USER MANUAL

Lithium Battery

CMLB-51.2-230
Wall-Mounted
LiFePO4 Battery System

User Manual

Content

Definition of Terms

The following acronyms and abbreviations are used in this manual.

BMS	Battery Management System
SOC	State of Charge
SOH	State of Health
DOD	Depth of Discharge
Battery Module	Multiple cells connected together
Cabinet	A carrier that carries multiple modules

1 Overview

1.1 Application Scope

This manual introduces the information about CMLB-51.2-230 wall-mounted battery products, including product specifications, operation specifications, product maintenance and other related information.

1.2 Applicable People

This manual is used for professional and technical staff who installs, operates and maintains the batteries, as well as for the end-user who may need to view the relevant technical parameters.

1.3 User Manual

Please read the user manual carefully before use to ensure that the person using the product is fully understood. After reading, please keep it in a safe place for future reference.

1.4 Disclaimers

It may cause serious injury to yourself or others, or result in damage to the product or property, if fail to operate this product properly. Once using, you will be deemed to have understood, acknowledged and accepted all the terms and contents in this document. Users undertake to be responsible for their own actions and all the consequences arising therefrom. The Company shall not be liable for all damages caused by the user's failure in accordance with the provisions of this document and the user manual.

The content of this manual will be constantly updated and revised, and update, revision or termination without prior notice. So please obtain the latest product manual.

2 Product description

CMLB-51.2-230 wall-mounted lithium battery products are developed for low-voltage small and medium-sized energy storage system applications. These products adopt the highest safety performance lithium iron phosphate cells, with a high-precision battery management system (BMS), which can monitor and collect voltage, current and temperature of each cell in the module in real time. The BMS also has a passive balance function, advanced battery control strategy, which can improve the performance of the battery pack further.

The battery module consists of LFP cells , BMS, housing and wire, each module owns complete protection function. The module can be installed on the wall and establish communication with the outside devices through CAN/RS485; the modules interact with each other through RS485.

3 Safety Instructions

3.1 Label Description

In order to ensure the user's personal safety when using this product, this manual provides relevant identification information and uses appropriate symbols to alert the user, who should carefully read the following list of symbols used in this manual.

Table 3-1 Label description

	Potentially low risk: may result in mild or moderate impairment if not avoided
	High Risk: May result in serious injury or death if not avoided
	The battery terminals must be disconnected before commencing on the battery
	The battery could explode and/or be severely damaged if dropped or crushed
	The battery may explode if exposed to open flames or other extreme sources of heat
	Grounding: The system must be firmly grounded for operator safety
	This side should be up
	Handle with care to avoid damage
	Keep dry
	Keep the battery away from kids
	Do not short circuit
	Do not reverse connection the positive and negative

3.2 Installation Tools

Table 3-2 Installation tool sheet

Tools	Multi-meter 	Protective gloves 	Insulated anti-smashing shoes 
	Protective suit 	Safety glasses 	ESD wrist strap 
Installation Tools	Electric screwdriver 	Cross screwdriver 	Socket spanner 
	Slotted screwdriver 	Wire stripper 	

3.3 Attention Items

3.3.1 Manual Custody

This manual contains important information about the CMLB-51.2-230 wall-mounted lithium batteries. A careful reading of this manual will help you become familiar with this product, and this manual should be kept in a safe place so that it can be easily accessed by maintenance personnel at any time when needed.

3.3.2 Product Identity Protection

Warning labels, back panels and front doors of cabinet contain important and safety protection information and are strictly forbidden to be torn and damaged.

3.3.3 Operator Requirements

Only trained and qualified professionals should perform various operations on the product: the product operator should be fully familiar with the product's system components and operating principles, as well as understanding the product's user manual.

3.3.4 Safety Warning

During the installation, daily maintenance, overhaul and other operations of CMLB-51.2-230 products, the following conventions should be observed in order to prevent the accidental operation, proximity or occurrence of accidents by unrelated personnel: the front and rear switches of the products should be clearly marked to prevent accidents caused by wrong switches; warning signs or safety warning belts should be set near the operation area to prevent the proximity of unrelated personnel.

3.3.5 Electric Measurement

Due to the high voltage of the battery that may endanger personal safety, accidental contact may cause serious injury, so when you need to perform measurement operations, please take good insulation protection (such as insulating gloves).

3.3.6 Measuring Instrument

In order to ensure that the electrical installation meets the requirements, please use the relevant electrical measuring equipment, such as multi-meter, power meters, etc.

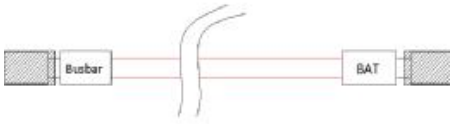
3.3.7 Maintenance

During maintenance and repair operations, it should be ensured that the energy storage battery cabinet is not accidentally charged; a multi-meter, should be used to ensure that there is no electricity in the energy storage battery cabinet; insulating materials should be used to insulate the possible electrical parts of the system; ensure that the system has necessary grounding connections.

