HBCU100/HBMU100
BATTERY MANAGEMENT SYSTEM
USER MANUAL

HBCU100 Master Control Module

HBMU100 Slave Control Module

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CONTENT

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Table 1 Software Version

Date	Version	Note
2022-08-15	1.0	Original release.
2023-05-29	1.1	Modify the wrong descriptions of terminal definition for HBCU100; Add CAN2 interface and diverter sampling interfaces for HBCU100; Modify the wrong terminal number of HBCU100 application diagram.

Table 2 Notation Clarification

Sign	Instruction
⚠NOTE	Highlights an essential element of a procedure to ensure correctness.
⚠CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
☠WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

Glossary and List of Abbreviations

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

HBCU100/HBMU100 Battery Management System (i.e. BMS) is a significant part of the storage battery cabinet, which can manage the battery system safely, realiably and efficiently. BMS collects the voltage and temperature of the single cell of the battery 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 not only realizes the passive balance of the cell, but also 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. BMS is compatible with protocol by PCS of different manufaturers to realize charge/discharge management of battery cluster.

HBCU100/HBMU100 Battery Management System is consisted of a master control module HBCU100, multiple slave control modules HBMU100, display module HMU8-BMS, insulation monitoring module, Hall current sensor and wiring harness. The master control module and slave control module communicate with each other via CANBUS. The whole system adopts mudular design, compact structure, high realiability, which can be widely used in various power levels of energy storage battery cabinet.

2 SYSTEM CONFIGURATION

Table 3 System Configuration Description

Model	Name	Funtion
HBCU100	BMS Master Module	To calculate SOC, SOH and other information to realize the protection and charge/discharge management of battery cluster.
HBMU100	BMS Slave Control Module	To collect cell voltage/temperature, balance the battery, and upload the information to HBCU100 through CAN interface.
GYDCG-UBCH1	Insulation Monitoring Module	To sample the insulation resistance of the cabinet shell between total positive and negative battery cluster and upload the data to HBCU100 through RS485
Hall Current Sensor	Current Sensor	To collect the charge/discharge current of the battery cluster circuit.
HMU8-BMS(Optional)	BMS Display Module	To display SOC, SOH, cell voltage/temperature of the battery cluster and set the protection parameter of the system.

Note: HBMU100 has two models: HBMU100-16 and HBMU100-32.

3 SYSTEM BLOCK DIAGRAM
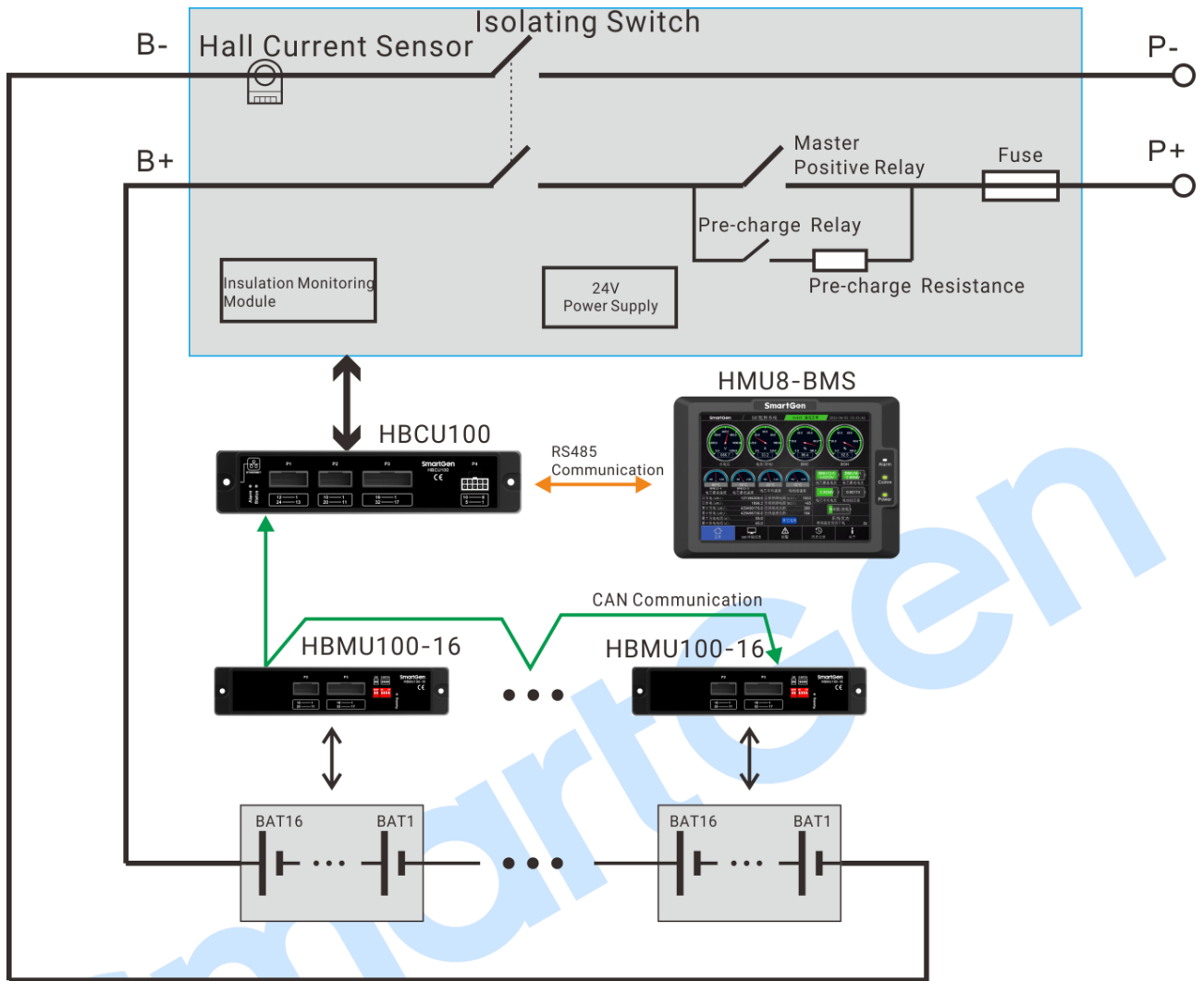
Fig.1 – BMS Block Diagram

4 PERFORMANCE AND CHARACTERISTICS

——The operating status of BCU and BMU could be viewed by indicators;

——Calculate the data of SOC/SOH of battery cluster, min. voltage/max. voltage of battery cells, average voltage, lowest temperature/highest temperature of battery cells;

——With tertiary fault alarm protection function, which can alarm and protect the failures of over/under voltage of battery cells, high/low temperature, charge/discharge overcurrent, low insulation resistance and so on;

——With master positive circuit relay control function and pre-charge circuit control function;

——The passive balance current of the BMU module cell is 100 mA;

——The available measured voltage range of battery cluster is (250~1000) VDC, up to 15 BUM modules online are supported at the same time;

——BCU communicates with BMU via CAN, which has strong anti-interference capability;

——The Bluetooth function make the battery cluster data monitored in real time by phone APP;

——BCU module is equipped with RS485-1 and RS485-2 external communication interfaces. The "four remote" functions (remote control, remote measurement, remote communication and remote adjustment) can be realized by MODBUS protocol, and matches with PCS of multiple manufacturers;

——With insulation resistance monitoring function (through RS485-3 interface of BCU module);

——BCU and BMU modules adopt ABS/PC plastic shell, with high insulation, voltage resistance and flame retardant;

——Fast firmware upgrade by CAN interface, eliminating unpacking and maintenance;

——The real-time monitoring, parameter configuration and firmware upgrade of the whole system can be realized through HMU8-BMS display module.

5 HBCU100 MASTER CONTROL MODULE

5.1 PERFORMANCE AND CHARACTERISTICS

——Rated operating voltage 12/24VDC;

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

——Can collect the total voltage and current of battery cluster, calculate the SOC and SOH data of battery cells;

——Can collect the insulation resistance of positive and negative sides to ground of battery cluster (read the data of insulation monitoring module via RS485);

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

——Receive the voltage and temperature of the single cell of BMU module via the non-isolated CAN interface and calculate the data of max. and min voltage/ temperature, etc., control the BMU module for passive balance of the cell at the same time. BCU module firmware can also be upgraded via this interface;

——One isolated CAN FD interface can realize the communication with PCS;

——Tertiary fault alarm protection can protect the over/under voltage, high/low temperature, charge/discharge overcurrent, low insulation resistance value, abnormal communication, high voltage collection fault, current collection fault, cell voltage collection fault, temperature collection fault, etc. The alarm protection action can be set as level-1 current drop (drop to 50%), level-2 current drop (drop to 80%), level-3 current drop (drop to 100%) and high voltage power-off;

——With 3 isolated RS485 communication interfaces, among which RS4851 and RS485-2 are Modbus protocol and can communicate with HMU8-BMS display module and PCS, RS485-3 is used to communicate with insulation monitoring module;

——With one ETHERNET interface to monitor the data of BCU module;

——The Bluetooth function can monitor the data of BCU module in real-time by phone APP;

——The 5 among of the 7 Aux. output ports are active outputs (default functions are master positive relay output, pre-charge output, module power control, alarm indicator output, running output), the other 2 are volts free output;

——It has 3 input ports, 2 of which are Aux. input ports, the other 1 is fixed as bonding test input of the master positive relay;

——One-way temperature sensor to be connected to NTC 10K-3950 temperature sensor;

——The event log can record 200 pieces of historical data circularly (the tertiary fault alarm content and details);

——Data of current and accumulated charge/discharge energy (kWh) and battery capacity (Ah) can be collected;

——Modular design, screw mounting, flame retardant ABC/PC enclosure with compact structure and easy installation.

5.2 SPECIFICATION

Table 4 Specification Parameters

Items	Contents
Operating Voltage Range	DC8V ~ DC35V, DC reverse connection protection
Overall Consumption	<5W (Standby mode: ≤2.5W)
DC High Voltage	Range: 250V~1000V Resolution: 0.1V Accuracy: 0.5%FSR(full range) or ±1.5V
Hall Current Sampling	Range: -100A~100A (Please specify the range when ordering) Resolution: 0.1A Accuracy: 0.5%FSR(full range)
Diverter Sampling	75mV diverter is supported Resolution: 0.1A Accuracy: 0.5%FSR (full range) Accuracy error is also related to the diverter type selection.
Temperature Sampling Input	Range: -40°C~+200°C Resolution:1°C Accuracy: ±1°C Temp sensor type: NTC 10K-3950
Aux. Output 1~5	1A DC30V DC power supply active output
Aux. Output 6~7	1A DC30V Volts free output
Digital Input 1~3	Low threshold voltage is 1.2V, max. input voltage is 60V
RS485-1	Fixed parameter: 115200 baud rate, 1 stop bit, no parity. Can be used to connect with HMU8-BMS display module.
RS485-2	Isolated, half-duplex, 9600 baud rate, maximum communication distance 1000m. Default: 9600 baud rate, 1 stop bit, no parity.
RS485-3	Isolated, half-duplex, used to communicate with insulation monitoring module.
Ethernet Interface	Self-adapting 10/100Mbit
CAN1	250kbps, non-isolated, maximum communication distance 250m, using Belden 9841cale or equivalent. Built-in 120Ω terminal impedance matching resistance.
CAN2	CAN FD, isolated, maximum communication distance 250m, using Belden 9841cale or equivalent. 120Ω terminal impedance matching resistance is optional.
EMC	GB/T 34131-2017
Vibration	5Hz~8Hz：±7.5mm 8Hz~500Hz：±2g IEC 60068-2-6
Shock	50g, 11ms, half-sine, three consecutive shocks are applied in each of the three mutually perpendicular directions, i.e. a total of 18 times. IEC 60068-2-27
Bump Test	25g, 16ms, half-sine

Items	Contents
	IEC 60255-21-2
Overall Dimensions	253mmx54mmx106mm
Working Temperature	(-40~+70) °C;
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80) °C;
Protection Level	IP20
Insulation Strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current is not more than 3mA within 1min.
Weight	0.5kg

5.3 MEASURE AND DISPLAY DATA

Table 5 Measure and Display Data

Measure & Display Data Items	
Total Voltage of Battery Cluster	Battery Cluster SOC
Current of Battery Cluster	Battery SOH
Total Battery Online	Total Temp Sensor Online
Max. Volt. of Single Cell	Min. Volt. of Single Cell
Battery No. of Max. Volt of Single Cell	Battery No. of Min. Volt. of Single Cell
Volt. Difference of Single Cell	Average Volt. of Single Cell
Max. Temp of Single Cell	Min. Temp of Single Cell
Max. Temp of Single Cell - Temp Sensor No.	Min. Temp of Single Cell - Temp Sensor No.
Temp Difference of Single Cell	Average Temp of Single Cell
Cycle-index of Battery Cluster	Total Capacity of Battery Cluster
Remaining Capacity of Battery Cluster	Charging Side Volt.
Positive Insulation Resistance	Negative Insulation Resistance
Max. Current Limit for Charging	Max. Current Limit for Discharging
Charging Max. Cut-off Voltage	Environment Temperature
Daily Charging Capacity	Daily Charging Electric Energy
Daily Discharging Capacity	Daily Discharging Electric Energy
Total Charging Capacity	Total Charging Electric Energy
Total Discharging Capacity	Total Discharging Electric Energy
Voltage Data of All Cells	Temp Data of All the Single Cells
Cell No. and Temp Sensor No. of Single BMU	Real-time Clock
Alarm Information	Event Log

Note: battery cluser is a battery combination that is connected by battery modules in series, parallel or series & parallel mode, and can operate independently after connecting with PCS and affiliated facilities. It should also include BMS, monitoring and protective circuits, electrical and communication interfaces and other components.

