

# Technical Document

Model: Honor ES RY-5/10/15/20-S1

Name: Product Specifications

NO. :

Version: VB

Date: 2022-03-30

Page: 18pages(cover included)

Draftsman	Verify	Standardization	Appovement	Customer
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Version Update Record

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Ref.	Version Updated	Reviser	Description	Date
1	VA	Yu Wang	First draft	2022-03-30
2	VB	Chuanyin He	Product picture and header changed, etc.	2022-05-18

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# 1 Content

This article mainly describes the detailed technical requirements of stacked low-voltage series energy storage products, and defines various interface definitions and specifications of the products, which are applicable to the design, production, testing, procurement and other links of the system products.

## 2 Product Introduction

This series of energy storage systems includes a control module and a battery module, of which the battery module uses a lithium iron phosphate battery. The rated output voltage of the system is 51.2V, and the capacity of a single battery module is 5kWh, which supports modular installation.

- A single energy storage system consists of a control box module and multiple battery modules, and supports up to 4 battery modules in parallel.
- The system can be used with inverters to store and release power according to the requirements of the inverter management system.
- The system supports parallel connection of up to 3 clusters, and the capacity can be expanded to 60kWh
- The battery management system (BMS) provides data collection, status monitoring and control to ensure the safe and reliable operation of the system.
- IP55 protection design, support outdoor use.

## 3 Technical performance indicators

### 3.1 System specifications

Table 3-1

Item	Parameters								Remark
	Honor	ES	Honor	ES	Honor	ES	Honor	ES	
Model	R	Y-5-S1	R	Y-10-S1	R	Y-15-S1	R	Y-20-S1	
Parallel NO	1		2		3		4		
Rated Capacity	5kWh		10kWh		15kWh		20kWh		
Rated charge and discharge current	50A		100A		150A		200A		
Maximum charge/discharge current	100A		180A		200A		200A		
Size	573*597*189mm		573*912*189m		573*1227*189m		573*1542*189m		W*H*D
Weight	65kg		115kg		165kg		215kg		
Rated Voltage	51.2V								
Operating voltage range	46.4V~55.2V								
Communication	CAN/RS485/WiFi								

Protection function	Charge overvoltage, discharge under-voltage, overcurrent, over-temperature, short circuit protection, etc.	
Cycle life	6000 times (25°C, 0.5C/0.5C, 90%DOD, 70%EOL)	
Scalable	max 3 Parallel	
Protection class	IP55	
Working temperature	Charging: [-10,50]°C	
	Discharging: [-20,50]°C	
Working environment humidity	10%~95%RH	
Working altitude	<4000m	Derating over 2000m
Certifications	UN38.3,IEC62619,CE, UL1973,.FCC,UL9540,UL9540A	

### 3.2 Battery module specifications

Table 3-2

Item	Parameters	Remark
Model	GCLB051100P03	
Cell Type	LFP	
Cell model	SBP-01-1000	
Rated Voltage	51.2V	
Group method	16S1P	
Rated Capacity	100Ah	
Rated Energy	5.12kWh	
Operating voltage range	46.4V~55.2V	
Rated charge and discharge current	50A	
Maximum charge and discharge current	100A	
Standard charging method	Constant current and voltage limiting (constant voltage point: 55.2V, stop charging current 5A)	Long-term floating charge is not recommended
Size(mm)	573mm*347mm *189mm	W*H*D
Weight(kg)	<50kg	
Internal resistance	<30mΩ	
Cooling method	Natural heat dissipation	
Working temperature	Charging: [-10,50]°C	

