SmartGen
MAKING CONTROL SMARTER

HBCU300
BMS MASTER CONTROL MODULE
USER MANUAL

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CONTENT

SmartGen

SmartGenRegistered trademark

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Table 1 Software Version

Date	Version	Note
2024-04-26	1.0	Original release.
2025-09-04	1.1	1. Modify the error in parameter setting table. 2. Add parameter setting contents: full-charge voltage return value, CHG end drop voltage1 return value, CHG end drop voltage2 return value, max single BMU temp. failure value, Total BMU with temp. sensor failure. 3. Add BMU input setting and fire alarm. 4. Add BMS fault reset function. 5. Add CAN communication Hall: SINOMAGS STB-CAB500M-5XC. 6. Add energy storage converter model: APAITEK. 7. Add high voltage power-off delay setting.

Glossary and List of Abbreviations

EMS: Energy Management System

PCS: Power Conversion System

BMS: Battery Management System

BCU: Battery Control Unit

BMU: Battery Management Unit

SOC: State of Charge

SOH: State of Health

SOP: State of Power

SOE: State of Energy

1 OVERVIEW

HBCU300 Master Control Module is a significant part of the energy storage battery management system (BMS), which can manage the battery system safely, realiably and efficiently. HBCU300 collects the voltage and temperature of the single cell of the battery module uploaded by BMU slave control module (supporting lithium iron phosphate and ternary lithium) to calculate SOC, SOH, the max. single cell voltage/temperature, the min. single cell voltage/temperature, insulation resistance and other data. It realizes the protections of over/under voltage, high/low temperature, charge/discharge overcurrent of the cell by the tertiary fault protection system and the control of external main circuit relay. HBCU300 is compatible with protocol by PCS of different manufaturers to realize charge/discharge management of battery cluster.

2 PERFORMANCE AND CHARACTERISTICS

——It can collect total voltage and current of battery cluster and calculate the SOE and SOH data;

——It can collect the insulation resistance to the ground for the positive and negative of the battery cluster;

——Collect the current of battery cluster by Hall current sensor or shunt;

——Receive the voltage and temperature of a single cell of BMU module via isolated CAN port, and calculate max./min. voltage, temperature of battery cell, control passive balance on BMU module. This port can also be used to upgrade BCU firmware program.

——Tertiary fault alarm protection function, which can alarm for over/under voltage, high/low temperature, charging/discharging overcurrent, low insulation resistance, abnormal communication, high voltage collecting fault, current collecting fault, cell voltage collecting fault, temperature collecting fault. The alarm protection actions can be set as warning, current dropping and high voltage power-off;

——With BMU ID automatic coding function;

——2 isolated RS485 communication ports using Modbus protocol, which can communicate with EMS and PCS;

——2 isolated CAN ports that can communicate with PCS;

——1 ETHERNET port using Modbus TCP/IP protocol, which can communicate with EMS and PCS;

——8 output ports, of which 6 are active output ports (the default function is master positive relay output, pre-charge output, alarm indicator output, running output), the other 2 are passive output ports;

——7 input ports, of which 2 are shared with ID auto-coding function;

——4-way high-voltage box temperature sensor, NTC 10K-3950 type can be connected;

——LED lamps indicate the running status and alarm status of the module;

——It is used for 1500VDC energy storage system;

——With event-log, which can circularly record 200 items of historical records (contents and detailed data of tertiary fault alarm);

——Current, total charging/discharging energy (kWh) and battery capacity (Ah) data can be counted;

——The built-in SD card storage function can record real-time running data and cell voltage/temperature data;

——Modular design, screw-mounting.

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3 SPECIFICATION

Table 2 Specification Parameters

Items	Contents
Operating Voltage Range	DC8V ~ DC35V **(NOTE1)**, DC reverse connection protection
Overall Consumption	<4W (no load for active output port)
Total Voltage Collection	Range: 10V~1500V Resolution: 0.1V Accuracy: 0.5%FSR (full range)
Hall Current Sampling	Range: -1000A~1000A (Please specify the range when ordering) Resolution: 0.1A Accuracy: 0.5%FSR (full range) Accuracy error is also related to the selection of Hall current sensor
Shunt Sampling	75mV shunt is supported. Resolution: 0.1A Accuracy: 0.5%FSR (full range) Accuracy error is also related to the selection of shunt.
Insulation Sampling	Range: (0~20)MΩ Accuracy: ±5%(>100kΩ); ±10kΩ(0~100kΩ)
Temperature Sampling Input	Range: -40°C~+125°C Resolution: 1°C Accuracy: ±1°C Temp. sensor type: NTC 10K-3950
Active Output Port 1-6	Max continuously output 3A at the same time Single output 1A continuously, 5A@1S instantaneously
Aux. Output 7, 8	1A DC30V Volts free output
Digital Input 1-7	Low on threshold voltage is 0.8V, max. input voltage is 60V
RS485-1	Isolated, half-duplex Fixed parameter: 115200 baud rate, 1 stop bit, no parity.
RS485-2	Isolated, half-duplex, maximum communication distance is 1000m when baud rate is 9600. Default: 9600 baud rate, 1 stop bit, no parity.
Ethernet Port	Self-adapting 10/100Mbit
CAN 1	500kbps, isolated, using Belden 9841 cable or equivalent. Built-in 120Ω terminal impedance matching resistor.
CAN 2	Isolated, using Belden 9841 cable or equivalent. 120Ω terminal impedance matching resistor is optional to connect.
EMC	Meet GB/T 17626 series standard
Vibration	5Hz~8Hz: displacement=±7.5mm 8Hz~500Hz: a=±2g IEC 60068-2-6
Shock	50g, 11ms, IEC 60068-2-27
Bump	20g, 16ms, half-sine IEC 60255-21-2

![SmartGen logo]

Items	Contents
Overall Dimensions	282mmx109mmx43mm
Working Temperature	(-40~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80)°C
Protection Level	IP20
Insulation Strength	Apply AC3.1kV voltage between DC high voltage terminal and low voltage terminal and the leakage current is not more than 10mA within 1min.
Weight	0.9kg

NOTE1: BCU module needs to be powered by 24V when using Hall current sensor with BCU+12V output power supply.

4   MODULE PANEL

4.1   PANEL DRAWING
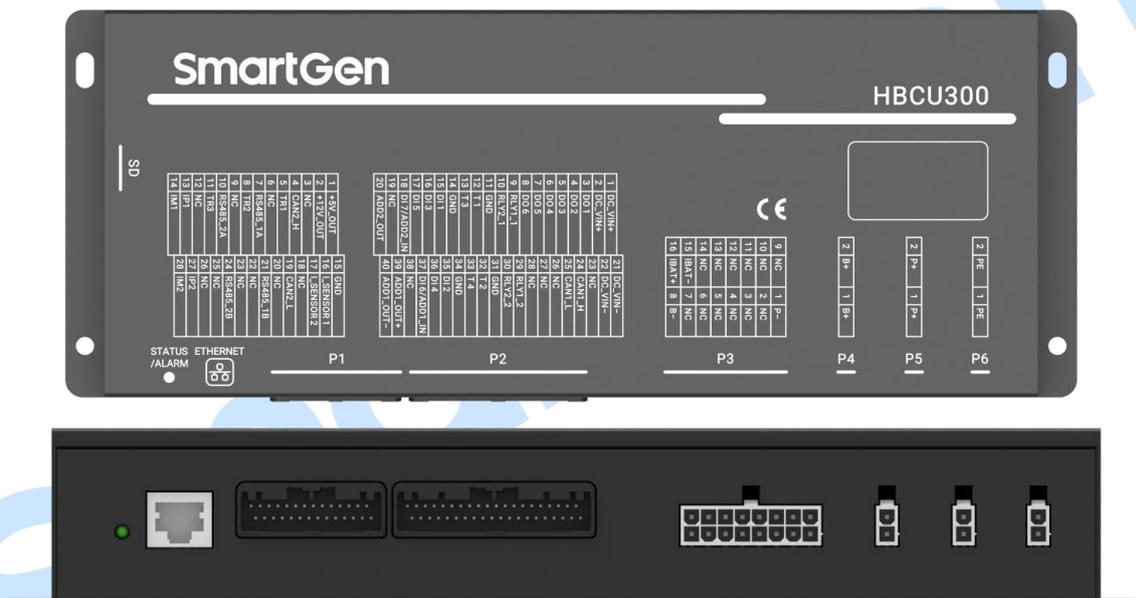
Fig.1 HBCU300 Panel Drawing

4.2   INDICATOR DESCRIPTION

——No alarm after powering on, green indicator flashing (1Hz);

——Mild (level 3) alarm, yellow indicator flashing (1Hz);

——Moderate (Level 2) alarm, red indicator flashing (1Hz);

——Serious (Level 1) alarm, red indicator fast flashing (2Hz).

