HV Energy Storage Battery

User Manual

Product Name: ESS-GRID HV Lithium-iron Energy Storage Battery

Model No: B69/B105/B122/B136/B129/B158/B170/B224

Version No: V1.2

Content

1. Statement of Law

This product complies with the design requirements of environmental protection and personal safety. The storage, use and disposal of the products shall be carried out in accordance with the product manual, relevant contract or relevant laws and regulations.

Customer can check the related information on the website of BSLBATT(Huizhou) Co., Ltd. when the product or technology is updated.
Web URL ： https://www.bsl-battery.com/

Please note that the product can be modified without prior notification.

2. Safety Guidelines

2.1. Main precautions

- It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or may damage the battery and the whole system.
- The battery needs to be recharged within 12 hours after fully discharging.
- Do not expose cable outside.
- All battery terminals must be disconnected before maintenance.
- Do not use cleaning solvents to clean the battery.
- Do not expose the battery to flammable or harsh chemicals or vapors.
- Any foreign object is prohibited to be inserted into any part of the battery.
- Any warranty claims are excluded for direct or indirect damage due to items above.
- Only qualified person can perform the wiring of the battery strings.
- If the battery is stored for a prolonged time, it is requirement that they are charged every three months, and the SOC should be no less than 50%.

2.2. Symbols

Symbol	Description
	Caution, risk of electric shock
	Heavy enough may cause severe injure
	Keep the battery away from open flame or ignition sources
	Keep the battery away from children
	Do not dispose of the product with household waste
	Recycling
	Read this manual before installation and operation

2.3. Abbreviations Used in this Manual.

Abbreviation	Designation
BSL	BSLBATT(Huizhou) Co., Ltd
QC	Quality Control
BMS	Battery Management System
PCS	Power Conversion System
SOC	State of Charge
UPS	Uninterruptible Power Supply
BESS	Battery Energy Storage System
EMS	Energy Management System
BCU	Battery control unit
BMU	Battery Management Unit
BAU	Battery array unit

2.4. Note Before Installation

- When receiving, please check the system and packing list first, if the pack is damaged or spare parts are missing, please contact the dealer.
- Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
- Wiring must be correct, do not mix-connect the positive and negative cables, and ensure no short circuit with the external device.
- It is prohibited to connect the battery to AC power directly without an AC Breaker.
- Please ensure the electrical parameters of AC power and Load are compatible to system.
- Keep the system away from fire or water.

- Battery is for indoor installation only.

2.5. During Operation

- If the system needs to be moved or repaired, the power must be cut off first and the battery is completely shut down.
- It is prohibited to connect the system with different type of battery.
- It is prohibited to put the batteries working with faulty or incompatible inverter.
- In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited.
- Please do not open, repair, or disassemble the system except staffs from BSLBATT or authorized by BSLBATT. We do not undertake any consequences or related responsibility due to violation of safety operation or violating of design, production, and equipment safety standards.

3. System Application Introduction

This product is a household energy storage battery pack. The system is matched with a 68/102/122/136kwh lithium iron phosphate battery pack. This product can be used in conjunction with electricity, so that electricity consumption can be adjusted. This product supports a variety of application modes, such as PV self-use surplus power to grid, peak shaving and valley filling, standby power supply, etc. The specific operation logic is as follows.

3.1. Product Properties

- Anode material is made from LiFePO4 with safety performance and long cycle life.
- Battery management system (BMS)has protection functions including over-discharge, over-charge, over-current and high/low temperature.
- The system can automatically manage charge and discharge state and balance current and voltage of each cell.
- Flexible configuration, multiple battery modules can be in serial for expanding voltage and Capacity.
- Triple protection mechanism, including relays, fuse, and circuit breaker, preventing battery from short circuits or other serious malfunctions.
- Standard intelligent gateway for remote battery monitoring and diagnosis.
- Good ventilation and cooling capacity, the battery pack will not generate heat accumulation.
- Working temperature range is from 0 to 50℃, with excellent discharge performance and cycle life.
- Small size and light weight, standard module is comfortable for installation and maintenance.