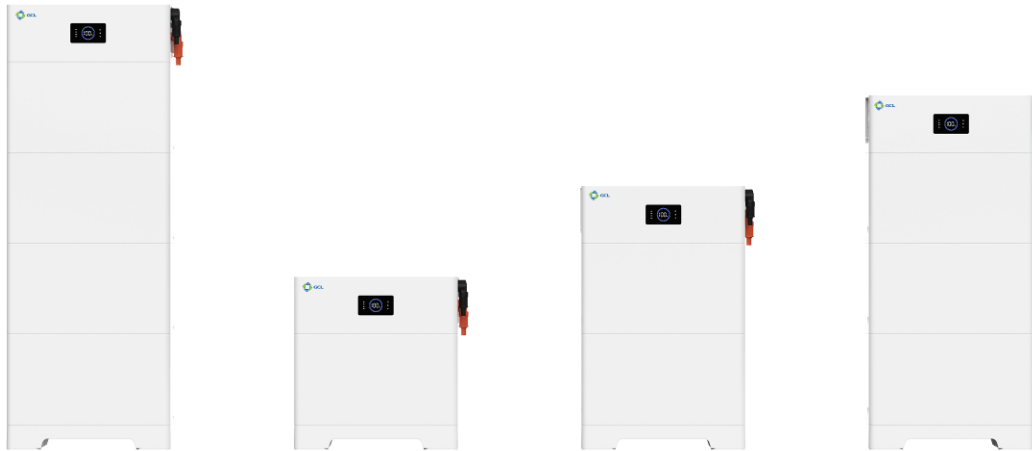
	Discharging: [-20,50]°C	
Working environment humidity	10%~95%RH	
Storage temperature	-10°C~35°C	
Protection Class	IP55	
Certifications	UN38.3,UL1973,CE,FCC,IEC62619,UL9540A	

## 4 System Description

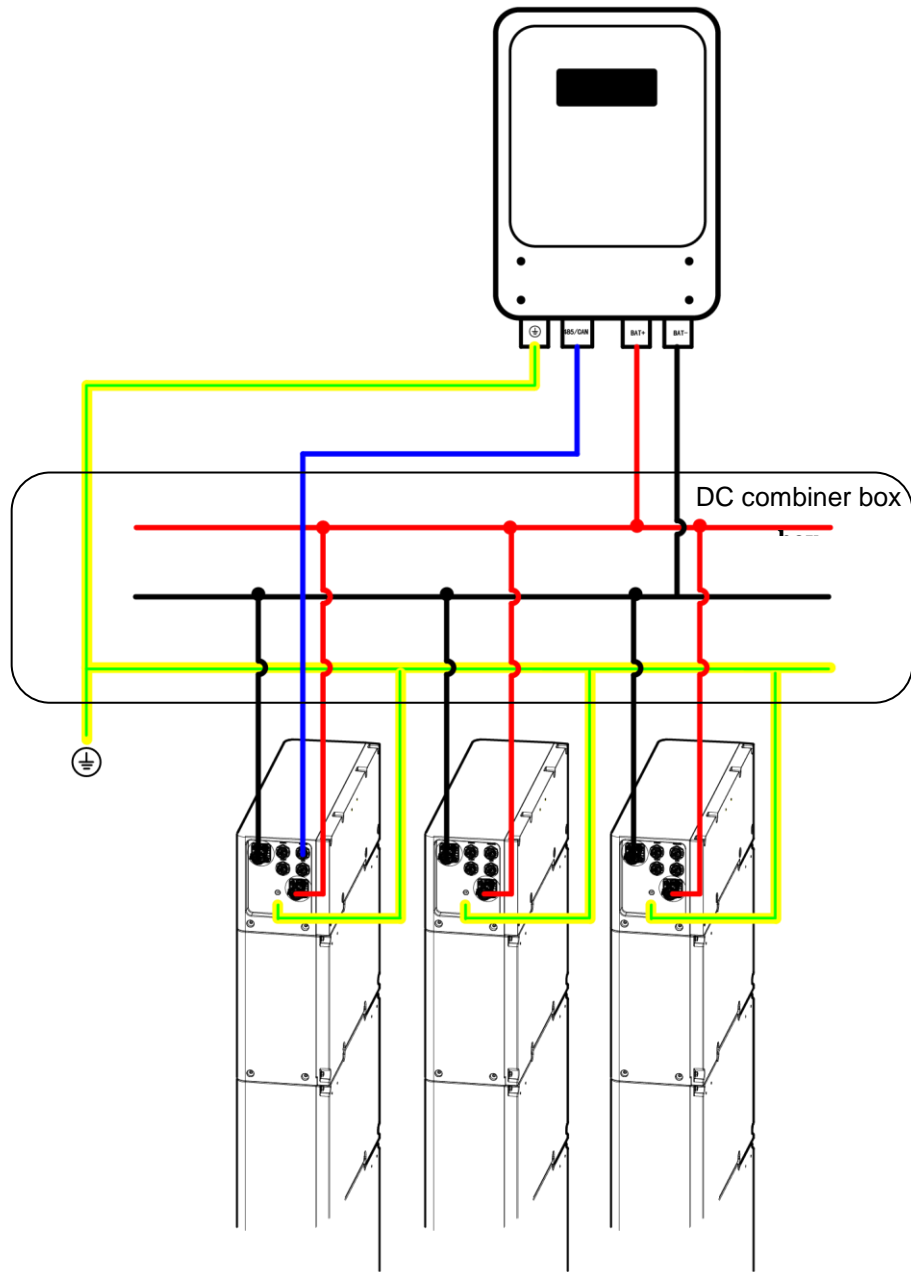
### 4.1 System structure and composition

