Specification

Product Name： EHVS500-BCU High Voltage Energy Storage System

Product Model： EHVS500-BCU-V1.1

上海恩阶电子科技有限公司

Version	Date	Editor	Version Revision Note
V1.0	2024.06.14	Wang Tao	Create first draft
V1.1	2024.06.28	Wang Tao	Modify the partial interface description
V1.1.2	2024.07.17	Wang Tao	Modify the partial interface description

上海恩阶电子有限公司

Content

上海恩阶电子有限公司

一、Product Description

EHVS500 Is a set of control management system for series structure of energy storage batteries. The system consists mainly of three parts, BCU, BMU and power. Its main function is to manage and control the battery cluster in the series energy storage battery system. Usually, the BMU module in EHVS500 is placed in the single battery PACK of the high voltage system, which is responsible for monitoring and collecting real-time data such as the voltage and temperature of the battery. The BCU module will be placed in the main control box of the high-voltage system to better monitor and manage the status of the battery cluster.

BCU (Battery Control Unit)

BCU is the core part of the entire energy storage battery management system. It receives the voltage and temperature information of the single cell collected from the BMU of each battery cluster, and performs the corresponding processing and calculation. Through these data, BCU can calculate the SOC (State of Charge) and SOH (State of Health) of the battery cluster, and perform the balance strategy judgment and battery fault diagnosis function. In addition, BCU can also protect the battery cluster and relay control according to the battery fault information, and can communicate and data interaction with other systems, so as to effectively manage and maintain the use of the battery. It can effectively manage the battery charging and discharging process, and improve the efficiency and safety of the energy storage system.

二、Scope Of Application

EHVS500-BCU is a main control module designed for the high-voltage energy storage battery management system. The main function of the module is to monitor the operation status of the battery and control the battery operation mode in real time to ensure the normal operation of the energy storage system.

First, the EHVS500-BCU has the ability to monitor the working state of the battery in real time. Through the built-in sensors and monitoring equipment, the key parameters such as battery voltage, current, temperature and so on are obtained in real time, so as to monitor the real-time state of the cell group. These data help us to find the possible problems of the cell group in time, so that we can take corresponding measures to deal with them.

Secondly, the EHVS500-BCU can also control the working state of the energy storage system. Once the operating state of the system is detected beyond the safety range, such as high voltage or temperature, the system will immediately activate the protection mechanism and quickly cut off the connection between the battery and the external equipment to prevent the cell overheating or overvoltage damage to the battery and the whole system.

In addition, the EHVS500-BCU is equipped with an external communication interface to communicate with external devices. With this interface, we can send the status and operation

data of the battery to external devices, such as a computer or mobile phone. In this way, we can grasp the working situation of the system in real time, including the battery power, working status, fault information and so on. By grasping the work situation of the battery in real time, we can make necessary adjustments and optimization in time.

EHVS500 Is a powerful and easy to operate high-voltage energy storage battery management system, which can effectively protect the battery, improve the efficiency of the battery, and provide a full range of management services for high-voltage energy storage battery.

三、Normative Application Documents

The following documents are essential for the application of this document. For all dated references, only the dated version applies to this file. For undated references, the latest version (including all modifications) applies to this file;

EMC-surge immunity standard in Table 5,6.15 of《GB/T34131-2023 Battery management system for electric energy storage》requirements of GB / T 17626.5 grade 3, usual line 1kV, ground line 2kV;

Standard for the immunity of electrostatic discharge in Table 5,6.15 of《GB/T34131-2023 Battery management system for electric energy storage》requirements of GB / T 17626.2 grade 3, it can withstand contact discharge 6kV, air discharge 8kV;

dielectric strength in Table 5,6.15 of《GB/T34131-2023 Battery management system for electric energy storage》:between the battery management system and the acquisition terminal and the ground terminal connected to the battery、between the communication terminal and the ground terminal、between the acquisition terminal and the power supply terminal、between the acquisition terminals and the communication terminals、between the power supply terminal and the communication terminal、which should withstand the specified power frequency AC voltage of 1min 2120V(DC voltage: 3000V), no insulation breakdown and flashover phenomenon and the leakage current is less than 10 mA;

Standard for the immunity of electrostatic discharge in Table 5,6.15 of《GB/T34131-2023 Battery management system for electric energy storage》requirements of GB / T 17626.4 grade 3, that the power port and the ground port(PE):Voltage peak at 2kV repeat frequency 5 or 100 kHZ; the Signal ports and the control ports:Voltage peak at 1kV repeat frequency 5 or 100 kHZ.

四、Functional Characteristics

4.1、Data Processing Control

- Upload the real-time battery data information collected through BMU to BCU, and realize the management and system of battery pack / cluster charging and discharging after processing;
- The estimation of SOC (State of Charge) and SOH (State of Health) can realize the accurate calculation of the SOC and SOH of a single battery and battery pack;
- Data storage function, can be the system running data of the local storage;
- Upper computer communication function, can be connected to the upper computer monitoring and data parameters writing operation;
- History recording function, intended for the purpose of system maintenance;
- Thermal management control function: the functional interface can provide active cold and heat management of the battery pack according to the battery temperature state, and realize the temperature control function of cooling or heating, so as to prolong the service life of the battery pack.

