	unrecoverOCPIstant	
883	unrecoverHwOCP	
888	unrecoverRelay1Fail	
889	unrecoverRelay2Fail	
893	unrecoverBusSCP	
894	unrecoverBatActFail	
895	unrecoverBusRPP	
896	BatteryStateErr	Restart the battery. If the problem is not resolved, please contact technical support.
897	PWMModeErr	
898	BMSVerionErr	
899	BMSOVOC	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
900	SwBatAvgOCP	
901	SwAvgOverloadP	
902	SwBusInstantOCP	
903	SwCBCOCP	
907	ChipClockFault	
911	ADOffsetCalibrateFault	Restart the battery and wait for seconds. If the problem is not resolved, please contact technical support.
904	PackIDErr	

If the battery status indicator does not indicate any error, perform the following steps to check whether the current installation status meets the battery operating requirements:

- ▶ Is the battery installed in a clean, dry, well-ventilated location?
- ▶ Check whether the battery circuit breaker is off?
- ▶ Check whether the cable section and length meet requirements?
- ▶ Is the wiring good?

- ▶ Whether the configuration Settings are correct for the user's specific installation?
- ▶ Whether the communication cable is correctly connected and is not damaged?

7.2 Daily Maintenance

Batteries usually do not require maintenance or calibration, but ensure that the radiator is not covered with dust, dirt, etc.

1. Clean the battery module

Please clean the battery module with an air blower, a dry & soft cloth or a soft bristle brush. Do not clean the inverter with water, corrosive chemicals, detergent, etc.

2. Clean the heat sink

In order to ensure the normal function and long service life of the product, it is necessary to ensure that there is enough air flow space around the radiator located above the product, and there is no material around the radiator that obstructs the air flow, such as dust or snow, must be removed. Clean the heat sink with compressed air, a soft cloth, or a soft brush. Do not use water, corrosive chemicals, cleaning agents, or strong detergents to clean the radiator.

3. System status

Check whether CBS5000 is damaged or deformed.

Check whether there is abnormal sound when CBS5000 is running.

Check whether CBS5000 parameters are correctly set when CBS5000 is running.

4. Electrical connection

Check whether cables are securely connected.

Check whether cables are damaged, especially whether the cable sheath that contacts a metal surface is damaged.

Check whether unused DC input terminals, CBS5000 terminals, and COM ports are locked by watertight caps.

8 Emergency Treatment



DANGER

Battery drops or is subjected to severe impact

- ▶ If a battery is dropped or violently impacted during installation, it may become faulty and must not be used. Using a faulty battery will cause safety risks such as cell leakage and electric shock.
- ▶ When installing batteries, if the battery drops or is subjected to strong impact, it may cause internal damage to the device. It is strictly prohibited to continue using it, otherwise there may be safety risks.
- ▶ If there is a noticeable odor, smoke, or fire, please immediately stay away from the equipment, call the police promptly, and contact professionals.



DANGER

Smoking or catching fire

- ▶ In case of smoke or fire, if there is a large amount of smoke in the battery storage room, do not open the door to prevent explosion risks and toxic gas inhalation.
- ▶ If a lithium battery catches fire, flammable and toxic gases will be released. Therefore, during the extinguishing process, all firefighters must wear a full set of protective suites, including flame retardant/fireproof clothing, air-purifying respirator or breathing apparatus, firefighter helmet and mask, and insulated shoes.
- ▶ Please turn off the device or disconnect the main power switch under sufficient safety conditions.
- ▶ Immediately call the fire alarm number after evacuating to a safe outdoor area. During the process of waiting for fire rescue, please contact your sales agent and after-sales technical service support at the same time.

- ▶ After extinguishing the open flame, set up an isolation warning area and continuously spray water to cool down until the battery temperature cools down to within $\pm 10\text{ }^{\circ}\text{C}$ of room temperature.
- ▶ After extinguishing the battery fire, please do not use the equipment. It should be handled by professional personnel are responsible for handling and recycling.