4 Main Components

The core components of the battery module are shown in Table 4-1 below:

Table 4-1 Main components sheet

No	Item	Picture
1	Battery Module (51.2V 230Ah)	
2	Power Cable	
3	Communication Cable	

5 Battery module specification

Item		Specification	Conditions
Nominal	Voltage	51.2V	25℃,0.2C
	Capacity	230Ah	
Module weight		99.0kg	±1kg
Dimensions(W*D*H), mm		455*740*234	±2mm
Operating parameters	Charging Voltage	56.0V~57.0V	
	Discharging Voltage	44.8V	The recommended discharge depth is 80%DOD, and it is about 50V
	Charging current	Max constant charge: 200A	Recommended 100A
	Discharging current	Max constant discharge: 200A	
Temperature	Charge range	0℃~50℃	
	Discharge range	-20℃~55℃	
	Storage range	-20℃~55℃	
BMS	Built-in BMS	Voltage, current, temperature management & cell balance	RS485,CAN communication

6 Product Description

6.1 Product Introduction

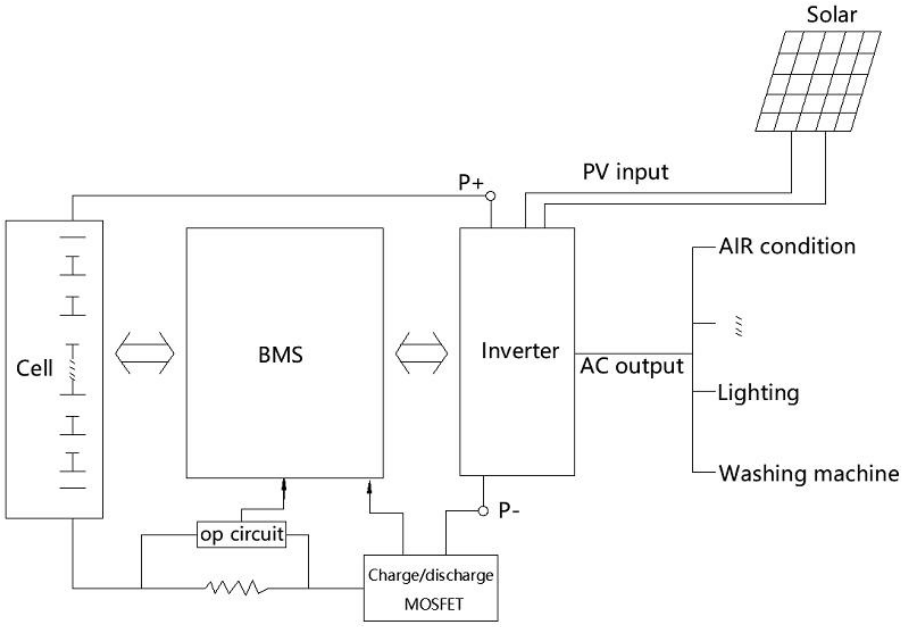
CMLB-51.2-230 wall-mounted energy storage products are modular products designed by Crown Micro Pvt. Ltd. for energy storage applications, and are widely used in small and medium-sized energy storage systems. A single module consists of cells, BMS and shell, and the BMS in each module has independent voltage, current, temperature detection and protection functions.

6.2 Working Principle

Under normal circumstances, the grid AC power supply, generator or solar energy system supplies power to the load and charges the battery pack; when the power supply fails or stops supplying power, it switches to battery power supply to ensure normal operation of the equipment; when the power supply is on again, restore power to the load and charge the battery pack again.

6.3 Connection Diagram

Figure 6-1 Working principle diagram of battery system



7 Module Description

7.1 Module Specification

CMLB-51.2-230 wall-mounted battery adopts the highest safety performance lithium iron phosphate battery. Each battery module has a built-in full-featured and high-precision battery management system (BMS), which can realize real-time monitoring of voltage, current and temperature, and has a passive balancing function, which can effectively improve battery performance.

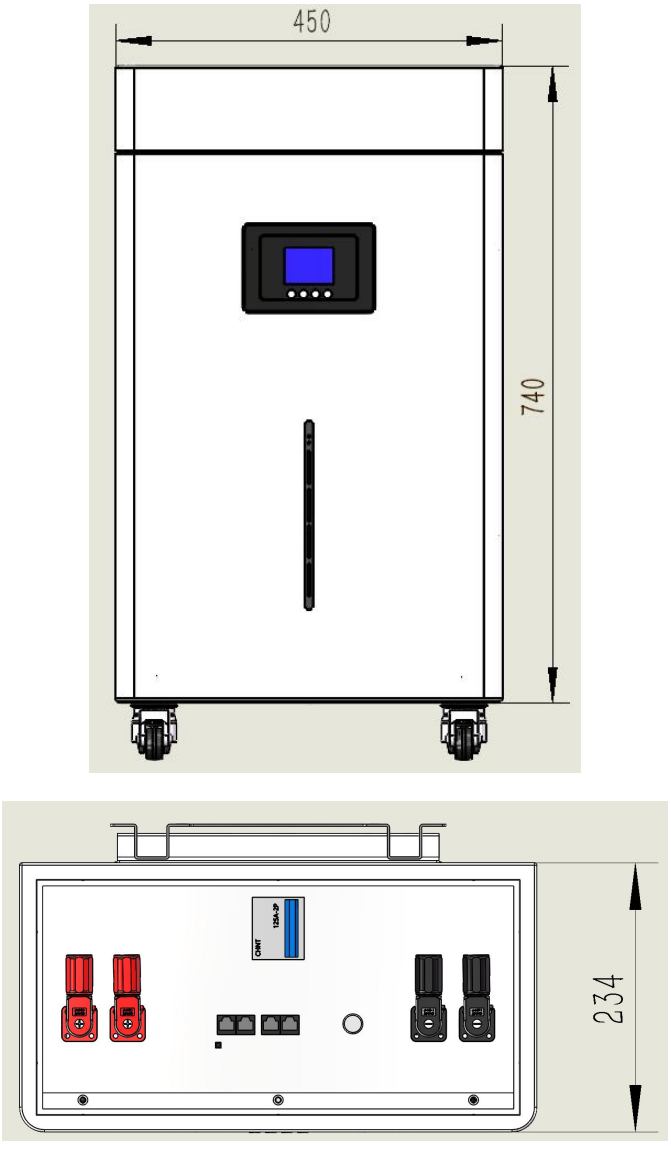
Table 7-1 CMLB-51.2-230 wall-mounted battery module specification

