Lenercom

3-5KW Lenercom Residential ESS

User's Manual

Thank you for purchasing this product.
Please read this manual before use.
Please keep this manual properly for consultation.

Scope

This manual is applicable to:

- *Installer*
- User

Symbols

The following symbols in this manual shall have the meanings as follows.

Symbol	Description
	To indicate the serious danger which will cause death or serious injury if not avoided
	To indicate the intermediate danger which may cause death or serious injury if not avoided
	To indicate the slight danger which may cause slight or moderate injury if not avoided
	To indicate the warning information for the safety issues about the equipment or environment, if not avoided, which may lead to equipment damage, data loss, performance degradation or other unpredictable results. "Note" does not involve personal injury.
 **Description**	To highlight the important/key information, best practices, tips, etc. "Description" is not safety warning information, and does not involve any personal, equipment and environmental damage information.

Version information

S/N	Revision No.	Date	Revision
1	V1.0	2/23/2021	
2	V1.5	3/1/2022	1. Information of 2 kW and 5.5 kW products and 24 V battery was deleted; 2. Type was reset and catalogue was updated; 3. APP instructions were updated; 4. Equipment installation instructions were updated; 5. Information of inverter and battery interface was updated; 6. Table of equipment parameters was updated; 7. Electrical connection instructions were updated; 8. General parameters in Table 4 of 8.4 were deleted 9. 51.2 V/4.4 kWh battery module was updated to 51.2 V/5.12 kWh; 10. Models of inverter and battery module of LC-E2 were added and updated

Table of Contents

1 Safety Precautions

1.1 General safety

Statement

When installing, operating and maintaining equipment, please read this manual first and follow the identification on the equipment and all safety precautions in this manual.
The "Notes", "Cautions", "Warnings" and "Dangers" in this manual do not represent all safety precautions to be observed, but only serve as supplements to all safety precautions. Lenercom does not assume any responsibility caused by violation of the general safe operation requirements or the safety standards for the design, production and use of equipment. This equipment shall be used in the environment in line with the design specifications, otherwise the equipment fault may be caused, and the resulting equipment abnormality or component damage, personal safety accident, property loss, etc. may not be covered by the quality assurance. When installing, operating and maintaining equipment, please observe the local laws, regulations and specifications. The safety precautions in this manual are only used as a supplement to local laws, regulations and specifications.

Lenercom assumes no responsibility for any of the following situations:
● Operation beyond the conditions of use described in this manual.
● Installation and use environment not in line with relevant international or national standards.
● Unauthorized disassembly, modification of products or modification of software codes.
● Failure to follow the operation instructions and safety warnings of products and documents.
● Equipment damage caused by abnormal natural environment (force majeure, such as earthquake, fire, storm, etc.).
● Damage during the transportation arranged by customer.
● Damage caused by storage conditions inconsistent with the requirements of product documents.

General requirements

Live operation is strictly prohibited during installation.
Do not install, use and operate outdoor equipment and cables (including but not limited to handling equipment, operating equipment and cables, plugging and unplugging signal interfaces connected to outdoors, aerial work, outdoor installation, etc.) in severe weather such as lightning, rain, snow and strong winds above Grade 6.
● After installing the equipment, remove the empty packaging materials in the equipment area, such as cartons, foam, plastics, cable ties, etc.
● In case of fire, withdraw from the building or equipment area and press the fire alarm bell or call the fire emergency number. Under no circumstances is it allowed to re-enter the burning building.
● Do not artificially alter, damage or block the marks and nameplates on the equipment.
● When installing the equipment, use tools to tighten the screws according to the specified torque.

● Fully understand the components, working principle of LC-E2 and relevant standards in the country/region where the project is located.
● Repair the paint scratches during equipment transportation and installation in time which shall not be exposed to outdoor environment for a long time.
● Do not open the back panel of inverter.

Personal safety

In case of the fault that may cause personal injury or equipment damage in the process of equipment operation, terminate the operation immediately, and make report to the person in charge to take effective protective measures.
● Be knowledgeable of the correct use of tools before the use to avoid the personal injury and equipment damage.
● When the equipment is running, the shell temperature is high, and there is a danger of burning. Please do not touch it.

1.2 Personnel requirements

Personnel for the installation and maintenance of LC-E2 shall first receive the rigorous training to understand various safety precautions and correct operation methods.
● Equipment shall only be installed, operated and maintained by the qualified professionals or trained personnel.
● Safety facilities and repair equipment shall only be removed by the qualified professionals.
● Personnel who operate equipment, including operators, trained personnel and professionals, shall have special operation qualifications required by local countries, such as high-voltage operation, working at heights and special equipment operation qualifications.
● Equipment or parts (including software) shall only be replaced by professionals or authorized personnel.

Description

● Professionals: People who have training or experience in operating equipment, and can know all kinds of potential hazard sources and hazard levels in the process of equipment installation, operation and maintenance.
● Trained person: A person with appropriate technical training and necessary experience, who is aware of the danger that may be brought to him when performing an operation, and can take measures to minimize the danger to himself or other personnel.
● Operators: Operators who may come into contact with equipment except trained personnel and professionals.

1.3 Electrical safety

Grounding requirements

● When installing the equipment to be grounded, install the protective grounding wire first. When removing equipment, remove the protective grounding wire last.
● Do not damage the grounding conductor.
● Do not operate the equipment without installing the grounding conductor.
● Permanently ground the equipment. Before operating the equipment, check the electrical connection of the equipment to ensure that the equipment is reliably grounded.

General requirements

Before the electrical connection, please ensure that the equipment is not damaged, otherwise the electric shock or fire may be caused.
● All electrical connections shall meet the electrical standards of the country/region.
● The grid can be connected for power generation only after the permission is obtained from the power authority of the country/region.
● User-provided cables shall comply with local laws and regulations.
● Special insulating tools shall be used for high voltage operation.

AC/DC operation

Live installation and removal of power line are prohibited. When touching the conductor, the power line core will produce electric arc or spark which can lead to fire or personal injury.
● Before the electrical connection of the equipment, if live parts may be touched, the corresponding breaking device at the front stage of the equipment shall be disconnected.
● Power line label shall be correctly identified before the connection of power line.
● If the equipment has multiple inputs, all inputs of the equipment shall be disconnected, and the equipment can be operated only after the complete power-off.

Wiring requirements

● The insulation layer may be aged and damaged when the cable is used in high temperature environment, and the distance between the cable and the periphery of heating device or heat source area shall be at least 30 mm.
● Cables of the same kind shall be bound together, and cables of different kinds shall be laid at the interval of at least 30 mm. Winding or cross laying shall be avoided.

1.4 Requirements of installation environment

● Installation environment of equipment shall be well ventilated.

● When the equipment is running, the vents or heat dissipation system shall not be blocked to prevent the fire caused by high temperature.
● The equipment shall not be placed in the environment of flammable, explosive gas or smoke, and do not carry out any operation in this environment.
● The equipment shall not be placed in high salt spray environment.
● Load strength of installation ground shall be greater than the load caused by product weight.
● The annual temperature of the installation area shall be lower than 50℃ and higher than 0℃.
● Relative humidity of air shall be less than 95%.

1.5 Mechanical safety

Drilling safety

The following safety precautions shall be considered when drilling holes on walls and ground:
● Wear goggles and protective gloves when drilling holes.
● Shield the equipment during drilling to prevent debris from falling into the equipment. After drilling, clean the debris in time.

Safety of carrying weights

● When carrying weights, prepare for bearing loads to avoid injury.
● When handling equipment, wear protective gloves to avoid injury.

< 18 kg (< 40 lbs)	1 person
18 – 32 kg (40 – 70 lbs)	2 persons
32 – 55 kg (70 – 121 lbs)	3 persons
> 55 kg (> 121 lbs)	4 persons or machinery

1.6 Debugging safety

When the equipment is powered on for the first time, the parameters shall be set correctly by professionals.

1.7 Maintenance and replacement

During the operation, high voltage may cause electric shock, resulting in death, serious personal injury or property loss. Therefore, the equipment shall be powered off before any maintenance, which shall be conducted in strict accordance with the safety precautions listed in this manual and other relevant documents.
● Please maintain the equipment after being knowledgeable of this manual and preparing suitable tools and test devices.

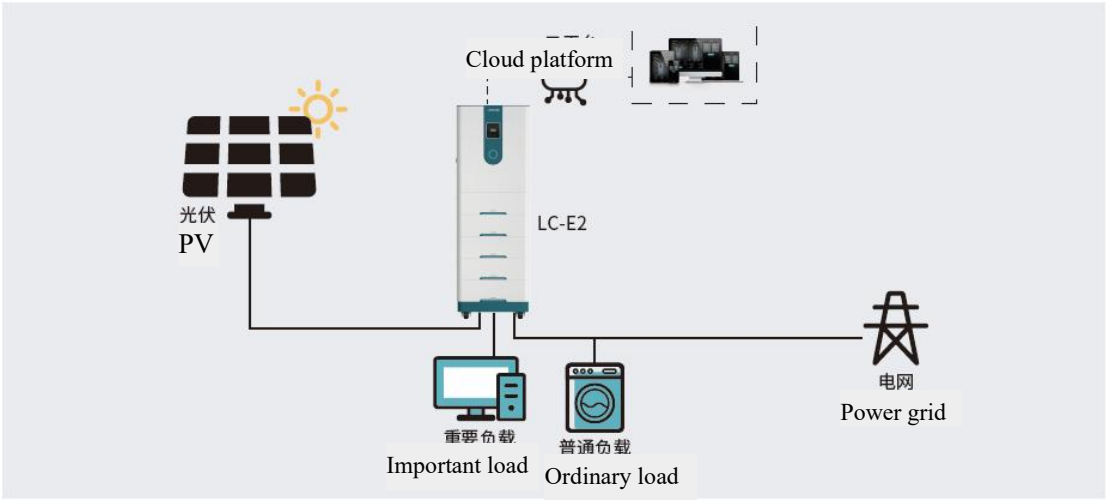
● Before the maintenance, please power off the equipment first, and then follow the instructions of the delayed discharge label and wait properly to ensure that the equipment has been powered off before operating the equipment.
● During the maintenance, please prevent the irrelevant personnel from entering the maintenance site, and set the temporary warning signs or fences for isolation.
● If the equipment fails, please contact your dealer for treatment.
● The equipment can be powered on again only after the fault is solved, otherwise the fault may be deteriorated or the equipment may be damaged.

2 Product Introduction

2.1 Introduction of products

Features

LC-E2 products are comprised of PV energy storage hybrid inverter, energy storage battery module and wireless communication module. PV power generation and energy management system can be formed if PV is connected. The product mainly functions to convert DC power of PV and battery into AC power and output it to loads. The system, in conjunction with the household EMS (Energy Management System) and BMS (Battery Management System) independently developed by Lenercom, can realize remote data monitoring, early warning and control of LC-E2.



The system can be used in off-grid system and grid-connected system, and is suitable for many applications such as home users, small agriculture, small business and electric vehicle charging.

Model

LC-E2 mainly includes the following models
LC-E2-305, LC-E2-310, LC-E2-315, LC-E2-320, LC-E2-325, LC-E2-330, LC-E2-335, LC-E2-340.LC-E2-405, LC-E2-410, LC-E2-415, LC-E2-420, LC-E2-425, LC-E2-430, LC-E2-435, LC-E2-440.LC-E2-505, LC-E2-510, LC-E2-515, LC-E2-520, LC-E2-525, LC-E2-530, LC-E2-535, LC-E2-540.

Model description (taking LC-E2-515 as an example)

LC-E2	5	15
Product line	Rated power (kW)	Battery capacity (see table below)

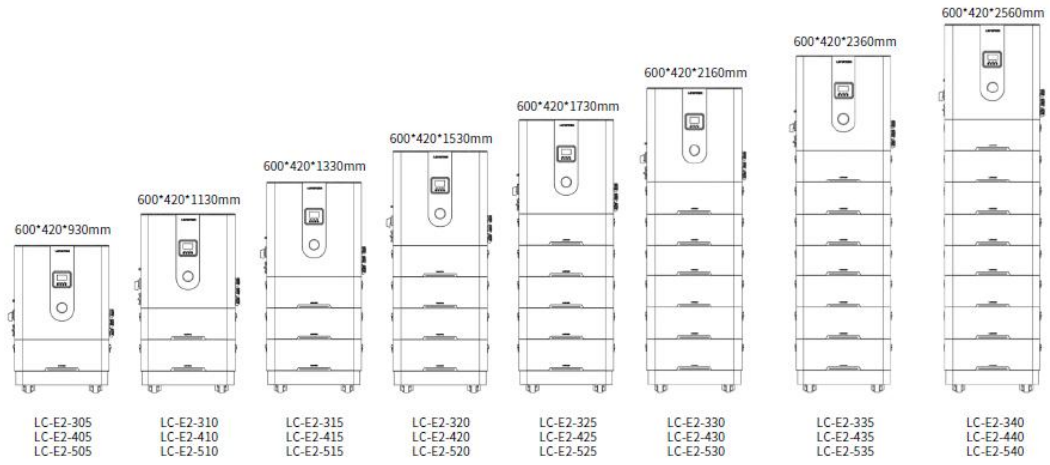
Description of battery capacity

Model	No. of battery modules	Battery capacity
05	1	5.12kWh*1
10	2	5.12kWh*2
15	3	5.12kWh*3
20	4	5.12kWh*4
25	5	5.12kWh*5
30	6	5.12kWh*6
35	7	5.12kWh*7
40	8	5.12kWh*8

LC-E2 configuration

LC-E2=inverter * 1 + battery module * n + base * 1

Note: n is the number of battery modules, $1 \leq n \leq 8$.



Inverter mainly includes the following models

LC-3KL1

LC-4KL1

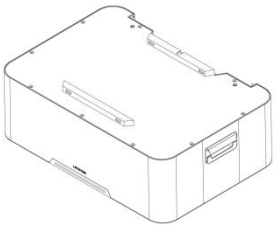
LC-5KL1

Model description (taking LC-3KL1 as an example)

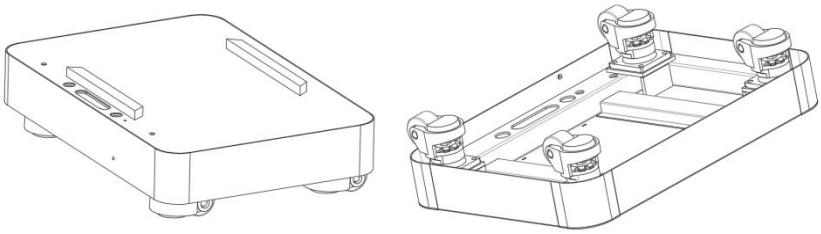
LC	3K	L	1	
Product line	Inverter power	Battery low voltage	Single phase 220Vac	

Battery module mainly includes the following models

LC-BL512

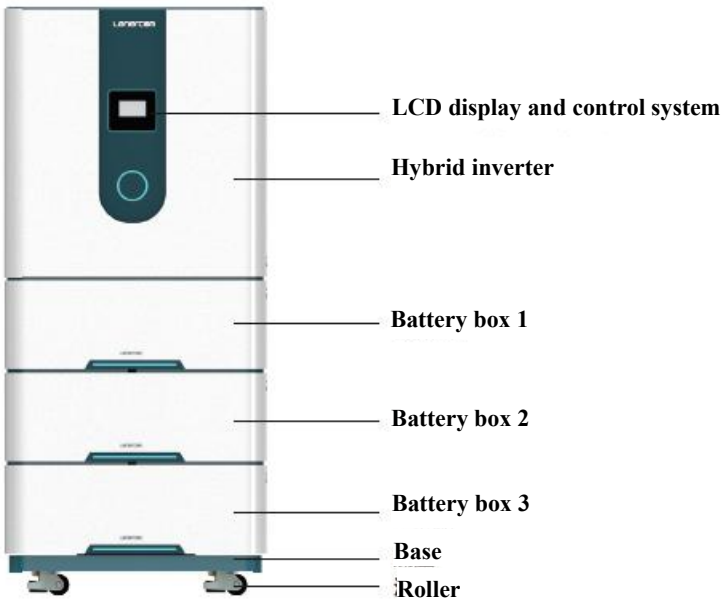
LC	B	L	512	
Product line	Battery module	Battery low voltage	Battery capacity 5.12kWh	

Base is as shown in the following figure.



2.2 Description of appearance and interfaces

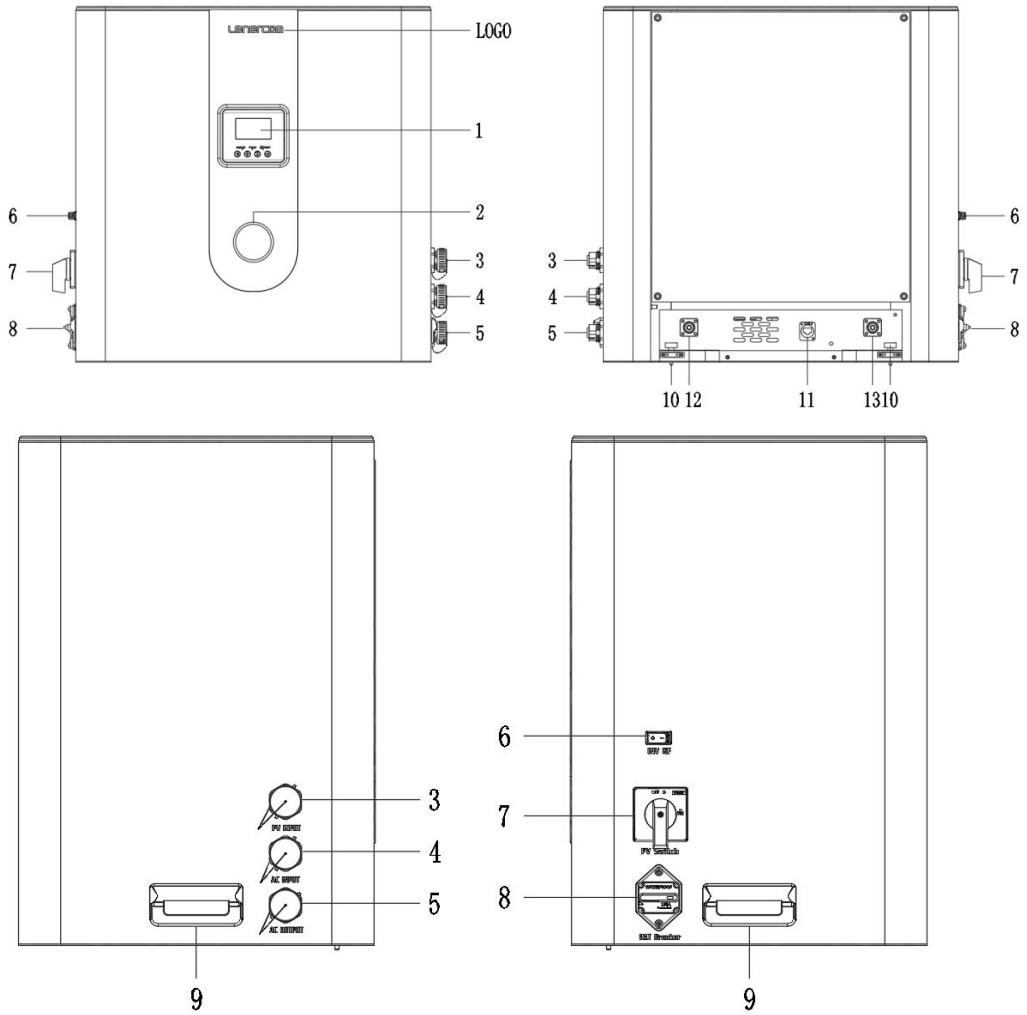
2.2.1 Equipment appearance



Description

LC-E2 3-5kW products can accommodate up to 8 battery modules which can be configured as required by user.

2.2.2 Appearance and interfaces of inverter



Code	Name	Description
1	LCD control panel	To display the data and set the functions of inverter
2	Breathing light	To display the battery level and fault
3	Aviation socket	To connect PV
4	Aviation socket	To connect the grid
5	Aviation socket	To connect the loads
6	Button switch	To turn on/off the inverter
7	PV knob switch	To turn on/off PV
8	Battery switch	As the master switch of battery
9	Handle	For assembly
10	Locating pin	For positioning in assembly
11	COM communication port	To connect the CAN communication port of the battery mainframe
12	Anode	To connect the anode
13	Cathode	To connect the cathode

Description

Description of breathing light: breathing light of inverter can feed back the relevant status of inverter battery in real time as shown in follows:

- Battery power: 40% < SOC ≤ 100%, it turns to blue with low frequency flashing;

Battery power: 15% < SOC ≤ 40%, it turns to green with low frequency flashing;

Battery power: SOC ≤ 15%, it turns to yellow with low frequency flashing;

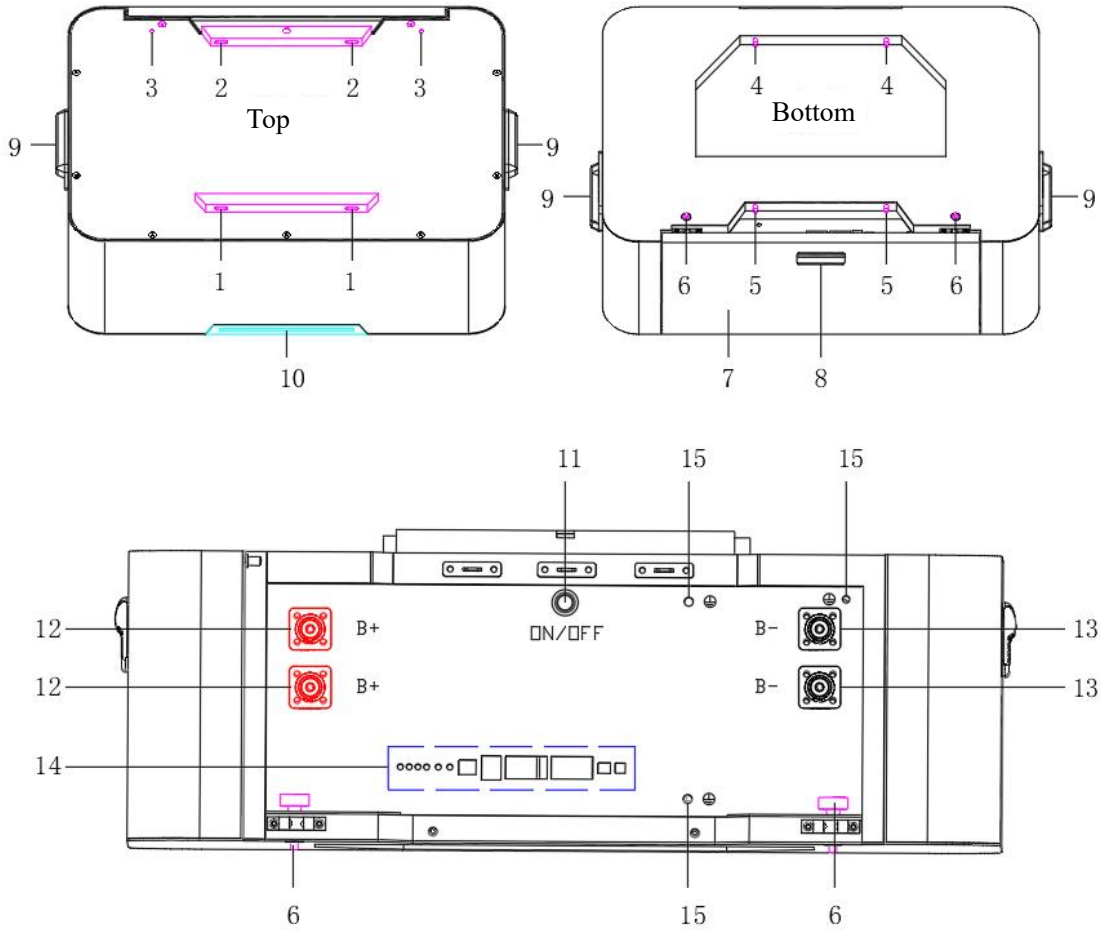
- When the inverter fails, it flashes in red;

After troubleshooting, breathing light displays the power again.

