ENGLISH

JKESS

Battery Management System

Rev ----06/2018

SPECIFICATION

Product Name: ESS Master BMS

Product model: BCU-B3

Product Code: 60.01.001.0017

Version: Ver1.19

目 录

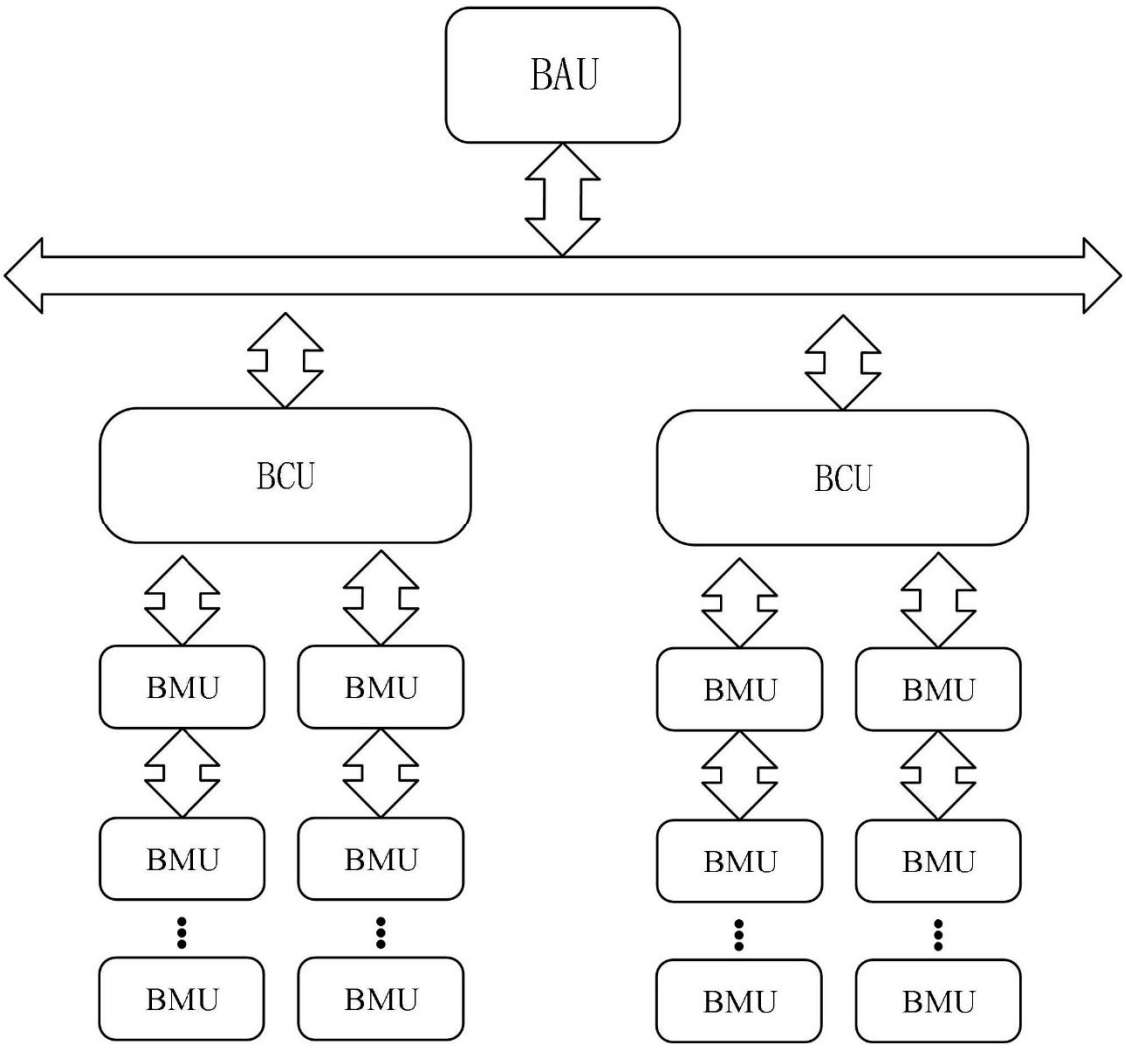
1. Product Overview

1.1 Overview

BCU-B3 is the main control module of battery management system (BMS) independently developed by our company. Through communication with the slave control unit (BMU), it monitors the voltage and temperature of battery cells, and monitors the total voltage, current, temperature, earth insulation resistance and other external characteristic parameters of the battery pack. It estimates and monitors the internal state of the battery (SOC, SOH, SOP, etc.) based on the physical model algorithm of the cell. On this basis, it realizes the charge and discharge management, thermal management, insulation detection, unit balance management and fault alarm of the battery pack system by turning on and off the output switch, so as to prevent overcharge or discharge of the battery and make the battery pack work in the best condition.Working status, in which the self-developed SOC Algorithm and active equalization algorithm, realize the energy balance management of the lithium battery system, and extend the service life of the battery.

The system has the characteristics of high reliability, high precision, anti-interference, flexible configuration, wide application, support for remote monitoring, remote OTA upgrade, etc. It can realize data exchange with PCs, EMS, man-machine interface and other equipment through communication bus, and realize communication with BMU through can or daisy chain. It supports remote monitoring of the