USER'S MANUAL

Rechargeable LiFePO4 Battery

SILA LP16 Series

Table of Contents

1 Overview

This product specification sheet provides a detailed description of the technical parameters of household low-voltage batteries, including battery specifications, charging and discharging parameters, installation, maintenance, packaging, transportation and storage conditions, and other requirements.

2 Warnings and safety precautions

1) Before installing or using the battery, it is essential to read the user manual carefully. Failure to do so or to follow any instructions or warnings in this document may result in electric-shock, serious injury or death, or may damage the battery, potentially rendering it inoperable.
2) If the battery is stored for a long time, it must be charged every six months, and the SOC (state of charge)should be no less than 30%.
3) The battery must be charged within 12 hours, after total discharge.
4) Do not install the product outdoors or beyond the operating temperature or humidity range listed in the manual.
5) Do not expose the cable to the outside.
6) Do not connect the power terminal reversely.
7) All battery terminals must be disconnected for maintenance.
8) Please contact the supplier within 24 hours if something abnormal happens.
9) Do not use detergent to clean the battery.
10) Do not expose batteries to flammable or harsh chemicals or vapours.
11) Do not paint any part of the battery, including internal or external components.
12) Do not connect the battery with PV solar wiring directly.
13) Any foreign object is prohibited from being inserted into any battery part.

3 Product introduction

LP1600 series is a lithium iron phosphate battery-based energy storage product developed and produced by MUST, it can supply reliable power for nearly all kinds of household appliances and equipment. It consists of a built-in BMS battery management system, which can manage and monitor cells information including voltage, current and temperature, used to limit the balance current between different batteries when parallel use to expand capacity and power to meet the requirements of longer power supporting duration and higher power consumption.It can be hung on the wall or installed in a floor standing or stacked manner in daily usage.

3.1 Product advantages

- ⋆ **Safty**：$LiFePO_4$ battery has BMS and Multiple safety protections which can manage and monitor battery voltage, current, temperature and other information.
- ⋆ **Stability**：It operates within a wide temperature range of -20℃ to 60℃ and supports high-rate charging and discharging. Its cycle life is up to 6000 cycles.
- ⋆ **Flexibility**：Supports the parallel use of 1 to 15 battery packs to meet different power needs.
- ⋆ **Convenient**：The installation and maintenance are simple, with automatic recognition of the battery pack's IP address. It can monitor battery parameters in real-time and supports multiple upgrade methods.