**DANGER****Flood disaster**

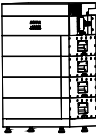
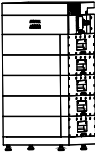
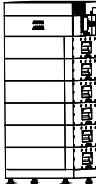
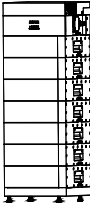
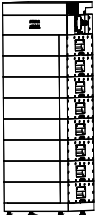
- ▶ Please power off the system while ensuring personal safety.
- ▶ If the battery pack is immersed in water, do not touch it to avoid the risk of electric shock.
- ▶ Do not use batteries that have been submerged after the flood recedes. Please contact your sales agent.

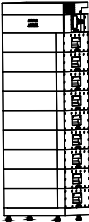
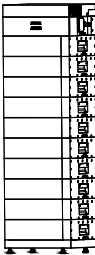
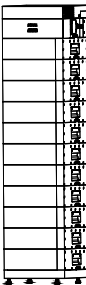
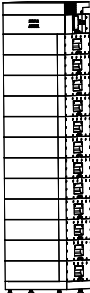
**DANGER****Battery odor or leakage**

- ▶ The leaked electrolyte is a colorless viscous liquid that may evaporate rapidly and is flammable, turning into white salt residues. The electrolyte has a pungent smell and is corrosive, irritating to eyes and skin. Avoid contact with it.
- ▶ When handling chemical leakage incidents, professional maintenance personnel and firefighters must wear
- ▶ The leaked electrolyte is a colorless viscous liquid that may quickly evaporate and be flammable. It has a pungent odor, corrosiveness, and is irritating to the eyes and skin. Contact should be avoided.
- ▶ When battery leakage or pungent odor is detected, please turn off the system power while ensuring personal safety.

- ▶ Please contact professionals immediately, professionals' protective equipment such as goggles, rubber gloves, and gas masks must be worn to protect oneself.
- ▶ Please do not come into contact with electrolyte and released gases. If in contact, the following measures need to be taken:
- ▶ Inhalation exposure: Immediately inhale fresh air, maintain air circulation, and seek medical assistance immediately
- ▶ Eye contact: Immediately rinse eyes with plenty of water for at least 15 minutes, do not rub eyes, and seek medical attention immediately
- ▶ Skin contact: Immediately wash the skin in contact area with plenty of water and soap, and seek medical attention immediately.

9 Datasheet

Model	CBS5000-H4 CBS5000-H4-H	CBS5000-H5 CBS5000-H5-H	CBS5000-H6 CBS5000-H6-H	CBS5000-H7 CBS5000-H7-H	CBS5000- H8 CBS5000-H8-H
System Schematic					
Number of Battery Modules	4	5	6	7	8
Battery Total Energy[2]	20.48kWh	25.6kWh	30.72kWh	35.84kWh	40.96kWh
Rated Capacity	20.48kWh	25.6kWh	30.72kWh	35.84kWh	40.96kWh
Rated Power	10kW	12.5kW	15kW	17.5kW	20kW
Dimension(W *H*D)	625*870*415 mm	625*1020*415 mm	625*1170*415 mm	625*1320*415 mm	625*1470*415 mm
Weight	210kg	257kg	304kg	351kg	398kg
Model	CBS5000-H9 CBS5000-H9-H	CBS5000- H10 CBS5000-H10-H	CBS5000- H11 CBS5000- H11-H	CBS5000-H12 CBS5000-H12-H	/

