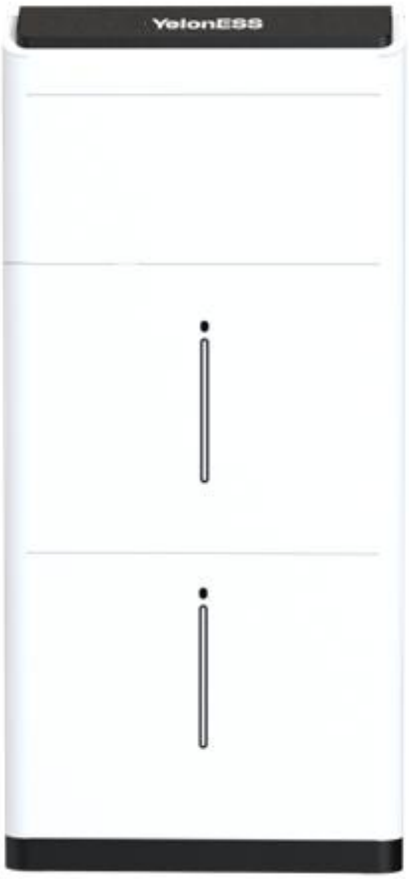
YelonESS

HT5000-n Series

Rechargeable Li-ion Battery

(HT5000-1, HT5000-2, HT5000-3)

User Manual



Contents

1. Meaning of 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 (in the accessories) carefully before installing 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 recharged within 12 hours.
4) Do not install the product in 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 the supplier within 24 hours if the product is not working normally.
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. Do not connect battery with PV solar wiring directly.
12) The warranty claims are excluded for direct or indirect damage due to items above.
13) 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 any part is missing, please contact with the local retailer.
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 to AC power directly.
5) The embedded BMS in the battery is designed for 96VDC. Please DO NOT connect battery in parallel.
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 and fire.

2.2 In Operation

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 type, brands and capacity of batteries.
3) It is prohibited to connect batteries with a faulty or incompatible inverter.

4) It is prohibited to disassemble the battery (QC sticker 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 which because of violation of safety operation or violating of design, production and equipment safety standards.

3. Introduction

HT5000 lithium iron phosphate battery is the new energy storage products developed and produced by YelonESS, it can be used to support reliable power for various types of equipment and systems.

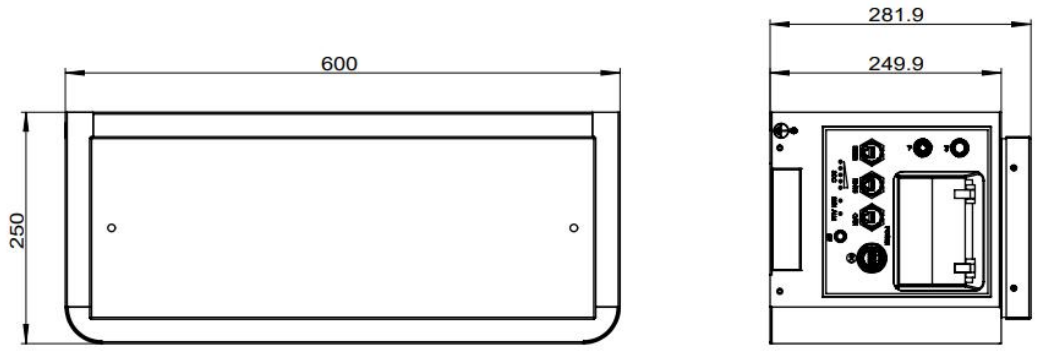
HT5000 has built-in BMS (battery management system), which can manage and monitor cells information including voltage, current and temperature.