Instruction: "SOC" stands for battery power

2.2.4 Appearance and interfaces of battery module

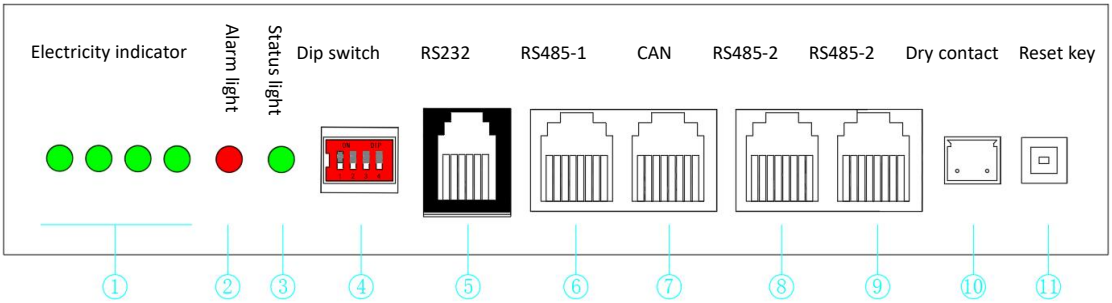
The interface of battery module is located on the back of battery module. Open the back cover of battery module and you can see it, as shown in the following figure



Code	Name	Description
1	Front locating hole	Transverse
2	Rear locating hole	Transverse
3	Rear locating hole	Longitudinal
4	Front locating pin	Transverse

5	Rear locating pin	Transverse
6	Rear locating pin	Longitudinal
7	Back panel	Openable
8	Back panel handle	
9	Handle	For assembly
10	Indicator lamp	To be blue if the battery module is powered on
11	Button switch	To turn on/off the battery module
12	Anode socket	To connect adjacent battery or anode of inverter
13	Cathode socket	To connect adjacent battery or cathode of inverter
14	BMS interface	See Chapter 2.2.5 "Description of BMS interface"
15	Grounding point	Installation point of grounding wire

2.2.5 Description of BMS interface



S/N	Name	Description
1	LED indicator	4 LED indicators display based on the electric quantity
2	Alarm light	To be red for fault and alarm
3	Status light	To be green if BMS is powered on
4	Dip switch	To set the communication address of BMS
5	RS232	Communication port of upper computer
6	RS485-1	Alternate communication port
7	CAN	To connect inverter COM communication port
8	RS485-2	BMS parallel communication port 1
9	RS485-2	BMS parallel communication port 2
10	Dry contact	Passive dry contact, normally open for normal operation of BMS/BMS protection conduction
11	Reset button	To reset BMS

Description

● LED indicator

Status	Normal/alarm, protection	Running light	Alarm light	Electricity indicator				Description
		Green	Red	L4	L3	L2	L1	
Power off	Sleep	Off	Off	Off	Off	Off	Off	All off
Standby	Normal	Flash once	Off	Display based on the electric quantity				
	Alarm	Flash once	Flash triple	See following table for power indication				Battery low voltage
Charging	Normal	Normally on	Off	See following table for power indication				In case of overvoltage alarm, the alarm indicator is off
	Alarm	Normally on	Flash triple					
	Overcharge protection	Normally on	Off	On	On	On	On	If the charger is not connected, the indicator displays the same as when the battery is in standby
	Temperature and overcurrent protection	Off	Normally on	Off	Off	Off	Off	Charging off
Discharging	Normal	Flash triple	Off	See following table for power indication				
	Alarm	Flash triple	Flash triple					
	Overdischarge protection	Off	Off	Off	Off	Off	Off	Discharging off
	Temperature and overcurrent short circuit protection	Off	On	Off	Off	Off	Off	Discharging off
Failure		Off	On	Off	Off	Off	Off	Charging and discharging off

● Description of LED flash

Flashing mode	On	Off
Flash once	0.25S	3.75S
Flash twice	0.5S	0.5S
Flash triple	0.5S	1.5S

● Description of power indication

Status		Charging				Discharging			
Capacity indicator		L4	L3	L2	L1	L4	L3	L2	L1
Electricity (%)	1~25%	Off	Off	Off	Flash twice	Off	Off	Off	On
	25~50%	Off	Off	Flash twice	On	Off	Off	On	On
	50~75%	Off	Flash twice	On	On	Off	On	On	On
	75~100%	Flash twice	On	On	On	On	On	On	On

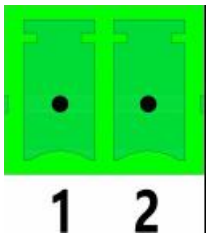
● Description of power on/off indicator

Power on	LED indicators turn on from the lowest power light (VL1) for 0.5s, and then light up at the same time until the end of pre-charging
Power off	After turning on for 1.5s at the same time, LED indicators light up from the lowest power light (VL1) for 0.5s

● Dip switch

To set communication address of BMS protection board, see Section 5 "Dip Settings" Chapter 9.

● Description of dry contact output



BMS protection board can provide a dry contact signal which is passive switch regardless of polarity;

Dry contact (2P terminal)		
BMS status	Action description	Remarks
BMS working normally	1/2 pin is open	
BMS under protection	1/2 pin is closed	SOC alarm, under-voltage and over-voltage alarm and BMS protection state output, such as under-voltage protection, over-voltage protection or short circuit protection.

● Reset button

Features same as power on/off button of battery module

2.3 Label description

Sample of inverter nameplate

Lenercom ESS	
Model: LC-E2-520	
PV input	
Maximum input current	80A
MPPT voltage range	64-130VDC
Maximum PV voltage (VOC)	145VDC
Maximum short circuit current	92A
Input channels of MPPT	1
Input channels of each MPPT	1
AC output parameters (off-grid)	
Rated power	5000W
Rated current	21.7A
Rated voltage	230VAC
Frequency	50/60HZ
Power factor	1
AC output parameters (grid-connected)	
Rated power	5000W
Rated current	21.7A
Rated voltage	230VAC
Frequency	50/60HZ
Power factor	1
Battery parameters	
Nominal voltage of battery	51.2V
Battery voltage range	40-58V
Maximum charge current	40A
Maximum discharge current	100A
Battery type	Lithium iron phosphate
System parameters	
IP grade	IP20
Overall dimensions (W*D*H)	600*420*1530mm
Maximum conversion efficiency	93%

Battery module nameplate

Parameters of LC-BL512 battery module	
Battery type	Lithium iron phosphate
Rated voltage	51.2V
Battery capacity	100Ah
Battery power	5120Wh

Box identification

This section explains all the symbols on the inverter and type labels.

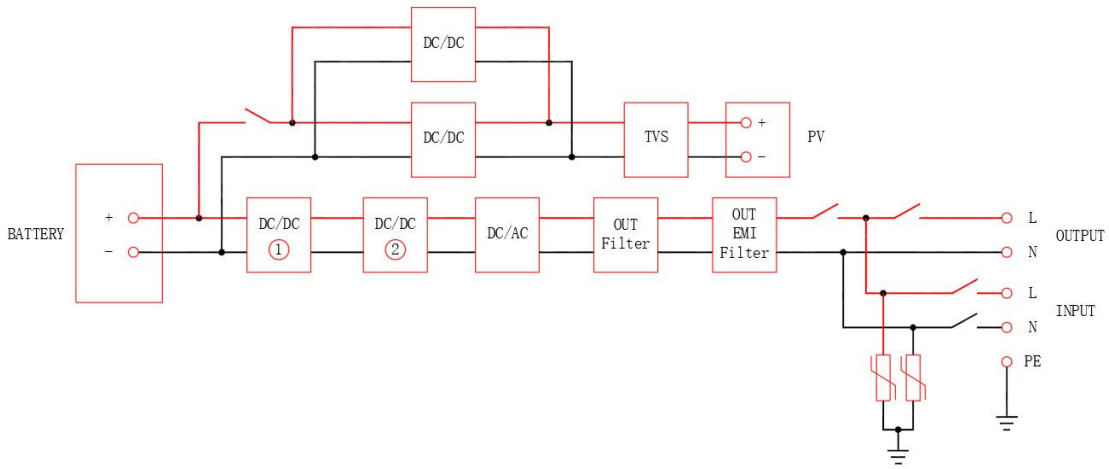
* Symbols on type labels

Symbol	Description
CE	CE mark Inverter meets the requirements of applicable CE product line
	Beware of hot surfaces. The inverter may get hot during operation to avoid the contact during operation.
	Danger of high-voltage electric shock!
	Watch out! Failure to comply with the warnings in this manual may cause the personal injury!
	Please follow the attached manual.
	The inverter shall not be disposed of with household waste, and the disposal information can be found in the attached file.
	Do not operate this inverter until it is isolated from the battery, power supply, and field PV generator.
5min	High voltage may endanger life. After the power off, residual voltage in the inverter takes 5 minutes to discharge.

2.4 Working principle

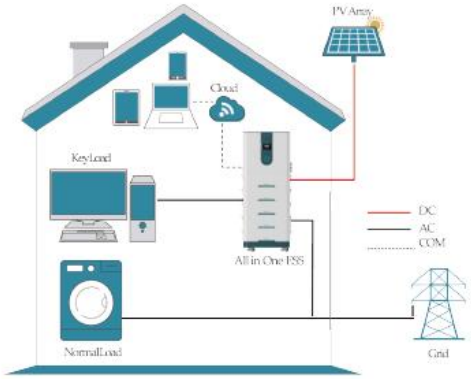
LC-E2 is connected with a PV string and an energy storage battery, converts the direct current of PV and battery into alternating current and outputs it to the loads. The direct current of PV can charge the battery at the same time. LC-E2 is connected with a 200V AC power supply, bypass the output to the load. At the same time, the inverter can convert the AC input power into DC power to charge the battery.

2.4.1 Block diagram of circuits

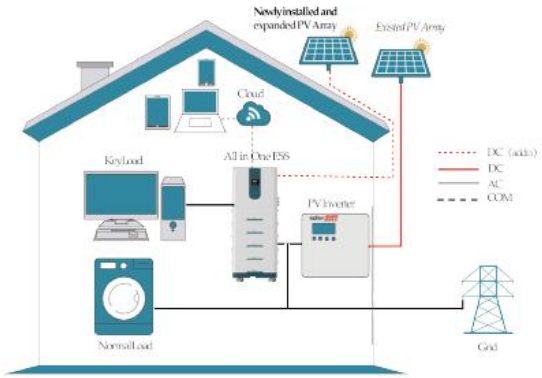


2.4.2 AC/DC coupling

LC-E2 can be applied to DC coupling system (mainly newly installed), AC coupling system (mainly retrofit) and hybrid coupling system (mainly retrofit and increased PV capacity)



DC Coupling
For new intallation



DC/AC Coupling
For modification and PV capacity expansion

Warning

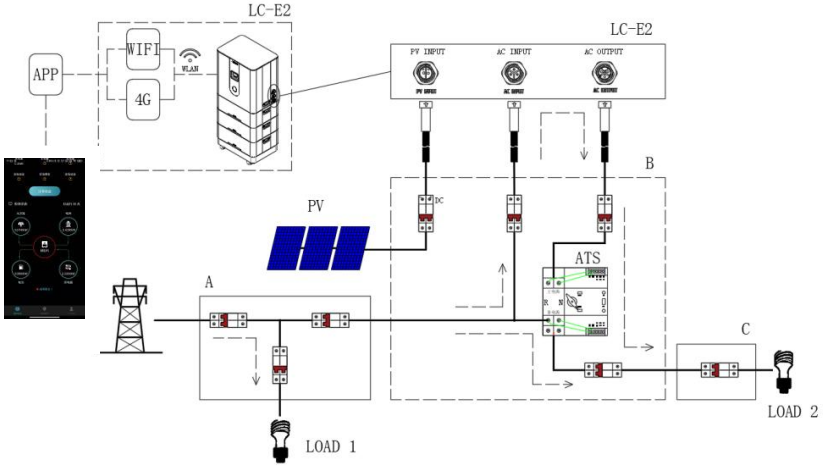
For AC/hybrid coupling systems, two electricity metering units shall be installed.

3 Application and Setting of Networking

Networking 1: LC-E2 + PV + Grid + LOAD

Description

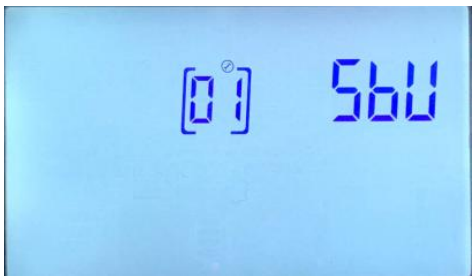
In the figure, distribution box "B" is optional, where ATS is a dual power transfer switch, LC-E2 is the main power supply, and grid power is the auxiliary power supply.



Self-generating and self-use

Working mode 1: PV supplies the power to LOAD 2 first. When PV generation power is greater than that of LOAD 2, remaining generation of PV charges battery; when PV generation power is less than that of LOAD 2, PV and battery supply the power to LOAD 2; when both PV and battery are insufficient, grid bypass supplies power to LOAD 2. Setting procedure of inverter is as follows:

LC-E2 inverter procedure "01" is set to: SBU



Power supply priority: PV - battery - grid

Working mode 2 (battery standby): PV supplies the power to LOAD 2 first. When PV generation power is greater than that of LOAD 2, remaining generation of PV charges battery; when PV generation power is less than that of LOAD 2, grid bypass supplies power to LOAD 2; when grid power is cut off, PV and battery supply power to LOAD 2. Setting procedure of inverter is as follows:

LC-E2 inverter procedure "01" is set to: SUB

Power supply priority: PV - grid - battery

Self-generating and self-use, surplus electricity fed to grid

Description

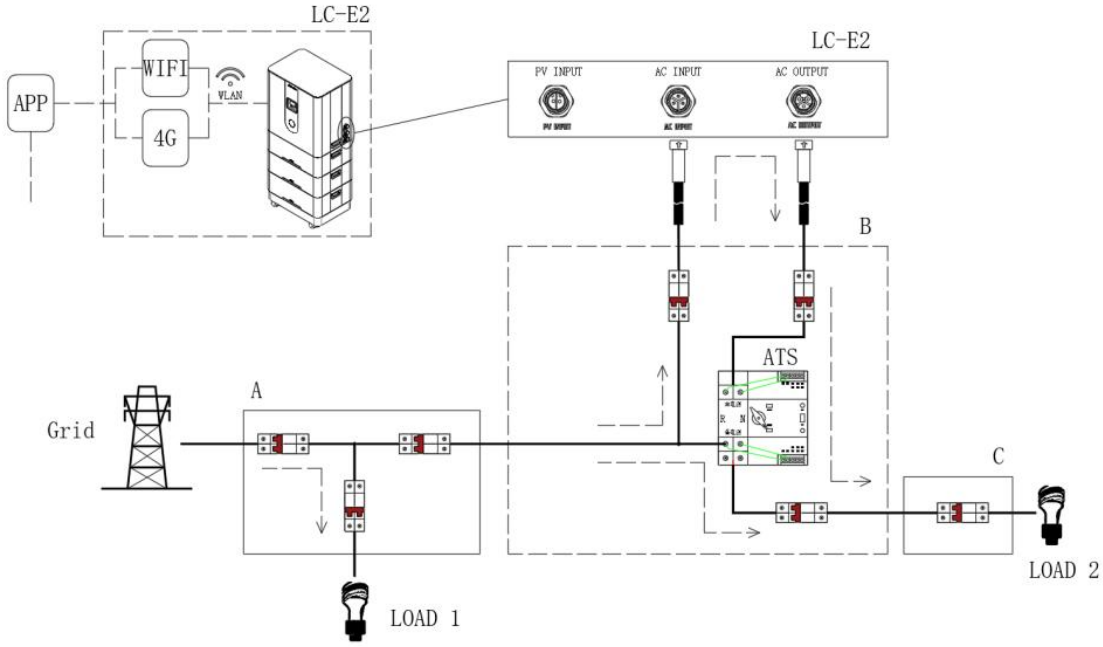
LC-E2 does not have grid-connected anti-countercurrent function.
Working mode: PV supplies power to load or battery first, and the surplus power is fed to the grid.
Setting procedure of inverter is as follows:

LC-E2 inverter procedure "01" is set to: SUB  Power supply priority: PV - grid - battery	LC-E2 inverter procedure "09"  Solar energy is sold to the grid.

Networking 2: LC-E2 + Grid + LOAD

Description

In the figure, distribution box "B" is optional, where ATS is a dual power transfer switch, LC-E2 is the main power supply, and grid power is the auxiliary power supply.



Working mode (battery standby):

Grid power supplies power to load, and when the grid power is cut off, the battery supplies power to LOAD 2. Setting procedure of inverter is as follows:

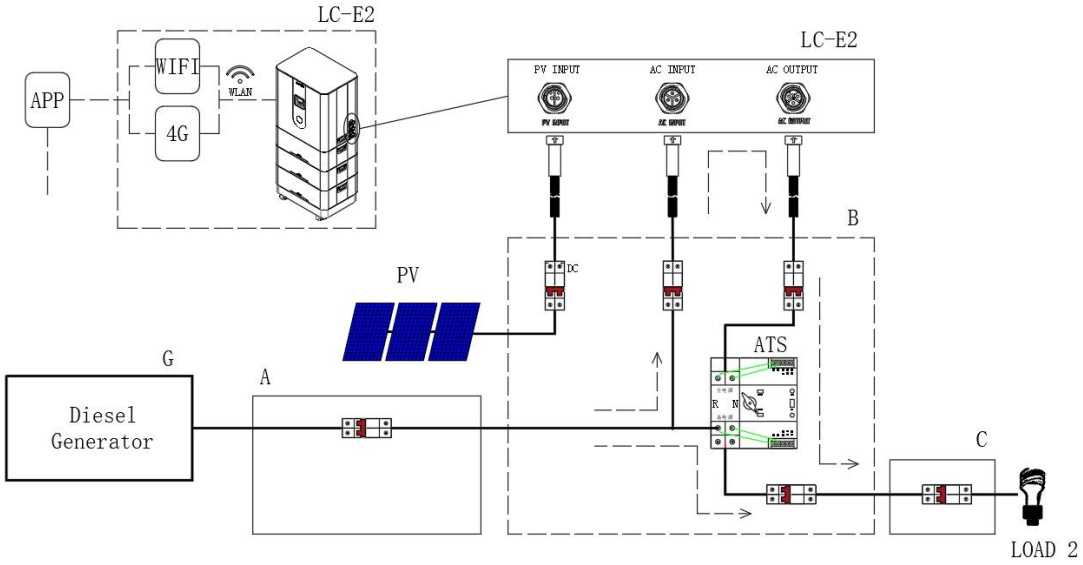
LC-E2 inverter procedure "01" is set to: SUB

Power supply priority: PV - grid - battery

Networking3: LC-E2+PV+Diesel Generator+LOAD

Description

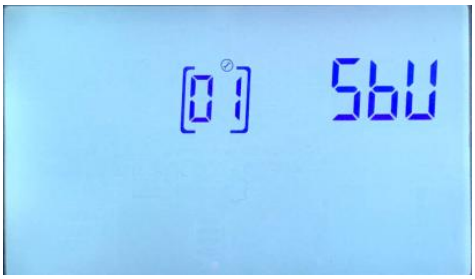
In the figure, distribution box "B" is optional, where ATS is a dual power transfer switch, LC-E2 is the main power supply, and grid power is the auxiliary power supply.



Pure off-grid system

Working mode (diesel generator standby): PV supplies the power to LOAD 2 first. When PV generation power is greater than that of LOAD 2, remaining generation of PV charges battery; when PV generation power is less than that of LOAD 2, PV + battery supply the power to LOAD 2; when both PV and battery are insufficient, the diesel generator is started to supply power to LOAD 2. Setting procedure of inverter is as follows:

LC-E2 inverter procedure "01" is set to: SBU



Power supply priority: PV - battery - grid

4 Installation of Equipment

4.1 Check before installation

Check of external package

Before unpacking the inverter, check the external package for visible damage, such as holes, cracks or other signs of possible internal damage, and check the inverter model. In case of any package anomaly or incorrect inverter model, do not open it and contact your dealer as soon as possible.

Check of fittings

Check the following list of parts to ensure no missing part

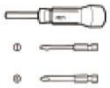
Lenercom provides the necessary parts for installation in the box, including:

LC-E2				
	 Expansion screw			
4 screws	4 screws	4 fixing supports	1xN battery communication wires (harness)	1xN+1 grounding wires
 Orange Orange	 Black Black	 Black Black	 Orange Orange	
1xN parallel wires of anode	1xN parallel wires of cathode	1 master cathode wire of battery	1 master anode wire of battery	1 User's Manual

Description

"N" is the number of LC-E2 battery modules.