Internet of things. By monitoring the operation status and positioning of the system in real time, and monitoring and controlling the battery system information, status, alarm information, etc., the big data cloud platform enhances the customer experience. The product design follows ISO 26262 functional safety design standard.

1.2 Schematic Diagram of BMS System



2. Functions and Features

The following functions should be used with JKESS slave BMU

☆ Charge and discharge management

☆ Accurate acquisition of voltage, current and temperature

☆ SOC, SOH, SOP estimation

☆ Support Bidirectional DC balance (with Bidirectional DC balance BMU)

☆ Effective Balancing current 2.0A

☆ Low power sleep mode

☆ The balance effect is not affected by the battery connection copper bar

☆ Prevent hot plug and wrong connector insertion

☆ Strong scalability and simple field application

☆ Compatible with Li-ion, Lifepo4, $LiMn_2O_4$, LiCoO2, LTO, Sodium-ion batteries

☆ Data storage, transmission and processing

☆ Support PCS communication

☆ Support human-computer interface interaction

☆ Support Beidou and GPS positioning

☆ Support remote real-time monitoring

☆ Support CANBUS online upgrade

☆ Support remote OTA upgrade

3. Application Scope

✓ Suitable for lithium iron phosphate batteries(Lifepo4), Ternary lithium batteries(Li-ion), Lithium manganese oxide batteries($LiMn_2O_4$), Lithium titanium oxide batteries(LTO), and lithium cobalt oxide batteries(LiCoO2), Sodium-ion batteries;

✓ Energy storage System, Energy storage Power station;

✓ Backup Power supply for communication base stations and radar ground stations;

✓ Upgrade the capacity of old batteries in a tiered manner;