3.2. PV Self-use Surplus Power to Grid

Under the condition of good illumination in the daytime, the DC power from PV panel is changed into AC through inverter to supply power for household load. If the household load cannot run out of photovoltaic power, the remaining power will be stored in the battery. If the battery is full, photovoltaic power will be supplied to the grid. In the night or rainy days, photovoltaic cannot generate electricity. The battery supplies power to the home load through an inverter. If the battery SOC is low, the household load will take power from the grid.

3.3. Peak Shaving and Valley Filling

In some countries and regions where peak valley time of use price is implemented, if the difference between peak price and low price is large, the application mode of peak shaving and valley filling can be adopted in energy storage system. In the low electricity price period, the energy storage system is charged; in the peak period of electricity price, the energy storage system supplies power to the household load. It can avoid users using too much power grid when the electricity price is high and save energy expenditure.

3.4. Standby Power Supply

In some extreme weather (such as tornadoes, typhoons, hail), or substation operation failure, power supply will be interrupted. If the energy storage system is installed, the user can still enjoy sufficient power guarantee under this situation.

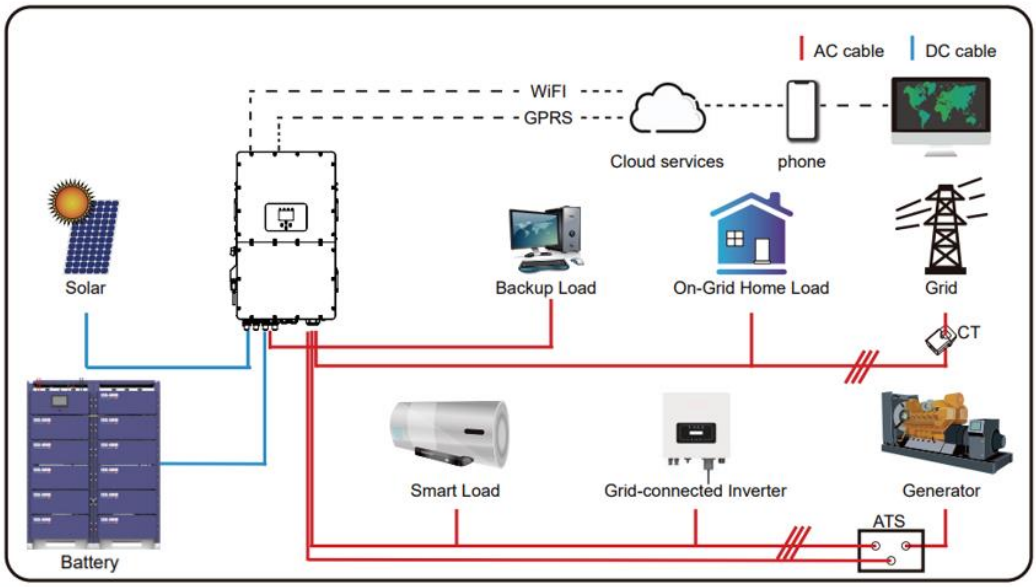


Figure 1. System Connection Diagram

4. Product Specification

ESS-GRID is a high voltage battery storage system based on lithium iron phosphate battery, which is one of the new energy storage products developed and produced by BSLBATT. It can be used to provide reliable power for various types of equipment and systems. ESS-GRID enables multiple strings parallel operation feature, which provides tremendous flexibility in system design and configuration. ESS-GRID is especially suitable for those application scenes which require flexible capacity extension, high power output, limited installation space, restricted load-bearing and long cycle life.

