



LiFePO4 Battery User Manual



EFG Battery



Green Energy Green Future!

Our vision: To be a world-leading smart energy battery brand!

Our mission: Making more users have access to a green future!

Brand information:

As a brand of GREENFUTURE INDUSTRY LTD, EFG Battery specializes in the R & D and manufacturing of lithium batteries. The brand has the core technology of integrating and applying lithium battery stored energy as well as the experience in manufacturing batteries for over 10 years. The products have been extensively applied to household, commercial grid, and portable stored energy fields.

Since its foundation, EFG Battery has gradually been an international brand with great reputation. By communicating with thousands of customers from countries including USA, UK, Germany, and Australia, we knew that safety, stability, intelligence, and high efficiency compose the important factors for them to choose batteries, and these features have been the basis of our technical innovations as well. In recent years, the global market has seen the substantial growth of renewable energy sources, especially in the context of global warming. EFG Battery has been committed to providing worldwide cutting-edge renewable energy sources to help more users have access to sustainable green future by using our green energy products!

Brand story:

Since the 1940s, people have realized that natural resources such as petroleum, natural gas, and coal have been declining rapidly, and the energy crisis has been increasingly severe in the 21st Century. We have seen that many people endure severe winter and scorching summer as a result of energy shortage. They can neither warm themselves in winter nor drink cold beer or beverages in summer. Besides, automobiles cannot get started and people cannot contact their families and friends by using phones as a result of energy deficiency. The shortages of power supply and costly electricity bills have made our lives miserable and painful. Would this happen if we had sufficient energy reserves? As an international enterprise, we needed to do something to change the situation. The brand EFG was established in response to the proper time and conditions. In the name, "E" stands for "Energy", "F" for "Future", and G for "Green". EFG bears people's pursuit of good life. It keeps changing people's lives with energy storage batteries that are increasingly safe, stable, intelligent, and efficient for illuminated nighttime and freedom of energy sources and electric power.



Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read the following instructions carefully before installing the unit. Do not operate this unit before carefully reading all safety information and using instructions.

1.Safety Precaution	3
1.1 When Using battery	3
1.2 While Charging	3
1.3 When Discharging the Battery	3
2.Parameters of Battery	4-13
2.1 Basic Block Diagram	4
2.2 Battery Specifications	5-6
2.3 Panel View	7-8
2.4 LED Indicators	9
2.5 Buzzer Operation (Optional)	9
2.6 Display function instruction	10
2.6.1 Display rendering	10
2.6.2 Functional Specifications	10-12
2.7 Connectors	13
2.8 Wake Up button	13
3.Safe handling guide	14-17
3.1 System Diagram	14
3.2 Tools	14
3.3 Safety Gear	14
3.4 Installation	15
3.4.1 Inventory of items	15
3.4.2 Installation Location	16
3.4.3 Wall-mounted	16
3.4.4 Mount on the rack	17
4.Operating intructions	18-24
4.1 Software Installation	18
4.2 Pre-operation step	18
4.3 Communication Function	18
4.3.1 Communication port definition	18
4.3.2 Battery communicate with PC/Software	19-21
4.3.3 Batteries communicated with inverter	22-24
5.Troubleshooting	25
6.Storage and Maintenance	25-26
6.1. Storage	25
6.2. Maintenance	26
7.Product Responsibilities and Consulting	27

1.Safety Precaution

1.1 When Using battery

The danger of High Voltage :

The high voltage power supply offers the equipment power. Wet objects in contact with a high voltage power supply directly or indirectly can cause fatal danger.

Using a unique tool :

Working in high voltage and ac power, use a unique tool instead of individual ones.

Static freeet :

Static electricity would damage the veneer on the electrostatic-sensitive components. Therefore, before touching the plugin, circuit board, or chips, use correct electrostatic prevention measures.

Disconnect the power supply in operation:

When operating the power supply, you must cut off the power supply first.

The danger of Dc short circuits :

The power system provides dc regulated power supply. Dc short circuits could cause fatal damage to the equipment.

1.2 While Charging

CAUTION

The temperature range over which the battery can be charged is 0°C to 45°C. Charging the battery at temperatures outside this range may cause the battery to become hot or break. Charging the battery outside of this temperature range may also harm the performance of the battery or reduce the battery's life expectancy.

1.3 When Discharging the Battery

DANGER

Do not discharge the battery using any device except for the specified device. When the battery is used in devices aside from the specified device, it may damage the performance of the battery or reduce its life expectancy. If the device causes an abnormal current to flow, it may cause the battery to become hot and cause serious injury.

CAUTION

The temperature range over which the battery can be discharged is -20°C to 60°C. Use of the battery outside of this temperature range may damage the performance of the battery or may reduce its life expectancy.

2.Parameters of Battery

2.1 Basic Block Diagram

There are Battery cells and BMS board inside. Before connecting the terminal, please read the diagram, and make sure the output is not short or other abnormal connection.

