LIGHTWAVE Touch Screen Lithium Battery Bank User Manual

LW-LiFe-EL-16KW; LW-LiFe-EL-18KW; LW-LiFe-EL-25KW

Thank you for using this product, LIGHTWAVE are committed to providing high quality, most cost-effective energy products to users all over the world.

Contents

Warning:

- Lightning has great destructive power. If buildings are not equipped with lightning protection devices, lightning can directly damage the buildings and their indoor electronic and electrical equipment, including batteries. To prevent lightning damage to batteries, ensure that lightning protection devices are installed at the AC and DC terminals outside the battery.
- Important Note:

Before using the battery for the first time, please perform one complete cycle of full discharge and charge to ensure the State of Charge (SOC) is displayed correctly.

If this step is skipped and issues occur with the SOC, perform a full cycle of complete discharge and charge to resolve the issue.

Troubleshooting steps:

1. This is a common and typical occurrence.
2. Even the slightest disparities in internal cell voltages, state of charge, cell resistance, BMS resistance, and even the voltage drop of the mosfets can result in the two separate battery strings carrying different amounts of current.

However, in real-world situations, this should not pose a problem as long as proper planning is in place. When current is drawn, one battery may supply more power initially. This causes that battery to discharge slightly faster, eventually leading to a drop in its internal voltage. At that point, the other battery will begin to carry more of the load. Once this process starts, the cells will self-balance.

With lithium iron phosphate (LFP) cells, voltage changes occur gradually, so it may take some time for the balance to be fully achieved.

1. Basic Information

1.1 Product Overview and Features

Our products undergo strict testing and inspection before leaving the factory. If you detect any abnormalities in the equipment, please contact the provider immediately.

The **LW-LiFe-EL Series** is an advanced energy storage solution designed for use in photovoltaic solar systems.

Product Features:

- **Premium Components:** Built with high-quality lithium iron phosphate aluminum shell cells, a high-efficiency Battery Management System (BMS), and an anti-static metal shell.
- **Enhanced Stability:** Square aluminum shell cells provide excellent stability and rapid heat dissipation.
- **Reliable BMS:** The BMS ensures effective management of overcharge, over-discharge, short circuits, and over-temperature conditions, enhancing safety and performance.
- **Robust Protection:** The thickened metal shell offers superior durability and protection against external elements.

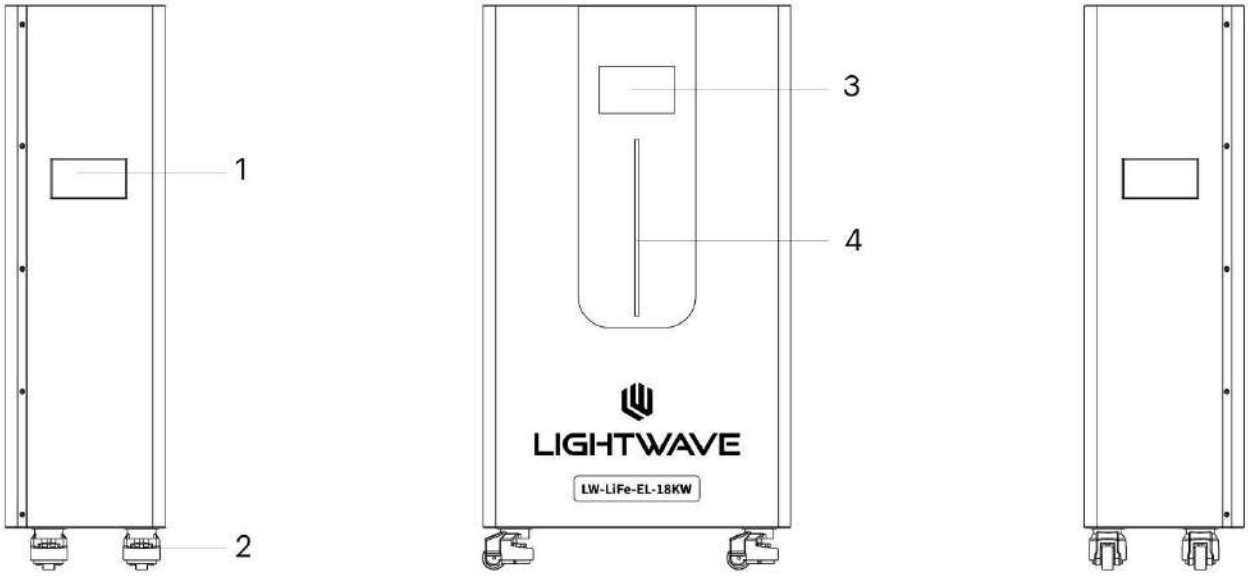
System Features:

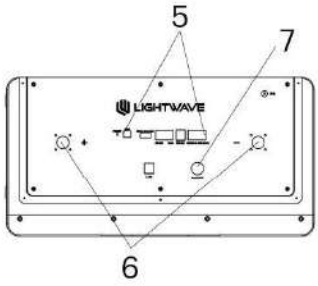
- The **LW-LiFe-EL-16KW and LW-LiFe-EL-18KW** model delivers a continuous 150A discharge and 150A charging capacity.
- The **LW-LiFe-EL-25KW** model delivers a continuous 200A discharge and 200A charging capacity.
- Supports **6,000 cycles** at 80% Depth of Discharge (DOD), ensuring long-lasting reliability.
- Capable of parallel connection to create larger capacity battery packs, meeting long-term power supply requirements.
- Incorporates a **closed-line design** to prevent dust and insects from obstructing the interface, increasing operational safety and ease of use.