3.1. Features

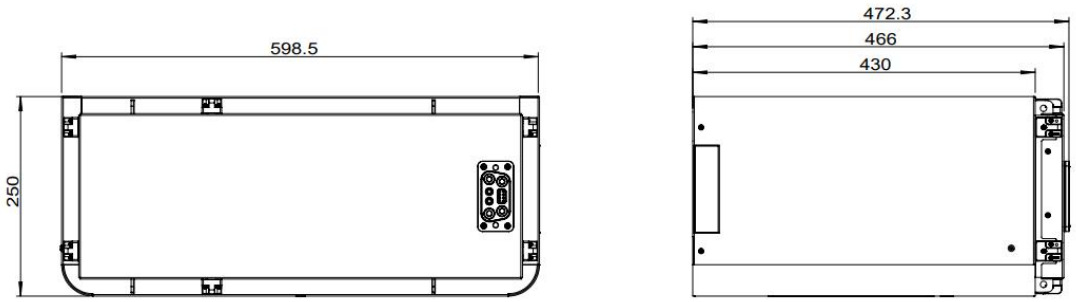
1) Wide temperature range. The product is designed to resist high and low temperature, and the lithium iron phosphate battery with high temperature resistance is used to ensure the normal operation of the system. The ambient temperate for battery charging is 0℃ ~ +50℃ and that for discharge is -15℃ ~ +50℃.
2) Multiple groups in series. Multiple groups of batteries are connected in series to support higher power loads. It can effectively deal with the adverse effects of the circulation on the overall operation of the system in series, and ensure the safe and long-life operation of the lithium battery pack.
3) Online software upgrade. Remote maintenance or function optimization can be achieved through remote online software upgrade.
4) High stability. High stability of lithium iron phosphate battery system and intelligent BMS ensure the stability of the battery.
5) Sleep mode. When the battery is under overvoltage protection, the BMS automatically shuts down the power supply to minimize the battery power consumption and prevent deep discharge, ensuring battery safety.
6) The battery has pre-charging function and the pre-charging time is 30s.
7) Thermal management: It has the function of monitoring the temperature of the cell and the environment, and it also has the function of high and low temperature alarm and cell protection, and high temperature protection.
8) Intelligent balancing: The charging balancing function flexibly configured to effectively improve battery life and cycle life.
9) Multiple protection functions including battery level overcharge, over discharge, overcurrent, short circuit, high temperature, low temperature alarm and protection, electric core level overcharge, over discharge alarm and protection functions.
10) Communication function. Supports CAN&RS485 communication interfaces to meet different application requirements of customers.
11) LED status indicator. Multiple LED indicators can indicate SOC, running status and faulty status.