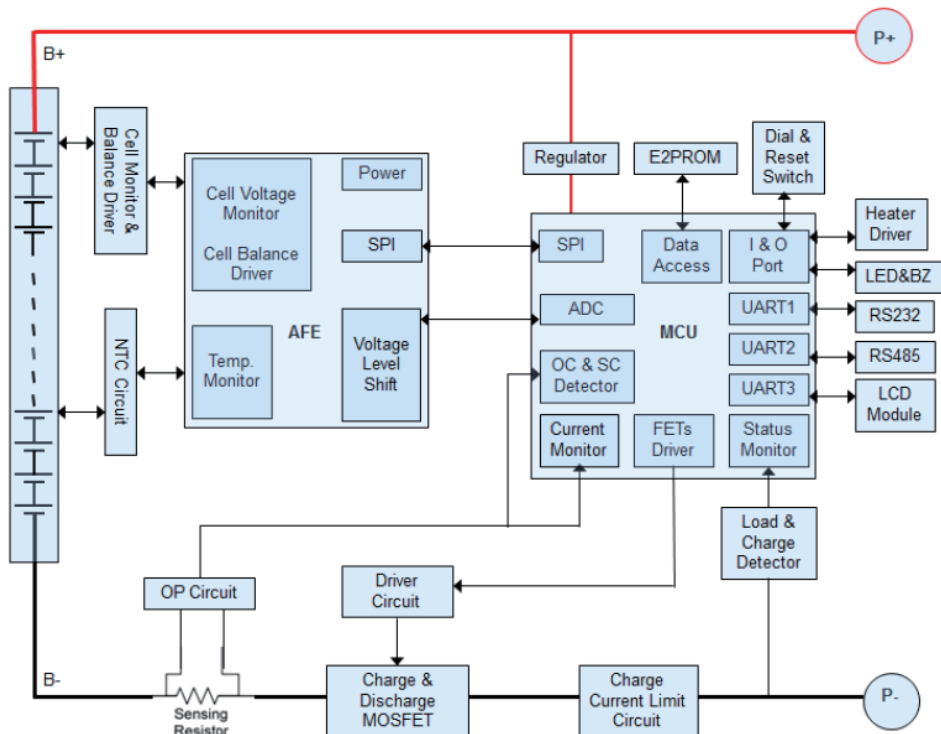


Fig1 Battery Block Diagram



EFG-R48100
Rack Mounted



EFG-W48100
Wall Mounted



EFG-WL48100
Wall Mounted

2.2 Battery Specifications

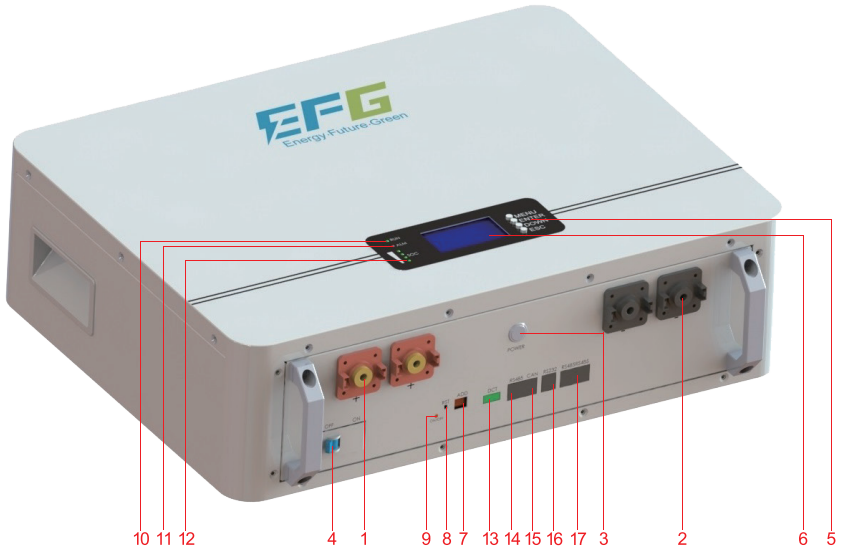
Wall Mounted Battery

Battery Specifications	
Model NO.	EFG-W48100, EFG-WL48100
Nominal Parameters	
Voltage	51.2V
Capacity	100Ah
Energy	5.12KWh
Dimensions(L*W*H) (EFG-W48100)	55*42*15.5cm (21.6*16.5*6.1in)
Dimensions(L*W*H) (EFG-WL48100)	40*58*15.5cm (15.7*22.8*6.1in)
Weight	48Kg (106lb)
Basic Parameters	
Design life time(25°C)	20 years
Life cycles(80% DOD,25°C)	7000 Cycles
Storage time/temperature	6 months: -10~35 °C (14~95 °F) 3 months: -10~45 °C (14~113 °F) 7 days-20~65 °C (-4~149 °F)
Operation temperature	-20~ 60 °C (-4~140 °C) @ 60±25 Relative Humidity
Storage temperature	0~45 °C (32~113 °C) @ 60±25 Relative Humidity
Lithium battery standard	IEC62619, UN38.3, ROHS, CE-EMC, FCC, UL1642, MSDS
Enclosure protection rating	IP52
Electrical Parameters	
Operation voltage	51.2Vdc
Max. charging voltage	57.6Vdc
Cut-off discharge voltage	43.2Vdc
Max. charge and discharging current	100A

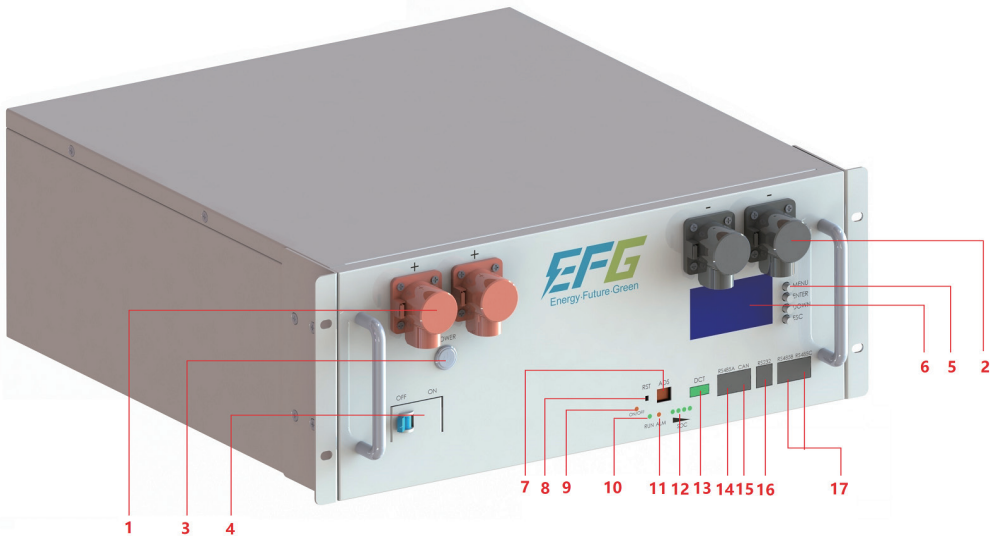
Rack Mounted Battery

Battery Specifications	
Model NO.	EFG-R48100
Nominal Parameters	
Voltage	51.2V
Capacity	100Ah
Energy	5.12KWh
Dimensions(L*W*H)	44.2*42*17.7cm (17.4*16.5*7in)
Weight	42.6Kg (94lb)
Basic Parameters	
Design life time(25°C)	20 years
Life cycles(80% DOD,25°C)	7000 Cycles
Storage time/temperature	6 months: -10~35°C (14~95°F) 3 months: -10~45°C (14~113°F) 7 days-20~65°C (-4~149°F)
Operation temperature	-20~ 60°C (-4~140°F) @ 60±25 Relative Humidity
Storage temperature	0~ 45°C (32~113°F) @ 60±25 Relative Humidity
Lithium battery standard	IEC62619, UN38.3, ROHS, CE-EMC, FCC, UL1642, MSDS
Enclosure protection rating	IP52
Electrical Parameters	
Operation voltage	51.2Vdc
Max. charging voltage	57.6Vdc
Cut-off discharge voltage	43.2Vdc
Max. charge and discharging current	100A