1.2 Basic parameters

ITEM	SPECIFICATIONS
Model	LW-LiFe-EL-16KW
Nominal Voltage	51.2V
Rated Capacity	305Ah
Usable Capacity	310Ah
Energy Power	16kWh
Equalized Charge Voltage	57.6V
Float Charge Voltage	56V
Max.Continuous Charging Current	150A
Max.Continuous Discharging Current	150A
ITEM	**SPECIFICATIONS**
Model	LW-LiFe-EL-18KW
Nominal Voltage	51.2V
Rated Capacity	314Ah
Usable Capacity	340Ah
Energy Power	18kWh
Equalized Charge Voltage	57.6V
Float Charge Voltage	56V
Max.Continuous Charging Current	150A
Max.Continuous Discharging Current	150A
ITEM	**SPECIFICATIONS**
Model	LW-LiFe-EL-25KW
Nominal Voltage	51.2V
Rated Capacity	460Ah
Usable Capacity	500Ah
Energy Power	25kWh
Equalized Charge Voltage	57.6V
Float Charge Voltage	56V
Max.Continuous Charging Current	200A
Max.Continuous Discharging Current	200A

1.3 Product function introduction



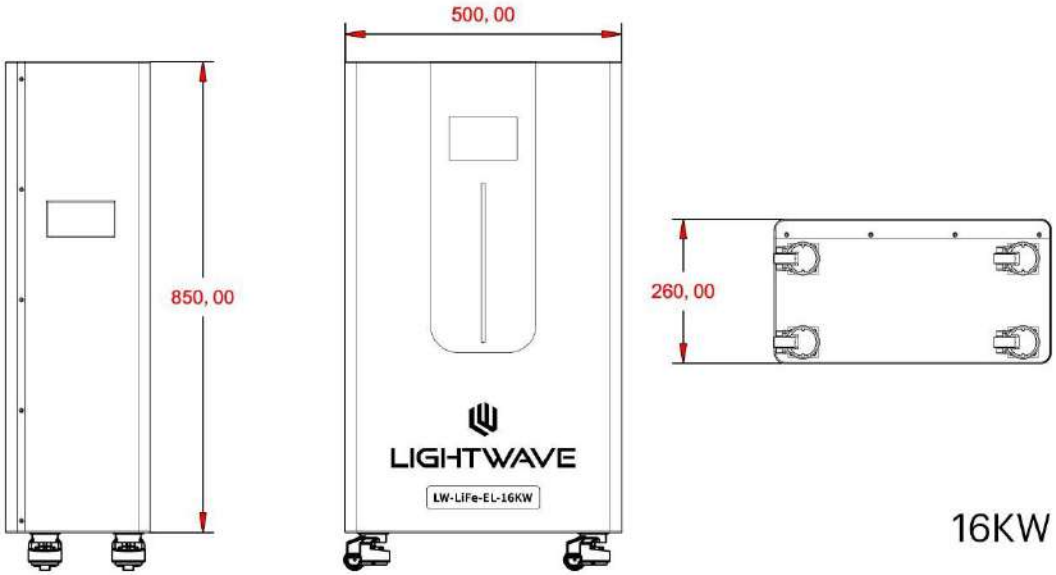


1. Handle
2. Wheels
3. Touch screen
4. Indicator light
5. Communication interface
6. Output terminal
7. Power switch

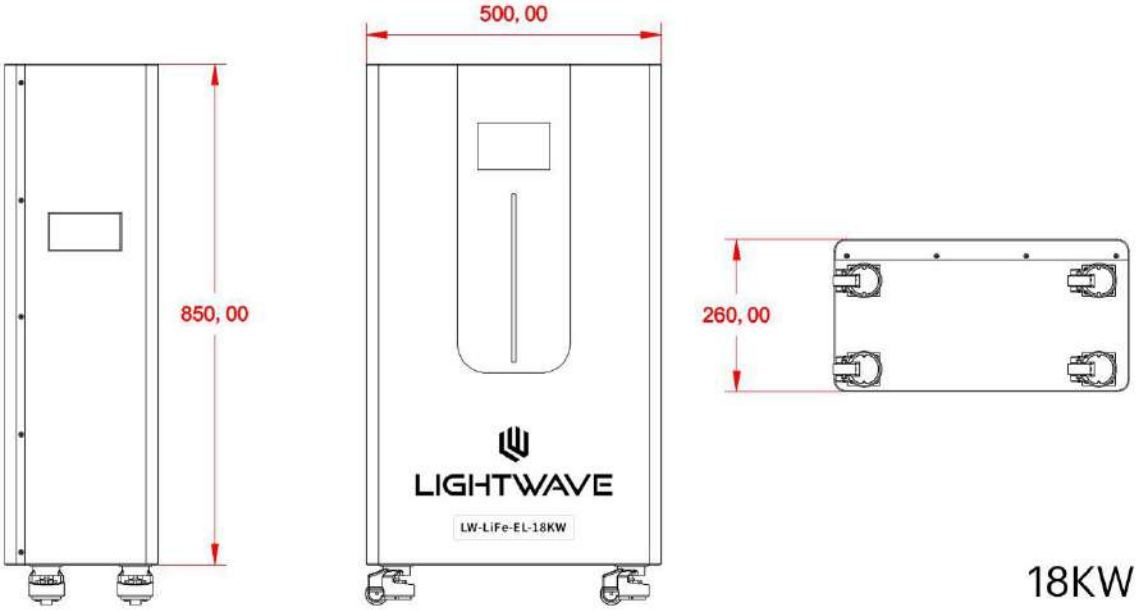
Function table

NO	Name	Function
1	Handle	Easy to move battery
2	Wheels	Prevent the battery from directly touching the ground and damaging the surface
3	Touch screen	5-inch touch screen for easy operation
4	Indicator light	Battery status indicator
5	Communication interface	CAN, RS485, RS232 communication ports
6	Output terminal	Positive and negative output
7	Power switch	Power on/off

1.4 Dimensions



16KW



18KW

25KW

2. Installation Instructions

2.1 Installation Preparation

- **Safety Requirements:** This system must be installed only by personnel trained in power systems who have sufficient knowledge of such systems. During installation, always adhere to the safety regulations outlined below as well as local safety standards.
- Ensure that all devices are powered off before beginning any operation, and use devices or accessories compatible with the battery parameters.
- Power distribution cables must be routed in a safe and organized manner with protective measures in place to prevent accidental contact during operation.
- Wear appropriate personal protective equipment, such as goggles, gloves, and installation attire.
- Prepare the necessary installation tools:

