YelonESS

LR5000

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).
	The certificate label for Safety by TÜV NORD

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.

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

LR5000 lithium iron phosphate battery is the energy storage product developed and produced by YelonESS. It can be used to support reliable power for various types of equipment and systems.

LR5000 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

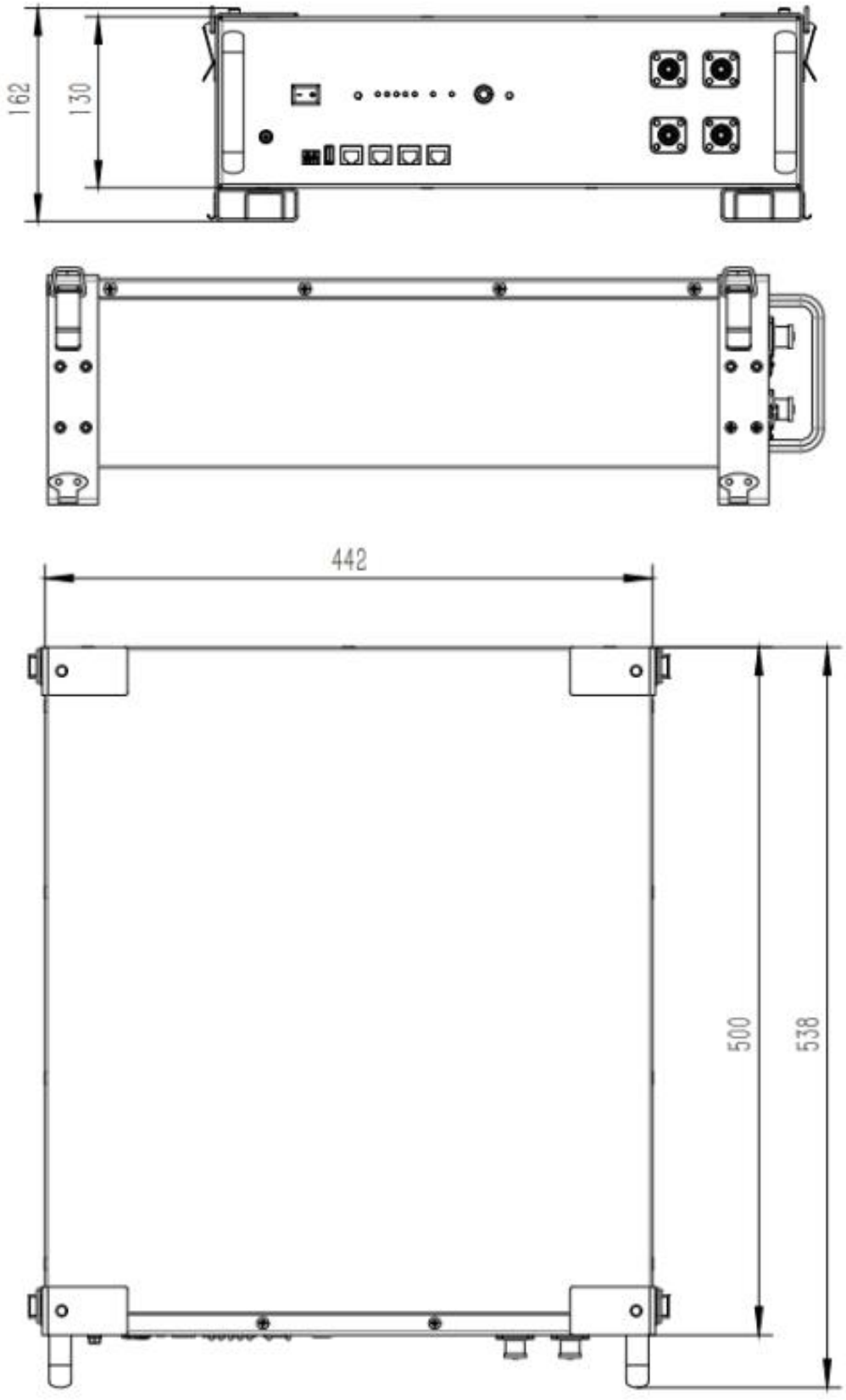
functions.

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

12) LED status indicator. Multiple LED indicators can indicate SOC, running status and fault status.

13) Small size and light weight. Standard 19-inch rack-mount module is easy to install and maintain.