2.3 Panel View



NO.	Description	Functional Description
1	Battery +	Positive terminal
2	Battery -	Negative terminal
3	Metal Button	Battery ON/OFF Button
4	MCB	Output ON/OFF
5	Button	Display button
6	LCD	Display Screen
7	Display Connection Address	ADS Dialer
8	RST Key	Reset Button
9	ON/OFF LED	Battery ON/OFF Indicator LED
10	Run LED	Run Indicator Light
11	ALM LED	Alarm Indicator Light Blinking
12	Capacity LED	Electricity Volume Indicator
13	DCT	2 Road Dry Contacts
14	RS485 Communication Port	RS485 Communication Interface
15	CAN Communication Port	CAN Communication Interface
16	RS232 Communication Port	RS232 Communication Interface
17	RS485 Communication Port	2 Road RS485 Ports For Battery Communication In Parallel



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1	Battery +	Positive terminal
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14	RS485 Communication Port	RS485 Communication Interface
15	CAN Communication Port	CAN Communication Interface
16	RS232 Communication Port	RS232 Communication Interface
17	RS485 Communication Port	2 Road RS485 Ports for Battery Communication in Paralle

2.4 LED Indicators

LED Indicators:

There are 6 LEDs on the upper panel to show the battery's working status:

Pack Status	Normal/Alarm/Protection	RUN	ALM	SOC Indication LED				Remark
		●	●	●	●	●	●	
Power Off	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Normal	Flash 1	OFF	Indication by SOC				Standby
	Alarm	Flash 1	Flash 3					Battery Undervoltage
Charge	Normal	ON	OFF	Indication by SOC				
	Alarm	ON	Flash 3					
	Over Charge Protection	ON	OFF					-ALM LED is off when overcharging protection
	Temperature/Over Current Protection	OFF	ON					Stop charge
Discharge	Normal	Flash 3	OFF	Indication by SOC				
	Alarm	Flash 3	Flash 3					
	Over Discharge Protection	OFF	OFF					Stop discharge
	Temperature/Over current / Short circuit protection	OFF	ON					Stop discharge
Fault		OFF	ON	OFF	OFF	OFF	OFF	Stop charge & discharge

NOTE:

The LED function can be set by monitor software. The default is on.

Flash	ON	OFF
Flash1	0.25Sec	3.75Sec
Flash2	0.5Sec	0.5Sec
Flash3	0.5Sec	1.5Sec

2.5 Buzzer Operation (Optional)

Model	Description and Status
Fault	Buzzing 0.25S per 1Sec
Protection	Buzzing 0.25S per 2Sec (Except over-charge protection)
Alarm	Buzzing 0.25S per 3Sec (Except over-charge alarm)

NOTE:

Buzzer function can be set by monitor software. The default is off.

NOTE: The circuit breaker of the battery circuit is set to OFF, connected to the switch power supply, and the output voltage of the switch power supply is set to (48V) 52.5-54V/(51.2V)56-57.6V, current set to 0.2C; when all settings are done, switch the circuit breaker ON.

2.6 Display function instruction

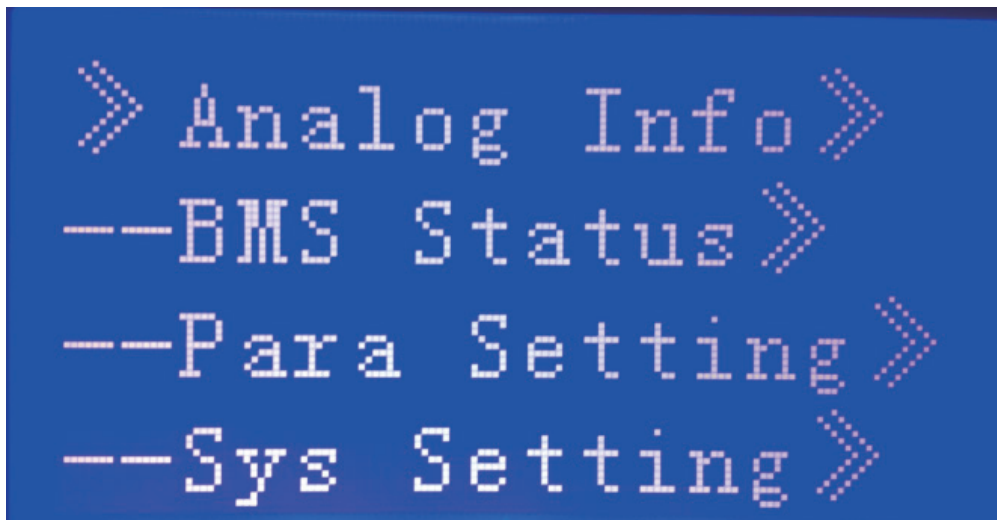
2.6.1 Display rendering



2.6.2 Functional Specifications

2.6.2.1 Main menu page

Electricity/dormancy activated will show the welcome screen; press the MENU button to enter the main menu page. For example, as shown in the figure below:



2.6.2.2 Battery parameters collection page

When the cursor" » » " is pointed to "Analog Info," pressing ENTER key will enter the page of "Analog Info," as shown in the figure below:

<pre> >> PackV: 52.44 V --Im: 0.00 A --Temperature>> --Cell Voltage>> </pre>	<pre> --T1: 31.2 °C --T2: 31.0 °C --T3: 32.1 °C --T4: 31.0 °C </pre>	<pre> --Cell01: 3277 mV --Cell02: 3278 mV --Cell03: 3278 mV --Cell04: 3277 mV </pre>
<pre> >> CellCapacity>> </pre>	<pre> SOC: 20.96 % FCC: 100.0AH Rm : 20.9AH CC : 0 </pre>	