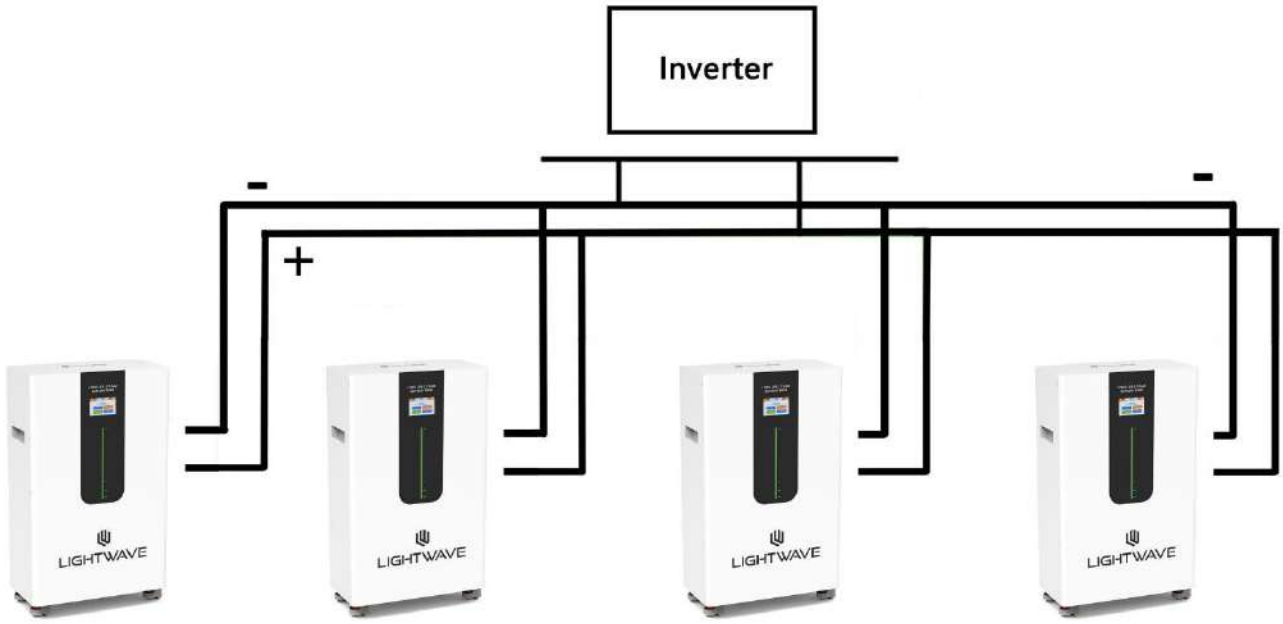
Drill	Hammer	Wrench	Scrw	Wire strippers
Insulating tape	Electric pencil	Multi meter	Pliers	Measuring ruler

2.2 Engineering Coordination

- Before construction begins, consider the following:
- Power Line Specifications: Ensure the power line specifications meet the requirements of the maximum discharge current for each product.
- Mounting Space and Load Capacity: Confirm that there is sufficient space for battery installation and that the rack or bracket can support the load.
- Power Line and Grounding: Ensure proper routing of power and grounding lines to prevent short circuits, water exposure, and corrosion.

2.3 Parallel connection

When connecting multiple 16kWh batteries in parallel (e.g., 2 or 3 units) with a 12kW inverter, it is essential to install a distribution box for safe and efficient operation.



2.4 Electrical interface check

Devices connected directly to the batteries can include user equipment, power supplies, or other power sources

- Ensure the user's PV power generation equipment, power supply, or other power source has a DC output interface, and verify that its voltage meets the inverter requirements.
- Confirm that the maximum discharge current capability of the DC power interface from the PV system, power supply, or other source exceeds the maximum charging current of the batteries.

2.5 Electrical installation

Before connecting power cables, use a multimeter to check for cable continuity, short circuits, and confirm the polarity. Accurately label the cables.

Measuring Methods:

- **Cable Availability:** Set the multimeter to buzzer mode and use the probe to test both ends of the same-colored cable. If the buzzer sounds, the cable is good.
- **Short Circuit Judgment:** Set the multimeter to resistance mode and probe the positive and negative ends. If the resistance reads infinity, the cable is good.
- After visually confirming proper cable connections, connect the positive and negative terminals of the batteries to the corresponding terminals of the opposite side.

It is recommended to install a circuit breaker between the inverter and battery system. The circuit breaker specifications should be:

$$\text{Voltage: } U > 60V$$

$$\text{Current: } | = \frac{\text{Inverter Power}}{43V}$$

2.6 Use, Maintenance, and Troubleshooting

Battery System Usage and Operation Instructions

After completing the electrical installation, follow these steps to start the battery system:

1. Refer to section 1.3. Press the self-locking switch to the "ON" position. The display screen and indicator will light up.
2. After the indicator self-test, the "RUN" indicator will light, and the SOC (State of Charge) indicator will turn on.


Notes:

1. If the battery status indicator on the front panel remains red after pressing the power button, please refer to "3.5 Alarm Description and Processing." If the issue cannot be resolved, contact the dealer promptly.
2. Use a voltmeter to check if the voltage at the circuit breaker battery access terminal is greater than 43V. Ensure the voltage polarity matches the inverter's input polarity. If the terminal shows a voltage greater than 43V, the battery has started normal operation.
3. After confirming that the battery output voltage and polarity are correct, turn on the inverter and close the circuit breaker.
4. Check if the communication indicator and battery access status indicator of both the inverter and battery connection are normal. If they are functioning correctly, the connection between the battery and inverter is complete. If any indicator shows an abnormal status, refer to the inverter manual for troubleshooting or contact the dealer.

3. Operating mode

3.1 Ambient temperature alarm protection

Ambient Temperature Warning	Ambient Low-Temperature Warning	-15℃
	Ambient Low-Temperature Protection	-20℃
	Ambient Low-Temperature Protection Release	-15℃
	Ambient High-Temperature Warning	65℃
	Ambient High-Temperature Protection	75℃
	Environmental High-Temperature Protection Contact Temperature	65℃

3.2 Other Protection Features

- Short Circuit Protection

  1) The system activates short circuit protection when a short circuit occurs.

  2) Protection will automatically release once the load is removed or a charging source is connected.

- Self-Shutdown

  1)If there are no external loads, power supply, or communication for over 24 hours, the device will automatically enter dormant standby mode to conserve energy.

3.3 Key description and buzzer action description

Key Functions

1. **Activate the BMS**
   - When the BMS is in sleep mode, press the button for 3–6 seconds and release.
   - The protection board activates, and the LED indicators light up sequentially for 0.5 seconds starting from "RUN."