3.2 Specification



Basic Parameters	LR5000
Battery Type	lithium iron phosphate
Nominal Voltage (V)	51.2
Nominal Capacity (Wh)	5120
Battery Capacity (Ah)	100
Dimension (mm)	448*500*133
Weight (Kg)	41
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)	8pcs in parallel maximum
Charge Temperature	0℃~50℃
Discharge Temperature	-15℃~50℃
IP rating of enclosure	IP21
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	IEC62619 / CE / UN38.3

3.3 Equipment Interface

3.3.1. SOC

5 green LEDs show the battery's current capacity.

3.3.2 Power Button

Turn on: press ON to start the battery module.

Turn off: press OFF to turn off the battery module.

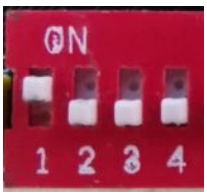
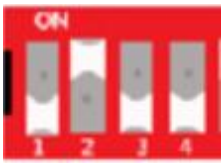
3.3.3 ADD Switch

ADD DIP switch requirements when a single battery set is used.

ADD（1234, from left to the right）				**location number**	
OFF	OFF	OFF	OFF	1	When you only have a single battery

In this picture, all buttons are at OFF position.

When multiple batteries are used in parallel, please click below:

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

3.3.4 WIFI Stick (Optional Accessory)

Please connect the phone app (YelonESS) through WiFi to check the battery data.

3.3.5 I/O

Port	PIN	Definition
	PIN1	/
	PIN2	/
	PIN3	Normal condition
	PIN4	Common pin
	PIN5	Protection mode
	PIN6	/
	PIN7	/
	PIN8	/

3.3.6 CAN

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

3.3.7. LINK A and LINK B

Port	PIN	Definition
	PIN1	/
	PIN2	/
	PIN3	/
	PIN4	/
	PIN5	/
	PIN6	/
	PIN7	RS485-B/T-B-
	PIN8	RS485-A/T+A-

3.3.8 Alarm

Red LED flashes to show the battery is alarming; solid on means the battery is under protection.

3.3.9 SW Button (Red in the middle)

Push the SW button for 2 seconds to open the indicator panel, turn off the circuit-breaker to turn off Indicator panel, or push the SW button for ≥2 seconds to turn off the indicator panel

3.3.10. Running Indicator

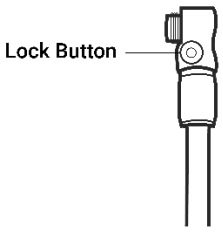
Green LED light flashes to show the battery running status.

3.3.11 Power Cables

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.