4.2、 Measuring Ability

- For the end of the voltage detection: through the implementation of isolation collection and processing of the voltage, to achieve real-time monitoring of the voltage;
- For current detection: using hall sensor for real-time isolation acquisition and processing;
- Fault detection function: with voltage, current, temperature, SOC, SOH and other threshold alarm function, and the circuit cut-off protection function of the limit alarm threshold;
- Hardware automatic power automatic detection: the system has the automatic power detection function, the system is equipped with precharged relay detection, total negative relay detection and discharge relay detection and other equipment;
- During operation, the system can conduct voltage sensing failure detection and charging relay failure detection in real time. In addition, the system also supports discharge relay failure detection, precharged relay failure detection and total negative relay failure detection.

4.3、Communication Function

- CAN, RS-485 to realize information interaction;
- The BCU upgrades the firmware online via the upper computer computer.

4.4、Low Power Consumption Mode

- Low power consumption working mode, prolong the service time and energy loss of the

battery pack.

4.5、Series Communication Function

- Automatic address coding is an automated process that can automatically assign and manage addresses to data. This encoding method can improve the efficiency and accuracy of data processing.

4.6、System Extension Function

- In terms of system expansion, it covers diversified safety control requirements such as output of two active / passive nodes, seven relay acquisition and control management, and effective isolation of strong and weak power.