Type	Voltage	Capacity	Energy	Width	Depth	Height	Weight
CMLB-51.2-230	51.2V	230Ah	12KWh	455mm	740mm	234mm	99±1kg

7.2 Module Illustration and Front Panel Description

7.2.1 CMLB-51.2-230 Appearance & Dimension Schematic

Figure 7-1 CMLB-51.2-230 Appearance & dimension drawing



7.2.2 CMLB-51.2-230 Front Panel Diagram

Figure 7-2 CMLB-51.2-230 front panel diagram

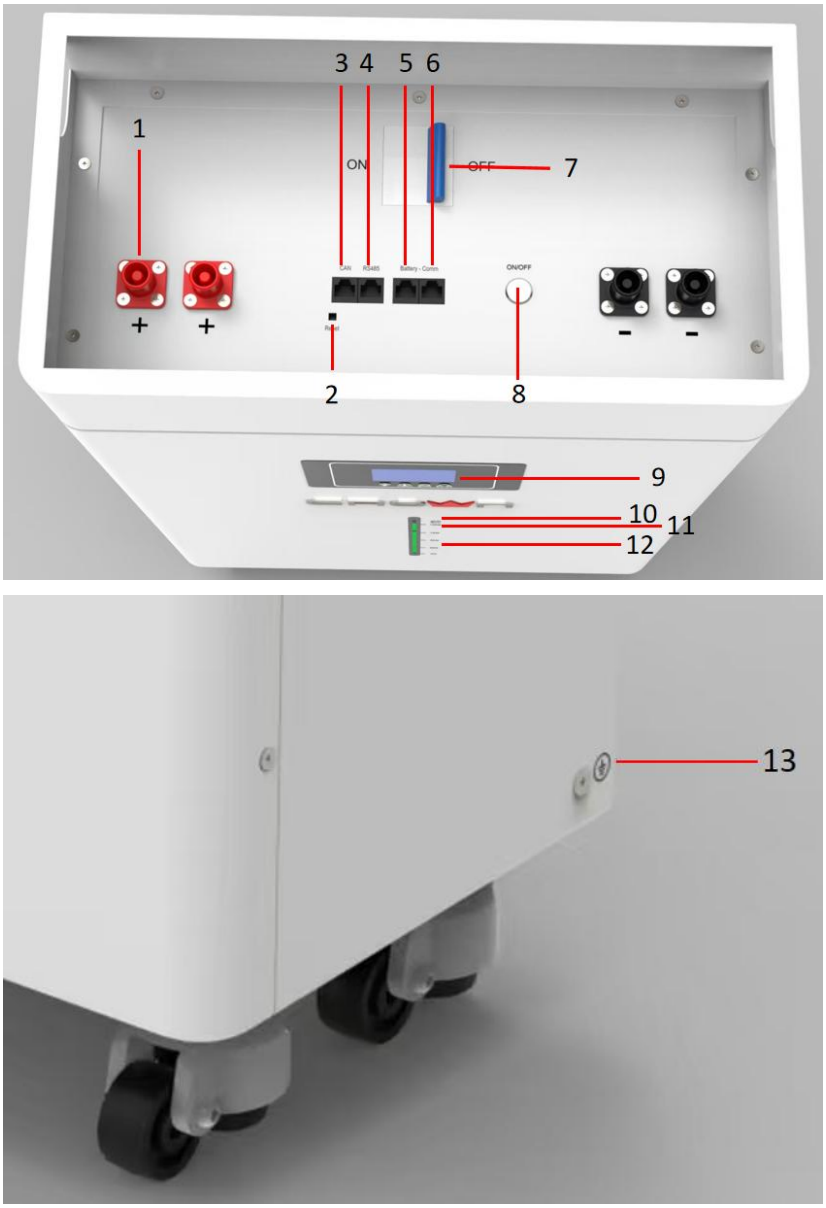


Table 7-2 CMLB-51.2-230 front panel interface description

No.	Item	Function Description	Remarks
1	Terminal	Positive/Negative	Plug-in type
2	RESET	Emergency restart button	
3	CAN	CAN Communication interface	
4	RS485	RS485 Communication interface	
5	Battery-Comm	Communication port	Only for battery communication

6	Battery-Comm	Communication port	Only for battery communication
7	Breaker	Output power switch	
8	ON/OFF	Button Switch on/off the BMS	On the side
9	LCD	LCD Screen	
10	ALM	Alarming indicates LED	4 nos green LED
11	RUN	Operating indicates LED	
12	SOC	The state of charge	
13	GND	Ground point	

7.3 ID Setting Description

The smart BMS automatically changes and recognizes the DIP address, so there is no need to manually change the DIP address on the battery.