✓ Distributed, multi string energy storage application system

4. Interface Configuration

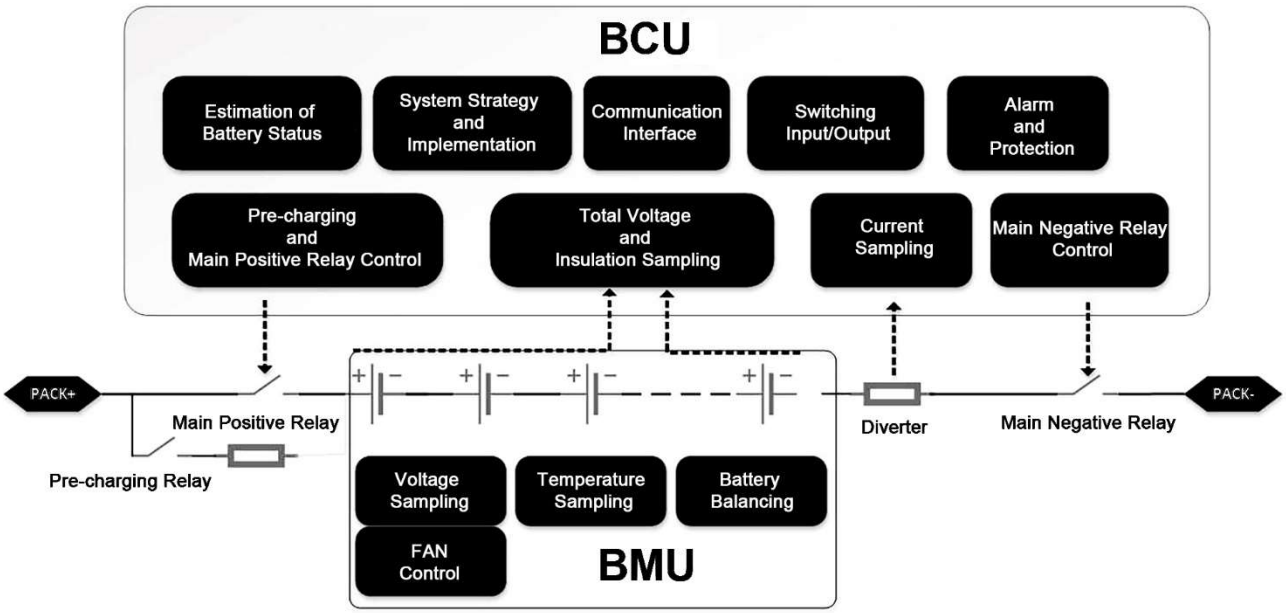
- ✓ 2-way CANBUS communication interface
- ✓ 2-way RS485 communication interface
- ✓ 6-way GPIO interface
- ✓ 6-way high side switch interface
- ✓ 2-way low side switch interface
- ✓ 4-way DRY contact output
- ✓ 1-way high voltage interlock detection interface
- ✓ 4-way high voltage detection interface
- ✓ 1-way circuit current detection interface of shunt
- ✓ 4-way internal temperature sampling
- ✓ Support remote real-time monitoring and GPS positioning configuration
- ✓ Support remote program upgrade configuration

5. Operating Environment

- Working temperature: -25 ℃ to 85 ℃
- Storage temperature: -40 ℃ to 105 ℃
- Relative humidity: 5% to 95% RH in non condensing state
- Working height: 2000 meters

6. System Typical Diagram

The BCU main control unit is composed of MCU control module, voltage and current acquisition module, high and low side switch control module and supporting peripherals. In the design, a highly reliable MCU control chip is used, and the latest acquisition technology is used, which has high acquisition accuracy and provides a good physical basis for SOC estimation. Based on the in-depth study of the complex electromagnetic environment of the battery pack application environment, the EMC design of the product was fully considered at the early stage of the design. Multiple power isolation schemes and high redundancy design were adopted, and rigorous tests were carried out to ensure the reliable operation of the product and stable and reliable operation in a variety of environmental conditions.



7. Electrical characteristics

7.1 Maximum limit parameter

Features	Symbol	Min	MAX	Unit	Note
Auxiliary power supply	V	7	33	V	
Ambient Temperature	T_full	-40	85	℃	
Storage Temperature	Tstg	-55	125	℃	
ESD Protecition	V_esd	-	16	kV	Air Discharge

Notes:

1) The maximum limit value means that beyond the working range, the module may be permanently damaged.

2) When the temperature rises, the maximum allowable Power consumption decreases, which is determined by the maximum working temperature T, ambient temperature TA and heat dissipation conditions.