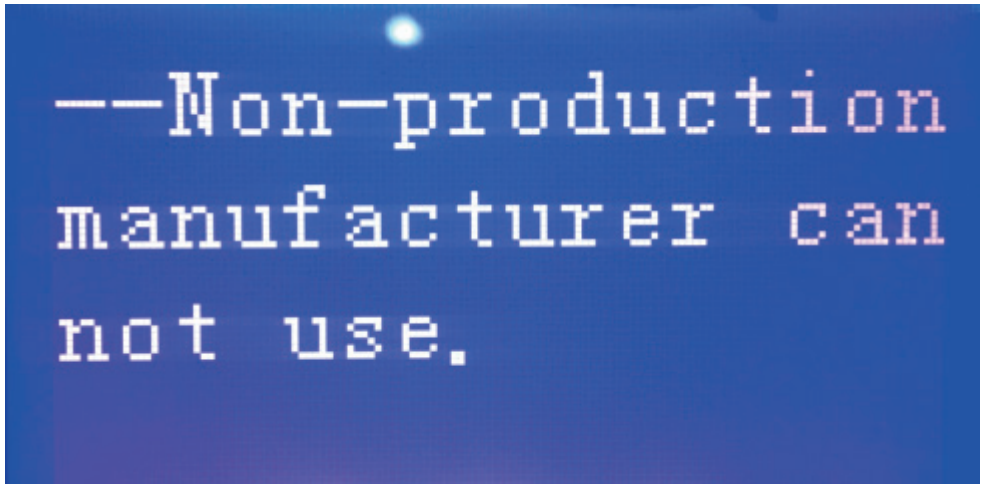
2.6.2.3 Battery status page

When the cursor" » » " is pointed to "BMS Status," pressing ENTER key will enter the page of "BMS Status," as shown in the figure below:

<pre> >> Status: Idle --Record>> --BMS Status>> </pre>	<pre> >> SCP: 5 --O/UTP: 0 --OCP: 0 --UVP: 4 </pre>	<pre> >> OVP: 1 </pre>
<pre> >> OT : N --OTP: N --OV: N --OVP: N </pre>	<pre> >> UV : N --UVP: N --OC: N --OCP: N </pre>	<pre> >> SCP: N --Failure: N </pre>

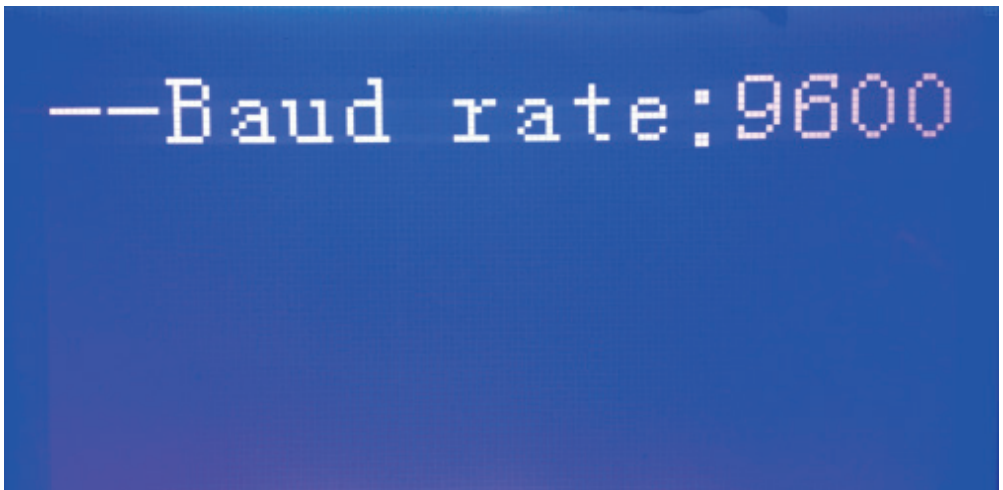
2.6.2.4 Battery Parameters Setting page

When the cursor "»" is pointed to "Para Setting," pressing ENTER key will enter the page of "Para Setting," as shown in the figure below:



2.6.2.5 Battery System Setting page

When the cursor "»" is pointed to "Sys setting," pressing ENTER key will enter the page of "Sys setting," as shown in the figure below:



2.7 Connectors

Charge / Discharge connectors: connect the positive pole (+) and negative pole (-) from the battery to the inverter via a DC isolator.

RS485: Active communication portal between battery and inverter.

RS232: To get dynamic monitoring data of the battery from the upper computer.

RS485/CAN: To get dynamic monitoring data of the battery from the inverter.

Address: Reserved Address portal for multiple parallel connections.

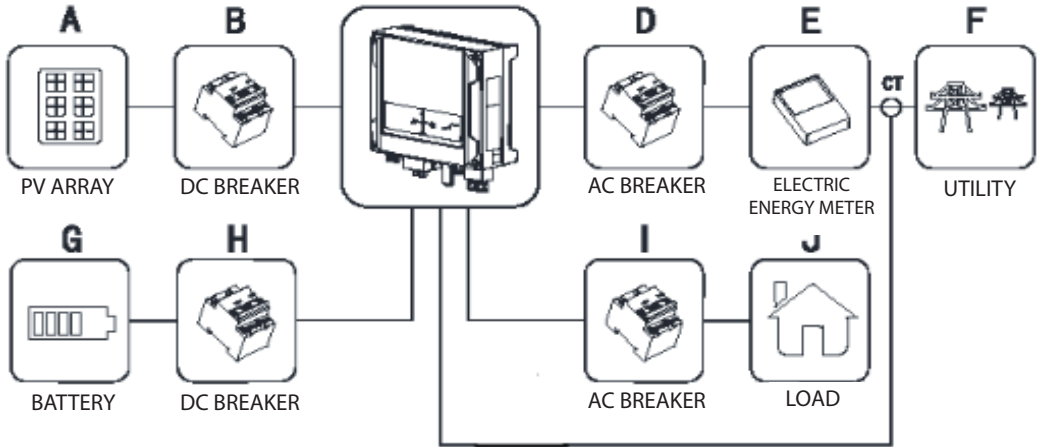
2.8 Wake Up button

Switch on: When the battery shuts down, press this button for 1 second. It is activated when the LED lights flicker from the RUN light to the lowest capacity indicator.

Reset: When the battery is activated, press this button for 6 seconds. After that, the battery will be reset, and all of the LED lights will be on simultaneously.