System Schematic					/
Number of Battery Modules	9	10	11	12	/
Battery Total Energy[2]	46.08kWh	51.2kWh	56.32kWh	61.44kWh	/
Rated Capacity	46.08kWh	51.2kWh	56.32kWh	61.44kWh	/
Rated Power	22.5kW	25kW	27.5kW	30kW	/
Dimension(W *H*D)	625*1620*415 mm	625*1770*41 mm	625*1920*415 mm	625*2070*415 mm	/
Weight	445kg	492kg	539kg	586kg	/
Battery Type[1]	LFP				
Battery Control Unit	CBS5000-BCU				
Number of Battery Control Unit	1				
Battery Module	CBS5000-BMU				
Nominal Voltage	600 Vd.c.				
Operating Voltage Range	600-1000 Vd.c.				
Max. Charging Current	50A				
Max. Discharging Current	50A				
General parameters					
Display	LED				
Communication	CAN				
Enclosure Type	IP66				

Cooling	Natural
Operating Temperature Range[2]	-20°C to +55°C
Humidity	5%~95%
Installation	Floor Mounted
Max. Operating Altitude[3]	4000m
Battery module[4]	
Model	CBS5000-BMU
Battery Module Energy	5.12kWh
Nominal Voltage	50 Vd.c.
Rated Power	2.5kW
Dimensions(W*H*D)	630*415*180.5 mm
Weight	47kg
Battery control unit	
Model	CBS5000-BCU
Operating Voltage Range	600-1000 Vd.c.
Maximum Current	50A
Number of CBS5000-BMU	4-12
Protective Class	Class I
Enclosure Type	IP66
Dimension(W*D*H)	630*415*230mm
Weight	24.5kg
Ordering and deliverable part	
Product Ordering Model[5]	CBS5000

[1] Rechargeable Li-ion Battery system.

[2] Refer to the curve of temperature VS charging/discharging current.

[3] Derating above 2000m.

[4] The internal battery pack is 51.2V, 100Ah.

[5] Storage system is ordered and delivered in the form of power module and battery module separately with corresponding quantity.

10 Manufacturer's Warranty and Liability Terms

Warranty period

Warranty period and calculation method of SOFAR battery products refer to the Quality Assurance Agreement of SOFAR CBS5000 Series Intelligent lithium battery System.

Extended warranty period

If the purchased battery exceeds the warranty period stipulated in the Warranty Agreement of SOFAR CBS5000 Series Intelligent lithium battery System, the customer can apply for the extended warranty period by providing the serial number of the product to the sales team of the company, and the Company has the right to reject the purchase application for the extended warranty period that does not meet the requirements.

If the original buyer wants to apply for the extended warranty service, please contact the sales team of Shenzhen SOFARSOLAR Co., LTD to purchase the products that exceed the extended warranty period but have not passed the warranty period stipulated in the Warranty Agreement of SOFAR CBS5000 Series Intelligent lithium battery System, the original buyer shall bear different extended premiums.

Upon purchase of the extended warranty service, our company will issue an extended warranty card to the customer to confirm the extended warranty period.

Invalid warranty clause

Equipment failure caused by the following reasons is not covered by the warranty:

1. The 'warranty card' has not been sent to the distributor or Shenzhen SOFARSOLAR Co., LTD.
2. Without the consent of Shenzhen SOFARSOLAR Co., LTD to change equipment or replace parts.

3. Use unqualified materials to support Shenzhen SOFARSOLAR Co., LTD 's products, resulting in product failure.
4. Technicians who don't belong to Shenzhen SOFARSOLAR Co., LTD modify or attempt to repair and erase the product serial number or silk screen.
5. Incorrect installation, debugging and use methods.
6. Failure to comply with safety regulations (certification standards, etc.).
7. Damage caused by improper storage by dealers or end users.
8. Transportation damage (including scratches caused by internal packaging during transportation) please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading.
9. Failure to follow the product user manual, installation manual and maintenance guidelines.
10. Improper use or misuse of the device.
11. Poor ventilation of the device.
12. The product maintenance process does not follow relevant standards.
13. Failure or damage caused by natural disasters or other force (such as earthquake, lightning strike, fire, etc.)

Version 1.0



ENERGY TO POWER YOUR LIFE

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