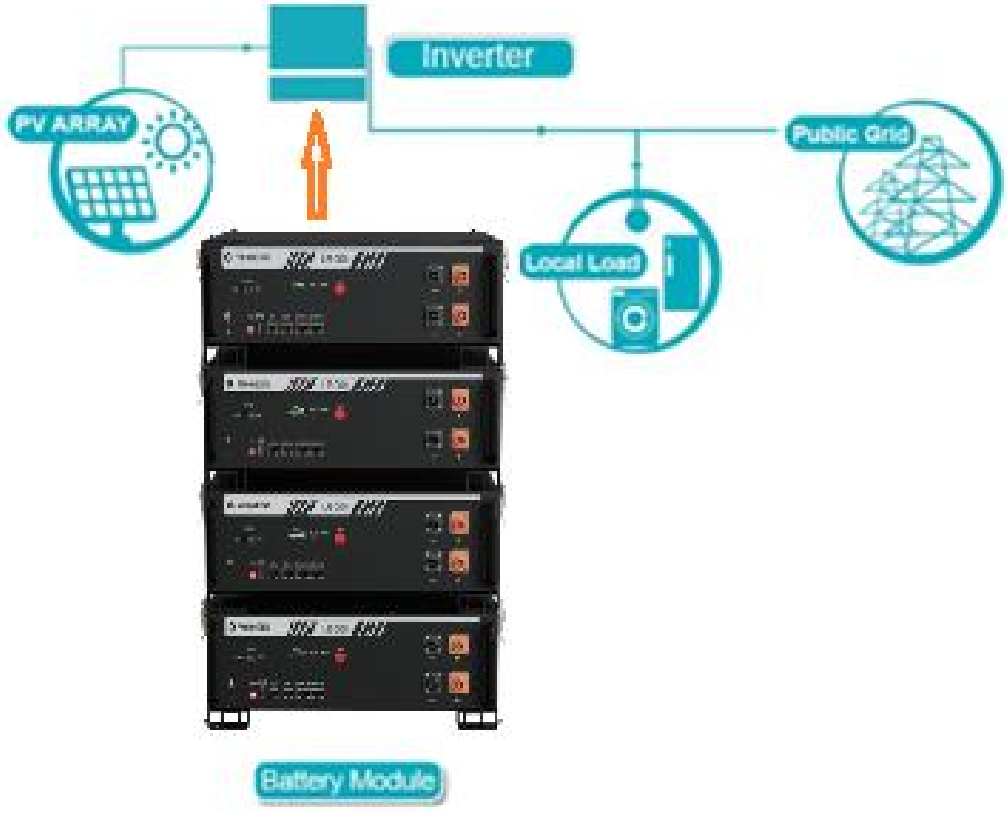


3.3.12 BMS Basic Function

Protection and alarm	**Management and monitor**
Charge/Discharge End	Cells Balance
Charge Over Voltage	Intelligent Charge Model
Discharge Under Voltage	Charge/Discharge Current Limit
Charge/Discharge Over Current	Remaining Capacity Calculate
High/Low Temperature(cell/BMS)	Administrator Monitor
Short Circuit	Operation Record
	Soft start of inverter

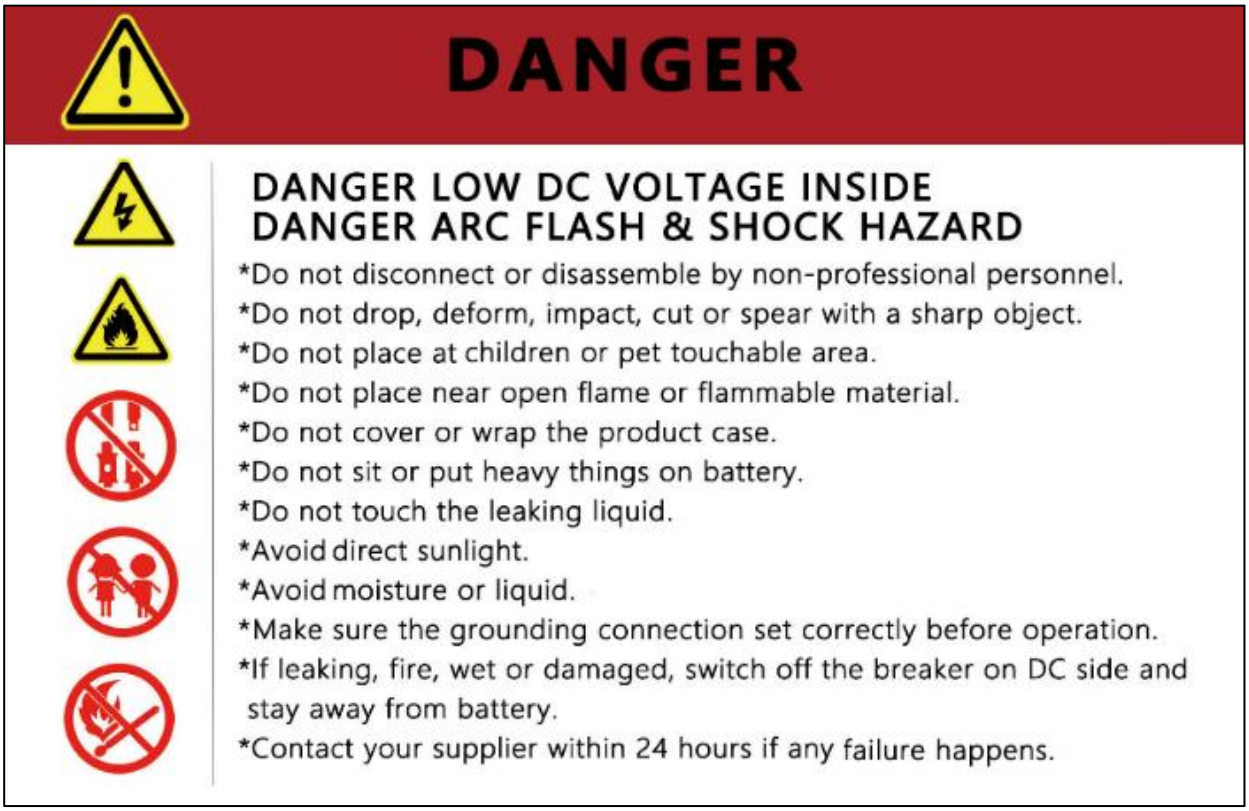
4. Safety guide for handling lithium batteries