3. Safe handling guide

3.1 System Diagram



3.2 Tools

The following tools are required to install the battery pack:

- Wire cutter
- Crimping Modular Plier
- Screw Driver

NOTE: Use appropriately insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

3.3 Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack:

- Insulated gloves
- Safety goggles
- Safety shoes

3.4 Installation

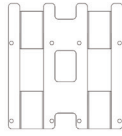
3.4.1 Inventory of items

Thoroughly inspect the packaging upon receipt of goods. If there is any missing item or damage to the external packaging or the unit itself upon unpacking, please get in touch with the supplier immediately.

Wall Mounted Battery



A



B



C



D

NO.	Item	Quantity	Remarks
A	Battery Pack	1	5.12KWh
B	Mounting frame	1	SPCC
C	Mounting frame screw	8	M8*70mm
D	Power cable(1.5M)	2	6AWG Wire-M6 125A/1000V
Option	RS232 Communication Cable	1	monitor battery through upper software
Option	Battery-Inverter Communication Cable	1	Battery communicated with inverter

Rack Mounted Battery



A



B



C



D

NO.	Item	Quantity	Remarks
A	Battery Pack	1	5.12KWh
B	Mounting frame	2	SPCC
C	Mounting frame screw	20	Cage Nut x 4PCS, M6 x 4PCS, m4 x 12PCS
D	Power cable(1.5M)	2	6AWG Wire-M6 125A/1000V
Option	RS232 Communication Cable	1	monitor battery through upper software
Option	Battery-Inverter Communication Cable	1	Battery communicated with inverter

3.4.2 Installation Location

Make sure that the installation location meets the following conditions:

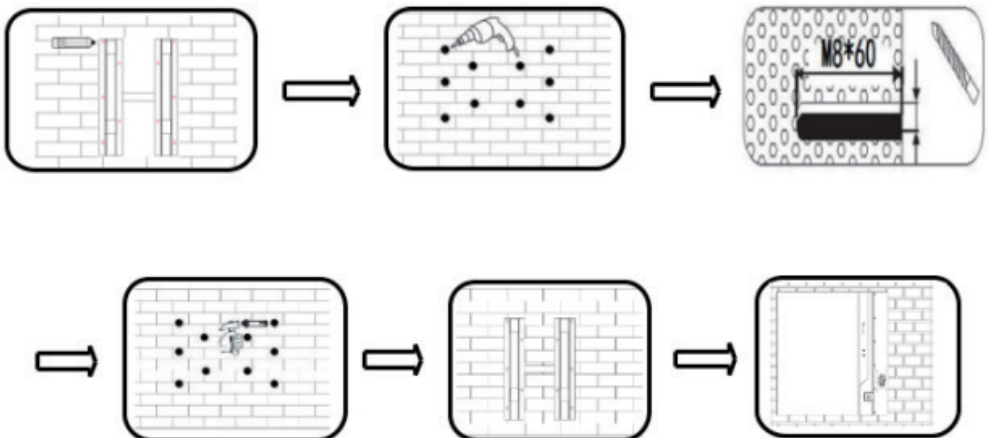
- The installation site must be suitable for the size and weight of the battery.
- Must be installed on a firm surface to sustain the weight of the battery.
- The area is waterproof.
- There are no flammable or explosive materials in proximity.
- The ambient temperature is within the range from 0°C to 45°C.
- The temperature and humidity are maintained at a constant level.
- There is minimal dust and dirt in the area.
- Installation must be vertical or tilted backward by a maximum of 15° - avoid forward or sideways tilt.

3.4.3 Wall-mounted

1. Choose a suitable firm wall with a thickness greater than 80mm.
2. Use the mounting frame as a template, and mark the hole position.
3. Drill eight holes according to the hole position; it is $\varnothing 10$ with a depth of 60mm.
4. Hammer the M8 screws to the above holes, and screw the nut.

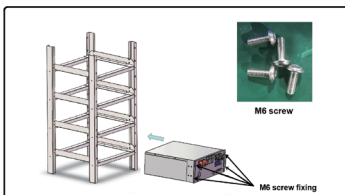
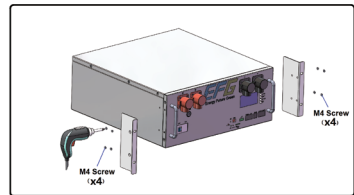
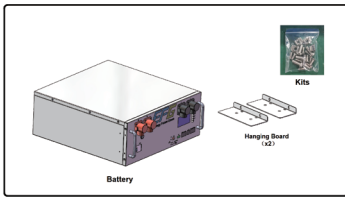
NOTE: Do not position screws to flush to the wall - leave 10 to 20 mm exposed.

5. Fix the mounting frame to the eight screws.
6. Raise the battery a little higher than the mounting frame while maintaining the balance of the battery. Then, hang the battery on the rack through the match hooks.



3.4.4 Mount on the rack

1. After unpacking the battery, use the accessories to assemble it in the cabinet or rack.
2. The accessories used with the battery are: mounting ears x2 and screw bag x1.
3. There are three screw accessories in the screw bag: M4 countersunk head screw x8, M6 cage nut x4, and M6 screw x4.
4. Fix the mounting ear on the battery pack with M4 screws first.
5. The M6 cage nuts are installed on the fixing holes of the cabinet or rack.
6. Push the battery pack parallel to the cabinet or rack and fix it with M6 screws.
7. The 2nd battery pack, the 3rd battery pack, the 4th battery board, etc., and install them on the cabinet or rack in sequence 4-6.



4. Operating Instructions

4.1 Software Installation

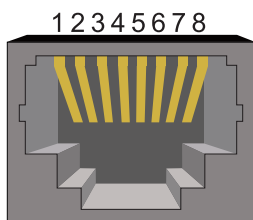
Install battery monitoring software to fully configure battery shutdown and other settings for optional computer system protection.

4.2 Pre-Operation Step

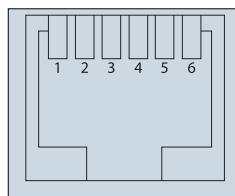
The circuit breaker of the battery circuit is set to OFF, connected to the switch power supply, and the output voltage of the switch power supply is set to 52.5-54V/56-57.6V, current set to 0.2C; when all settings are done, switch the circuit breaker ON.