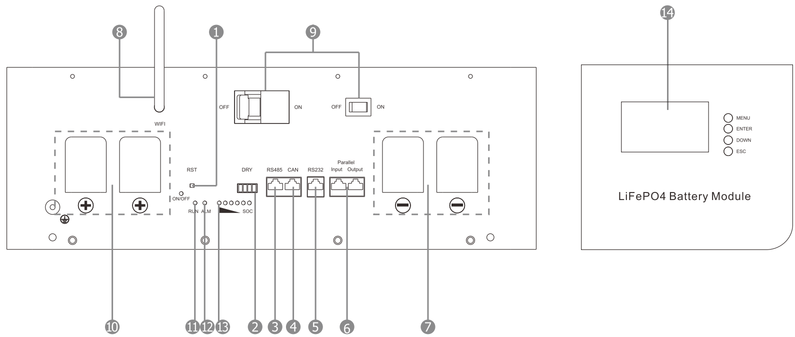
3.2 Product parameters

3.2.1 Battery technical parameter requirements

parameter	Data sheet						
Nominal Voltage	25. 6V			51.2V			
Nominal Capacity	100Ah	200Ah	300Ah	100Ah	200Ah	300Ah	320Ah
Nominal Energy	2560Wh	5120Wh	7680Wh	5120Wh	10240Wh	15360Wh	16384Wh
Max. Output Power	2.5kW	3.5kW	5kW	5kW	7.5kW	10kW	10kW
Rated Charge Current	20A	40A	60A	20A	40A	60A	60A
Rated Discharge Current	20A	40A	60A	20A	40A	60A	60A
Max Continuous Current	100A	150A	200A	100A	150A	200A	200A
Charge Voltage	29.2V			58.4V			
Discharge Voltage	22.0V			44.0V			
Operation Temperature	Charge: 0°C to 50°C / Discharge: -20°C to 60°C						
Storage Temperature	-5°C to 35°C						
Life Cycles	6000 cycles @ 80% DOD,25°C						
Module Parallel	Up to 15 units						
Communication	CAN2.0/RS232/RS485						
IP Protection Level	IP 21						
Certification & Standards	CE-EMC (EN 61000-6-3: 2007+A1: 2011+AC: 2012 EN IEC 61000-6-1: 2019) IEC62619-1:2018; IEC62619:2022; IEC62619:2017; UN38.3/ MSDS						
Installation Mode	Wall-mounted, Stacked-mounted, Rack-mounted(optional)					Vertical-mounted	
Dimension (mm)	442*485.5*177	442*486.5*250	442*495*230	442*625.5*177	442*686.5*250	490*923*265	
N.W (kg)	27	44	58	45	80	114	

3.3 Interface Information

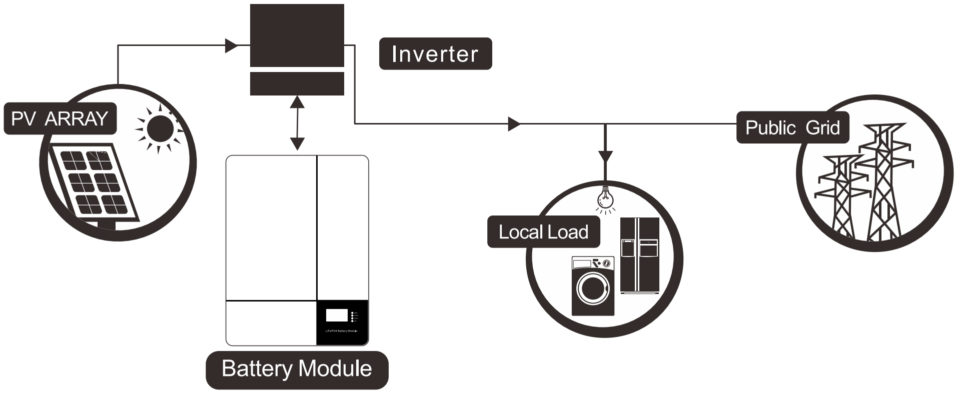
The following figure shows the product appearance and interface functions.The location of the components shown in the figure varies for different types of batteries.



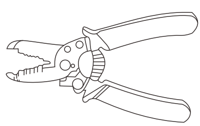
NO	Description	Function
1	RST	When the BMS is dormant, press the button (3-6S) to release, the protection plate is activated, and the LED indicator light starts from "RUN" for 0.5 seconds. When the BMS is active, press the button (3-6S) and release, the protection plate is dormant,and the LED indicator starts from the lowest power light for 0.5 seconds. When the BMS is active, press the button(6-10S) and release it, the protection plate is reset, and the LED lights are all lit for 1.5 seconds.
2	DRY port	Dry contact 1 -PIN 1 to PIN 2: normally open, low battery closed. Dry contact 2-PIN3 to PIN 4: normally open, closed during fault protection
3	RS485 port	RS485 communication ports . For an Inverter and a Secondary Battery
4	CAN port	CAN communication ports .For an Inverter and a Secondary Battery
5	RS232 port	RS232 connecting with upper computer to let manufacturer or professional engineer to process adjusting service
6	Parallel port	Paralle with anther battery
7	BAT-	Negative for charge and discharge
8	WiFi/BLE	Connect network
9	Power switch	Turn on or turn off power
10	BAT+	Positive for charge and discharge
11	RUN	RUN Indicator: Green LED indicates the battery's running status
12	ALM	Red LED Flashing indicates the battery alarm
13	SOC	SOC-six Green LEDs indicate the battery's current capacity
14	LCD screen	Display battery parameters and status information

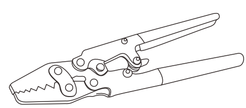
4 Installation instructions

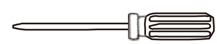
The following figure shows the common topology of the product in the residential energy storage application.



