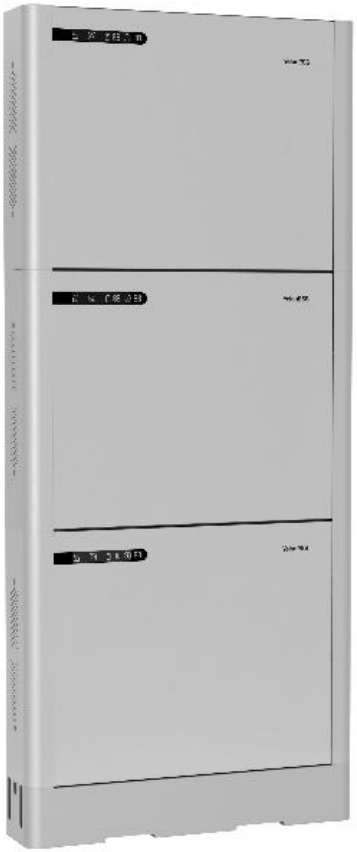
YelonESS

LW5000

Rechargeable Li-ion Battery

User Manual



Contents

1. Symbol in label, manual and product

	Caution! Warning! Reminder Safety related information. Risk of battery system failure or life cycle reduces.
	Do not reversely connect the positive and negative.
	Do not place the device near flame.
	Do not place within reach of children and pets.
	Warning: electric shock
	Warning: fire Do not place near flammable material.
	Read the product and operation manual before operating the battery system.
	Grounding.
	Recycle label
	The certificate label for EMC
	Label for Waste Electrical and Electronic Equipment (WEEE). Directive (2012/19/EU).

2. Safety Precautions

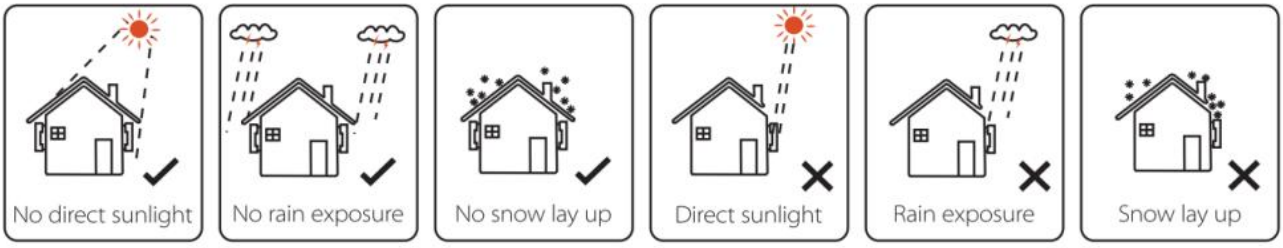
Reminder

1) It is important and necessary to read the user manual carefully (in the accessories) before installation or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.
2) If the battery is stored for a long time, it is required to charge the battery every six months. The battery should be charged to no less than 90% of SOC.
3) After being fully discharged, the battery needs to be charged within 12 hours.
4) Do not install the product in outdoor environment, or an environment out of the operation temperature or humidity range listed in manual.
5) Do not expose cable outside.
6) Do not connect power terminal reversely.
7) All the battery terminals must be disconnected for maintenance.
8) Please contact YelonESS local dealer within 24 hours if there is something abnormal.
9) Do not use cleaning solvents to clean battery.
10) Do not expose battery to flammable or harsh chemicals or vapors.
11) Do not paint any part of battery, include any internal or external components.
12) Do not connect battery with PV solar wiring directly.
13) The warranty claims are excluded for direct or indirect damage due to items above.
14) Any foreign object is prohibited to insert into any part of battery.

Warning

2.1 Before Connecting

1) After unpacking, please check product and packing list first, if product is damaged or any part is missing, please contact the YelonESS local dealer.
2) Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
3) Cable connection must be correct. Do not mix up the positive and negative cables and ensure there is no short circuit with the external device.
4) It is prohibited to connect the battery and AC power directly.
5) The embedded BMS in the battery is designed for 48V DC. Please DO NOT connect battery in series.
6) Battery must be grounded.
7) Please ensure that the electrical specification of the product meets the requirement of the equipment which it works with.
8) Keep the battery away from water or fire.
9) If the battery is installed outdoors, please avoid direct sunlight and rain. Make sure the battery is level when hanging it on the wall.



2.2 In Use

1) If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shut down;

2) It is prohibited to connect the battery with different types or brands of battery;

3) It is prohibited to connect batteries with a faulty or incompatible inverter;

4) It is prohibited to disassemble the battery (QC tab removed or damaged);

5) In case of fire, only dry powder fire extinguisher can be used. Liquid fire extinguishers are prohibited;

6) Please do not open, repair or disassemble the battery unless it's done by staffs from YelonESS or authorized by YelonESS. We do not undertake any consequences or related responsibility due to violation of safety operation or breach of design, production and equipment safety standards.

3. Introduction

LW5000 lithium iron phosphate battery is the energy storage products developed and produced by YelonESS. It can be used to support reliable power for various types of equipment and systems.

LW5000 has built-in BMS battery management system, which can manage and monitor cells information including voltage, current and temperature.

3.1 Features

1) Wide temperature range. The product is designed to resist high and low temperature, and the lithium iron phosphate battery with high temperature resistance is used to ensure the normal operation of the system, which can adapt to the environment of -15℃ ~ +50℃. The ambient temperate for battery charging is 0℃ ~ +50℃ and that for discharge is -15℃ ~ +50℃.

2) Quick-plug installation. The product is equipped with quick-plug standard interfaces, the interface protection level reaches IP65, and the insulation voltage is 1500V, making the installation fast, safe and efficient.

3) Multiple groups in parallel. Multiple groups of batteries are connected in parallel to increase the capacity.

4) Online software upgrade. Remote maintenance or function optimization can be achieved through remote online software upgrade.

5) High stability. High stability of lithium iron phosphate battery system and intelligent BMS ensure the stability of the battery.

6) Sleep mode. When the battery is under low-voltage protection or on standby for 24 hours after boot up, the BMS automatically shuts down the power supply to minimize the battery power consumption and prevent deep discharge, ensuring battery safety. Manually booting up the product or charging with a voltage greater than 40V can exit the sleep mode.

7) Pre-charging. It has the pre-charging function and can adapt to the load condition when the input end has a large capacity capacitor. The maximum pre-charge flow is 2A and the maximum pre-charge time is 3s. This mode applies to the scenario where the device has no more than 40mF capacitor.

8) Temperature thermal management. It has the function of collecting the temperature of the cell and the environment, and it also has the function of high and low temperature alarm and protection of the cell, and high temperature protection.

9) Intelligent balancing. The charging balancing policy can be flexibly configured to effectively improve battery life and cycle life.