#### 4.1.1 Storage system

This series of energy storage systems includes control box modules and battery modules. One control box module supports up to 4 battery modules in parallel, and the system supports up to 3 control box modules for extended use.



Graph 4-1 Capacity Description



Graph 4-2 System parallel diagram

#### 4.1.2 Battery module

Size: 573mm\*347\*189mm (W\*H\*D)

Weight: <50kg

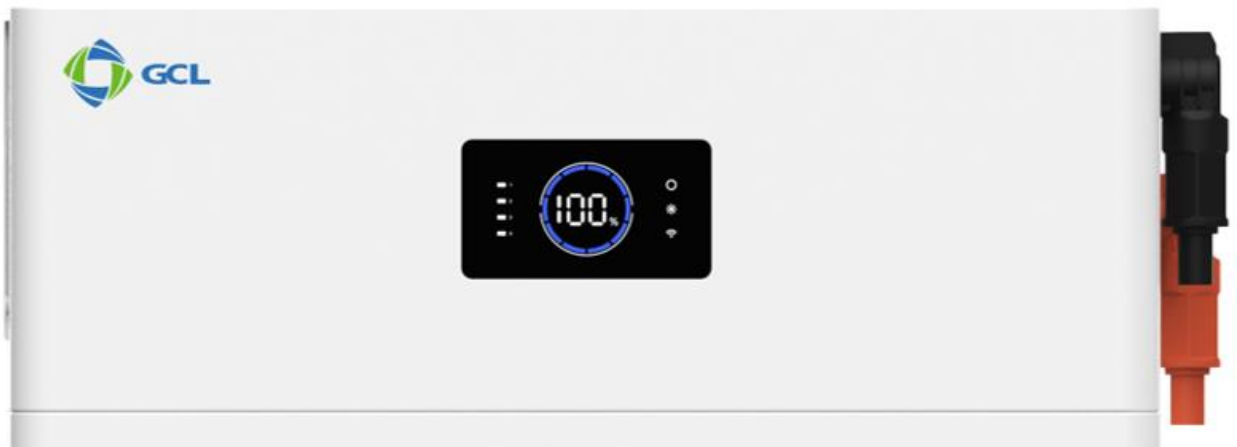


Graph 4-3 Appearance drawing of battery module (schematic)

#### 4.1.3 Control box

Size: 573mm\*200\*189mm (W\*H\*D)