5.4 MODULE PANEL
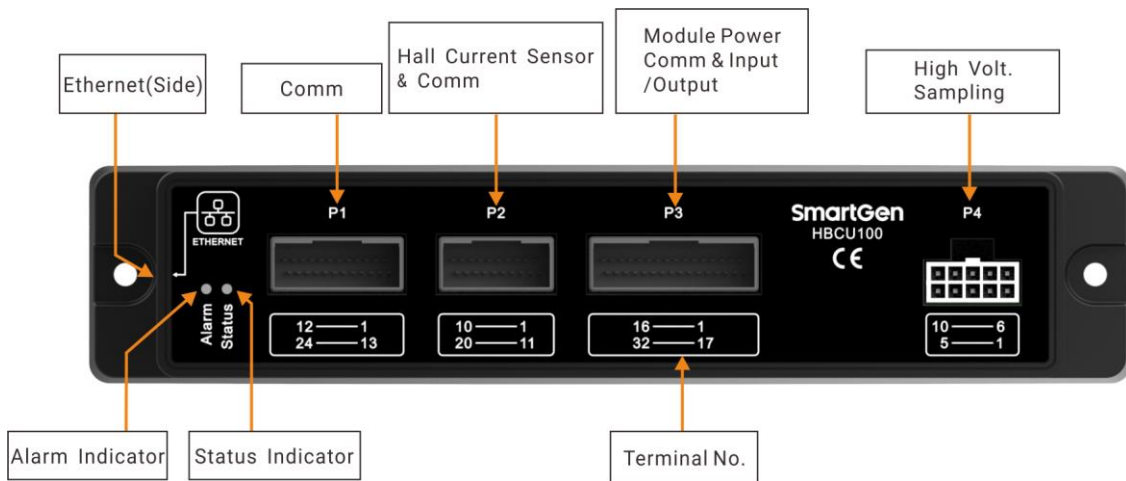
Fig.2 - HBCU100 Panel Drawing

Table 6 Indicator Description

Indicator	Function
Status Indicator	The indicator slow flashes (once per second) when module is power on.
Alarm Indicator	The indicator slow flashes (once per second) when the level-1 fault alarm occurs. The indicator slow flashes (5 times per second) when the level-2 fault alarm occurs. The indicator is always illuminated when the level-3 fault alarm occurs.

Table 7 Terminal Definition

Terminal No.	Definition	Terminal No.	Definition
P1 Terminal (24PIN)	JAE MX34024NF1		
	JAE MX34024SF1		
	JAE M34S75C4F2		
1	RS485_2A	13	RS485_2B
2	NC	14	TR2
3	NC	15	NC
4	NC	16	NC
5	NC	17	NC
6	RS485_3A	18	RS485_3B
7	NC	19	TR3
8	NC	20	NC
9	NC	21	NC
10	NC	22	NC
11	CAN2_H	23	CAN2_L
12	NC	24	TR4
P2 Terminal (20PIN)	JAE MX34020NF1		
	JAE MX34020SF1		

Terminal No.	Definition	Terminal No.	Definition
JAE M34S75C4F2			
1	TEMP_1	11	TEMP_2
2	NC	12	NC
3	+5V	13	I_SENSOR1
4	GND	14	I_SENSOR2
5	NC	15	NC
6	NC	16	NC
7	NC	17	NC
8	NC	18	NC
9	RS485_1A	19	RS485_1B
10	NC	20	TR1
P3 Terminal (32PIN)	JAE MX34032NF2		
	JAE MX34032SF1		
	JAE M34S75C4F2		
1	DC_VIN+	17	DC_VIN-
2	NC	18	NC
3	CAN1_H	19	CAN1_L
4	NC	20	NC
5	RELAY1	21	NC
6	RELAY2	22	NC
7	RELAY3	23	NC
8	RELAY4	24	NC
9	RELAY5	25	NC
10	RELAY6_2	26	RELAY6_1
11	RELAY7_2	27	RELAY7_1
12	NC	28	NC
13	NC	29	NC
14	INPUT2	30	INPUT1
15	INPUT_COM	31	INPUT_COM
16	INPUT_COM	32	INPUT3
P4 Terminal (10PIN)	YATXF 10-0501-16		
	H4201-2x5NP		
	YT4202-01		
1	B+	6	CHG
2	NC	7	NC
3	NC	8	NC
4	NC	9	IBAT-
5	B-	10	IBAT+

Table 8 Terminal Function Description

Terminal No.	Definition	Function
P1 Terminal		
1	RS485_2A	Isolated RS485 interface for communication between PCS and EMS.
13	RS485_2B	
14	TR2	According to the onsite connections, it is short connected with Terminal 1 for using to connect to 120Ω terminal impedance matching resistance of RS485-2.
6	RS485_3A	Isolated RS485 interface for communication with insulation monitoring module.
18	RS485_3B	
19	TR3	According to the onsite connections, it is short connected with Terminal 6 for using to connect to 120Ω terminal impedance matching resistance of RS485-3. Default to hang up in the air.
11	CAN2_H	Isolated CAN for communication with PCS.
23	CAN2_L	
24	TR4	According to the onsite connections, it is short connected with Terminal 11 for using to connect to 120Ω terminal impedance matching resistance of CAN2.
Other Terminals	NC	Must be hang up in the air.
P2 Terminal		
1	TEMP	Temperature sensor connected. An NTC 10K-3950 type sensor is required.
11		
3	5V	Hall current sensor sampling input.
4	GND	
13	I_SENSOR1	
14	I_SENSOR2	Reserved, hang up in the air.
9	RS485_1A	The isolated RS485 interface is used for communication among HMU8-BMS, PCS and EMS.
19	RS485_1B	Fixed communication parameter: 115200 baud rate, no parity bit, 1 stop bit.
20	TR1	According to the onsite connections, it is short connected with Terminal 9 for using to connect to 120Ω terminal impedance matching resistance of RS485-1.
Other Terminals	NC	Must be hang up in the air.
P3 Terminal		
1	DC_VIN+	Module power input.
17	DC_VIN-	
3	CAN1_H	Non-isolated CAN interface is used for internal communication between BCU and BMU module.
19	CAN1_L	There is a 120Ω terminal impedance matching resistance between CAN1_H and CAN1_L.

Terminal No.	Definition	Function
5	RELAY1	AUX. Output 1. Active output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Master Positive Relay Output".
6	RELAY2	AUX. Output 2. Active output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Pre-charge Output".
7	RELAY3	AUX. Output 3. Active output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Module Power Control".
8	RELAY4	AUX. Output 4. Active output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Alarm Indicator Output".
9	RELAY5	AUX. Output 5. Active output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Running Output".
10	RELAY6_2	AUX. Output 6.
26	RELAY6_1	Volts free output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Not Used".
11	RELAY7_2	AUX. Output 7.
27	RELAY7_1	Volts free output (Terminal 1 provides power supply), capacity 1A DC30V. Default "Not Used".
14	INPUT2	Digital Input 2.
15	INPUT_COM	
30	INPUT1	Digital Input 1.
31	INPUT_COM	
16	INPUT_COM	Bonding test input of the master positive relay, used to test whether the master positive relay is bonded.
32	INPUT3	
Other Terminals	NC	Must be hang up in the air.
P4 Terminal		
1	B+	High voltage sampling input of total positive of storage battery.
5	B-	High voltage sampling input of total negative of storage battery.
6	CHG	High voltage sampling input on charging side of energy storage battery.
9	IBAT-	Diverter connects to negative side.
10	IBAT+	Diverter connects to positive side.
Other	NC	Must be hang up in the air.

Terminal No.	Definition	Function
Terminals		

Cable specification requirements:

0.5mm² cable is used for Terminal P1, P2 and P3;

0.5mm² impedance 120Ω shielding wire is used for communication line of RS485 and CAN and it is grounded at a single end;

1.0mm² cable is used for P4 high voltage sampling, the rated voltage is determined according to the voltage of energy storage battery cluster.

5.5 OPERATION

5.5.1 WORKING PROCESS

a) After module is power on, the module power control outputs and the running indicating outputs at the same time, the module enters BMS standby status;

b) In standby status, the communication of all the BMU modules and insulation monitoring modules is normal, then enters the self-check stage of BMS; otherwise, it will be in the standby status for waiting all the time., when the master-slave communication fails or insulation monitoring module fails to enable the communication, BCU will send an alarm;

c) In BMS self-check stage, if the status of mater positive relay (no bonding) is normal, the pre-charge stage will be entered; otherwise, it will be in the self-check stage for waiting all the time, when the master positive relay bonding test enables, BCU will send an alarm;

d) In pre-charge stage of BMS, the pre-charge outputs. When the voltage on 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);

e) In the high voltage power-on stage of BMS, after the master positive relay is closed for 2 seconds, the pre-charge output is disconnected, it will enter the normal running stage of BMS;

f) 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;

g) When BMS is in the high voltage power-off stage, the master positive relay is disconnected, BMS will enter the shutdown stage.

Note 1: The insulation monitoring module will perform a detection every 2 minutes in the normal running stage of BMS;

Note 2: When lock fault alarms or triggers high voltage power-off action of BMS, it is necessary to disconnect the power supply of the module to reset the alarm.

5.5.2 INTERACTION LOGIC WITH PCS

BCU module communicates with PCS by RS485 interface or ETHERNET interface, PCS can communicate to request the max. limit current for charging/discharging and the max. cut-off voltage for charging to adjust the output current of PCS.

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

5.6 FAULT ALARM PROTECTION

BCU has a tertiary fault alarm protection function, which is level-1 fault alarm, level-2 fault alarm and level-3 fault alarm.

The alarm action can be set as level-1 current drop (drop to 50%), level-2 current drop (drop to 50%), level-3 current drop (drop to 100%) and High voltage power-off.

Table 9 Description of Fault Alarm Level

No.	Fault Alarm Level	Description
1	Level 1 Fault Alarm	The alarm indicator flashes slowly when module detects the signal of level-1 fault alarm.
2	Level 2 Fault Alarm	The alarm indicator flashes rapidly when module detects the signal of level-2 fault alarm.
3	Level 3 Fault Alarm	The alarm indicator will be always illuminated when module detects the signal of level-3 fault alarm.