10) Multiple protection functions including battery level overcharge, over discharge, over-current, short circuit, high temperature, low temperature alarm and protection, overcharge, over discharge alarm and protection functions.

11) Communication function. Supports CAN & RS485 communication interfaces to meet different application requirements of customers.

12) The front panel of the product is designed with a touch control panel with an unlocking button and a power button, and digital display of SOC and battery status.

13) The overall protection level of the product is IP65, which can support indoor installation or outdoor use in designated scenes.

14) The product is equipped with a WiFi communication stick interface. By plugging in the Wifi communication stick, which is an optional accessory, you can connect to the mobile APP through WiFi to view the parameters and status of the battery.

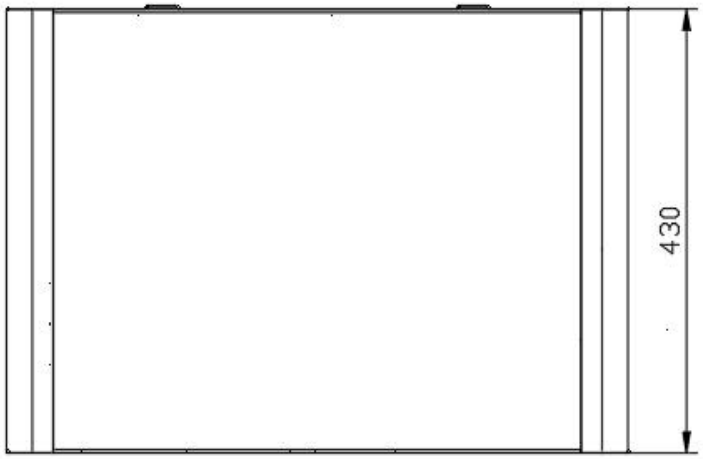
15) The product can also be equipped with a built-in fire suppression module and automatic heating function. The fire suppression module can increase the safety of the battery. The automatic heating function makes it possible for the battery to operate in low temperature environment.

16) The covers on both sides of the product have two installation methods: magnetic and screw fixing. You can choose either or both installation methods for installation.

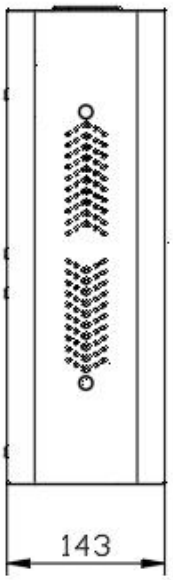
17) The product supports wall-mounted installation and floor-standing stacking installation. Wall-mounted bracket and floor-standing installation base can be selected according to the user's installation location.

18) The side of the product is equipped with an anti-explosion valve to make the battery safer.