4.2 Tools preparation

Category	Tools and Instruments		
Installation	 Percussion drill (bit φ 8mm)	 Torque socket spanner	Torque spanner
Category	**Tools and Instruments**		
Category name	 Oblique plier	 Wire stripping plier	 Torque screwdriver
	 Utility knife	 Crimping plier (Model: PVCZM-22100/19100)	 Multimeter (DC voltage range≥ 600V DC)
	 Removal and installation tools (Model: PVMS-HZ open spanner)	Cable tie	 Clip-on ammeter
	 Marker pen	 Steel tape	
Category	**Tools and Instruments**		
Personal protective equipment	 Safety gloves	 Protective goggles	 Dust mask
	 Safety shoe		

4.3 Selection of installation location

● The product shall be installed in a well-ventilated indoor environment to ensure good heat dissipation.

● Inverter shall not be installed in areas where flammable and explosive materials are stored.

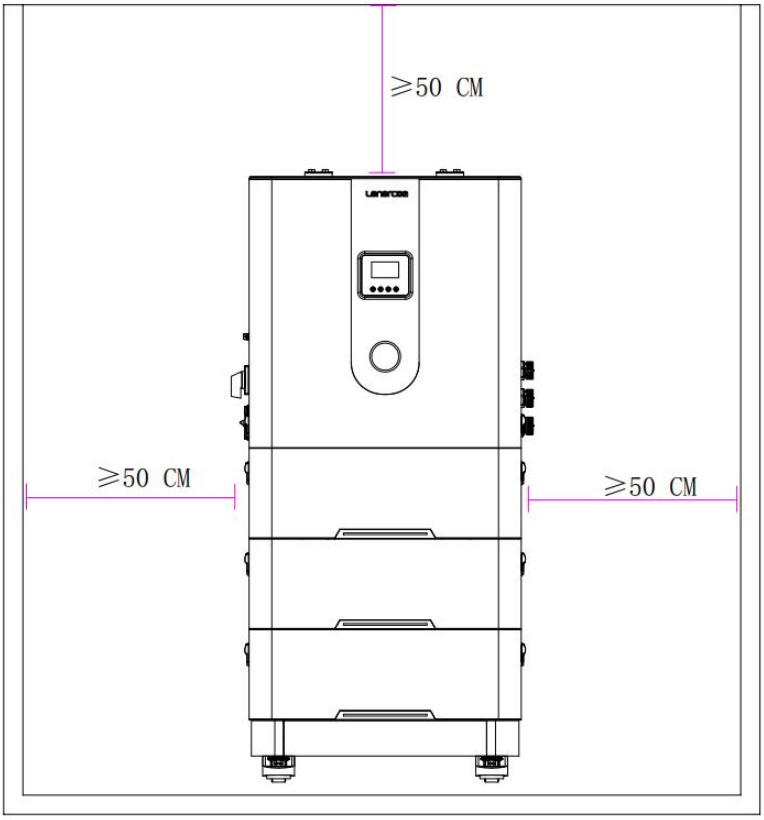
● LC-E2 will be corroded when installed in high salt spray areas, which may cause fire.

● Inverter shall not be installed on the flammable building materials.

● LC-E2 is heavy, so the mounting surface shall be firm and can support the inverter.

4.4 Space requirements for installation

The distance between product and surrounding objects shall be more than 50cm to ensure the sufficient heat dissipation and maintenance space.

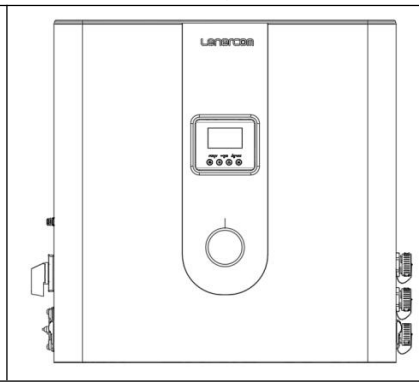


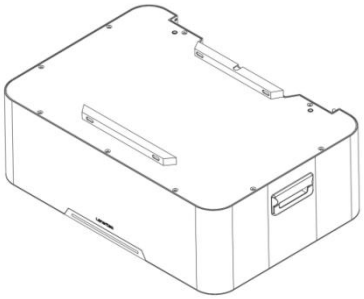
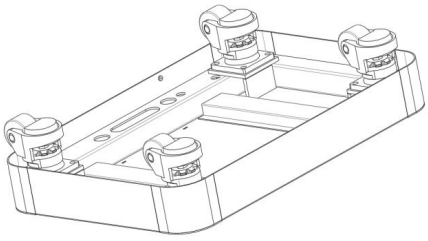
4.5 Installation steps

⚠ Caution

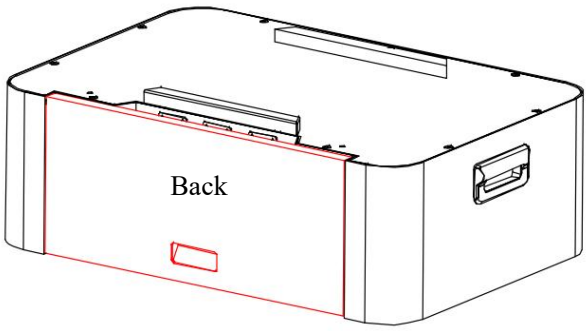
The equipment shall be mounted by no less than 2 installers who shall wear the safety shoes, gloves and other protective tools.

Step 1: Take out inverter, battery, base and accessories;

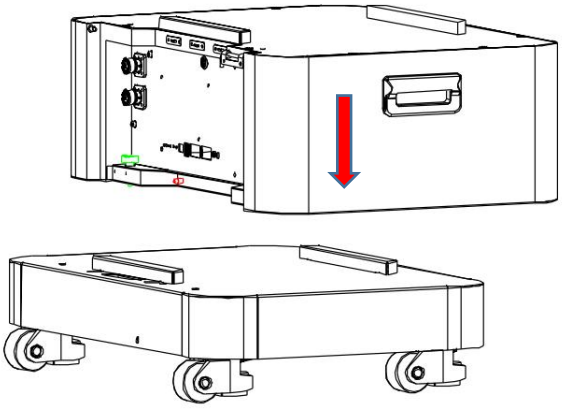
Inverter	

Battery module	
Base	

Step 2: First place the base at the installation position of equipment, take off the back panel of each battery box, and put the first battery box on the base at malposition.



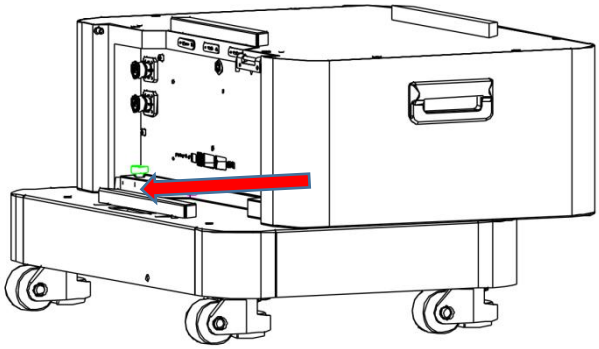
Remove the back panel of battery module



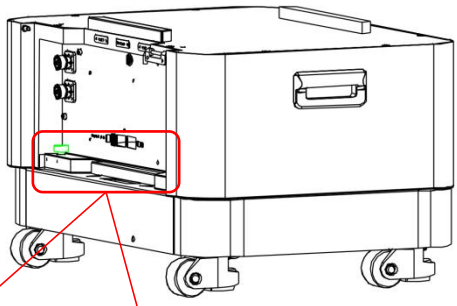
Place the battery module at the assembly position on base in the direction of arrow

Step 3: Align the transverse locating pin at the bottom of battery box with the axis of transverse locating hole of base; push the battery to the extent that the longitudinal locating pin of battery is aligned with the longitudinal locating hole of base, put down the longitudinal locating pin at the back of battery, and complete the installation after the clamping sound of pin.

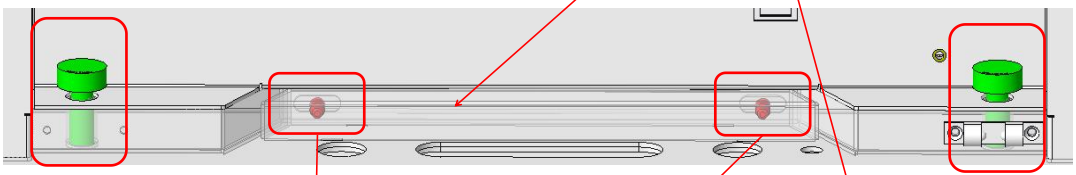
In the direction of arrow, push the battery on the left and right sides at the same time to insert the limit post of battery into the limit hole of base.



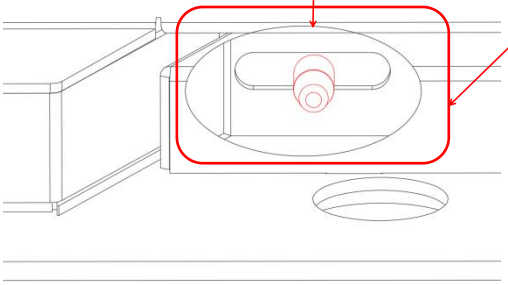
Rotate and drop two longitudinal locating pins respectively, insert the locating pin into the locating hole and complete the installation after the clamping sound of pin.



Description of correct installation: the locating pin is fully inserted into the locating hole

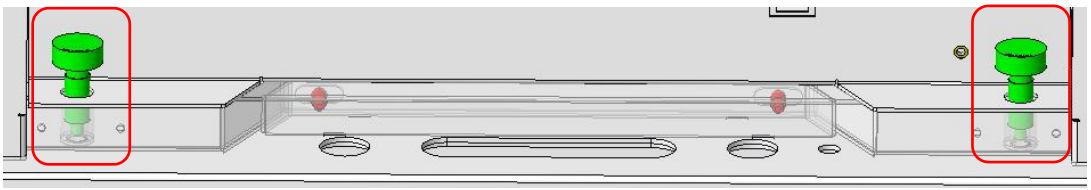


Description of correct installation: the locating pin is fully inserted into the locating hole



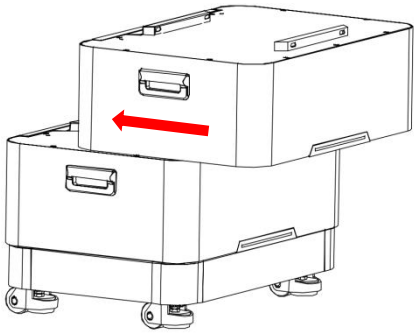
Enlarged view of assembly section of transverse locating pin

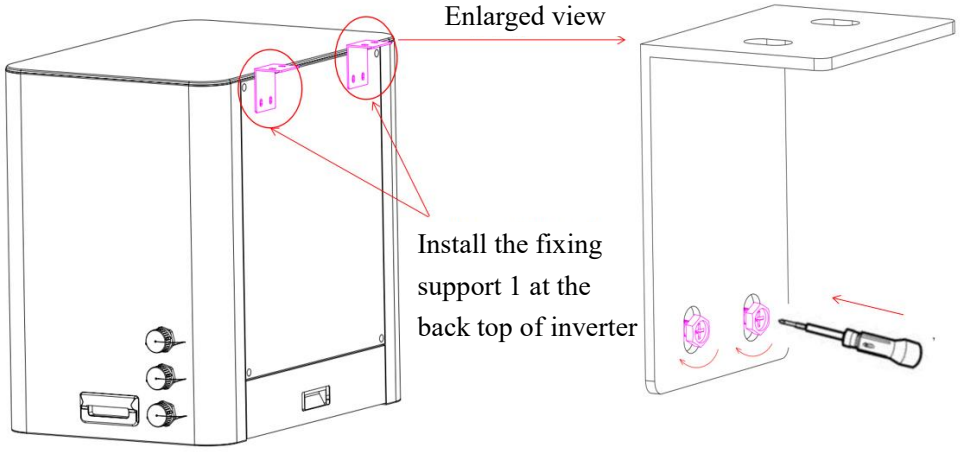
Description of wrong installation: Locating pin is not fully inserted into locating hole

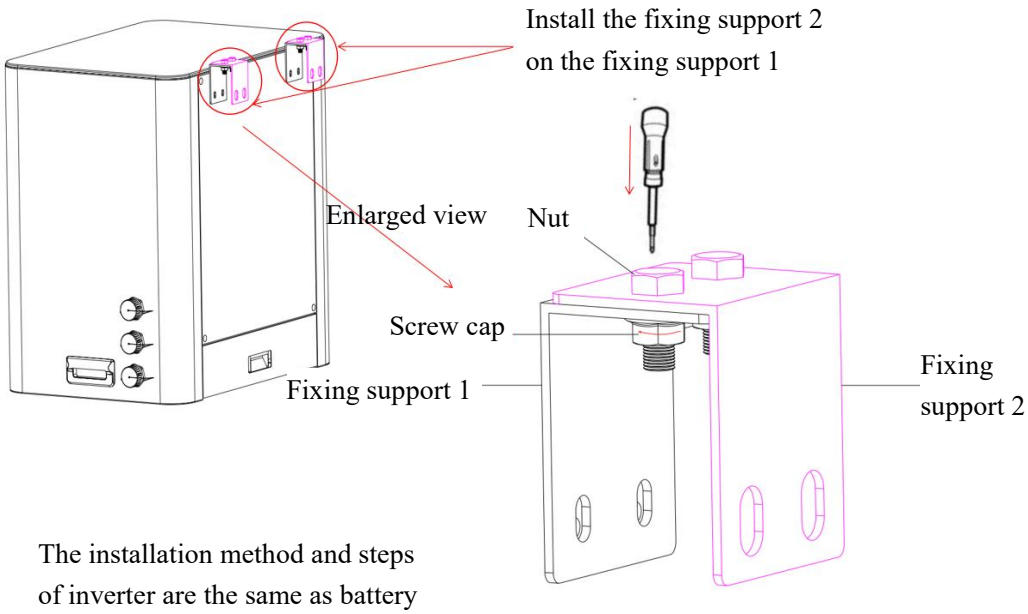


Step 5: Install the rest of the batteries and inverters according to the same method and steps as above:

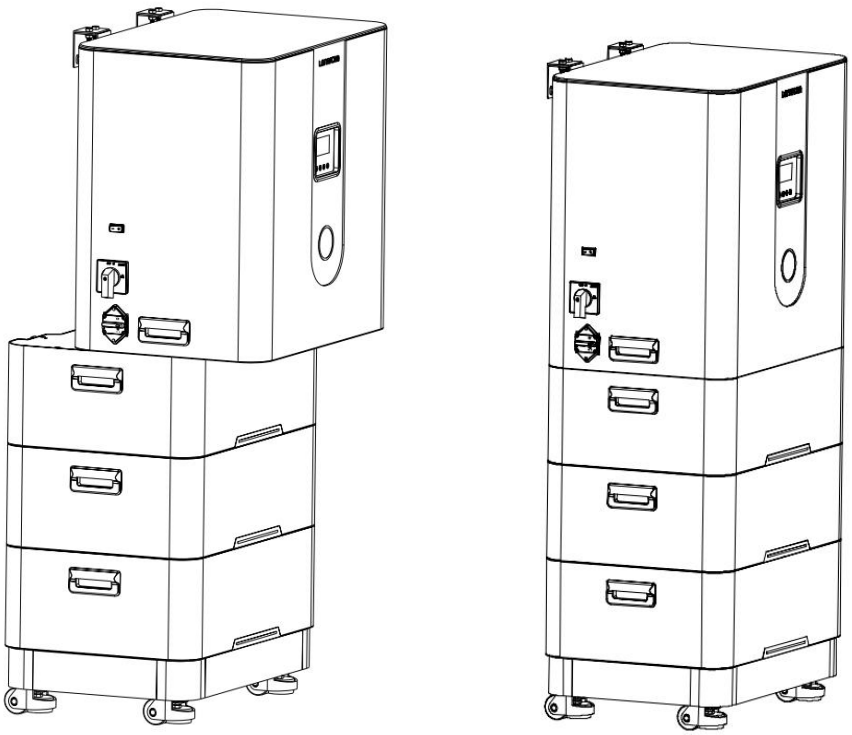
The installation method and steps are the same as above







The installation method and steps of inverter are the same as battery



Step 6: Fix the equipment, and after completing all installations and debugging, apply the rear cover of battery box, install two fixing supports on the back of inverter, punch two expansion screws on the wall according to the height of screw holes of the fixing support, move the equipment against the wall, and lock the fixing support on the expansion screw.

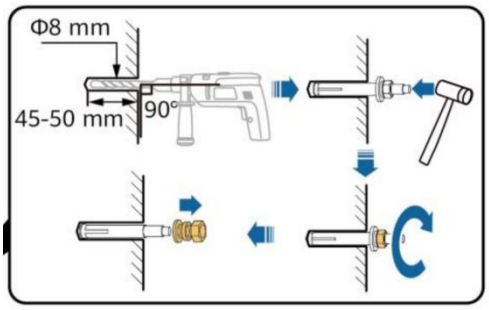
Caution

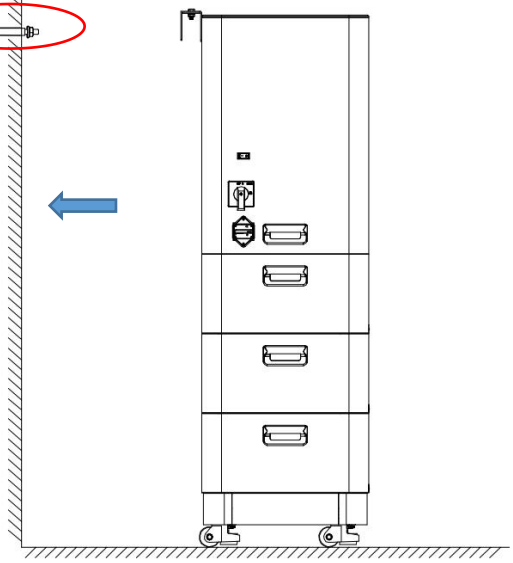
Before punching holes of expansion screws on the wall, please take dust protection measures to prevent the wall ash from contaminating the equipment.

Wall

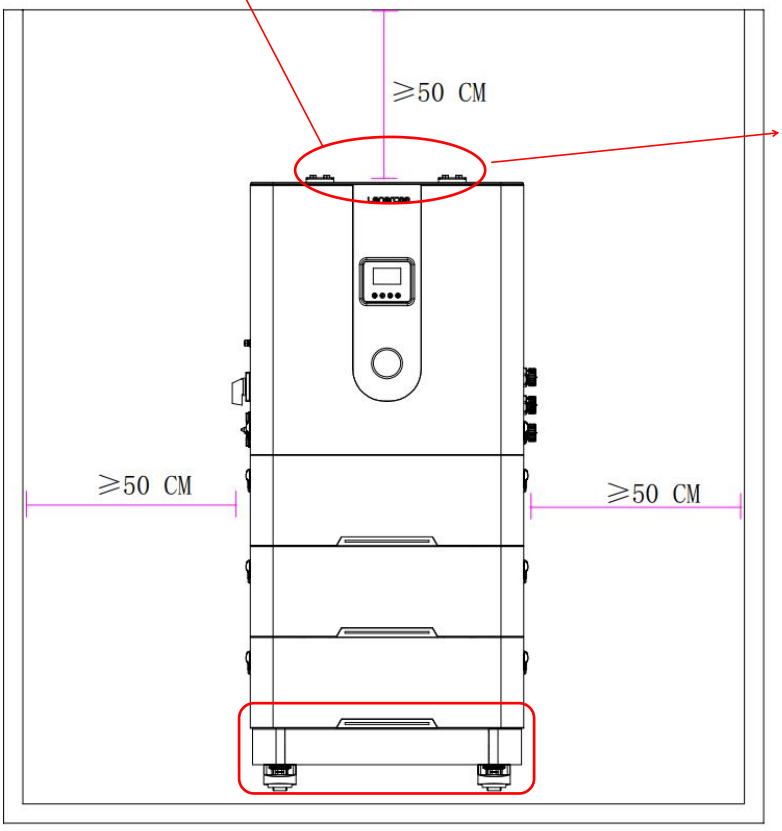
Punch holes in the wall, then install the expansion screw into the wall.

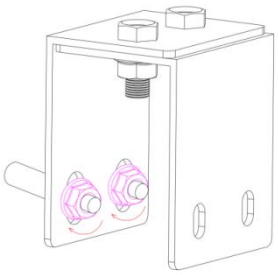
Schematic diagram for mounting the expansion screws into the wall.





Mounting the expansion screws into the wall are fixed on the wall.