7.2 Basic Electrical Parameters

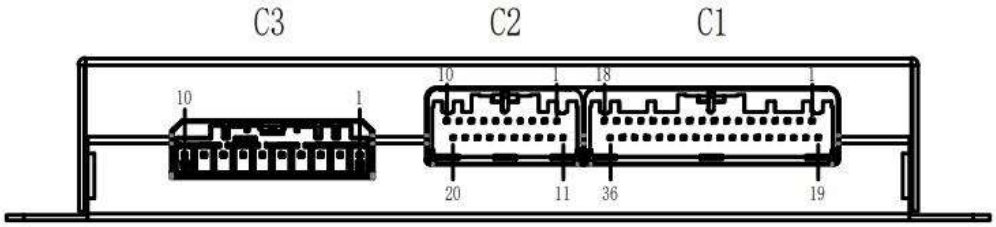
Features	Symbol	Test Cnditions	MIN	Typical	MAX	Unit
Auxiliary power consumption	I_pwr+	PWR+= 24V		20		mA
HSD high side output	V_hsd			1	3	A
GPIO	V_gp			24		V
Temperature sampling range	T_ran		-30		105	℃
Temperature sampling accuracy	T_acc				2	℃
Sleep static power consumption	I_sq				10	uA
Temperature protection	T_pro			85		℃
Temperature protection release	T_rel			75		℃
Balanced full power temperature rise	T_ful			40		℃

7.3 Interface and Electrical Parameters

Name	NUM	Parameter	MIN	Typical	MAX	Note
Auxiliary power	2	Voltage	9V	24V	32V	Switching power supply/battery
		Current		100mA		
Total voltage sampling	1	Voltage	0V		1500V	Total Voltage
		Accuracy			±1%FS	
Diverter sampling	1	Voltage	-75mV		75mV	
		Accuracy			±0.3mV	
Insulation resistance sampling	1			20M		
HVIL	1					HVIL function detection
Analog input	6	Sampling Error		±2%		For temperature, other ad inputs, etc
High side switch output	6	Voltage/Current		1A	3A@300mS	Vmax=32V
Low side switch output	2	Voltage/Current		1A		
Dry Contact	4	Voltage/Current		0.5A	1A	Vmax=32V
CANBUS port	2	Isolate				
RS485 port	2	Isolate				Optional welding

8. Product Appearance

8.1 Master BMS interface definition



BCU-B3 Interface front view

Connector	Brand	PIN	BMS Code/Model	Cable Code/Model
Plug spring terminal：63.09.002.0002/M34S75C4F1/FOR 0.22~0.35mm2 Wire diameter				
C1	JAE	36	63.09.000.0027/ MX34036NF1	63.09.001.0009/MX34036SF1
C2	JAE	20	63.09.000.0003 / MX34020NF1	63.09.001.0008 /MX34020SF1
Plug spring terminal：：63.09.002.0005/AAUTA179-K001B54CQ/FOR 0.5~0.75mm2 Wire diameter				
C3	LOTES	10	63.09.000.002/ AAUS07AP5-010K02	63.09.001.0007/ AAUS07AS0-010K01

C1（BMS）：MX34036NF1									
PIN	9	8	7	6	5	4	3	2	1
Definition	H_OUT2	H_OUT1	PWR-	PWR-	PWR-	PWR+	PWR+	DRY1-	DRY1+
PIN	18	17	16	15	14	13	12	11	10
Definition	N C	NC	NC	L_OUT2	L_OUT1	H_OUT6	H_OUT5	H_OUT4	H_OUT3
PIN	27	26	25	24	23	22	21	20	19
Definition	RT3	RT2	RT 1	DRY4-	DRY4+	DRY3-	DRY3+	DRY2-	DRY2+
PIN	36	35	34	33	32	31	30	29	28
Definition	NC	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	RT-	RT4