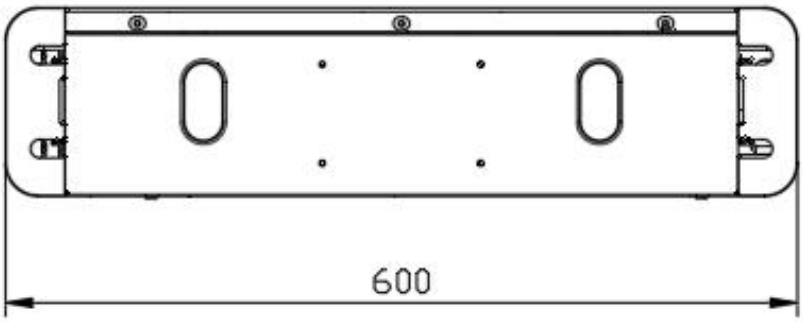
3.2 Specification



Height of the battery without the positioning ridge on the top



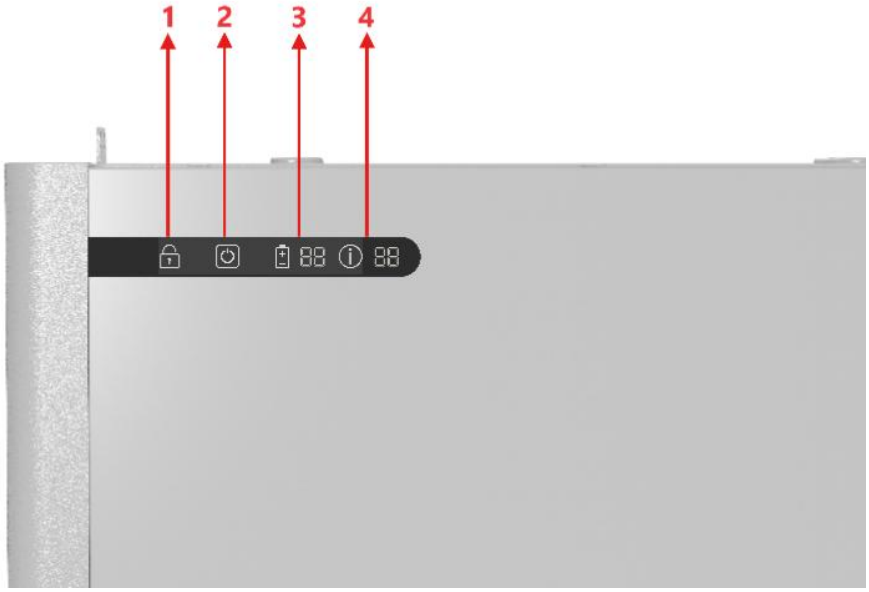
Depth of the battery

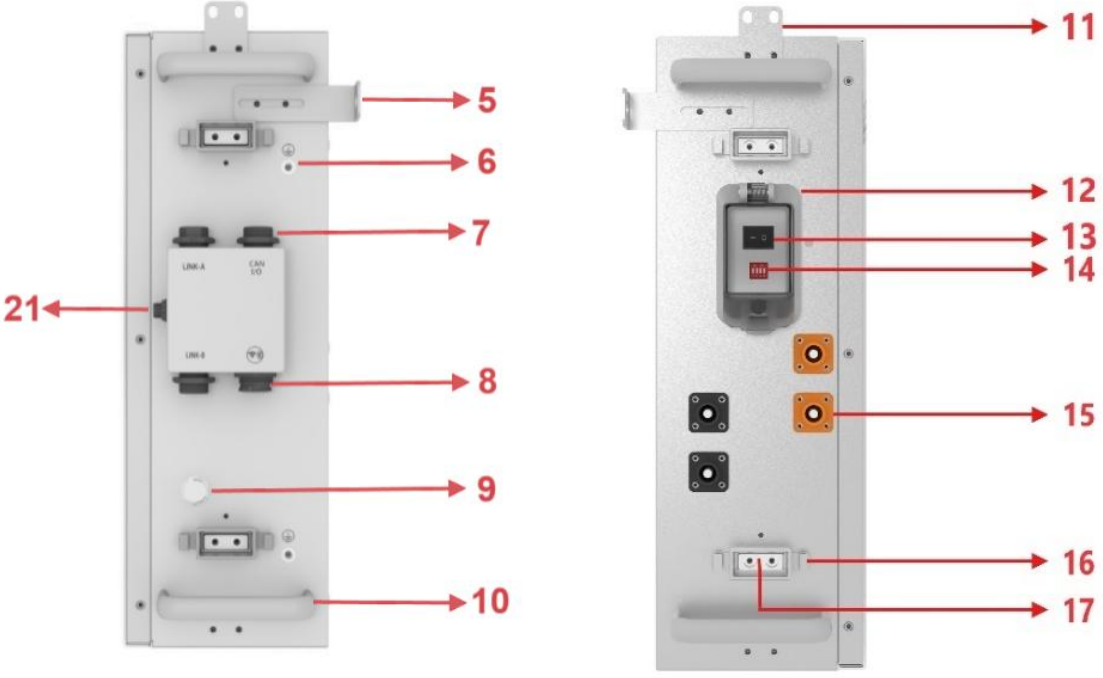


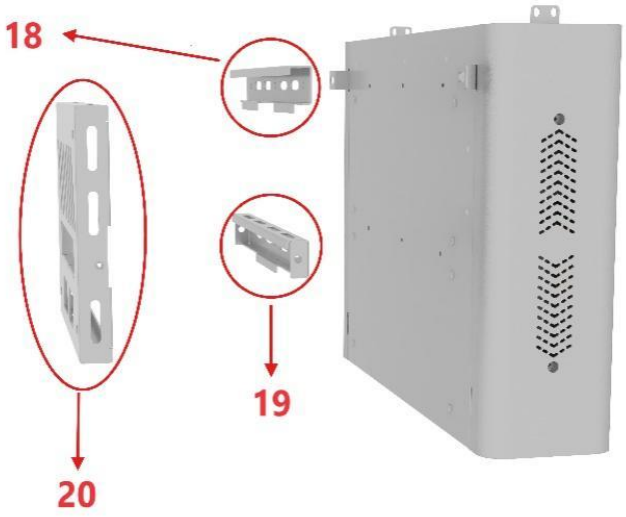
Width of the battery with the side cover

Basic Parameters	LW5000
Battery Type	lithium iron phosphate
Nominal Voltage (V)	51.2
Nominal Capacity (Wh)	5120
Battery Capacity (Ah)	100
Dimension (W*H*D, mm)	600*430*142
Weight (Kg)	45
Recommend Charge Voltage (V)	57.6
Recommend Charge Current (A)	50
Recommend Discharge Current (A)	50
Max. Charge Current (A)	100
Max. Discharge Current (A)	100
Peak Charge/Discharge Current (A)	120A（15sec）
Communication	RS485, CAN
Configuration (max. in 1 battery group)	16pcs in parallel maximum
Charge Temperature	0℃~50℃
Discharge Temperature	-20℃~50℃
IP rating of enclosure	IP65
Type of cooling	Air cooling
Humidity	5 ~ 95%(RH)
Altitude(m)	≤4000
Cycle Life	>6,000 25℃ Test conditions:0.2C discharge，25 ℃, DoD 80%
Certification	CE / UN38.3

3.3 Appearance and Interface Introduction







1. Unlock button

The panel has an accidental touch protection function. Press for 3 seconds to unlock before you can turn on or off the power button.

2. Power button

After unlocking the control panel, you can press for 1 second to turn on and off.

Steps to turn on the battery: turn the SPST switch (13) to O; press and hold the unlock button (1), and the power on button (2) will light up after 3 seconds. Press the power on button (2) for 1 second to turn on the battery.

3. Battery capacity

The displayed number represents the percentage of the current battery SOC. For example, if the number 50 is displayed, it means that the battery capacity is 50%. If it is 100%, the letter FU will be displayed.

4. Battery status

The meaning of the status code shown on the battery is as follows:

01	Battery charging
02	Battery discharge
03	Battery shelving
10	Total overvoltage protection
11	Module overvoltage protection
12	Monomer overvoltage protection
13	Total low voltage protection
14	Module low voltage protection
15	Cell low voltage protection
16	Discharge overcurrent protection
17	Charge overcurrent protection
18	Short circuit protection
19	Discharge overtemperature protection
20	Low temperature discharge protection
21	Charge overtemperature protection
22	Charge low temperature protection
50	Voltage sensor fault
51	Temperature sensor fault
52	Current sensor fault
53	Cell failure

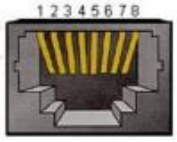
5. L wall bracket

This bracket is for fixing the battery onto the wall. The installation distance between the battery and the wall is 1cm to 3cm.

6. Grounding

7. LINK-A、LINK-B、CAN and I/O

LINK A and LINK B

Port	PIN	Definition
	PIN1	LINK B TD
	PIN2	LINK A TD
	PIN3	GND
	PIN4	CAN-H
	PIN5	CAN-L
	PIN6	LINK
	PIN7	RS485-A
	PIN8	RS485-B

CAN and I/O

Port	PIN	Definition
	PIN1	GND
	PIN2	OUT +
	PIN3	IN +
	PIN4	CAN-H
	PIN5	CAN-L
	PIN6	OUT -
	PIN7	RS485-A
	PIN8	RS485-B

8. Please connect the YelonESS APP through WiFi to check the battery data.

9. Anti-explosion valve

10. Handles

11. Stacking support

The support between the upper and bottom batteries for fixing and stabling when the batteries are stacked up.

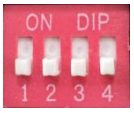
12. Transparent protection cover

13. Switch

The on/off switch for the battery

14. ADD DIP switch

The form below shows the ADD DIP setting when a single battery is used.

ADD（1234, from left to the right）				**location number**	
OFF	OFF	OFF	OFF	1 	

The form below shows the ADD DIP setting when multiple batteries are used in parallel.

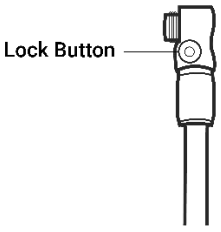
ADD（1234）				**location number**	
ON	OFF	OFF	OFF	1 	The first battery connected to the inverter
OFF	ON	OFF	OFF	2 	Other batteries

15. The power cables (+ and -) connection

One end of the cable connects to the positive and negative output interface on the battery, and the other end connects to the inverter.

Keep pressing the Lock Button while pulling out the power plug.

There is a “click” sound when connected tightly.



16. Positioner

For the positioning of the side cover

17. Magnet

Permanent magnet

18. Wall hanger (Upper)

Installed on the upper back of the battery and attach it to the wall-mount bracket.