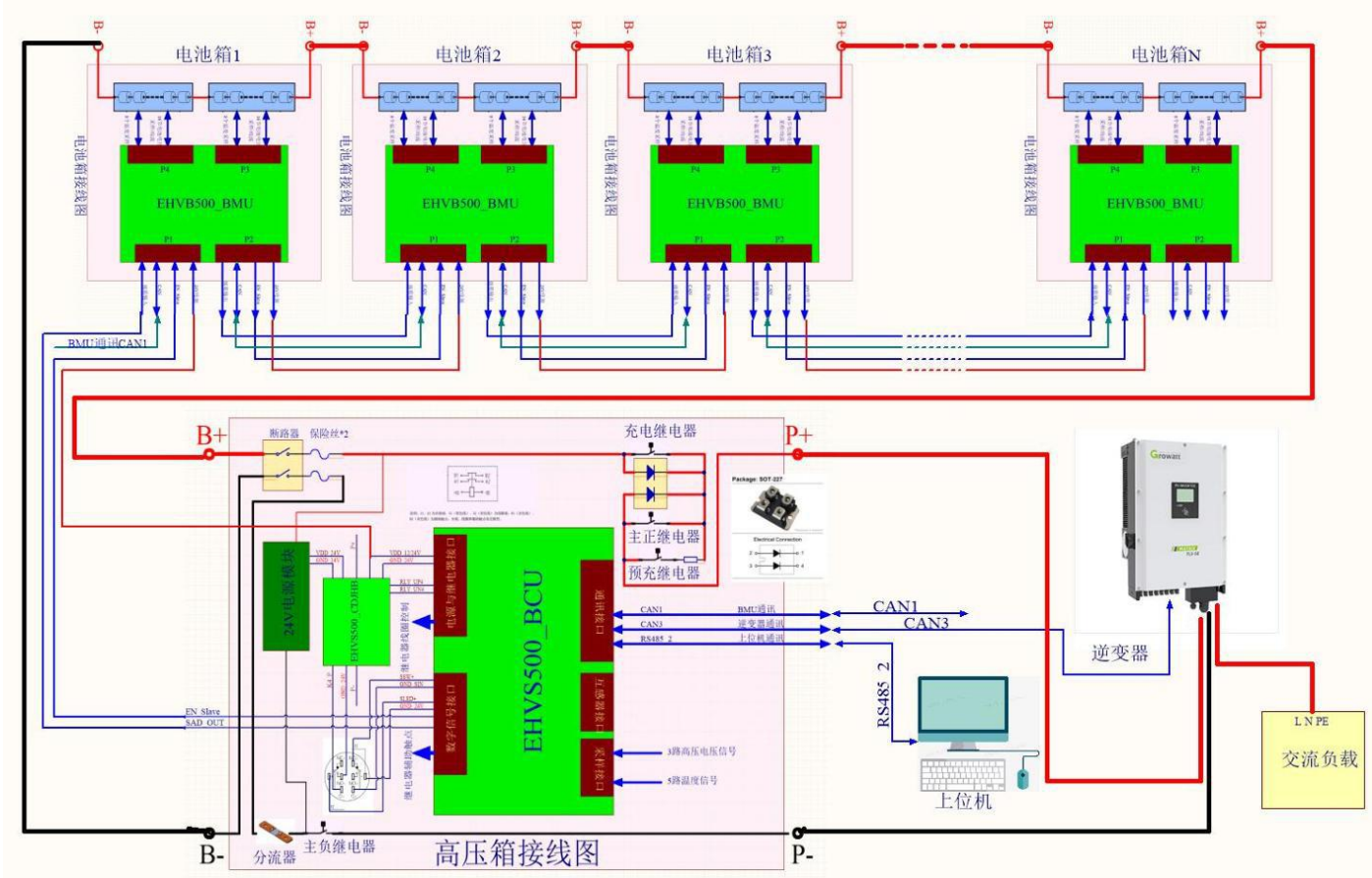
五. Technical Parameters

5.1、BCU Main Parameter

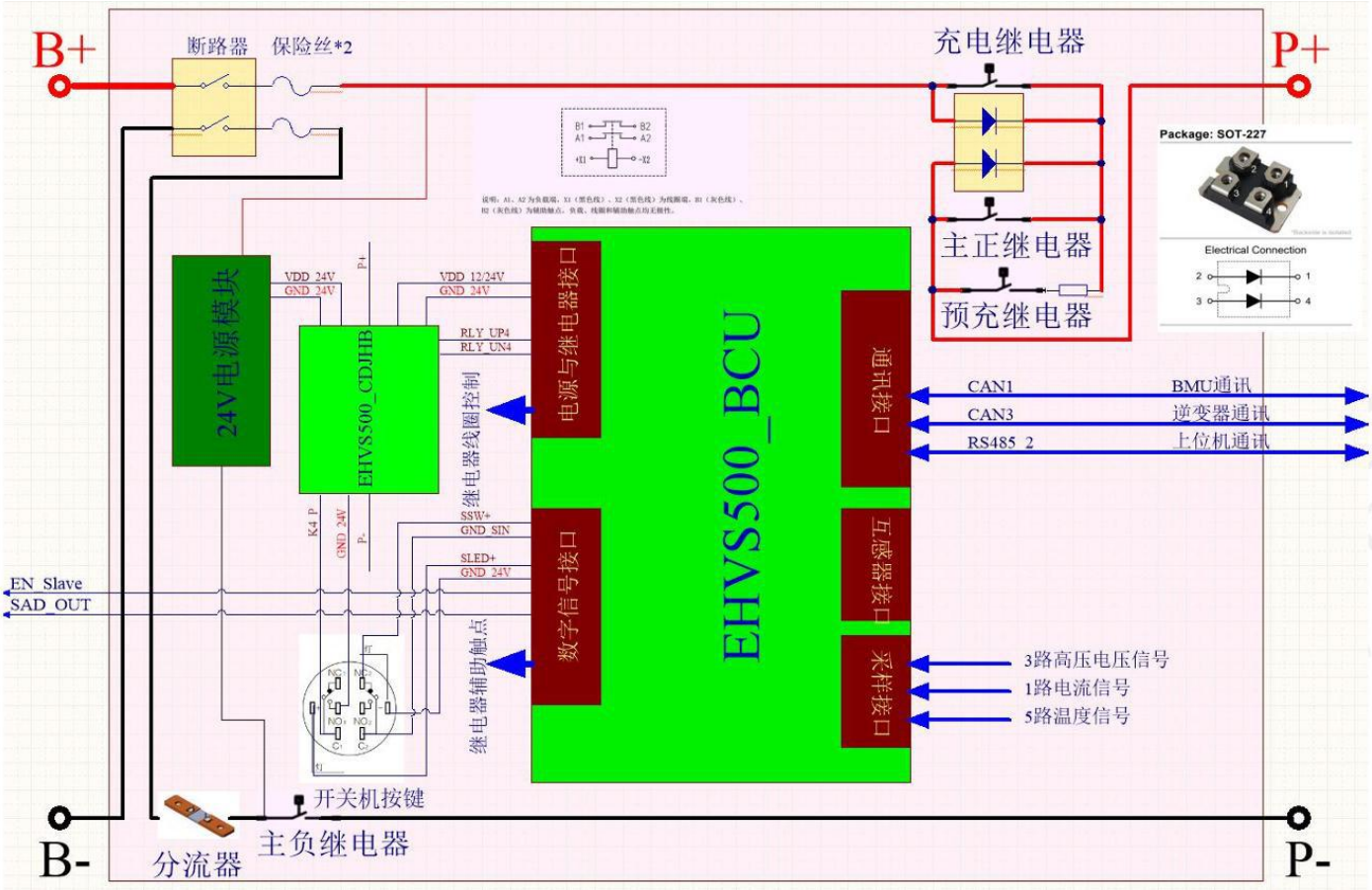
BCU Main Parameter		
scope of applicable voltage	100V-1000V	
Low voltage power supply	18V-36V	
consumption	Standby consumption	≤3W（No relays）
	Sleep consumption	≤0.1W
Voltage sampling	Sampling range	0 - 1500V
	Sampling accuracy	Deviation≤±5mV accuracy 0.2% FS
Current sampling	Sampling range	-150A~+150A
	Sampling accuracy	Better than±0.5%
	sampling period	1ms
Temperature sampling	Sampling range	-40℃~+125℃
	Sampling accuracy	±2℃

	sampling period	100ms		
	Sampling number	4		
State estimation	SOC	≤±5%		
	SOH	100%		
Communication interface	CAN	125-1000Kbps, Baud rate: 500Kbps		
	RS485	Baud rate: 115200bps		
Dry contact point	IP grade	40	Operating temperature range	-40 - 85℃
	Output(current)		Operating humidity range	5-90%
Activation mode	Charge to activate voltage	≥460V	Charging current threshold	≥0.6A
	Reduction bond activation	Support		
	Charging activation	Optional		
Sleep function	Standby with shutdown	>1H（set）		
	Low voltage shutdown	Support（set）		
	Turn off the reset button	Support		
work pattern	Charging mode	Support		
	Low power consumption mode	Obligate		
	Discharge mode	Support		
	Shutdown mode	Support		
LED	RUN	SOC	ALARM	Support
Temperature sampling	4			