Table 10 Level 1/Level 2/Level 3 Fault Alarm List

No.	Alarm	Fault Alarm Levels		
		Level 1	Level 2	Level 3
1	Total Volt. High	●	●	●
2	Total Volt. Low	●	●	●
3	Single Volt. High	●	●	●
4	Single Volt. Low	●	●	●
5	Single Volt. Difference Large	●	●	●
6	Over Temp	●	●	●
7	Under Temp	●	●	●
8	Large Temp Difference	●	●	●
9	Temp Rise Fast	●	●	●
10	SOC Low	●	●	●
11	Charge Overcurrent	●	●	●
12	Discharge Overcurrent	●	●	●
13	Insulation Low	●	●	●
14	Volt. Sampling Line Abnormal	●	●	●
15	Temp Sampling Line Abnormal	●	●	●
16	Current Sampling Line Abnormal	●	●	●
17	High Volt. Sampling Fault	●	●	●
18	Master Positive Relay Bond	/	/	●
19	Master-Slave Comm. Failure Alarm	●	●	●
20	Insulation Module Comm. Failure	●	●	●
21	Max. Charging Current Over Limit	●	●	●
22	Max. Discharging Current Over Limit	●	●	●
23	Environment Temp High	●	●	●
24	Pre-charge Failure	/	/	●

Table 11 Fault 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 online 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	Over Temp	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	Under Temp	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 continuous 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.

No.	Type	Description
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.
13	Insulation Low	When the insulation resistance value of the insulation monitoring module is read and the total voltage of battery cluster is greater than 100V, 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	Volt. Sampling Line Abnormal	When voltage sampling line disconnects and after a continuous set delay time, it will send the alarm signal of voltage sampling line abnormal.
15	Temp Sampling Line Abnormal	When temperature sampling line disconnects and after a continuous set delay time, it will send the alarm signal of temperature sampling line abnormal.
16	Current Sampling Line Abnormal	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 line abnormal.
17	High Volt. Sampling Fault	When the total voltage of battery cluster is 0, after a continuous set delay time, it will send the alarm signal of high voltage sampling fault.
18	Master Positive Relay Bond	When the 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-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.
20	Insulation Module Comm. Failure	When BCU module cannot receive the data responded by insulation monitoring module, after a continuous set delay time, it will send the alarm signal of insulation module communication failure.
21	Max. Charging Current Over Limit	When the battery cluster is in charging status and the charging current is greater than 1A, 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 1A, 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	Environment Temp High	When the environment temperature of BCU module is over the pre-set threshold of max. environment temperature, after a continuous set delay time, it will send the alarm signal of environment 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.

5.7 SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

5.7.1 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	Number of BMU	(1-15)	13	The number of battery module of storage system.
5	Battery No. of Slave Unit	(1-32)	16	The single cell number of single BMU.
6	Temp Sensor No. of Slave Unit	(1-16)	8	The temperature sensor number of single BMU.
7	Comm Baud Rate of RS485-2	(0-2)	0	0: 9600bit/s 1: 19200bit/s 2: 115200bit/s
8	Comm Stop Bit of RS485-2	(0-1)	0	0: 1 bit 1: 2 bits
9	Parity Bit of RS485-2	(0-2)	0	0: None 1: Odd 2: Even
10	MAC	(0-255)	/	The MAC address, which can only be read.
11		(0-255)	/	
12		(0-255)	/	
13		(0-255)	/	
14		(0-255)	/	
15		(0-255)	/	
16	ip	(0-255)	192	IP address.
17		(0-255)	168	
18		(0-255)	0	
19		(0-255)	2	
20	Subnet Mask	(0-255)	255	
21		(0-255)	255	
22		(0-255)	255	
23		(0-255)	0	

No.	Items	Ranges	Defaults	Description
24	Gateway Address	(0-255)	192	
25		(0-255)	168	
26		(0-255)	0	
27		(0-255)	1	
Battery Cluster Setting				
1	Rated Voltage	(50.0-1500.0)V	665.6V	The rated voltage of current system.
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	50.0AH	The standard design capacity of the storage system.
4	Total Capacity	(1-1000.0) Ah	50.0AH	Reserved.
5	Pre-charge Protection Enable	(0-1)	1	0：Disable 1：Enable
Aux. Input Setting				
Input Port 1				
1	Content	(0-10)	0	Not used. See Table 14.
2	Active Type	(0-1)	0	0：closed;　1:Open.
Input Port 2				
1	Content	(0-10)	1	Isolating switch closing status input. See Table 14.
2	Active Type	(0-1)	0	0：closed;　1:Open.
Aux. Output Setting				
Output Port 1				
1	Content	(0-20)	1	The master positive relay output. See Table 13.
2	Output Type	(0-1)	0	0: NO；1:NC
Output Port 2				
1	Output Port	(0-20)	2	Pre-charge output. See Table 13.
2	Output Type	(0-1)	0	0: NO；1:NC
Output Port 3				
1	Content	(0-20)	3	The module power control. See Table 13
2	Output Type	(0-1)	0	0: NO；1:NC
Output Port 4				
1	Content	(0-20)	4	The alarm indicator output. See Table 13.
2	Output Type	(0-1)	0	0: NO；1:NC
Output Port 5				
1	Content	(0-20)	8	Running output. See Table 13.

No.	Items		Ranges	Defaults	Description
2	Output Type		(0-1)	0	0: NO；1:NC
Output Port 6					
1	Content		(0-20)	0	Not used. See Table 13.
2	Output Type		(0-1)	0	0: NO；1:NC
Output Port 7					
1	Content		(0-20)	0	Not used. See Table 13.
2	Output Type		(0-1)	0	0: NO；1:NC
Charging and SOC Setting					
1	Balanced Open Volt.		(0-5000) mV	3450	The battery passively balance to open the voltage.
Protection Parameter Setting					
Total Voltage High					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-5000)mV	3600	The threshold value of alarm action.
4		Return Value	(0-5000)mV	3350	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-5000)mV	3650	The threshold value of alarm action.
10		Return Value	(0-5000)mV	3450	The reset threshold value of alarm when alarm type is "self-reset".

No.	Items		Ranges	Defaults	Description
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-5000)mV	3700	The threshold value of alarm action.
16		Return Value	(0-5000)mV	3550	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Total Voltage Low					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-5000)mV	2600	The threshold value of alarm action.
4		Return Value	(0-5000)mV	2900	The reset threshold of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0) s	10.0	Alarm action delay.
6		Return Delay Value	(0-3000.0) s	10.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset

No.	Items		Ranges	Defaults	Description
8	Alarm	Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-5000)mV	2600	The threshold of alarm action.
10		Return Value	(0-5000)mV	2800	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-5000)mV	2500	The threshold value of alarm action.
16		Return Value	(0-5000)mV	2600	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Battery Cell Voltage Difference Large					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-5000) mV	500	The threshold value of alarm action.
4		Return Value	(0-5000) mV	300	The reset threshold value of alarm when alarm type is "self-reset".

No.	Items		Ranges	Defaults	Description
5		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-5000)mV	1000	The threshold value of alarm action.
10		Return Value	(0-5000)mV	800	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-5000)mV	2000	The threshold value of alarm action.
16		Return Value	(0-5000)mV	700	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Battery Cell Over Voltage					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-5000)mV	3700	The threshold value of alarm action.
4		Return Value	(0-5000)mV	3550	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-5000)mV	3720	The threshold value of alarm action.
10		Return Value	(0-5000)mV	3600	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	3.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	4.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-5000)mV	3750	The threshold of alarm action.

No.	Items		Ranges	Defaults	Description
16		Return Value	(0-5000)mV	3650	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	3.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	4.0	The reset delay value of alarm when the type is "self-reset".
Battery Cell Under Voltage					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-5000)mV	2700	The threshold value of alarm action.
4		Return Value	(0-5000)mV	3000	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-5000)mV	2500	The threshold value of alarm action.
10		Return Value	(0-5000)mV	2700	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-5000)mV	2000	The threshold value of alarm action.
16		Return Value	(0-5000)mV	2500	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Charge/Discharge Temperature High					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(-40-200)°C	55	The threshold value of alarm action.
4		Return Value	(-40-200)°C	50	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(-40-200)°C	60	The threshold value of alarm action.

No.	Items		Ranges	Defaults	Description
10		Return Value	(-40-200)°C	55	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	3.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	4.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(-40-200)°C	65	The threshold value of alarm action.
16		Return Value	(-40-200)°C	60	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	3.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	2.0	The reset delay value of alarm when the type is "self-reset".
Charge/Discharge Temperature Low					
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(-40-200)°C	5	The threshold value of alarm action.
4		Return Value	(-40-200)°C	10	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	6.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(-40-200)°C	5	The threshold value of alarm action.
10		Return Value	(-40-200)°C	10	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(-40-200)°C	0	The threshold value of alarm action.
16		Return Value	(-40-200)°C	5	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Temperature Difference Large					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-200)°C	10	The threshold value of alarm action.

No.	Items		Ranges	Defaults	Description
4		Return Value	(0-200)°C	5	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-200)°C	10	The threshold value of alarm action.
10		Return Value	(0-200)°C	5	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-200)°C	15	The threshold value of alarm action.
16		Return Value	(0-200)°C	10	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Temperature Rise Fast					

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No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-200)°C /s	4	The threshold value of alarm action.
4		Return Value	(0-200)°C /s	1	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-200)°C /s	6	The threshold value of alarm action.
10		Return Value	(0-200)°C /s	1	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-200)°C /s	8	The threshold value of alarm action.

No.	Items		Ranges	Defaults	Description
16		Return Value	(0-200)°C /s	1	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
Charge Overcurrent					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-500.0)A	60.0	The threshold value of alarm action.
4		Return Value	(0-500.0)A	50.0	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-500.0)A	100.0	The threshold value of alarm action.
10		Return Value	(0-500.0)A	60.0	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-500.0)A	120.0	The threshold value of alarm action.
16		Return Value	(0-500.0)A	80.0	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
Discharge Overcurrent					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0.0-500.0) A	120.0	The threshold value of alarm action.
4		Return Value	(0.0-500.0) A	50.0	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	1	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-500.0)A	150.0	The threshold value of alarm action.

No.	Items		Ranges	Defaults	Description
10		Return Value	(0-500.0)A	80.0	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	1.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	4.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	2	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-500.0)A	180.0	The threshold value of alarm action.
16		Return Value	(0-500.0)A	130.0	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	1.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	4.0	The reset delay value of alarm when the type is "self-reset".
SOC Low					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-100.0)%	20.0	The threshold value of alarm action.
4		Return Value	(0-100.0)%	22.0	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-100.0)%	10.0	The threshold value of alarm action.
10		Return Value	(0-100.0)%	12.0	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-100.0)%	0	The threshold value of alarm action.
16		Return Value	(0-100.0)%	10.0	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
Insulation Resistance Low					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(0-10000)Ω/V	1000	The threshold value of alarm action.

No.	Items		Ranges	Defaults	Description
4		Return Value	(0-10000)Ω/V	2000	The reset threshold value of alarm when alarm type is "self-reset".
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(0-10000)Ω/V	500	The threshold value of alarm action.
10		Return Value	(0-10000)Ω/V	2000	The reset threshold value of alarm when alarm type is "self-reset".
11		Action Delay Value	(0-3000.0)s	1.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	2.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(0-10000)Ω/V	200	The threshold value of alarm action.
16		Return Value	(0-10000)Ω/V	500	The reset threshold value of alarm when alarm type is "self-reset".
17		Action Delay Value	(0-3000.0)s	1.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
Cell Sampling Fault					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
Temperature Sampling Fault					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
Current Sampling Fault					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
High Voltage Sampling Fault					

No.	Items		Ranges	Defaults	Description
1	Level-1Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	10.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".
Master-slave Communication Failure					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
Insulation Module Communication Failure					

No.	Items		Ranges	Defaults	Description
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
4		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
5	Level-2 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
6		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
7		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
8		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
9	Level-3 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
10		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
11		Action Delay Value	(0-3000.0)s	30.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	30.0	The reset delay value of alarm when the type is "self-reset".
Master Positve Relay Bond					

No.	Items		Ranges	Defaults	Description
1	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	3	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Action Delay Value	(0-3000.0) s	1.0	Alarm action delay.
4		Return Delay Value	(0-3000.0) s	3000.0	The reset delay value of alarm when the type is "self-reset".
Max. Charging Current Over Limit					
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
4		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".
5		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
10		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
11		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
16		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".
17		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
Max. Discharging Current Over Limit					
1	Level-1 Fault Alarm	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
4		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".
5		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault	Type	(0-2)	0	0: Disable 1: Lock 2: Self-reset

No.	Items		Ranges	Defaults	Description
8	Alarm	Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
10		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".
11		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	1	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	4	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(50.0-200.0)%	120.0	Threshold value of alarm action.
16		Return Value	(50.0-200.0)%	100.0	The reset threshold value of alarm when the type is "self-reset".
17		Action Delay Value	(0-3000.0) s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0) s	6.0	The reset delay value of alarm when the type is "self-reset".
Environment Temperature High					
1	Level-1 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
2		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
3		Set Value	(-40-200)°C	65	Threshold value of alarm action.
4		Return Value	(-40-200)°C	45	The reset threshold value of alarm when the type is "self-reset".