2. **Enter Sleep Mode**
    - When the BMS is active, press the button for 3–6 seconds and release.
    - The protection board enters sleep mode, and the LED indicators light up for 0.5 seconds starting from the lowest battery light.
3. **Reset the BMS**
    - When the BMS is active, press the button for 6–10 seconds and release.
    - The protection board resets, and all LED lights illuminate simultaneously for 1.5 seconds.
4. **Restore Initial Parameters**
    - After resetting, the system retains the parameters and functions set by the host computer.
    - To restore default settings, use the "Restore Default Value" option on the host computer. Operating records (e.g., power, cycle count, protection logs) remain unchanged.

Buzzer Functions

1. **Fault Indicator**
    - Beeps for 0.25 seconds every 1 second.
2. **Protection Mode**
    - Beeps for 0.25 seconds every 2 seconds (excluding over-voltage protection).
3. **Alarm Mode**
    - Beeps for 0.25 seconds every 3 seconds (excluding over-voltage alarms).

Note:

- The buzzer function can be enabled or disabled via the host computer.
- The factory default setting for the buzzer is disabled.

3.4 Working status of the indicator light

LED working status indication

State	Normal / Alarm / Protection	ON/ OFF	RUN	ALM	SOC Indication LEDs						Instructions
		●	●	●	●	●	●	●	●	●	
Power Off	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All LEDs are off.
Standby	Normal	ON	Flash1	OFF	Indication by SOC						The battery is on standby with no alarms.
	Alarm	ON	Flash1	Flash3							Alarm due to low cell voltage.
Charge	Normal	ON	ON	OFF	Indication by SOC (The top SOC Led Flash 2)						Description for Charge (Normal): Maximum power LED flashes (Flash²). ALM does not flash for overcharge warning. Description for Charge (Alarm): Overcharge alarm.
	Overcharge alarm	ON	ON	Flash3							
	Over Charge Protection	ON	ON	OFF	ON	ON	ON	ON	ON	ON	If no mains supply, LED as standby
	Temperature. Over-current Fault Protection	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close charge
	Normal	ON	Flash3	OFF	Indication by SOC						
	Alarm	ON	Flash3	Flash3							

Discharge	Under	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Close
	Temperature. Over-current. Short Circuit Fault Protection	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close discharge
Fault		OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close charge Close discharge

State		Charge						Discharge					
Capacity indicator light		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
Electricity (%)	0~16.6%	OFF	OFF	OFF	OFF	OFF	flash2	OFF	OFF	OFF	OFF	OFF	ON
	16.6~33.2%	OFF	OFF	OFF	OFF	flash2	ON	OFF	OFF	OFF	OFF	ON	ON
	33.2~49.8%	OFF	OFF	OFF	flash 2	ON	ON	OFF	OFF	OFF	ON	ON	ON
	49.8~66.4%	OFF	OFF	flash2	ON	ON	ON	OFF	OFF	ON	ON	ON	ON
	66.4~83.0%	OFF	flash2	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
	83.0~100%	flash2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Running light ●		ON						flash(flash 3)					

Capacity Instructions

4.Communication Description

The Battery Management System (BMS) offers multiple communication interfaces to monitor and control the battery system effectively.

4.1 RS232 Communication

- **Function:** Allows communication between the BMS and a host computer.
- **Information Monitored:** battery voltage, current, temperature, status, production information
- **Default Baud Rate:** 9600 bps

4.2 CAN Communication

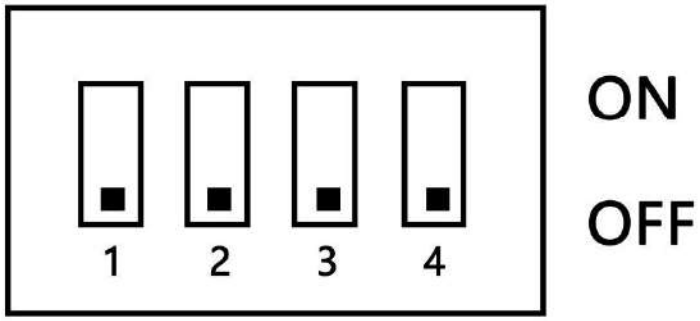
- **Function:** Supports Controller Area Network (CAN) communication for efficient data exchange.
- **Default Communication Rate:** 500 Kbps

4.3 RS485 Communication

- **Function:** Features dual RS485 interfaces for system monitoring and interaction.
  - Enables viewing of individual PACK information.
  - Allows communication with monitoring devices acting as hosts.
  - Hosts poll data according to the address of each PACK.
- **Default Baud Rate:** 9600 bps