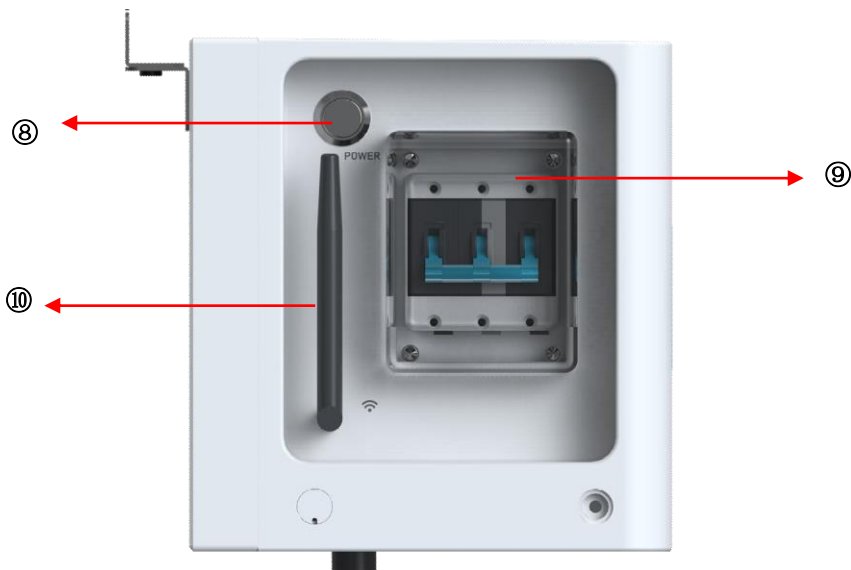
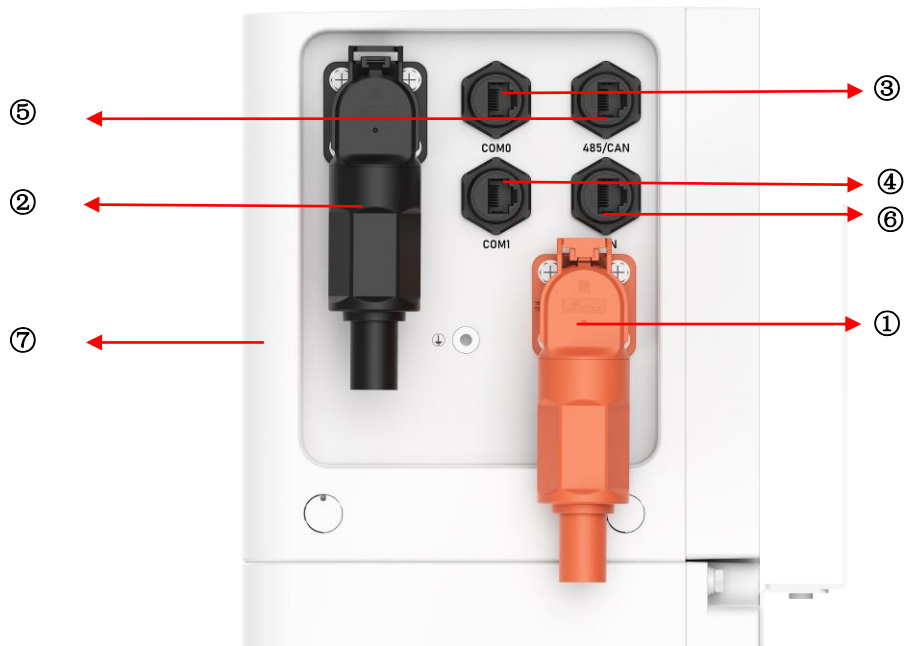
Weight: 15kg (Control box + Base)



Graph 4-4 Appearance drawing of control box module (schematic)



## 4.2 Interface description



Graph 4-5 Control box interface diagram (schematic)

No.	Description	Function	Remark
①	DC+	Positive output terminal	
②	DC-	Negative output terminal	
③	COM0	Parallel communication interface 1	
④	COM1	Parallel communication interface 1	
⑤	RS485/CAN	PCS communication interface	

⑥	LAN	System debugging interface	
⑦	PE	Grounding point	
⑧	Power	Power button	
⑨	Switch	Protection switch	
⑩	WiFi	Wifi Antenna	

### 4.3 Function description

#### 4.3.1 On & Off

- The system has two startup modes: switch button startup and charger charging startup

##### 1. Press the switch button to start

Before starting the device, close the protection switch. Press and hold the power button for more than 3s, the system will start and output voltage after self-checking, and the display interface and power button lights will be on.