No.	Items		Ranges	Defaults	Description
5		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
6		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
7	Level-2 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
8		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
9		Set Value	(-40-200)°C	70	Threshold value of alarm action.
10		Return Value	(-40-200)°C	50	The reset threshold value of alarm when the type is "self-reset".
11		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
12		Return Delay Value	(0-3000.0)s	5.0	The reset delay value of alarm when the type is "self-reset".
13	Level-3 Fault Alarm	Type	(0-2)	2	0: Disable 1: Lock 2: Self-reset
14		Action	(0-4)	0	0: Alarm 1: Level-1 current drop (drop to 50%) 2: Level-2 current drop (drop to 20%) 3: Level-3 current drop (drop to 0%) 4: High voltage power-off
15		Set Value	(-40-200)°C	75	Threshold value of alarm action.
16		Return Value	(-40-200)°C	50	The reset threshold value of alarm when the type is "self-reset".
17		Action Delay Value	(0-3000.0)s	5.0	Alarm action delay.
18		Return Delay Value	(0-3000.0)s	10.0	The reset delay value of alarm when the type is "self-reset".

5.7.2 DEFINABLE CONTENTS OF PROGRAMMABLE OUTPUT PORTS 1~7

Table 13 Definable Contents of Programmable Output Port 1~7

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	Module Power Control	BCU outputs after power on.
4	Alarm Indicator Output	Output when the module alarms, the output logic is consistent with the alarm indicator on the module panel.
5	Reserved	
6	Reserved	
7	Master Negative Output	
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 or the control output port of HMU8-BMS display module
10	Charging Indication	
11	Discharging Indication	
12	Level-1 Fault Alarm	
13	Level-2 Fault Alarm	
14	Level-3 Fault Alarm	
15	Reserved	
16	Reserved	
17	Reserved	
18	Reserved	
19	Reserved	
20	Reserved	

5.7.3 DEFINABLE CONTENTS OF DIGITAL INPUT PORTS 1~2

Table 14 Definable Contents of Digital Input Port 1~2 (Active when all connect to INPUT_COM)

No.	Items	Function Description
0	Not Used	
1	Isolating Switch Closing Status Input	It is used for the isolating switch with closing auxiliary contacts to realize the fast power failure of BCU module. When this input port is active, if the closing auxiliary contact is disconnected, the 24V power control output is disconnected.
2	Master Negative Relay Closing	
3~10	Reserved	

5.8 PARAMETER SETTING

The configured parameter of module can be configured by PC software or HMU8-BMS. When enter the password and input "01234" to set all the 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), please contact with manufacturer when forgetting the password.
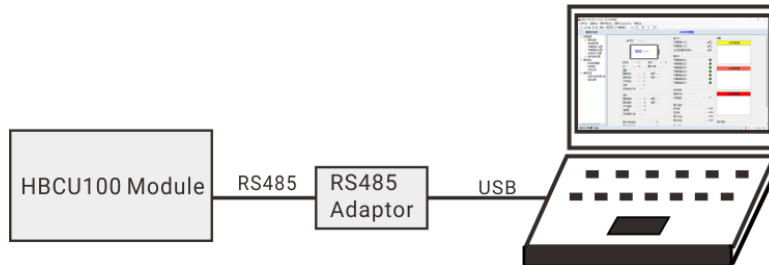
Fig.3 – PC Connection Diagram

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.

5.9 INSTALLATION

5.9.1 CASE DIMENSIONS AND PANEL CUTOUT

Unit: mm
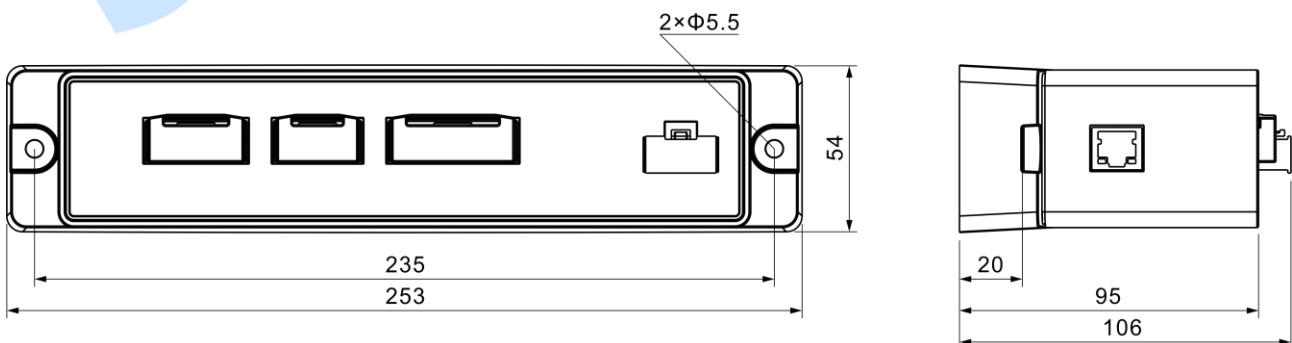
Fig.4 – Overall Dimensions and Panel Cutout

5.10 ETHERNET INTERFACE

ETHERNET interface is used for monitoring of battery cluster to realized 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.

5.10.1 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, the 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 control. 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.

5.10.2 DESCRIPTION OF NETWORK CONNECTION

Table 15   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.

6 HBMU100 SLAVE CONTROL MODULE

6.1 PERFORMANCE AND CHARACTERISTICS

——LED lamp indicates the communication of BCU module;

——There're two models: HBMU100-6 and HBMU-32. HBMU100-16 can collect 16 cell voltages and 8 temperatures, HBMU100-32 can collect 32 cell voltages and 16 temperatures;

——The voltage range of the single cell can be collected is (0-5)VDC;

——The range of the temperature sensor can be collected is (-40~200)°C, the type of the temperature sensor is NTC 10K-3950;

——1 non-isolated CAN interface is used to communicate with BCU module and also to upgrade the software of firmware via CAN interface;

——The 120Ω terminal matching resistor on CANBUS is accessed by dip switch;

——Select the CAN ID number of the module by dip switch, the setting range is 1~15;

——With passive balance function, the max. balance current is 100mA;

——Modular design, screw mounting, flame retardant ABC/PC enclosure with compact structure and easy installation.

6.2 SPECIFICATION PARAMETER

Table 16   Specification Parameter

Items	Contents
Operating Voltage Range	DC8V ~ DC35V，DC reverse connection protection
Overall Consumption	<0.5W
Cell Volt. Sampling	Range: (0~5) VDC Resolution: 1mV Accuracy: ±5mV
Temp Sampling Input	Range: -40°C~+200°C Resolution: 1°C Accuracy: ±1°C Temp Sensor Type：NTC 10K-3950
CAN Interface	250kbps, non-isolated, maximum communication distance 250m, using Belden 9841cale or equivalent.
EMC	GB/T 34131-2017
Vibration	5Hz~8Hz: ±7.5mm 8Hz~500Hz: ±2g IEC 60068-2-6
Shock	50g, 11ms, half-sine, three consecutive shocks are applied in each of the three mutually perpendicular directions, i.e. a total of 18 times. IEC 60068-2-27
Bump Test	20g,16ms, half-sine IEC 60255-21-2
Case Dimensions	253mmx54mmx101mm
Working Temperature	(-40~+80) °C;
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80) °C;

Items	Contents
Protection Level	IP20
Weight	0.5kg

6.3 MODULE PANEL
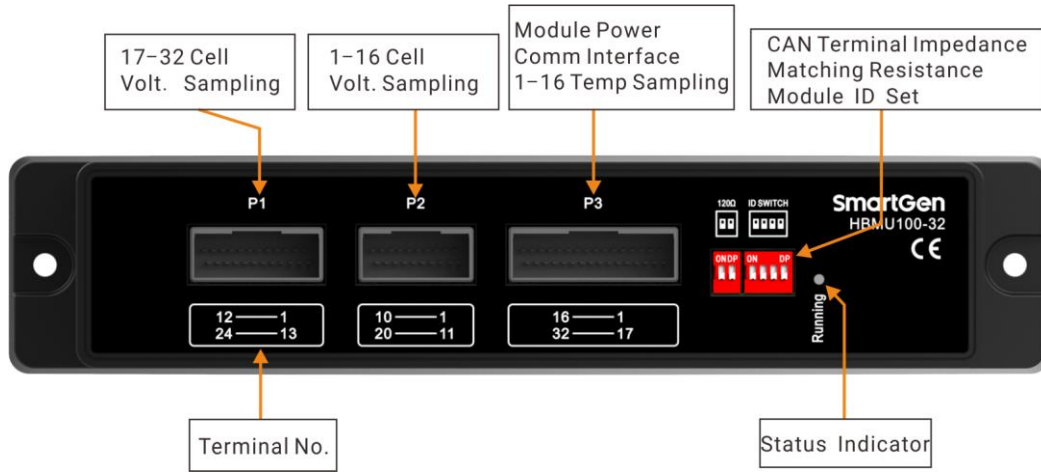
Fig.5 – HBMU100-32 Panel Drawing
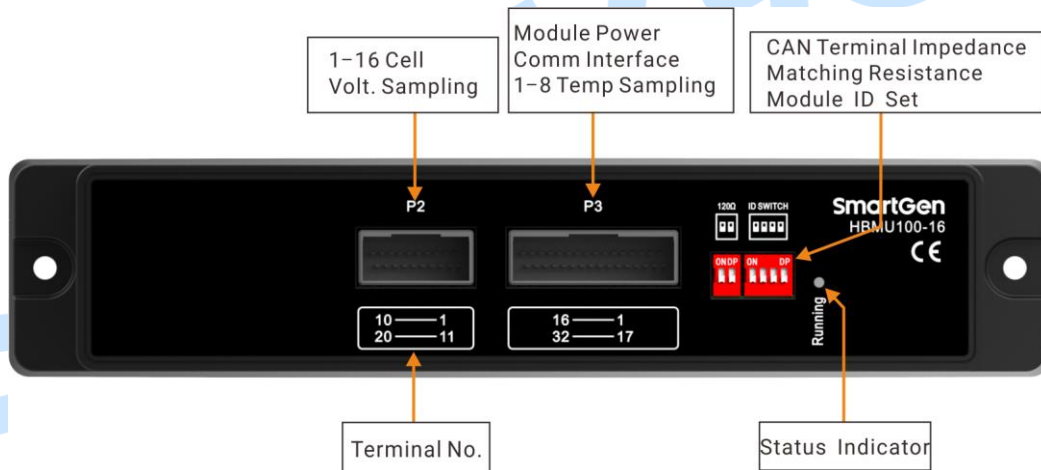
Fig.6 – HBMU100-16 Panel Drawing

Table 17   Specification Parameter

Indicator	Function Description
Status	Always illuminated when module is power on. Slow flashes (Once per second) when receiving the data of BCU module.

Table 18   120Ω Dip Switch Description

No.	Position of Dip Switch	Description
1	ON DP 1 2	The 120Ω terminal impedance matching resistor is not connected to the CANBUS.
2	ON DP 1 2	The 120Ω terminal impedance matching resistor is connected to the CANBUS.