3.2. Specification

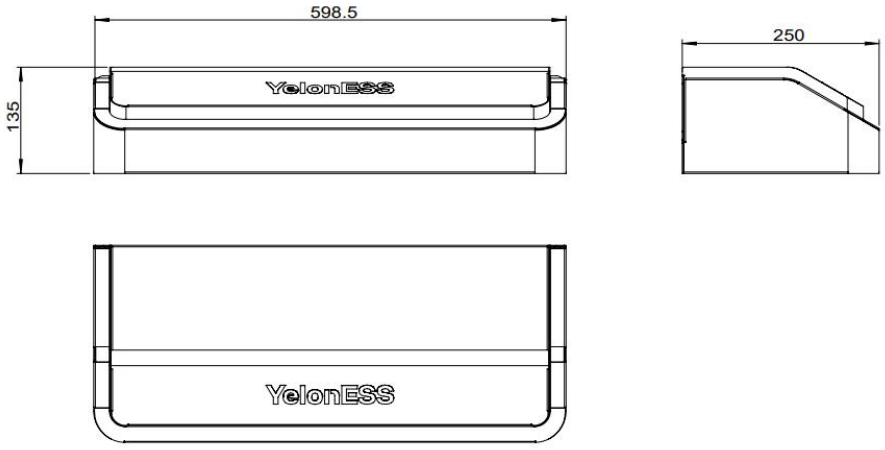
CT0500 control box



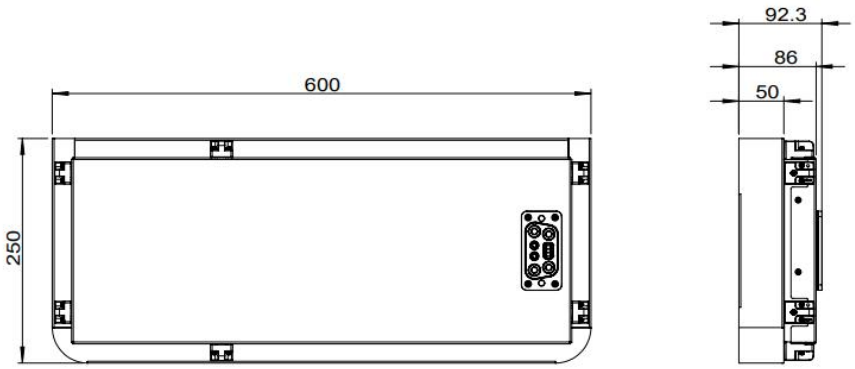
HT5000 battery module



HT5000 Top cover

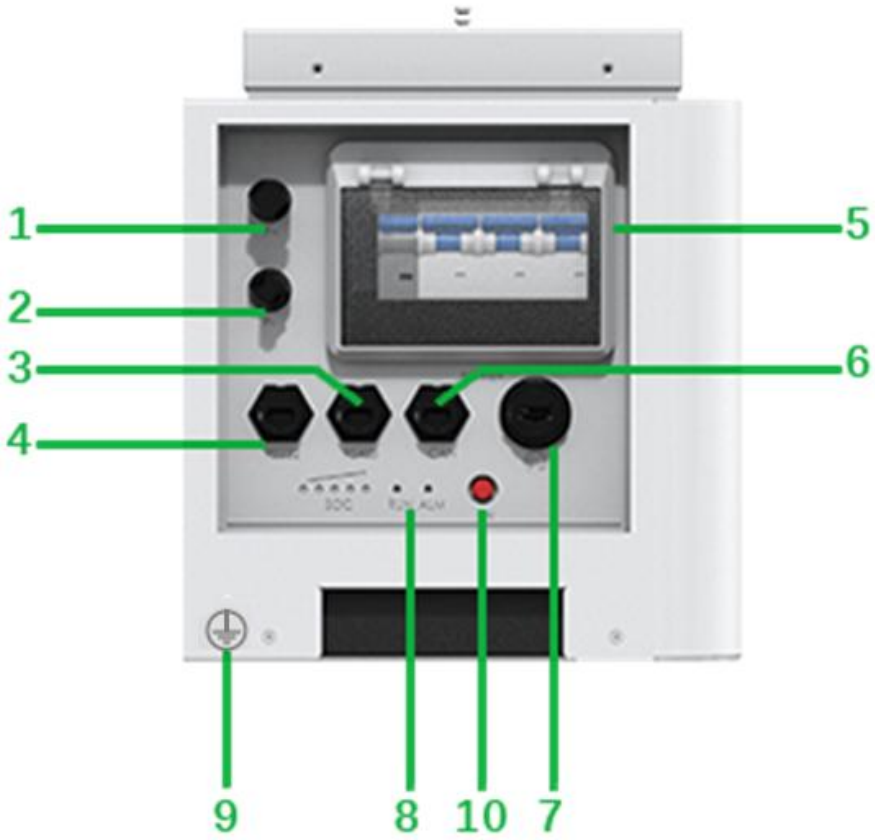


HT5000 Base



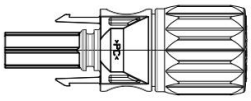
Basic Parameters	HT5000
Battery Type	lithium iron phosphate
Nominal Voltage (V)	96
Nominal Capacity (Wh)	4800
Battery Capacity (Ah)	50
Dimension (mm)(HT5000x1)	600x250x430
Dimension (mm)(CT0500x1)	600x282x250
Weight (Kg) HT5000x1	60
Weight (Kg) CT0500x1	15.2
Recommend Charge Voltage (V)	108
Recommend Charge Current (A)	25
Recommend Discharge Current (A)	25
Max. Charge Current (A)	45
Max. Discharge Current (A)	50
Communication	RS485, CAN
Configuration (max. in 1 battery group)	3 pcs in series
Charge Temperature	0℃~50℃
Discharge Temperature	-15℃~50℃
IP rating of enclosure	IP65
Type of cooling	Air cooling
Humidity	5 ~ 95%(RH)
Altitude(m)	2000
Cycle Life	>6,000 25℃ Test conditions: 0.2C Charging/Discharging, @25℃, 80% DOD
Certification	IEC62619 / CE / UN38.3

3.3. Equipment interface

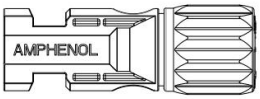


1/ Power Interface

Use the included power cable to plug into the interface. One end of the cable connects to the positive and negative output interfaces on the battery, and the other end connects to the inverter.