4.1 Schematic diagram of solution



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

4.1 Danger Label



4.2 Safety gears

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

Insulated gloves

Safety goggles

Safety shoes

4.3 Tools

Wire cutter

Crimping modular plier

Screwdriver

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

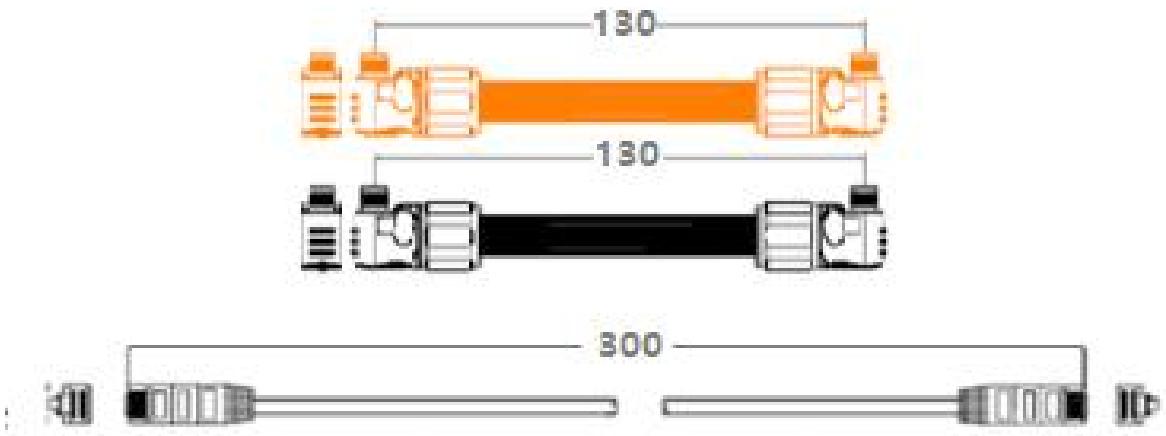
5.1 Items Included

Unpack and check the Packing List

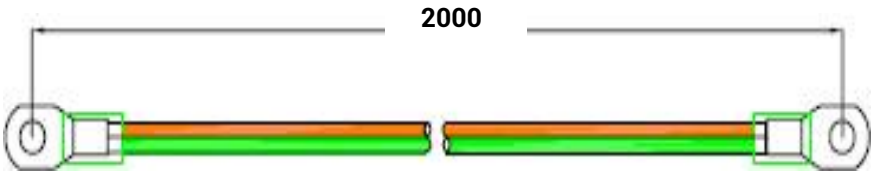
1) For battery module package:

- Battery module

Two 25mm2 power cables and one RJ45 communication cable(mm)



6mm^2 grounding cable

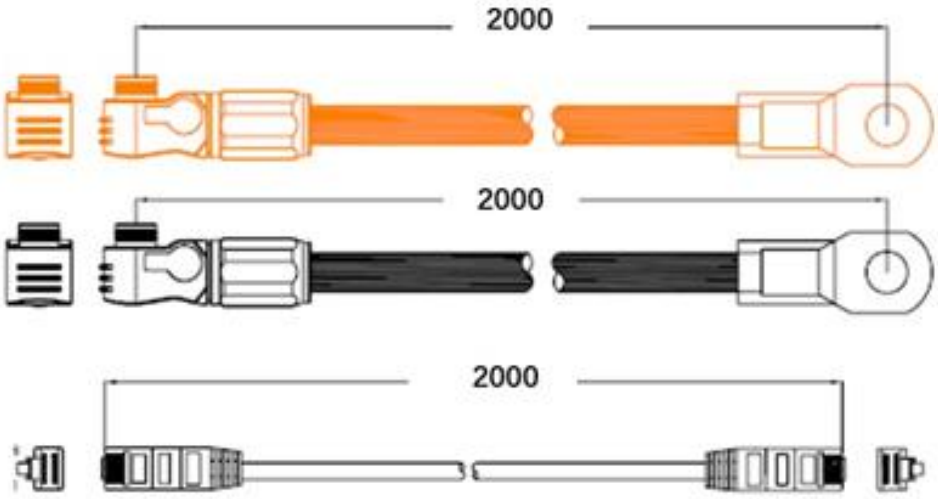


2) For external cable kits:

NOTE

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

Two 25mm2 power cables (peak current capacity 120A, constant 100A) and RJ45 communication cable for each energy storage system(mm)



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.