Table 19   ID SWITCH Description
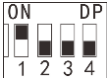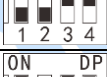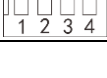
No.	Position of Dip Switch	Module No.
1		**1**
2		**2**
3		**3**
4		**4**
5		**5**
6		**6**
7		**7**
8		**8**
9		**9**
10		**10**
11		**11**
12		**12**
13		**13**
14		**14**
15		**15**

Table 20   Terminal Definition (HBMU100-32)

Terminal No.	Definition	Terminal No.	Definition
P1(24PIN)			
1	B17-	13	NC
2	B18	14	B17
3	B20	15	B19
4	B22	16	B21
5	B24	17	B23
6	B26	18	B25
7	B28	19	B27
8	B30	20	B29
9	B32	21	B31
10	NC	22	NC
11	NC	23	NC
12	NC	24	NC
P2 (20PIN)			
1	B1-	11	NC
2	B2	12	B1
3	B4	13	B3
4	B6	14	B5
5	B8	15	B7
6	B10	16	B9
7	B12	17	B11
8	B14	18	B13
9	B16	19	B15
10	NC	20	NC
P3 (32PIN)			
1	DC_VIN+	17	DC_VIN-
2	CAN_H_IN	18	CAN_L_IN
3	CAN_H_OUT	19	CAN_L_OUT
4	NC	20	NC
5	T2	21	T1
6	T4	22	T3
7	GND	23	GND
8	T6	24	T5
9	T8	25	T7
10	GND	26	GND
11	T10	27	T9
12	T12	28	T11
13	GND	29	GND
14	T14	30	T13
15	T16	31	T15
16	GND	32	GND

Table 21   Function Description

Terminal No.	Definition	Function Description
P1 Terminal		
1	B17-	No.17 Cell Negative
14	B17	No.17 Cell Positive
2	B18	No.18 Cell Positive
15	B19	No.19 Cell Positive
3	B20	No.20 Cell Positive
16	B21	No.21 Cell Positive
4	B22	No.22 Cell Positive
17	B23	No.23 Cell Positive
5	B24	No.24 Cell Positive
18	B25	No.25 Cell Positive
6	B26	No.26 Cell Positive
19	B27	No.27 Cell Positive
7	B28	No.28 Cell Positive
20	B29	No.29 Cell Positive
8	B30	No.30Cell Positive
21	B31	No.31 Cell Positive
9	B32	No.32 Cell Positive
Other Terminals	NC	Must be hang up in the air.
P2 Terminal		
1	B1-	No.1 Cell Negative
12	B1	No.1 Cell Positive
2	B2	No.2 Cell Positive
13	B3	No.3 Cell Positive
3	B4	No.4 Cell Positive
14	B5	No.5 Cell Positive
4	B6	No.6 Cell Positive
15	B7	No.7 Cell Positive
5	B8	No.8 Cell Positive
16	B9	No.9 Cell Positive
6	B10	No.10 Cell Positive
17	B11	No.11 Cell Positive
7	B12	No.12 Cell Positive
18	B13	No.13 Cell Positive
8	B14	No.14 Cell Positive
19	B15	No.15 Cell Positive
9	B16	No.16 Cell Positive
Other Terminals	NC	Must be hang up in the air.
P3 Terminal		
1	DC_VIN+	BMU module power supply.

Terminal No.	Definition	Function Description
17	DC_VIN-	
2	CAN_H_IN	Non-isolated CAN is used for internal communication between BCU module and BMU module.
18	CAN_L_IN	User the DIP switch to determine whether the terminal impedance matching resistor is connected.
3	CAN_H_OUT	It communicates with Terminal 2. It is used to cascade BMU modules.
19	CAN_L_OUT	It communicates with Terminal 18. It is used to cascade BMU modules
21	T1	Terminal 1 temperature sensor input.
22	T3	Terminal 3 temperature sensor input.
23	GND	The common port of Terminal 1 & Terminal 3 temperature sensors.
5	T2	Terminal 2 temperature sensor input.
6	T4	Terminal 4 temperature sensor input.
7	GND	The common port of Terminal 2 & Terminal 4 temperature sensors.
24	T5	Terminal 5 temperature sensor input.
25	T7	Terminal 7 temperature sensor input.
26	GND	The common port of Terminal 5 & Terminal 7 temperature sensors.
8	T6	Terminal 6 temperature sensor input.
9	T8	Terminal 8 temperature sensor input.
10	GND	The common port of Terminal 6 & Terminal 8 temperature sensors.
27	T9	Terminal 9 temperature sensor input.
28	T11	Terminal 11 temperature sensor input.
29	GND	The common port of Terminal 9 & Terminal 11 temperature sensors.
11	T10	Terminal 10 temperature sensor input.
12	T12	Terminal 12 temperature sensor input.
13	GND	The common port of Terminal 10 & Terminal 12 temperature sensors.
30	T13	Terminal 13 temperature sensor input.
31	T15	Terminal 15 temperature sensor input.
32	GND	The common port of Terminal 13 & Terminal 15 temperature sensors.
14	T14	Terminal 14 temperature sensor input.
15	T16	Terminal 16 temperature sensor input.
16	GND	The common port of Terminal 14 & Terminal 16 temperature sensors.
Other terminals	NC	Must be hang up in the air.

Note1: HBMU100-16 has no P1 terminal and No. 9-16 temperature sensor are not connected of P3 Terminal.

Note 2: The terminal defined as NC must be hang up up in the air.

Cable size requirements: P1, P2 and P3 use 0.5mm² cable;

CAN communication uses 0.5mm² shielding wire with an impedance of 120Ω and its single-end connect with ground.
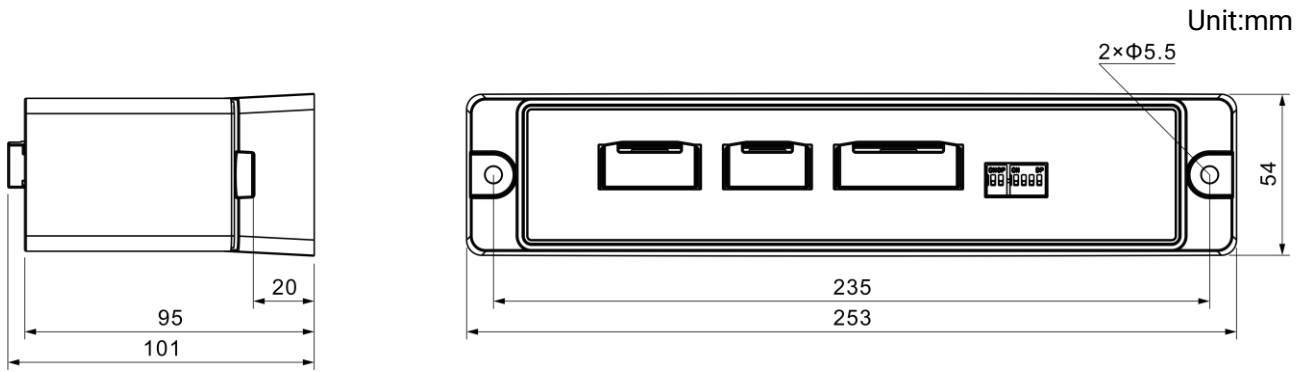
6.4 OVERALL DIMENSIONS AND PANEL CUTOUT

Unit:mm

2×Φ5.5

54

20

95

101

235

253

Fig.7 – Overall Dimensions and Panel Cutout

7 HMU8-BMS DISPLAY MODULE (OPTIONAL)

7.1 PERFORMANCE AND CHARACTERISTICS

——The display module adopts 8-inch LCD with 800*600 resolution, HMI display, capacitive touch screen and optional Chinese/English operation, which is selectable on site and convenient for debugging;

——With power indicator, communication indicator and alarm indicator;

——The 10-level dimming can be adjusted for different environments;

——With 4 RS485 interfaces, 1 CANBUS interface, 1 ETHERENT interface. Using RS485-1 to communicate with BCU master control module, CANBUS interface to debug the communication between BCU and BMU, and the others are reserved interfaces;

——The USB device interface is used to upgrade the firmware of the module;

——The USB host interface is used to upgrade the screen images and fonts library of display module;

——There is a rubber seal ring between shell and control panel, the waterproof of front panel can reach IP65;

——The controller is fixed with metal clips;

——Modular design, pluggable terminal, built-in mounting with compact structure and easy installation.

7.2 SPECIFICTION

Table 22 Specification Parameter

Items	Contents
Operating Voltage	Range: DC10V ~ DC35V，continuous power supply, DC reverse connection protection
Overall Consumption	<6W
RS485 Interface	Isolated, half-duplex, 9600/19200/38400/57600/115200bps baud rate, maximum communication distance 1000m. (At 9600bps baud rate)
Ethernet Interface	Self-adapting 10/100Mbit
CAN BUS Interface	Isolated, maximum communication distance 250m, using Belden 9841cale or equivalent.
Vibration	5-8Hz: ±7.5mm 8-500Hz: 2g IEC60068-2-6
Shock	50g, 11ms, half-sine, three consecutive shocks are applied in each of the three mutually perpendicular directions, i.e. a total of 18 times. IEC60068-2-27
Bump Test	20g, 16ms, half-sine IEC 60255-21-2
Overall Dimensions	221mm x 163mm x 51mm
Panel Cutout	205mm x 147mm
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-30~+80)°C

Items	Contents
Protection Level	Front Panel: IP65, when waterproof rubber ring inserted between panel and housing. Back Panel: IP20
Weight	1.3kg

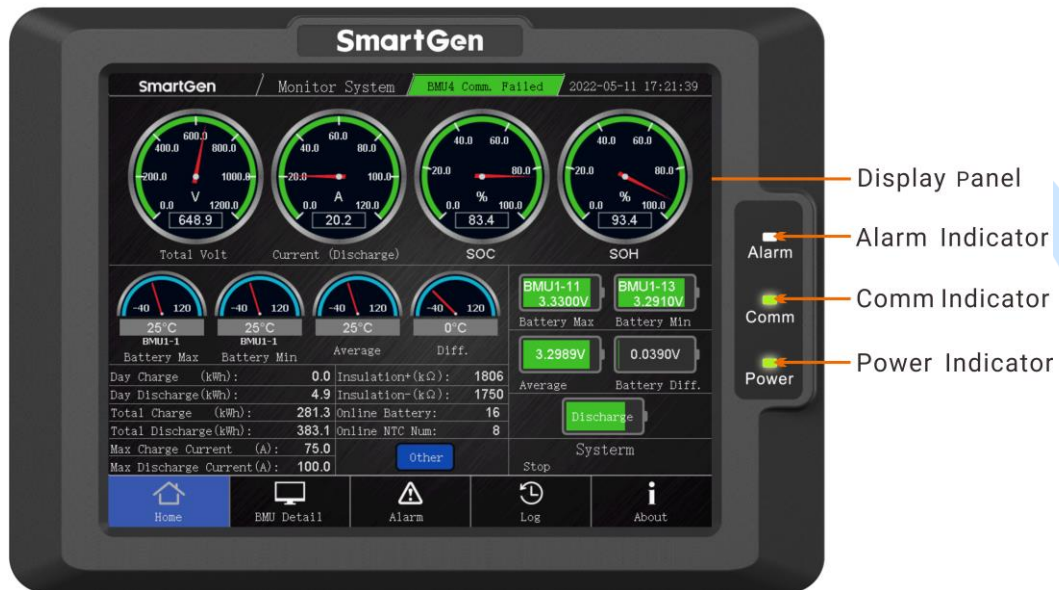## 7.3 DISPLAY AND OPERATION

7.3.1 FRONT PANEL OF DISPLAY MODULE

Fig.8 – Front Panel Drawing

Table 23   Indicator Description

Indicators	Description
Alarm	Level-1 Fault Alarm: slow flashing (once per second). Level-2 Fault Alarm: fast flashing (5 times per second). Level-3 Fault Alarm: always illuminated. No Alarm: distinguished.
Comm	Always illuminated when the communication between display module and master control module is normal. Distinguished when the communication is abnormal.
Power	Always illuminated when the controller is power on and works. Distinguished when controller stops working.