19. Wall hanger (lower)

Installed on the lower back of the battery and attach it to the wall-mount bracket.

20. Wall-mount bracket

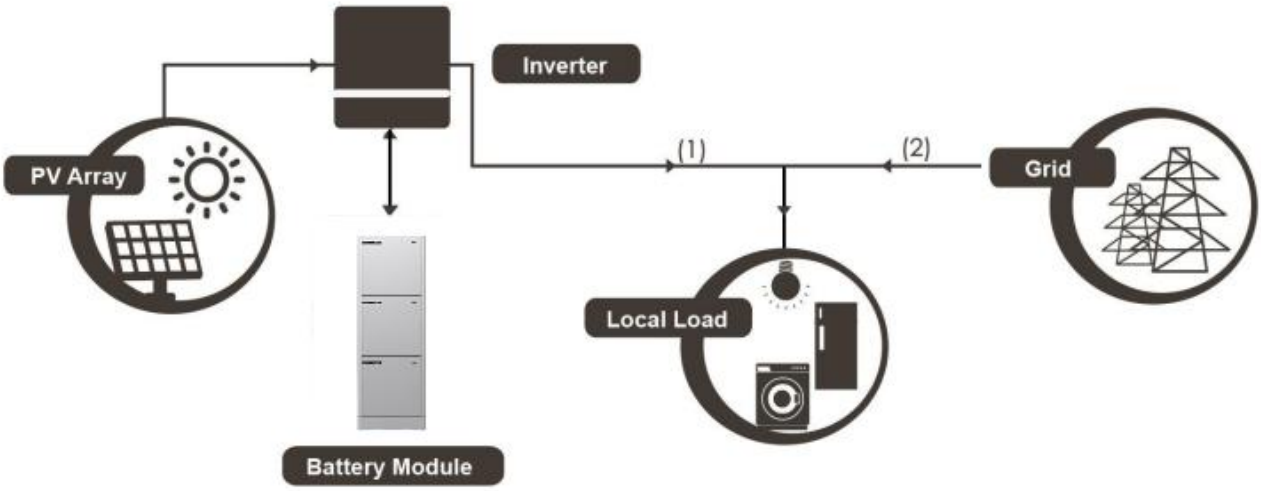
Fixed on the wall for battery mounting.

21. 0V Charging port

When the battery SOC is so low that the battery can't be turned on, you can connect the adapter to the charging port on side of the battery and plug the adapter into a 220V socket. Connect the charger to the "+"and "-" on the other side of the battery and plug the charger into a 220V socket. For detailed instruction, please refer to LW Charging Guide.

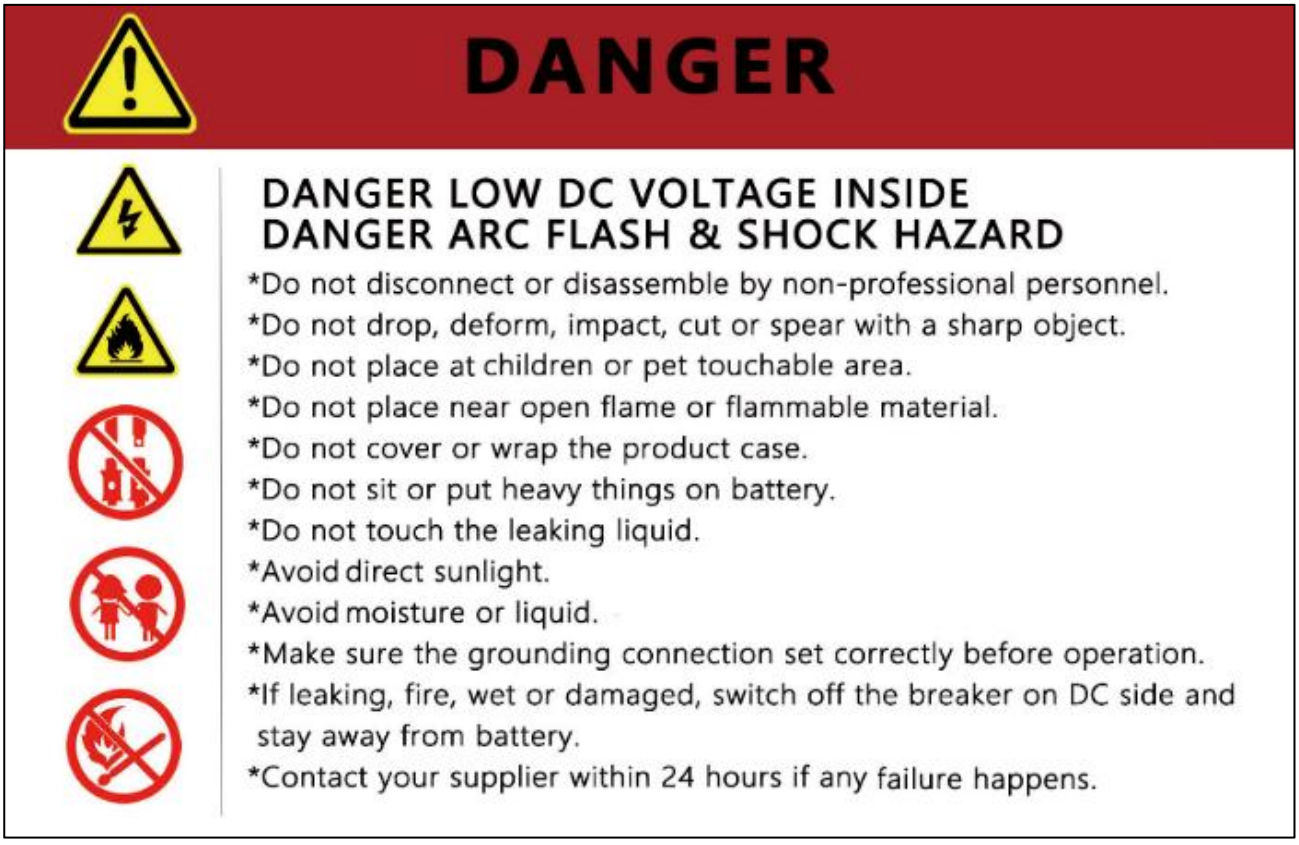
4. Safety guide for handling lithium batteries