4.3   TERMINAL DESCRIPTION

Table 3 Terminal Model Comparison

No.	Board Model	Cable Model	Pin Model	Remark
P1(28PIN)	JAE MX34028NF2	MX34028SF1	M34S75C4F2	Wire Diameter 0.5mm²~0.75mm² AWG18-20

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No.	Board Model	Cable Model	Pin Model	Remark
P2(40PIN)	JAE MX34040NF2	MX34040SF1	M34S75C4F2	Wire Diameter $0.5mm^2\sim0.75mm^2$ AWG18-20
P3(16PIN)	YATXF 16-0501-16-K3456	H4201-2x8NP	YT4202-01	Wire Diameter $0.2mm^2\sim0.5mm^2$ AWG20-24
P4(2PIN)	YATXF 02-0501-16	H4201-2x1P	YT4202-01	Wire Diameter $0.2mm^2\sim0.5mm^2$ AWG20-24
P5(2PIN)	YATXF 02-0501-16	H4201-2x1P	YT4202-01	Wire Diameter $0.2mm^2\sim0.5mm^2$ AWG20-24
P6(2PIN)	YATXF 02-0501-16	H4201-2x1P	YT4202-01	Wire Diameter $0.2mm^2\sim0.5mm^2$ AWG20-24

14	13	12	11	10	9	8	7	6	5	4	3	2	1
IM1	IP1	NC	TR3	RS485_2A	NC	TR2	RS485_1A	NC	TR1	CAN2_H	NC	+12V_OUT	+5V_OUT

28	27	26	25	24	23	22	21	20	19	18	17	16	15
IM2	IP2	NC	NC	RS485_2B	NC	NC	RS485_1B	NC	CAN2_L	NC	I_SENSOR 2	I_SENSOR 1	GND

Fig.2 P1 Terminal Description

Table 4 P1 Terminal Function Description

Terminal No.	Definition	Function
1	+5V_OUT	Power positive of 5V Hall current sensor.
2	+12V_OUT	Power positive of 12V Hall current sensor.
15	GND	Power negative of Hall current sensor.
16	I_SENSOR1	Single channel Hall current sensor signal input; Or large range signal input (voltage type) of dual channel Hall current sensor.
17	I_SENSOR2	Small range signal input (voltage type) of dual channel Hall current sensor.
4	CAN2_H	Isolated CAN, used for communication with PCS.
19	CAN2_L	
5	TR1	It is short connected with Terminal 4 according to site wiring situation for connecting to 120Ω terminal impedance matching resistor of CAN2.
7	RS485_1A	Isolated RS485 port for communication with monitoring, PCS or

Terminal No.	Definition	Function
21	RS485_1B	EMS. Fixed communication parameters: 115200 baud rate, no parity, 1 stop bit.
8	TR2	It is short connected with Terminal 7 according to site wiring situation for connecting to 120Ω terminal impedance matching resistor of RS485-1.
10	RS485_2A	Isolated RS485 port for communication with monitoring, PCS or EMS.
24	RS485_2B	
11	TR3	It is short connected with Terminal 10 according to site wiring situation for connecting to 120Ω terminal impedance matching resistor of RS485-2.
13	IP1	Daisy chain communication 1 for communication with slave control module (work with BMU with daisy chain communication function).
14	1M1	
27	IP2	Daisy chain communication 2 for communication with slave control module (work with BMU with daisy chain communication function).
28	IM2	
3/6/9/12/ 18/20/22/ 23/25/26	NC	Must hang up in the air.

Fig.3 P2 Terminal Description

Table 5 P2 Terminal Function Description

Terminal No.	Definition	Function
1	DC_VIN+	Module power.
2		
21	DC_VIN-	
22		
24	CAN1_H	Isolated CAN for internal communication between BCU and BMU.
25	CAN1_L	There is already a 120Ω terminal impedance matching resistor between CAN1_H and CAN1_L.
3	DO1	Aux. output port 1. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s.

Terminal No.	Definition	Function
		Default "Master Positive Relay Output".
4	DO2	Aux. output port 2. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s. Default "Pre-charge Output".
5	DO3	Aux. output port 3. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s. Default "Not Used".
6	DO4	Aux. output port 4. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s. Default "Alarm Indicator Output".
7	DO5	Aux. output port 5. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s. Default "Running Output".
8	DO6	Aux. output port 6. Active output (Terminal 1 and 2 provide power supply), continuous 1A, max 5A@1s. Default "Not Used".
9	RLY1_1	Aux. relay output port 7.
29	RLY1_2	Volts free output, capacity 1A DC30V. Default "Not Used".
10	RLY2_1	Aux. relay output port 8.
30	RLY2_2	Volts free output, capacity 1A DC30V. Default "Not Used".
11	GND	Common terminal of high-voltage box temperature sensor.
31		
12	T1	Temperature sensor 1 of high-voltage box.
32	T2	Temperature sensor 2 of high-voltage box.
13	T3	Temperature sensor 3 of high-voltage box.
33	T4	Temperature sensor 4 of high-voltage box.
14	GND	Common terminal of digital input port.
34		
15	DI1	Digital input port 1.
35	DI2	Digital input port 2.
16	DI3	Digital input port 3.
36	DI4	Digital input port 4.
17	DI5	Digital input port 5.
37	DI6/ADD1_IN	Digital input port 6. Multiplexed with BCU ID automatic coding function, ID automatic coding function is preferred (reserved).
18	DI7/ADD2_IN	Digital input port 7.

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Terminal No.	Definition	Function
		Multiplexed with BMU ID automatic coding function, ID automatic coding function is preferred.
20	ADD2_OUT	Connect ID IN terminal of first BMU slave control module.
39	ADD1_OUT+	Connect ADD1_IN terminal of next BCU master control module.
40	ADD1_OUT-	Used for tertiary BMS system (reserved).
19/23/26/ 27/28/38	NC	Must hang up in the air.

Fig.4 P3 Terminal Description

Table 6 P3 Terminal Description

Terminal No.	Definition	Function
1	P-	External negative sampling input of storage battery.
8	B-	High voltage sampling input of total negative of storage battery.
15	IBAT-	Shunt connects to negative.
16	IBAT+	Shunt connects to positive.
2-7/9-14	NC	Must hang up in the air.

Fig.5 P4 Terminal Description

Table 7 P4 Terminal Description

Terminal No.	Definition	Function
1	B+	High voltage sampling input of total positive of storage battery.
2		

```
2
P+

1
P+
```

Fig.6 P5 Terminal Description

Table 8 P5 Terminal Description

Terminal No.	Definition	Function
1	P+	External positive sampling input of storage battery.
2		

```
2
PE

1
PE
```

Fig.7 P6 Terminal Description

Table 9 P6 Terminal Description

Terminal No.	Definition	Function
1	PE	Metal shell or earth of energy storage system.
2		

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5 OPERATION

5.1 WORKING PROCESS

a) After module is powered on, BMS enters ID automatic coding status, if all BMU modules communicate normally, it will enter BMS standby status, otherwise, it will always wait;

b) In standby status, BMS enters self-check status after no alarm, otherwise, it will always be in standby status;

c) In BMS self-check stage, if the status of master positive and negative relay (if configured) is normal (no bonding), and insulation resistance value is normal (the value is within alarm threshold), it will enter BMS master negative relay closed stage (if configured); otherwise, it will be in the self-check stage for waiting all the time;

d) BMS master negative relay is closed (if configured);

e) In pre-charge stage of BMS, the pre-charge outputs. When the voltage on charging side is greater than or equal to the preset pre-charge voltage or 5-second delay ends, it will enter high voltage power-on stage of BMS (In the case of pre-charge protection enabled, the failure of pre-charge will alarm and BMS will enter the shutdown stage);

f) In the high voltage power-on stage of BMS, after the master positive relay is closed for 500ms, the pre-charge output is disconnected, it will enter the normal running stage of BMS;

g) From the pre-charge stage of BMS to the normal running stage, if the fault alarm triggers the high voltage power-off action, BMS will enter the high voltage power-off stage;

h) When BMS is in the high voltage power-off stage, the master positive relay and master negative relay are disconnected;

i) BMS enters shutdown stage.

NOTE1: The insulation resistor will detect once in power-on, and then detect cyclically in running according to the configuration;

NOTE2: When lock alarms occur or high voltage power-off action of BMS triggers, disconnect the power supply of the module to reset the alarm or click BMS fault reset button via PC to reset alarm after BMS shutdown.

5.2 INTERACTION LOGIC WITH PCS

BCU module communicates with PCS by RS485 port or CAN port, PCS can communicate to request the max. charging/discharging current and the voltage upper limit for charging, voltage lower limit for discharging to adjust the output current (power) of PCS.

The max. charging current/discharging current are related to the specifications of the storage battery cluster cell and the current fault alarm action of BCU (current dropping or high voltage power-off).

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6 FAULT ALARM PROTECTION

BCU has a tertiary fault alarm protection function, which is serious alarm, moderate alarm and mild alarm.

The alarm types can be set to disable, lock, self-reset. When set the alarm type as lock, BCU module needs to be powered off and reset alarm; when set alarm type as self-reset, and alarms reach to return threshold, the alarm will be reset.

The alarm action can be set as warning, current dropping (drop to 50%), current dropping (drop to 80%), current dropping (drop to 100%) and high voltage power-off.

