



User Manual

MODEL: Orion LV2.7
Lithium-ion Battery



CESC NEW ENERGY TECHNOLOGY CO., Ltd.

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Contents

01	Safety	02	05	System Commissioning	08
1.1	Safety Instructions	02	5.1	Inspection before Power On	08
1.2	Symbols in the Document	02	5.2	System Power On	08
1.3	Qualified Personnel	02	5.3	LED Indicators	08
1.4	Equipment Requirements	03	5.3.1	Normal State	08
1.5	Electrical Requirements	03	5.3.2	LED Indicator	08
1.6	Installation Requirements	03	5.4	Power Off	09
1.7	Environment Requirements	03			
02	Product Introduction	04	06	System Maintenance	09
2.1	Dimension and Weight	04	6.1	Routine Maintenance	09
2.2	Appearance	04	6.2	Troubleshooting	10
2.3	Performance	05			
2.4	Battery Label	05			
03	Installation Instructions	06	07	What to do in Case of an Emergency	12
3.1	Installation Contents	06	7.1	In Case of Fire	12
3.2	Tools & Instruments Prepared	06	7.2	In Case of Flooding	12
3.3	Installation Location clearance	06	7.3	In Case of Unusual Noises	12
			7.4	In Case of Unusual Smell or Smoke	12
04	Cable Connection	07			
4.1	Signal Cable Connection	07			
4.2	DC Power Cables Connection	07			

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Please read this entire document carefully before installing or using the battery system. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury or death, can damage battery, potentially rendering it inoperable. Warranty claims are invalid, if damage is caused by human error in a manner inconsistent with the installation manual's instructions.

The information included in this manual is verified by CESC to be accurate at the time of publication. However, due to the continuous improvement of products, this manual is subject to change without prior notice.

The illustrations in this manual are intended to help explain operating system configurations and installation instructions. Any confusion, please contact CESC immediately for advice and clarification. Thank you for your choice and trust.

01 Safety

1.1 Safety Instructions










For safety reasons, please read this entire manual before installing, servicing or using. Failure to comply with the instructions can result in electrical shock, serious injury, death or can damage the battery, potentially rendering it inoperable.

CAUTION

Proper disposal of batteries is required. Please refer to your local regulations for disposal requirements.

1.2 Symbols in this Document

This manual uses the following symbols to highlight essential information:

	WARNING
	CAUTION
	RISK OF ELECTRIC SHOCK
	REFER TO OPERATING INSTRUCTIONS
	DO NOT THROW AWAY
	RECYCLABLE
	HEAVY WEIGHT MAY CAUSE SERIOUS INJURIES
	GROUND (EARTH) CONNECTION
	RISK OF ELECTRIC SHOCK ENERGY STORAGE DISCHARGE TIME

1.3 Qualified Personnel

- Battery Management System (BMS) installation and maintenance must be carried out only by certified installers who possess all following qualifications and experience:
- Knowledge of the installation of electrical devices.
- Knowledge of the functional principles and operation of on-grid and off-grid systems.
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of and adherence to this manual and all safety precautions and best practices.
- Knowledge of the protective measures to minimize hazards to themselves and others.

1.4 Equipment Requirements

If the battery module seems to be damaged, pack it in its original container, and then return it to your distributor.

- Do not damage the battery module.
- Do not use water to clean electrical components inside or outside of the battery module.
- Do not stand on, lean on, or sit on the top of the battery module.
- Promptly repaint any scratches that occur during the transportation or installation of the battery module.
- Exposing a scratched battery module to the outdoors for extended periods is not advisable.

1.5 Electrical Requirements

- Ensure that the power setting matches the rated input of this power supply.
- Make sure to connect the protective grounding to prevent an electric shock before activating the power.
- Never sever the internal or external protective grounding wire, or disconnect the wiring of protective grounding terminal. Such actions can create a shock hazard, potentially causing injury.
- Do not connect the battery module directly to photo-voltaic (PV) solar wiring.
- Do not short-circuit the wiring terminals of the battery module. Short circuits can cause a fire hazard.