H4PFC8TM **Female terminals**



H4PMC8TM **Male terminals**

2 / RS485

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

3 / RS232

Port	PIN	Definition
	PIN1	232-RX
	PIN2	232-TX
	PIN3	232-COM
	PIN4	/
	PIN5	/
	PIN6	/
	PIN7	/
	PIN8	/

4/Grounding

Grounding cables shall be 6mm^2 or higher yellow-green cables. After connection, the resistance from battery and control box grounding point to grounding connection point of room.

1. If there is any paint on the grounding point on the module's surface and the rack, paint should be removed.

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

5 / ON/OFF

Turn on: turn on the circuit-breaker first. After 2 seconds, push the SW button (NO.10 in the Figure above) for 2 seconds to turn on the battery.

Turn off: Turn off the circuit-breaker to turn off the battery

6 / CAN

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

7 / WiFi stick

Users can connect the phone app through WiFi to check the battery data.

8 / Indicator panel

State	**Charge**					**Discharge**				
Capacity light	LED5	LED4	LED3	LED2	LED1	LED5	LED4	LED3	LED2	LED1
SOC 0~20	Off	Off	Off	Off	Flash twice	Off	Off	Off	Off	Solid
SOC 20~40	Off	Off	Off	Flash twice	Solid	Off	Off	Off	Solid	Solid
SOC 40~60	Off	Off	Twice flash	Solid	Solid	Off	Off	Solid	Solid	Solid
SOC 60~80	Off	Flash twice	Solid	Solid	Solid	Off	Solid	Solid	Solid	Solid
SOC 80~100	Twice flash	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid

LED	LED5	LED4	LED3	LED2	LED1	ALM	RUN
Normal	Refer to the battery level chart above					Off	Flash twice
Protection /Normal	Refer to the battery level chart above					Solid	Flash twice
Master and Slave connection error	Flash twice					Off	Flash twice
PCS/master equipment communication error	Refer to the battery level chart above					Solid	Flash twice

If the status indicator (Run) is flashing after the battery is turned on, the battery is in a normal status; if it is off, the battery is in is an abnormal status.

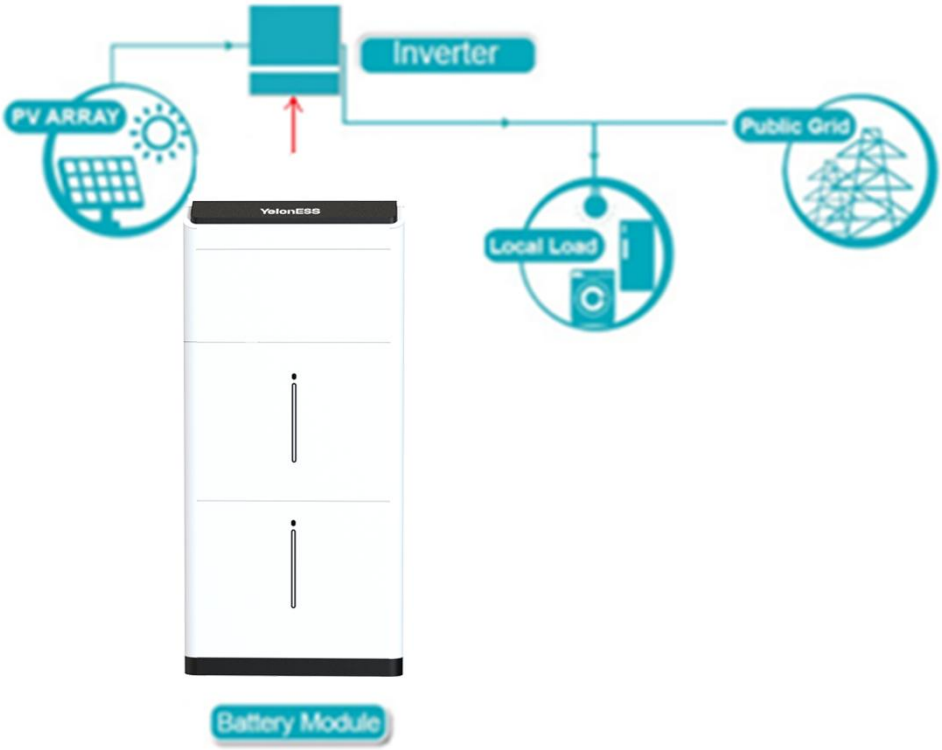
9/ Handle

Product handle for easy handling.