Table 10 Alarm List

No.	Alarm	Alarm Levels		
		Serious	Moderate	Mild
1	Total Volt. High	•	•	•
2	Total Volt. Low	•	•	•
3	Single Volt. High	•	•	•
4	Single Volt. Low	•	•	•
5	Single Volt. Difference Large	•	•	•
6	Charging Over Temp	•	•	•
7	Charging Under Temp	•	•	•
8	Large Temp. Difference	•	•	•
9	Temp. Rise Fast	•	•	•
10	SOC Low	•	•	•
11	Charge Overcurrent	•	•	•
12	Discharge Overcurrent	•	•	•
13	Insulation Resistance Low	•	•	•
14	Single Volt. Sampling Fault	•	•	•
15	Single Temp. Sampling Fault	•	•	•
16	Current Sampling Fault	•	•	•
17	High Volt. Sampling Fault	•	•	•
18	Master Positive Relay Bond	•	•	•
19	Master Negative Relay Bond	•	•	•
20	Master-Slave Comm. Alarm	•	•	•
21	Max. Charging Current Over Limit	•	•	•
22	Max. Discharging Current Over Limit	•	•	•
23	High-voltage Box Temp. High	•	•	•
24	Pre-charge Failure	•	/	/
25	Connector Temp. High	•	•	•
26	Connector Temp. Sensor Open	•	•	•
27	Discharging Temp. High	•	•	•
28	Discharging Temp. Low	•	•	•
29	High-voltage Box Temp. Sensor Open	•	•	•
30	Emergency Stop	•	/	/
31	SOH Low	•	•	•

Table 11 Alarm Details

No.	Type	Description
1	Total Volt. High	When the total voltage of the battery cluster is greater than or equal to the pre-set single threshold of the total voltage high multiplied by the total number of cells, after a continuous set delay time, it will send the alarm signal of total voltage high.
2	Total Volt. Low	When the total voltage of the battery cluster is not 0 and less than or equal to the pre-set single threshold of the total voltage low multiplied by the total number of cells, after a continuous set delay time, it will send the alarm signal of total voltage low.
3	Single Volt. High	When the max. single voltage online is greater than or equal to the pre-set threshold of single max. voltage, after a continuous set delay time, it will send the alarm signal of single voltage high.
4	Single Volt. Low	When the min. single voltage is less than or equal to the pre-set threshold of single min. voltage, after a continuous set delay time, it will send the alarm signal of single voltage low.
5	Single Volt. Difference Large	When the voltage difference between max. single voltage and min. single voltage is greater than or equal to the pre-set threshold of single voltage difference, after a continuous set delay time, it will send the alarm signal of single voltage difference large.
6	Charging Temp. High	When the max. temperature online is greater than or equal to the pre-set threshold of over temperature, after a continuous set delay time, it will send the alarm signal of over temperature.
7	Charging Temp. Low	When the min. temperature online is less than or equal to the pre-set threshold of under temperature, and the set delay time continues after a set delay time, it will send the alarm signal of under temperature.
8	Large Temp Difference	When the difference value between the max. temperature and min. temperature online is greater than or equal to the pre-set threshold of temperature difference, after a continuous set delay time, it will send the alarm signal of large temperature difference.
9	Temp Rise Fast	When the change rate per second of the average temperature online is greater than or equal to the pre-set threshold of temperature rising, after a continuous set delay time, it will send the alarm signal of temperature rise fast.
10	SOC Low	When the SOC of battery cluster is less than or equal to the pre-set threshold of SOC, after a continuous set delay time, it will send the alarm signal of SOC low.
11	Charge Overcurrent	When the battery cluster is charging, the current is greater than or equal to the pre-set threshold of charging overcurrent, after a continuous set delay time, it will send the alarm signal of charging overcurrent.
12	Discharge Overcurrent	When the battery cluster is discharging, the current is greater than or equal to the pre-set threshold of discharging overcurrent, after a continuous set delay time, it will send the alarm signal of discharging overcurrent.

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No.	Type	Description
13	Insulation Resistance Low	When the insulation detection is enabled and the insulation resistance value is detected and the total voltage of battery cluster is greater than or equal to 90V, the insulation rate (the ratio of the min. value (total positive insulation resistance to ground and total negative insulation resistance to ground) to the current total voltage) is less than or equal to the pre-set threshold, after a continuous set delay time, it will send the alarm signal of insulation low.
14	Single Volt. Sampling Fault	When voltage sampling line disconnects and after a continuous set delay time, it will send the alarm signal of voltage sampling fault.
15	Single Temp. Sampling Fault	When temperature sampling line disconnects, and single BMU disconnect temperature is greater than or equal to max value of temperature fault or the number of BMU with temperature disconnection is greater than or equal to the number of BMU with temperature fault, and after a continuous set delay time, it will send the alarm signal of temperature sampling fault.
16	Current Sampling Fault	When the Hall current sensor fails or the connection with module fails, after a continuous set delay time, it will send the alarm signal of current sampling fault.
17	B+ Sampling Fault	When the total voltage of battery cluster is 0, after a continuous set delay time, it will send the alarm signal of B+ sampling fault.
18	Master Positive Relay Bond	When the master contact output of the master positive relay is disconnected, if the auxiliary contact of the master positive relay is still closed, after a continuous set delay time, it will send the alarm signal of master positive relay bond.
19	Master Negative Relay Bond	When the master contact output of the master negative relay is disconnected, if the auxiliary contact of the master negative relay is still closed, after a continuous set delay time, it will send the alarm signal of master negative relay bond.
20	Master-slave Comm. Failure Alarm	When BCU module cannot receive data frames sent by BMU module, after a continuous set delay time, it will send the alarm signal of master-slave communication failure.
21	Max. Charging Current Over Limit	When the battery cluster is in charging status and the charging current is greater than or equal to the limit, the charging current exceeds the set allowed max. charging current, after a continuous set delay time, it will send the alarm signal of max. charging current over limit.
22	Max. Discharging Current Over Limit	When the battery cluster is in discharging status and the discharging current is greater than or equal to the limit, the discharging current exceeds the set allowed max. discharging current, after a continuous set delay time, it will send the alarm signal of max. discharging current over limit.
23	High-Voltage Box Temp. High	When the max. value measured by temperature sensor of high-voltage box exceeds the pre-set threshold, after a continuous set delay time, it will send the alarm signal of temperature high.

No.	Type	Description
24	Pre-charge Failure	When BMS is in the pre-charge stage and the protection enables, if the charging side voltage is still less than the pre-set pre-charge voltage at the end of 5s delay, it will send the alarm signal of pre-charge failure and the BMS will enter the shutdown stage.
25	Connector Temp. High	When the sampling temperature on BMU connector exceeds the preset max. temperature threshold, and lasts for the set delay, it will send a signal of alarm.
26	Connector Temp. Sampling Fault	When the sampling temperature on BMU connector is disconnected, and lasts for the set delay, it will send a signal of alarm.
27	Discharging Temp. High	When the highest temperature of the online cell is greater than or equal to the preset threshold, and lasts for the set delay, it will send a signal of alarm.
28	Discharging Temp. Low	When the lowest temperature of the online cell is less than or equal to the preset threshold, and lasts for the set delay, it will send a signal of alarm.
29	Temp. Sensor Open of High-voltage Box	When the online temperature sampling number of high-voltage box is lower than the preset threshold, and lasts for the set delay, it will send a signal of alarm.
30	Emergency Stop	When the input is set to emergency stop and it is active, it will send a signal of alarm.
31	SOH Low	When the SOH of battery cluster is less than or equal to the pre-set threshold, after a continuous set delay time, it will send the alarm signal of SOH low.
32	BMU Fire	When it is configured for BMU input ports, and it is closed for active, after the input is active, it send a signal of alarm.