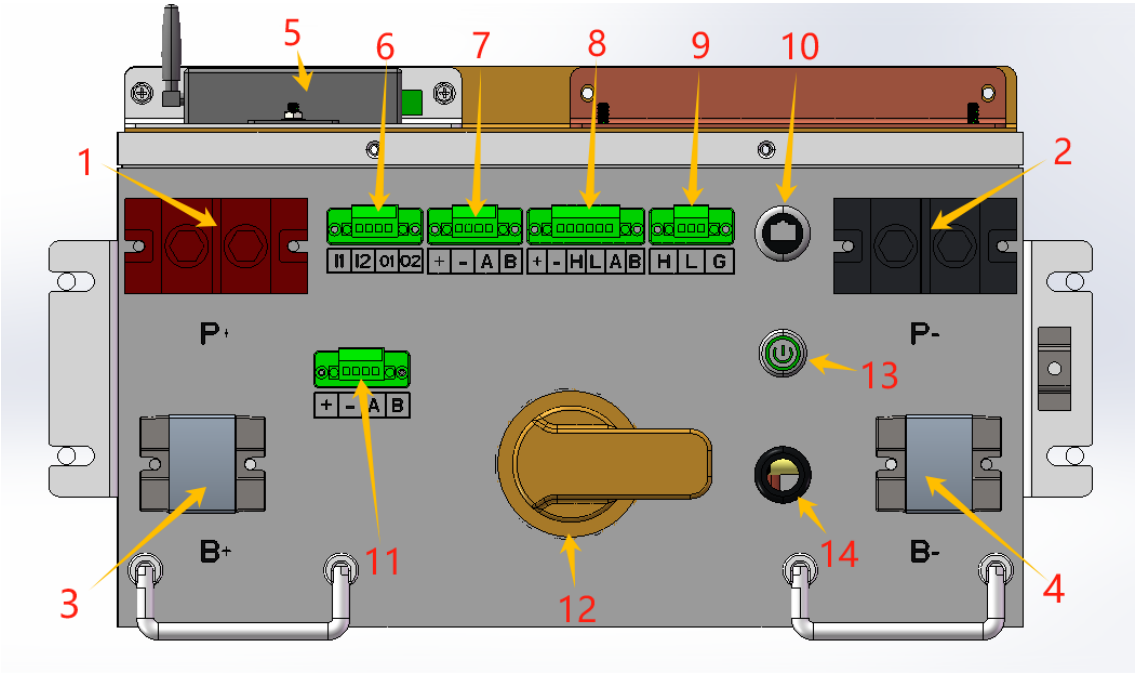
4.1. System Performance Parameter

No	General Parameter	ESS-GRID B69	ESS-GRID B105	ESS-GRID B122	ESS-GRID B136
1	Rated Voltage	512V	512V	435.2V	486.4V
2	Rated Capacity	134Ah	205Ah	280Ah	280Ah
3	Cell Brand (LFP-3.2V)	Gotion67AH	REPT205AH	REPT280AH	REPT280AH
4	System configuration	160S2P	160S1P	136S1P	152S1P
5	Battery single box number	10 pack+1box	10 pack+1box	9 pack+1box	10 pack+1box
6	Rated power	68.6kWh	104.9kWh	121.9kWh	136.2kWh
7	Charge Upper Voltage	568V	568V	482.8V	539.6V
8	Discharge Lower Voltage	456V	456V	387.6V	433.2V
9	Recommended Current	68A	102A	140A	140A
10	Maximum Charging Current	134A	200A	200A	200A
11	Maximum Discharging Current	134A	200A	200A	200A
12	Dimension (W*D*H, mm)	1132*624*1493	1012*720*1943	1008*869*1840	1008*869*1840
13	Communication protocol	CANBUS/Modbus RTU			
14	Host software protocol	CANBUS (Baud rate @500Kb/s)			
15	Operation Temperature Range	Charge:0~55℃			
16		Discharge: -20~55℃			
17	Cycle Life(25℃)	6000@80%SOH			
18	Protection level	IP20			
19	Storage Temperature	-10℃~40℃			
20	Storage Humidity	10%RH ~90%RH			
21	Internal Impedance	≤1Ω			
Note: Parameters can be adjusted according to customer requirements					