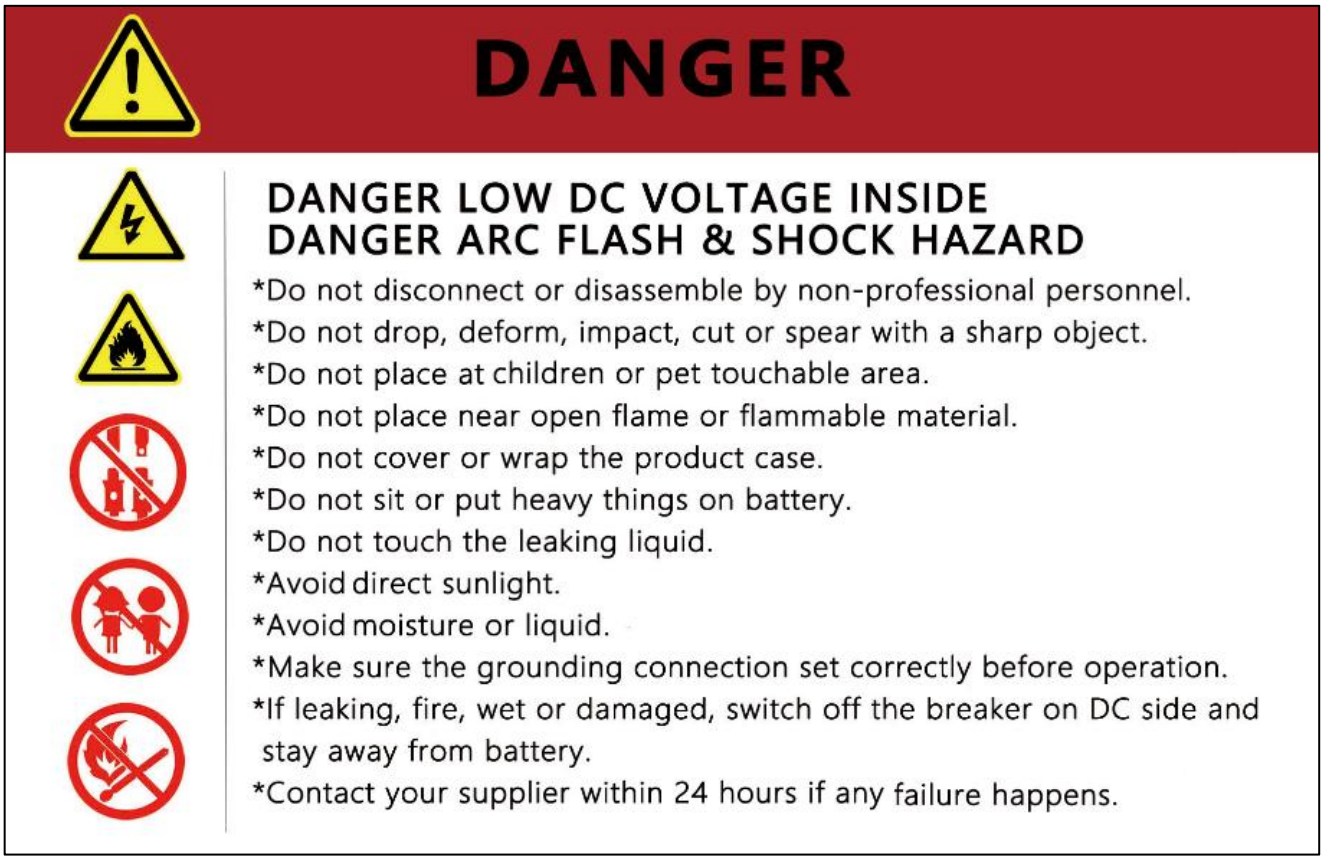
4. Safe handling guide for lithium batteries

4.1. Schematic diagram of solution

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



4.2. Danger label



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.