4.4 DIP Switch Address Setting

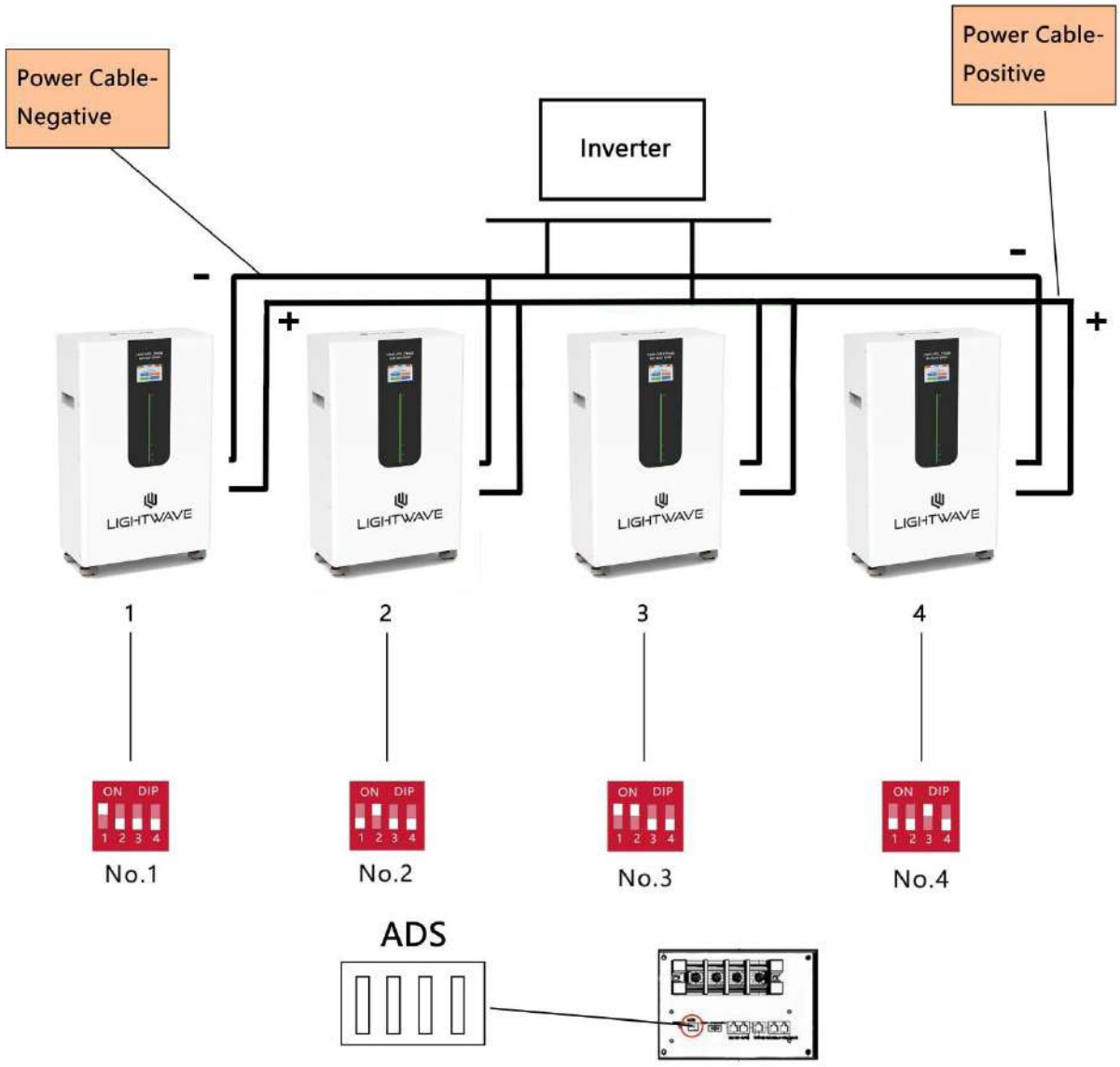
- **Purpose:** Distinguishes between battery PACKs when used in parallel by setting unique addresses via the DIP switch on the BMS.
- **Important Note:** Ensure that no two PACKs have the same address to avoid communication conflicts.


ON
OFF
1
2
3
4

Address	Dial code switch position			
	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

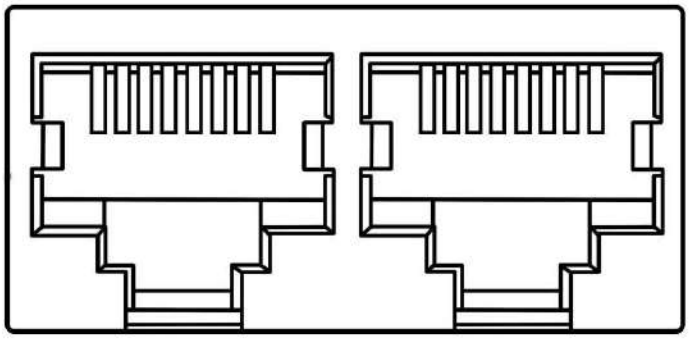
Form 4.4

Demonstration of DIP switch for 4 unit batteries in parallel

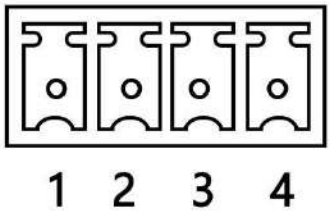


Please refer to form 4.4 for more equipment to be connected

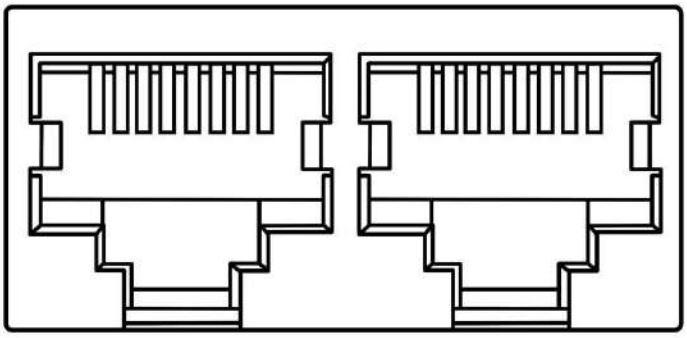
4.5 Communication interface definition as shown below



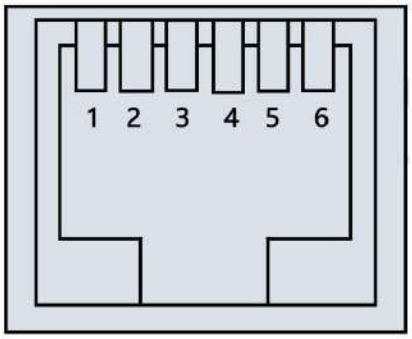
CAN and RS485 interface



Dry contact



Parallel communication port



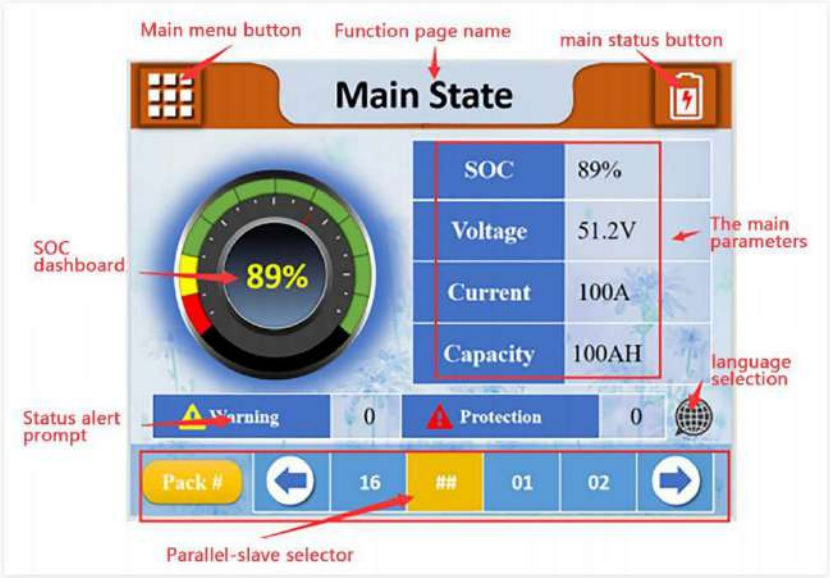
RS232 communication port

4.6 LCD Display Directions For Use

4.6.1 Welcome interface

Description: The boot process lasts for 3 seconds and is used for program preparation and communication with the BMS motherboard to exchange data. Afterward, the system enters the main status interface.