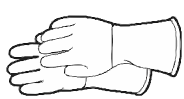
4.1 Tools and safety gear

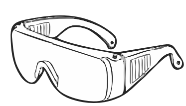

Wire cutter


Crimping modular plier


Screwdriver


Protective clothing


Insulated gloves


Safety goggles


Safety shoes

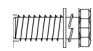
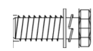
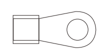
Use appropriately insulated tools to prevent accidental electric shock or short circuits. If insulated tools are unavailable, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

It is recommended to wear safety gear, insulated gloves, safety Goggles and safety shoes when dealing with the battery pack.

4.2 Package items

After receiving the product, please unpack the boxes, and check product and packing list first, if product is damaged or lack of parts, please contact with the local retailer.

Here is the SILA LP16 Packing List:

NO.	Item	Specification	Qty.	Usage	Diagram
1	SILA LP16	R-XC016161(-H)	1	Battery	
2	Mounting Panel	15*3*0.5(inches)/ 508*2 15*20(mm)	1	Mounting battery on the wall	
3	Embedded Screw	M8*80	6	Fix battery on the wall	
4	Embedded Screw	M6*12	16	Fix truckle on the horn ring	
5	Embedded Screw	M5*12	1	Fix mounting panel on the wall and connect nrniinHinn	
6	OT terminal	/	4	For power cable installation	
7	communication line	2m	1	communication cable connecting the battery and inverter	

Optional accessories

2 power cables

Stacking base

4.3 Installation location

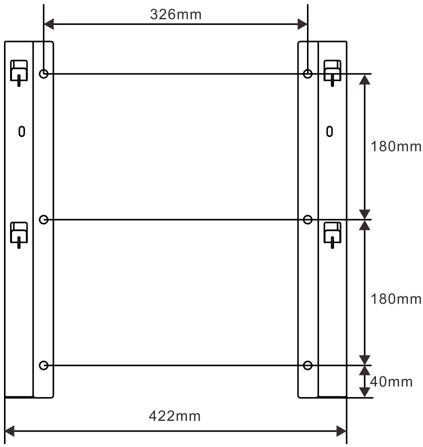
Make sure that the installation location meets the following conditions:

- The area is completely waterproof.
- The floor is flat and level.
- There are no flammable or explosive materials.
- The ambient temperature ranges 0°C to 45°C.
- The temperature and humidity are maintained a constant level.
- There is minimal dust and dirt in the area.
- The distance from the heat source is more than 2 meters
- The distance from the air outlet of the inverter is more than 0.5 meters.
- The installation area shall avoid direct sunlight.
- The battery module has no mandatory ventilation requirement, but please avoid installation in confined areas.The operation shall avoid high salinity,high humidity, or high temperature.

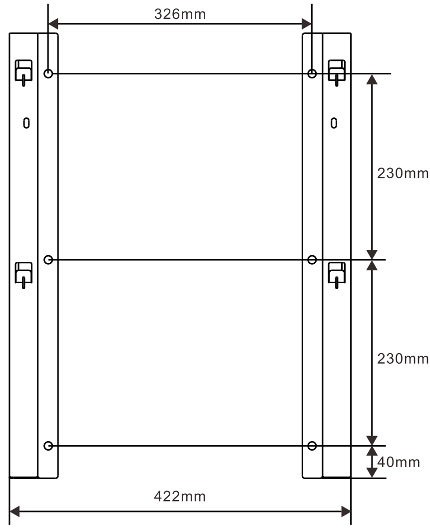
4.4 Installation step

4.4.1 Installation of mounting rack.

Install the battery mounting rack with following drawing dimension.