No	General Parameter	ESS-GRID B129	ESS-GRID B158	ESS-GRID B170	ESS-GRID B224
1	Rated Voltage	460.8V	563.2V	563.2V	819.2V
2	Rated Capacity (Ah)	280	280	304	304
3	Cell Brand (LFP-3.2V)	REPT280AH	REPT280AH	EVE304AH	EVE304AH
4	System configuration	144S1P	176S1P	176S1P	256S1P
5	System composition	9pack+1box	11 pack+1box	11 pack+1box	16 pack+1box
6	Rated power	129.0kWh	157.7kWh	171.2kWh	249.0kWh
7	Charge Upper Voltage	511.2V	624.8V	624.8V	908.8V
8	Discharge Lower Voltage	410.4V	501.6V	501.6V	729.6V
9	Recommended Current	140A	140A	152A	152A
10	Maximum Charging Current	200A	200A	200A	200A
11	Maximum Discharging Current	200A	200A	200A	200A
12	Dimension (W*D*H, mm)	1000*850*1949	1000*850*1949	1000*850*1949	1500*850*1949
13	Communication protocol	CANBUS/Modbus RTU			
14	Host software protocol	CANBUS (Baud rate @500Kb/s)			
15	Operation Temperature Range	Charge:0~55℃			
16		Discharge: -20~55℃			
17	Cycle Life(25℃)	6000@80%SOH			
18	Protection level	IP20			
19	Storage Temperature	-10℃~40℃			
20	Storage Humidity	10%RH ~90%RH			
21	Internal Impedance	≤1Ω			
Note: Parameters can be adjusted according to customer requirements					

4.2. System Drawing

4.3. *Battery Controller Box*



Item	Name	Definition
1	External Positive socket	Connect battery system with Inverter positive terminal
2	External Negative socket	Connect battery system with Inverter negative terminal
3	Internal Positive socket	Connect battery controller with battery pack positive terminal
4	Internal Negative socket	Connect battery controller with battery pack negative terminal
5	Intelligent Gateway	Upload battery data through 4G or WIFI
6	Parallel communication port	Address confirmation for parallel connection with another ESS-GRID
7	Gateway communication port	24V DC power supply for gateway and 485 upload channels for battery
8	Internal communication port	Communicate battery controller with battery pack
9	Debugging port	Communicate to computer for monitoring and upgrading battery
10	PCS communication port	Communicate battery controller with inverter
11	Screen communication port	24V DC power supply for screen and 485 upload channels for battery
12	DC circuit breaker	Used to control the on/off of the high-voltage circuit of the battery
13	Circular metal switch	Used to control the on/off of the low voltage circuit of the battery
14	Reserved interface	Reserved

Caution: When the DC breaker is tripped off because of over current or short circuit, must wait after 30min to turn on it again, otherwise may cause the breaker damage.

Power On Button: Generally when it is at ON state, you can't turn off it during normal running condition.
Danger: Ensure Power On Switch is turned on before waking up the battery. Otherwise it will affect automatic checking process and cause danger.

Danger: DO NOT turn off the " Power On Switch" during normal running condition, only in emergency case it could be turned off directly. Otherwise will cause this battery string current surge by another battery strings.