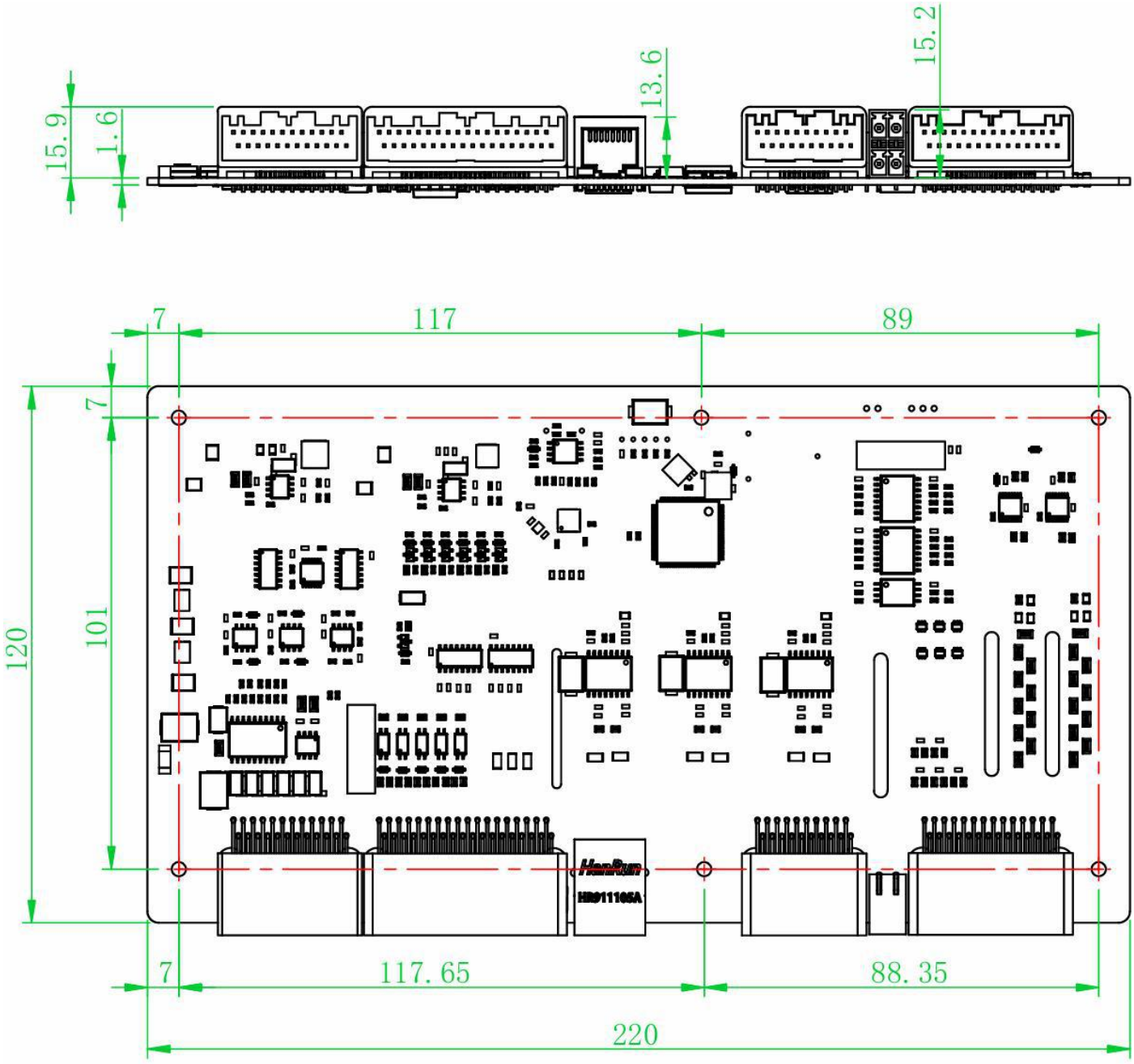
5.2、System Topology



5.3、BCU Connection Diagram



5.4、BCU Appearance Dimension Diagram



5.5、Interface Definition

5.5.1、Power Supply & Relay Interface

Order number	Name	Description	Order number	Name	Description
PIN1	GJD_OCP2		PIN13	GJD_OCN2	
PIN2	GJD_OCP1		PIN14	GJD_OCN1	
PIN3	RAY_DP3		PIN15	RAY_DN3	
PIN4	RAY_DP2		PIN16	RAY_DN2	
PIN5	RAY_DP1	Precharged relay controls the positive pole	PIN17	RAY_DN1	Precharged relay controls the negative pole
PIN6	RAY_UP1	The discharge relay controls the positive pole	PIN18	RAY_UN1	The discharge relay controls the negative pole
PIN7	RAY_UP2	The charging relay controls the positive pole	PIN19	RAY_UN2	The charging relay controls the negative pole
PIN8	RAY_UP3	The negative electrode relay controls the positive pole	PIN20	RAY_UN3	The negative electrode relay controls the negative pole
PIN9	RAY_UP4	The power supply self-locking relay controls the positive pole	PIN21	RAY_UN4	The power supply self-locking relay controls the negative pole
PIN10	VDD_LCD	External LCD power supply positive pole	PIN22	GND_24V	External LCD power supply negative pole
PIN11	VDD_OUT	Output system power supply positive pole	PIN23	GND_24V	Output system power supply negative pole
PIN12	VDD_12/24V	Input the system power supply positive pole	PIN24	GND_24V	Output system power supply negative pole