##### 2. Charger starts

Before starting the device, close the protection switch. In the case of external charging voltage at the system output, the system can automatically start.

Note: If the voltage of the charger is lower than the activation voltage of the battery, the system will not start.

- The system has two shutdown modes: switch button shutdown and low voltage shutdown:

##### 1. Press the switch button

When the system is started, press and hold the power button for more than 3s, the system will turn off the output, and the display interface and power button lights will go out. Disconnect the protection switch and the system shuts down.

##### 2. Low voltage shutdown

After the battery voltage is lower than the under-voltage protection value for a period of time, the system turns off the output, and the display interface and the power button light go out.

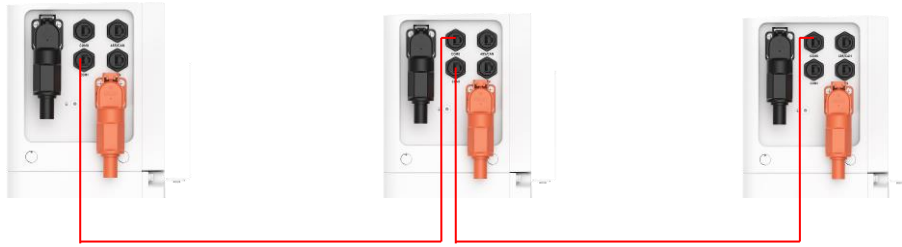
#### 4.3.2 Communication connection

The system can match various brands of inverters, support CAN or RS485 communication, and connect the inverters through the RS485/CAN interface. COM0 and COM1 interfaces are used for parallel communication connection of multiple systems.

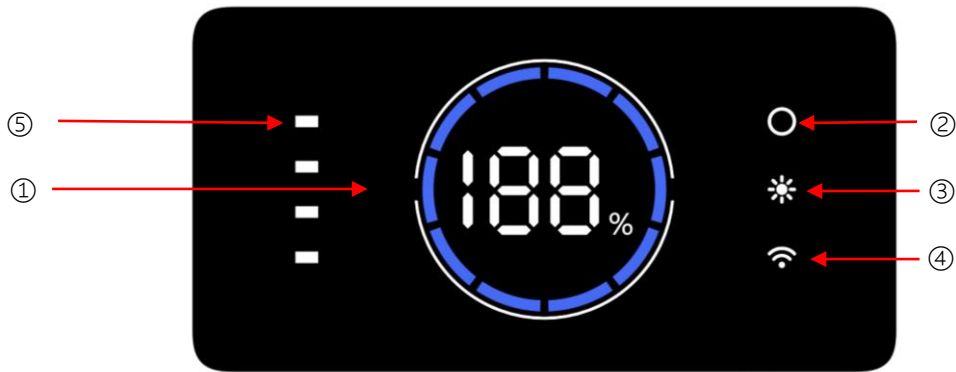
Master

Slave 2

Slave 3



#### 4.3.3 Display



No.	Description	Function
①	SOC	display real-time SOC value of energy storage system
②	System status	Steady light means normal operation, flashing means system failure
③	Heating status	Steady on means the internal heating function of the system is activated, and off means the heating function is not activated
④	Network status	Steady on means the WiFi network connection is successful, flashing means the WiFi network is not connected
⑤	Battery module status	Steady on means the battery module is normal, flashing means the battery module is faulty

#### 4.3.4 Alarm protection parameters

Alarm and Protection Items		Operating Value	Time	Remark
Overvoltage	Alarm value	3.55V	3s	