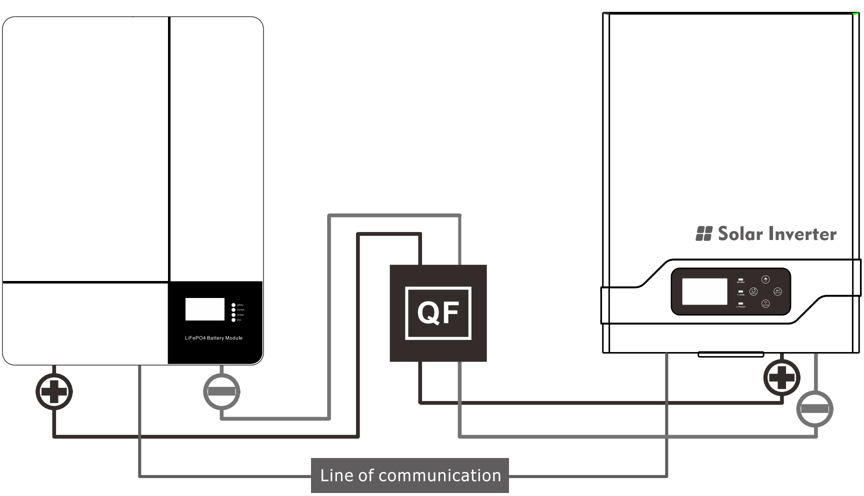


The dimensional drawing of universal rack for other models



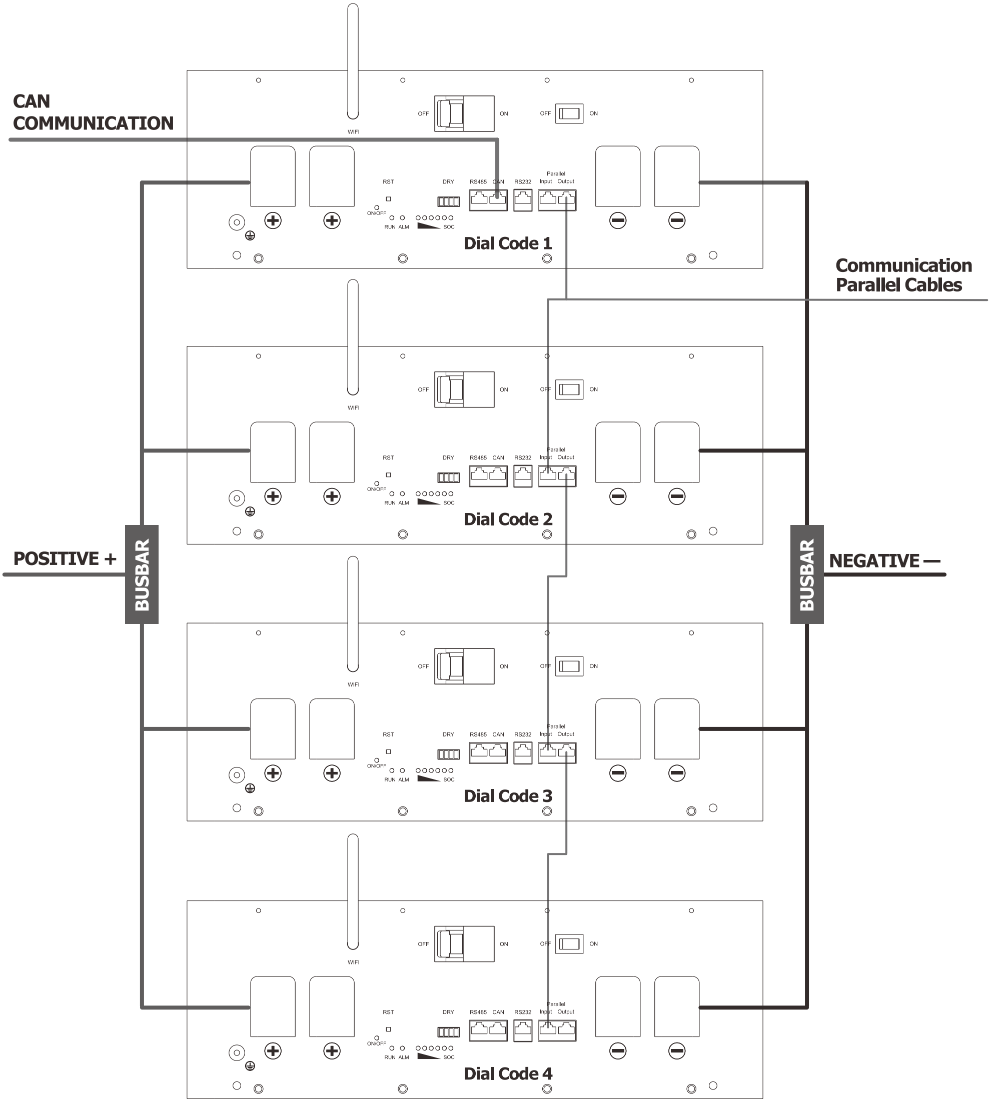
The dimensional drawing of dedicated rack for LP16-48200