7 SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

7.1 CONTENTS AND SCOPES OF PARAMETER SETTING

Table 12 Contents and Scopes of Parameter Setting

No.	Items	Ranges	Defaults	Description
Module Setting				
1	Module Address	(1-254)	1	The address of controller during remote monitoring.
2	Password	(0-65534)	1234	The password to be entered when writing parameter configurations via PC.
3	Data-storage Period	(2-600)s	30	The period of real-time data storage.
4	RS485-2 Communication Baud Rate	(0-2)	0	0: 9600bps 1: 19200bps 2: 115200bps
5	RS485-2 Communication Stop Bit	(0-1)	0	0: 1-bit 1: 2-bit

No.	Items	Ranges	Defaults	Description
6	RS485-2 Parity	(0-2)	0	0: None 1: Odd Parity 2: Even Parity
7	MAC	(0-255)	/	The MAC address, which can only be read.
8		(0-255)	/	
9		(0-255)	/	
10		(0-255)	/	
11		(0-255)	/	
12		(0-255)	/	
13	IP	(0-255)	192	IP address.
14		(0-255)	168	
15		(0-255)	0	
16		(0-255)	2	
17	Subnet Mask	(0-255)	255	
18		(0-255)	255	
19		(0-255)	255	
20		(0-255)	0	
21	Gateway Address	(0-255)	192	
22		(0-255)	168	
23		(0-255)	0	
24		(0-255)	1	
25	Current Range	(10-1000)A	200	
26	Current Sensor Type	(0-4)	0	0: Single Range Hall 1: Shunt 2: can Hall 3: Double Range Hall 4: Reserved
27	Hall Current Sensor Reverse	(0-1)	0	0: Disable 1: Enable
28	Hall Secondary Range	(0-1)	0	0: ±2000mV 1: ±625mV (If you need to adjust something related to hardware, please consult the manufacturer)

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No.	Items	Ranges	Defaults	Description
29	Storage Energy Converter Model	(0-50)	0	0: Not Used 1: INVT 2: Sinexcel 3: Deye High-voltage 4: AiSWEI 5: GROWATT 6: Reserved 7: SG-box 8: GOODWE 9: SCU 10: MEGAREVO 11: INVT PV 12: Reserved 13: Deye Low-voltage 14: APAITEK 15-50: Reserved
30	Insulation Monitoring Set	(0-1)	1	0: Disable 1: Self-adaption (judge after above 120V according to rated voltage)
31	Insulation Detection Interval	(1-2000)min	5	The insulation detection time after BMS normal running.
32	Insulation Detection Mode	(0-1)	1	0: Period Detection 1: Power-on Detection
33	Fan On Temp.	(0-55)°C	35	BCU opens or stops the fan according to the value.
34	Fan Off Temp.	(0-55)°C	25	Fan output can be controlled by BCU output port or BMU output port.
35	Temp. Sensor Number of High-voltage Box	(0-4)	4	Temperature sensor number of high-voltage box.
36	High-voltage Power-off Delay	(0~10)s	0	When BMS enters high-voltage power-off stage, master positive and negative breaker open will delay.
BMU Connection Setting				
1	Same BMU Model	(0-1)	1	0: No 1: Yes When "No" is selected, it needs to set single voltage number and temperature number of each BMU. When "Yes" is selected, all BMU single voltage and temperature numbers can use the setting value of BMU1.
2	BMU Connector Temperature	(0-1)	0	0: Disable 1: Enable
3	BMU Number	(1-32)	15	BMU number of battery cluster.

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No.	Items	Ranges	Defaults	Description
4	BMU1 Single Voltage Number	(1-64)	16	
5	BMU1 Temperature Number	(1-64)	8	
6	BMU2 Single Voltage Number	(1-64)	16	
7	BMU2 Temperature Number	(1-64)	8	
8	BMU3 Single Voltage Number	(1-64)	16	
9	BMU3 Temperature Number	(1-64)	8	
10	BMU4 Single Voltage Number	(1-64)	16	
11	BMU4 Temperature Number	(1-64)	8	
12	BMU5 Single Voltage Number	(1-64)	16	
13	BMU5 Temperature Number	(1-64)	8	
14	BMU6 Single Voltage Number	(1-64)	16	
15	BMU6 Temperature Number	(1-64)	8	
16	BMU7 Single Voltage Number	(1-64)	16	
17	BMU7 Temperature Number	(1-64)	8	
18	BMU8 Single Voltage Number	(1-64)	16	
19	BMU8 Temperature Number	(1-64)	8	
20	BMU9 Single Voltage Number	(1-64)	16	
21	BMU9 Temperature Number	(1-64)	8	
22	BMU10 Single Voltage Number	(1-64)	16	
23	BMU10 Temperature Number	(1-64)	8	
24	BMU11 Single Voltage Number	(1-64)	16	

No.	Items	Ranges	Defaults	Description
25	BMU11 Temperature Number	(1-64)	8	
26	BMU12 Single Voltage Number	(1-64)	16	
27	BMU12 Temperature Number	(1-64)	8	
28	BMU13 Single Voltage Number	(1-64)	16	
29	BMU13 Temperature Number	(1-64)	8	
30	BMU14 Single Voltage Number	(1-64)	16	
31	BMU14 Temperature Number	(1-64)	8	
32	BMU15 Single Voltage Number	(1-64)	16	
33	BMU15 Temperature Number	(1-64)	8	
34	BMU16 Single Voltage Number	(1-64)	1	
35	BMU16 Temperature Number	(1-64)	1	
36	BMU17 Single Voltage Number	(1-64)	1	
37	BMU17 Temperature Number	(1-64)	1	
38	BMU18 Single Voltage Number	(1-64)	1	
39	BMU18 Temperature Number	(1-64)	1	
40	BMU19 Single Voltage Number	(1-64)	1	
41	BMU19 Temperature Number	(1-64)	1	
42	BMU20 Single Voltage Number	(1-64)	1	

No.	Items	Ranges	Defaults	Description
43	BMU20 Temperature Number	(1-64)	1	
44	BMU21 Single Voltage Number	(1-64)	1	
45	BMU21 Temperature Number	(1-64)	1	
46	BMU22 Single Voltage Number	(1-64)	1	
47	BMU22 Temperature Number	(1-64)	1	
48	BMU23 Single Voltage Number	(1-64)	1	
49	BMU23 Temperature Number	(1-64)	1	
50	BMU24 Single Voltage Number	(1-64)	1	
51	BMU24 Temperature Number	(1-64)	1	
52	BMU25 Single Voltage Number	(1-64)	1	
53	BMU25 Temperature Number	(1-64)	1	
54	BMU26 Single Voltage Number	(1-64)	1	
55	BMU26 Temperature Number	(1-64)	1	
56	BMU27 Single Voltage Number	(1-64)	1	
57	BMU27 Temperature Number	(1-64)	1	
58	BMU28 Single Voltage Number	(1-64)	1	
59	BMU28 Temperature Number	(1-64)	1	
60	BMU29 Single Voltage Number	(1-64)	1	

No.	Items	Ranges	Defaults	Description
61	BMU29 Temperature Number	(1-64)	1	
62	BMU30 Single Voltage Number	(1-64)	1	
63	BMU30 Temperature Number	(1-64)	1	
64	BMU31 Single Voltage Number	(1-64)	1	
65	BMU31 Temperature Number	(1-64)	1	
66	BMU32 Single Voltage Number	(1-64)	1	
67	BMU32 Temperature Number	(1-64)	1	
Battery Cluster Setting				
1	Rated Voltage	(50.0-1500.0)V	768.0	
2	Percentage of Pre-charge Voltage	(50-100)%	95	In the pre-charge stage of BMS, the pre-charge output will be disconnected only when the pre-charge voltage reaches this value.
3	Nominal Capacity	(1-1000.0)Ah	280.0	The standard design capacity of the storage system.
4	Total Actual Capacity	(1-1000.0)Ah	280.0	The max. factory capacity of the storage system
5	Pre-charge Protection Enable	(0-1)	1	0: Disable 1: Enable
6	Rated Charging Current	(1-1000.0)A	140	
7	Rated Discharging Current	(1-1000.0)A	140	
8	Min. Current of Charging over Limit Detection	(0.1-10.0)A	1.0	When charging current is greater than or equal to this value, the over limit alarm detection is active.
9	Min. Current of Discharging over Limit Detection	(0.1-10.0)A	1.0	When discharging current is greater than or equal to this value, the over limit alarm detection is active.
10	Zero Current	(0-50.0)A	0.5	Allowed max. deviation when the current is 0.
11	System Nominal Energy	(0-2000.0)kWh	214.5	The nominal energy of energy storage system, which is used for display.

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No.	Items	Ranges	Defaults	Description
Aux. Input Setting				
Input Port 1				
1	Content	(0-13)	1	Master positive relay closed input. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 2				
1	Content	(0-13)	2	Master negative relay closed input. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 3				
1	Content	(0-13)	3	Emergency stop input. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 4				
1	Content	(0-13)	0	Not used. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 5				
1	Content	(0-13)	0	Not used. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 6				
1	Content	(0-13)	0	Not used. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Input Port 7				
1	Content	(0-13)	0	Not used. See Table 15.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
BMU Input1				
1	Content	(0-5)	0	Not used. See Table 16.
2	Active Type	(0-1)	0	0: Closed; 1: Open.
Aux. Output Setting				
Output Port 1				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	1	Master positive relay output. See Table 14.
Output Port 2				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	2	Pre-charge output. See Table 14.
Output Port 3				
1	Output Type	(0-1)	0	0: NO; 1: NC

No.	Items	Ranges	Defaults	Description
2	Content	(0-50)	0	Not used. See Table 14.
Output Port 4				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	4	Alarm indicator output. See Table 14.
Output Port 5				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	8	Running output. See Table 14.
Output Port 6				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	0	Not used. See Table 14.
Output Port 7				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	0	Not used. See Table 14.
Output Port 8				
1	Output Type	(0-1)	0	0: NO; 1: NC
2	Content	(0-50)	0	Not used. See Table 14.
Charging and SOC Setting				
1	Balanced Volt.	(0-5000)mV	3450	The passive balanced voltage of the battery.
2	Charging Volt. Upper Limit	(40.0-2000.0)V	864.0	The upper limit of charging voltage sent to PCS.
3	Discharging Volt. Lower Limit	(40.0-2000.0)V	672.0	The lower limit of discharging voltage sent to PCS.
4	Forced Charging SOC Request	(0-80.0)%	10.0	Used for protocol of INVT converter.
5	Single Voltage of Forced Charging Request	(0-5000)mV	2800	Used for protocol of INVT converter.
6	Forced Charging SOC Stop	(0-80.0)%	30.0	Used for protocol of INVT converter.
7	Full Charging of Single Volt.	(2000-5000)mV	3600	
8	Return Diff. of Full Charging Volt.	(0-1000)mV	100	Return difference of full charging voltage when charging is enabled. **NOTE:** Return difference=single voltage of full charging - single voltage return value of full charging.