Caution

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 higher yellow-green cables. After connection, the resistance from battery grounding point to ground connection point of room.

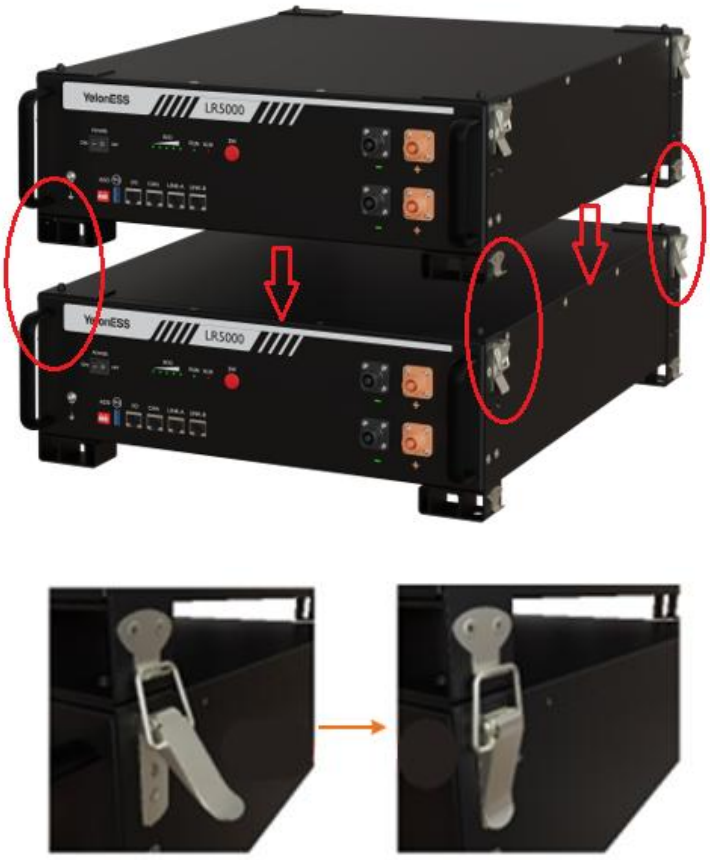
1. The grounding connector should be free of any dirt or paint to ensure a direct connection with the cable.

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

5.4 Stack Up

1) Put the battery into 4 pcs of brackets.

2) Use 4 location holes. Stack the batteries together. Connect the 4 lockers together.



There can be a maximum of 4 batteries in stack.

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 2: 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 SW button is pressed. No indicator is on.

  Solution: Contact YelonESS local dealer for help.

- **Problem 2：**

  After SW button is pressed, the status indicator is flashing; the ALM indicator is off; SOC indicators are off.

  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 SW button is pressed, the ALM is on. The battery cannot be charged or discharged. The buzzer is not ringing.

  Possible causes: The system is under protection.

  Solution:

  a) 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.

  b) 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.

  c) 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.

- **Problem 4:** After SW button is pressed, the status indicator is off and the ALM is flashing.

  Possible causes: The temperature, current, and/or voltage value are not within the normal range, so it causes alarm.

  Solution: Refer to Problem 3 above.

- **Problem 5:** After SW button is pressed, the ALM indicator is on. All the other indicators are off. The temperature is within normal range (0~55℃). The battery cannot be charged by a charger and cannot be discharged with a load.

  Possible causes: It is under permanent protection. The single cell voltage is higher than 3.65V or lower than 2.8V.

  Solution: Switch off the module and contact your local distributor for repair.

- **Problem 6:** After SW button is pressed, the buzzer rings. ALM indicator is on. Other indicators are off.

  Possible causes:

  a) Voltage sensor is faulty

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

  b) Temperature sensor is faulty

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

  c) Current sensor is faulty

  Try to turn on a single module with no cable connected. If the buzzer still rings, switch 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 local dealer.

7. Emergency Situations

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.

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.

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 switch on inverter side.

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.

Caution

Damaged batteries may leak electrolyte or produce flammable gas.

8. Remarks

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.

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. 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) If 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.

YelonESS

Jiangsu Daybright Intelligent Energy, Co., Ltd.

Add: NO. 223 Jiangjun Avenue, Jiangning District, Nanjing, China

Email: service@yeloness.com

Web: www.yeloness.com