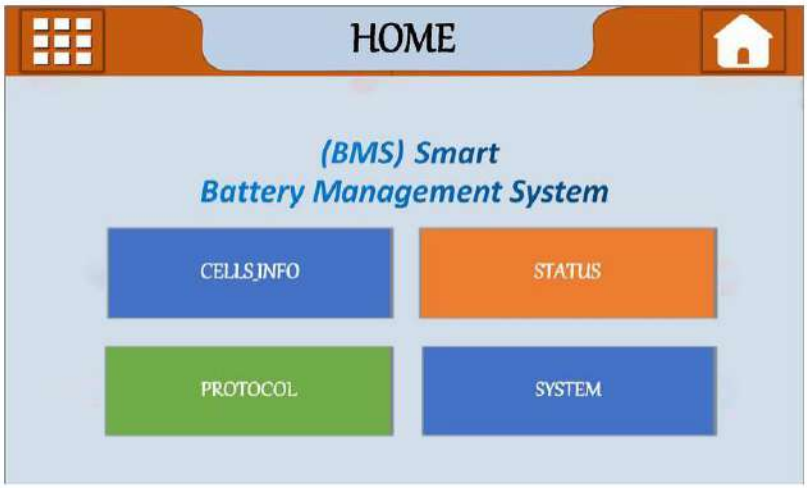
4.6.2 Main status screen



Note: When the welcome interface is activated, it will automatically switch to this interface after 3 seconds. You will enter this interface automatically whenever you wake up the screen. The Main State will display SOC, Battery Voltage, Battery Current, Battery Capacity, Warning times, Parallel-slave selector packs, and Language selection.

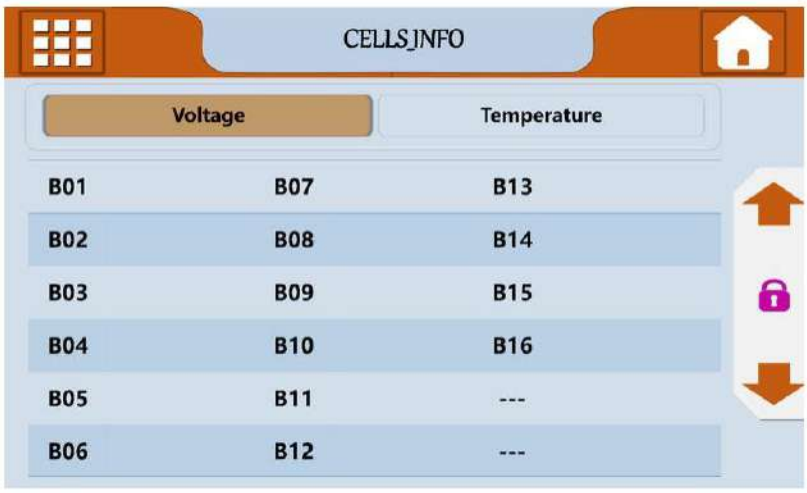
4.6.3 Home menu page

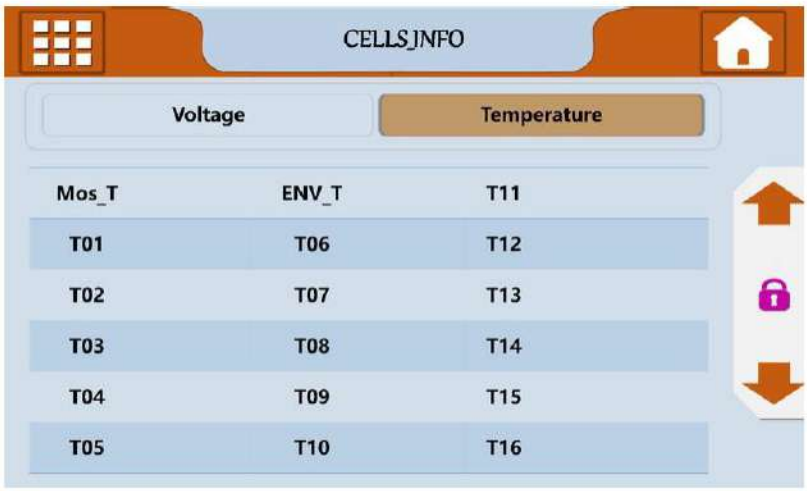
Description: On the home page, you have the option to view Cells Info, Status Data, Protocol Selection, System Setting, Battery Operating Status, Protocol Settings, and System Settings.



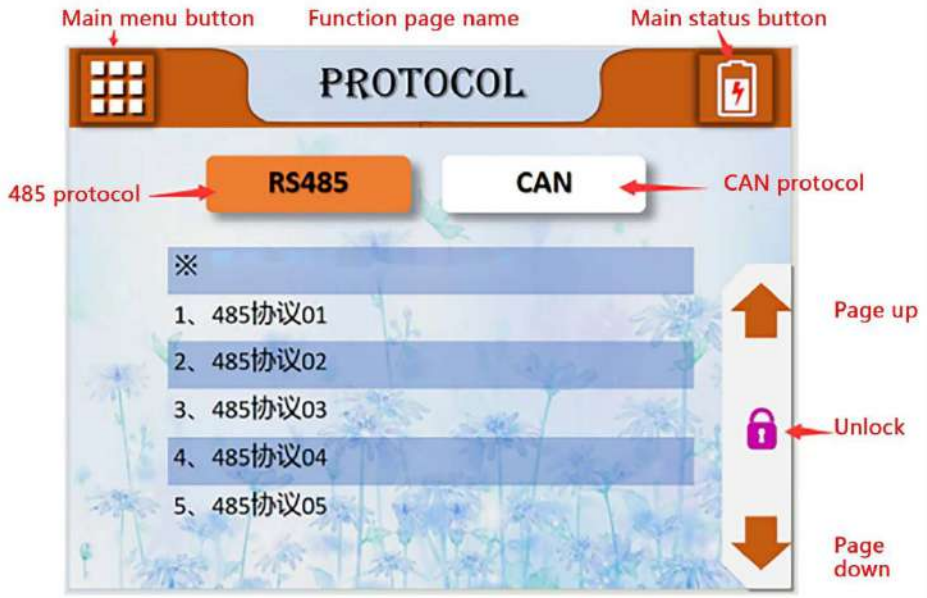
4.6.4 Cells Info

Description: On the CELLS INFO page, you can view the voltage of each signal cell (measured in millivolts) as well as the internal temperature of the battery.