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No.	Items	Ranges	Defaults	Description
9	Current Dropping Voltage 1 at Charging End	(2000-5000)mV	3500	When max. single voltage is greater than or equal to current dropping voltage 1, charging current dropping begins.
10	Current Dropping Coefficient 1 at Charging End	(0-100)%	50	Max. charging current is less than or equal to (current dropping coefficient 1*rated charging current).
11	Current Dropping Voltage 1 Return Diff. at Charging End	(0-1000)mV	100	When it reaches return difference of current dropping voltage1, current dropping restores. **NOTE:** Return difference= current dropping voltage at charging end − return value of current dropping voltage at charging end.
12	Current Dropping Voltage 2 at Charging End	(2000-5000)mV	3550	When max. single voltage is greater than or equal to current dropping voltage 2, charging current dropping begins.
13	Current Dropping Coefficient 2 at Charging End	(0-100)%	25	Max. charging current is less than or equal to (current dropping coefficient 2*rated charging current).
14	Current Dropping Voltage 2 Return Diff. at Charging End	(0-1000)mV	100	When it reaches return difference of current dropping voltage2, current dropping restores. **NOTE:** Return difference= current dropping voltage at charging end − return value of current dropping voltage at charging end.
15	Full Charging Interval	(0-60)min	1	The interval time of next charging after current fully-charging.
16	Current Dropping Voltage 1 at Discharging End	(2000-5000)mV	2900	When min. single voltage is greater than or equal to current dropping voltage 1, discharging current dropping begins.
17	Current Dropping Coefficient 1 at Discharging End	(0-100)%	50	Max. discharging current is less than or equal to (current dropping coefficient 1*rated discharging current).
18	Current Dropping Voltage 2 at Discharging End	(2000-5000)mV	2750	When min. single voltage is greater than or equal to current dropping voltage 2, discharging current dropping begins.
19	Current Dropping Coefficient 2 at Discharging End	(0-100)%	25	Max. discharging current is less than or equal to (current dropping coefficient 2*rated discharging current).
20	Full Discharging Voltage	(2000-5000)mV	2600	When min. single voltage is less than or equal to this value, the max. discharging current is 0.
21	Min. Volt Difference of Balance Open	(0-500)mV	20	When cell voltage difference is greater than or equal to the value, balance opens.
22	Max. Volt Difference of Balance Open	(0-1000)mV	500	When cell voltage difference is less than or equal to the value, balance opens.

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No.	Items		Ranges	Defaults	Description
23	Min. Volt of Balance Close		(0-5000)mV	2750	Min. single voltage in balance closing.
24	Max. Volt of Balance Close		(0-60)°C	50	Max. single voltage in balance closing.
Protection Parameter Setting					
Total Voltage High					
1	Alarm 1	Type	(0-2)	2	See Table 13 for details
2		Action	(0-12)	0	
3		Set Value	(0-5000)mV	3550	
4		Return Value	(0-5000)mV	3450	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	3	
9		Set Value	(0-5000)mV	3600	
10		Return Value	(0-5000)mV	3500	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-5000)mV	3650	
16		Return Value	(0-5000)mV	3550	
17		Action Delay Value	(0-6000.0)s	2.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Total Voltage Low					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-5000)mV	2800	

No.	Items		Ranges	Defaults	Description
4		Return Value	(0-5000)mV	2900	
5		Action Delay Value	(0-6000.0)s	10.0	
6		Return Delay Value	(0-6000.0)s	10.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	6	
9		Set Value	(0-5000)mV	2600	
10		Return Value	(0-5000)mV	2800	
11		Action Delay Value	(0-6000.0)s	10.0	
12		Return Delay Value	(0-6000.0)s	10.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-5000)mV	2500	
16		Return Value	(0-5000)mV	2600	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Single Battery Voltage Difference Large					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-5000)mV	300	
4		Return Value	(0-5000)mV	200	
5		Action Delay Value	(0-6000.0)s	30.0	
6		Return Delay Value	(0-6000.0)s	30.0	

No.	Items		Ranges	Defaults	Description
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	7	
9		Set Value	(0-5000)mV	500	
10		Return Value	(0-5000)mV	300	
11		Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	
13	Alarm 3	Type	(0-2)	2	
14		Action	(0-12)	12	
15		Set Value	(0-5000)mV	1500	
16		Return Value	(0-5000)mV	700	
17		Action Delay Value	(0-6000.0)s	30.0	
18		Return Delay Value	(0-6000.0)s	30.0	
Single Battery Over Voltage					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-5000)mV	3550	
4		Return Value	(0-5000)mV	3450	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	3	
9		Set Value	(0-5000)mV	3600	
10		Return Value	(0-5000)mV	3500	

No.	Items		Ranges	Defaults	Description
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-5000)mV	3650	
16		Return Value	(0-5000)mV	3550	
17		Action Delay Value	(0-6000.0)s	2.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Single Battery Under Voltage					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-5000)mV	2800	
4		Return Value	(0-5000)mV	2900	
5		Action Delay Value	(0-6000.0)s	10.0	
6		Return Delay Value	(0-6000.0)s	10.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	6	
9		Set Value	(0-5000)mV	2600	
10		Return Value	(0-5000)mV	2800	
11		Action Delay Value	(0-6000.0)s	10.0	
12		Return Delay Value	(0-6000.0)s	10.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-5000)mV	2500	

No.	Items		Ranges	Defaults	Description
16		Return Value	(0-5000)mV	2600	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Charging Temperature High					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	50.0	
4		Return Value	(-40.0-125.0)°C	45.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	2	
9		Set Value	(-40.0-125.0)°C	55.0	
10		Return Value	(-40.0-125.0)°C	50.0	
11		Action Delay Value	(0-6000.0)s	3.0	
12		Return Delay Value	(0-6000.0)s	4.0	
13	Alarm 3	Type	(0-2)	2	
14		Action	(0-12)	3	
15		Set Value	(-40.0-125.0)°C	60.0	
16		Return Value	(-40.0-125.0)°C	55.0	
17		Action Delay Value	(0-6000.0)s	3.0	
18		Return Delay Value	(0-6000.0)s	2.0	
Discharging Temperature High					
1	Alarm	Type	(0-2)	2	

No.	Items		Ranges	Defaults	Description
2	1	Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	50.0	
4		Return Value	(-40.0-125.0)°C	45.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	2	
9		Set Value	(-40.0-125.0)°C	55.0	
10		Return Value	(-40.0-125.0)°C	50.0	
11		Action Delay Value	(0-6000.0)s	3.0	
12		Return Delay Value	(0-6000.0)s	4.0	
13	Alarm 3	Type	(0-2)	2	
14		Action	(0-12)	3	
15		Set Value	(-40.0-125.0)°C	60.0	
16		Return Value	(-40.0-125.0)°C	55.0	
17		Action Delay Value	(0-6000.0)s	3.0	
18		Return Delay Value	(0-6000.0)s	2.0	
Charging Temperature Low					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	5.0	
4		Return Value	(-40.0-125.0)°C	10.0	
5		Action Delay Value	(0-6000.0)s	6.0	
6		Return Delay Value	(0-6000.0)s	6.0	

No.	Items		Ranges	Defaults	Description
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	2	
9		Set Value	(-40.0-125.0)°C	0.0	
10		Return Value	(-40.0-125.0)°C	5.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	2	
14		Action	(0-12)	3	
15		Set Value	(-40.0-125.0)°C	-5.0	
16		Return Value	(-40.0-125.0)°C	0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Discharging Temperature Low					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	-10.0	
4		Return Value	(-40.0-125.0)°C	-5.0	
5		Action Delay Value	(0-6000.0)s	6.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	2	
9		Set Value	(-40.0-125.0)°C	-15.0	
10		Return Value	(-40.0-125.0)°C	-10.0	
11		Action Delay Value	(0-6000.0)s	5.0	