5.5.2、Digital Signal Input Interface

Order number	Name	Description	Order number	Name	Description
PIN1	GND_24V	Negative power source of the output system	PIN19		
PIN2	HAD_IN		PIN20		
PIN3	EN_Slave	Power up the control signal from the machine (BMU)	PIN21		
PIN4	UART4_TX		PIN22		
PIN5	SOC2	50%: LED light power indicator	PIN23	SOC1	25%: LED light power indicator
PIN6	SOC4	100%: LED light power indicator	PIN24	SOC3	75%: LED light power indicator
PIN7	SOC6	RUN: LED light operation indicator	PIN25	SOC5	ALM: LED light operation indicator
PIN8	SLED+	LED+	PIN26	GND_24V	Negative power source of the output system
PIN9	NC		PIN27		
PIN10	NC		PIN28		
PIN11	SSW+	System switch machine signal+ (Normally closed switch)	PIN29	GND_SIN	Digital signal grounding (At SSW+' s the other end)
PIN12			PIN30		
PIN13			PIN31		
PIN14			PIN32		
PIN15	RLY_INP4	Negative-electrode relay auxiliary contacts	PIN33	GND_SIN	Negative-electrode relay auxiliary contacts
PIN16	RLY_INP3	Charging relay auxiliary contact	PIN34	GND_SIN	Charging relay auxiliary contact
PIN17	RLY_INP2	Discharge relay auxiliary contact	PIN35	GND_SIN	Discharge relay auxiliary contact
PIN18			PIN36		

5.5.3、 Communication Interface

Order number	Name	Description	Order number	Name	Description
PIN1	CAN3_L	The L-terminal signal of CAN # 3	PIN11	NC	
PIN2	CAN3_H	The H-terminal signal of CAN # 3	PIN12	RS485_3B	B terminal signal of RS485
PIN3	GND_CAN3		PIN13	RS485_3A	The A terminal signal of RS485
PIN4	NC		PIN14	NC	
PIN5	CAN2_L	The L-terminal signal of CAN # 2	PIN15	RS485_2B	B terminal signal of RS485
PIN6	CAN2_H	The H-terminal signal of CAN # 2	PIN16	RS485_2A	The A terminal signal of RS485
PIN7	NC		PIN17	GND_CAN2	
PIN8	CAN1_L	The H-terminal signal of CAN # 1	PIN18	NC	
PIN9	CAN1_H	The H-terminal signal of CAN # 1	PIN19	RS485_1B	B terminal signal of RS485
PIN10	GND_CAN1		PIN20	RS485_1A	A terminal signal of RS485

CAN1, For the communication with the BMU
CAN3, For communication with the inverter
RS485-2, For communication with the upper computer computer

5.5.4、Current Transformer Interface

Order number	Name	Description	Order number	Name	Description
PIN1	LEM-CH1	Transformers' signal output	PIN3	VDD_LEM+	Positive electrode of transformer
PIN2	LEM-CH2	Reference ground of the transformer signal	PIN4	VDD_LEM-	Negative power supply of the transformer

5.6.5、Analog Signal Input Interface

Order number	Name	Description	Order number	Name	Description
PIN1	NC	ununited	PIN15	HIV_IN1	B + Voltage Sampling
PIN2	NC	ununited	PIN16	NC	ununited
PIN3	HIV_IN2	P + voltage sampling	PIN17	NC	ununited
PIN4	NC	ununited	PIN18	NC	ununited
PIN5	NC	ununited	PIN19	NC	ununited
PIN6	NC	ununited	PIN20	HIV_IN3	P-Voltage Sampling
PIN7	NC	ununited	PIN21	NC	ununited
PIN8	HIV_VSS	ununited	PIN22	NC	ununited
PIN9	SENSE+	The shunt is moved away from the reference ground signal input	PIN23	NC	ununited
PIN10	SENSE-	The shunt is close to the reference ground signal input	PIN24	GND_ASM	Refer to the shunt
PIN11	GND_ASM	B + B- -the sampling reference site	PIN25	GND_ASM	Reference site for ambient temperature sampling
PIN12	PTC_CH1	Temperature sampling point 1, B + terminal	PIN26	PTC_CH5	Temperature sampling point 5, the ambient temperature
PIN13	PTC_CH2	Temperature sampling point 2, the P + terminal	PIN27	PTC_CH4	Temperature sampling point 4, B-terminal
PIN14	GND	P + P-sampling reference site	PIN28	PTC_CH3	Temperature sampling point 3, P-terminal