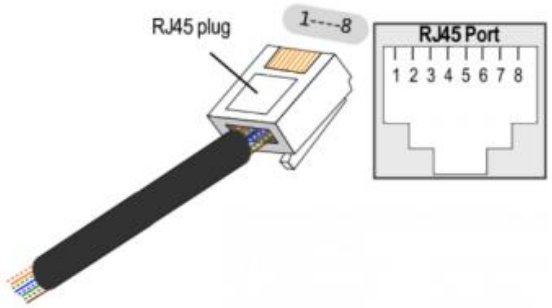
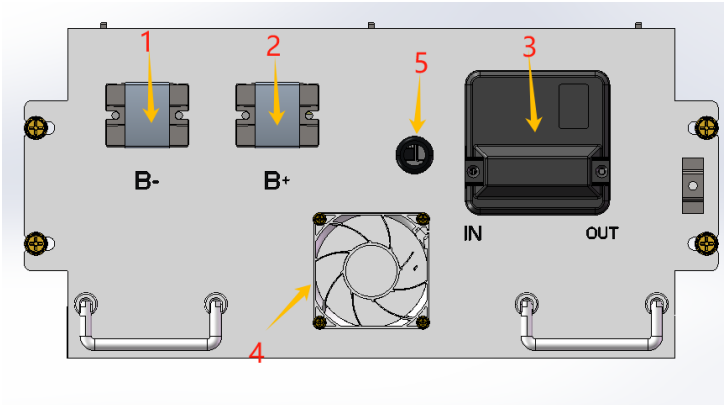


Figure 2. Definition of "PCS" port pin

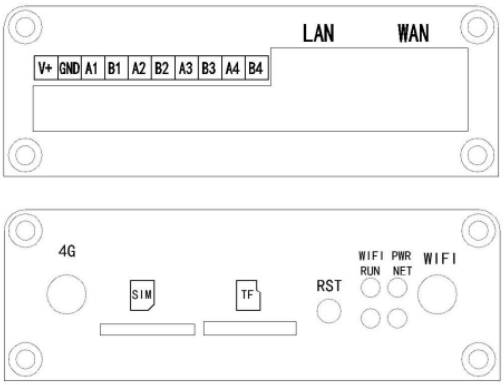
PIN	Color	Definition
1	Orange/White	NC
2	Orange	NC
3	Green/White	NC
4	Blue	CANH
5	Blue/White	CANL
6	Green	NC
7	Brown/White	NC
8	Brown	NC

4.4. Battery Pack



Item	Name	Definition
1	Pack Negative socket	Negative terminal of battery pack
2	Pack Positive socket	Positive terminal of battery pack
3	BMU	Used to collect and upload cell voltage and temperature, drive the fan
4	Adjustable speed fan	Fan speed can be adjusted according to temperature
5	Reserved interface	Reserved