4.3 Communication Function

4.3.1 Communication port definition



RS485 interface

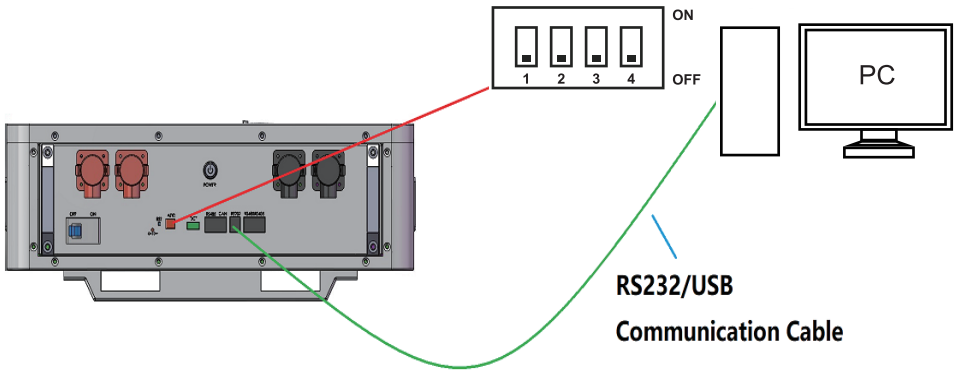


RS232 interface

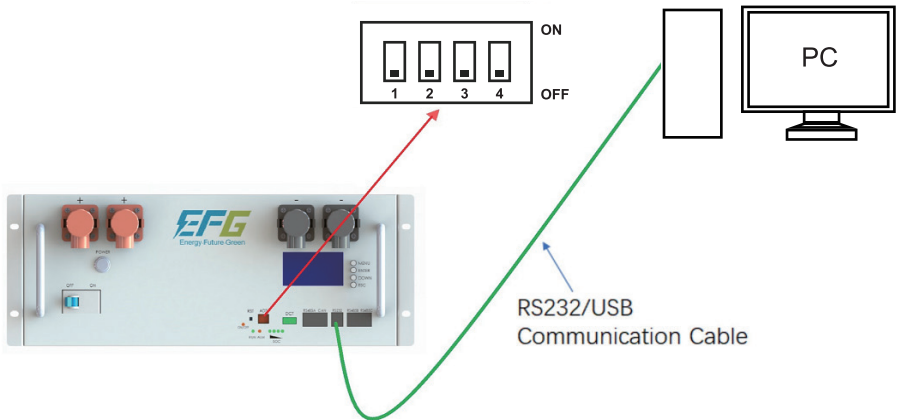
RS485 Terminal Port	Definition
Pin1 , 8	RS485_B
Pin2 , 7	RS485_A
Pin3 , 6	GND
Pin4 , 5	NC
RS485 Communication Port Definition	
CAN Terminal Port	Definition
Pin4	CAN H
Pin5	CAN L
Pin7	GND
Pin1,2,3,6,8	NC
CAN Communication Port Definition	
RS232 Terminal Port	Definition
Pin3	BMS Transmit, PC Receive
Pin4	BMS Receive, PC Transmit
Pin5	GND
Pin1,2,,6	NC
RS232 Communication Port Definition	

4.3.2 Battery communicates with PC/Software

4.3.2.1 Single battery communicates with PC/Software



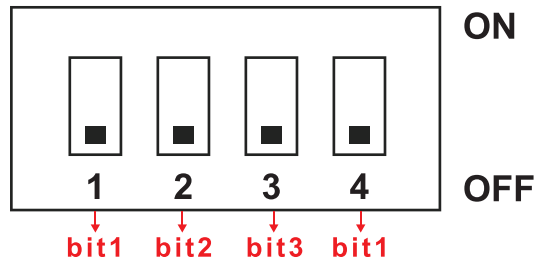
Wall Mounted Battery



Rack Battery

4.3.2.2 Batteries parallel communicate with PC/Software

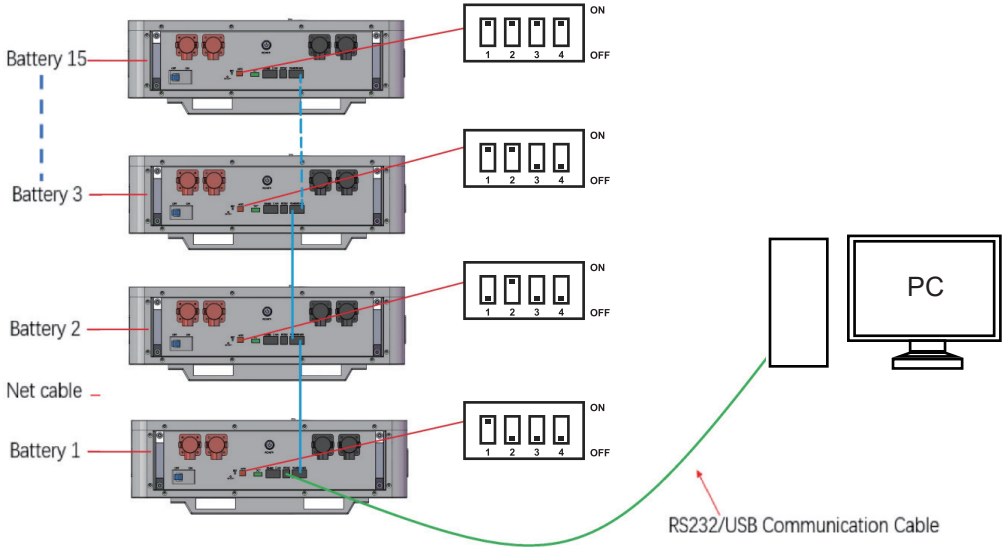
The dial-up addresses of the battery are different in parallel communication.