7.4 LED Indicator status and definition

Table 7-3 LED indicator status and definition

Status	**Normal/Alarm/ Protection**	**RUN**	**ALM**	**SOC Indicate LED**	**Notes**
		●	●	SOC1~SOC4●	
Shutdown / Sleep		OFF	OFF	OFF	
Stand by	Normal	ON	OFF	Based on battery indicator （Each LED indicators 25%SOC）	
Charge	Normal	Flash 1	OFF		
	Alarm	Flash 1	OFF		
	End-off Voltage	ON	OFF		
	Over-Temp Protection	OFF	ON		
	Over-current transfer limit -current	Flash 1	Flash 3/OFF		Over-current flash 3, limit-current OFF
Discharge	Normal	Flash 2	OFF	Based on battery indicator	
	Alarm	Flash 2	Flash 3		
	End-off Voltage	OFF	OFF		Go to sleep
	Over-Temp/Over-current Protection	OFF	ON		

Notes: Flash 1: flash once every 1 second; Flash 2: flash once every 1.5 seconds; Flash 3: flash once every 2 seconds

7.5 Communication Interface Diagram and Description

Figure 7-4 Communication interface diagram

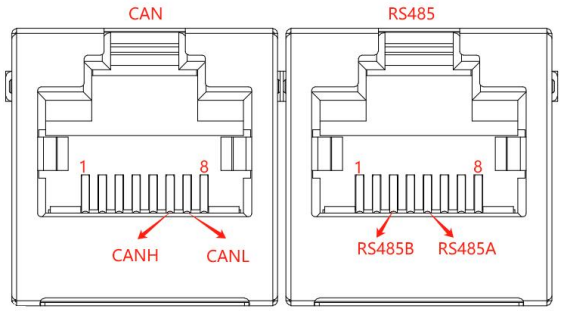


Table 7-4 Communication interface definition

CAN- interface		**RS485 interface**	
Pin No.	Definition	Pin No.	Definition
PIN-6	CAN_H	Pin-1,Pin-3	RS485 B-(T/R-)
PIN-7	CAN_L	Pin-2, Pin-5	RS485 A+(T/R+)
Others	NC	Others	NC

8 Module Auxiliary Accessories

8.1 Power Cable

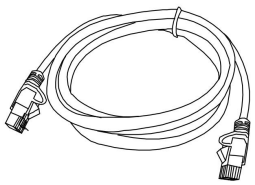
Table 8-1 Power cable specification

Picture	Item	Specification
	Cross-sectional area	2AWG
	Cross-sectional area	2AWG

8.2 Communication Cable

The communication line is suitable for the information interaction between battery and inverter.

Table 8-2 Communication cable specification

Picture	Item	Specification
	UL Rating	UL1007
	Parameter	CAT6

9 System Installation

9.1 Handling, Transportation, Storage

9.1.1 Handling

Rough handling practices may cause short circuit or damage to the battery pack, resulting in battery leakage or fire. Forklifts or carts should be used for handling, and materials transported should not exceed the width and height of aisles and doors, and should be transported at a moderate speed. Avoid the phenomenon of inverted and laminated battery packs when unloading.

9.1.2 Transportation

Due to the heavy weight of the battery module, in order to guarantee safety, it is recommended to use a forklift that meets the requirements for moving and transporting, and should avoid dropping and throwing; the equipment should be prevented from collision and strong vibration during transportation.

Figure 9-1 Handling tool diagram

9.1.3 Storage

Short-term storage (within 3 months): If the battery is not used in a short period of time, the battery can be fully charged and stored in a dry, cool, non-corrosive gas, temperature 10-45°C, relative humidity 60±30%, no strong electromagnetic fields and in direct sunlight.

Long-term storage (over 3 months): If the battery is not used for more than 3 months, keep the battery SOC at 50%~70%, store it in a dry, cool, non-corrosive gas, temperature 20-35 ℃, relative humidity 50 ± 15 %, in an environment without strong electromagnetic fields and direct sunlight, and ensure to charge once every 6 months to avoid irreversible capacity loss caused by long-term storage.

9.2 Open-box Inspection

9.2.1 Unpacking Tools

Table 9-1 Unpacking tools sheet

Item	Tools		
Tools	Slotted screwdriver 	Protective gloves 	Stripper 
	Hammer 		

CMLB-51.2-230 products have been strictly tested and tested before leaving the factory. Please sign for them after inspection. If the product is damaged, please contact the local distributor in time.

Please open the box to check: whether the outer packaging is intact or damaged; whether the quantity and type of goods on the bill of materials are consistent with the description; whether the internal equipment is damaged.

9.2.2 Packing List

Table 9-2 Packing list

Parts List		
Item	Item name	Qty
1	Battery Pack	1
2	Explosion screw, M8*70	4
3	Power cable between battery and Inverter (50mm²_1.5m)	2
4	Communication cable_1.5m	1
5	SC35-8Nickel plated terminal	2
6	warranty card	1
7	Specifications	1
8	certificate	1

9.3 Mechanical Installation

9.3.1 Installation Requirements

The installation position of the battery cabinet has a direct impact on its safety, service life and performance. It should ensure that the wiring of the system is convenient, easy to maintain and operate, and should avoid placing the battery cabinet in a high temperature and high humidity environment.

1. Installation space and load bearing. Make sure that there are sufficient fixed components to install the battery, and to ensure the battery mounting bracket or the cabinet be strong enough to bear the weight.
2. Cable specifications. To ensure that the use of the connection of the power supply line can match the maximum current requirements of equipment operation.
3. Layout. Ensure the whole construction process of power equipment, batteries reasonable layout.
4. Wiring layout. Ensure the wiring reasonable,orderly; consider the moisture-proof, corrosion prevention.
5. The whole installation process should wear anti-static wristband.
6. The installation site should be at least two or more peoples to operate.