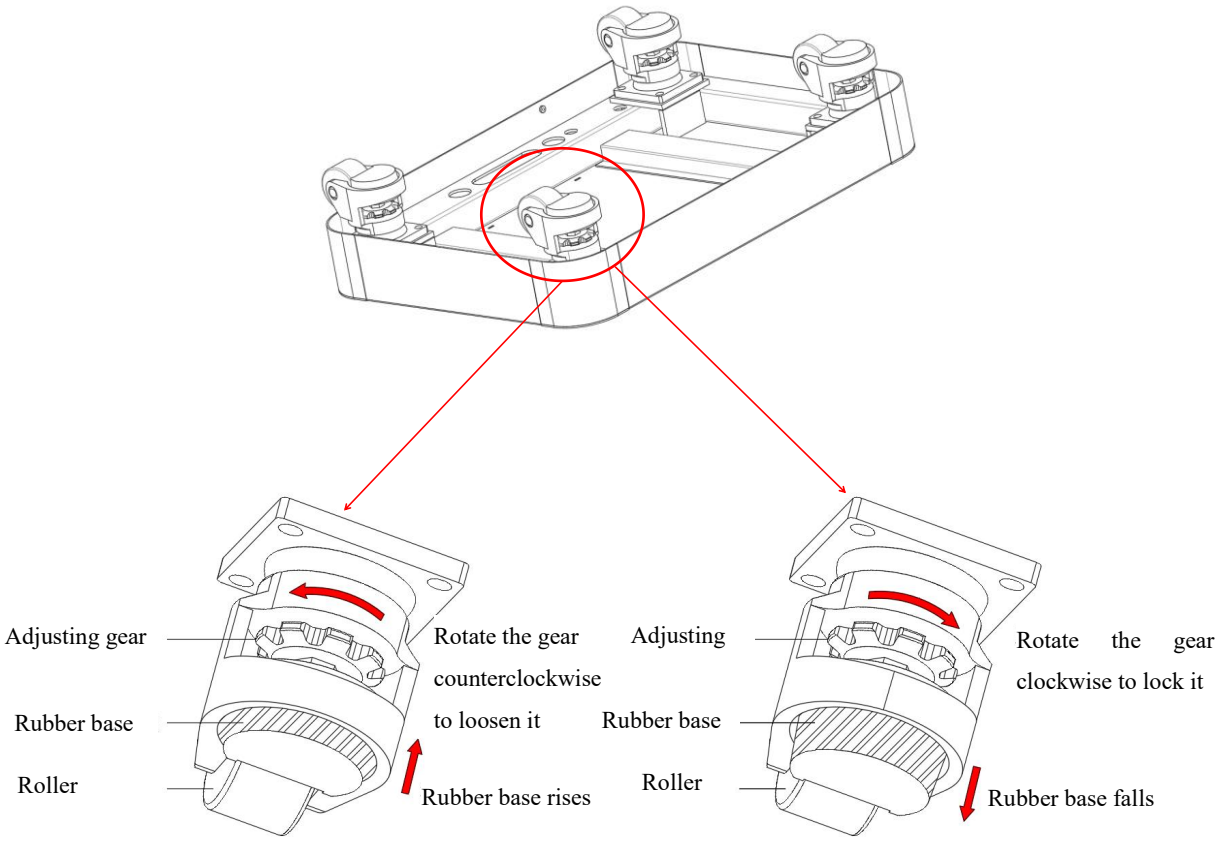




The top, left and right sides of the equipment shall keep more than 50cm away.

Step 7: Lock the universal wheel.

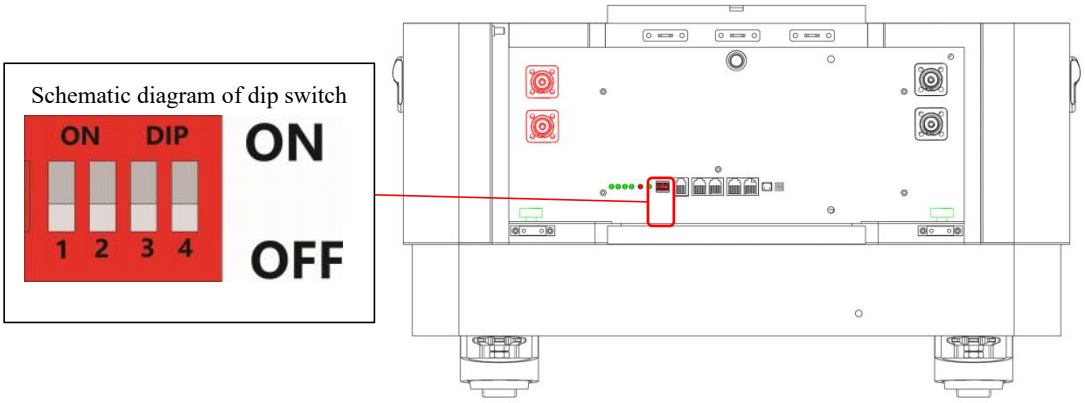
After fixing the equipment, lock the universal wheel according to the following figure:



Loosen the universal wheel　　Lock the universal wheel

4.6 Dip settings

After the installation, set the communication address of battery BMS. The dip switch for address setting is located on the left side of BMS interface on the back of battery module as shown in the following figure.



Caution

At most 8 batteries can be installed in parallel for 3 ~ 5kW products.

Dip switch is used to set the address of each BMS protection board. The code value is "1" at "ON"

position, and "0" at "OFF" position. The address of mainframe is set to "0", and the address of slave is set to "1 ~ 7".

The list of dip addresses is as follows:

Dip position				Address		Dip position				Address		Dip position				Address		Dip position				Address
1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4	
0	0	0	0	0		0	0	1	0	4		0	0	0	1	8		0	0	1	1	12
1	0	0	0	1		1	0	1	0	5		1	0	0	1	9		1	0	1	1	13
0	1	0	0	2		0	1	1	0	6		0	1	0	1	10		0	1	1	1	14
1	1	0	0	3		1	1	1	0	7		1	1	0	1	11		1	1	1	1	15

Instruction: The first battery module of LC-E2 from top to bottom is mainframe.

5 Electrical Connection

5.1 Internal wiring of equipment

Danger

All wiring operations shall be carried out by or under the guidance of professionals.

5.1.1 Communication link

Please connect the equipment with the attached communication cable.

Warning

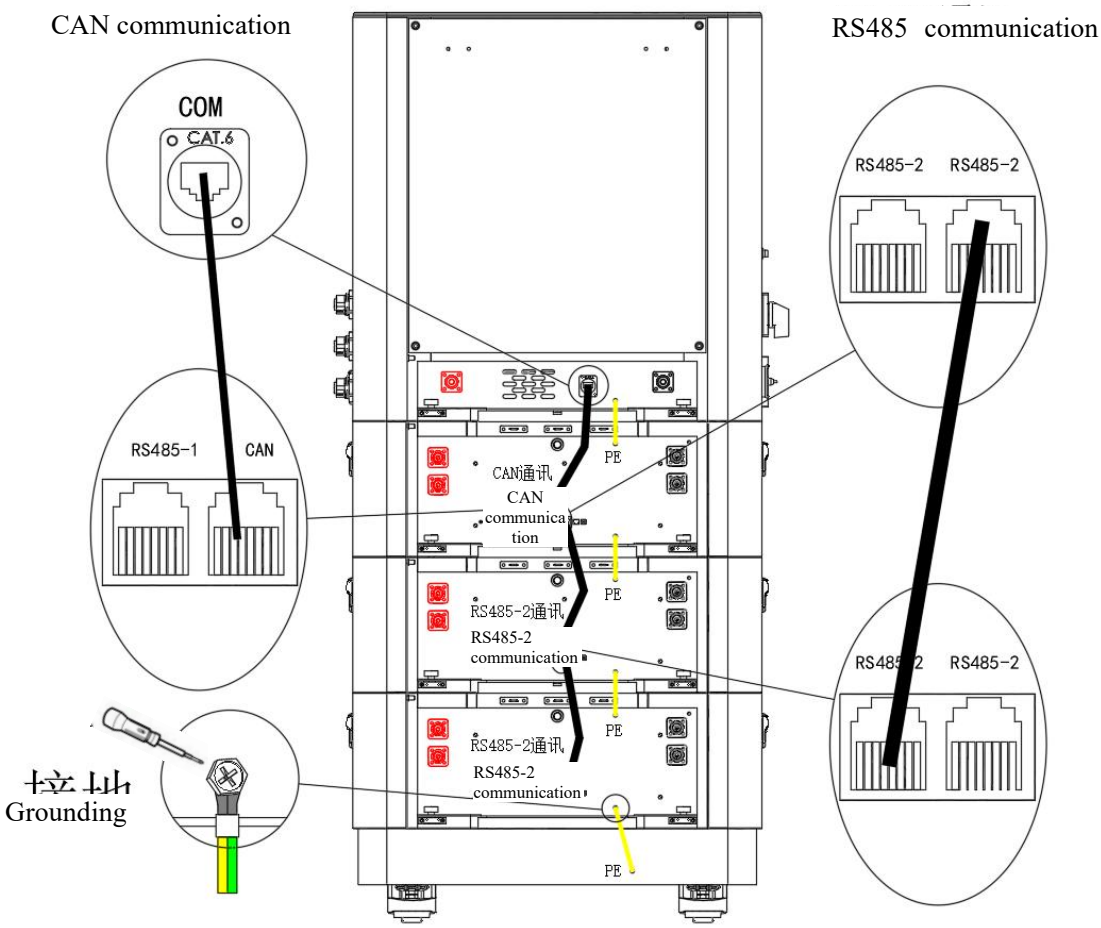
Do not use network cable as communication cable to communicate directly with PC port. Otherwise, the internal components of controller will be damaged.

Warning

RJ45 interface is only available for Lenercom products or professional operations.
The communication between battery BMS is RS485-2 interface. CAN interface of battery module (mainframe) and inverter are connected by COM interface, both of which are network cables with RJ45 connector.

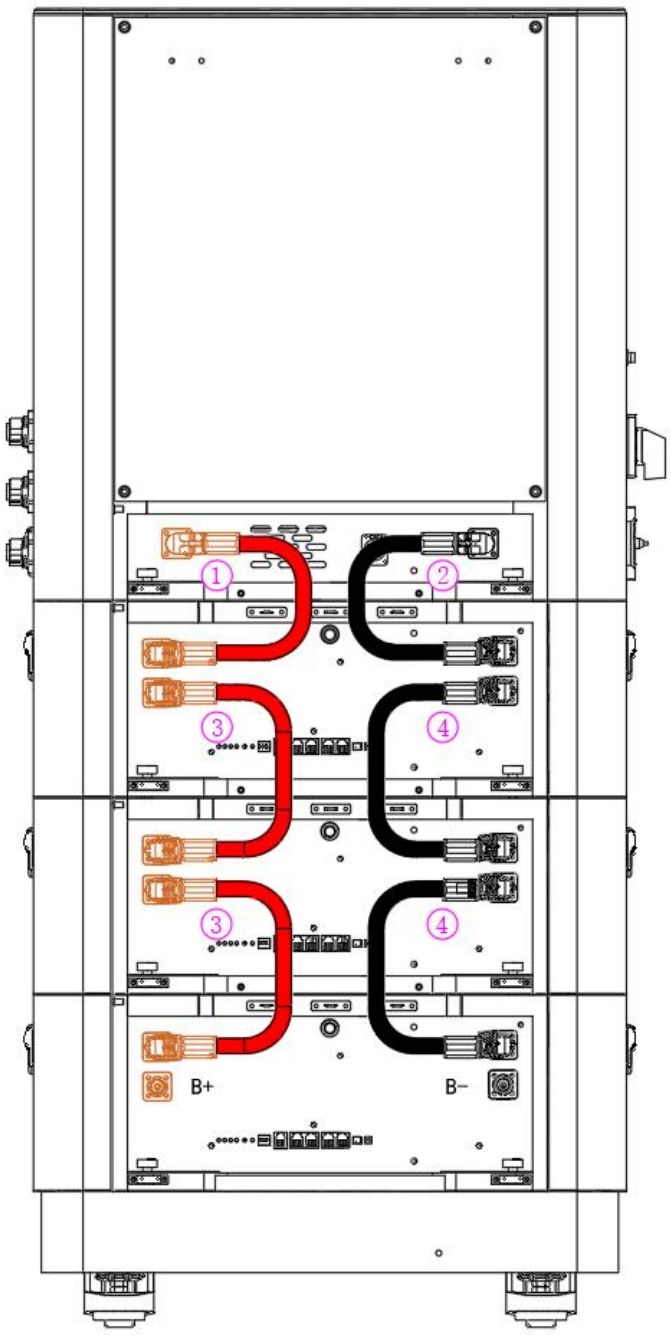
5.1.2 Grounding wire connection

Connect the grounding points of the base, battery module, and inverter in turn, and fasten the grounding wire with grounding screws.



5.1.3 Power line connection

Parallel wires of battery include anode wire and cathode wire, the connector plugs at both ends of anode wire are orange, and the connector plugs at both ends of cathode wire are black. The connector plugs at both ends of the anode and cathode wires of the inverter and the battery are of different models, and the one end with visually large size is connected with the inverter.

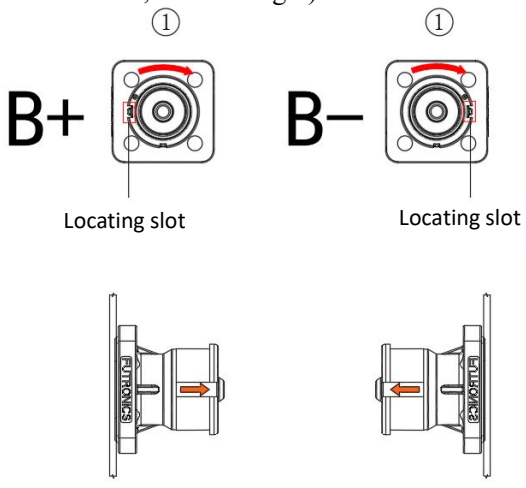


No.	Name	Illustration	Description
①	Anode of power output line (Orange)		To connect inverter "B +" and battery "B +". The large end of plug is connected with inverter.

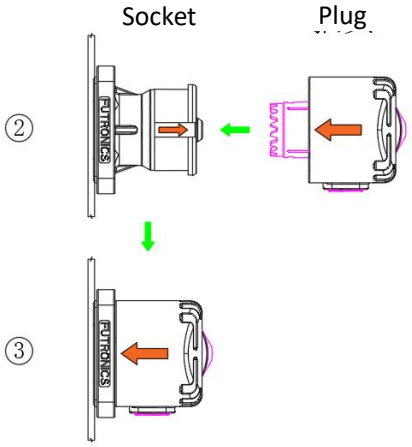
②	Cathode of power output line (Black)		To connect inverter "B-" and battery "B-". The large end of plug is connected with inverter.
③	Parallel wire of anode (Orange)		To connect "B +" of adjacent batteries The plugs at both ends are of the same model
④	Parallel wire of cathode (Black)		To connect "B -" of adjacent batteries The plugs at both ends are of the same model

Precautions for connector installation

The locating ring of battery anode/cathode socket can be rotated with two locating slots. Before the cable is connected, make the locating slot indicated by the socket arrow face outward (B + to the left, B-to the right)

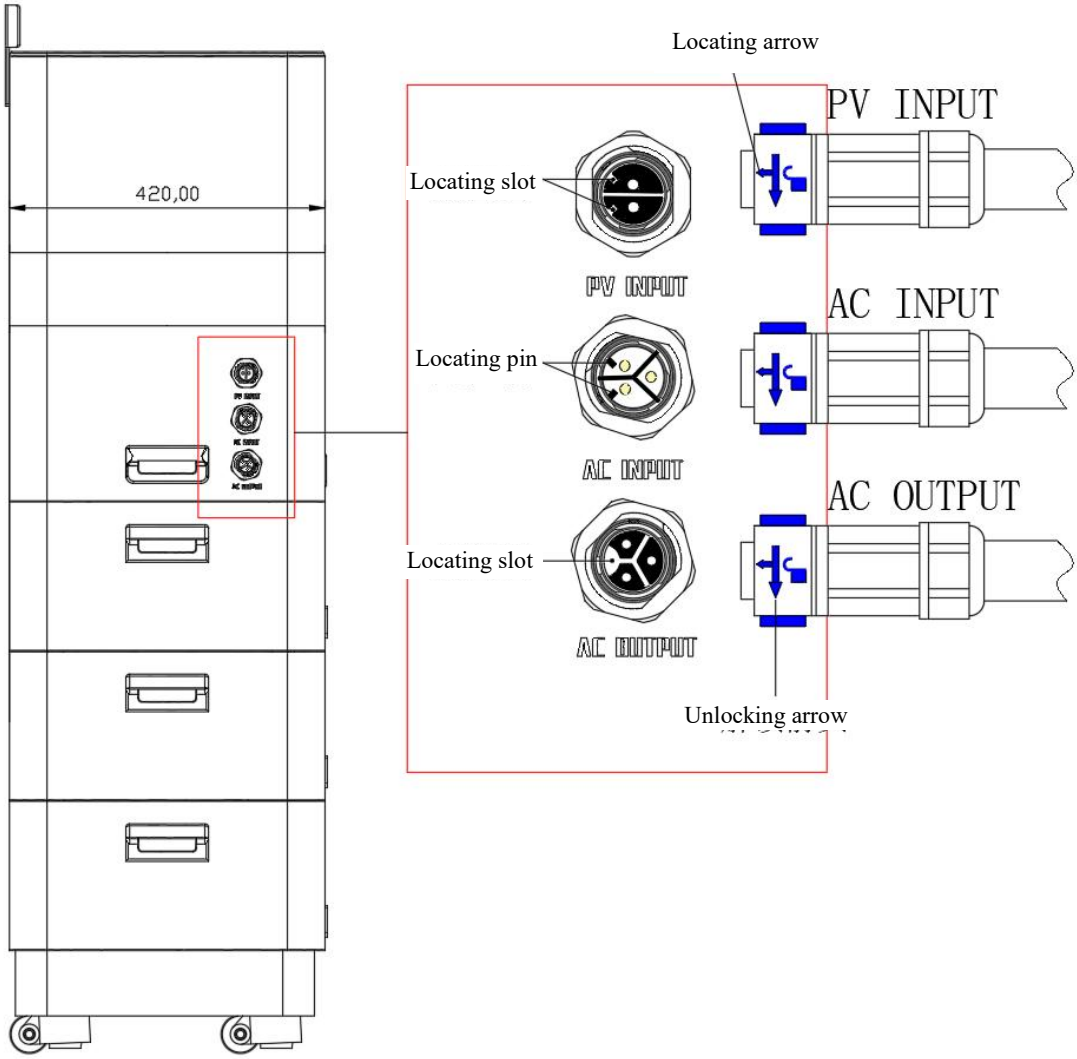


The power line plug has two locating pins, and the plug is aligned with the socket arrow. Insert the power line plug into the socket, and complete the connection after a beep sound



Power-on check of battery: after the internal cables are connected, press the on/off button of battery module mainframe for 3-6s to observe whether all parallel battery modules are powered on at the same time. If a battery module cannot be powered on, please check whether the internal wiring is correct and whether the connector is plugged in place.

5.2 External wiring of equipment



5.2.1 PV input wiring

Caution

Please turn off the battery before starting the external wiring.

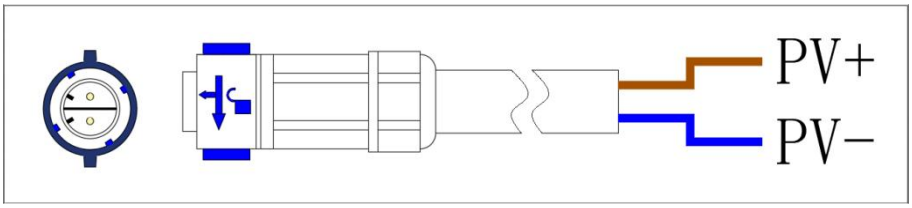
Warning

All wiring shall be performed by professionals.

Warning

It is very important for the safe and efficient operation of the system to connect PV modules with appropriate cables. To reduce the risk of injury, please use the following recommended cable sizes.

Model	Typical amperage	Cable size	Torque value
3-5kW	80A	6AWG/10mm^2	2.0 ~ 2.4Nm



Connecting wire of PV (PV INPUT)

PV +: anode wire of PV (brown)

PV -: cathode wire of PV (blue)

The open circuit voltage (V_{OC}) of PV module shall not exceed the maximum value, and the open circuit voltage of inverter PV array shall be lower than 145V.

The open circuit voltage (VOC) of PV module shall be higher than the minimum voltage of battery.

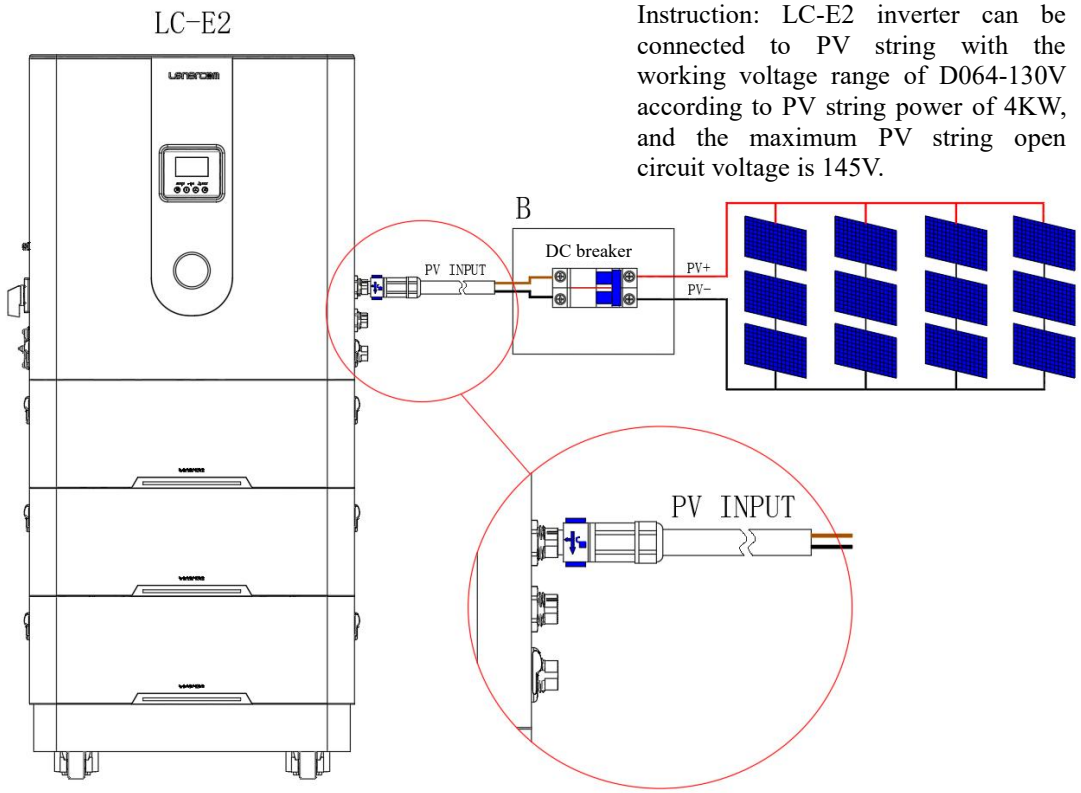
Maximum power voltage of PV module (Vmp) shall be close to or within the range of optimal VMP of inverter, (voltage at optimal operating range of MPPT is **64V-130V** for optimal performance. If one PV module cannot meet this requirement, multiple PV modules shall be connected in series. Please refer to the table below.