4.4.2 Installation of battery pack



a. Connect the cables between battery modules.

b. Connect the cables to the inverter.



CAUTION

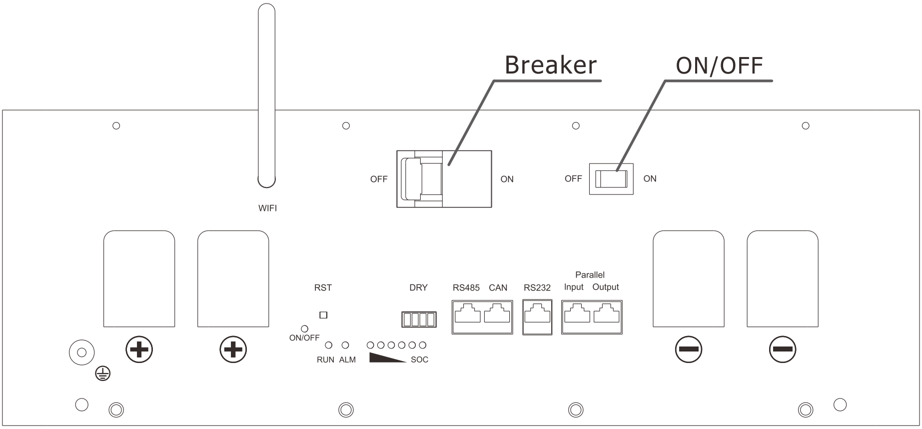
A suitable breaker between the battery system and inverter is required.
The complete installation and operation of the system must follow the local electric standard.

5 Operating instruction

5.1 Power on

Check all the power and communication cables again.

Switch on all the battery modules.



The one with an empty "Link port 1 " is the primary battery module; the others are secondary.Primary battery configuration with a maximum of 15 secondary batteries.

Switch the red switch on the primary battery to turn the power on; all the battery LEDs will be on one by one from the primary battery.After the battery module is powered on, activating the-soft start function takes 3 seconds.After the soft start, the battery is ready for high-power output.

During capacity expansion or replacement,when different parallel soc/voltage of a module are together, please maintain the system idle for ≥ 15 mins or until the SOC LED lights up(=1 LEDS difference) before regular operation.

5.2 Setting and descriptions

5.2.1 BMS communication protocol settings

- In the "Para Setting" section, the display screen has the function of setting the BMS protocol.Users can view and select the required communication protocol through buttons, and send the selectedprotocol version number back to the BMS motherboard program, thereby changing the communication protocol between the BMS and inverter.
- Under the main interface shown in Figure 1-1, select the down key and place the front cursor "》".