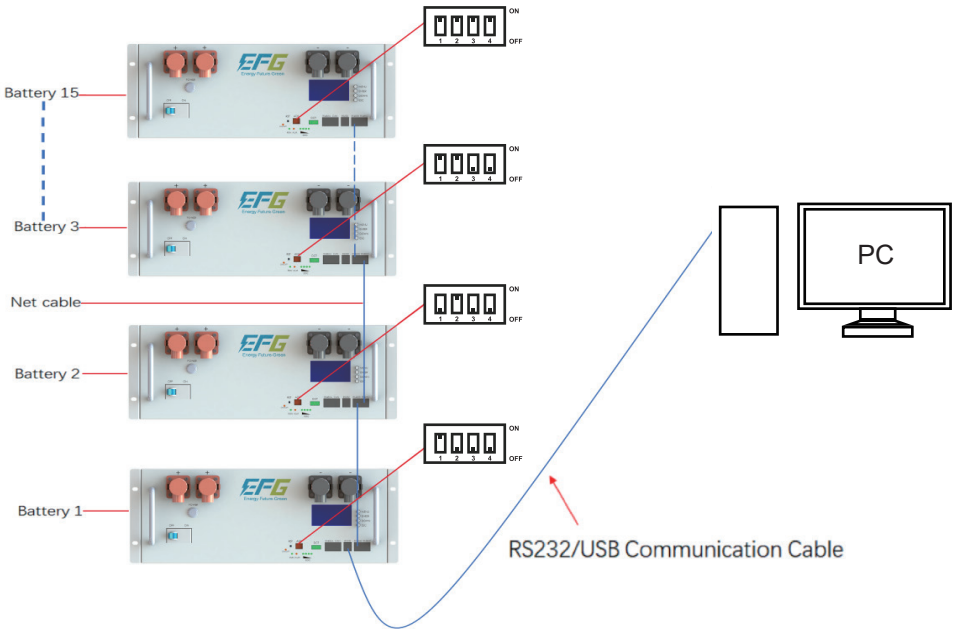
Address	Dial Switch				Remark
	bit1	bit2	bit3	bit4	
1	ON	OFF	OFF	OFF	Battery 1
2	OFF	ON	OFF	OFF	Battery 2
3	ON	ON	OFF	OFF	Battery 3
4	OFF	OFF	ON	OFF	Battery 4
5	ON	OFF	ON	OFF	Battery 5
.....
14	OFF	ON	ON	ON	Battery 14
15	ON	ON	ON	ON	Battery 15

Note: The range of batteries' address bit 1-bit 4 is 1-15.

For example:15 sets batteries in parallel communicated with PC/software as below:



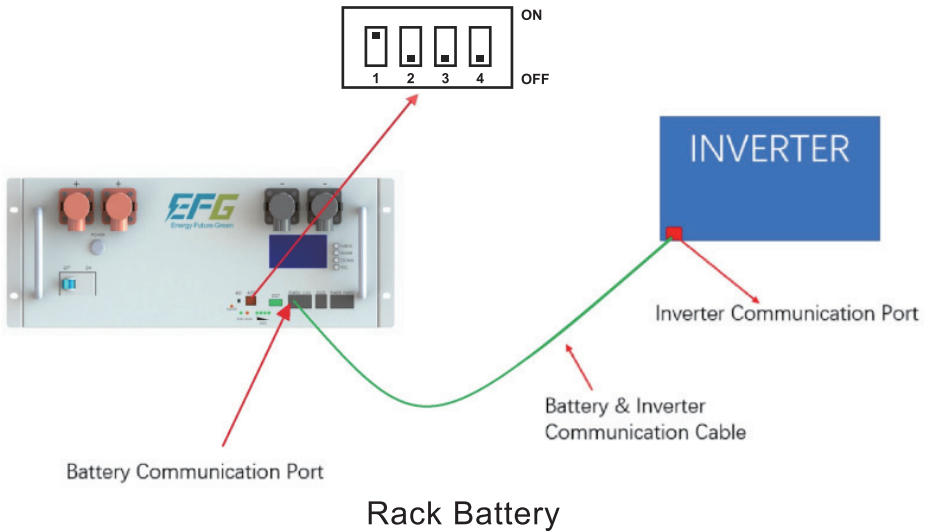
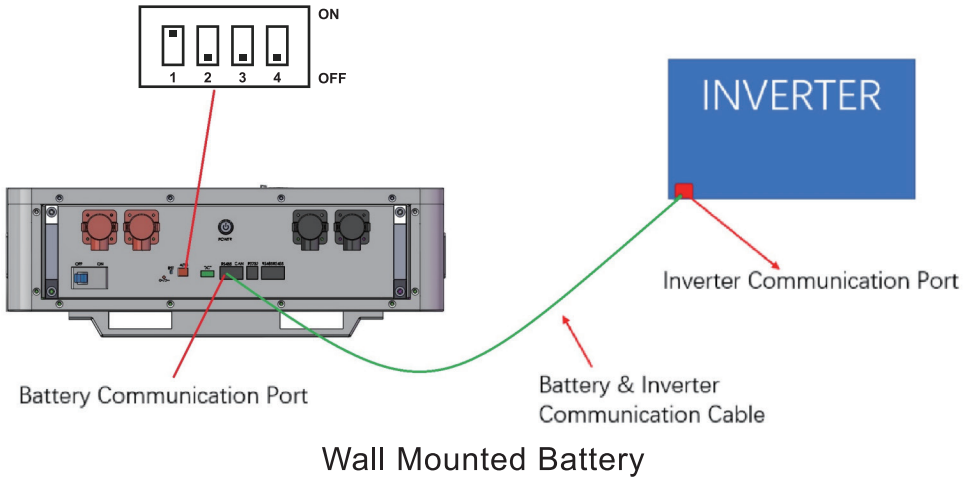
Wall Mounted Battery



Rack Mounted Battery

4.3.3 Batteries communicated with inverter

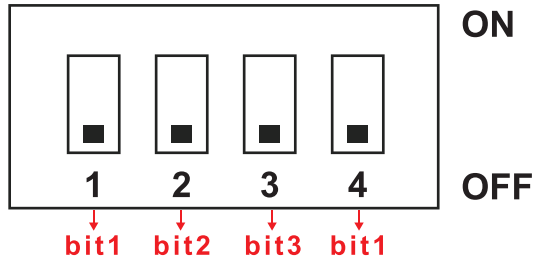
4.3.3.1 Single battery communicate with inverter



- Note: 1. If communicated with LUX inverter, please connect with RS485 port of battery.
 2. If communicated with DEYE inverter, please connect with CAN port of battery.