Solar charging mode (MPPT)			
Inverter model	3kW	4kW	5kW
Rated power	3000W	4000W	5000W
MPPT controller			
PV charge current	80A		
Open circuit voltage of PV array	145V		
MPPT voltage range of PV array	64-130V		

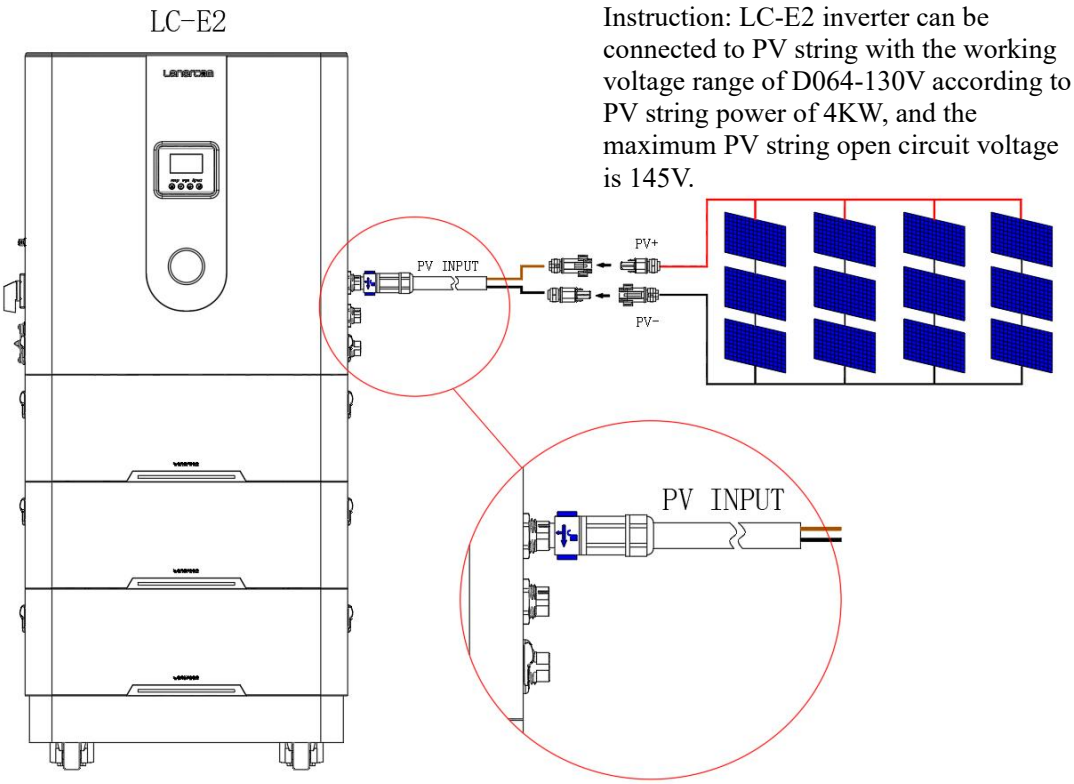
Recommended PV component configuration

Maximum Power (Pmax)	440W	Maximum number of PV modules in series: 3
Maximum power point voltage Vmpp (V)	33.72V	
Maximum power point current Impp (A)	13.05A	Maximum number of PV strings in parallel: 4
Open circuit voltage Voc (V)	41.02V	
Short circuit current Isc (A)	13.73A	

Schematic diagram of solar battery panel installation



Instruction: LC-E2 inverter can be connected to PV string with the working voltage range of D064-130V according to PV string power of 4KW, and the maximum PV string open circuit voltage is 145V.



Instruction: LC-E2 inverter can be connected to PV string with the working voltage range of D064-130V according to PV string power of 4KW, and the maximum PV string open circuit voltage is 145V.

5.2.2 AC input / output connection

Caution

Install a separate AC breaker between the inverter and AC input power supply before the connection to AC input power supply. This ensures that the inverter can be safely disconnected during maintenance and is completely protected from AC input overload. Refer to the following table for the recommended specifications of AC breaker.

Inverter power	Breaker specification
3kW	32A
4kW	40A
5kW	50A

Caution

All wiring operations shall be carried out by or under the guidance of professionals.

Warning

It is very important for the safe and efficient operation of the system to connect AC input with appropriate cables. To reduce the risk of injury, please use the following recommended cable sizes.
Recommended wire requirements for AC conductors

Model	Standard size	Torque value
3KW	12AWG/4mm^2	1.2 ~ 1.6Nm
4KW	12AWG/4mm^2	1.4 ~ 1.6Nm
5KW	12AWG/4mm^2	1.4 ~ 1.6Nm

Caution

Fool-proofing design of AC input and AC output connectors.

Caution

Always use the AC conductors with correct polarity. If the N and L wires are connected in reverse, these inverters running in parallel may cause a short circuit to the grid.

Caution

Electrical appliances such as air conditioners need at least 2-3 minutes to restart, because it shall take enough time to balance the refrigerant gas in the circuit. If there is a power shortage and it is restored in a short time, the equipment you connect may be damaged. To prevent such damage, please check with the air conditioner manufacturer whether it has delay function before installation. Otherwise, this inverter may trigger the overload function and cut off the output to

protect your equipment, but sometimes the interior of air conditioner may be damaged.

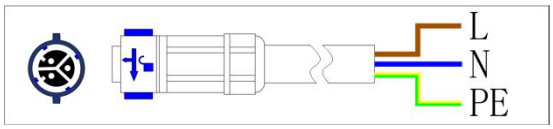
5.2.2.1 Grid input connection

Danger

Live operation may result in high voltage electric shock.

Please disconnect all incoming power of distribution box before wiring operation.

Take out the AC input plug in the accessories and connect the plug cable, and insert the plug into the corresponding socket of the equipment after ensuring that the cable is connected correctly.

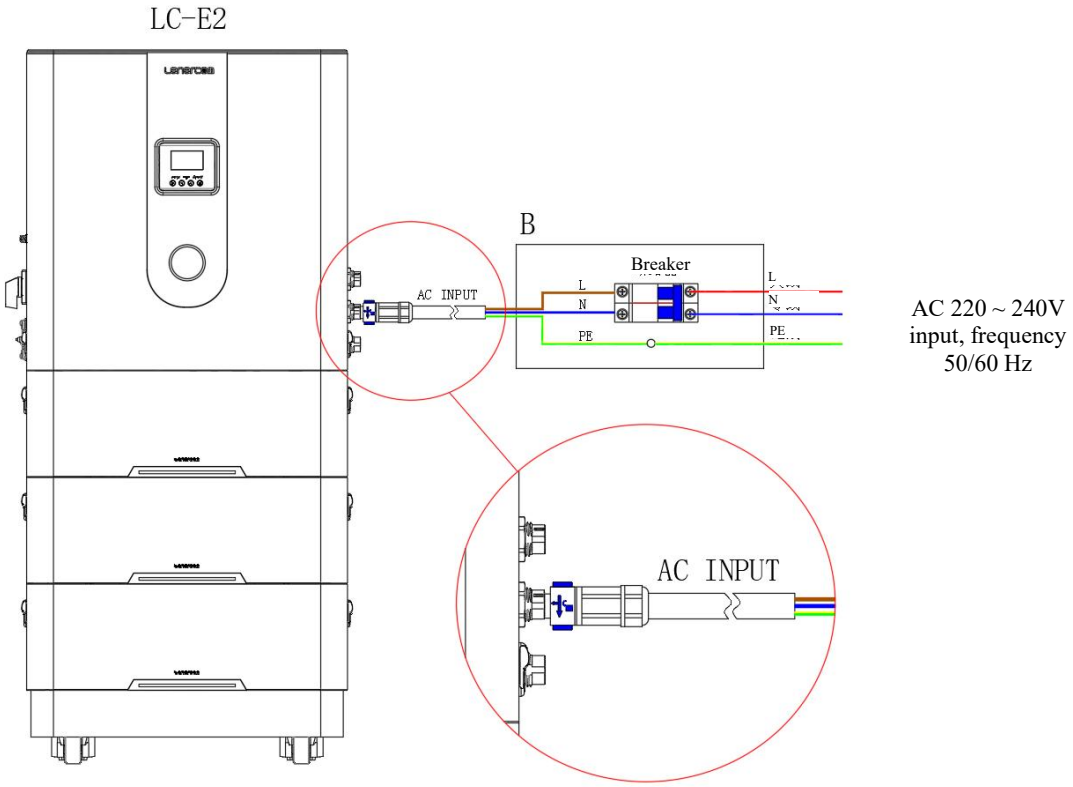


Connecting wire of grid input (AC INPUT)

L: (Live) Brown

N: (Null) Blue

PE: (Protective Earth) Yellow Green



AC 220 ~ 240V input, frequency 50/60 Hz

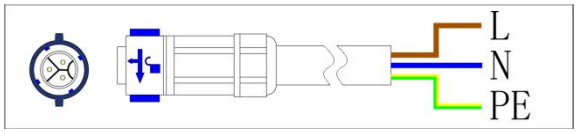
5.2.2.2 AC output connection

Danger

Live operation may result in high voltage electric shock.

Please disconnect all incoming power of distribution box before wiring operation.

Take out the AC input plug in the accessories and insert the plug into the corresponding socket.

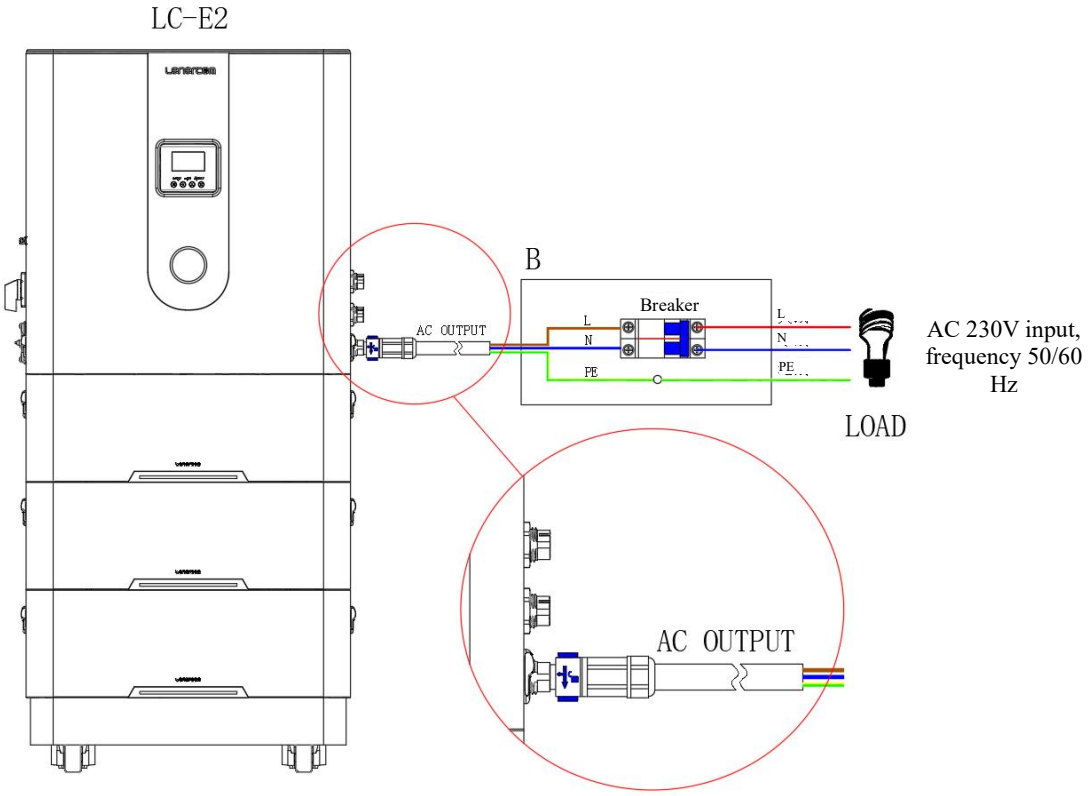


Connecting wire of AC output (AC INPUT)

L: (Live) Brown

N: (Null) Blue

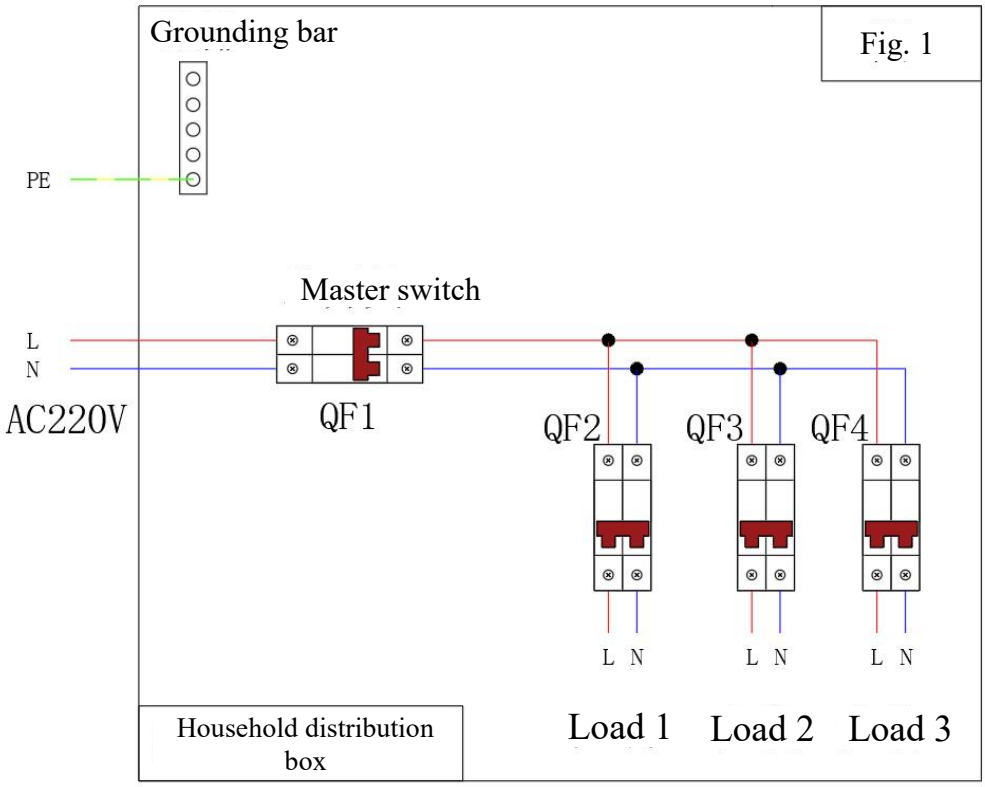
PE: (Protective Earth) Yellow Green



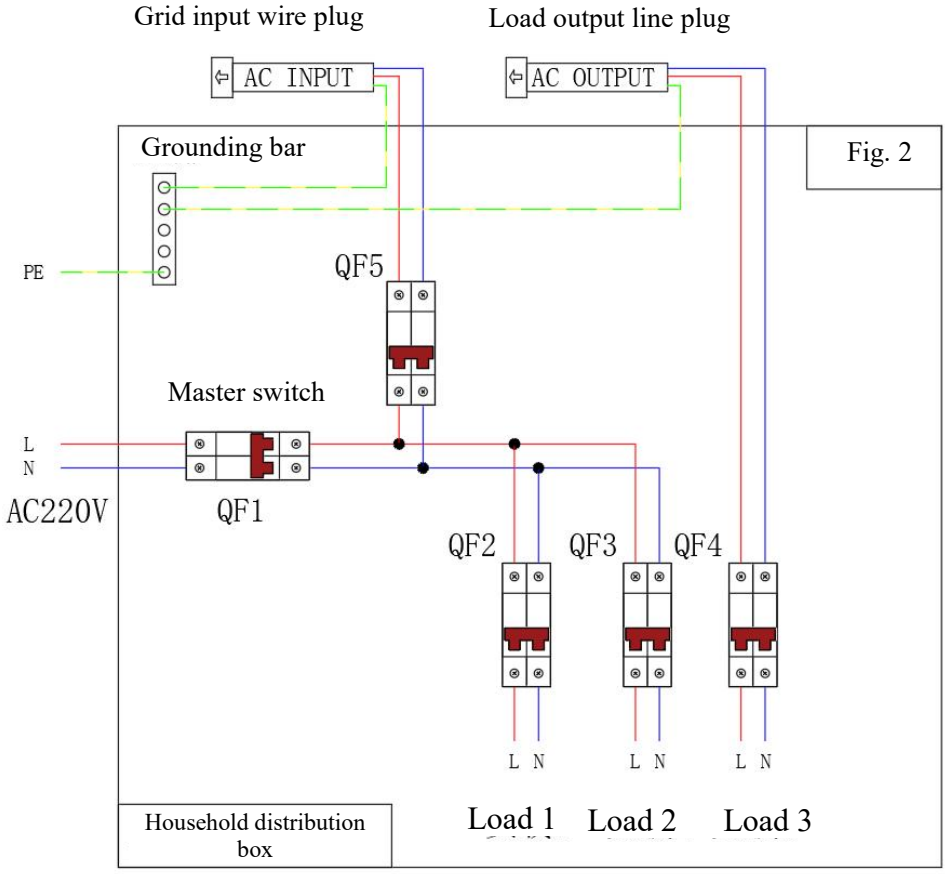
Disconnect the connecting wires between the load to be connected and the power grid or the original input power supply, and connect the null line and live line of AC output line to the upper end of load breaker and the grounding bar respectively.

5.3 Examples of grid input and off-grid load wiring

Grid power and load wiring are as shown in Figure 1/2/3 below, taking the "Load 3" wiring in the figure as an example:

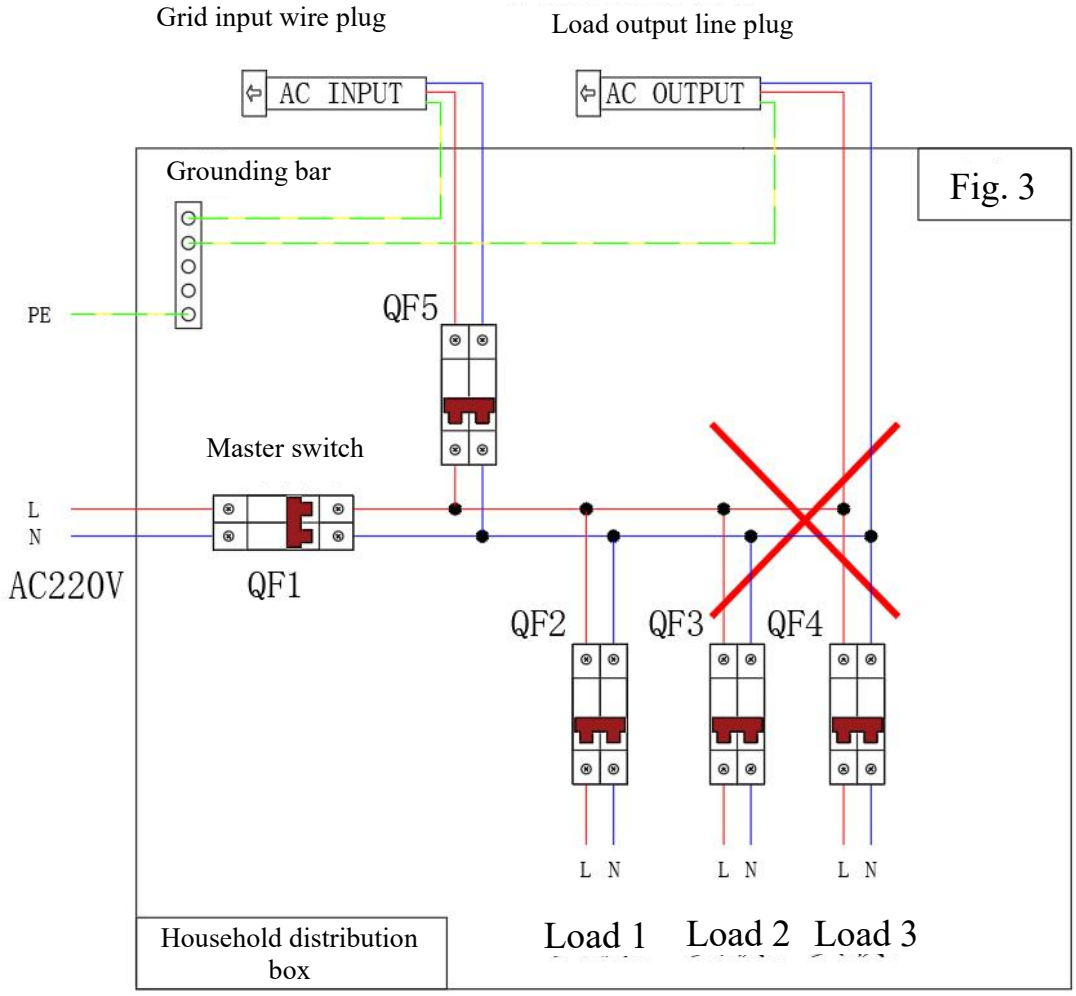


Example “Fig. 1” is the original circuit diagram before LC-E2 is connected to the household distribution box



Example “Fig. 2” is the circuit diagram after LC-E2 is connected to the "household distribution box": QF5 power supply circuit is inverter AC input power supply;
Disconnect "Load 3" from the original grid power circuit and move it to the LC-E2 inverter AC output power circuit.

5.4 Example of wrong off-grid load wiring:



Example “Fig. 3” is the wrong wiring mode, and the load shall not be connected to inverter AC output circuit before being disconnected from the original grid power circuit.

Warning

Short circuit between the inverter grid power input (AC INPUT) and AC output circuit.