DANGER

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire hazards may occur.

1.6 Installation Requirements

- Understand the components and functioning of a grid-tied PV power system and relevant local standards.
- Do not install, use, or operate outdoor equipment and cables in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Wear proper personal protective equipment (PPE) during operation. If there is a probability of personal injury or equipment damage, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- Tighten screws using tools when installing the battery module.
- To prevent fire due to high temperature, ensure that the ventilation vents of the heat dissipation system are not blocked when the battery is running.
- After installing the battery module, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

DANGER

Do not work with power turned on during installation.

1.7 Environment Requirements

Operating Temperature	0°C to 54°C (32°F to 129.2°F)
Humidity	≤95%
Storage < = 6 months	Stage of Energy (SOE): 50% initial
Max. Altitude	Max. 2000m (6562 ft)

- Install the battery module in a dry and well-ventilated environment to ensure good heat dissipation.
- Install the battery module in a sheltered place or install an awning over it.
- Install the battery module at a height that prevents damage from flooding.
- Avoid exposing the battery module to direct sunlight or water.

- Avoid exposing the battery module to direct sunlight or water.
- Do not install the battery module near heating equipment.
- Do not place any flammable or explosive materials around the battery module.
- Do not subject the battery module to high pressures.
- Do not place any objects on top of the battery module.
- Do not expose the battery module to ambient temperatures above 60°C (140°F) or below -30°C (-22°F).
- Children are not allowed to enter the installation position.
- Operating or storing the battery module in temperatures outside its specified range might cause damage to the battery module.
- Ensure that there is minimal dust and dirt in the area.
- Ensure that no water sources are above or near the battery module, including downspouts, sprinklers, or faucets.
- The battery module site must be equipped with qualified fire extinguishing facilities, such as fire extinguishing sands and powder fire extinguishers.

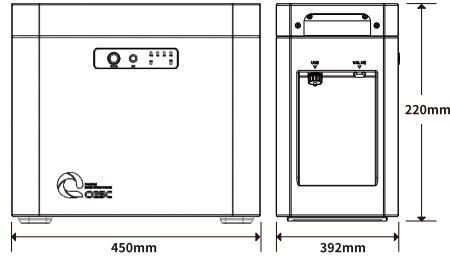
CAUTION

The recommended operating temperature ranges from 15°C to 30°C.

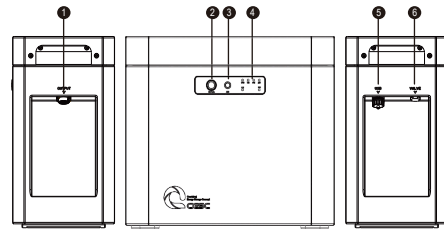
02 Product Introduction

2.1 Dimension and Weight

W*D*H: 450*392*220mm Weight: 30kg



2.2 Appearance



No.	Port Signs	Function Description
1	OUTPUT	Output cable (power on and communication)
2	Switch	Switch on/off the battery system
3	ADD	Battery system IP address (press the button) Clear hardware error (press for 3s during the error occurs)
4	LED	Indicates the battery system status, running green light, warning red light, SOC blue light
5	USB	Software updates
6	VALVE	Ventilation and protection (do not disassemble it)