4.4. Safety gear

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

Insulated gloves

Safety goggles

Safety shoes

5. Installation and operation

5.1. Items Included

Unpacking and check the Packing List

For battery module and control box package:

Control box

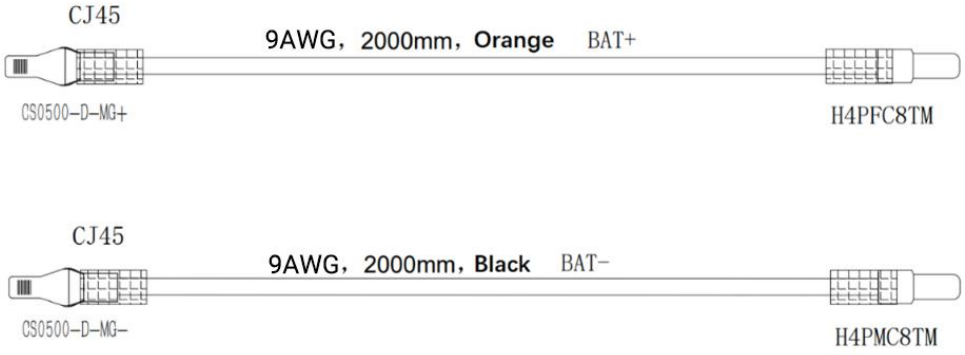
Battery module

1) For External cable kits:

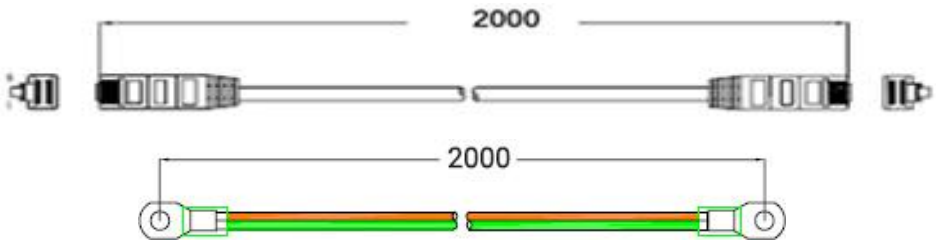
NOTE

Power and communication cables to connect to inverter belongs to an **ExternalCable Kit, included in battery carton box**. If there is anything missing, please contact YelonESS local dealer.

Two 9AWG power cables (peak current capacity 55A, constant 50A) and one RJ45 communication cable are provided for each energy storage system.



6mm^2 grounding cable



5.2. Installation location

Make sure that the installation location meets the following conditions:

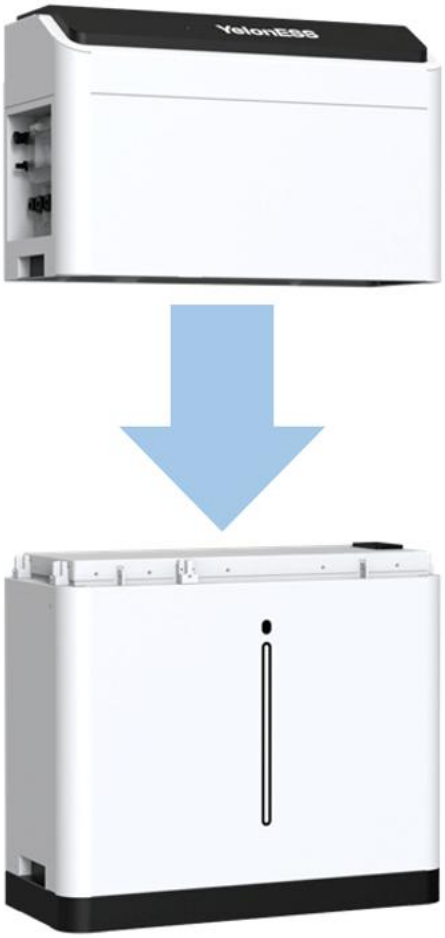
1) The area should be completely waterproof.
2) The floor should be flat and level.
3) There are no flammable or explosive materials.
4) The ambient temperature is within the range from 0℃~+50℃.
5) The temperature and humidity should be maintained at a constant level.
6) There should be minimal dust 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 pack to operate is 10°C to 40°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery.