No.	Items		Ranges	Defaults	Description
12		Return Delay Value	(0-6000.0)s	6.0	
13		Type	(0-2)	2	
14		Action	(0-12)	3	
15		Set Value	(-40.0-125.0)°C	-20.0	
16	Alarm 3	Return Value	(-40.0-125.0)°C	-15.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Temperature Difference Large					
1		Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0.0-125.0)°C	8.0	
4		Return Value	(0.0-125.0)°C	5.0	
5	Alarm 1	Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7		Type	(0-2)	2	
8		Action	(0-12)	7	
9		Set Value	(0.0-125.0)°C	10.0	
10		Return Value	(0.0-125.0)°C	8.0	
11	Alarm 2	Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13		Type	(0-2)	2	
14		Action	(0-12)	9	
15	Alarm 3	Set Value	(0.0-125.0)°C	15.0	
16		Return Value	(0.0-125.0)°C	10.0	

No.	Items		Ranges	Defaults	Description
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Temperature Rise Fast					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-200)°C/s	4.0	
4		Return Value	(0-200)°C/s	1.0	
5		Action Delay Value	(0-6000.0)s	0.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	9	
9		Set Value	(0-200)°C/s	6.0	
10		Return Value	(0-200)°C/s	1.0	
11		Action Delay Value	(0-6000.0)s	0.5	
12		Return Delay Value	(0-6000.0)s	5.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-200)°C /s	8.0	
16		Return Value	(0-200)°C /s	1.0	
17		Action Delay Value	(0-6000.0)s	0.5	
18		Return Delay Value	(0-6000.0)s	10.0	
Charge Overcurrent					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0.0-1000.0)%	105.0	

No.	Items		Ranges	Defaults	Description
4		Return Value	(0.0-1000.0)%	100.0	
5		Action Delay Value	(0-6000.0)s	30.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	1	
9		Set Value	(0.0-1000.0)%	120.0	
10		Return Value	(0.0-1000.0)%	110.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	5.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0.0-1000.0)%	150.0	
16		Return Value	(0.0-1000.0)%	140.0	
17		Action Delay Value	(0-6000.0)s	0.5	
18		Return Delay Value	(0-6000.0)s	5.0	
Discharge Overcurrent					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0.0-1000.0)%	105.0	
4		Return Value	(0.0-1000.0)%	100.0	
5		Action Delay Value	(0-6000.0)s	30.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	1	

No.	Items		Ranges	Defaults	Description
9		Set Value	(0.0-1000.0)%	120.0	
10		Return Value	(0.0-1000.0)%	110.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	5.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0.0-1000.0)%	150.0	
16		Return Value	(0.0-1000.0)%	140.0	
17		Action Delay Value	(0-6000.0)s	0.5	
18		Return Delay Value	(0-6000.0)s	5.0	
SOC Low					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-100.0)%	20.0	
4		Return Value	(0-100.0)%	22.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(0-100.0)%	10.0	
10		Return Value	(0-100.0)%	12.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm	Type	(0-2)	2	

No.	Items		Ranges	Defaults	Description
14	3	Action	(0-12)	9	
15		Set Value	(0-100.0)%	0.0	
16		Return Value	(0-100.0)%	10.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
SOH Low					
1	Alarm 1	Type	(0-2)	0	
2		Action	(0-12)	0	
3		Set Value	(0-100.0)%	20.0	
4		Return Value	(0-100.0)%	22.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(0-100.0)%	10.0	
10		Return Value	(0-100.0)%	12.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	0	
14		Action	(0-12)	0	
15		Set Value	(0-100.0)%	0.0	
16		Return Value	(0-100.0)%	10.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	

SmartGen

No.	Items		Ranges	Defaults	Description
Insulation Resistance Low					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(0-10000)Ω/V	1000	
4		Return Value	(0-10000)Ω/V	2000	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(0-10000)Ω/V	500	
10		Return Value	(0-10000)Ω/V	2000	
11		Action Delay Value	(0-6000.0)s	1.0	
12		Return Delay Value	(0-6000.0)s	2.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(0-10000)Ω/V	200	
16		Return Value	(0-10000)Ω/V	500	
17		Action Delay Value	(0-6000.0)s	1.0	
18		Return Delay Value	(0-6000.0)s	10.0	
Voltage Sampling Fault					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Action Delay Value	(0-6000.0)s	1.0	
4		Return Delay Value	(0-6000.0)s	5.0	
5	Alarm	Type	(0-2)	2	

No.	Items		Ranges	Defaults	Description
6	2	Action	(0-12)	9	
7		Action Delay Value	(0-6000.0)s	2.0	
8		Return Delay Value	(0-6000.0)s	10.0	
9		Type	(0-2)	1	
10		Action	(0-12)	12	
11	Alarm 3	Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	
Temperature Sampling Fault					
1	Max Value of Single BMU Temp. Fault	/	(1-5)	1	When the number of single BMU temperature fault or the number of BMU temperature fault is greater or equal to the set value, temperature sampling fault is triggered.
2	Total BMU with Temp. Fault	/	(1-3)	1	
3		Type	(0-2)	2	
4		Action	(0-12)	0	
5	Alarm 1	Action Delay Value	(0-6000.0)s	1.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7		Type	(0-2)	2	
8		Action	(0-12)	9	
9	Alarm 2	Action Delay Value	(0-6000.0)s	5.0	
10		Return Delay Value	(0-6000.0)s	10.0	
11	Alarm	Type	(0-2)	1	

No.	Items		Ranges	Defaults	Description
12	3	Action	(0-12)	12	
13		Action Delay Value	(0-6000.0)s	30.0	
14		Return Delay Value	(0-6000.0)s	30.0	
Current Sampling Fault					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Action Delay Value	(0-6000.0)s	30.0	
4		Return Delay Value	(0-6000.0)s	30.0	
5	Alarm 2	Type	(0-2)	0	
6		Action	(0-12)	0	
7		Action Delay Value	(0-6000.0)s	30.0	
8		Return Delay Value	(0-6000.0)s	30.0	
9	Alarm 3	Type	(0-2)	1	
10		Action	(0-12)	12	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	10.0	
B+ Sampling Fault					
1	Alarm 1	Type	(0-2)	0	
2		Action	(0-12)	0	
3		Action Delay Value	(0-6000.0)s	30.0	
4		Return Delay Value	(0-6000.0)s	30.0	
5	Alarm 2	Type	(0-2)	0	
6		Action	(0-12)	0	

No.	Items		Ranges	Defaults	Description
7		Action Delay Value	(0-6000.0)s	30.0	
8		Return Delay Value	(0-6000.0)s	30.0	
9		Type	(0-2)	1	
10		Action	(0-12)	12	
11	Alarm 3	Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	
Master-Slave Communication Fault					
1		Type	(0-2)	2	
2		Action	(0-12)	0	
3	Alarm 1	Action Delay Value	(0-6000.0)s	1.0	
4		Return Delay Value	(0-6000.0)s	30.0	
5		Type	(0-2)	2	
6		Action	(0-12)	9	
7	Alarm 2	Action Delay Value	(0-6000.0)s	3.0	
8		Return Delay Value	(0-6000.0)s	30.0	
9		Type	(0-2)	1	
10		Action	(0-12)	12	
11	Alarm 3	Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	5.0	
Master Positive Relay Bond					
1	Alarm 1	Type	(0-2)	1	
2		Action	(0-12)	12	

No.	Items		Ranges	Defaults	Description
3		Action Delay Value	(0-6000.0)s	1.0	
4		Return Delay Value	(0-6000.0)s	3000.0	
5	Alarm 2	Type	(0-2)	1	
6		Action	(0-12)	12	
7		Action Delay Value	(0-6000.0)s	1.0	
8		Return Delay Value	(0-6000.0)s	3000.0	
9	Alarm 3	Type	(0-2)	1	
10		Action	(0-12)	12	
11		Action Delay Value	(0-6000.0)s	1.0	
12		Return Delay Value	(0-6000.0)s	3000.0	
Master Negative Relay Bond					
1	Alarm 1	Type	(0-2)	1	
2		Action	(0-12)	12	
3		Action Delay Value	(0-6000.0)s	1.0	
4		Return Delay Value	(0-6000.0)s	3000.0	
5	Alarm 2	Type	(0-2)	1	
6		Action	(0-12)	12	
7		Action Delay Value	(0-6000.0)s	1.0	
8		Return Delay Value	(0-6000.0)s	3000.0	
9	Alarm 3	Type	(0-2)	1	
10		Action	(0-12)	12	
11		Action Delay Value	(0-6000.0)s	1.0	

No.	Items		Ranges	Defaults	Description
12		Return Delay Value	(0-6000.0)s	3000.0	
Max. Charging Current Over Limit					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(50.0-200.0)%	110.0	
4		Return Value	(50.0-200.0)%	100.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(50.0-200.0)%	120.0	
10		Return Value	(50.0-200.0)%	100.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(50.0-200.0)%	130.0	
16		Return Value	(50.0-200.0)%	100.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
Max. Discharging Current Over Limit					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(50.0-200.0)%	110.0	
4		Return Value	(50.0-200.0)%	100.0	

No.	Items		Ranges	Defaults	Description
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	6.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(50.0-200.0)%	120.0	
10		Return Value	(50.0-200.0)%	100.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	6.0	
13	Alarm 3	Type	(0-2)	1	
14		Action	(0-12)	12	
15		Set Value	(50.0-200.0)%	130.0	
16		Return Value	(50.0-200.0)%	100.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	6.0	
High-voltage Box Temperature High					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	65.0	
4		Return Value	(-40.0-125.0)°C	55.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7	Alarm 2	Type	(0-2)	2	
8		Action	(0-12)	7	
9		Set Value	(-40.0-125.0)°C	70.0	