	Alarm recovery value	3.31V	3s	
	Protection value	3.6V	3s	
	Protection recovery value	3.31V	3s	
Under-voltage	Alarm value	2.9V	3s	
	Alarm recovery value	3.25V	3s	
	Protection value	2.8V	3s	
	Protection recovery value	3.25V	3s	
Charge overcurrent	Alarm value	100A	3s	
	Alarm recovery value	80A	3s	
	Protection value	101A	3s	
	Protection logic value	Cut current-limiting module charging, upload charging current-limiting value		
	Protection recovery logic	The current limiting module automatically runs for 30min to recover; transfer discharge; restart		
Discharge overcurrent	Alarm value	101A	3s	
	Alarm recovery value	80A	3s	
	Protection value	102A	3s	
	Protection value	Charging recovery, restart recovery, automatic recovery after 1min, and triggering 3 protection locks in 1 hour		
Charging short circuit	Protection	200A	10ms	
	Protection logic	Cut current-limiting module charging, upload charging current-limiting value		
	Protection recovery logic	The current limiting module automatically runs for 30min to recover; transfer discharge; restart		
Discharging short circuit	Protection	267A	512us	
	Recovery	Charging recovery, restart recovery, automatic recovery after 1min, and triggering 3 protection locks in 1 hour		
High temperature	Alarm value	53°C	3s	When charging at or above 53°C, the

charging				battery box will automatically enter the charging current limit state (current limit is 5±1A)
	Alarm recovery value	48°C	3s	
	Protection value	55°C	3s	
	Protection recovery value	50°C	3s	
Low temperature charging	Alarm value	3°C	3s	When charging at ≤3°C, the battery box will automatically enter the charging current limit state (current limit is 5±1A)
	Alarm recovery value	5°C	3s	
	Protection value	2°C	3s	
	Protection recovery value	5°C	3s	
Discharge high temperature	Alarm value	55°C	3s	
	Alarm recovery value	50°C	3s	
	Protection value	60°C	3s	
	Protection recovery value	55°C	3s	
Discharge low temperature	Alarm value	-15°C	3s	
	Alarm recovery value	-13°C	3s	
	Protection value	-20°C	3s	
	Protection recovery value	-13°C	3s	

#### 4.3.5 Heating function

A single battery module is equipped with a heating film, which can automatically control the start and stop of heating.

#### 4.4 Performance description

##### 4.4.1 Battery system energy and power

Each battery module capacity is 5kWh, and supports up to 4 battery modules in parallel

##### 4.4.2 Cell performance

- 1) Adopt square lithium iron phosphate system battery;
- 2) Nominal capacity of a single cell 100Ah;
- 3) Battery charge and discharge voltage range 2.8V~3.45V;
- 4) The cells that make up the battery pack are arranged in 16 series and 1 parallel
- 5) The cycle life meets the parameter specifications in Table 3-1

##### 4.4.3 Static power

- 1) In the off state, the battery pack self-consumption is less than 200uA
- 2) After the battery pack is shut down due to low voltage, it is allowed to not replenish the power for 30 days at room temperature without damaging the cells.

##### 4.4.4 Acquisition performance

The voltage, current, temperature acquisition, and SOC estimation accuracy meet the specifications in the following table.

Single voltage acquisition range	0~5.0V		
Single voltage acquisition error	-20°C~55°C	0~1V	≤±10mV
		1~4.5V	≤±3mV
		4.5~5.0V	≤±10mV
Temperature acquisition error	-20°C~85°C	≤±2°C	
	Other range	≤±3°C	
Current detection error	≤±1%		
SOC calculation error	Normal temperature	≤5%	
	10°C~30°C		
	High temperature	≤5%	
	30°C~50°C		
	Low temperature	≤20%	
-20°C~10°C			

