215KWH C&I ENERGY

STORAGE CABINET SOLUTION

DONGGUAN TECHNOLOGY CO. , LTD

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1 Scope of application

This product specification is applicable to the 100kW/215kWh medium-sized energy storage products independently developed by . It stipulates the scope of application, technical specifications, test standards,marks,packaging,transportation,storage and other precautions of this product.

2 Reference standard

Standard	Standard name
GB 2900 . 11- 1988	Battery terminology
GB/T36558-2018	General technical specifications for electrochemical energy storage systems in power systems
GB/T 36547- 2018	Technical regulations for connecting electrochemical energy storage system to power grid
GB/T 36548- 2018	Test specification for electrochemical energy storage system connected to grid
GB 51048- 2014	Code for Design of Electrochemical Energy Storage Power Station
GB/T 50064- 2014	Code for design of overvoltage protection and insulation coordination for AC electrical
GB/T 50065- 2011	installations Design code for grounding of AC electrical installations .
NB/T 42091-2016	Technical specifications for lithium- ion batteries used in electrochemical energy storage power
GB 51048- 2014	stations. Code for Design of electrochemical Energy Storage Power Station
GB/T 36276- 2018	Lithium- ion batteries for power storage
GB/T34131-2017	Technical specification for lithium- ion battery management system for electrochemical energy storage power station
GB/T 36549- 2018	Operation index and evaluation of electrochemical energy storage power station
GB/T25294-2010	General technical requirements for power integrated control cabinets
GB 50171- 2012	Specifications for wiring construction and acceptance of panels, cabinets and secondary circuits of electrical
GB/T 10125- 1997	installations Artificial atmosphere corrosion test Salt spray test
GB/T 4208-2017	Enclosure rating (IP code)
GB/T 1804-2000	General tolerances Tolerances for untolerated linear and angular dimensions
GB 50116- 2013	Code for design of automatic fire alarm system
GB 50370- 2005	Code for design of gas fire extinguishing system
GB 50263- 2007	Specifications for construction and acceptance of gas fire extinguishing system
GB 50166- 2007	Code for construction and acceptance of automatic fire alarm system
GB 30122- 2013	Stand- alone heat- sensitive fire detector
GB 15322 .5- 2003	Combustible Gas Detector

3 Technical term

■ Power Conversion System，PCS

The energy storage converter is an important part of the smart grid, and it is a bidirectional converter that realizes the charge and discharge control of the energy storage battery. On the one hand,the converter can invert the direct current of the energy storage battery into alternating current to supply power to the load or input it into the grid; on the other hand, the converter can rectify the alternating current of the grid into direct current to charge the

energy storage battery.Photovoltaic storage DC coupling,directly connected to photovoltaic panels.

■ Cell

The basic unit that realizes the mutual conversion of chemical energy and electrical energy is composed of positive electrode, negative electrode,separator, electrolyte, casing and terminals.

■Battery Module

A battery assembly consisting of battery cells connected in series, parallel or series-parallel, with only one pair of positive and negative output terminals, should also include casings, management and protection devices and other components.

■Battery Cluster

The battery assembly is a battery assembly that is connected in series, parallel or series-parallel by battery modules, and is connected to energy storage converters and auxiliary facilities to realize independent operation. It should also include battery management systems, monitoring and protection circuits, electrical and communication interfaces, etc. part.

■ Battery Management Unit, BMU

Manage a battery module, monitor battery status (voltage, temperature, etc.) , and provide a communication interface.

■ Battery Cluster Management Unit, BCMU

Manage a unit of energy storage, including all battery clusters in the battery system, be able to monitor and control all battery clusters in the system, and perform battery cluster capacity estimation, battery cluster remaining capacity (SOC) estimation, battery cluster fault diagnosis, balance control strategy, security Control strategies, etc. , can upload battery system information, status and battery alarm information.

■ Battery Management System， BMS

Manage a unit of energy storage, including all battery clusters in the battery system, be able to monitor and control all battery clusters in the system, and perform battery cluster capacity estimation, battery cluster remaining capacity (SOC) estimation, battery cluster fault diagnosis, balance control strategy, security Control strategies, etc. , can upload battery system information, status and battery alarm information.

■ Energy Management System

The energy management system is a computer system, including software and hardware platforms that provide battery system management and PCS control, as well as application software that ensures the safe and economical operation of power distribution and electrical equipment in the energy storage system.

■ Fire Fighting System, FFS

Detect the fire signal of the battery system in real time, and can send out a fire alarm signal to prevent the fire from spreading and start automatically.