5.7、Main Technical Parameters Of The Product

Order number	Parameter items			Default Setting		Remark
1	Single overvoltage	Alarm	Single high voltage alarm	3.500V	Set	
			Single-unit high-voltage alarm recovery	3.400V	Set	
		Protect	Single overvoltage protection	3.650V	Set	The charging relay is disconnected
			The monomer overvoltage protection was recovered	3.400V	Set	Charge relay is closed
			Single-body overvoltage protection delay	5S	Set	
	Single-body high-voltage protection relief condition		Directive recovery		Set	Charge relay is closed
			discharge current ＞10.0A continue 10S			
2	Single undervoltage	Alarm	Single low voltage alarm	2.900V	Set	
			Single-unit low-voltage alarm recovery	3.100V	Set	
		Protect	Single under-voltage protection	2.700V	Set	Discharge relay is disconnected
			Single-body under-voltage protection recovery	3.100V	Set	The discharge relay closes
			Single-body under-voltage protection delay	5S	Set	
	Single-body under-voltage protection relief condition		Directive recovery		Set	The discharge relay closes
			charging current ＞3.0A continue 3S			
3	Total voltage overvoltage	Alarm	Total voltage high voltage alarm	448V	Set	
			Main voltage voltage alarm is recovered	435.2V	Set	
		Protect	Total voltage overvoltage protection	467.20V	Set	The charging relay is disconnected

			Total-voltage overvoltage protection recovery	435.2V	Set	Charge relay is closed
			Total voltage and overvoltage protection delay	4S	Set	
	Total voltage and overvoltage protection relief condition		Directive recovery		Set	Charge relay is closed
			discharge current ＞10.0A continue 10S			
4	Total voltage undervoltage	Alarm	Always low voltage alarm	371.20V	Set	
			Total low voltage alarm is recovered	396.8V	Set	
		Protect	Total voltage undervoltage protection	345.60V	Set	Discharge relay is disconnected
			Total voltage and undervoltage protection recovery	396.8V	Set	The discharge relay closes
			Total voltage and undervoltage protection delay	4S	Set	
	Relief condition under total voltage		Directive recovery		Set	The discharge relay closes
			charging current ＞3.0A continue 3S			
5	The low voltage charge of the cell is prohibited		Protect	1.50V	Low voltage cell start low voltage no charge	
6	Charging high temperature	Alarm	Charging high temperature alarm	50℃	Set	
			Charging high temperature alarm recovery	47℃	Set	
		Protect	Charge overtemperature protection	60℃	Set	The charging relay is disconnected
			Charging and overtemperature protection is restored	50℃	Set	Charge relay is closed
			Charging overtemperature protection delay	5S	Set	
	Charging overtemperature protection release		Directive recovery			Charge relay is closed

	condition					

7	Charging low temperature	Alarm	Charging low temperature alarm	2℃	Set	
			Charge the low-temperature alarm recovery	5℃	Set	
		Protect	Charging undertemperature protection	-10℃	Set	The charging relay is disconnected
			Charging undertemperature protection is restored	0℃	Set	Charge relay is closed
			Charging undertemperature protection delay	5S	Set	
	Charging low temperature protection release conditions		Directive recovery			Charge relay is closed
8	Discharge high temperature	Alarm	Discharge high temperature alarm	52℃	Set	
			Discharge high temperature alarm recovery	47℃	Set	
		Protect	Overtemperature protection of discharge	60℃	Set	Discharge relay is disconnected
			The charge overtemperature protection is restored	50℃	Set	The discharge relay closes
			Discharge overtemperature protection delay	4S	Set	
	Discharge high temperature protection release conditions		Directive recovery			The discharge relay closes
	Discharge low temperature	Alarm	Discharge low temperature alarm	-10℃	Set	

9			The discharge low-temperature alarm is resumed	3℃	Set	
		Protect	Discharge insufficient temperature protection	-20℃	Set	Discharge relay is disconnected
			Discharge undertemperature protection recovery	-10℃	Set	The discharge relay closes
			Undertemperature discharge protection delay	4S	Set	
	Discharge high temperature protection release conditions		Directive recovery			The charge / discharge relay is closed
10	Terminal high temperature	Alarm	Terminal high temperature alarm	80	Set	
			High-temperature alarm recovery at the terminal	75	Set	
		Protect	End over temperature protection	100	Set	The charge-discharge relay is disconnected
			Terminal overtemperature protection recovery	85	Set	The charge / discharge relay is closed
			Terminal over-temperature protection delay	4	Set	
	Terminal high temperature protection release condition		Directive recovery			
11	High temperature environment	Alarm	Environmental high temperature alarm	50℃	Set	
			Environmental high temperature alarm recovery	47	Set	
		Protect	Environmental overtemperature protection	60℃	Set	The charge-discharge relay is disconnected
			Environmental overtemperature protection is	55℃	Set	The charge / discharge relay is closed

			restored			
			Environmental overtemperature protection delay	5S	Set	
	Environmental high temperature protection release conditions		Directive recovery			
	Low temperature environment	Alarm	Environmental low temperature alarm	-10℃	Set	
			The ambient low-temperature alarm is recovered	3℃	Set	
		Protect	Environmental undertemperature protection	-20℃	Set	The charge-discharge relay is disconnected
			Environmental undertemperature protection is restored	-10℃	Set	The charge / discharge relay is closed
			Environmental undertemperature protection delay	5S	Set	
	Environmental low-temperature protection and release conditions		Directive recovery			
12	Cell temperature difference	Alarm	Cell temperature difference alarm	10℃	Set	
			Cell temperature difference alarm recovery	8℃	Set	
		Protect	Cell temperature difference protection	15℃	Set	
			Cell temperature difference protection recovery	13	Set	
			Cell temperature difference protection delay	5S	Set	
	Cell temperature difference protection release condition		Directive recovery			