4.3.3.2 Batteries parallel communicate with inverter

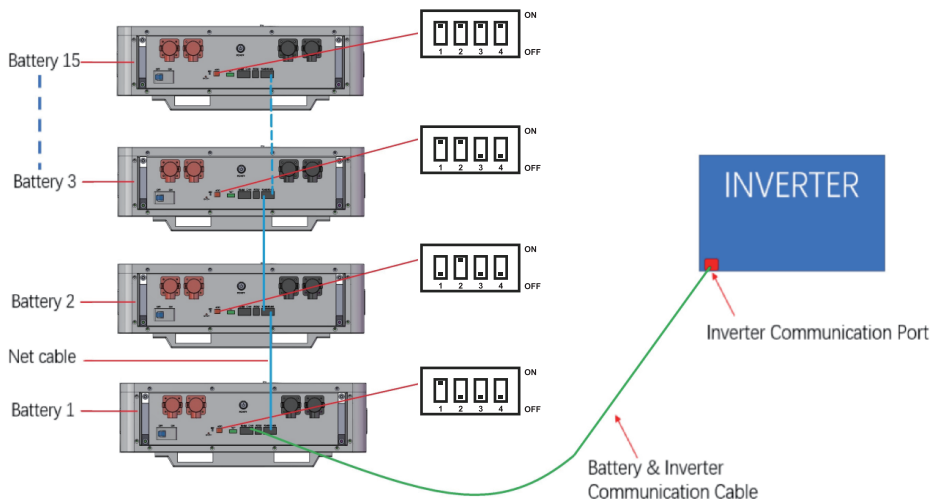
The dial-up addresses of the battery are different in parallel communication.



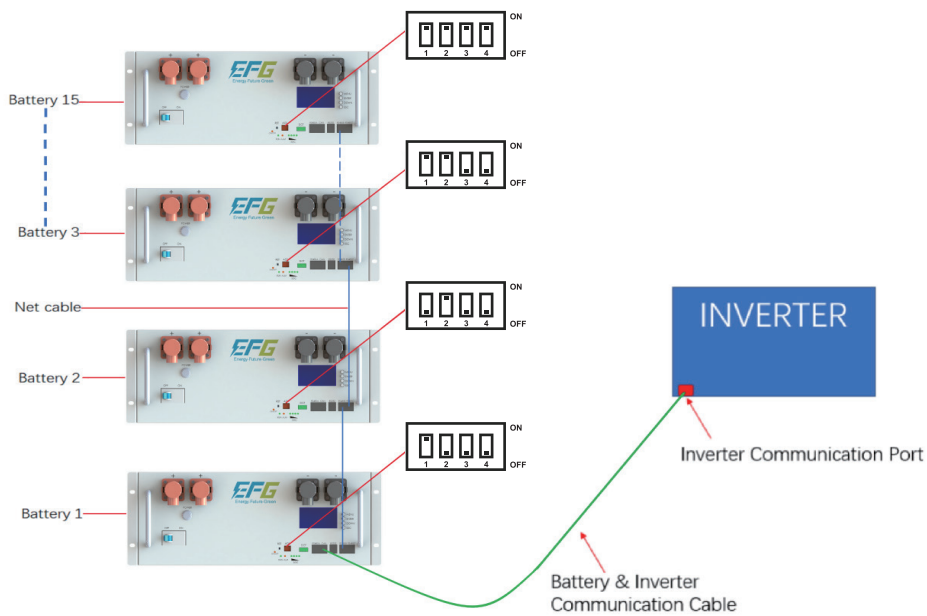
Address	Dial Switch				Remark
	bit1	bit2	bit3	bit4	
1	ON	OFF	OFF	OFF	Battery 1
2	OFF	ON	OFF	OFF	Battery 2
3	ON	ON	OFF	OFF	Battery 3
4	OFF	OFF	ON	OFF	Battery 4
5	ON	OFF	ON	OFF	Battery 5
.....
14	OFF	ON	ON	ON	Battery 14
15	ON	ON	ON	ON	Battery 15

Note: The range of address bit 1-bit 4 is 1-15.

For example:15 sets batteries in parallel communicated with inverter as below:



Wall Mounted Battery



Rack Mounted Battery

5. Troubleshooting

If the battery does not operate correctly, please solve the problem using the table below.

Symptom	Possible cause	Remedy
No indication and alarm in the front display panel	Sleeping mode	Press Reset to normal mode
No indication and alarm in the front display panel even Reset still no	Battery voltage too low	Charge battery immediately
Red LED Flashing when Standby	Battery cell low voltage	Charge battery immediately
Red LED Flashing when charging	Alarm for protection when charging	BMS show alarm, protect and adjustment
Red LED Flashing when Discharging	Battery is too low and will shutdown	Charge battery immediately
RED LED Lighting continuous	Battery wrong	Need to repair

6. Storage and Maintenance

6.1. Storage

Before storing, charge the battery for at least 7 hours. Then, keep the battery covered and upright in a cool, dry location. Recommended long-term storage temperature is 15°C -25°C. During storage, recharge the battery by the following table:

Storage Temperature	Recharge Frequency	Charging Duration
0°C - 40°C	Every 3 months	1-2 hours

6.2. Maintenance



The battery system operates with hazardous voltages. Only qualified maintenance personnel can repair it.



Even after the unit is disconnected from the mains, components inside are still connected to the battery cells which are potentially dangerous.



Before carrying out any service or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals.



Only persons adequately familiar with batteries and the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must keep well away from the batteries.



Verify that no voltage between the battery terminals and the ground is present before maintenance or repair. This product's battery circuit is not isolated from the input voltage. As a result, hazardous voltages may occur between the battery terminals and the ground.



Batteries may cause electric shock and have a high short-circuit current. Please remove all wristwatches, rings, and other personal metal objects before maintenance or repair, and only use tools with insulated grips and handles for maintenance or repair.



When replacing the batteries, install the same number and type of batteries.



When replacing the parallel batteries, ensure the new battery is fully charged.



Do not open or destroy batteries. Escaping electrolytes can cause injury to the skin and eyes. It may be toxic.



Please replace the fuse only with the same type and amperage to avoid fire hazards.



Do not disassemble the battery system.

7 Product Responsibilities and Consulting

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

(2)We will not send separate notice, provided that the contents of this specification change due to improvement of product quality or technological upgrading; provided that you want to understand the latest information on this product, please get in touch with us.

(3)We will maintain the product, which is in the warranty period for free of charge, provided that it has any product quality problems within the specified operating range. We may replace the relevant parts if we fail to maintain them to achieve the purpose of sustainable use without performance reduction; our after-sales service personnel will propose specific maintenance and troubleshooting methods.

(4)In case of any questions, please contact us: info@efgbattery.com / eric@efgbattery.com.



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