4 Product model and its meaning

4.1 Product name: Medium-sized energy storage products

4.2 Product specification: 100kW/215kWh

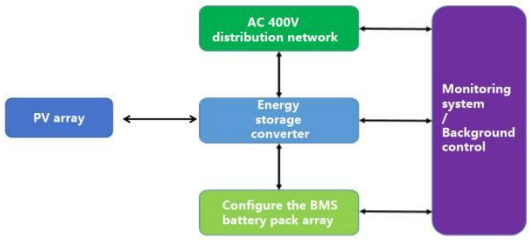
4.3Productmodel:HVS-R215P100-M

5 Product overview

5.1 Product introduction

The medium- sized energy storage system is an energy storage system independently developed by and applied in industrial and commercial scenarios. It can be directly connected to the AC low- voltage side to provide reliable power support for various equipment and systems. The energy storage system adopts lithium iron phosphate battery, which has high energy density and long cycle life . The cabin adopts an outdoor cabinet design, which can be flexibly expanded, and the system is easy to maintain and repair. The local data monitoring is configured in the cabinet to realize the comprehensive management of the equipment in the system, which can be controlled independently or connected to the station - level control system to realize multi- machine linkage. Through the status monitoring and data recording of the equipment in the cabinet, early warning and rapid positioning of system failures are realized. The energy storage system has an intelligent temperature control function, which can improve system efficiency and battery cycle life; the modular design is easy for system expansion and flexible deployment.

The application topology of medium- sized energy storage products is shown in the figure below.



Application topology of medium- sized energy storage products

5.2 Product characteristic

■ Highly integrated

All in one design, small footprint, high site utilization;

Easy installation, integrated transportation, suitable for bottom and top hoisting conditions, and can be transported by forklift;

Convenient operation and maintenance, open the door separately for maintenance, other devices will not be disturbed, front maintenance design, high operability;

■ Easy to expand

Modular design, building block expansion, any combination of horizontal and vertical;
Support 2 h, 4 h, 6 h power configuration, support AC, DC coupling parallel connection;
Support kWh to MWh applications;

■ Standardization

Standardized design, standardized production;

Pre-installed in the factory, integrated and fast delivery, low on- site operation and maintenance costs;

■ Intelligent

Intelligent temperature control to improve system energy efficiency;

Intelligent operation and maintenance management, intelligent fault analysis, intelligent strategy optimization and upgrade, intelligent early warning;

Support multiple operating modes and strategies, adapt to various application scenarios such as station areas, solar storage, storage and charging, micro- grid, etc. , and realize peak shaving and valley filling, dynamic expansion, reactive power compensation, reverse power

control, demand response, and virtual power stations , power scheduling, peak shaving and frequency modulation control, AGC response and other functions;

■ Safety

Full cell voltage monitoring, real- time insulation monitoring;

The battery is independently isolated, 2 h fireproof and heat preservation;

Gas fire extinguishing and cooling, comprehensive inspection of smoke temperature and gas;

Big data active analysis and early warning;

■ Reliability

- 20 - 50 °C wide temperature adaptability, high wind resistance level, high earthquake resistance level;

IP55 high protection level;

Cluster- level fault isolation;

One- to- one fine temperature control;

Independent charge and discharge management, distributed unit management.

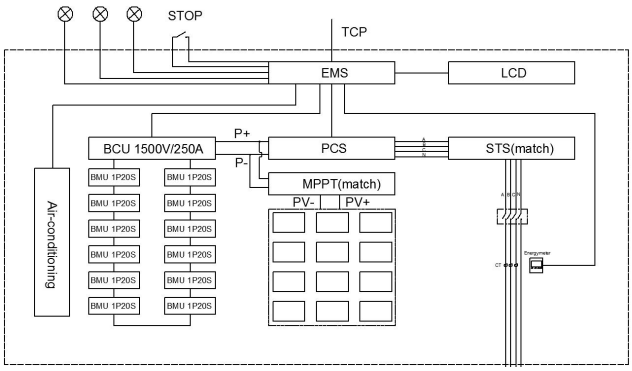
5.3 Product battery configuration

Item	Name	Specification
Battery monomer	Rated Capacity (Ah)	314
	Rated Voltage (V)	3.2
	Working voltage range(V)	2.5-3.65
Battery module	Monomer battery quantity	20
	Series and parallel	1P20S
	Working voltage range(V)	50-73
Battery system	Number of battery modules	11
	Battery in series and parallel mode	1P220S
	Working voltage range(V)	594-792
	Installed power (kWh)	215

5.4 Product system structure Diagram

The energy storage system includes battery system, DC confluence, low-voltage power distribution, local monitoring system, thermal management system, fire extinguishing system,

etc. Data transmission is realized by communication between systems, and control strategies are executed; some devices perform state feedback and control through switching state. As the core control unit, local monitoring monitors the data of each device in the system, protects against failures, and formulates system operation strategies.