4.6.5 Protocol slection



The LCD display can directly select the protocol. The main protocols are as follows:

CAN

- GOODWE PROTOCOL
- LV BMS Protocol(CAN) for Solar Inverter Family
- PYLON PROTOCOL 2.0
- Pylon CAN bus protocol V 2.0.
- SMA PROTOCOL
- SMAF SS-Connecting Bat-TI-en-20W
- GROW ATT_PROTOCOL
- Growatt BMS CAN-Bus-protocol-low-voltage
- Other CAN protocol

RS485

- USER_485_VOLTRON
- Voltronic Inverter and BMS 485 communication protocol 20200325(1)
- PYLON
- RS 485-protocol-pylon-low-voltag
- Luxpowertek Battery Protocol RS 485_V 01
- Other RS485 protocol;

4.6.6 System page

Description: On the System page, you have the option to modify the language, as well as verify the BMS version and serial number.

4.6.7 Hibernation/shutdown

During regular operation, the system will enter the hibernation/shutdown state after 3 minutes of keyless operation. In the shutdown/hibernate state, tapping anywhere on the screen will activate the display and enter the main status interface. Simultaneously, the authorization will be cleared.

4.7 WIFI & BLUETOOTH APP

4.7.1 Download and install

- During the initial testing phase, the app will be available on the Dandelion platform for easy access. The official version will be listed on the app store.

- According to the mobile phone system, select the download link or scan the APP code directly:

Android Entry: https: / / www.pgyer.com/OsHo
The iOS entry: https: / / www.pgyer.com/3sbG

4.7.2 The APP dynamic permission

To install the app, click on the icon and start smoothly. Initially, the startup will actively prompt the user to confirm and authorize the following permissions:

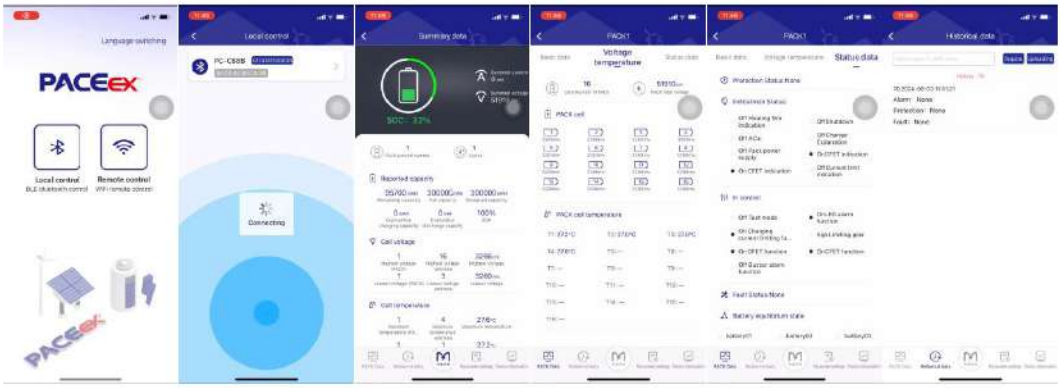
- Camera permission: This is used when adding Wi-Fi devices for remote control.
- Location permission: This is used to search for nearby Bluetooth devices for local control and to identify the current network information for remote control.
- Equipment status information: This permission is required to detect the operational status of the equipment.
- Photos and audio: This permission allows the code scanning interface in the remote control to directly access the local photo album.

4.7.3 Control Method

Local control: BLE Bluetooth communication allows for direct searching of nearby Bluetooth signals. Once paired, the devices remain connected at all times, enabling

control without the need for account login or binding records. In other words, it is ready to use.

Remote control: WiFi communication enables control of the device even when not in the same geographical location. However, it requires account registration and login. Additionally, the binding between the account and device needs to be recorded, and the distribution network operation must be completed.



4.7.4 Telecontrol

Account registration and login

Registration: Create a new account using an email address, password, and verification code. (Note: When creating a new account, please select the correct country and region based on your actual location. This is crucial. Once selected and successfully created, any subsequent devices added through the account distribution network will automatically connect to the server nodes using the same account number.)

Login: Log in using the registered account number and password.

Forgot your password? You can reset it by using your email address.

4.7.5 Device addition

- The wifi module resumes leaving the factory

To confirm the flashing status of the module lamp, press and hold RESET for 5-10 seconds.

- Double flash: Restores the factory status and has a Bluetooth signal pending distribution network.
- Slow flash: Indicates that it is connecting to the router.

- Continuous flash: Indicates a successful router connection and is currently being connected to the server.
- Long bright: Indicates a successful connection to the server and supports remote communication.
- Click on "Add" and "+" to access the search page and search for the device.

(Note: This step requires the phone to enable the "Bluetooth", "positioning", and "WiFi" functions. Otherwise, the search and subsequent distribution network operations will not be completed.)

- Fill in the distribution network information

Click the device found in 4.2.2, jump to the distribution network information page, and fill in the WiFi account and password to be connected to the serial port screenTo replace the WiFi, confirm the password, click "Next", enter the distribution network waiting page.

(Note: The mobile phone should be connected to the WiFi first, and the serial port screen only supports 2.4G WiFi, please identify it by yourself)

- Perform the distribution network operation

The APP and the device will automatically perform the Discovery Device, Connect Device, Configure
Network, Bind Device operations, Please wait patiently.

- Distribution network results

When the distribution network is over, it will jump to the page, click Save to successfully add and automatically jump back to the device list page

(Note: If the network distribution fails, please follow the APP prompt information, start from step 4.2.1 after checking, and operate again. If the distribution network is still lost for many times Failure, please save the report error page and contact the after-sales personnel!)