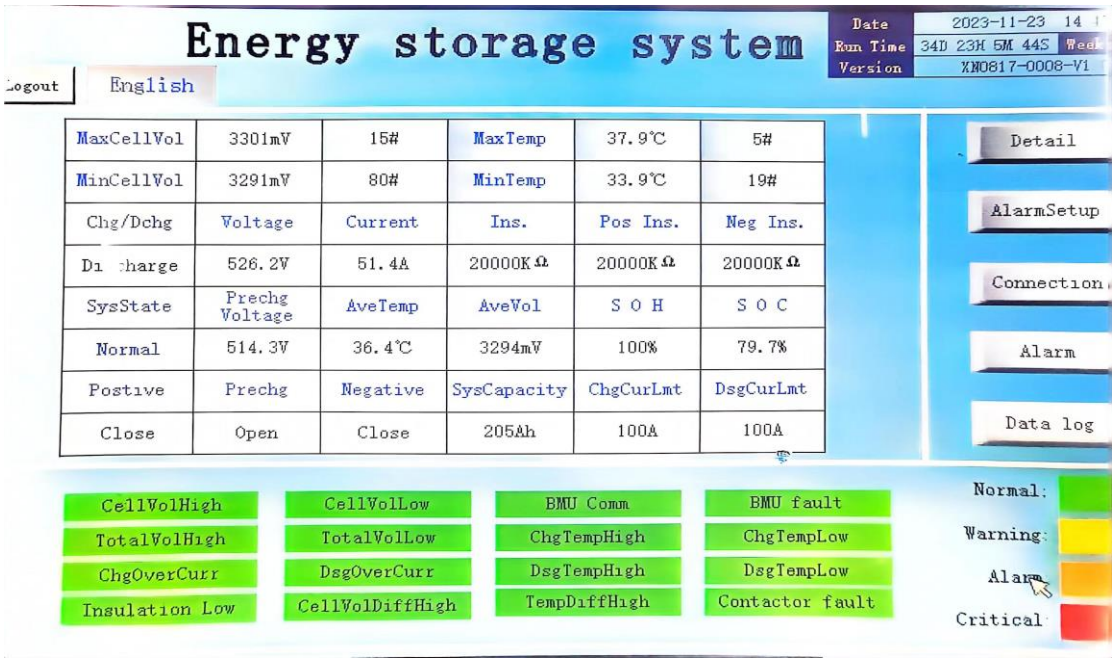
4.5. Intelligent Gateway



Indicator Light Name	Status	Instructions
PWR	Always on	Power supply is normal
	Off	Power supply is Abnormal
RUN	Off	System not started
	Flashing	System started successfully
NET	Always on	Successfully connected to the uplink network
	Off	Not connected to uplink network
	Flashing	Connecting to uplink network
WIFI	Always on	Connecting to WIFI terminal devices
	Off	Not connected to WIFI terminal device
	Flashing	Sending and receiving WIFI packets in progress
ETH WAN LAN	Always on	Wired connection to the network
	Off	No network cable inserted
	Flashing	Network port is transmitting and receiving data

Battery data can be uploaded to the cloud platform after the intelligent gateway Successfully connected to the uplink network:

4.6. Display rendering



Name	Definition
Detail	Check cell voltage and battery pack temperature
Alarm Setup	Modify alarm and protection parameters (only with BSL's permission)
Connection	Manual grid connection or change communication protocol
Alarm	Check current and historical alarm records
Data log	Save screen data to USB flash drive

5. System Installation Instructions

5.1. Installation location

Make sure that the installation location meets the following conditions:

- The building is designed to withstand earthquakes.
- Far away from the sea to avoid salt water and humidity.
- The floor is flat.
- No flammable or explosive materials nearby.
- Optimal ambient temperature is between 25℃ and 55°C.
- Temperature and humidity stay at a constant level.
- Minimal dust and dirt in the area.
- No corrosive gases present, including ammonia and acid vapor.

The system could be installed indoor. If the ambient temperature is outside the operating range, battery will protect itself by shutting down. The system optimal operate temperature is 0°C to 55°C. Before installation and system power on, the dust and iron scurf must be removed to keep a clean environment. And the environment must have certain anti-dust ability. Frequent exposure to severe operating condition would exacerbate the performance and lifetime of the system.

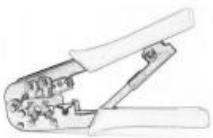
NOTICE

Make sure that the cross-sectional area of charging cables is 25 to 35 mm^2

A breaker between BSL battery and inverter was recommended to install and the breakers min. current should meet twice the rated current of the system or following with local regulations.

5.2. Installation Tools

To install the battery pack, those following tools are probably required:

			
Phillips screwdriver	Torque wrench	Cable crimper	Wire clamp
			
Voltmeter	Tape measure	Drill	Flat-head screwdriver

Insulated glove

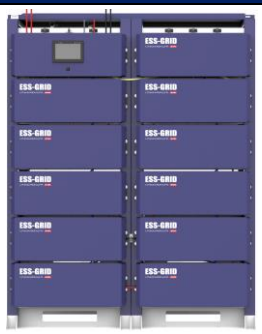
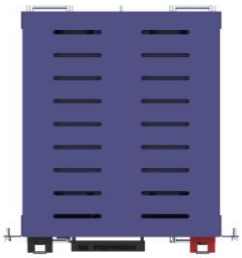
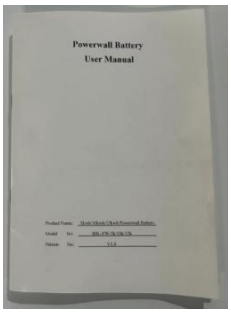
Safety goggles