9.3.2 Expansion Screws Fixing

A pen is used to mark the position of the 6 holes. The holes distance is 345mm*150mm for 51.2V230Ah . Then drill 8 mm holes and make sure the depth of the holes is deeper than 70mm. Install the expansion tubes into the holes and tight them, then use the expansion screws (packaged together with the expansion tubes) to install and fix on the wall.

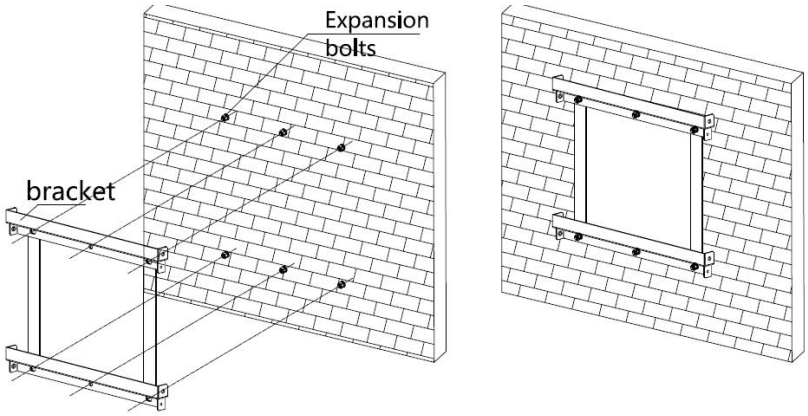


Figure 9-2 Expansion screws fixing

9.3.3 Battery Fixing

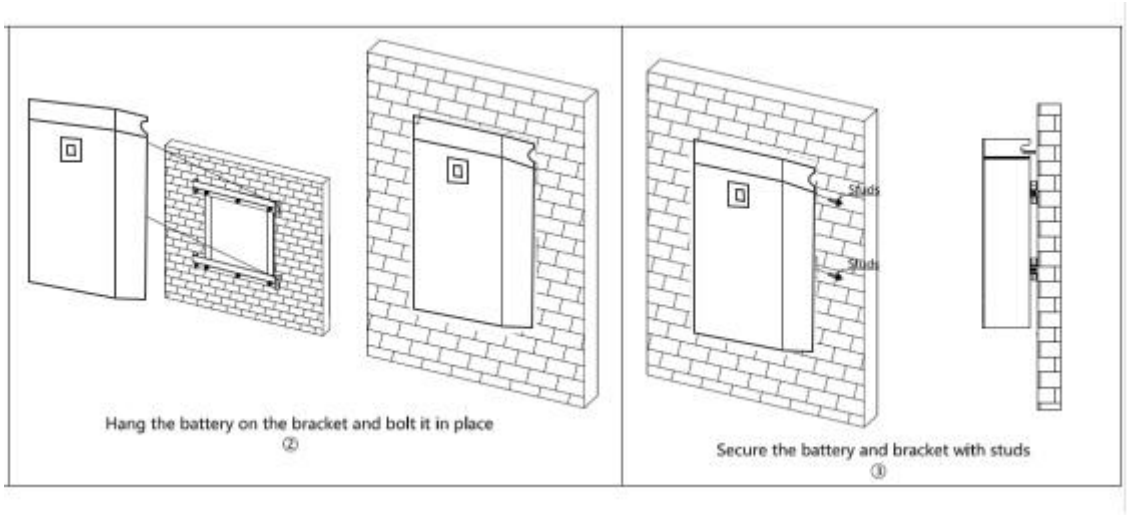


Figure 9-3 Install the battery on the wall

⚠ Install the battery on the wall and lock the battery using the security screws.

1.Single battery module is about 70/90kg. If without handling tools must have more than 2 men to handling with it. Handles on the two sides of the battery can be used to handle.

2.And the battery has feet for standing on the ground application, If you can't hang the wall, you can also use it on the ground, but need be careful of falling.

9.4 Electrical Installation

9.4.1 Tolls Introduction

The following tools are required for electrical connection, as shown in Table 9-4-1:

Table 9-3 Electrical installation tools diagram

Item			
Tools	Multi-meter 	Protective gloves 	Screwdriver 
	Electric batch 	Cross screwdriver 	Socket wrench 

9.4.2 Terminals Connection

1. One end of the grounding cable（PVC 25mm2）is screwed to the grounding hole at the end of the chassis（M5）, and the other end is connected to the grounding copper strip to ensure a solid connection.

2. Connect to Inverter with power cable and communication cable.

3. Connect the battery module RS485/CAN interface to the PC monitor or SMPS or UPS controller.

4. Push the “ON/OFF” button to start the battery system.

5. Check the battery data and ensure the battery is on normal operation.

Caution：If you have any question about the installation, please stop and contact technical support immediately. If the battery does not start or control panel ALM lights, please disconnect the power line inspection and re-install the start, if still cannot solve please contact technical support, avoid damage to equipment or cause accidents.