  In the "Para Setting" column.Enter key to enter as shown in Figure 1-1. At this time, place the front cursor"》"in the "Current Prot" column. Enter key to enter as shown in Figure 1-2 to view the current default communication protocol.

```
》Current Prot.》
--Set CAN Prot.》
--Set 485 Prot.》
```

Figure 1-1

```
Current CanProto.
VICTRON
Current 485Proto.
PYLON
```

Figure 1-2

5.2.2 Set CAN communication protocol

- Under the interface shown in Figure 1-1, select downwards with the Down key, place the front cursor "》"in the "Set CAN Prot" column, and press the Enter key to enter Figure 1-2.1.
- In the interface of Figure 1-2.1,the communication protocol for the requirement can be selected by pressing the Down key. Place the cursor "》"in the corresponding column of the protocol name for the requirement, and press the Enter key Enter the protocol settings, as shown in Figure 1-2.2.
- At this time, select "PYLON" to set the communication protocol, and press the Enter key to select "YES" to enter the successful setting interface, as shown in Figure 1-2.3. Press the ESC key to return to the previous interface.

```
》GOODWE
--STUDER
--SOFAR
--SOFARO3
```

Figure 1-2.1

```
Set CAN Proto.
PYLON

》YES》     --NO》
```

Figure 1-2.2

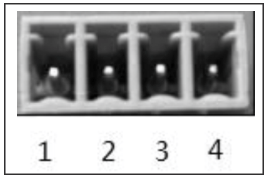
```
Protocol Change
Succeeded. Press
   》ESC》
to Exit.
```

Figure 1-2.3

5.2.3 Set RS485 communication protocol

Under the interface shown in Figure 1-1, select downwards using the Down key, place the front cursor"》"in the "Set 485 Prot" column,and enter the Enter key to set the corresponding RS485 communication protocol .The operation steps are the same as setting the CAN communication protocol.

5.2.4 DRY contact output description

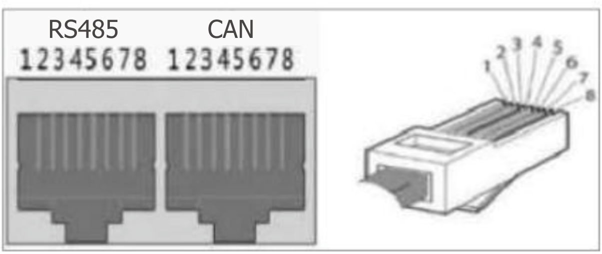


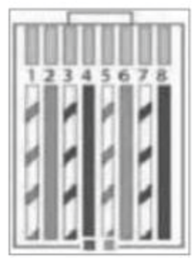
Dry contact 1 -PIN 1 to PIN 2: normally open, low battery closed.

Dry contact 2-PIN3 to PIN 4: normally open, closed during fault protection.

5.2.5 RS458 and CAN

The RS458 and CAN use to connect an Inverter and a Secondary Battery.



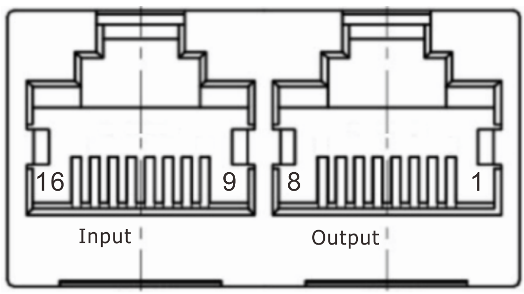


Communication port definition:

Port	Definition		Port	Definition	
Rs485 Communication Port	PIN 1	RS485-B	CAN Communication port	PIN 1	NC(Empty)
	PIN 2	RS485-A		PIN 2	GND
	PIN 3	GND		PIN 3	NC(Empty)
	PIN 4	NC(Empty)		PIN 4	CAN H
	PIN 5	NC(Empty)		PIN 5	CAN L
	PIN 6	GND		PIN 6	NC(Empty)
	PIN 7	RS485-A		PIN 7	NC(Empty)
	PIN 8	RS485-B		PIN 8	NC(Empty)

5.2.6 Battery pack parallel function:

- Use a parallel communication cable to connect the parallel output interface of the host machine to the interface of the first slave machine, and then connect the paralleloutput interface of the first slave machine to the parallel input interface of thesecond slave machine. Connect in sequence according to the above method.
- When parallel status,only the primary battery pack communicate with the PC upper computer as remote monitoring, uploading data, displaying status and any other info of all battery packs.