No.	Items		Ranges	Defaults	Description
10		Return Value	(-40.0-125.0)°C	60.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	5.0	
13	Alarm 3	Type	(0-2)	2	
14		Action	(0-12)	9	
15		Set Value	(-40.0-125.0)°C	75	
16		Return Value	(-40.0-125.0)°C	65	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	10.0	
High-voltage Box Temperature Sampling Fault					
1	Alarm 1	Type	(0-2)	2	
2		Action	(0-12)	0	
3		Action Delay Value	(0-6000.0)s	5.0	
4		Return Delay Value	(0-6000.0)s	5.0	
5	Alarm 2	Type	(0-2)	0	
6		Action	(0-12)	0	
7		Action Delay Value	(0-6000.0)s	10.0	
8		Return Delay Value	(0-6000.0)s	10.0	
9	Alarm 3	Type	(0-2)	1	
10		Action	(0-12)	12	
11		Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	

No.	Items		Ranges	Defaults	Description
Connector Temperature High					
1	Alarm 1	Type	(0-2)	0	
2		Action	(0-12)	0	
3		Set Value	(-40.0-125.0)°C	65.0	
4		Return Value	(-40.0-125.0)°C	55.0	
5		Action Delay Value	(0-6000.0)s	5.0	
6		Return Delay Value	(0-6000.0)s	5.0	
7	Alarm 2	Type	(0-2)	0	
8		Action	(0-12)	0	
9		Set Value	(-40.0-125.0)°C	70.0	
10		Return Value	(-40.0-125.0)°C	60.0	
11		Action Delay Value	(0-6000.0)s	5.0	
12		Return Delay Value	(0-6000.0)s	5.0	
13	Alarm 3	Type	(0-2)	0	
14		Action	(0-12)	0	
15		Set Value	(-40.0-125.0)°C	75.0	
16		Return Value	(-40.0-125.0)°C	65.0	
17		Action Delay Value	(0-6000.0)s	5.0	
18		Return Delay Value	(0-6000.0)s	10.0	
Connector Temperature Sampling Fault					
1	Alarm 1	Type	(0-2)	0	
2		Action	(0-12)	0	
3		Action Delay Value	(0-6000.0)s	5.0	
4		Return Delay Value	(0-6000.0)s	5.0	
5	Alarm	Type	(0-2)	0	

No.		Items	Ranges	Defaults	Description
6	2	Action	(0-12)	0	
7		Action Delay Value	(0-6000.0)s	10.0	
8		Return Delay Value	(0-6000.0)s	10.0	
9		Type	(0-2)	0	
10		Action	(0-12)	4	
11	Alarm 3	Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	
BMU Fire Alarm					
1		Type	(0-2)	2	
2		Action	(0-12)	0	
3	Alarm 1	Action Delay Value	(0-6000.0)s	5.0	
4		Return Delay Value	(0-6000.0)s	5.0	
5		Type	(0-2)	2	
6		Action	(0-12)	0	
7	Alarm 2	Action Delay Value	(0-6000.0)s	10.0	
8		Return Delay Value	(0-6000.0)s	10.0	
9		Type	(0-2)	1	
10		Action	(0-12)	12	
11	Alarm 3	Action Delay Value	(0-6000.0)s	30.0	
12		Return Delay Value	(0-6000.0)s	30.0	

7.2 ALARM SETTING

Table 13 Alarm Setting Contents

No.	Item	Setting	Description
1	Alarm Type	0: Disable 1: Lock 2: Self-reset	
2	Alarm Action	0: Warning 1: Charging Current Drop 50% 2: Charging Current Drop 80% 3: Charging Current Drop 100% 4: Discharging Current Drop 50% 5: Discharging Current Drop 80% 6: Discharging Current Drop 100% 7: Current Drop 50% 8: Current Drop 80% 9: Current Drop 100% 10: Reserved 11: Reserved 12: High voltage power-off	Corresponding action in alarm occurring.
3	Set Value		Alarm threshold.
4	Return Value		The reset threshold value of alarm when alarm type is "Warning".
5	Action Delay Value		Alarm delay value.
6	Return Delay Value		Alarm reset delay value.

7.3 DEFINED CONTENTS OF PROGRAMMABLE OUTPUT PORTS 1~8

Table 14 Defined Contents of Programmable Output Ports 1~8

No.	Items	Function Description
0	Not Used	Not Used.
1	Master Positive Relay Output	BMS outputs between the high voltage power on and power off.
2	Pre-charge Output	BMS outputs in pre-charge stage.
3	Reserved	
4	Alarm Indicator Output	Output when the module has serious alarm, moderate alarm, mild alarm.
5	Reserved	

No.	Items	Function Description
6	Reserved	
7	Master Negative Relay Output	Master negative relay outputs.
8	Running Output	Output when BCU module is power on.
9	Remote Control Output	When it is configured this function, it can output by PC software.
10	Charging Indication	Output in charging.
11	Discharging Indication	Output in discharging.
12	Serious Alarm	
13	Moderate Alarm	
14	Mild Alarm	
15-50	Reserved	

7.4 DEFINED CONTENTS OF DIGITAL INPUT PORTS 1~7

Table 15 Defined Contents of Digital Input Port 1~7 (All GND Connected Active)

No.	Items	Function Description
0	Not Used	
1	Master Positive Relay Closing Input	It is used for detecting whether the master positive relay is bond.
2	Master Negative Relay Closing Input	When output port is configured as "Master Negative Output", whether the master negative relay is bond could be detected.
3	Emergency Stop Input	When the input is active, BMS enters high-voltage power-off.
4~13	Reserved	

7.5 BMU DEFINED CONTENTS OF DIGITAL INPUT PORTS

Table 16 BMU Defined Contents of Digital Input Ports (All BMU GND Connected Active)

No.	Items	Function Description
0	Not Used	
1	BMU Fire Alarm Input	It is used for configuring slave BMU input ports that can detect whether fire alarm occurs in the module.
2~5	Reserved	

8 PARAMETER SETTING

The configured parameter of module can be configured by PC software. Enter "01234" can set all parameter items. When the default password (01234) is changed, setting parameter by PC software need inputting the same password as the controller. When there are more items need to be set (i.e Voltage and Current Calibration) or the password is forgotten, please contact with manufacturer.
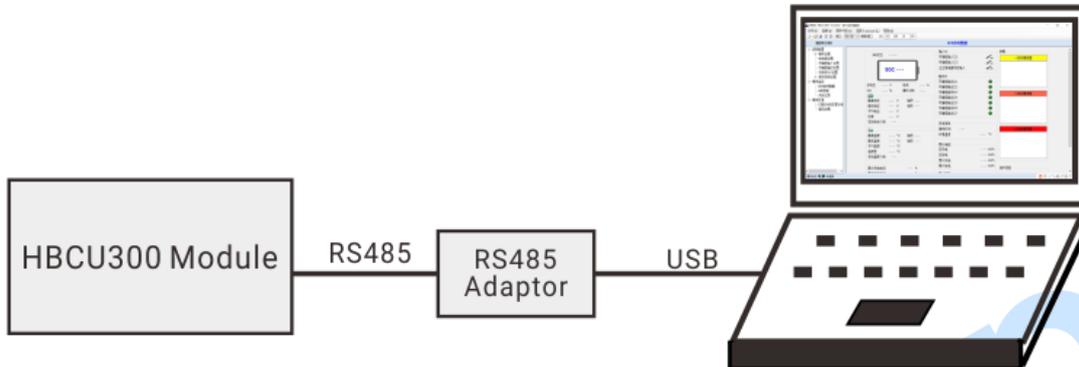

Fig.8 PC Connection Diagram

NOTES:

a) The high threshold value must be greater than the low threshold value, for example, the overvoltage threshold value must be greater than the under voltage threshold value, otherwise, both overvoltage and under voltage will occur.

b) When setting the self-reset alarm, please set the return value correctly, otherwise, the normal alarm will not occur. If the threshold value is set too high, the return value should be less than the set value, and if the threshold value is set too low, the return value should be greater than the set value.