4.1 Schematic diagram of solution



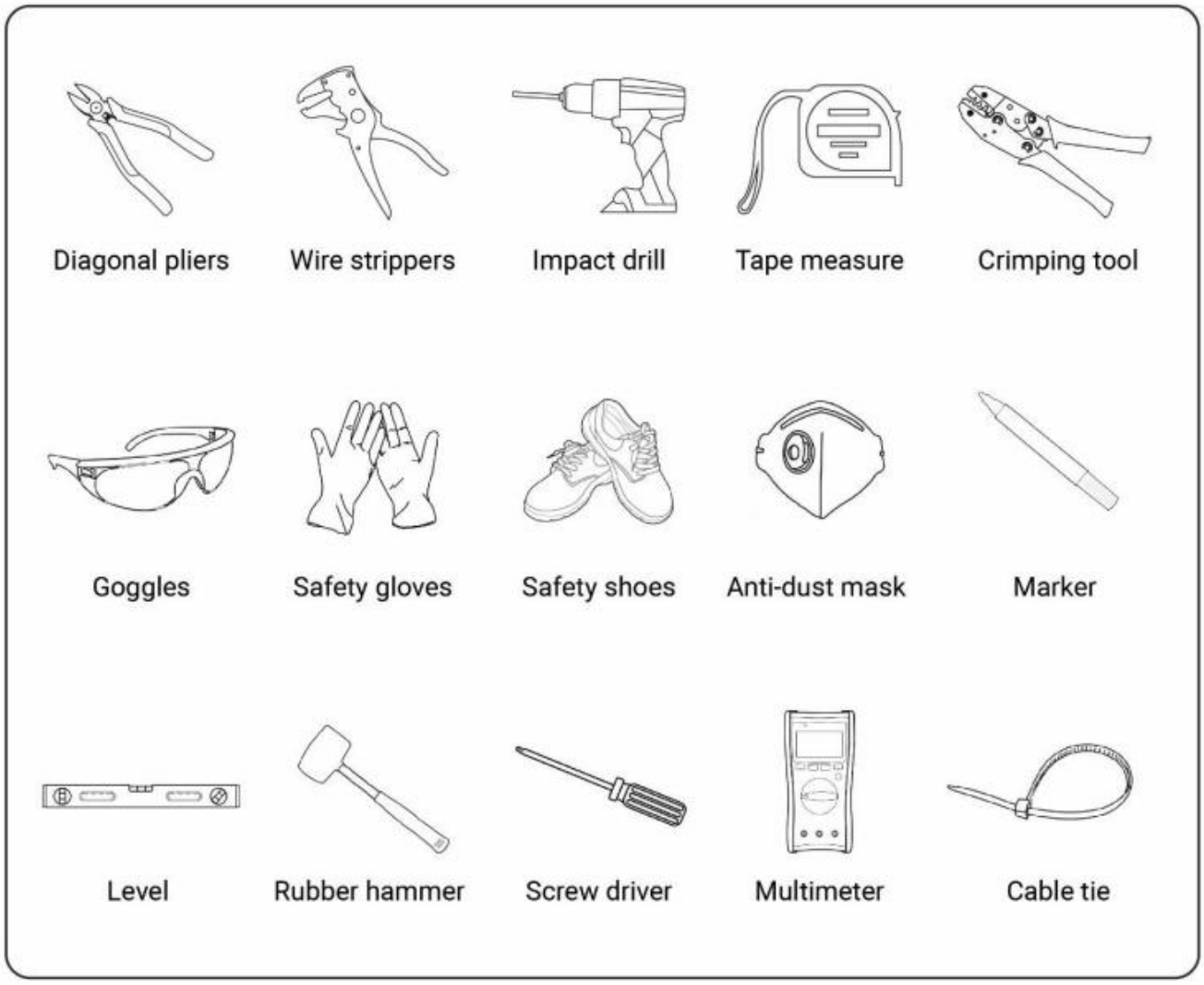
Batteries can be used in a single set or multiple sets in parallel.

4.2 Danger Label



4.3 Safety gears

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



NOTE

Use properly 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.

5. Installation and operation

5.1 Items Included

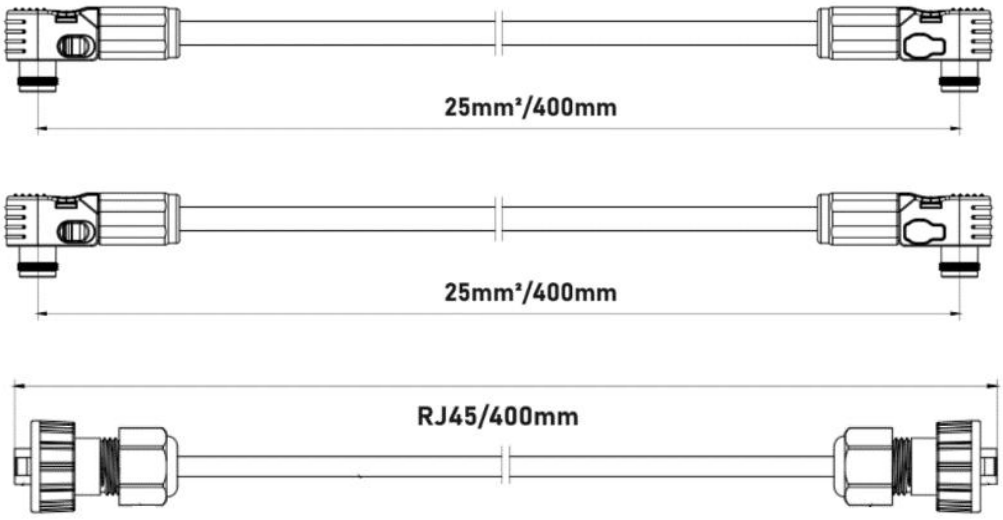
Unpack and check the Packing List

1) For battery module package:

Cables for connecting two batteries are as follows:

Two 25mm^2 power cables and one RJ45 communication cable(mm)

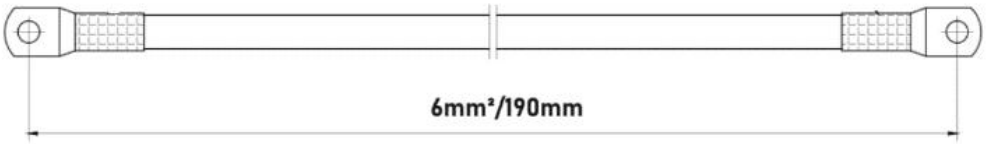
The orange one is the positive “+” power cable and the black one is the negative “-” power cable.



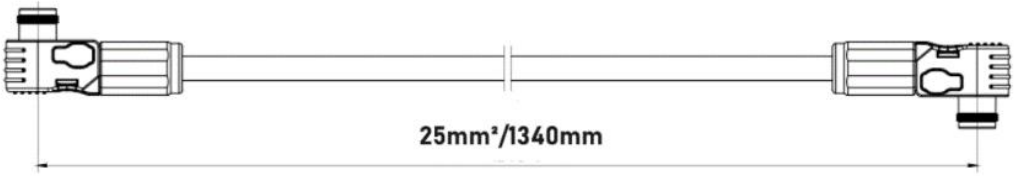
The communication cable and power cables used when the batteries are stacked up or hung on the wall.