Safety shoes

5.3. *Unpacking inspection*

- When the equipment arrives at the installation site, loading and unloading should be performed according to the rules and regulations, to prevent from being exposed under sunlight. Battery should not be installed in direct sunlight.
- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and the case shall be checked for good condition.
- In the process of unpacking, handle with care and protect the surface coating of the object.
- Open the package, the installation personnel should read the technical documents, verify the list, according to the configuration table and packing list, ensure objects are complete and intact, if the internal packing is damaged, should be examined and recorded in detail.

5.4. *Packing List*

Battery mounting bracket	Battery Controller Box	Battery Pack
		
Power cable	**Communication cable**	**User's manual**
		

5.5. Handling and Placement

- The battery pile's power terminals have high DC voltage. It must be installed in a restricted access area.
- ESS-GRID is a high voltage DC system, operated by qualified and authorized personnel only.
- Single battery pack is quite heavy. The battery pack must be handled by more than 2 personnel if there're no handling tools.
- ESS-GRID system working temperature range: -20℃~55℃; Optimum temperature: 18℃~28℃. DO NOT expose the battery system to direct sun light. It is suggested to build sunshade equipment. In cold area a heating system is required.
- ESS-GRID system must not be immersed in water. The battery base cannot be exposed to rain or other water sources. As a suggestion, the base's height shall be >300mm above the ground.
- The support surface should have sufficient load capacity to support the weight of whole battery system(>2T).
- ESS-GRID system must be installed on a fixed and flat support surface.

5.6. Battery system self-test

Step1: Check if all battery wiring is correct.
Step2: Turn on the DC breaker.
Step3: Press the circular metal switch to "on" status.
Step4: Check if any alarm information is displayed on the screen, if so, please contact your installer or BSLATT.

5.7. Shut down

Step1: Press the circular metal switch to "off" status.
Step2: Turn off the DC breaker.

5.8. Connecting inverter

- An external DC Breaker that operates both positive and negative conductors simultaneously between the battery controller and inverter on the power cable is recommended. After waking up the battery controller and ensure that the battery controller is pre-charged, you can turn on it.
- Please confirm that the battery system is in the off state before connecting. It maybe causes electric shock to personnel and damage to the inverter if connect the battery directly without power off.
- When connecting to the inverter's battery port, ensure that the positive and negative cables are not reversed.

5.9. Storage Recommendations

- For long-term storage (more than 3 months), the battery cells should be stored in the environment: temperature range of 5~45℃, relative humidity<65%and contains non-corrosive gas.
- The battery module should arrange in range of 5~45℃, dry, clean, and well-ventilated environment. The battery should be charged to 50~55% SOC before storage.
- It is recommended to active the battery system (discharge and charge) every 3 months, and the longest duration of storage without charge and discharge cannot exceed 6 months.

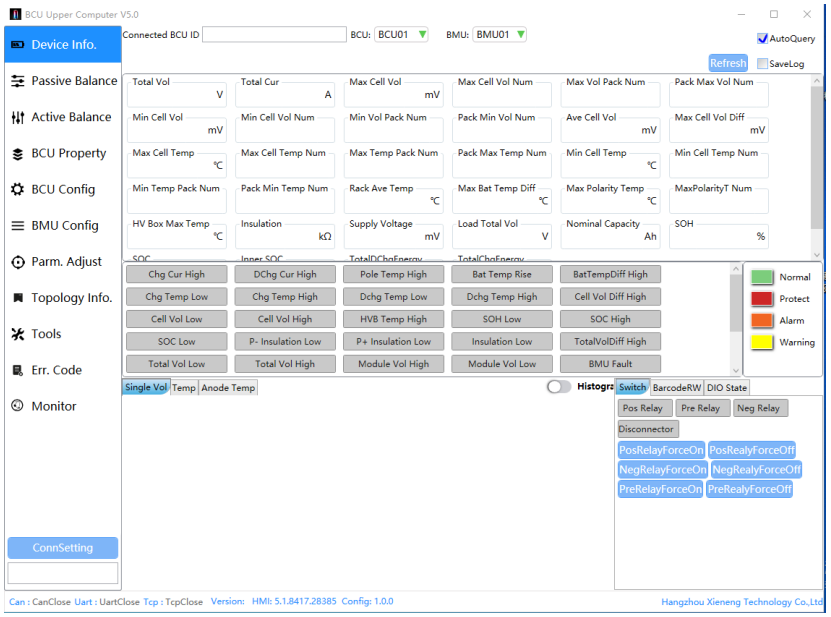
Caution: The cycle life of the battery will have relative heavily reduction if not follow the above instructions to store the battery for a long term.