9.4.3 Battery Wiring Diagram

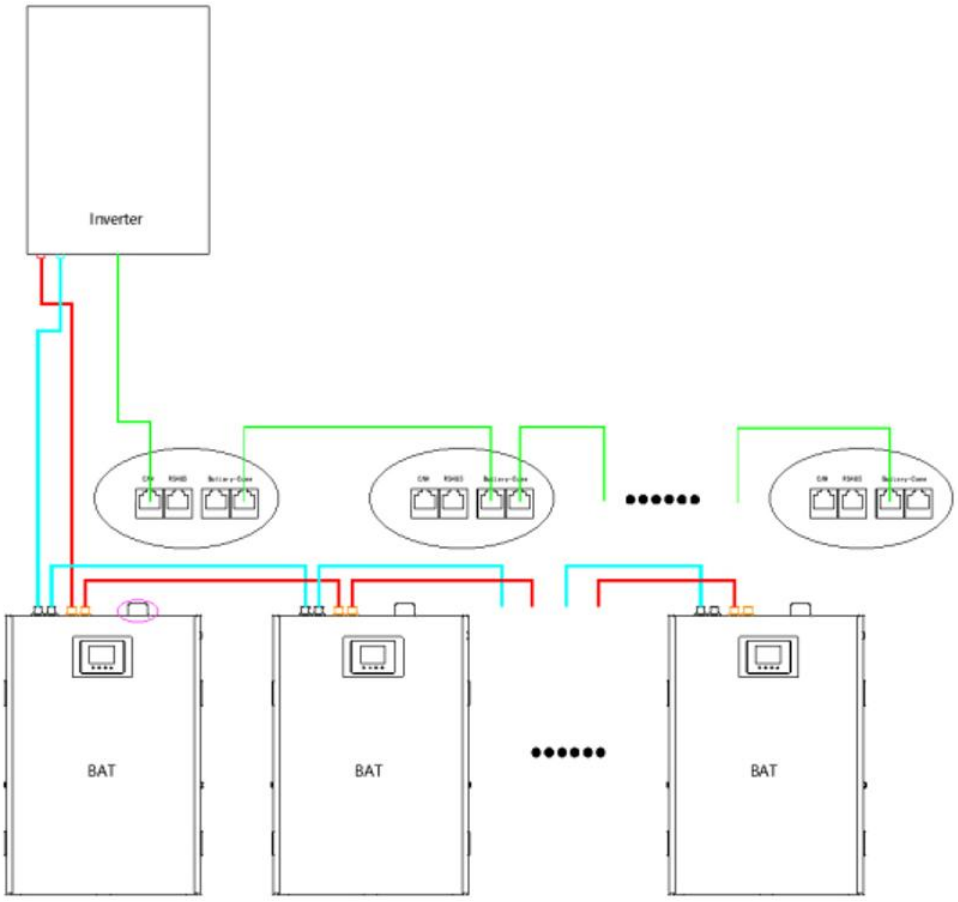


Figure 9-4 Battery Wiring Diagram

Tips：

1) If there is only one battery , the No.1 battery directly connect to the inverter. And the communication port of battery connected to the corresponding inverter communication port.

2) The smart BMS automatically changes and recognizes the DIP address, so there is no need to manually change the DIP address on the battery.

9.5 System Starting Up

9.5.1 Start Up Checking

⚠ After installation or maintenance, the lithium battery system needs to be started up. Before starting up, please check the following precautions carefully to make sure there are no errors.

All electrical connections must be made in accordance with the electrical diagrams in the manual; the DC combiner box must be open; the cables are properly distributed, without mechanical damage, and connected and fastened

correctly; the internal protection devices in the combiner box must be firmly installed; No excess parts or conductive material remains.

9.5.2 Start Up

 After completing the above steps, press the ON/OFF switch on the control panel to turn on the machine, then turn on the miniature circuit breaker and turn on the power of the whole system to complete the installation.

9.5.3 System Charge

 When the battery system is transported or stored for a long time, the battery SOH may be low due to self-discharge of the cells and system consumption, and the lithium battery needs to be charged after normal start-up and before use.

10 LCD Screen and PC Software

Each module has a built-in LCD display，and the PC software is only suitable for installation, maintenance.

10.1 LCD Display Introduction

LCD display is embedded in each battery module，it's used to display some important information about the cells, such as voltage, current, temperature, SOC, capacity, running status etc.

10.1.1 Button Description

There are 4 function buttons below the display with detailed descriptions as shown in the table below.

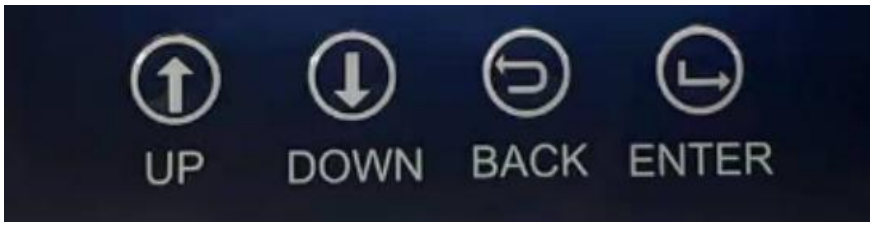


Figure 10-1 Button description

The corresponding function description for each button is shown in the table below.

Table 10-1 Button description Table

No.	Item	Description
1	UP	Page up
2	DOWN	Page down
3	BACK	Return
4	ENTER	Confirm

10.1.2 Button Description

The 6 lights are described in detail in the tablebe low.

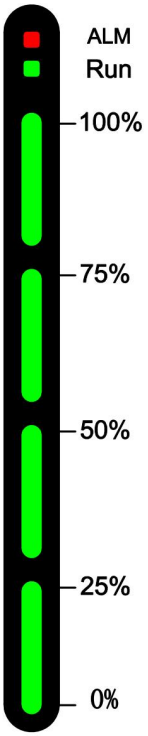


Figure 10-2 Button description

The corresponding function description for each button is shown in the table below.