6mm^2 grounding cable with M6 cable lug, which is used when the batteries are stacked up.

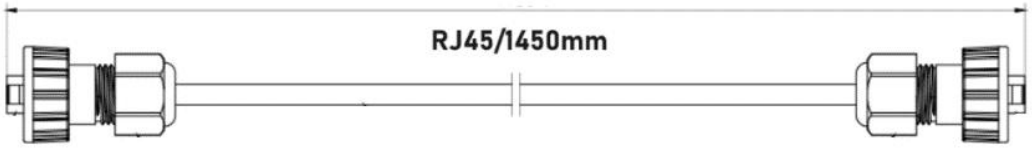
Power cables for connecting two clusters are as follows:



The orange one is the positive “+” power cable and the black one is the negative “-” power cable.



Communication for connecting two clusters



2) For external cable kits

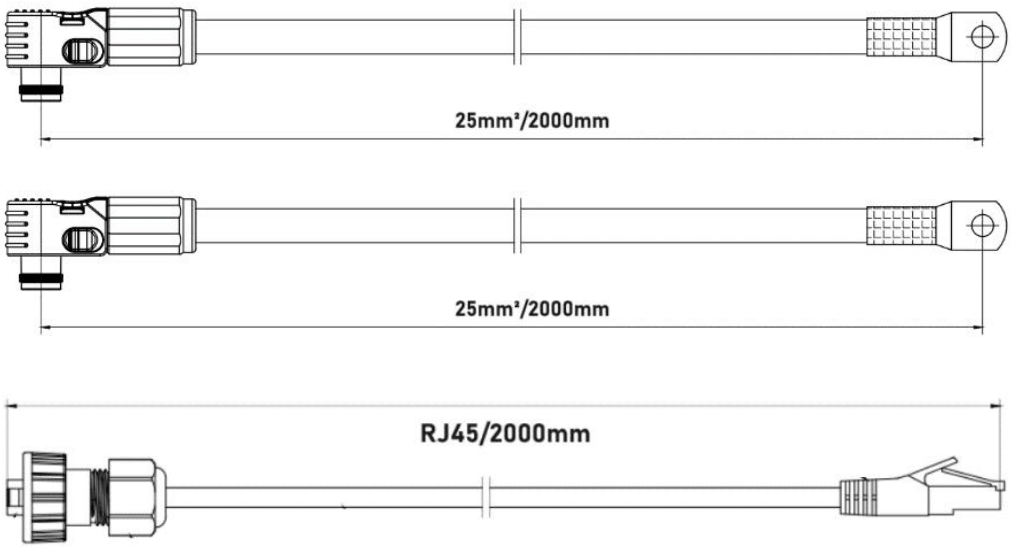
NOTE

Power and communication cables connecting to inverter are in an ExternalCable Kit, included in battery carton box. If any cable is missing, please contact YelonESS local dealer.

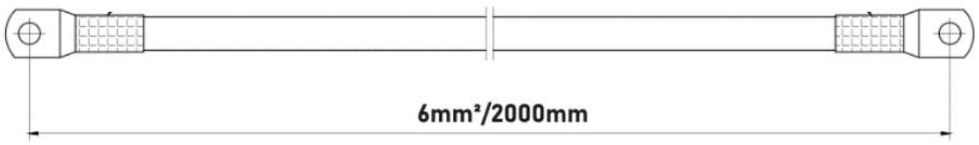
Two 25mm^2 power cables (peak current capacity 120A, constant 100A) and RJ45 communication cable for each energy storage system(mm)

The orange one is the positive “+” power cable and the black one is the negative “-” power cable. The cable lug is M8.

There is also a communication cable and a grounding cable with M6 cable lug.



Grounding cable with M6 cable lug



5.2 Installation location

Make sure that the installation location meets the following conditions:

1) The area should be completely waterproof.
2) The floor should be flat and level.
3) There are no flammable or explosive materials.
4) The ambient temperature is within the range from 0℃~+50℃.
5) The temperature and humidity should be maintained at a constant level.
6) There should be minimal dust and dirt in the area.
7) The distance from heat source should be more than 2 meters.
8) The distance from air outlet of inverter should be more than 0.5 meters.
9) The installation areas should avoid direct sunlight.
10) There is no mandatory ventilation requirement for battery module, but please do not install in confined area. Do not install in environment with high salinity, humidity or temperature.

If the ambient temperature is out of the operating range, the battery stops operating to protect itself. The optimal temperature range for the battery to operate is 10°C to 40°C. Frequent exposure to harsh temperatures may impact the performance and reduce life of the battery.

5.3 Grounding

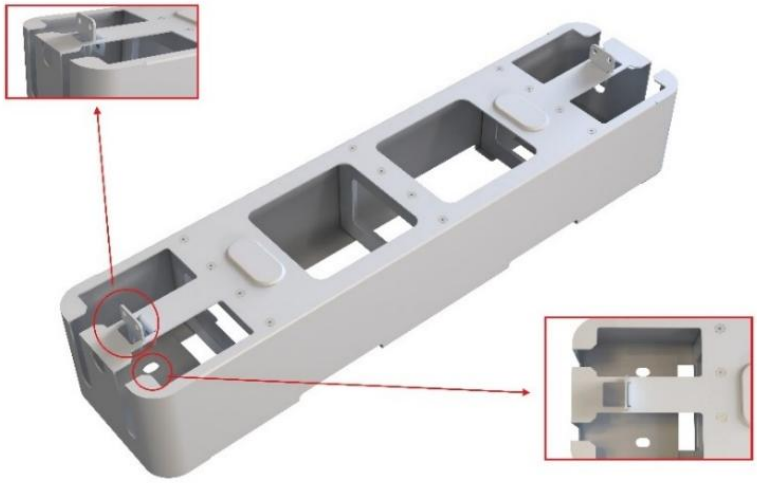
Grounding cables shall be 6mm2 or greater yellow-green cables. After connection, the resistance from battery grounding point to ground connection point of room.

1.The grounding connector should be free of any dirt or paint to ensure a direct connection with the cable.