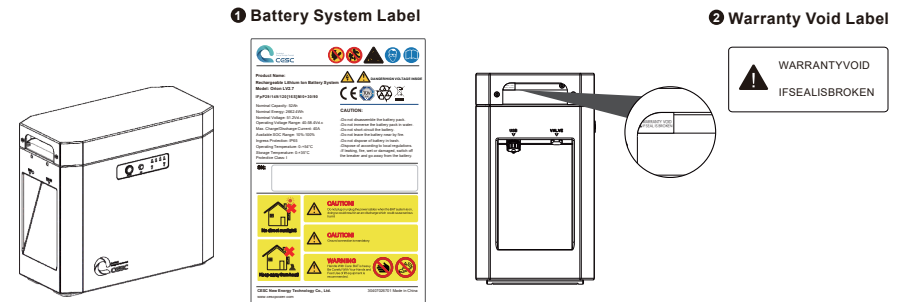
2.3 Performance

Battery System Type	Orion LV2.7
Total Energy [kWh]	2.6624
Usable Energy [kWh]	2.396
Nominal Voltage [Vd.c]	51.2
Operating Voltage Range [Vd.c]	40-58.4
Nominal Capacity [Ah]	52
Max. Charge/Discharge Current [A]	40
Depth of Discharge	90%
Cycle Life [90% DOD]	6000 cycles/10 years (90% DOD, 25°C)
Data Communication	CAN
Operating Temperature	0°C to 54°C
Enclosure Protection Rating	IP65
Humidity	≤95%
Altitude	≤2000
Certificate	IEC62619/UN38.3/EN IEC 61000
Installation Mode	Free

The testing temperature is 25°C (77°F) at the beginning of life.

* The operating temperature should be in the range of 0°C to 54°C (32°F to 129.2°F). The battery system does not work when the operating temperature is more than 55°C (131°F) or less than 0°C (32°F), whose value is only for battery module. Maximal usable energy of the AC output may be affected by the conditions, such as inverter efficiency, configuration and temperature.

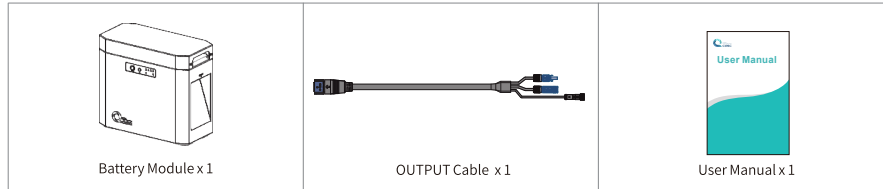
2.4 Battery Label



03 Installation Instructions

3.1 Installation Contents

The following items are included in the carton. Checking the delivery for completeness and contacting your dealer at once if something is missing.



CAUTION

The user manual is a part of the unit and should be read and kept carefully. It is recommended that the packaging should not be removed until the unit is located in the installation site.

3.2 Tools & Instruments Prepared

The following tools shall be prepared before installation:

No.	Tool	Tool Name	Remarks
1		Screwdriver	Turning screws
2		Safety gloves	Protecting the hand

WARNING

The battery modules are heavy. Wear appropriate personal protective equipment (such as gloves and safety shoes) when handling the unit. Only a sufficient number of trained movers should lift the battery modules. The use of lift equipment is recommended.

3.3 Installation Location and Clearance

Installation Location Requirements:

- There must be no highly flammable or explosive materials nearby.
- The ambient temperature should be within the range of -20°C (-4°F) to 122°F).
- The battery module must be installed on flat leveled ground that can support its weight.
- Product shall be installed indoors (e.g. in a basement or a garage) or outdoors under an eave out of direct sunlight.