C2（BMS）：MX34020NF1										
PIN	10	9	8	7	6	5	4	3	2	1
Definition	NC	NC	HVIL_ OUT	HVIL_ IN	RS485_ EARTH2	RS485 B2	RS485 A2	RS485_ EARTH1	RS485 B1	RS485 A1
PIN	20	19	18	17	16	15	14	13	12	11
Definition	EARTH	NC	IM0	IP0	CAN_ EARTH2	CAN2_ L	CAN2_ H	CAN_ EARTH1	CAN1_ L	CAN1_ H

C3（BMS）：AAUS07AP5-010K02										
PIN	10	9	8	7	6	5	4	3	2	1
Definition	BAT+	NC	HV_CH1	HV_CH2	NC	HV_NTC1	HV_CH4	IN0+	IN0-	BAT-

8.2 Connector interface description

C1 Interface Definition

Connector	PIN NUM	Signal Name	Function Description	Default Application
C1 Connector	1	DRY1+	1st DRY Contact Postive	
	2	DRY1-	1st DRY Contact Negative	
	3	PWR+	System Power Positive	BCU Power Positive
	4	PWR+	System Power Positive	BCU Power Positive
	5	PWR-	System Power Negative	BCU Power Negative
	6	PWR-	System Power Negative	BCU Power Negative
	7	PWR-	System Power Negative	BCU Power Negative
	8	H_OUT1	1st High Side Output	Precharge Relay Drive Signal
	9	H_OUT2	2nd High Side Output	Postive Relay Drive Signal
	10	H_OUT3	3rd High Side Output	Reserved
	11	H_OUT4	4th High Side Output	Negative Relay Drive Signal
	12	H_OUT5	5th High Side Output	Shunt trip
	13	H_OUT6	6th High Side Output	Fan Relay Drive Signal
	14	L_OUT1	1st Low Side Output	Operation Indicator - Green
	15	L_OUT2	2nd Low Side Output	Fault Indicator - Red
	16	NC	Vacant	
	17	NC	Vacant	
	18	NC	Vacant	
	19	DRY2+	2nd DRY Contact Postive	
	20	DRY2-	2nd DRY Contact Negative	
	21	DRY3+	3rd DRY Contact Postive	
	22	DRY3-	3rd DRY Contact Negative	
	23	DRY4+	4th DRY Contact Postive	
	24	DRY4-	4th DRY Contact Negative	
	25	RT1	1st ADC Sampling	Pull Up 33K
	26	RT2	2nd ADC Sampling	Pull Up 33K
	27	RT3	3rd ADC Sampling	Pull Up 33K
	28	RT4	4th ADC Sampling	Pull Up 33K
	29	RT-	ADC Reference GND	Internal Pull - Up 100K
	30	DIO1	1st Input and Output	Internal Pull - Up 100K
	31	DIO2	2nd Input and Output	Internal Pull - Up 100K
	32	DIO3	3rd Input and Output	Internal Pull - Up 100K
	33	DIO4	4th Input and Output	Internal Pull - Up 100K
	34	DIO5	5th Input and Output	Internal Pull - Up 100K
	35	DIO6	6th Input and Output	Pull Up 33K
	36	NC	Vacant	