2. Install a grounding cable to the grounding point of the modules.

5.4 Base installation

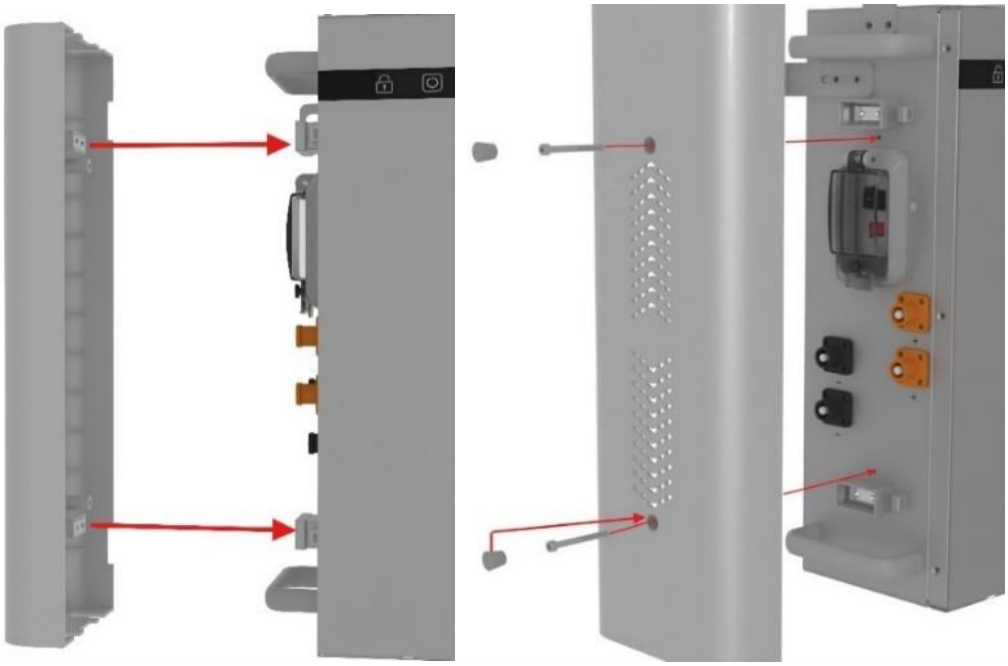
1) Use expansion screws to fix the base on a flat, level ground. Align the base and the upper battery and place the battery steadily on the base.



2) Align the screw holes of the stacking fixing plate of the base with the two screw holes at the bottom of the battery and fix them with screws, and then use screws to fix the stacking fixing plate of the base to the base.

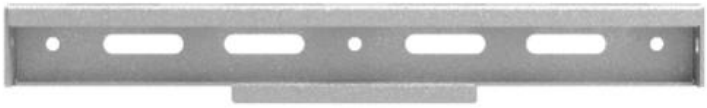
5.5 Side cover installation

Align the side cover with the magnetic positioner on the side of the battery, and install the cover on the side of the battery. The side cover will be fixed on both sides of the battery by magnetic attraction. Alternatively, you can use long screws to fix holes of the side cover and install it. Put the plugs into the holes to cover the screw holes.

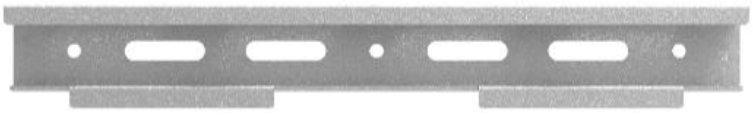


5.6 Wall-mount bracket installation

Use 6 screws to align the screw holes of the wall hanger (upper) and the wall-hanger (lower) and fix them on the back of the battery. Make sure the positioning plates should be downward. The hanger with two plates should be on the top while the hanger with one plate should be at the bottom).



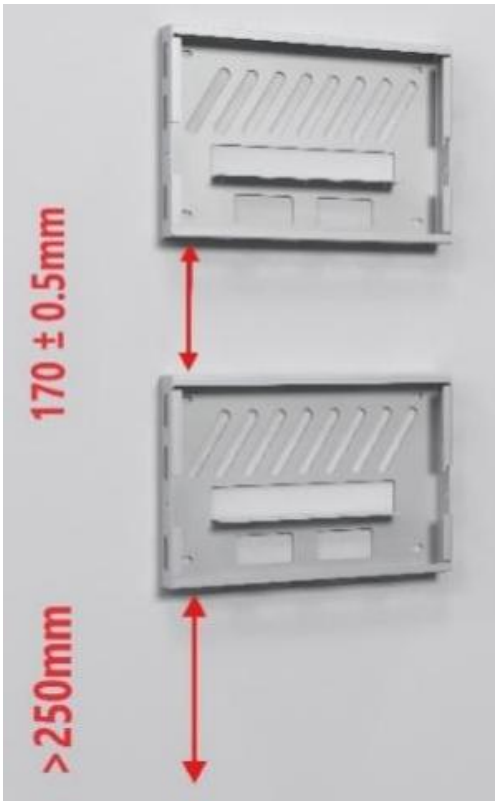
The hanger with one positioning plate



The hanger with two positioning plates

Use expansion screws to fix the wall-mount bracket to the wall (as shown in the figure). Align the positioning plate and insert it into the corresponding positioning slot of the wall-mount bracket.

1



2

3

4

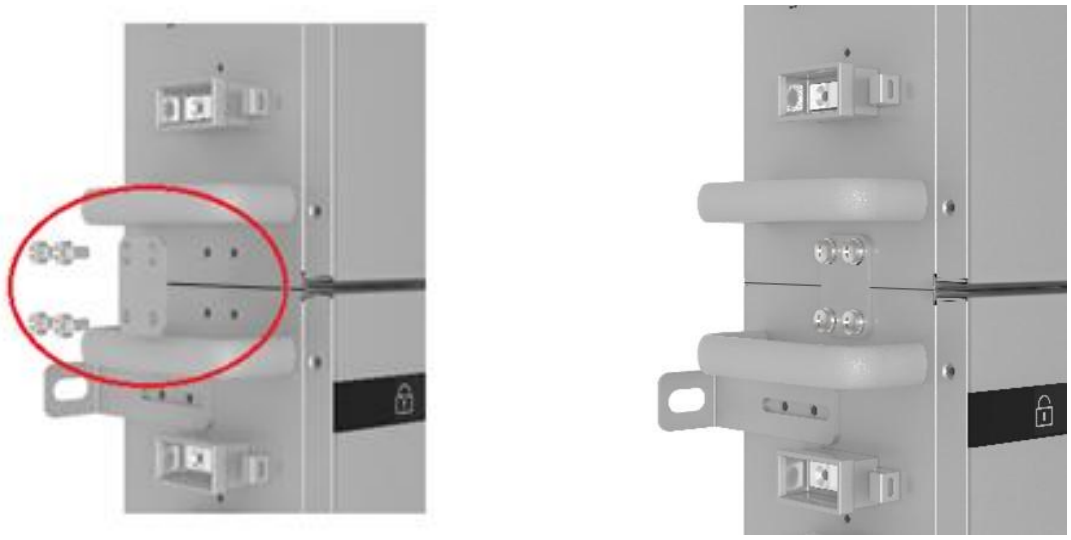
Use the screw on the side to fix it after hanging it on the wall to enhance the reliability of the wall mounting.

5.7 Battery Stacking Guide

1）Align the two batteries. Make sure the two ridges on the top of the bottom battery interlocks with the groove at the bottom of the top battery.