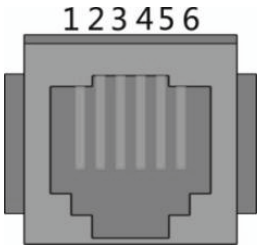


Parallel port

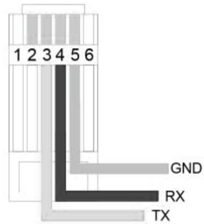
Parallel Output RJ45		Parallel Input RJ45	
Pin	Clarifying	Pin	Clarifying
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	GND	11、14	GND
4	GND	13	UP_IN
5	DN_OP+	12	GND

5.2.7 RS232(Adjusting)

RS232 connecting with upper computer to let manufacturer or professional engineerto process adjusting service.



RS232 Port



Port	Clarifying	
RS232 Communication port Difinition	PIN 1	NC(Empty)
	PIN 2	NC(Empty)
	PIN 3	TX protection board sending data (PC receiving data)
	PIN 4	RX protection board receving data (PC Sending data)
	PIN 5	GND
	PIN 6	NC(Empty)

5.2.8 LED Instructions

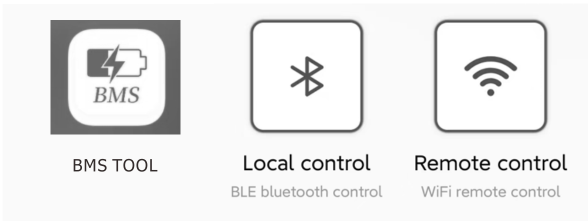
Condition	RUN	ALR	1	2	3	4	5	6
OFF	–	–	–	–	–	–	–	–
ON	●	●	●	●	●	●	●	●
NORMAL	●	–	–	–	–	–	–	–
Charge	●	–	Show soc					
Discharge	●		Show soc					
Alarm	ALM ● Other LEDs are same as above.							
System fault or protection	–	●	–	–	–	–	–	
●/●	ON							
●	flash, on: 0.3s; off: 3.7s							
●/●	flash, on:0.5s; off: 1.5s							

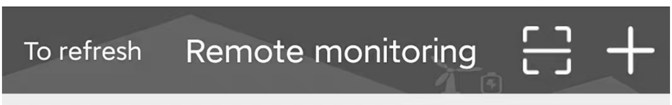
5.3 Wi-Fi Configuration

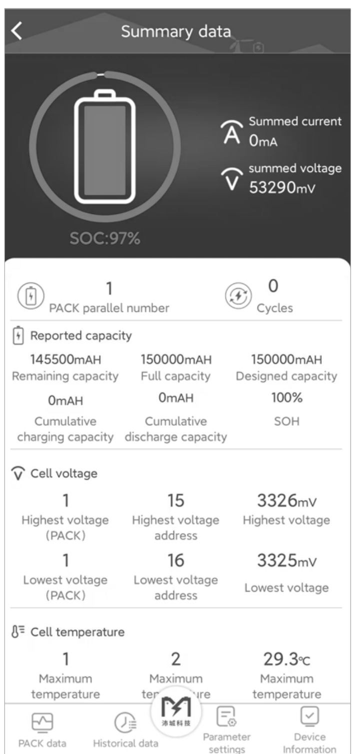
Through the BMS TOOL, you can view various information about the battery in real-time, including battery capacity, cell temperature, current, voltage, and more.

For first-time use, please install the BMS TOOL on your phone. After installing the APP, follow the steps below to connect to the battery device.

1) Open the BMS TOOL.
2) Select remote control.
3) Scan the QR code on the battery body to connect the device.







6 Others

This document has been prepared to describe the appropriate cautions and prohibitions, which the customer should take or employ when the customer uses and handles the Lithium-ion battery pack to be manufactured and supplied by MUST ENERGY TECHNOLOGY CO., LTD in order to obtain optimum performance and safety.