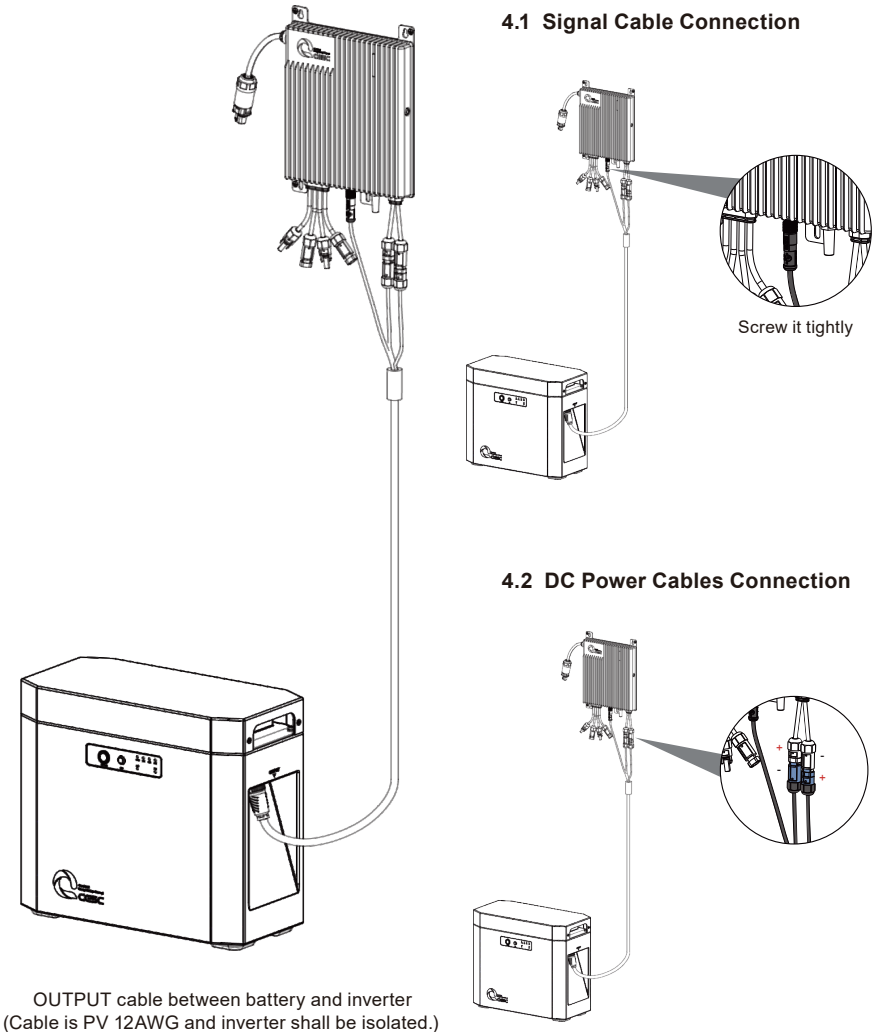
Recommendations:

- The building should be designed to withstand earthquakes.
- The area should be waterproof and properly ventilated (IP65).
- The product should be installed out of reach of children and animals.

CAUTION

If the ambient temperature is outside the operating range, the battery module will stop operating to protect itself. The optimal temperature range for the battery module to operate is from 15°C to 30°C (59°F to 86°F). Frequent exposure to harsh temperatures may deteriorate the performance and lifespan of the battery module.

04 Cable Connection



05 System Commissioning

5.1 Inspection Before Power On

Table: Checklist and Acceptance Criteria.

No.	Check Item	Acceptance Criteria
1	Battery installation	The installation is correct and reliable.
2	Cable connection	The DC power cables, signal cables and ground cables are connected correctly, and securely.
3	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

5.2 System Power On

Power on the system through the following steps:

1. Press the Switch button (SW) on the equipment.
2. The green running LED should normally be ON.
3. If it is failed to switch on the system, check that all the electrical connections are correct.
4. If the electrical connections are correct, but the system is still not able to switch on, contact our after-sale service within 48 hours.

5.3 LED Indicators

5.3.1 Normal State

LED Indicator	SOC Indicator	Description
Working: Green light blinking for 1s		SOC=0%
		0%<SOC<25%
		25%≤SOC<50%
		50%≤SOC<75%
		75%≤SOC≤100%

5.3.2 LED Indicator

NOTE

- refers to the LED indicator is off
- refers to the LED indicator is on
- refers to the LED indicator is blinking

Button Indicator	LED & SOC Indicator	Fault Description
		Over voltage
Green light blinking for 1s Red light on		Over current
		Under voltage
		Over temperature

5.4 Power off

Power off the system through the following steps:

1. Turn off the inverter.
2. Press the switch button(SW) to be OFF.
3. Ensure that all LED indicators are OFF and the system has shut down completely.
4. Disconnect all the system wiring.