7.3.2 HOMEPAGE DISPLAY
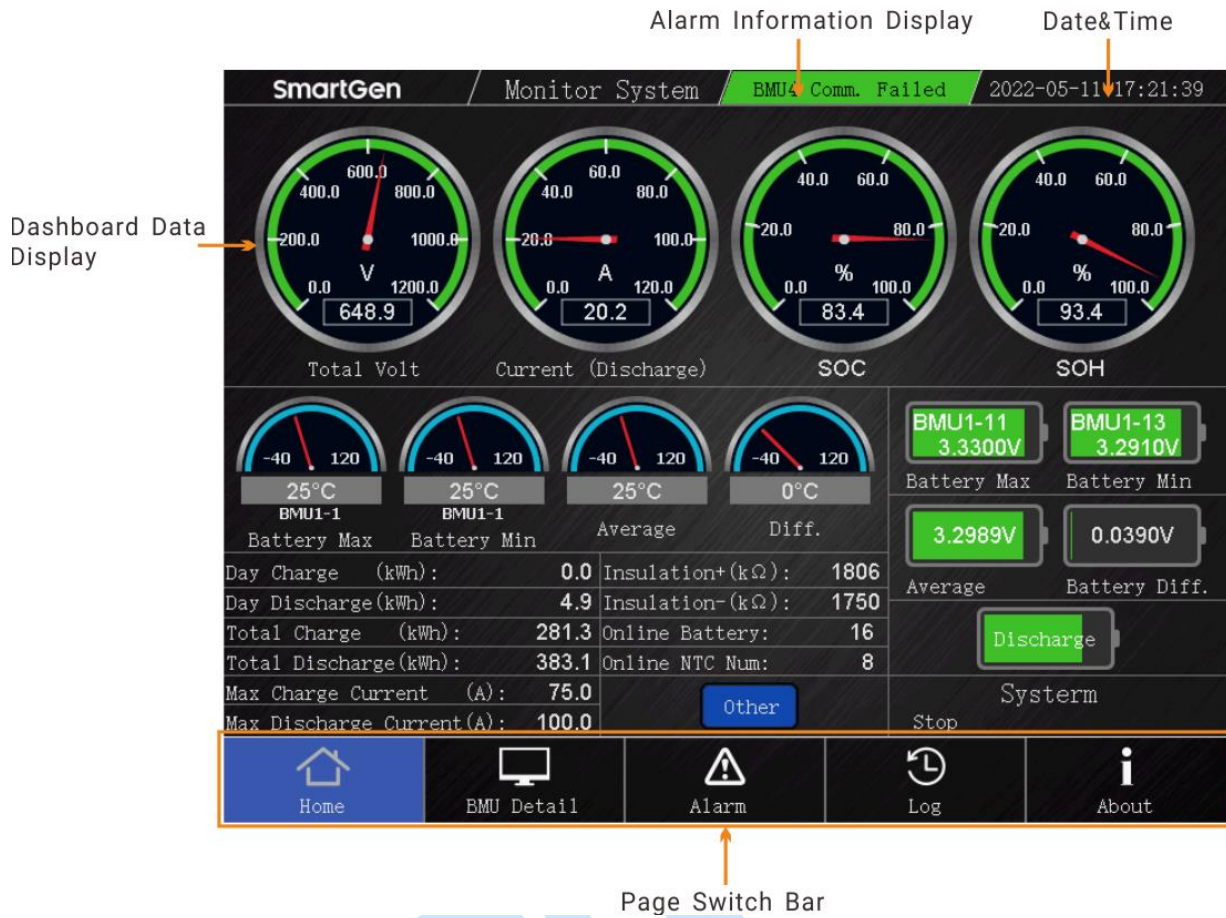
Fig.9 – Homepage Display

7.3.3 BMU DETAILS

Fig.10 – BMU Details

This page displays all the cell voltage, temperature data and the current balance status of signal BMU. To switch BMU display by "Left" or "Right" key.

7.3.4 ALARM PAGE

Fig.11 – Alarm Page

Alarm page can display the contents of Level-1 fault alarm, Level-2 fault alarm and Level-3 fault alarm.

Table 24 Indicator Description

Icons	Keys	Description
	Alarm Mute	Press this key to eliminate the alarm sound of display module and master control module, and the white section of key turns red at the same time. Press this key again, the alarm sound is active again, and the the red section of the key turns white at the same time.

Fig.12 – Event Log

Each page can display 2 items of event record, including the number/total items of current event, event type, event content, occurrentce time and data details.

Up to 200 items of event records can be viewed circularly by "Page Up"and "Page Down".

7.3.6 ABOUT PAGE

Fig.13 − About Page

Table 25 Keys Description of About Page

Icons	Keys	Description
⚙	Parameter Set	Press this key to select display module and master control module for parameter setting.
EN	Language Set	Press this key to set the language as Chinese or English.
🕐	Time & Date	Press this key to set the time and date of master control module.
☼	Brightness	Press this key for screen brightness adjustment and lamp test (lasts for 2 seconds).
🔧	Advanced Parameter Set	Press this key and enter the password for data calibration and parameter restore.
BMU Upgrade	BMU Upgrade	Press this key to enter the interface of firmware upgrade of HBMU100 module.
BCU Upgrade	BCU Upgrade	Press this key to enter the interface of firmware upgrade of HBCU module.

7.3.7 PARAMETER SETTING

In "About" interface, press [⚙] to enter the "Select Page" to select the module that the parameter needs to be configured.
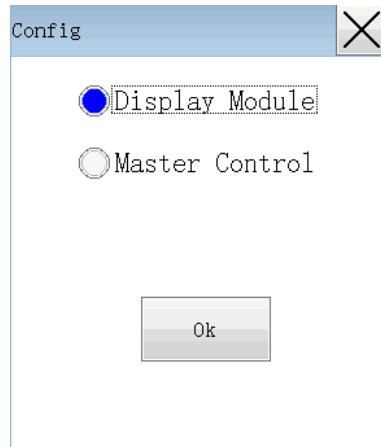
Fig.14 – Module Selection

7.3.8 PARAMETER CONFIGURATION OF DISPLAY MODULE
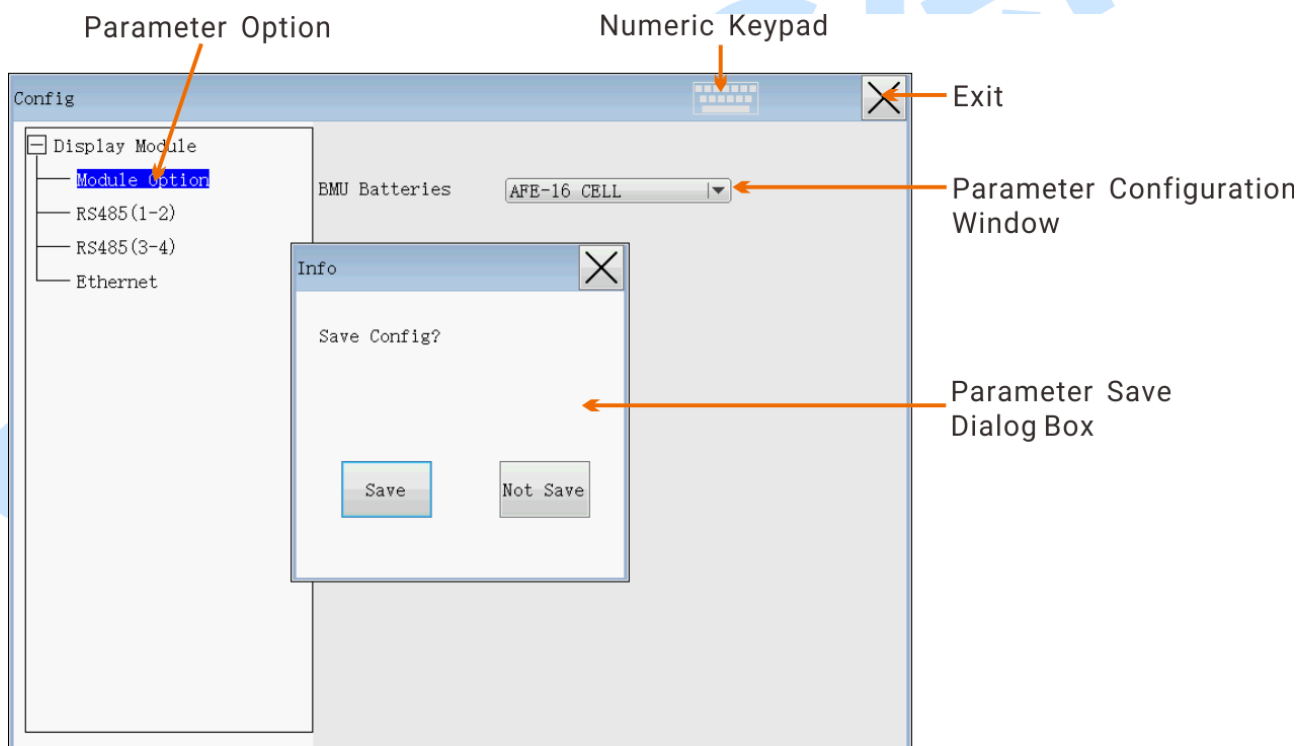
Fig.15 – Parameter Configuration Interface of Display Module

The parameter configuration steps are as follows:

o configure the parameters of the display module, perform the following steps:

1) Select the parameter item to be configured by the tree diagram;

2) Set the parameter to be changed in the right window. Press the numeric keypad button when necessary to pop up the numeric keypad;

3) After the configuration, press the exit button to pop up the saving dialog box. Save the parameter follow the prompts.
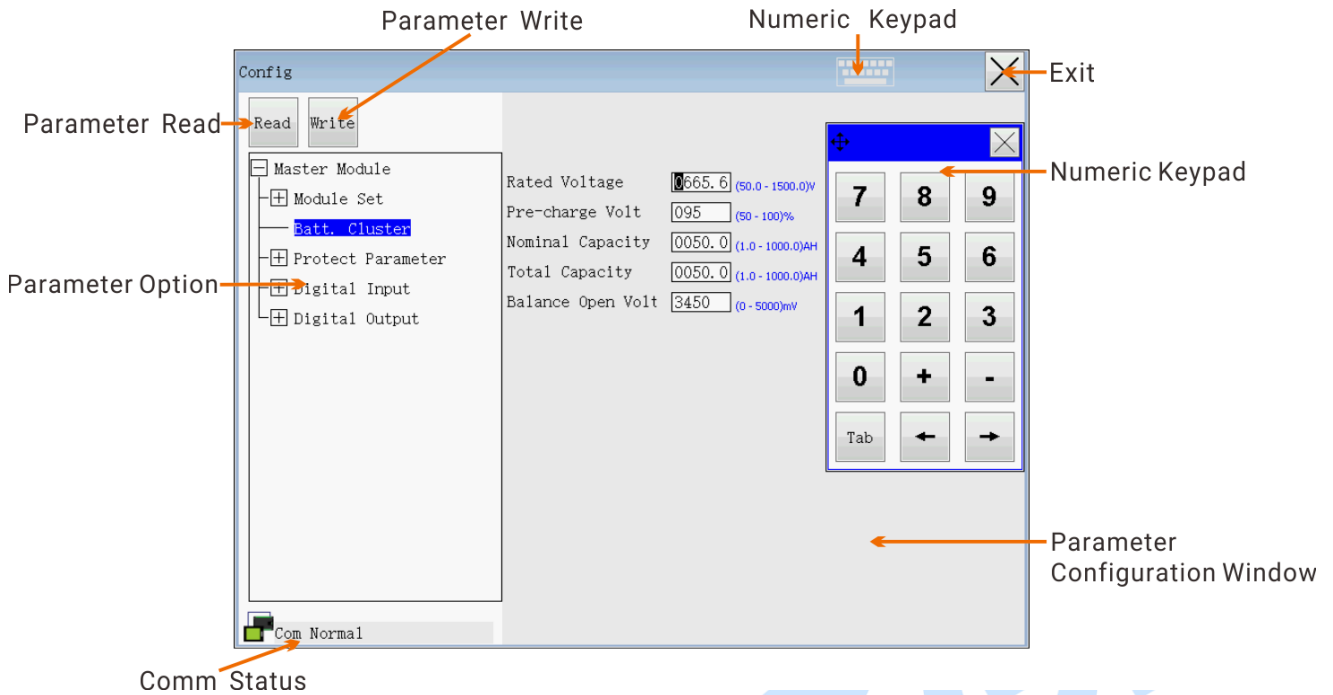
Fig.16 – Parameter Configuration Interface of Master Control Module

Before entering the parameter configuration interface, the display module will first read the parameters of the master control module. If the communication fails at this time, the display module will load the default parameter values of the master control module.

The parameter configuration steps are as follows:

1) Select the parameter item to be configured by the tree diagram;

2) Set the parameter to be changed in the right window. Press the numeric keypad button when necessary to pop up the numeric keypad;

3) After the parameter configuration, click the parameter write button to write the parameter. Before writing, if the password saved by the display module is inconsistent with the password of the master control module, a password dialog box will pop up. After entering the correct password of the master control module, the parameters can be written successfully; otherwise, it cannot be written. If the correct password has been saved before, the parameter is written directly.