4.7.6 Device editing

Long press the device item, and the edit menu will pop up at the bottom
Rename: Modify device nickname to use
Delete: unbinding relationship with the device, the next use need to scan the code or add the network

4.7.7 Device sharing

Long press the device item, when you are the device administrator (the first account bound to the distribution network), you can generate the device QR code,
For other users to scan the code to add; Note: non-administrators can not share twice, the QR code generated each time only support scanning once, and Time limit for scanning code (30 minutes)

4.7.8 Equipment control

According to the functions supported by the serial port protocol 0.0.9, all the other functional APP has been completed except if the protocol itself is wrong or lacking Summary interface, basic information, voltage and temperature, state data, historical data, parameter setting, equipment information, general setting, etc

4.7.9 OTA upgrade

The trigger policy for the upgrade is designed so that the app automatically determines whether an upgrade is necessary by considering the current software version number of the device.

- Equipment list page, click the equipment icon
- The APP automatically identifies whether it needs to be upgraded according to the current software version number of the device. If there is a new version, the upgrade will be pushed

4.7.10 Account exit and cancellation

Account exit: After exiting, you can switch to other accounts for login.

Account cancellation: Once cancelled, all the information and binding relationships of the account will be cleared, and you will need to register again next time.

4.8 Electrical interface definition

RS232--Adopt 6P6C vertical RJ11 socket	
RJ11 pin	Definition description
2	NC
3	TX (veneer)
4	RX (veneer)
5	GND

CAN-- adopts 8P8C vertical RJ45 socket		RS485-- 8P8C vertical RJ45 socket	
RJ45 pin	specifies	RJ45 pin	specifies
1、2、3、6、8	NC	9、16	RS485-B1
5	CANL	10、15	RS485-A1
4	CANH	11、14	GND
7	GND	12、13	NC

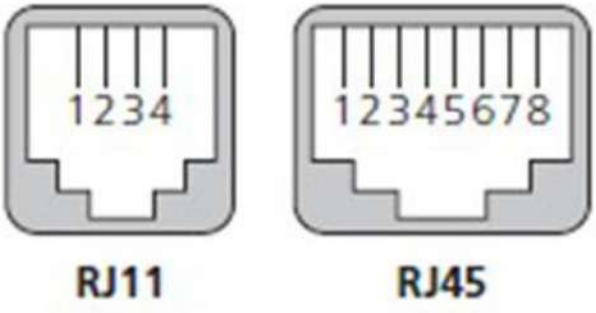
CAN and RS485 interface

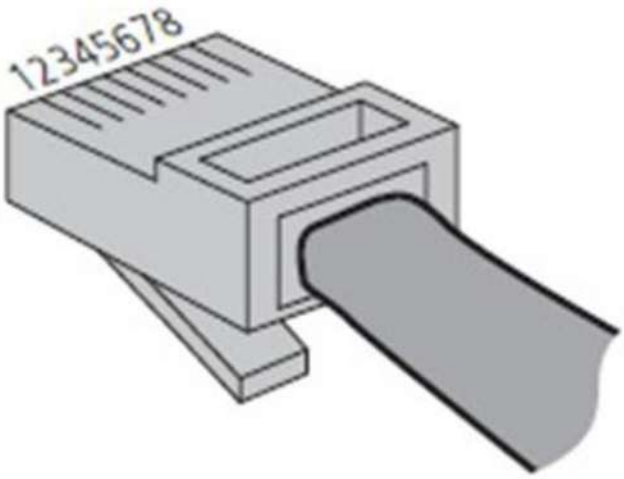
RS485-- 8P8C vertical RJ45 socket		RS485-- 8P8C vertical RJ45 socket	
RJ45 pin	specifies	RJ45 pin	specifies
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	GND	11、14	GND
4、5	NC	12、13	NC

Parallel communication port

Interface	Definition			
B+	The positive pole of the battery PACK is used to supply power to the BMS; the positive power P+ is directly connected to the positive pole of the battery			
B-	Battery PACK negative pole			
P-	The negative electrode of the battery PACK, that is, both the negative electrode for charging and the negative electrode for discharging (the same port for charging and discharging)			
	J2-1	NTC1	J4-1	NTC2
	J2-2	NTC	J4-2	NTC
	J2-3	CELL1-	J4-3	CELL5+
	J2-4	CELL1+	J4-4	CELL6+

	J2-5	CELL2+	J4-5	CELL7+
	J2-6	CELL3+	J4-6	CELL8+
	J2-7	CELL4+		
	J5-1	NTC3	J6-1	NTC4
	J5-2	NTC	J6-2	NTC
	J5-3	NC	J6-3	CELL13+
	J5-4	CELL9+	J6-4	CELL14+
	J5-5	CELL10+	J6-5	CELL15+
	J5-6	CELL11+	J6-6	CELL16+
	J5-7	CELL12+		





4.9 Compatible to brand inverter

NO	Brand of inverter
1	Deye
2	Pylontech
3	Growatt
4	Sofar
5	Luxpower
6	Voltronic power
7	Sunsynk
8	Goodwe
9	Megarevo
10	Solis
11	Must
12	Srne
13	Schneider
14	Phocos
15	Victron energy
16	Sorotec
17	SMA
18	Aoguan
19	Invt
20	Sako
21	Solark
22	Afore
23	Mppsolar

5. Storage and use environment requirements

Working temperature:: -20℃~+55℃
The charging temperature range: 0C~+55℃
Discharge temperature range: -20℃~+55℃
Storage temperature: -10℃~+35℃
Relative humidity: 5% ~ 85%RH
Altitude: no more than 4000m
During storage, recharge once every 6 months to 60%-80%DOD
Working environment: indoor installation, the site is protected from the sun, no wind, no conductive dust and corrosive gas

6. Attachment table

Name	Model	Quantity	Picture
51.2V310Ah 51.2V340Ah 51.2V500Ah	LW-LiFe-EL-16KW LW-LiFe-EL-18KW LW-LiFe-EL-25KW	1	
Tinned copper Core wire	35square * 100cm	Optional	
Communication line	Double-ended network cable	2	
Manual	How to use	1	

Pay attention to check before unpacking

Loading and unloading should be carried out in accordance with the rules and regulations to prevent the sun and rain.

The total number of packages should be indicated on the shipping manifest accompanying each package and checked for completeness.

During the unpacking process, handle with care to protect the surface coating of the object.

When opening the package, the installer should read the technical documents, verify the list, and ensure that the items are complete and complete according to the configuration sheet and packing list. If the internal package is damaged, the shipper should be contacted in time

Thanks for choosing LIGHTWAVE