##### 4.4.5 Charge and discharge current

NO.	Cell temperature	Max.charging current	Remark
1	-10°C < T ≤ 0°C	Charging is not allowed	
2	0°C < T ≤ 10°C	Charging current 0.1C	When charging at ≤3°C, the battery box will automatically enter the charging current limit state (current limit is 5±1A)
3	10°C < T ≤ 25°C	Charging current 0.5C	
4	25°C < T	Charging current 1C	When charging at ≥53°C, the battery box will automatically

			enter the charging current limit state (current limit is $5\pm 1A$ )
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No.	Cell temperature	Max.discharging current	Remark
1	$T\leq -20^{\circ}C$	Discharging is not allowed	
2	$-20^{\circ}C < T < -10^{\circ}C$	Discharging current 0.2C	
3	$-10^{\circ}C \leq T < 0^{\circ}C$	Discharging current 0.5C	
4	$0^{\circ}C \leq T$	Discharging current 1C	

## 5 Identification, packaging, transportation, storage

### 5.1 Identification

Each device shall be marked with hazard warning instructions and operation attention instructions, and include the following Chinese/English signs: product name, model, nominal voltage of the battery used, rated capacity, charging limit voltage, positive and negative polarity, manufacturing Date or batch number, manufacturer's name, trademark and cautionary statement, which allow the implementation of standard number, factory address, zip code and contact number to be printed on the package or instruction manual.

There are high pressure danger signs and high temperature danger signs in the product.

The battery pack shell inside the product has hazard warning instructions and operation attention instructions, and includes the following Chinese/English signs: product name, model, nominal voltage of the battery used, rated capacity, charging limit voltage, positive and negative polarity, Date of manufacture or batch number, manufacturer's name, trademark and warning statement, which allows the implementation of the standard number, factory address, zip code and contact number to be printed on the package or instruction manual.

All signs should be clear and complete, firmly pasted, flat, non-blistering, clearly identifiable, and cannot be filled in by hand.

The product body and the packaging box production serial number, model date and other information must be consistent.

### 5.2 Packaging

Since this product contains lithium-ion batteries, it must be packaged in accordance with the requirements when it is shipped by sea or by air.

The packaging requirements for dangerous packages of battery products are as follows:

1. The packaging manufacturer with the packaging qualification for dangerous goods is responsible for providing product packaging, and the packaging manufacturer has a record in the local commodity inspection bureau;
2. After the packaging manufacturer completes the packaging, the supplier needs to apply to the Commodity Inspection Bureau, and the Commodity Inspection Bureau will provide the "Dangerous Package Product Use Inspection Sheet" and "Dangerous Package Product Performance Inspection Sheet", and complete the dangerous package commodity inspection work;
3. All battery packs should be packaged with product instruction manuals. The packaged product should be placed in a dry, dust-proof and moisture-proof packing box;
4. The product name, model, quantity, gross weight, manufacturer, and manufacturing date should be marked on the outside of the packing box, and there should be necessary signs such as "handle with care", "afraid of moisture", "upward" and "afraid of fire". The symbol of transport icon shall meet

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the requirements of GB/T 191;

5. The packaging method is: a single device is packed in a carton with molded foam cushioning material; multiple devices are packed in a wooden box, if there is space in the wooden box, it needs to be packed with regular fillers (foam pads, cardboard, etc.) to prevent the equipment in the box from shifting;

6. Accessories packaging: single accessories are first fastened with cardboard or plastic film or woven bandages, neatly placed in a wooden box, and filled with regular fillers (foam pads, cardboard, etc.) to prevent the box Internal attachment displacement. The following documents should be included with the product when leaving the factory:

- a), product certificate (both in Chinese and English);
- b), product user(installation) manual (both in Chinese and English);
- c), product packing list (both in Chinese and English);
- d), factory inspection report (in both Chinese and English).

### 5.3 Transportation

Products should be packed in boxes for transportation. During transportation, violent vibration, impact or extrusion should be prevented, and sun and rain should be prevented as well. Vehicles, trains, ships and other means of transportation can be used for transportation.

Lithium-ion battery products are generally not allowed to be transported by aircraft. In special cases, when they need to be transported by aircraft, they need to be certified according to the requirements of UN38.3.

### 5.4 Storage

This product contains lithium-ion batteries. When storing, you should pay attention to the power of the battery pack and the temperature and humidity of the storage environment of the whole machine.