4) After the parameters are written, click the exit button to exit the interface.

Note 1: The default password of master control module is "01234", please contact with the manufacturer when forgetting;

Note 2: During the configuration process, if the communication fails and becomes normal, the display module will read and load the parameter configuration of the master control module.

Notes and Instructions:

a) Modify the internal parameters of the module (e.g. various protection threshold values and their delay, etc.) when the battery cluster is in the static state, otherwise, BMS alarm protection may occur, resulting in load power failure;

b) High limit value must be greater than the low limit value, such as the over voltage threshold value must be greater than the under voltage threshold value, otherwise, both over voltage and under voltage may occur at the same time;

c) When set the self-reset alarm, please set the return value correctly. Otherwise, it will fail to alarm normally. When set the high limit value, the return value should be less than the set value. When set the low limit value, the return value must be greater than the setting value;

d) The Aux. input ports cannot be set as the same item, otherwise, the correct function will not be available, while the Aux. output ports can be set as the same items.
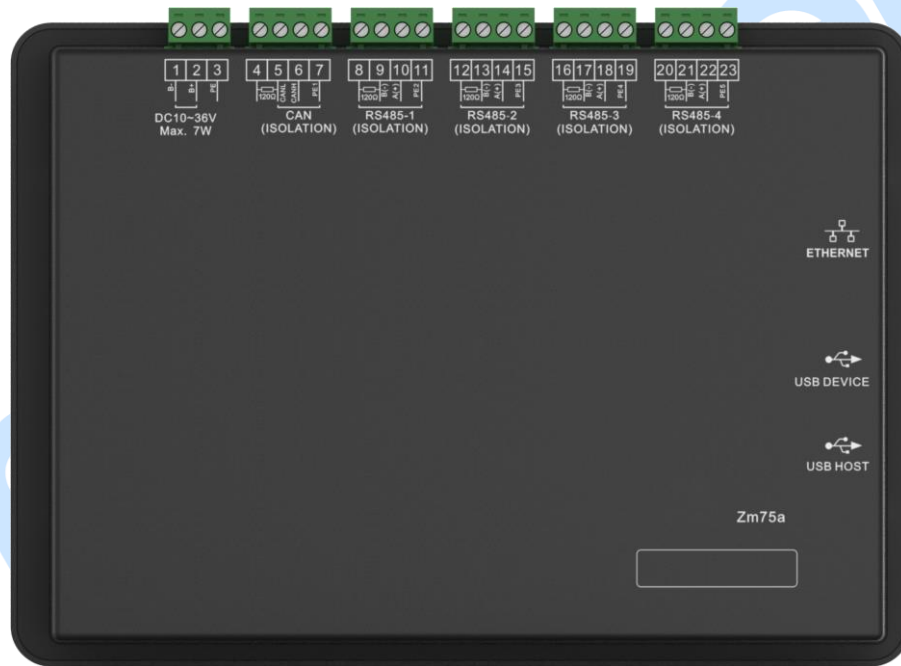
7.4 THE BACK PANEL OF DISPLAY MODULE HMU8-BMS

Fig.17 – The Back Panel Drawing

Table 26 Terminal Description

No.	Function		Cable Size	Remark
1	B-		1.0mm^2	Connect to starter battery negative.
2	B+		1.0mm^2	Connect to starter battery positive.
3	PE			Grounding protection.
4	CAN	Terminal Matching Resistance (120Ω)	0.5mm^2	Used for BMU debugging, BCU upgrading and firmware upgrading of BMU. A twisted-pair shielded wire with an impedance of 120Ω is recommended. The shielded wire is grounded
5		CAN L	0.5mm^2	

No.	Function		Cable Size	Remark
6		CAN H	0.5mm^2	at a single end. Short connect Terminal 4 and Terminal 6 to the 120Ω terminal resistor.
7		PE1		Grounding protection.
8	RS485-1	Terminal Matching Resistance (120Ω)	0.5mm^2	Used for connecting to master control module. A twisted-pair shielded wire with an impedance of 120Ω is recommended. The shielded wire is grounded at a single end. Short connect Terminal 8 and Terminal 10 to the 120Ω terminal resistor.
9		B(-)	0.5mm^2	
10		A(+)	0.5mm^2	
11		PE2		Grounding protection.
12	RS485-2	Terminal Matching Resistance (120Ω)	0.5mm^2	Reserved interface. A twisted-pair shielded wire with an impedance of 120Ω is recommended. The shielded wire is grounded at a single end. Short connect Terminal 12 and Terminal 14 to the 120Ω terminal resistor.
13		B(-)	0.5mm^2	
14		A(+)	0.5mm^2	
15		PE3		Grounding protection.
16	RS485-3	Terminal Matching Resistance (120Ω)	0.5mm^2	Reserved interface. A twisted-pair shielded wire with an impedance of 120Ω is recommended. The shielded wire is grounded at a single end. Short connect Terminal 16 and Terminal 18 to the 120Ω terminal resistor.
17		B(-)	0.5mm^2	
18		A(+)	0.5mm^2	
19		PE4		Grounding protection.
20	RS485-4	Terminal Matching Resistance (120Ω)	0.5mm^2	Reserved interface. A twisted-pair shielded wire with an impedance of 120Ω is recommended. The shielded wire is grounded at a single end. Short connect Terminal 20 and Terminal 22 to the 120Ω terminal resistor.
21		B(-)	0.5mm^2	
22		A(+)	0.5mm^2	
23		PE5		Grounding protection.

Note 1: The slave USB interface of controller side is used for the firmware upgrading of controller.

Note 2: The master USB interface of controller side is used for updating the display image and font library

Note 3: The ETHERENT interface of controller side is the reserved interface.

7.5 HMU8-BMS INSTALLATION

a) **CLIPS**

——The controller is panel mounted and fixed by clips during installation.

——Unscrew the screw of fixed metal clips to the appropriate position counterclockwise.

——Pull the fixed metal clips backwards towards the back of controller to ensure the four fixed metal clips are all fixed in the specified slot.

——Screw the metal clips clockwise and fixed them to the controller panel.

——Do not screw the metal clips too tightly, the torque 2.75kgf.cm (0.27N.m).

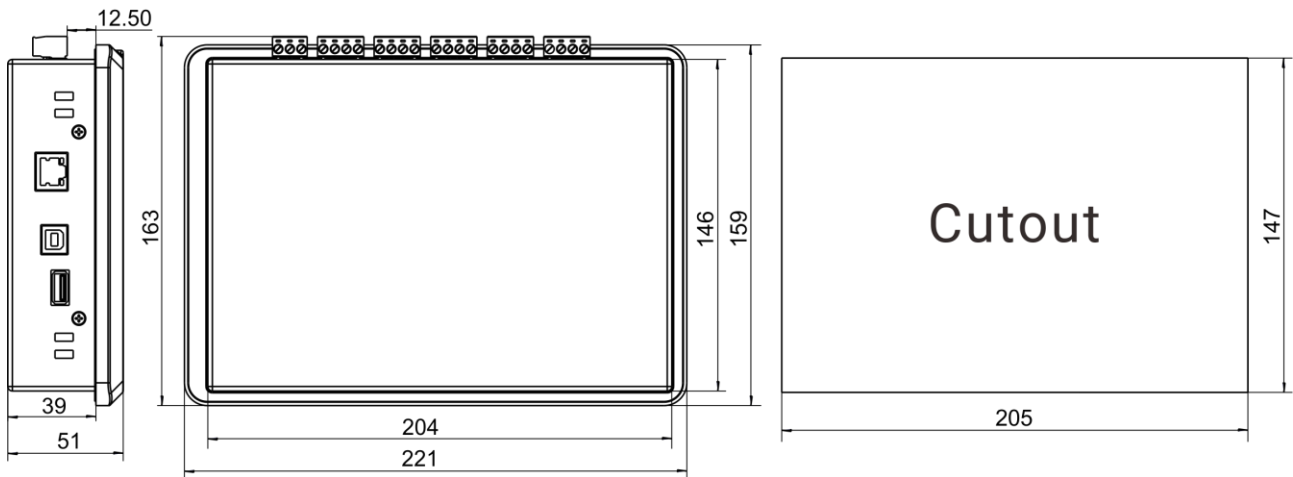b) **OVERALL DIMENSIONS AND PANEL CUTOUT**

Unit: mm

Fig.18- Overall Dimensions and Panel Cutout

8 CURRENT SENSOR

8.1 SPECIFICATION PARAMETER

HBCU100 module uses Hall current sensor to sample the chargeg/discharge current of battery cluster. The model of the Hall current sensors is shown as below:

Table 27　Specification Parameters

Model	Range	Accuracy	Voltage	Remark
HAS2020	-100A~+100A	1%FSR(Full Range)	5V	

Note: The Hall current sensor can be customized according to requirements.

8.2 CONNECTIONS

Table 28　Current Sensor Connections

Model	Interface	Terminal No.	Definition	Description
HAS2020	1 2 3 4	1	+5V	Connects to 5V output of BCU module
		2	0V	Connects to GND of BCU module.
		3	Vout	Connect to I_SENSOR1 of BCU module.
		4	Vref	Hang up in the air.

8.3 OVERALL DIMENSIONS AND PANEL CUTOUT
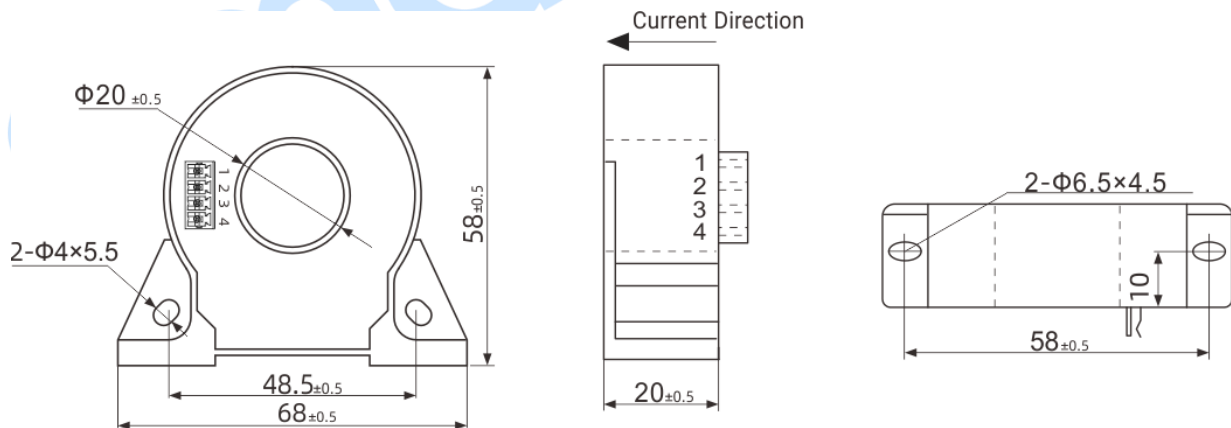
Unit: mm

Fig.19 - Overall Dimensions and Panel Cutout

9 INSULATION MONITORING MODULE

9.1 SPECIFICATION PARAMETERS

HBCU100 module obtains the positive and negative insulation resistance values of the battery cluster from the insulation monitoring module via 485 communication.

Table 29 Specification Parameters

Items	Contents
Operating Voltage Range	(DC9V ~ DC30V)
Power Consumption	<3W
Measurement Range	1kΩ~10MΩ Accuracy ≤5% (Battery cluster voltage can only be monitored in the range of 100VDC~1000VDC)

9.2 CONNECTIONS

Table 30 Terminal Function Definition

Terminal Definition	Descriptions	Terminal Definition	Descriptions
DC+	Total positive of battery cluster	DC-	Total negative of battery cluster
Vin	Positive of power supply	0V	Negative of power supply.
A	RS485-A	B	RS485-B
GND	System ground (connect to battery cluster cabinet)		

Note: All bits of the dip switch should be kept at the OFF position.