C2 Interface Definition

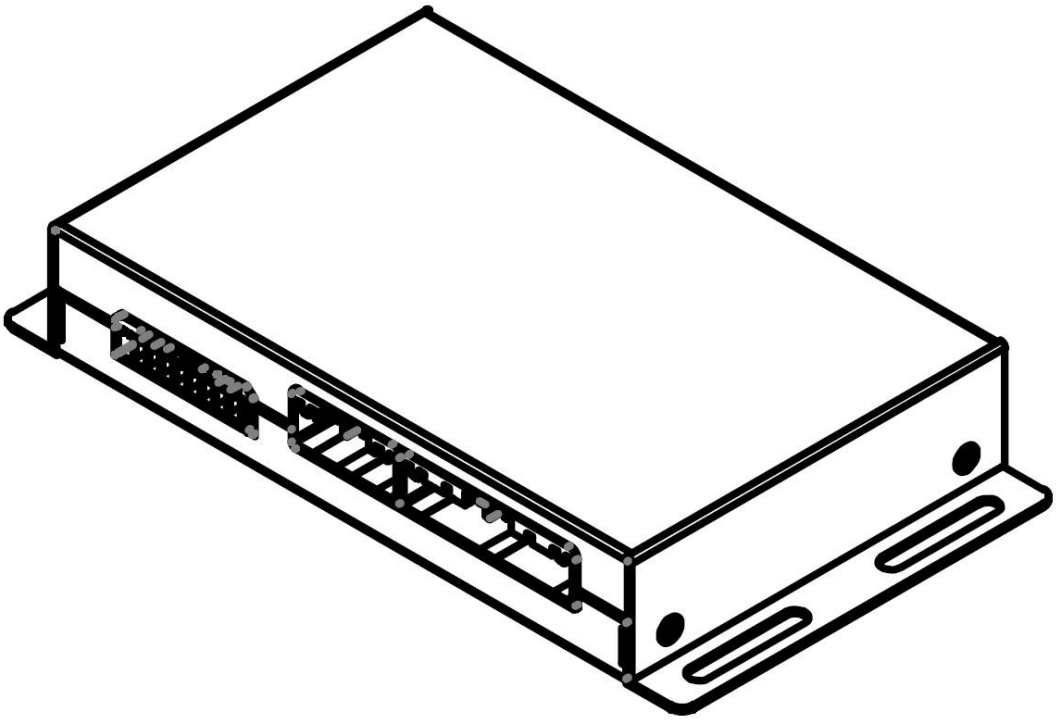
Connector	PIN NUM	Signal Name	Function Description	Default Application
C2 Connector	1	RS485A1	485_1 A	Secondary Architecture Used as PCS Communication 485A
	2	RS485B1	485_1 B	Secondary Architecture Used as PCS Communication 485B
	3	485_EARTH1	485_1 Shielded GND	
	4	RS485A2	485_2 A	Secondary Architecture Used as HIMI Communication 485A
	5	RS485B2	485_2 B	Secondary Architecture Used as HIMI Communication 485B
	6	485_EARTH2	485_2 Shielded GND	
	7	HVIL_IN	HVIL Input	
	8	HVIL_OUT	HVIL Output	
	9	NC	Vacant	
	10	NC	Vacant	
	11	CAN1_H	Can_1 H	Commissioning General/Intranet CAN_H
	12	CAN1_L	Can_1 L	Commissioning General/Intranet CAN_L
	13	CAN_EARTH1	Can_1 Shielded GND	
	14	CAN2_H	Can_2 H	Charger/BAU Communication CAN_H
	15	CAN2_L	Can_2 L	Charger/BAU Communication CAN_L
	16	CAN_EARTH2	Can_2 Shielded GND	
	17	IP0	Daisy Chain Communication Positive	Daisy Chain Communication Interface
	18	IM0	Daisy Chain Communication Negative	Daisy Chain Communication Interface
	19	NC	Vacant	
	20	EARTH	Case	Insulation Detection Reference Ground Connected to Case