Table 10-2 Button description Table

No.	Item	Description
1	ALM	trouble light
2	Run	Equipment running light
3	0%	0% Electricity
4	25%	25% Electricity
5	50%	50% Electricity
6	75%	75% Electricity
7	100%	100% Electricity

10.1.3 Screen Wake Up

Press any key to wake up the screen when power is on, and more information will be shown on the display.

Figure 10-3 Main Page information

Table 10-3 Main page information introduction

Battery module name	CMLB-51.2-230 wall-mounted		
Battery status	Standby	Battery module voltage	Vol：53.34V
Capacity	230Ah	Battery SOC	SOC：100%
System time	2024-02-23 15:49	Maxcharging voltage	56V
Low cut off voltage	44V		

10.1.4 Cell Information

Press the “Enter” button, check the cell information, there are 2 pages, “Up” and “Down” to change the page. Page 1 is for cell 01~ cell 9, page 2 is for cell 10 ~cell 16.

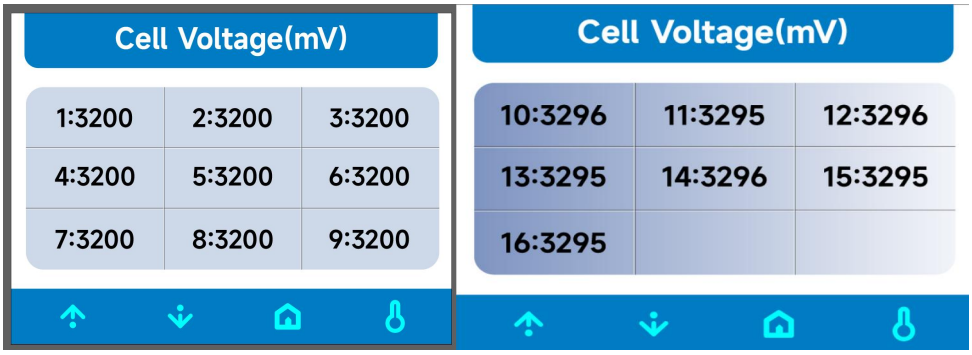


Figure 10-4 Cell information

10.1.5 Temperature Information

In the above interface, click the thermometer icon on the screen and press "Enter" below to view the information under the corresponding icon.

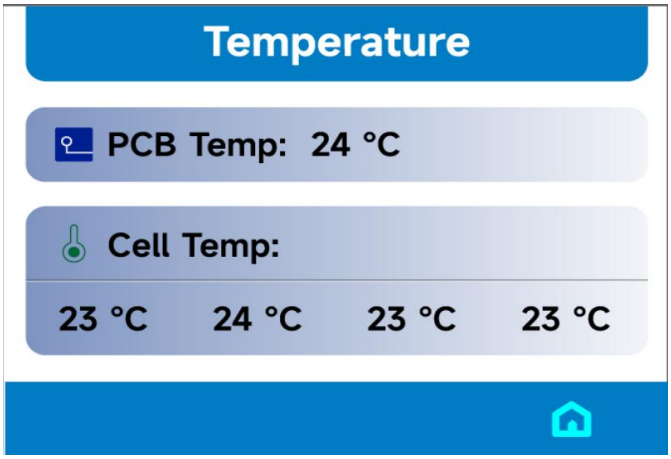


Figure 10-5 Temperature information

10.1.6 Working Mode Selection

Press and hold Back for 5 seconds to enter the working mode; select the corresponding 485 program or CAN program, and click Enter; press the return key to return to the main interface, power on again, and the battery will correspond to the program.

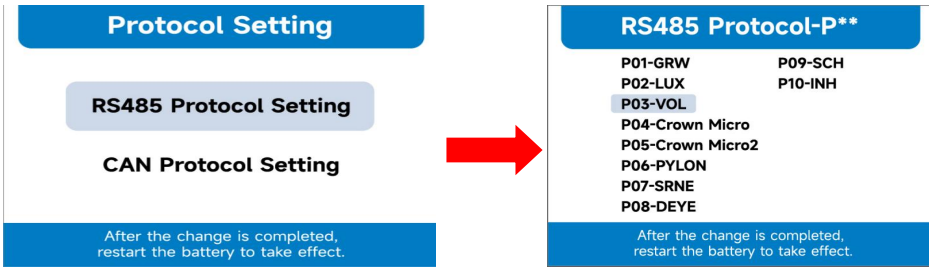


Figure 10-6 Working mode selection—RS485

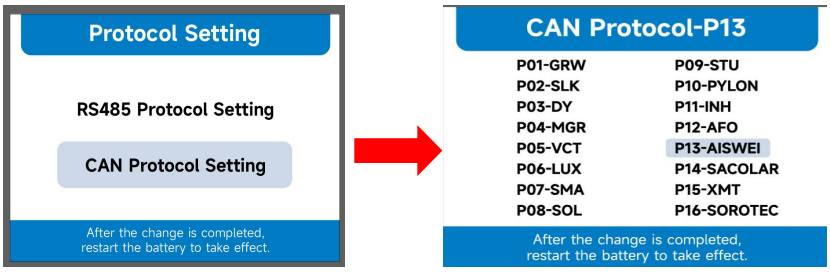


Figure 10-7 Working mode selection—CAN

Notes:

The protocol can only be changed at battery NO.16 . After the change is completed, restart the battery to take effect.