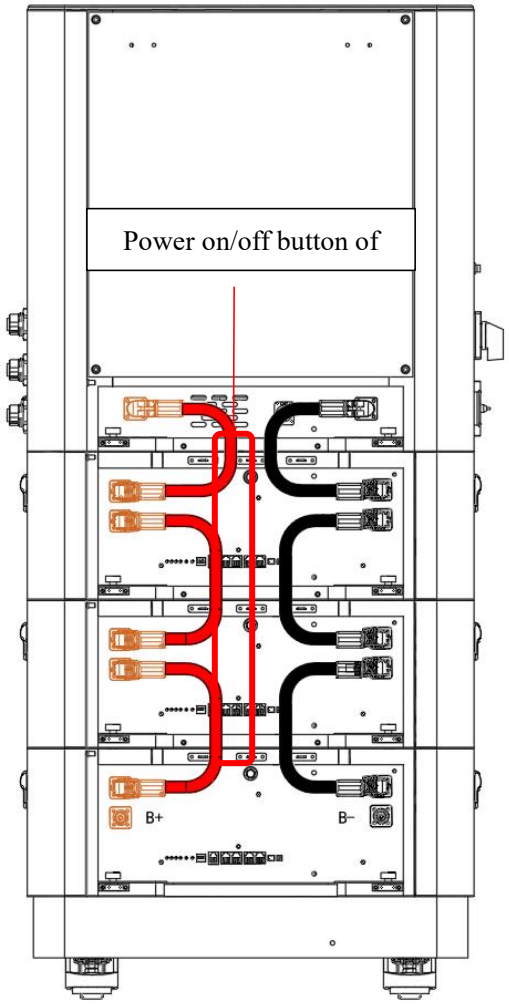
6 Power On/Off

6.1 Power on

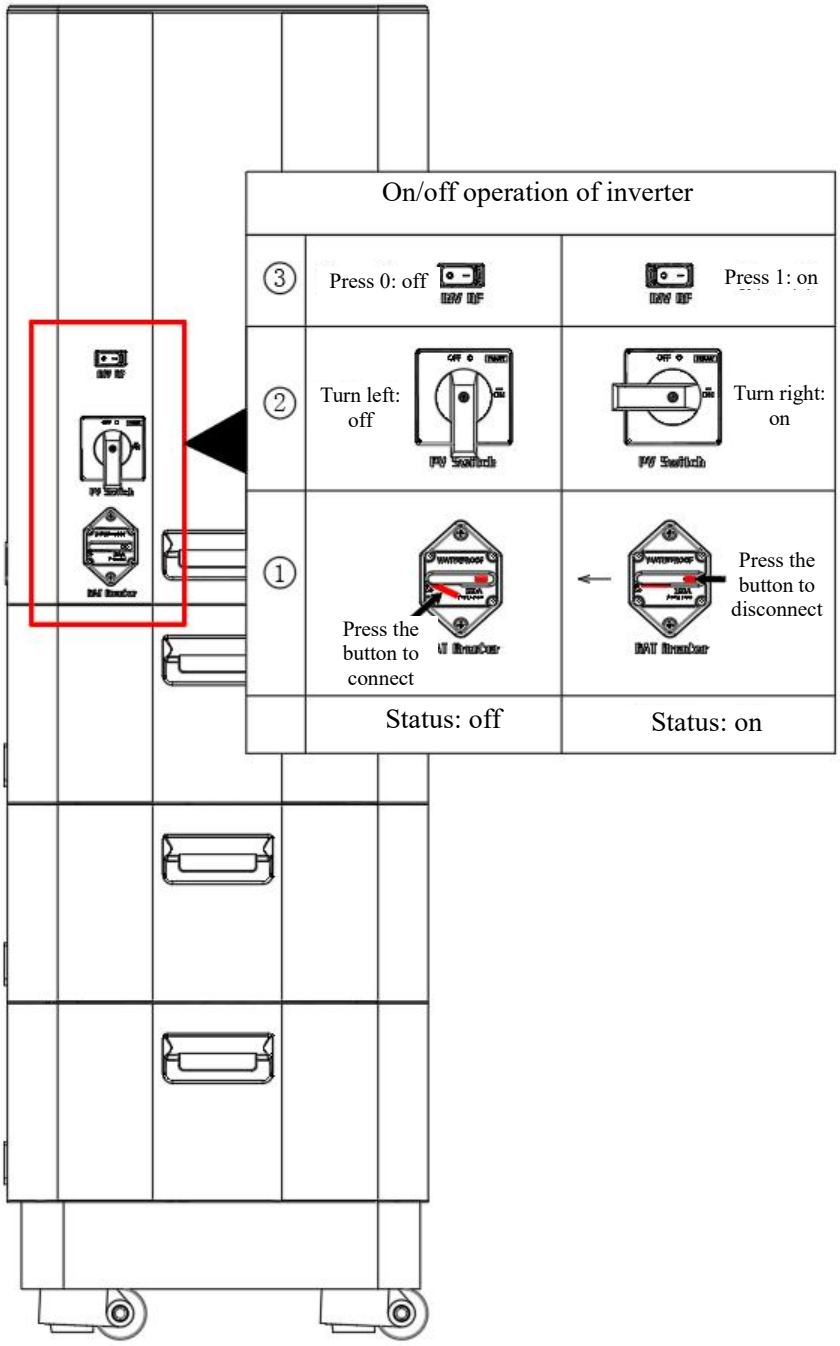
After checking that the wiring is correct, disconnect grid power input circuit and load output circuit breaker before powering on for the first time. After measuring the equipment end that it is

not electrified with multimeter at AC position, measure whether there is short circuit in household distribution box with multimeter at buzzer position. After confirming that it is correct, you can prepare to power on.

Step 1: Long press the power-on button of battery module mainframe for 3s, all battery power indicators are normally on (green), battery status lights are normally on (green), and battery is powered on;



Step 2: Turn on ① master switch of battery, ② PV switch and ③ inverter switch on the left side of equipment (from bottom to top);



Step 3: Check whether the LCD display of inverter is normally powered on, check whether the display shows the alarm code, check whether the PV and battery voltage display is correct, check whether the AC output voltage display is correct, and measure whether the load circuit voltage of distribution box is consistent with the voltage of LCD display with multimeter at AC position.

Step 4: Measure whether the grid power input of distribution box meets the requirements of input voltage and frequency of inverter with multimeter at AC position, close the grid input circuit breaker of equipment after confirmation, and check whether the grid input voltage displayed on the LCD display of inverter is correct.

Step 5: Close the load output circuit breaker, confirm that the equipment works normally with load, and complete the power-on.

6.2 Power off

Step 1: Disconnect the grid input breaker of distribution box;

Step 2: Turn off the inverter switch, PV input switch and battery switch in turn;

7 Instructions of APP

7.1 Product Introduction

Lenercom APP is a client for PV and energy storage system monitoring and control provided for LC-E2. Customers can remotely view the operating parameters of LC-E2 through APP, monitor the running status and working conditions of equipment, and remotely issue control commands, thus realizing remote management of LC-E2.

7.2 APP download

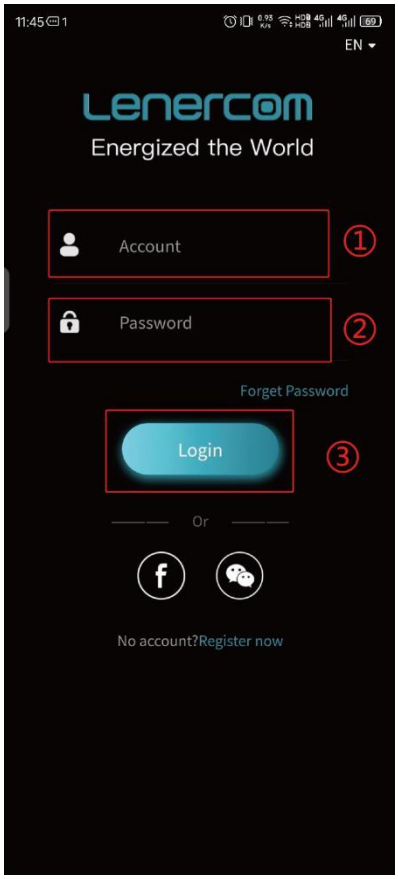
1. Overseas Android users visit Google Store and search for "Lenercom EMS" to download (or download by scanning QR code on the last page of manual).

2. IOS users visit app store and search for "Lenercom EMS" to download for installation (or download by scanning QR code on the last page of manual).

7.3 Functional description

Login

Launch the app to see the following interface. Users with existing accounts shall enter the account password to log in.



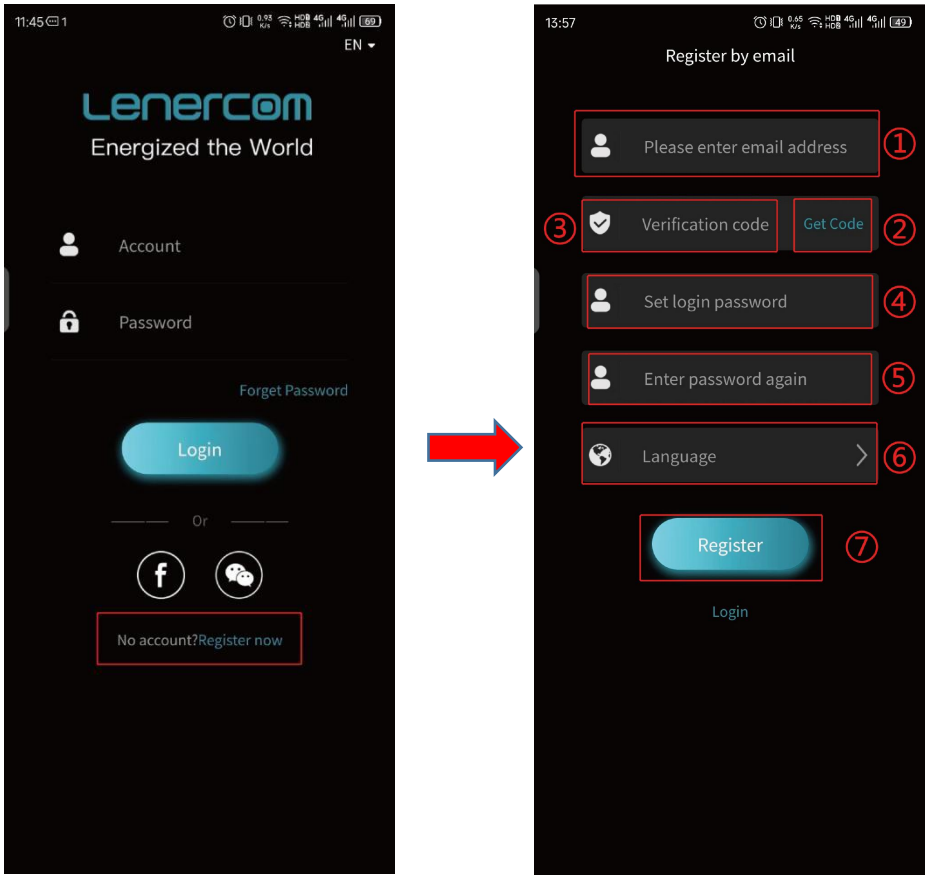
① Enter the account number (email or cell phone number)

② Enter the password

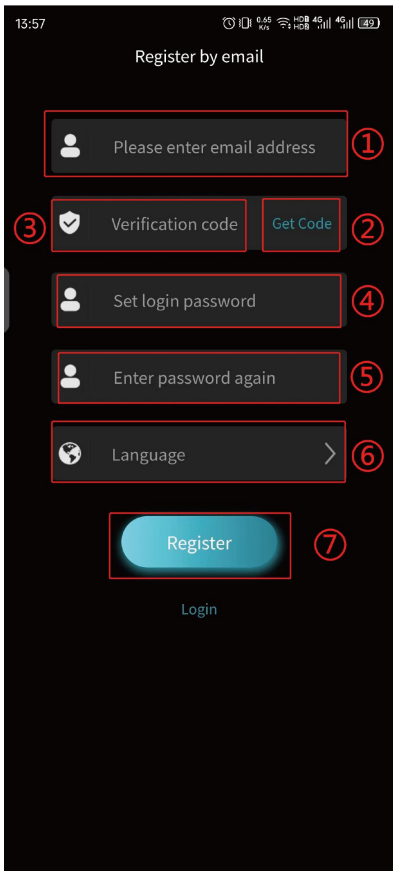
③ Click “Login”

Registration

After downloading the APP, the new user launches APP to enter the homepage, and clicks "Register Now" to enter the registration page. Two registration modes are provided: email registration or cell phone registration. After selecting the registration method, complete the registration steps according to the prompts (the country is a required option), and return to the login page to complete the login. (Cell phone registration only available in Chinese mainland)



Email registration



① Select the email registration

② Enter the email account

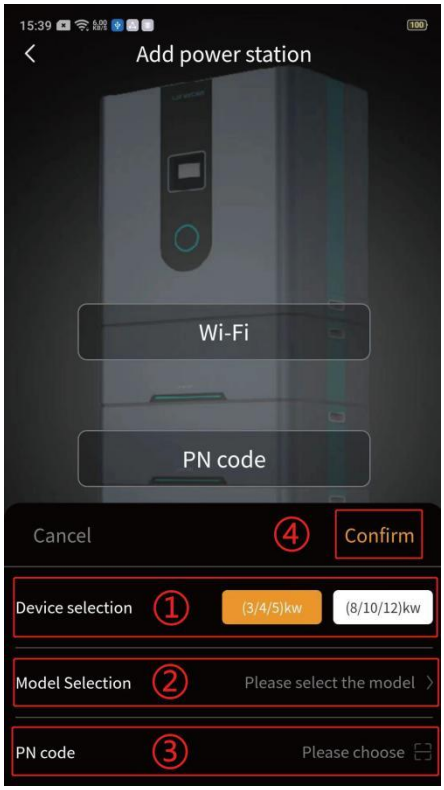
③ Click to get the verification code

④ Enter the email verification code
⑤ Set the login password
⑥ Select your country (required)
⑦ Click register, and after completing the register, return to the homepage and enter the account number and password to log in.

Addition of power station

Addition of first power station

The power station addition function can add power station without ownership and consists of two addition modes (4G RTU and WiFi) according to the communication module.

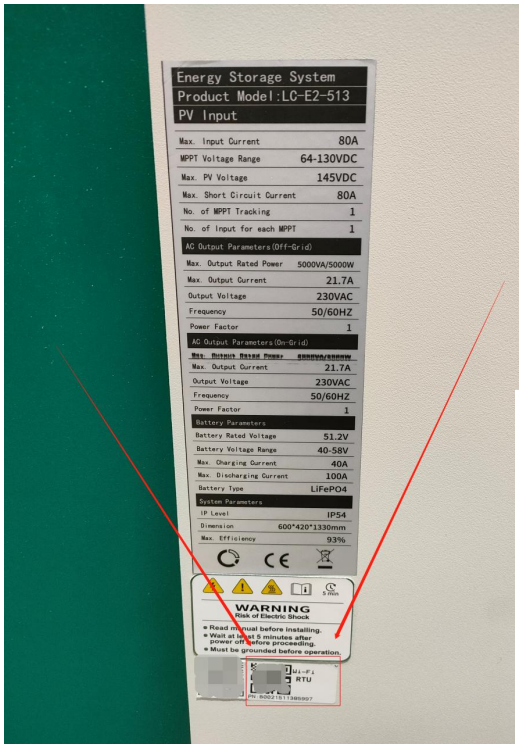


①Select the power range of the equipment to be added.

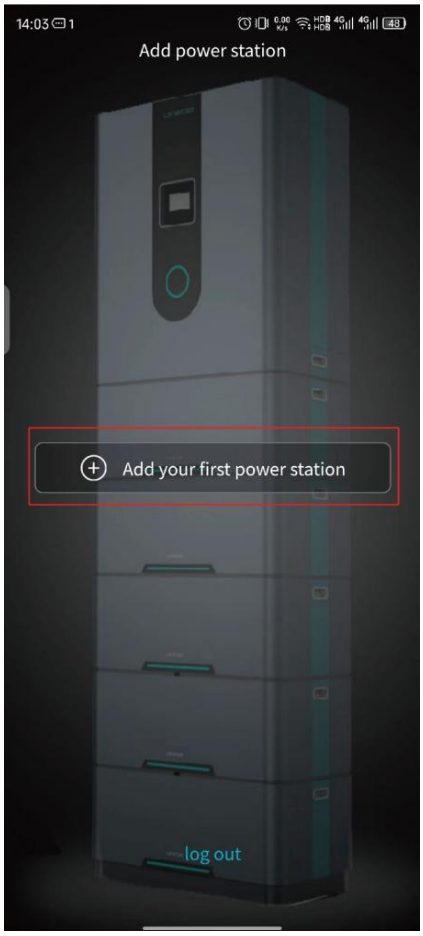
②Select the model of the equipment to be added.

③Enter sn code or click the “Scan” sign to scan QR code behind the body.

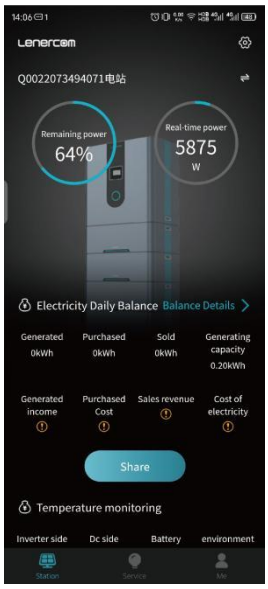
④Click “Enter” to add.

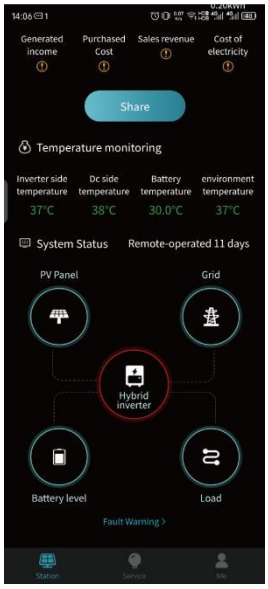


The communication module can be added by scanning the QR code or filling in the PN code which can be scanned or viewed under the inverter nameplate.

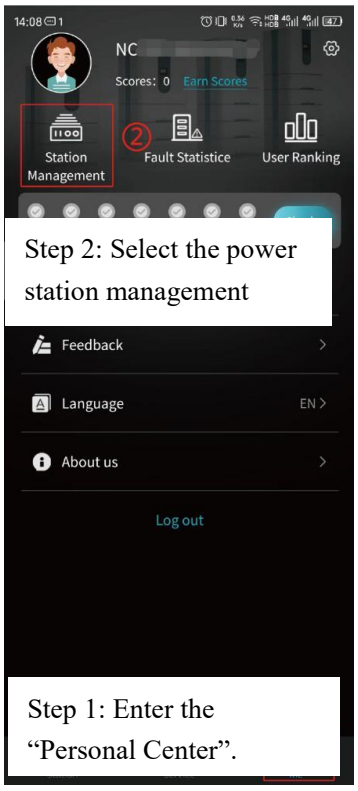


For adding a power station for the first time, APP will directly enter the prompt page of adding power station after the account is logged in, and click it to add your first power station, and complete the addition of first power station according to the prompts. See Instructions for Lenercom APP for detailed operation steps. After adding the first power station, enter the homepage as shown in the following figure. At this time, you can view the operation data of power station on APP.





Addition of multiple power stations



Step 2: Select the power station management

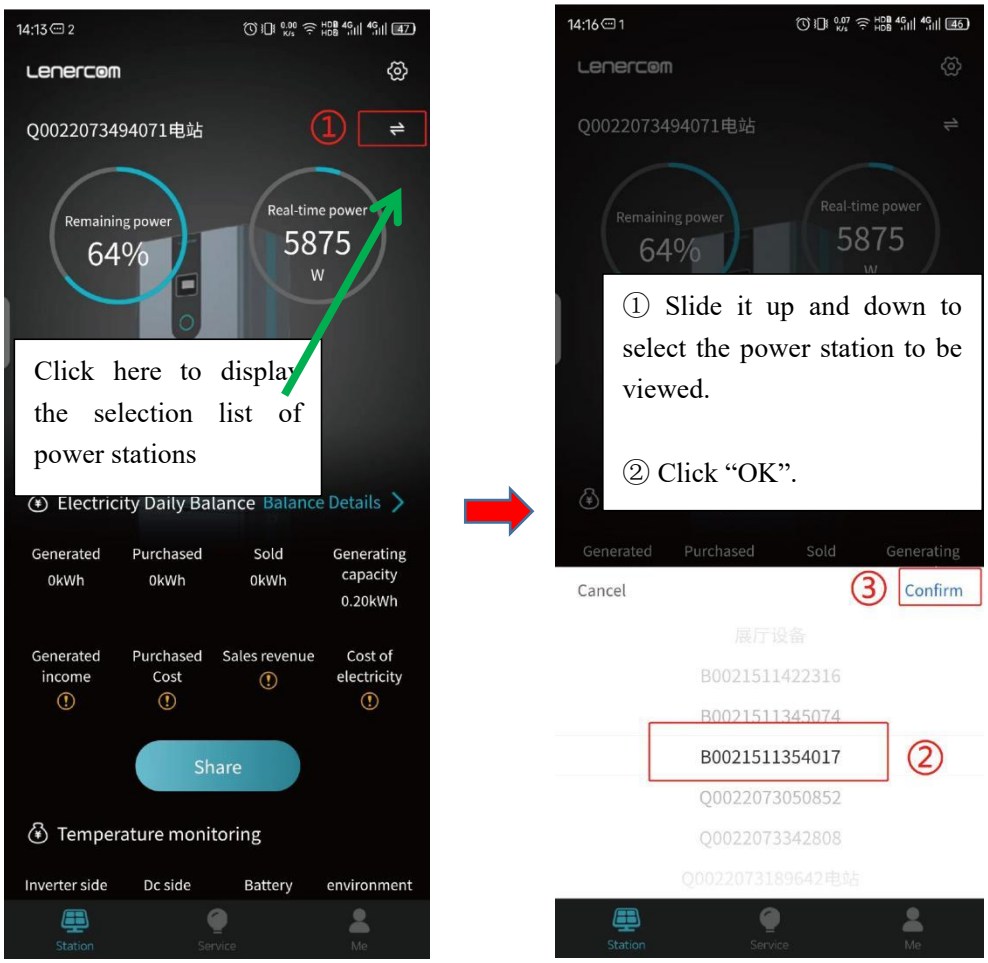
Step 1: Enter the "Personal Center".

Step 3: Click "Add Power Station" to start adding new power

Description

Multiple power stations can be added under the same account number, and one power station can only be added to one account number.