WARNING

After the system powers off, residual electricity and heat may still pose risks of electric shocks and burns. Therefore, it is advisable to wear protective gloves and wait 15 minutes after the system has powered off before performing any operations on the system.

06 System Maintenance

6.1 Routine Maintenance

To ensure that the system can operate properly for a long term, it is recommended to perform routine maintenance according to the description in this chapter.

CAUTION

Power off the system before cleaning the system, connecting cables and ensuring the grounding reliability.

Check Item	Check Method	Maintenance Period
Appearance status	Check that the battery is not damaged or deformed	Once every 6 months
System running status	Check that the battery does not generate abnormal sound when it is in operation	Once every 6 months
Electrical connection	Check that cables are secured and intact, in particular, the parts touching the metallic surface are not scratched	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.

6.2 Troubleshooting

Common alarms find troubleshooting measures as follows:

No.	Warning Messages	Description	Troubleshooting
1	Over voltage		Please contact your dealer or technical support
2	Under voltage		Please contact your dealer or technical support
3	Over temperature		Wait till the temperature of cell go back to the normal state
4	Under temperature		Wait till the temperature of cell go back to the normal state
5	Over current		Please contact your dealer or technical support
6	Self-test error		Please contact your dealer or technical support
7	Precharge error		Please contact your dealer or technical support
8	Relay error		Please contact your dealer or technical support
9	Communication timeout		Please contact your dealer or technical support
10	Large differential voltage		Please contact your dealer or technical support
11	Large differential temperature		Please contact your dealer or technical support
12	Reverse connection error		Please contact your dealer or technical support

No.	Hardware Error	Description	Troubleshooting
1	Over voltage		Please contact your dealer or technical support
2	Under voltage		Please contact your dealer or technical support
3	Over temperature		Wait till the temperature of cell go back to the normal state
4	External short circuit		Please contact your dealer or technical support
5	Over current		Please contact your dealer or technical support
6	AFE error		Please contact your dealer or technical support
7	Voltage sensor error		Please contact your dealer or technical support
8	Temperature sensor error		Please contact your dealer or technical support
9	Current sensor error		Please contact your dealer or technical support

No.	Associated Address Error	Description	Troubleshooting
1	Timeout		Please contact your dealer or technical support
2	Error		Please contact your dealer or technical support

07 What to do in Case of an Emergency

In the event of any threat to health or safety, always begin with these two steps before addressing the other suggestions below:

1. Immediately contact the fire department or other relevant emergency response team.
2. Notify all people who might be affected and ensure that they can evacuate the area.

WARNING

Only perform the suggested actions below if it is safe to do so.

7.1 In Case of a Fire

The battery module may catch fire when heated about 150°C.

1. Press the switch button (SW) to be OFF.
2. Turn off the breaker to the inverter.
3. Acceptable fire extinguisher types are CO2 and ABC.

7.2 In Case of Flooding

1. Stay out of the water if any part of the battery module or any wiring is submerged.
2. Press the switch button (SW) to be OFF.
3. Turn off the breaker to the inverter.
4. If possible, protect the system by finding and stopping the source of the water, and pumping water away.
5. Let the area dry completely before use.

7.3 In Case of Unusual Noises

1. Press the switch button (SW) to be OFF.
2. Turn off the breaker to the inverter.
3. Ensure that nothing is inside the case, then restart the system and if there are still unusual noises, please contact your dealer or technical support.

7.4 In Case of Unusual Smell or Smoke

1. Please ensure your safety first, then contact your dealer or fire department based on the actual situation to move to the next step.
2. Press the Switch button (SW) to be OFF.
3. Turn off the breaker to the inverter.
4. Ensure nothing is in contact with the battery system.