2) Fix the stacking fixing plate on the top and bottom batteries.

During the stacking process, the fixing plates on both sides must be fixed after each battery is installed to prevent tipping over.



* If your wall-mount or stack-up installation method is different from what YelonESS recommended above, please contact YelonESS authorized dealer for support and cable recommendation.

5.8 Wiring introduction for multiple units in parallel

At most 3 sets of batteries can be connected in parallel as a cluster, otherwise the size of the entire system will be too high and inconvenient to install. However, multiple clusters can be connected to increase the system capacity. If only 2 clusters are connected, the connection lines between clusters are routed from the inside of the base. If 3 clusters need to be connected, the connection between the 1st and 2nd clusters is still routed inside the base, and the connection between the 2nd and 3rd clusters is routed from the top of the cluster. If 4 clusters of batteries are connected, the connection between the 3rd and 4th clusters is also routed inside the base. The connection between more clusters can be referenced. The installation distance between two clusters of batteries does not exceed 200mm, which is limited by the length of the cluster connection line. If longer cables are needed, you can contact the YelonESS authorized dealer or YelonESS Sales Team for customized cables).

Floor installation

A base must be installed for floor installation.

Wall-mounted installation

The default wall installation leaves no space between two clusters.

Caution

1) According to the local electric safety and installation policy, a suitable breaker between battery system and inverter might be required.
2) All the installation and operation must follow local electric standard.
3) When the power cables and the communication cables of battery and the inverter are connected, please turn on the inverter and then the battery.

6. Trouble shooting

6.1 Communication problem

Problem:

The battery is unable to communicate with inverter on compatible list.

Possible cause 1: The wrong protocol was chosen.

Solution: Choose the right protocol on the inverter according to the User Manual of the inverter.

Possible cause 1: Communication cables are damaged or not properly connected.

Solution: Properly connect the communication cable according to the User Manual. Check the appearance of the cables to make sure they are not damaged. Try with new YelonESS cables. If the problem is not solved, contact YelonESS authorized dealer for help.

6.2 Functional related problem

Problem 1:

The battery cannot be turned on after the power button is pressed. No digital display is on.

Solution: Contact YelonESS local dealer for help.

Problem2:

After power button is pressed, the number indicates that the corresponding battery status is protected.

Possible causes: capacity is too low, or module is over-discharged.

Solution: use a charger or inverter to provide 53-57.6V voltage. If the battery can be turned on, keep charging the module and use monitoring tools to check the battery log. If the battery voltage is ⩽45V DC, please use ⩽5A to slowly charge the module to avoid affecting SOH. If battery voltage is >45V DC, use ⩽ 50A to charge. If the battery still cannot be turned on, contact YelonESS local dealer for help.

Problem 3:

After power button is pressed, the digital display is on. The battery cannot be charged or discharged.

Possible cause 1: The system is under protection.

Solution:

1. Check the temperature. If the temperature is above 55 ℃ or under -20 ℃, the battery cannot work. Take the battery to the environment with normal operating temperature.
2. Check the current. If the current exceeds the allowed working current, the battery protection will be triggered. Change the settings of the power supply equipment.
3. Check the voltage. If charging voltage is above 57.6V, battery protection will be triggered. if the voltage is too high, change the settings of the power supply equipment and discharge the battery. When the battery is discharged to 44.8V or less, battery protection will be triggered. Charge the battery until the ALM indicator is off.

Possible cause 2:

Voltage sensor is faulty

Solution:

Turn on a single module with no cable connected.

Try to turn on a single module with no cable connected. If the buzzer still rings, turn off the module and contact your local seller.

If the problem still cannot be located after trying the solutions above, turn off the battery and contact your local YelonESS authorized dealer.

7. Emergency Situations

7,.1 Leaking Batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If anyone is exposed to the leaked substance, immediately perform the actions described below.

a) Inhalation: Evacuate the contaminated area and seek medical attention.

b) Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical help.

c) Contact with skin: Wash the affected area thoroughly with soap and water and seek medical help.

d) Ingestion: Induce vomiting and seek medical help.

7.2 Fire

Do not use WATER! Only dry powder fire or carbon dioxide extinguisher can be used; if possible, move the battery to a safe area before it catches fire.

7.3 Wet Batteries

If the battery is wet or submerged in water, do not let people access it. Contact YelonESS or YelonESS local dealer for technical support. Cut off all power.

7.4 Damaged Batteries

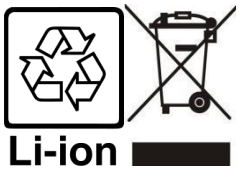
Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property.

Damaged batteries may leak electrolyte or produce flammable gas.

8. Remarks

8.1 Recycle and disposal

In case a battery (normal condition or damaged) needs disposal or needs recycling, it shall follow the local recycling regulation to process, and using the best available techniques to achieve a relevant recycling efficiency.



8.2 Storage, Maintenance and Expansion

*The following table shows the battery degradation when the battery is stored and not used at all in different temperature. Normal use will reduce battery cell degradation.

Required storage temperature	Actual storage temperature storage temperature	Impact	Remarks
-20°C≤T<50°C	T<-20°C	It will cause irreversible damage to the battery and affect battery performance.	Not allowed to be stored at this temperature
	-20°C≤T≤35°C	It will cause irreversible capacity decrease of the battery, with a decrease rate of 1%-3% every 3 months. It will also lead to increased inconsistency in the battery cells and increased internal resistance.	Charging interval:6 months
	35°C<T≤50℃	It will cause irreversible capacity decrease of the battery, with a decrease rate of 2%-4% every 3 months. It will also lead to increased inconsistency in the battery cells and increased internal resistance.	Charging interval:3 months
	50℃<T	It will cause irreversible damage to the battery and affect battery performance.	Not allowed to be stored at this temperature

1) If the product is stored at an unacceptable temperature or is not recharged within the specified recharge interval, please consult with YelonESS or have it inspected and tested by professionals before putting it into use.

2) I f the user uses the battery product for a period of time and stops using it and then stored the battery, it is also necessary to recharge the battery to more than 90% SOC before turning off and storing it.

3) If the battery is not used for a long time, the SOC will become lower. When the SOC is down to certain level, the battery may not be turned on. Users are recommended to recharge the battery according to the table above.

4) The connection of power connector, grounding point, power cable and screw are suggested to be checked annually after installation. Make sure the connection point is not loose, broken or corroded. Check the installation environment such as dust, water, insects etc.

5) The connection of power connector, grounding point, power cable and screw are suggested to be checked annually after installation. Make sure the connection point is not loose, broken or corroded. Check the installation environment such as dust, water, insects etc. Make sure it is suitable for IP65 Battery system.

YelonESS

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