c) The Aux. input ports cannot be set as the same item, otherwise the correct function will not occur, while the Aux. output ports can be set as the same items.
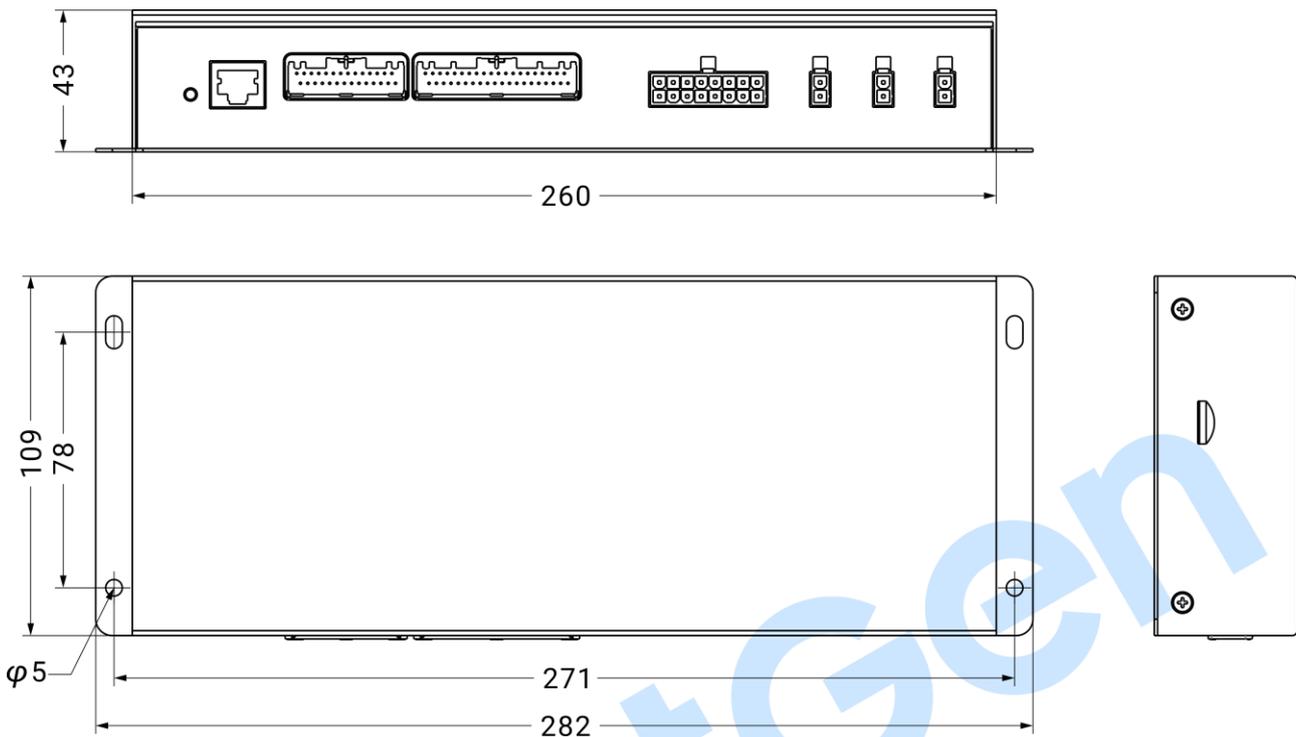
9 OVERALL DIMENSIONS AND PANEL CUTOUT

Unit: mm

Fig.9 Overall Dimensions and Panel Cutout

10 ETHERNET INTERFACE

10.1 ILLUSTRATION

ETHERNET interface is used for monitoring of battery cluster to realize the network client connection。

⚠**NOTE:** After changing the network parameters (such as IP address and subnet mask), the new parameter will be active only after the controller is power off and power on again.

10.2 NETWORK CLIENT CONNECTION

BCU module acts as the server, and the users monitor the controller by using TCP MODBUS protocol through the netwok interface.

The steps are as follows:

——Set the IP address and subnet mask of the controller. The IP address should be in the same network segment and different from the IP address used by the monitoring device (such as PC), for instance, If the IP address of the monitoring device is 192.168.0.16, the IP address of the controller can be set as 192.168.0.18 and the subnet mask is 255.255.255.0;

——Connect the controller. The monitoring device can be directly connected with the controller by using the network cable or through the switch;

——The monitoring device uses TCP MODBUS protocol to communicate with controller.

⚠**NOTE:** The parameter of controller can be set by this connection mode. The test software provided by our company can be connected in this way, and the communication protocol can be obtained from relavant staff from our company.

10.3 DESCRIPTION OF NETWORK CONNECTION

Table 17 Definition of Controller Network Interface

No.	Definition	Description
1	TX+	Tranceive Data+ (Sending Data+)
2	TX-	Tranceive Data- (Sending Data -)
3	RX+	Receive Data+ (Receiving Data+)
4	NC	
5	NC	
6	RX-	Receive Data- (Receiving Data-)
7	NC	
8	NC	

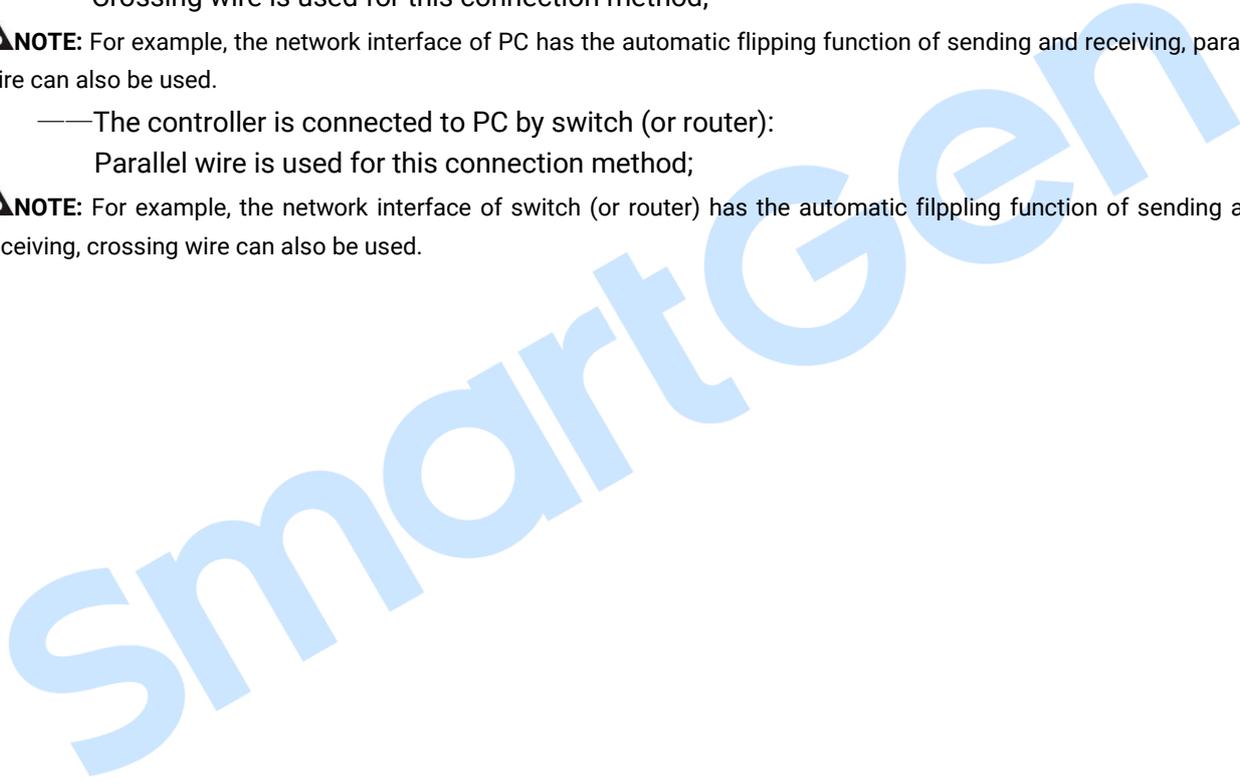——The controller is directly connected to PC only by using a network cable:

Crossing wire is used for this connection method;

⚠**NOTE:** For example, the network interface of PC has the automatic flipping function of sending and receiving, parallel wire can also be used.

——The controller is connected to PC by switch (or router):

Parallel wire is used for this connection method;

⚠**NOTE:** For example, the network interface of switch (or router) has the automatic filppling function of sending and receiving, crossing wire can also be used.

11 SYSTEM TYPICAL APPLICATION DIAGRAM

Fig.10 HBCU300 Application Diagram

Fig.11 BCU and BMU Communication Diagram

12 COMMISSIONING

It is recommended to do the following checks before the system is operating:
——Check all the wirings are correct and the diameters are suitable;
——Test a single battery module to ensure that the voltage and temperature data of the cell are within the normal range;
——After the system is power on, check the insulation resistance value of the total positive and negative of the battery cluster to ground is within the normal range;
——Conduct a full charge/discharge test on the battery cluster to ensure that the battery cluster can stop charging and discharging when it is fully charged normally;
Please contact our service personnel in time if there is any question.

13 TROUBLESHOOTING

Table 18 Troubleshooting

Fault Symptom	Possible Measurement
Controller no response when power on	Check controller wirings; Check if there is voltage output of power supply module;
BMS always in ID assigning	Check wirings of ID auto-coding; Check if BMU number setting is consistent with actual using number.
RS485 communication failure	Check the wirings; Check if the settings of COM port are correct; Check if A and B of RS485 are reversely connected; Check if the communication port of PC is damaged; A 120Ω resistor is recommended to connect between A&B of RS485.
CAN communication failure	Check the wirings; Check if the wirings between CANH and CANL are reversely connected; A 120Ω resistor is recommended to connect between CANH and CANL.

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