6. Appendix1

When the equipment manufacturer confirms that it is necessary for customer to set the battery parameter, it can authorize to provide the customer with the host software and operating instructions.

Figure3.CAN Serial port communication device

Host soft operation:



7. Appendix2

7.1. Abnormal Situation Addressing

- What if the system does not work properly after power on?

A: The most direct way is to check the LCD Displaying of the inverter, through the LCD Displaying to find the fault phenomenon, causes can be roughly analyzed from the LCD Displaying interface prompt alarm, protection, fault, and other information, it can also provide necessary reference for further testing.

- What are the Battery Failures including?

1) Sampling failure: analog front-end and main control chip communication failure. When the fault occurs, the charge and discharge function is turned off, and the fault alarm can be automatically cleared after the fault is cleared.

2) Temperature NTC failure mainly detects whether the temperature NTC is short-circuited or disconnected. When the fault occurs, the charge and discharge function is turned off, and the fault alarm can be automatically cleared after the fault is cleared.

3) Cell failure: the voltage difference of the cell exceeds 1V, or the difference between the total voltage detection voltage and the sum of single cell voltage is more than 5V, or the minimum voltage is less than 0.5V. The voltage sampling line disconnect also reports the same fault. When the fault is cleared, the fault alarm can be automatically cleared.

7.2. Product Responsibilities and Consulting

- We will not be liable for the accidents resulting from operation breaking this specification and user manual.

- We will not send separate notice, provided that the contents of this specification are changed due to improvement of product quality or technological upgrading, if you want to understand the latest information of this product, please contact us.

- The shelf life of this product is within 60 months after it is delivered, we will maintain the product, which is in the warranty period for free of charge, if it has any product quality problems within the specified operation range, we may replace the relevant parts if we fail to maintain it.

- To achieve the purpose of sustainable use without performance reduction, our after-sales service personnel will propose the specific maintenance and troubleshooting methods in case of any questions, please contact us.

WARRANTY CARD			
Product Name		Model Number	
BATCH NO.		Shiping Date	
The Buyer		Phone	
Address			

If a device becomes defective during the agreed warranty period, please report the defective device situation to the original manufacturer with this warranty card. Supplier or end users required to send the warranty claim form to the original manufacturer or authorized service partner with all the necessary information. Customers must present this warranty card, battery purchasing invoice, extension warranty letter if applicable, and other related materials as well if required. It is the responsibility of the warranty holder to substantiate the warranty claim and show that the conditions are met. Please note the original manufacturer reserve the ultimate explanation right on this warranty card.

THANK YOU FOR CHOOSING

LET'S DEVELOP TRUST AND BUSINESS

Best Solution Lithium Battery

Since 2003, BSLBATT provides electric energy more efficiently and reliably as best solution. Powerwall charges by day and powers at night for residential solar system with compact, affordable, and easy installation features.

BSLBATT Battery - Solar

inquiry@bsl-battery.com
+86-752 2819 469

Building 1, Zhongkai Innovation Base of Lihe Science and Technology, Huizhou, Huizhou City, Guangdong Province, China