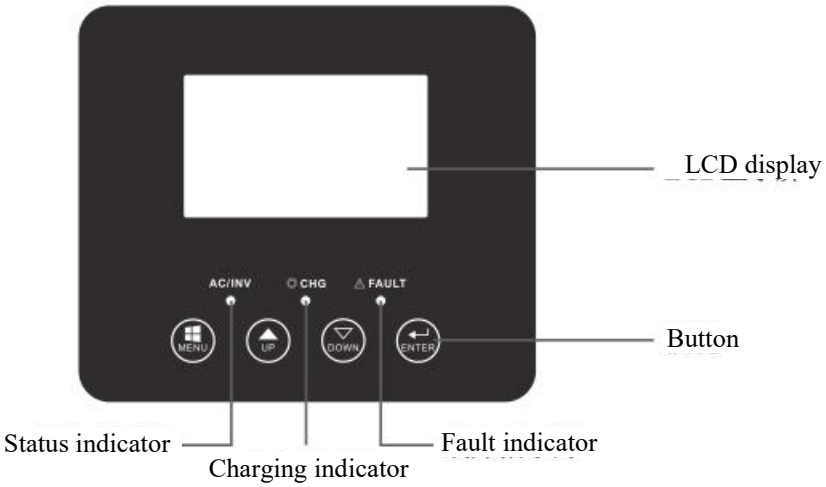
View the data of power station



8 Operating Instructions of Inverter

8.1 Instructions of display and operating panel

The operation and display panel as shown in the following figure is located on the front panel of inverter. It includes three indicators, four function keys and an LCD display which is used to indicate the running status, and input or output information.



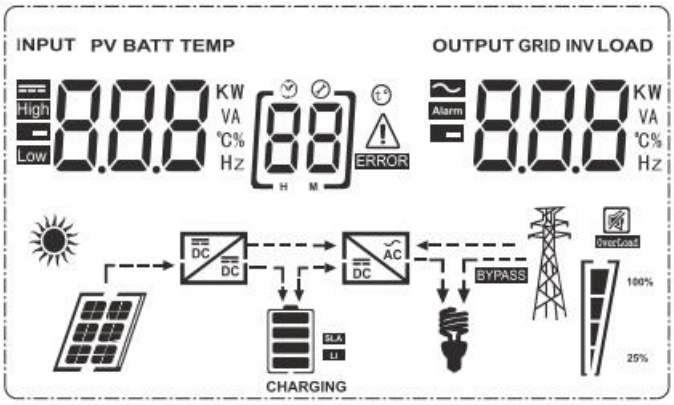
LED indicator

LED indicator			Information
AC/INV grid power/battery	Green	On	Grid power supply, online mode.
		Flash	Battery supply
✷CHG charging / discharging	Yellow	Flash	Charging
▽FAULT	Red	On	Fault
		Flash	Alarm

Function button

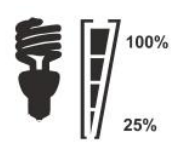
Function button	Description
Menu	Enter reset mode or enter the previous selection.
Up	Increase setting data.
Down	Decrease setting data.
Enter	Enter setup mode and confirm the selection in setup mode, enter next selection or exit reset mode.

Icons of LCD display



Icon	Function description
Input the source information and output the information	
	Alternating current
	Direct current
	Input voltage, input frequency, battery voltage and charger current, and output voltage, output frequency, load (VA), load (W) and discharge current
Configuration procedure and fault information	
	Setting procedure
	Warning and fault codes WARNING  Warning icon flashes Fault  Fault icon goes on
Battery information	
	0-24%, 25-49%, 50-74%, 75-100% battery power, and online charging state.
Battery capacity in battery mode	

Battery power		LCD
0-24%		
25-49%		
50-74%		
75-100%		

Load				
	Overload			
	0-24%, 25-49%, 50-74% and 75-100% load			
	0-24%	25-49%	50-74%	75-100%
				

Mode operation information	
	Equipment is connected to the grid
	Equipment is connected to PV panel
	Load is powered by grid
	Controller is working
	Inverter DC/AC is working
Silent mode	
	Equipment sound is turned off

8.2 Settings of inverter LCD

Long press "ENTER" button for 3s and then enter the setting mode. Press the "UP" or "DOWN" button to select the setup procedure. Then long press the "ENTER" or "MENU" button to confirm the selection and exit.

1.1. Setting

Procedure	Description	Optional	
00	Exit the setting mode	Exit 	
01	Output priority: Configure the power supply priority	(Default) 	1. Solar energy first supplies power to the load. 2. If solar energy is not enough to power all connected loads, the gap will be provided by grid. 3. Battery powers the load only when the grid is abnormal. 4. If the solar energy is abnormal, the grid charges the battery until the battery voltage reaches the 21th set point. 5. If solar energy is available, but the battery voltage is below the 20th set point,

			the grid will charge the battery until the battery voltage reaches the 20th set point to protect the battery.
			1. Solar energy first supplies power to the load. 2. If solar energy is insufficient to power all connected loads, the gap will be provided by battery. 3. The grid supplies power to the load only when the battery voltage is lower than 20th set point or when PV and battery are insufficient. 4. After the grid is unavailable or the battery voltage reaches 21th (BLU) or 20th (LBU) set point, the battery supplies power to the load. 5. If solar energy is available, but the battery voltage is below the 20th set point, the grid will charge the battery until the battery voltage reaches the 20th set point to protect the battery.
			1. Solar energy first supplies power to the load. 2. If the battery voltage is above 21th set point for 5 min and solar energy is available for 5 min, the inverter will switch to battery mode, and both solar energy and battery will power the load at the same time. 3. When the battery voltage is below 20th set point, the inverter will switch to bypass mode, the grid will only supply power to the load, and the solar energy will charge the battery at the same time.
			Grid supplies power to load first, and only when the grid is abnormal, solar energy and battery supply power to the load.
02	Range of AC input voltage	Equipment (default) 	If this option is selected, the acceptable AC input voltage will be within 90-280VAC.
		UPS	If this option is selected, the acceptable AC input voltage will be within 170-280VAC.

			
		Generator 	When the user connects the generator with the equipment, please select the generator mode.
		VDE 	Setting range of AC input voltage complies with VDE 4105 (184VAC-253VAC)
03	Output voltage		Output voltage can be set within 220VAC-240VAC (step size: 1V)
04	Output frequency	50HZ (default) 	60HZ 
05	Solar energy preferred	(Default) 	BLU: Battery preferred When the grid is normal, the power provided by solar energy charges the battery first. If the battery voltage is below 21th set point, the solar energy will never power the load or feed the power grid, but only charge the battery. If the battery voltage is higher than 21th set point, the solar energy will power the load or feed the power grid or charge the battery
			LBU: Load preferred The power provided by solar energy is supplied to the load If the battery voltage is lower than 20th set points, solar energy will never power the load or feed the power grid, but only charge the battery. If the battery voltage is higher than 20th set point, the solar energy will power the load or feed the power grid or charge the battery
06	Bypass overloading: When enabled,	Bypass disabled	Bypass enabled (default)

	if overloading occurs in battery mode, the equipment will be switched to online mode.		
07	Automatic restart after overload	Restart disabled (default) 	Restart enabled 
08	Automatic restart after overtemperature	Restart disabled (default) 	Restart enabled 
09	Setting of electricity selling mode	(Default) 	Solar or battery energy is not sold to the grid.
			Solar or battery energy is sold to the grid. In SUB mode, if the solar power is higher than the load and the battery voltage is higher than 21th (BLU) or 20th (LBU) set point, the solar energy can be sold to the grid. In SBU mode, if the battery voltage is higher than 21th (BLU) or 20th (LBU) set point, the solar energy and battery energy can be sold to the grid.
10	Priority of charger power: Set the charging priority	If the inverter is in grid or standby mode, the charger can be changed to the following priority	
		Solar energy preferred 	Solar energy charges the battery first. Grid charges the battery only when solar energy is unavailable
		Solar energy and grid (default) 	Solar energy and grid charge the battery together
		Only solar energy 	Solar charging only, grid not charging

<table>
<tr><td></td><td></td><td colspan="2">If the inverter is operating in battery mode or power-saving mode, only solar energy charges the battery. If the solar energy is sufficient, solar energy will charge the battery and power the load.</td></tr>
<tr><td rowspan="4">11</td><td rowspan="4">Maximum charge current = grid charge current + solar charge current</td><td colspan="2">MPPT solar charger charge current</td></tr>
<tr><td>60A (default)
  </td><td>Setting range is 1A to 120A. Step size is 1A.</td></tr>
<tr><td>80A (default)
  </td><td>Setting range is 1A to 140A. Step size is 1A.</td></tr>
<tr><td>100A (default)
  </td><td>Setting range is 1A to 160A. Step size is 1A.</td></tr>
<tr><td>13</td><td>Maximum grid charge current</td><td>30A (default)
  </td><td>Setting range is 1A to 60A and step size is 1A.</td></tr>
<tr><td rowspan="5">14</td><td rowspan="5">Battery type</td><td>Maintenance-free lead-acid battery (default)
  </td><td>Flooded
  </td></tr>
<tr><td>Colloidal battery
  </td><td>LEAD
  </td></tr>
<tr><td>Lithium battery
  </td><td>User-defined
  </td></tr>
<tr><td colspan="2">If "USE" or "LI" battery is selected, the specific parameters are set in options 17, 18 and 19</td></tr>
<tr><td rowspan="3">17</td><td rowspan="3">Setting of bulk charging voltage (constant charge voltage)</td><td colspan="2">Default of 24V battery: 28.2 V
  </td></tr>
<tr><td colspan="2">This procedure can be set if "USE" or "LI" battery is selected in 14th option. Setting range of 24V battery is 24.0 V to 29.2 V. Step size is 0.1V.</td></tr>
<tr><td colspan="2">Default of 48V battery: 56.4V</td></tr>
</table>

			
		This procedure can be set if "USE" or "LI" battery is selected in 14th option. Setting range of 48V battery is 48.0V to 58.4V. Step size is 0.1V.	
18	Floating charge voltage	Default of 24V battery: 27V 	
		This procedure can be set if "USE" or "LI" battery is selected in 14th option. Setting range of 24V battery is 24.0V to 28.2V. Step size is 0.1V.	
		Default of 48V battery: 54V 	
		This procedure can be set if "USE" or "LI" battery is selected in 14th option. Setting range of 48V battery is 48.0V to 58.4V. Step size is 0.1V.	
19	DC battery low-voltage cut-off setting	Default of 24V battery: 20.4V 	
		This procedure can be set if "USE" or "LI" battery is selected in 14th option. Setting range of 24V battery is 20.0V to 24.0V. Step size is 0.1V. Regardless of the percentage of connected load, DC cut-off voltage will be fixed at the set value.	
		Default of 48V battery: 40.8V 	
		This procedure can be set if "USE" or "LI" battery is selected in 14th option. 48V battery may be set in the range of 40.0 V to 48.0 V. Step size is 0.1V. Regardless of the percentage of connected load, DC cut-off voltage will be fixed at the set value.	
20	Discharging-stop voltage of battery	24V (optional)	
		24.0V (default) 	Setting range is 22.0V to 29.0V. Step size is 0.1V.
		48V (optional)	
		48.0V (default)	Setting range is 44.0V to 58.0V. Step size is 0.1V.

			
21	Maximum grid charging voltage	24V (optional)	
		27.0V (default) 	Setting range is 22.0V to 29.0V. Step size is 0.1V.
		48V (optional)	
		54.0V (default) 	Setting range is 44.0V to 58.0V. Step size is 0.1V.
22	Auto paging	(Default) 	If selected, the screen will automatically show the paging display.
			If selected, the screen will stay on the latest screen switched by user.
23	Backlight control	Backlight on 	Backlight off (default) 
24	Alarm control	Alarm on (default) 	Alarm off 
25	Buzzer alarm in case of main power supply failure	Alarm on 	Alarm off (default) 
27	Record of fault code	Record enabled (default) 	Record disabled 
28	Balance of solar power generation. When enabled, the solar energy input power	Solar energy balance enabled 	If selected, the solar input power will be automatically adjusted according to the following formula: maximum solar input power = maximum charging power of battery + connected load power, off-grid operation mode

	will be automatically adjusted according to the connected load power	Solar balance disabled (default) 	If selected, the solar input power will be the same as the maximum regardless of how many loads are connected. The maximum charging power of battery will be based on the set current in procedure 11 (Maximum PV power = Maximum charging power of battery)
29	Power-saving mode enabled/disabled	Power-saving mode disabled (default) 	If disabled, the on/off status of inverter output is not affected regardless of whether the connected load is low or high
		Power-saving mode enabled 	If enabled, the output of inverter is turned off when the connected load is fairly low or undetected.
30	Equalized charging mode	Equalized charging mode 	Equalized charging mode disabled (default) 
31	Equalized charging value of battery	Available 24V model: 28.8 V 	
		Available 48V model: 57.6V 	
		Setting range: 24.0V ~ 29.2V (24V model), 48.0V ~ 58.4V (48V model) Step size is 0.1V.	
33	Equalized charging duration	60min (default) 	Setting range is 5min to 900min. Step size is 5min.
34	Maximum equalized charging duration	120min (default) 	Setting range is 5min to 900min. Step size is 5min.
35	Equalized charging interval (days)	30 days (default) 	Setting range is 0-90 days. Step size is 1 day.

36	Start of equalized charging	Enabled 	Disabled (default) 
		If the equalized charging is enabled in procedure 30, this procedure can be set. If "Enable" is selected in this procedure, the equalized charging will be activated immediately, and LCD main page will display "E9". If "Disable" is selected, the equalized charging will be canceled until the next active equalized charging duration reaches the set value of procedure 35. At this point, "E9" is also shown	
37	Control method of BMS	Voltage (default) 	Percentage of SOC 
38	Discharging-stop SOC of battery	20% (default) 	Setting range is from 20% to 100%, and the step size is 1%.
39	Charging-stop SOC of battery	95% (default) 	Setting range is from 20% to 100%, and the step size is 1%.
40	BMS communication	(Default) 	When the communication between the inverter and BMS fails, the inverter continues to charge and discharge the battery
			When the communication between the inverter and BMS fails, the inverter stops charging and discharging the battery
Instruction: Procedures 30-36 are only applicable to lead acid battery.			

Press and hold the "Menu" button for 6s, and the equipment will enter reset mode. Press "Up" and "Down" buttons to select the procedure. Then, press "Enter" button to exit.

(Default) Reset disabled

Reset enabled

8.3 Reference code of fault

Fault code	Cause	LCD display

01	Fan failure	
02	Too high temperature of transformer	
03	Too high voltage of battery	
04	Too low voltage of battery	
05	Output short circuit	
06	Too high output voltage	
07	Overload timeout	
08	Too high voltage of bus	
09	Soft start failure of bus	
11	Failure of main relay	
21	Fault of output voltage sensor	
22	Fault of grid voltage sensor	
23	Fault of output current sensor	
24	Fault of grid current sensor	

25	Fault of load current sensor	
26	Excessive grid current	
27	Too high temperature of radiator	
31	Solar controller battery voltage level error	
32	Current sensor error of solar controller	
33	Current sensor failure of solar charger	
41	Too low voltage of grid	
42	Too high voltage of grid	
43	Too low frequency of grid	
44	Too high frequency of grid	
51	Overcurrent or shock	
52	Too low voltage of bus	
53	Soft start failure of inverter	
55	Large offset of DC output	

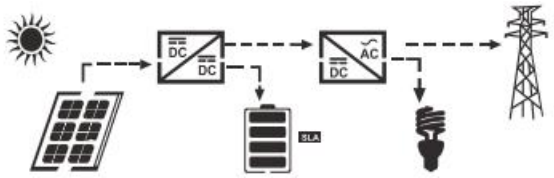
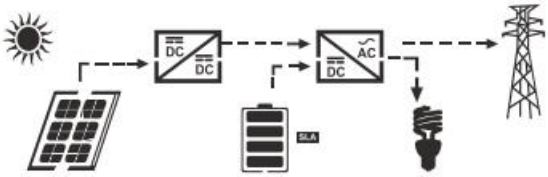
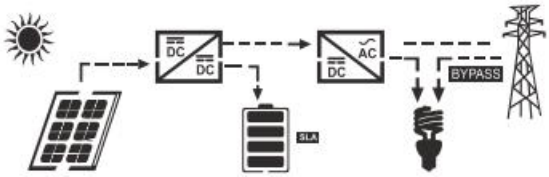
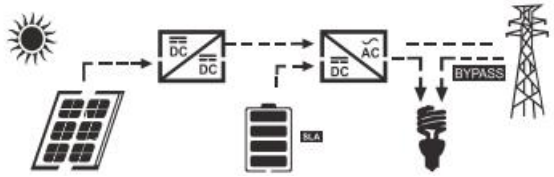
56	Battery not connected or battery voltage too low	
57	Fault of control current sensor	
58	Too low output voltage	

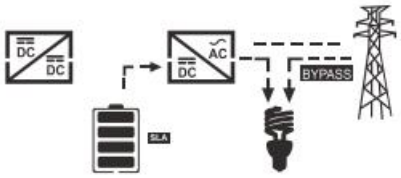
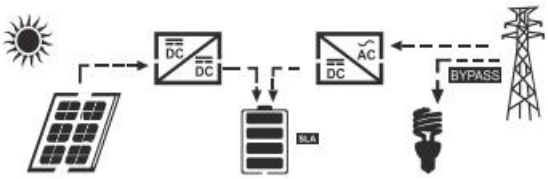
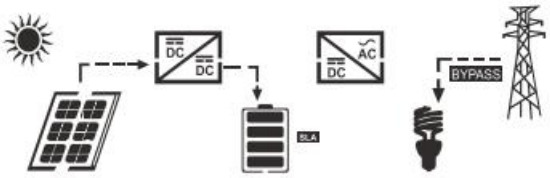
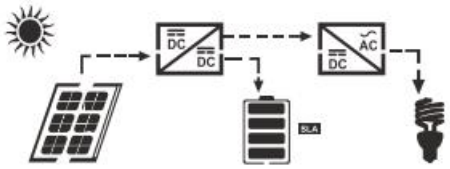
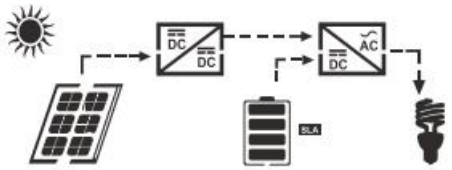
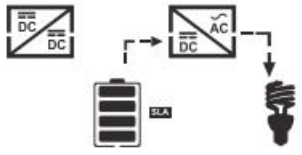
8.4 Alarm indications

Alarm code	Warnings	Icon flashes
61	Fan is locked when inverter is turned on	
62	Fan 2 is locked when inverter is turned on	
63	Battery overcharge	
64	Low battery power	
67	Overload	
70	Output power derating	
72	Charging controller failure due to the too low voltage of battery	
73	Voltage of PV array beyond the voltage range of controller	
74	Failure of solar charger due to overcurrent	
75	Solar charger overtemperature	

76	Solar charger communication error	
77	Parameter error	
90	Alarm of battery high voltage	
91	Alarm of battery undervoltage	

8.5 Instructions of working modes

Working mode	Description	LCD display
Electricity selling mode: When the solar ray is strong, PV system generates electricity, supplies power to your home and feeds excess power back to the grid.	The electric energy generated by PV is fed to the grid	PV generation power is greater than inverter power  PV generation power is less than inverter power 
The energy generated by PV is preferentially used by load, and the power is not sold: The direct current generated by PV system is converted to alternating current by the inverter. Direct supply to AC load. Any excess electricity generated will not be sold back to the grid, but stored in the battery	PV energy source charges the battery or is converted by the inverter to alternating current to power the load.	PV generation power is greater than inverter power.  PV generation power is less than inverter power.  No solar energy

<table>
<tr><td></td><td></td><td>  </td></tr>
<tr><td>Charging</td><td>PV and grid charge the battery together</td><td>  </td></tr>
<tr><td>Bypass</td><td>Due to the high temperature of inverter, short circuit of output and other faults, the inverter will turn to bypass to supply power to the load</td><td>  </td></tr>
<tr><td rowspan="3">No grid</td><td rowspan="3">Battery and PV panel provide energy to load</td><td>PV panel charges the battery and supplies power to the load
  </td></tr>
<tr><td>Battery and PV panel supply power to the load at the same time.
  </td></tr>
<tr><td>Battery supplies power to the load.
  </td></tr>
<tr><td>Stop</td><td>If you shut down the inverter by software, the inverter will stop working or fail.</td><td>  </td></tr>
</table>

8.6 Display settings

Press "Up" or "Down" buttons in turn to switch the LCD display information. Optional information is switched in the following order: Battery Voltage, Battery Current, Inverter Voltage, Inverter Current, Grid Voltage, Grid Current, Load Power, Load Current, Grid Frequency, Inverter Frequency, PV Voltage, PV Charge Power, PV Charge Output Voltage, PV Charge Current.

Optional information	LCD display
Battery voltage / DC discharge current	
Inverter output voltage / inverter output current	
Grid voltage / current	
Output load power (W)	
Grid frequency/inverter frequency	
PV voltage and power	
Battery voltage at controller terminal/charge current of controller	

9 Technical Data

9.1 Table of LC-E2 electrical parameters

Model		LC-E2-3☐☐	LC-E2-4☐☐	LC-E2-5☐☐
Inverter output	Rated power	3000W	4000W	5000W
	Instantaneous power	6000W	8000W	10000W
	Waveform	Pure sine wave		
	Rated voltage	(220V~240V) ± 5%		
	Rated current	13.0A	17.4A	21.7A
	Overload protection, duration	3300W, 10S	4400W, 10S	5500W, 10S
	Output frequency	50Hz/60Hz; automatic detection		
	THD (Linear load)	Off-grid ≤ 2%		
		Grid-connected discharge ≤ 3%		

		Grid-connected charge ≤ 3%		
	Efficiency	93%		
	Switching duration	10ms (UPS, VDE); 20ms (APL)		
	Power factor	1		
AC input	Rated power	3000W	4000W	5000W
	Rated voltage	230V		
	Available voltage range	170-280V(UPS) 90-280V(APL) 183-253V(VDE)		
	Range of frequency	50Hz/60Hz; automatic detection		
Battery	Voltage of battery	48V		
	Floating charge voltage	58V		
	Overcharge protection voltage	60V		
	Battery type	Lithium iron phosphate battery		
	Maximum charge current	140A		
	Maximum discharge current	100A		
PV & grid charging	Maximum open circuit voltage	145V		
	MPPT voltage range	64-130V		
	No-load loss	2W		
	Rated power of PV	4000W		
	Maximum input current of PV	80A		
	Maximum efficiency of PV	98%		
	Maximum charge current of grid	60A		
	Total current	140A		
	Maximum short circuit current of PV	92A		
	Maximum feedback current of PV	0A		
	Input channels of MPPT	1		
	Input channels of each MPPT	1		
Others	Design life	>10 years (25°C)		
	IP grade	IP20		
	Display	LCD		
	Working temperature	-15°C ~55°C		
	Safety regulations	IEC 62109-1&-2, IEC 62477, CE-EMC, UN38.3		

*Note: "□□" is the code of battery capacity, see Chapter 2.1 Model Description.