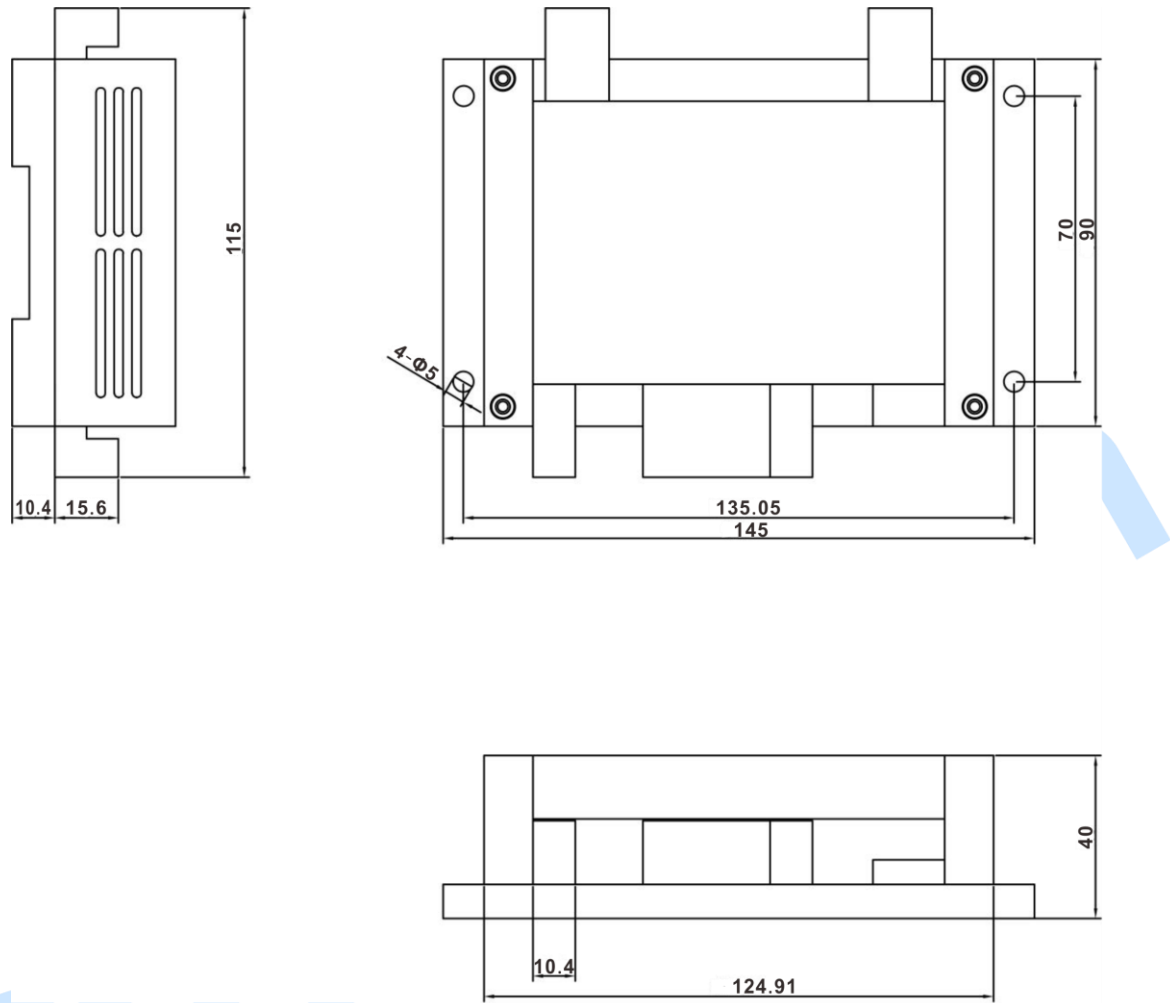## 9.3 OVERALL DIMENSIONS AND PANEL CUTOUT

Unit：mm

Fig.20 - Overall Dimensions and Panel Cutout
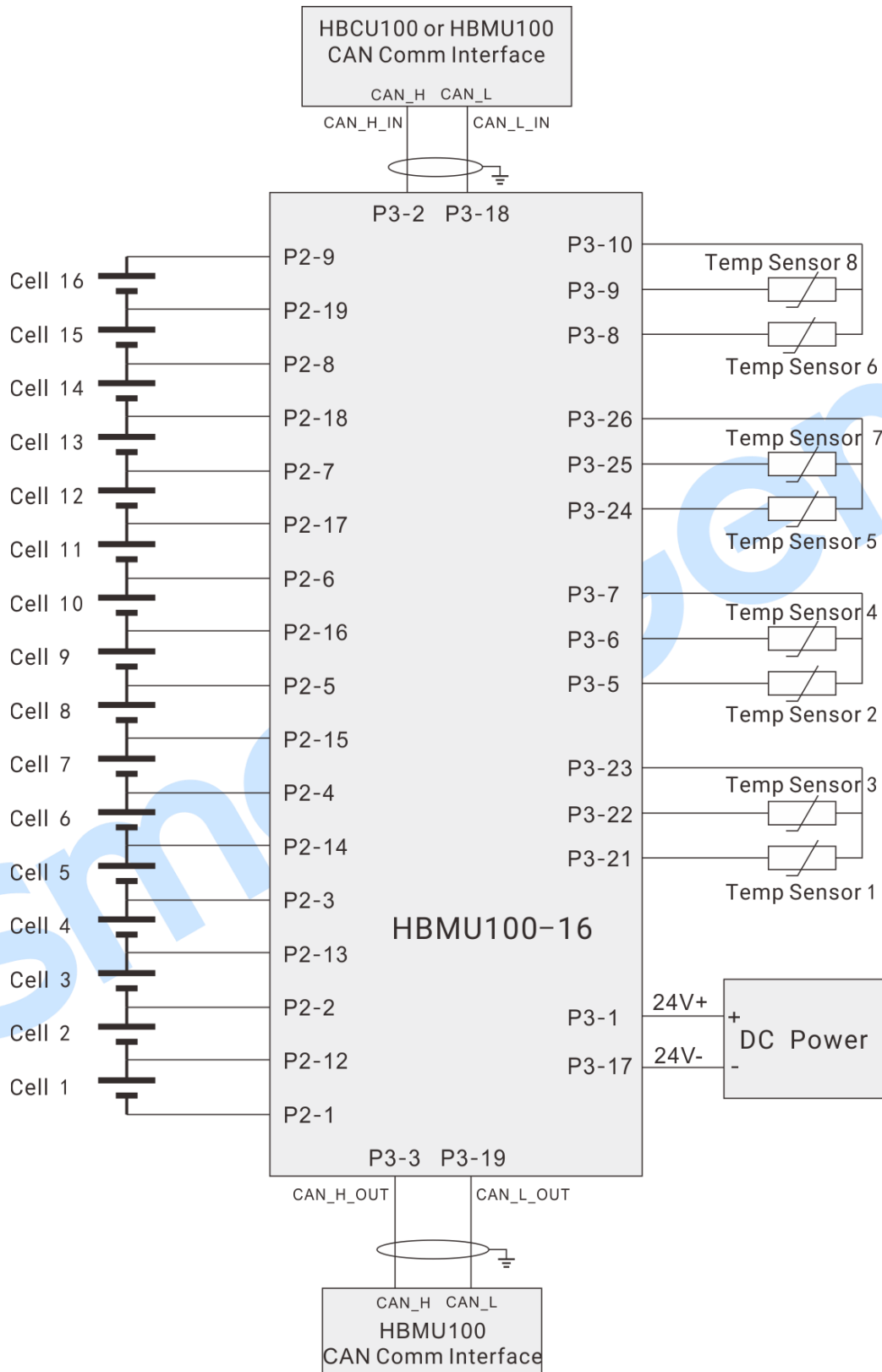
10 SYSTEM TYPICAL APPLICATION DIAGRAM

Fig.21 – HBMU100-16 Application Diagram

Note 1: Refer to the above figure for Cell 1-16 and Temp Sensor 1-8. The connection of Cell 17-32 and Temp Sensor 9-16 is similar to the figure above. Please check the terminal connection table.

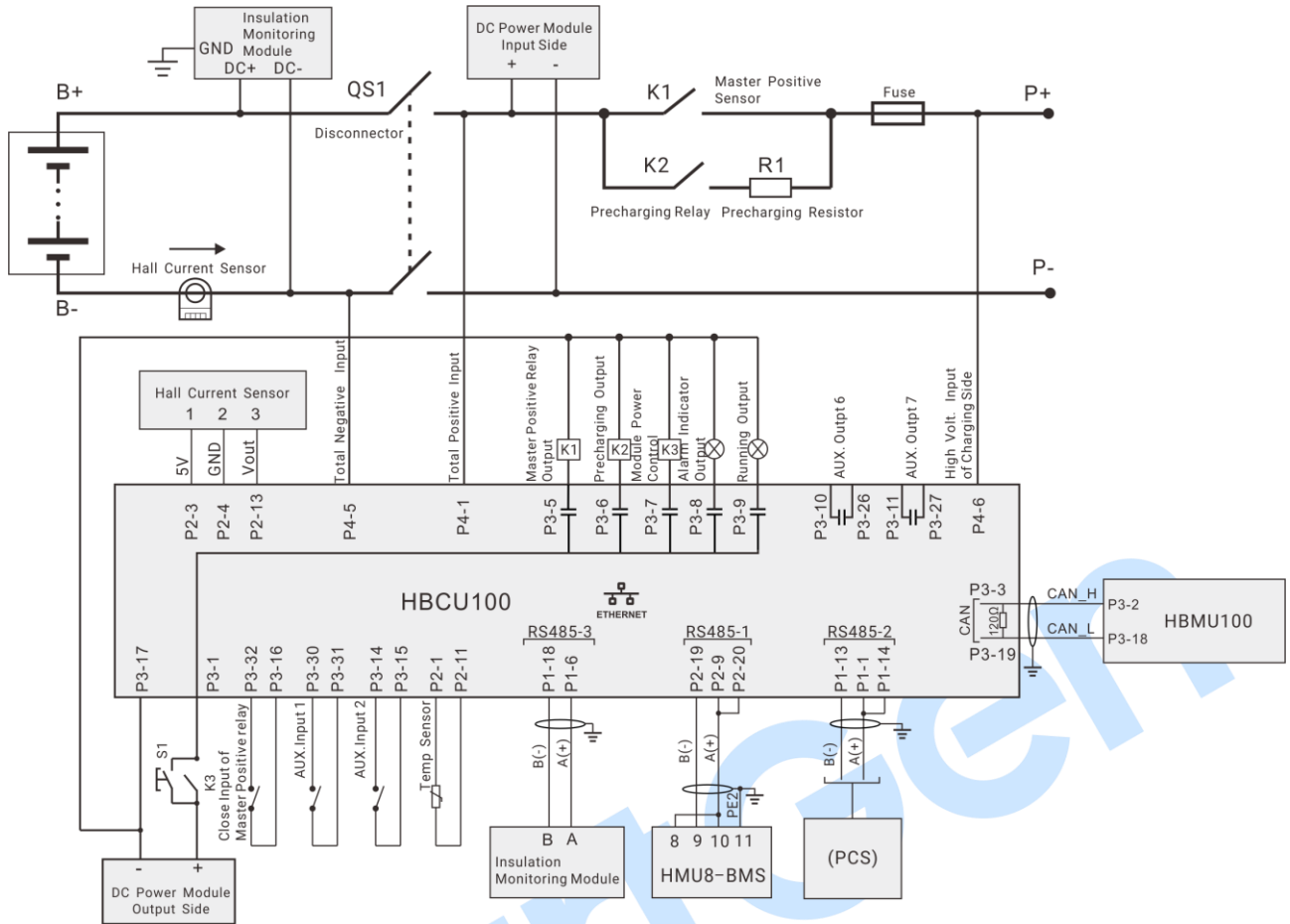Note 2: The temperature sensor needs to adopt the NTC 10K-3950 type.

Fig.22 – HBCU100 Application Diagram

11   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 full charged normally;
Please contact our service personnel in time if there is any question.

12   TROUBLESHOOTING

Table 31   Troubleshooting

Fault Symptom	Possible Measurement
Controller no response when power on	Check controller wirings; Check if there is voltage output of power supply module;
RS485 communication failure	Check the wirings; Check if the settings of COM port are correct; Check the communication port of PC is damaged or not; A 120Ω resistor is recommended to connect between A&B of RS485.

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