13	Charging over the flow	Alarm	Charge excessive alarm	15A	Set	
			Charge overcharge alarm is recovered	10A	Set	
		Protect	Charging over-current protection	20A	Set	
			Charge overcurrent protection delay	10S	Set	
	Charging overcurrent protection release condition		Directive recovery		No Set	

Notes: The relay cannot be automatically restored after disconnection, and the instruction shall be issued after professional software inspection

六、LED

6.1、LED Sequence

1 Run lamp、1 alarm lamp、4 Capacity indicator light

●	●	●	●	●	●
SOC				ALARM	RUN

6.2、容量指示

status		charging				discharging			
capacity indicator light		L4●	L3●	L2●	L1●	L4●	L3●	L2●	L1●
residual capacity	0～25%	OFF	OFF	OFF	Quick flashing	OFF	OFF	OFF	ON
	25～50%	OFF	OFF	Quick flashing	ON	OFF	OFF	ON	ON
	50～75%	OFF	Quick flashing	ON	ON	OFF	ON	ON	ON
	≥75%	Quick	ON	ON	ON	ON	ON	ON	ON

		flashing							
Run lamp ●		ON				Quick flashing			

6.3、闪动说明

Flash mode	ON	OFF
quick flashing	0.5s	0.5s
Slow flashing	0.5s	1.5s
Breathing flashing	0.25s	3.75s

6.4、State Instructions

system status	running status	RUN	ALM	SOC			
		●	●	●	●	●	●
shut down	dormancy	OFF	OFF	OFF	OFF	OFF	OFF
standby	normal	Breathing flashing	OFF	According to the power display			
charging	normal	ON	OFF				
	any alarm	ON	Slow flashing				
	temperature, overcurrent and other protection	ON	ON				
	overvoltage protection	ON	Breathing flashing				
discharge	normal	quick flashing	OFF				
	any alarm	quick flashing	Slow flashing				
	temperature, overcurrent, short circuit and other protection	OFF	ON	OFF	OFF	OFF	OFF
	undervoltage protection	OFF	Breathing flashing	OFF	OFF	OFF	OFF

七、Functional Description

7.1、Holding State

After the BCU is correctly connected to power, press the reset button under no overvoltage, undervoltage, overcurrent, short circuit, overtemperature, undertemperature and other protection states, and the BCU is in standby state.

In the BCU standby state, the running light flashes, and the battery can be charged and discharged.

7.2、Overcharge Protection And Recovery

7.2.1、Mmonomer Overcharge Protection And Recovery

When any section of the battery cell is higher than the set value of single overcharge protection, the BCU enters the state of overcharge protection, and the charging equipment cannot charge the battery.

After monomer overvoltage protection, when the highest monomer voltage drops below the monomer overcharge recovery value and the SOC is lower than 96%, the overcharge protection state is relieved. It can also be discharged.

7.2.2 、Total voltage Overcharge Protection And Recovery

When the battery voltage is higher than the total voltage overcharge protection set value, the BCU enters the overcharge protection state, and the charging device cannot charge the battery.When the total voltage drops below the recovery value of the total voltage and the SOC is lower than 96%, the overcharge protection state is relieved.It can also be discharged.

7.3、Overrelease Protection And Recovery

7.3.1、Single-body Overrelease Protection And Recovery

When any section of the battery cell is lower than the set value of the cell, the BCU enters the overdischarge protection state, and the load cannot discharge the battery. BCU is off after 1 minute communication.

After the protection, the battery pack can be relieved by charging the protection state. Or press the reset button, and the BCU will turn on and re-check whether the battery pack voltage has reached the recovery value.

Note: BCU discharge undervoltage protection, shutdown, the button activation or charge activation, BCU keeps the output voltage for 1 minute to the inverter to detect the voltage of the battery, so the discharge is not allowed within 1 minute.

7.3.2、Total And Overvoltage Protection And Recovery

When the battery voltage is lower than the total voltage overdischarge protection set point, the BCU enters the overdischarge protection state, and the load cannot discharge the battery. BCU is off after 1 minute communication.

After the protection, the battery pack can be relieved by charging the protection state. Or press the reset button, and the BCU will turn on and re-check whether the battery pack voltage has reached the recovery value.

Note: BCU discharge undervoltage protection, shutdown, the button activation or charge activation, BCU keeps the output voltage for 1 minute to the inverter to detect the voltage

of the battery, so the discharge is not allowed within 1 minute.

7.4、Charge For Overcurrent Protection And Recovery

When the charging current exceeds the charging overcurrent protection set value, and the delay time is reached. The BCU enters the charging overcurrent protection, and the charging device cannot charge the battery.

After the charging overcurrent protection occurs, the BCU automatically delays the recovery and redetects the current of the external charger. Discharge can also remove the charge overcurrent protection.