9.2 Table of battery module parameters

Model	LC-BL512
Battery type	Lithium iron phosphate
Capacity	5.12kWh
Rated voltage	51.2V
Maximum charge/ discharge current	40A/100A

Range of charging temperature	0℃~+55℃
Range of discharging temperature	-15℃ ~+55℃
Current-limited start	42A
Discharging overcurrent protection	100A
Communication mode	RS485/CAN
Dimensions (W/D/H)	600mm/420mm/200mm
Weight	54kg
Prompt: the discharge rate will be attenuated when the temperature is lower than 0 ° C When the temperature is lower than 0 ℃, the battery cannot be charged When the temperature is lower than -15℃, the battery cannot be discharged	

9.3 Dimensions and weight of equipment

Equipment name	Dimension (mm)	Net weight(kg)
3kW hybrid inverter (W/D/H)	600*420*600	31.9±1
4 -5kW hybrid inverter (W/D/H)	600*420*600	38.5±1
Battery module (W/D/H)	600*420*200	54±1
Base (W/D/H)	600*420*130	17.5±1

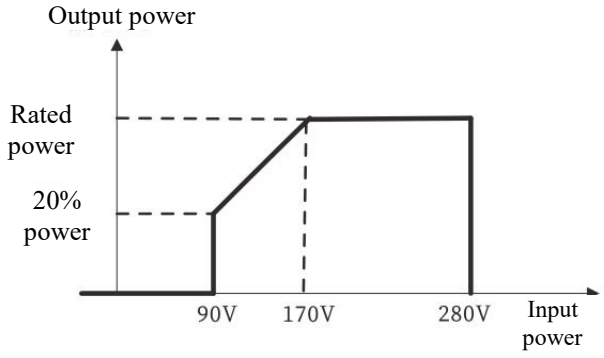
9.4 Dimensions and weight of packaging

Packaging	Dimension (mm)	Net weight (kg)
Packing carton of inverter (W/D/H)	690*450*650	10.5
Packing carton of battery module (W/D/H)	670*455*260	8
Packing carton of base (W/D/H)	660*460*170	3

10 Inverter Protection and Charging Parameters

10.1 Parameters of online mode

Inverter model	3KW-5KW
Waveform of input voltage	Sine wave (grid or generator)
Rated input voltage	230Vac
Low voltage protection value	90Vac 土 7V(APL,GEN); 170Vac 土 7V(UPS); 186Vac 土 7V(VDE)
Low voltage recovery value	100Vac 土 7V(APL,GEN);180Vac 土 7V(UPS); 196Vac 土 7V(VDE)
High voltage protection value	280Vac+7V(UPS,APL,GEN); 253Vac±7V(VDE)
High voltage recovery value	270Vac 土 7V(UPS,APL,GEN); 250Vac 土 7V(VDE)
Maximum input voltage	300Vac
Input frequency	5OHZ/60HZ(Auto detection)

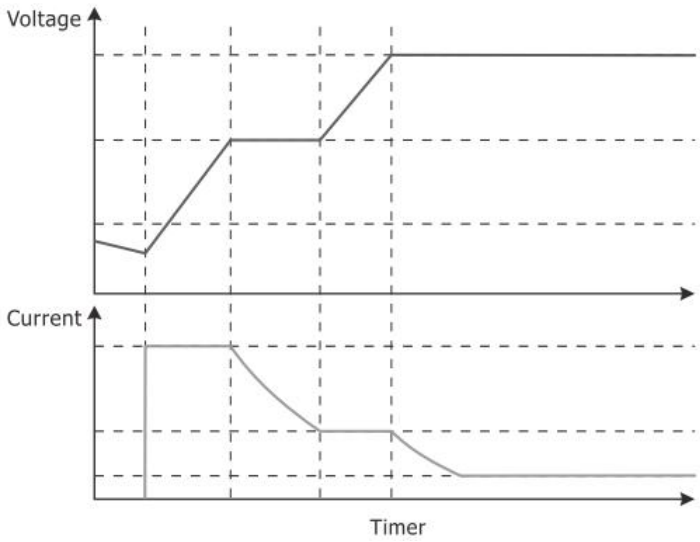
Low frequency protection value	40HZ±1HZ(UPS,APL,GEN); 47.5HZ±0.05HZ(VDE)
Low frequency recovery value	42HZ±1HZ(UPS,APL,GEN); 47.5HZ±0.05HZ(VDE)
High frequency protection value	65HZ±1HZ(UPS,APL,GEN); 51.5HZ±0.05HZ(VDE)
High frequency recovery value	63HZ±1HZ(APL,GEN,UPS); 50.05HZ±0.05HZ(VDE)
Output short circuit protection	Online mode: overcurrent protector; battery mode: output short circuit protection
Transition time	10ms typical (UPS, VDE); 20ms typical (APL)
Bypass output power derating: When the AC input volume drops to 170V (depending on mode), the output power decreases.	230V mode: 

10.2 Parameters of inverter mode

Inverter model	3-5kW
Rated output power	3000W-5000W
Waveform of output voltage	Pure sine wave
Range of output voltage	230Vac±5%
Output frequency	60Hz or 50Hz
Peak power	90%
Overload protection	5s @ > 150% load; 10s @ 110% ~ 150% load
Rated DC input voltage	48Vdc
Cold start voltage	46Vdc

10.3 Parameters of charging mode

Grid charging mode		
Inverter model		3-5kW
Charge current@ rated input voltage		1-60A
Floating charge voltage	Lithium battery	54.8Vdc
Bulk voltage (constant)	Lithium battery	57.6Vdc
Charging mode		4-Section (lithium battery)
Solar charging mode		

Inverter model		3-5kW
Rated power		3000W-5000W
MPPT controller		
Charge current of solar controller	80A	
Open circuit voltage of PV array	145Vdc max	
MPPT voltage range of PV array	64-130Vdc	
Standby power consumption	2W	
Charge curve of lithium battery		
Grid and solar charging		
Inverter model	3-5kW	
	MPPT	
Total charge current of grid and controller	140A	
Charge current of controller	80A	

11 Transportation

Basic Requirements

● LC-E2 shall be packed and shipped separately.

● Before packing and transportation, the package shall be intact and undamaged, and the product model and identification information shall be clear and complete.

● The product shall not be transported together with inflammable, explosive and other dangerous goods.

● The equipment shall be transported on the pallet with anti-dumping measures to avoid the violent vibration.

12 Storage

Basic Requirements

Before the assembly of LC-E2, the inverter, battery module and base shall be packed and stored separately. If they are not put into use immediately, the storage shall meet the following requirements:

● Do not remove the outer package of inverter, battery module and base.

● The storage temperature shall be kept at -20 ℃ ~ + 60 ℃, and the recommended temperature is 25 ℃ 5 ℃; the relative humidity shall be kept at 5% RH ~ 95% RH.

● The product shall be stored at the clean and dry place to prevent the erosion caused by dust and water vapor.

● Up to 6 layers can be stacked. The equipment shall be stacked carefully to avoid personal injury or equipment damage caused by rollover.

● During the storage, regular check shall be made (it is recommended to check once every three months). If the packages are damaged by insects and rat,
the packaging materials shall be replaced in time.

● During the storage period, the battery shall be checked regularly to supplement the power loss caused by self-discharge and keep about 50% of power (it is recommended to check once every 6 months).

● If the storage time of battery is 1 year or more, the battery shall be checked and tested by professionals before put into use.

● If the storage time of inverter is 2 years or more, the battery shall be checked and tested by professionals before put into use.

13 Battery Charging

Basic Requirements

● Battery module shall be charged by professionals.

● Battery in the same batch shall be tested and charged uniformly.

● Ambient temperature requirement: 0 ℃ ≤ T ≤ 50 ℃, it is forbidden to charge beyond this temperature range.

● Remaining battery power: It is recommended to charge lithium battery to 40% ~ 60% of capacity for storage.

13.1 Self-discharge during long-term storage

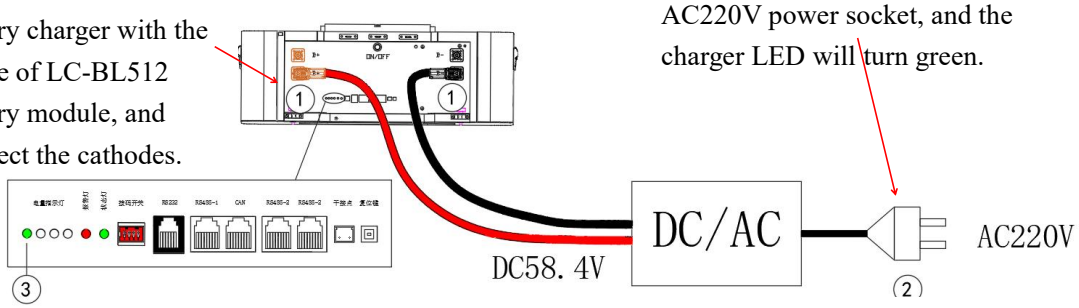
● Charge cycle: 3 ~ 6 months.

● Charge with special lithium battery charger.

● DC charging voltage of lithium battery charger shall support the voltage of charged battery module, and the maximum allowed charge voltage is 58.4 Vdc.

① Connect the DC output anode of lithium battery charger with the anode of LC-BL512 battery module, and connect the cathodes.

② Insert the AC input power plug of lithium battery charger into the AC220V power socket, and the charger LED will turn green.



③ After the BMS protection board detects the external voltage input, the BMS protection board of the battery module automatically activates, and when the LED power indicator on the left side of battery module flashes, it starts to charge the battery module, and the charger LED turns red.

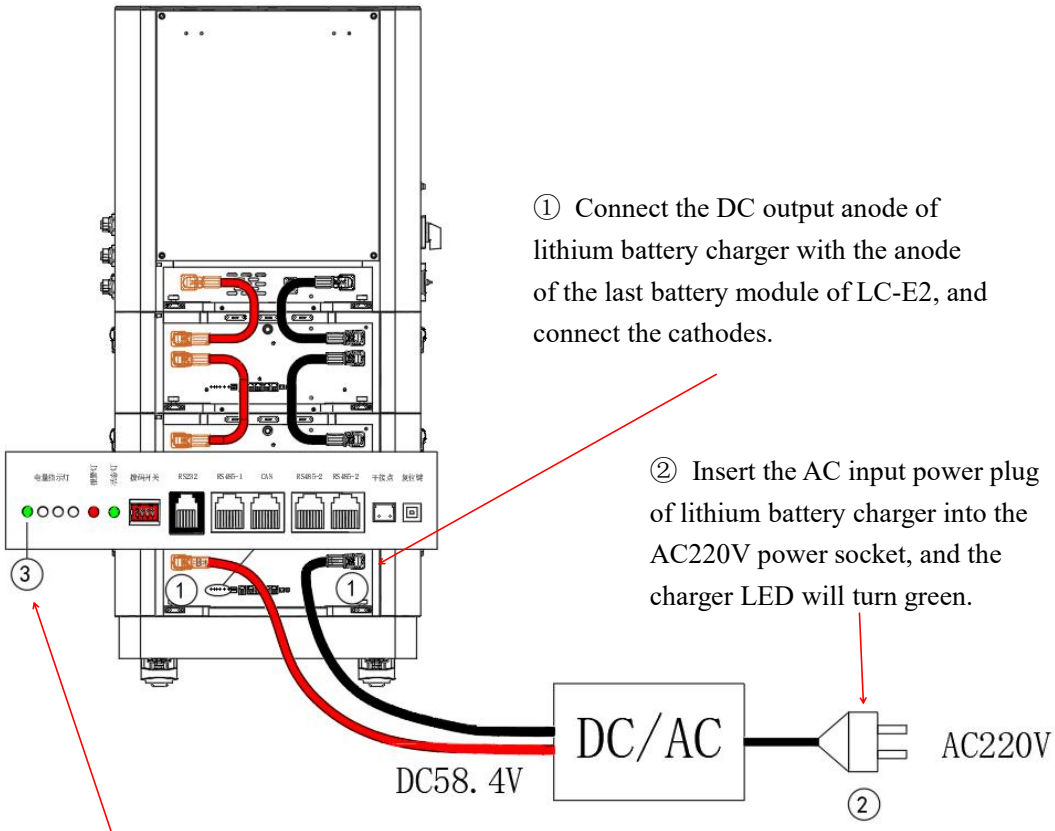
Warning

Incorrect charging will cause the battery to fail to charge or damage the battery (if the charging voltage of the charger is lower than the battery voltage, it may fail to charge the battery; if the charging voltage of the charger exceeds the upper limit of battery, it will cause the battery to overcharge or even explode).

13.2 Overdischarge protection

When LC-E2 is running on load, if the battery can't be charged for a long time after the battery is run out, LC-E2 will be powered off due to the battery undervoltage protection. At this time, it is necessary to charge the battery with the lithium battery charger and activate the battery BMS protection board.

LC-E2 is powered off due to battery undervoltage protection usually in pure off-grid application or frequent power outages of grid.



14 Troubleshooting

Fault	LCD/LED/buzzer	Description/possible reasons	Solutions
Device automatically shuts down during startup.	LCD/LED and buzzer shut down 3s after startup	Too low voltage of battery (< 1.91V/battery)	1. Re-charge the battery. 2. Replace the battery.
No response after startup	No instructions	1. Too low voltage of battery (< 1.4V/battery) 2. Reversed battery polarity	1. Check whether the battery and wires are connected well. 2. Re-charge the battery. 3. Replace the battery.
Although grid is available, it can only work in	Input voltage is displayed as 0 on LCD, and the LED	Tripping of input protector	Check whether AC breaker trips and whether AC wires are well connected.

battery mode.	flashes in green.		
	LED flashes in green	Insufficient AC power. (Tidal generator or diesel generator)	1. Check whether the AC wire is too thin or too long. 2. Check whether the generator (if used) is working properly or the input voltage range is set correctly.
	LED flashes in green	"Solar Energy preferred" is set as output source	First change the output source to grid
The internal relay is turned on and off repeatedly after startup.	LCD display and indicator flash	Disconnection of battery	Check whether the battery wire is connected well.
Buzzer continuously makes a sound, and LED turns red.	Fault No. 01	Fault of fan	Replace the fan.
	Fault No. 02	Internal temperature of inverter beyond 90 ℃.	Check whether the air flow of equipment is blocked or whether the ambient temperature is too high.
	Fault No. 03	Battery overcharge	Send it back to the maintenance center.
		Too high voltage of battery	Check whether the specifications and quantity of the battery meet the requirements.
	Fault No. 05	Output short circuit	Check whether the wires are well connected and eliminate the abnormal load.
	Fault No. 06/ 58	Output anomaly (inverter voltage below 190Vac or above 260Vac)	1. Reduce the connected load. 2. Send it back to the maintenance center.
	Fault No. 07	Overload error Inverter is overloaded by over 110%, and the time is over	Reduce the connected load by shutting down some devices.
	Fault No. 08/09/53/57	Internal component error	Send it back to the maintenance center.
	Fault No. 51	Overload or shock	Restart the equipment. If the error occurs again, please return it to the maintenance center. If the battery is well connected, please send it back to the maintenance center.
	Fault No. 52	Too low voltage of bus	
	Fault No. 55	Unbalance output voltage	

	Fault No. 56	Poor connection of battery or burnout of fuse	If the battery is well connected, please send it back to the maintenance center.

15 Warranty

15.1 Warranty Period

Hunan Lenercom Technology Co., Ltd. (hereinafter referred to as "Lenercom") provides LC-E2 ESS series products (hybrid inverter (referred to as "inverter") + battery module) with warranty services in line with warranty scope and conditions, and the warranty period is 5 years for inverter and 10 years for battery module.
The warranty period is calculated from 1) the first installation date; 2) 3 months from the delivery by Lenercom (whichever comes first).

15.2 Warranty Conditions

LC-E2 products purchased and installed through Lenercom or its authorized partners are within the warranty scope of Lenercom. New, second-hand or refurbished products purchased through other channels are not covered by this warranty.

15.3 Request for Repair

During the warranty period, if the product is operated normally according to the manual, and the product fails or cannot work, the requester can send the Customer Repair Registration Form or provide enough information to Lenercom through call/fax/e-mail to help the after-sales service team complete the warranty repair. [This article is tentative: first understand how to realize it on the computer, register on the website as recommended, and then report the fault directly].
The requester shall provide the following information or documents about the faulty product:

S/N	Content
1	Contact information of requester: including name, company name, telephone number, email, contact address and purchase outlet;
2	Information of faulty product: including product model, serial number, installation date and fault date (which can be provided by photos);
3	PV installation information (if any): including the brand, model and quantity of PV system components;
4	If conditions permit, please provide LCD error information, additional fault/error information, etc.;
5	Description of product performance before fault;
6	Provide the PN code.

If the product fails during the warranty period, Lenercom will handle it in one of the following ways:

◎Remote video technical support;
◎On-site maintenance by Lenercom or its authorized third party;
◎Send it back to Lenercom maintenance center for repair;
◎Replace it with a refurbished machine with the latest firmware (if the production of original model has been suspended and there is no stock, Lenercom has the right to provide products with equal value and equal functions for replacement).
Depending on the fault, Lenercom will arrange remote video technical support or on-site inspection to identify the cause. The requester shall ensure that the technical personnel of Lenercom and its authorized third party have the authority and time to conduct on-site inspection and protect their safety. In case that the technical personnel think that the site safety conditions are insufficient, they have the right to refuse access to the site. The requester shall be responsible for the failure of inspection due to negligence in site access conditions, time or safety.
The replaced product or component in return shipment shall be in the original packaging or equivalent packaging. The replacement product will automatically inherit the remaining warranty period. Before the shipper entrusted by Lenercom retrieves the replaced product, the requester shall be responsible for the proper preservation of the product, and the lost product during this period shall be compensated by the requester.

15.4 Faults beyond Warranty Scope

Product faults caused by the following conditions are not covered by the warranty:
◎Failure to comply with applicable safety regulations;
◎The product is damaged, lost or stolen during transportation;
◎Fault or damage caused by the causes other than product quality;
◎ Failure to comply with user manual, maintenance procedures and time intervals, incorrect use or improper storage, operation, debugging or modification of products;
◎Live installation, wiring or incorrect use of tools;
◎ Product damage caused by disassemble, repair, process, replacement, installation or commissioning by the distributor or installer not authorized or certified, or due to the negligence or recklessness, intentional behavior of any third party;
◎The service environment of product exceeds the normal temperature (0°C-40°C);
◎ Product fault or damage caused by the wrong installation position (for example, the distance from the wall can not meet the installation requirements of the manual, and the outside of box is corroded, dusted or drenched, or the product is exposed to coastal/saline or other corrosive environmental conditions);
◎Product damage due to the risk of installation location (such as the storage place of inflammable and explosive materials, high humidity area (no condensation when the humidity exceeds 85%), and long-term water accumulation area)
◎ Product damaged caused by the product accessories or consumables purchased from third parties other than Lenercom or the authorized agency;
◎Battery power loss due to normal loss and long-term idleness for more than 6 months;
◎The requester refuses to provide the information about the installation, commissioning, operation, use environment and fault;

◎Damage caused by force majeure (such as extreme weather, fire, flood, earthquake, lightning strike, lightning, war, etc., including but not limited to the above events);
◎All other environments and behaviors that may damage the normal use of equipment.

15.5 Service after Expiration of Warranty Period

For products beyond the warranty period, Lenercom can still provide related services, but will charge relevant fees to end users, including but not limited to:
◎ On-site service fee: including the travel expenses and working hours of technicians who deal with problems on site.
◎ Material cost: the cost of replacing materials (including all transportation and management expenses).
◎ Labor cost: the labor cost of technicians includes testing, repairing, maintaining, installing (hardware or software) and debugging faulty products.
◎ Logistics costs: delivery costs and other related costs, including sending faulty products from users to Lenercom or/and repaired products from Lenercom to the user's location.

15.6 Miscellaneous

The purchase invoice shall be properly kept as the basis for repairing. [Tentative]
Warranty clause is the only express guarantee clause of Lenercom for LC-E2 products without any other express, implied, oral or written warranty.
Warranty cannot be understood as a guarantee of product service life or usability of products of the same model.
During the warranty period, Lenercom shall assume the labor cost of maintenance and testing and the cost of required materials and no other expenses.
Unless otherwise provided in a separate service agreement between Lenercom and the customer, this agreement shall prevail.

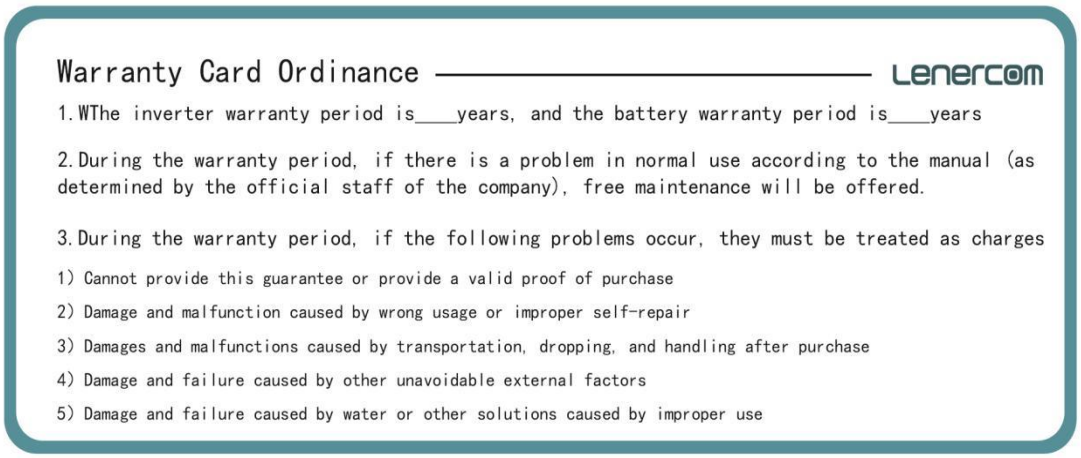
15.7 Contact Information

Hunan Lenercom Technology Co., Ltd.

Tel: +86 73188051567
E-mail: service@lenercom.com
Official website: www.lenercom.com
Address: Building B1, Lugu Innovation and Entrepreneurship Park, Yuelu District, Changsha City, Hunan Province

IOS	Google	Android

Warranty card



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