The protocol list below

Table 10-4 The communication protocol list

RS485		**CAN**	
Protocol Name	**Inverter's Brand Name**	**Protocol Name**	**Inverter's Brand Name**
P01-GRW	Growatt	P01-GRW	Growatt
P02-LUX	Luxpower	P02-SLK	Sol-Ark
P03-VOL	Voltronic	P03-DY	Deye
P04-Crown Micro	Crown Micro	P04-MGR	Megarevo
P05-Crown Micro2	Crown Micro2	P05-VCT	Victron
P06-PYLON	Pylon	P06-LUX	Luxpower
P07-SRNE	SRNE	P07-SMA	SMA
P08-DEYE	DEYE	P08-SOL	Solis
P09-SCH	Schneider	P09-STU	Studer
P10-INH	Inhenergy	P10-PYL	Pylon
		P11-INH	Inhenergy
		P12-AFO	Afore
		P13-AISWEI	Aiswei
		P14-SACOLAR	Sacolar
		P15-XMT	XMT
		P16-SOROTEC	Sorotec

11 Maintenance

11.1 Common Faults (Phenomenon) and Solutions

Common faults and solutions are shown in table 11-1.

Table 11-1 Common faults (phenomenon) and solutions

NO.	Fault phenomenon	Analysis	Solution
1	Communication failure with inverter	Communication port connect error	Refer 8.4.2
2	No DC output	Not close breaker or low voltage	Close breaker or charge the battery
3	Power supply time is too short	Battery capacity lack or not full power	Maintenance or replacement
4	Battery can't be charged fully	Power system DC output voltage falls below the minimum charge voltage	Regulating DC output voltage of power supply to battery suitable charging voltage
5	ALM LED always lights	Power line connection short circuit	Disconnect the power cable and check all cables
6	The battery output voltage is unstable	Battery management system do not operate normally	Press the reset button to reset the system, then reboot the system
7	ALM LED flash 20 times and SOC1 LED on	Unbalance voltage with cell	Examine/balance the cell
8	ALM LED flash 20 times and SOC2 LED on	Unbalance temperature	Replace temperature senor cable
9	ALM LED flash 20 times and SOC3/4 LED on	BMS damaged	Replace BMS
10	Different SOC value of batteries in parallel	Normal phenomenon	No operation

11.2 Daily Maintenance

Routine maintenance items are shown in Table 11-2 below.

Table 11-2 Routine maintenance items

Item	Maintenance Method	Maintenance intervals
Power Cables 	1. check whether there is mechanical damage to the power cable and whether the terminal insulation sleeve has fallen off; if there is such a phenomenon, please turn off the machine and carry out maintenance or replacement. 2. check whether the power cable is loose; if there is any sign of looseness, please use a standard torque wrench to tighten it. 3. check the system for loose screws or discoloration of the copper bus bar; if the screws are loose, please tighten them with a standard torque wrench; if the copper bus bar is discolored, please contact the manufacturer for after-sales replacement.	Once every 6 month
Communication Cables 	1. check whether the parallel communication cable terminal is loose, if it is loose, re-tighten it. 2. check whether the color of the communication cable has obvious discoloration, if discoloration, please shut down the machine to replace the communication cable	Once a year
Cabinet Cleanliness	Check the cleanliness of the front door, back door and battery module inside the cabinet, if there is obvious dusty, please clean up in time.	Once 6-12 month
System running status 	1. check if all parameters are normal when the system is running (system voltage, current, temperature, etc.) 2. check whether the main core components of the system are normal, including system switches, contactors, etc. are normal 3. check whether the system air inlet and outlet, air ducts are normal, if there is blockage and congestion, need to clean up in time	Once every 6 month
Charge and discharge maintenance	Use light load and shallow charge/discharge to check whether the SOC, SOH status of the battery is normal (using the upper computer software to read); it is recommended that the depth of discharge and charge/discharge power should not exceed 20% of the rated value	Once every 6 month

12 Cautions and Warranty

12.1 Cautions

 Please read and comply with the following conditions of installation and use of the battery, incorrect installation using the battery may cause personal injury or damage to the product.

(1) DO NOT throw the battery into water. Store batteries in cool and dry environment.

(2) DO NOT put the battery into fire or heat the battery, so as to avoid explosion or other dangerous events.

(3) When charge the battery, please choose specialized charging equipment, and follow the correct procedures, do not use unqualified chargers.

(4) DO NOT reverse positive and negative terminals, do not connect the battery directly to AC power, avoid battery short circuit.

(5) DO NOT using batteries from different manufacturers or different kinds, types together, and do not mix old batteries and new batteries.

(6) DO NOT use the battery when it is hot, bulges, deforms or leaks.

(7) DO NOT puncture the battery by nail or other sharp objects; Do not throw, stamp on, impact or hit the battery.

(8) DO NOT open or try to repair the battery when it is defective. Warranty invalid if the battery repaired or disassembled.

(9) Batteries are half charged before shipment, Don't use the battery if it's hot, bulge, or smell abnormal and so on, and report to after-sale dept. immediately.

(10) If you need storage the battery for a long time, please charge and discharge the battery every three months to ensure the best performance, and the best state of charge for storage is between 50%~60%.

(11) Please use the battery in the temperature range which defined in the manual.

(12) The state of charge of batteries is 50% before shipment, please charge the battery before using.

12.2 Description of Warranty

We promises that during the valid warranty period of the product, any problems such as product damage or functional failure caused by non-human or intentional damage will enjoy our free repair and replacement services. Customers need to provide a valid purchase invoice or related product warranty information. If no valid proof can be provided, our company has the right to refuse to provide related services.