The customer is requested to contact MUST in advance, if the customer needs other applications or operating conditions is beyond those described in this document, as we need to do additional check or tests to verify the battery pack performance and safety under such conditions.

MUST will not take responsibility for any accident when the battery pack is used under other conditions than those described in this Document.

If necessary, MUST will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the battery pack.

6.1 Charging

6.1.1 Charging current

Charging current should be less than maximum charge current specified in the product specification. Charging with higher current than recommended value may cause damage to battery pack electrical, mechanical and safety performance and could lead to heat generation or leakage.

6.1.2 Charging voltage

Charging shall be done by voltage less than that specified in the Product specification (FC/PACK). Charging beyond FC, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the battery pack electrical, mechanical safety performance and could lead to heat generation or leakage.

6.1.3 Charging temperature

The battery pack shall be charged within the specific temperature range in the Product Specification.

6.1.4 Prohibition of reverse charging

Reverse charging is prohibited. The battery pack shall be connected correctly. The polarity has to be confirmed before wiring, in case of the battery pack is connected improperly, the battery pack cannot be charged. Simultaneously, the reverse charging may cause damaging to the battery pack which may lead to degradation of battery pack performance and damage the battery pack safety, and could cause heat generation or leakage.

Please use approved charger or charger supplied from supplier. If charger used improperly, it may damage the battery pack. For any un-approved charger which caused the battery pack problem, MUST will not take any responsibility.

6.2 Discharging

6.2.1 Discharging current

The battery pack shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

6.2.2 Discharging temperature

The battery pack shall be discharged within the specific temperature range specified in the Product Specification.

6.2.3 Over-discharging

It should be noted that the battery pack would be possible to be at an over-discharged state by its self-discharge characteristics in case the battery pack is not used for long time. In order to prevent over-discharging, the battery pack shall be charged periodically to maintain between 40%-60%.

Over-discharging may cause loss of battery pack performance, characteristics, or battery pack functions.

The charger shall have the function to prevent the battery pack to be further discharged beyond a cut-off voyage specified in the Product Specification. Also, the charger shall be equipped with a device to control the recharging procedures. If the battery pack is over discharged, please use the following steps:

Firstly, charge the battery pack with a very low current (0.01C) for 15-30 min, i.e.-charging, before rapid charging starts. When the voltage is above FD then start normal charge. The charger can be determined with the use of an appropriate timer for pre-charging. In case the voltage does not rise to FD within the pre-charging time, then the charger shall have functions to stop further charging and show the pack is at abnormal state.

6.3 Storage

The storage temperature of the battery pack is as below:

The battery pack should be stored at half charged state in a dry, clean, no corrosive gas place with good ventilation, If the cell has to be stored for a long time (Over 3 months), the environmental condition should be -10℃ to 25℃, low humidity, no corrosive gas atmosphere. The voltage for a long-time storage shall be 40%-60% range. For every three months, cycle the battery pack 1-3 times to keep the battery pack performance, and stored again at half charged.

6.4 Others

6.4.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the battery pack shall be used to maintain extra safety protection.

6.4.2 Prohibition of disassemble

- The disassembling may generate internal short circuit in the battery pack, which may cause firing, or other problems.
- The battery pack should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.
- Never incinerate nor dispose the battery pack in fire. These may cause firing of the battery pack, which is very dangerous and is prohibited.
- The battery pack shall never be soaked with liquids such as water, seawater drinks such as soft drinks, juices coffee or others.
- The battery pack replacement shall be done only by either battery pack supplier or device supplier and never be done by the user.
- Prohibition of use of damaged battery pack

- The batteries might be damaged during shipping by shock. If any abnormal features of the batteries are found such as damages in a plastic envelop of the batteries, deformation of the battery pack package, smelling of electrolyte, electrolyte leakage and others, the battery pack shall never be used any more.
- The batteries with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.

5410-090051-00B2