7.5、Discharge Overcurrent Protection And Recovery

When the discharge current exceeds the discharge overcurrent protection setting value, and the delay time is reached. The BCU enters the discharge overcurrent protection, and the load cannot charge the battery.

After the discharge overcurrent protection occurs, the BCU automatically delay recovers and redetects the external load current. Charging can also remove the discharge overcurrent protection.

Discharge overcurrent protection has secondary protection, achieving transient overcurrent protection and discharge overcurrent protection recovery. Transient overcurrent protection will be locked when the condition reaches the condition, and the recovery must be shut down during startup or charging.

7.6、Temperature Protection And Recovery

BCU has four terminal temperature 1 ambient temperature, BMU has 16 cell temperature 2 ambient temperature detection ports, implement monitoring temperature change to achieve protection measures.

7.6.1、Charge And Discharge Of The Battery For High-temperature Protection And Recovery

When any one of the 16 cell NTC is above the high temperature protection set point, the BMS enters the high temperature protection. The BMS stops charging or discharging.

When the temperature of the cell is lower than the high temperature recovery value, the BMS resumes charging or discharging.

7.6.2 、Charge And Discharge Cryoprotection And Recovery

When any of the 16 cell NTC is below the cryoprotection set point under charge and discharge, BMS enters cryogenic protection. The BMS stops charging or discharging.

When the cell temperature is higher than the low temperature recovery value, the BMS resumes the charge or discharge.

7.6.3 、Environmental Temperature Protection, Power And Temperature Protection

When the NTC detects that the ambient temperature is higher than the ambient high temperature set point, the BMS enters the ambient high temperature protection. The BMS stops

charging and discharging.

When the NTC detects that the power temperature is higher than the power protection setting value, the BMS enters the power high temperature protection. The BMS stops charging and discharging.

7.7、Balanced Function

BMS has the function of standby and charging balancing. BMS system adopts energy consumption equalization circuit, and the balanced open voltage software is adjustable. Any section is higher than the balanced open voltage and the voltage difference reaches the condition together.

The charging is stopped or the voltage difference of the cell is less than the set value.

7.8、Turn On And Off

order number	function	definition
1	Boot / start	When the BCU is in the dormant state, after pressing the reset button for 1s, the BCU is started, and the LED indicator light is always on, and turns to the normal working state.
2	Shut off / sleep	When the BCU is in standby or discharging state, press this key for 5.5s, and the BCU is dormant. Then the LED indicator is completely out.

7.9、 Memory

The storage contents include: protection and alarm and its category, the recovery time of protection and alarm, single battery voltage, total voltage of battery pack, charge / discharge capacity, charge / discharge current, temperature, etc.

Record by year / month / day / hour / minute / second, or record the information content in a certain period through setting.

Up to 30000 historical records can store the earliest generated record content.

You can read the historical data through the host computer and save it as an excel file to the computer.

八、Communication

8.1、CAN And RS485 Communication

BMS has the battery pack upload CAN communication function, and its baud rate is 500K. Through the CAN interface, you can communicate with the inverter or the CAN TEST.When battery pack is

connected, RS485 communication is connected, and finally the data, status and information of battery pack are uploaded to PCS through CAN communication.

In addition, the BMS also has the battery pack upload RS485 communication function, with a port rate of 115,200 bps。Establish communication with the upper host computer software through the RM485 upper host computer communication interface, and upload the data, status and other information of the battery pack to the upper host computer.

九、Precautions For Use

Lithium battery energy storage system is often composed of hundreds or more batteries in series and parallel, and the voltage is often hundreds to one kilovolts. During the installation, debugging and use, safety protection measures must be taken in accordance with the relevant safety regulations to avoid the occurrence of safety accidents.

Rigorous matters	There is high voltage in the energy storage system. For technical personnel not authorized by the company or the company, it is strictly prohibited to open the case for disassembly and maintenance without authorization, otherwise there is the possibility of electric shock, and the warranty right is lost.
	Do not attach any wire head or connector in the BMS to the positive and negative electrode of the battery, otherwise there may be a risk of short circuit and damage to the circuit board.
	Do not connect the slave BMU when the main BCU is charged to avoid possible damage to BMS,Except for special emergency, it is strictly prohibited to cut the power bus circuit breaker in the main circuit.
Safety precautions	The tools used by the installation and commissioning personnel shall have insulation protection. During installation, debugging and maintenance, wear insulated rubber gloves, goggles and insulated rubber boots according to the situation to avoid safety accidents as far as possible. If the wire metal generated during the installation, debugging and maintenance falls into the battery room, please be sure to use the insulation tool, and do not leave the sundries out.
	When maintenance is required, the main circuit breaker must be disconnected to connect the battery pack to the PCS DC bus.
	According to the different project requirements, the parameters such as charge and discharge current and charge and discharge voltage of the battery management system have been set during the initial installation and debugging, and the parameters shall not be changed

	without authorization, otherwise the battery life may be shortened, and the more serious ones may cause serious harm to the battery and cause safety accidents.
	Try to avoid long-term use in the following working environments: Places with strong vibration or vulnerable to impact. Places exceeding the temperature or humidity range specified in the specification. In direct sunlight or near a heat source. There are dust, strong corrosive substances, flammable and explosive substances, high salt fog places.

上海恩阶电子有限公司