C3 Interface Definition

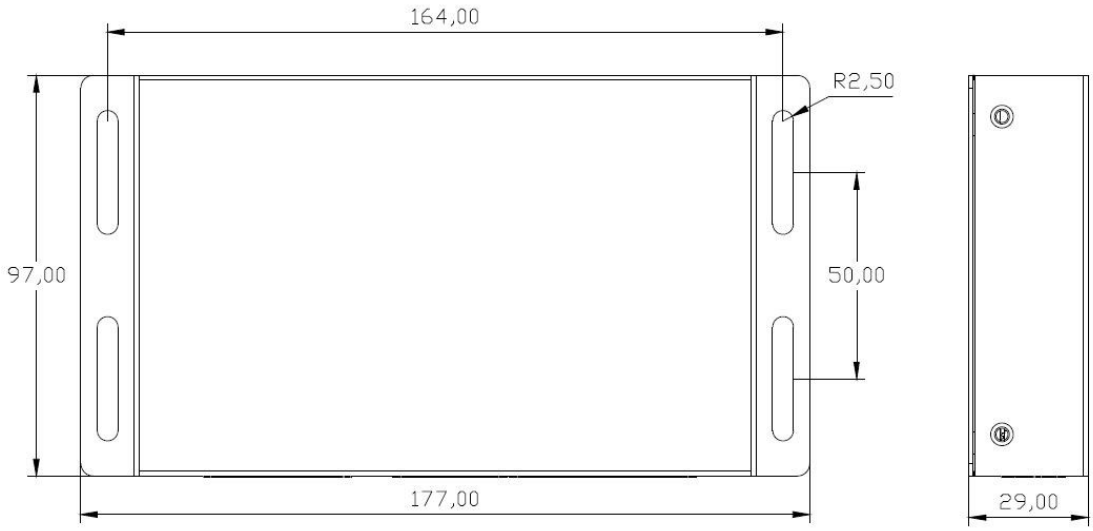
Connector	PIN NUM	Signal Name	Function Description	Default Application
C3 Connector	1	BAT-	Total Voltage Sampling Negative	Connected to the total Negative Port of Battery
	2	IN0-	Diverter Sampling Negative	Connected to the Diverter Output
	3	IN0+	Diverter Sampling Postive	
	4	HV_CH4	Detection of Negative Relay	Secondary Architecture Used as HIMI Communication 485A
	5	HV_NTC1	ADC Sampling	Secondary Architecture Used as HIMI Communication 485B
	6	NC	Vacant	
	7	HV_CH2	High Voltage Sampling	Reserved High Voltage Sampling
	8	HV_CH1	Detection of Postive Relay	Adhesion Detection of Positive Relay
	9	NC	Vacant	
	10	BAT+	Total Voltage Sampling Postive	Total Voltage Sampling, Connected to the Total Positive Port of Battery

8.3 appearance and dimensions

The shape of the product is a sheet metal shell with 4 waist circle fixing holes, which has a wider product adaptability.



Appearance



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9. Precautions for Use

1. Please connect the wire correctly before use. Refer to the product manual or the manufacturer's technical service center for the specific wiring method.

2. If the relay is selected, the charging and discharging current should not exceed the nominal parameter value of the relay or contactor.

3. When not in use, please disconnect the Power supply of the System.

4. Please do not change the System configuration parameters at will.

5. If the product is found abnormal, please cut off the Power in time and contact the company's technical support center.

10. Packaging and Storage

10.1 Packaging

Separate module bubble bag packaging. Carton packaging with cardboard partition.

10.2 Transportation

During transportation, it is necessary to prevent violent vibration, falling from height, extrusion, impact, sun and rain, etc. The stacking height shall not exceed 5 layers, and it is forbidden to place heavy objects.

10.3 Storage

- It is recommended that the storage ambient temperature be between 0 ℃ and 45 ℃.
- It is recommended that the relative humidity for storage be between 25% and 75%.
- Packaged with desiccant to reduce oxidation. Products shall not be stored in harmful gases such as sulfur or chlorine.

11. Technical Support and Service

1. For packaging information, please refer to product shipping packaging information

2. If the product operates above the load indicated in this manual, the product performance cannot be guaranteed to meet all performance indicators in this manual

3. Unless otherwise specified, the data in this paper are measured when ta=25 ℃, humidity<75%, Input nominal voltage and Output rated load

4. The above are the product performance indicators listed in this manual

5. Our company supports OEM/ODM. Please feel free to contact us about product use and technology. We will reply to you as soon as we receive the information. We look forward to communicating with you!