5.3. Stack Up

1) . Stack up the battery module and the control box

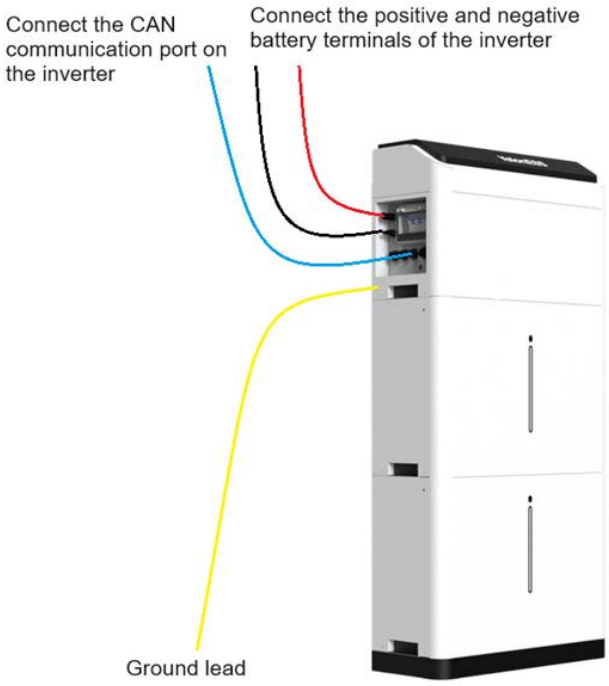


2) . Use Corresponding plug and slot to stack and connect the batteries together.

Pairing plug on the top

Slot on the bottom

Caution



Follow local electrical safety and installation policy, a suitable breaker between battery system and inverter could be installed.

All the installation and operation must follow local electrical standard.

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 problem:

- **Problem 1:**

After pressing the SW button, the status indicator flashes; the ALM indicator is off; the SOC indicator is off.

Possible causes:

The capacity is too low, or the battery is over-discharged.

Solution:

Use a charger (105V) and a charging tool to charge each battery, and use the configuration tool to view the battery log. If the battery voltage is ≤85Vdc, please charge slowly at ≤0.05C so as not to affect the SOH. When the battery terminal voltage is >85Vdc, the user can use ≤0.5C for charging.

- **Problem 2:**

After pressing the SW button, all SOC lights flash

Possible causes:

Internal communication failure between the high voltage box and the battery box.

Solution:

Please shut down and try again, if you can't solve it, please contact the after-sales service.

- **Problem 3:**

After pressing the SW button, the RUN indicator is on and then off

Possible causes:

Communication between BMS and inverter failed

Solution:

Detect the communication cable between BMS and the inverter or change the communication protocol

- **Problem 4:**

After pressing the SW button, the ALM light is on, and the battery cannot be charged or discharged.

Possible causes:

Temperature, current, and voltage values may be abnormal.

Solution:

a) When the ambient temperature is higher than 55°C or lower than -20°C, the battery cannot work. Move the battery to an environment with the desired operating temperature.

b) When the charging current exceeds 50A or the discharging current exceeds 55A, the battery will be protected. Check if the current is too high. If so, modify the power supplying equipment settings.

c) When the charging voltage is greater than 108V*N(1), the battery will be protected. Check if the charging voltage is too high. If so, please modify the settings on the power supply equipment, and discharge the battery after the battery voltage drops and the ALM is off.

d) When the battery discharges below 84V*N, the battery will be protected. Check whether the discharge voltage is too low. After the battery voltage rises and ALM is off, the battery should be charged.

- **Problem 5:**

The SOC and ALM indicators are all on.

Possible causes:

The system is locked, so the charger cannot be used to charge or the load to discharge.

Solution:

Turn off the battery and contact YelonESS local dealer.

- **Problem 6:**

The buzzer rings and the ALM is solid red.

Possible causes:

Battery internal voltage, temperature, and/or current sensor are faulty.

Solution:

Turn off the battery and turn on the power again. If the problem cannot be solved, please turn off the battery and contact YelonESS local dealer.

If the fault still cannot be located, turn off battery and contact YelonESS local dealer.

Note (1): If there are N battery modules, the voltage parameter in the description needs to be multiplied by N.

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 help.

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

1) 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.

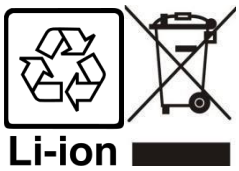
Caution

Damaged batteries may leak electrolyte or produce flammable gas.

8. Remarks

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 (i.e. Regulation (EC) Nº 1013/2006 among European Union) 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. 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

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