The battery pack is usually stored in a clean, dry and ventilated room with an ambient temperature of  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and a relative humidity of not more than 75% at a state of charge of 45% to 55%. C. Touching with corrosive substances should be avoided, and fire and heat sources should be kept away.

From shipment date from the manufacturer, the battery needs to be maintained at a maximum interval of 6 months; the requirements for the recharge interval after the battery is empty are as follows:

- Ambient temperature ( $45,50]^{\circ}\text{C}$ , should be recharged within 7 days;
- Ambient temperature ( $35,45]^{\circ}\text{C}$ , should be recharged within 15 days;
- Ambient temperature  $\leq 35^{\circ}\text{C}$ , should be recharged within 30 days.

## 6 Rules of use and safety instructions

### 6.1 User manual

1. Please read the specification carefully before using the battery.
2. During use, keep away from heat sources, high pressure, and do not beat.
3. Do not short-circuit the positive and negative electrodes of the battery, do not disassemble the battery by yourself, and do not place the battery in a damp place to avoid danger.
4. When not in use for a long time, please store the battery well and keep the battery in a half-charged state. Please wrap the battery with non-conductive material to avoid direct metal contact with the battery and damage to the battery. Store the battery in a cool and dry place.
5. Please dispose of waste batteries safely and properly, do not throw them into fire or water.



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6. If the battery is used for other equipment, please consult the supplier, and do not use the battery pack for other systems without authorization.

## 6.2 Warning

### 1. Forbidden to disassemble the battery inside the product

There are protective mechanisms and protective circuits inside the battery to avoid danger. Improper disassembly will damage the protection function, which will cause the battery to heat up, emit smoke, deform or burn.

### 2. Forbidden to short-circuit the battery inside the product

Do not connect the positive and negative poles of the battery with metal, and do not store and move the battery pack together with metal sheets. If the battery is shorted, an excessive current will flow and the fuse will be damaged.

### 3. Strictly forbidden to heat and incinerate the battery inside the product

Heating and incinerating the battery will cause melting of the battery separator, loss of safety function or burning of the electrolyte, and overheating will cause the battery to heat, smoke, deform or burn.

### 4. Avoid using batteries near heat sources

Do not use the battery near a fire, an oven, or in an environment over 80°C. Overheating will cause a short circuit inside the battery, causing the battery to heat up, emit smoke, deform or burn.

### 5. Forbidden to soak the product to make the internal battery get wet

Do not wet the battery and put the battery into water, otherwise it will cause the loss of the internal protection circuit and function of the battery and abnormal chemical reactions, and the battery may generate heat, smoke, deform or burn.

### 6. Forbidden to disassemble the machine with electricity

When the product is working, there is high voltage inside. Before disassembling the machine, it must be turned off to ensure that all output interfaces are free of voltage.

### 7. Forbidden to destroy the battery

It is forbidden to dig into the battery with metal, hammer or beat the battery or damage the battery by other methods, otherwise it will cause the battery to heat up, smoke, deform or burn, or even be dangerous.

### 8. Forbidden to directly weld on the battery body inside the product

Overheating will cause the battery separator to melt, lose its safety protection function, and cause the battery to generate heat, smoke, deform or burn.

### 9. Do not directly touch the leaking battery

The leaked electrolyte will cause skin discomfort. If the electrolyte gets into the eyes, rinse it with clean water as soon as possible and go to the hospital for treatment.

## 6.3 Danger type

The customer shall be aware of the following potential hazards during battery use and operation:

1. The operator may be injured by chemicals, electric shock or arc during operation. Although the human body responds differently to direct current and alternating current, both DC voltages higher than 50V and alternating current can cause serious damage to the human body, so customers must take a conservative posture during operation to avoid current damage.

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2. There is a chemical risk from the electrolyte in the battery.

3. When operating batteries and selecting personal protective equipment, customers and their employees must consider the above potential risks to prevent accidental short-circuits, resulting in arcing, explosion or thermal runaway.

4. When the product is working, there is high pressure inside, and the user must take conservative behavior in operation to avoid high pressure injury.