Electrical Topology

5.5 Product system configuration list

No	Part name	Quantity	Unit
1	Cabinet	1	set
2	Air conditioning system	1	set
3	Distribution box	1	set
4	PCS	1	set
5	Fire equipment	1	set
6	Battery Inset box	12	set
7	High and low voltage wiring harness	1	set
8	EMS	1	set

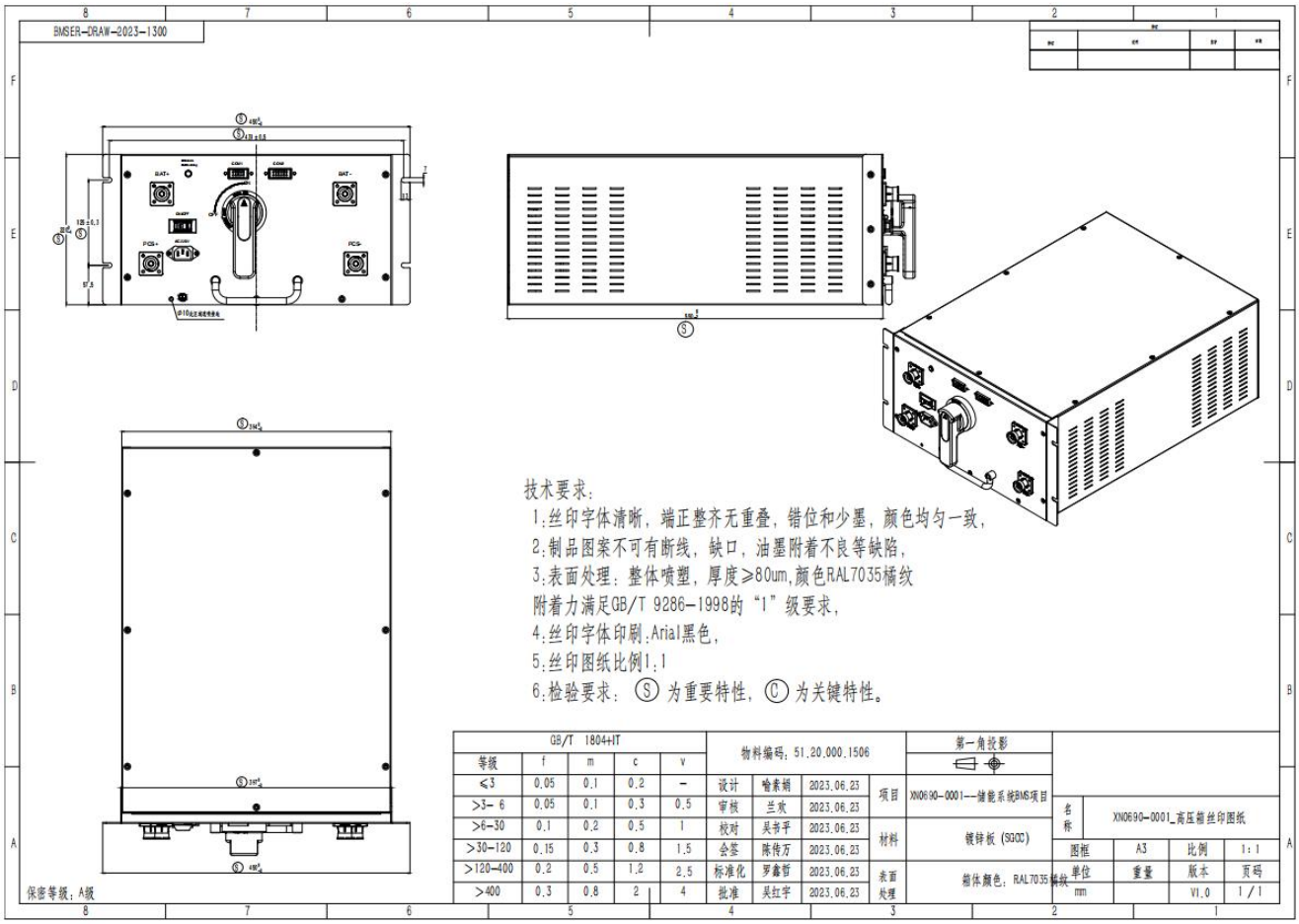
5.6 Product system performance parameter characteristic table

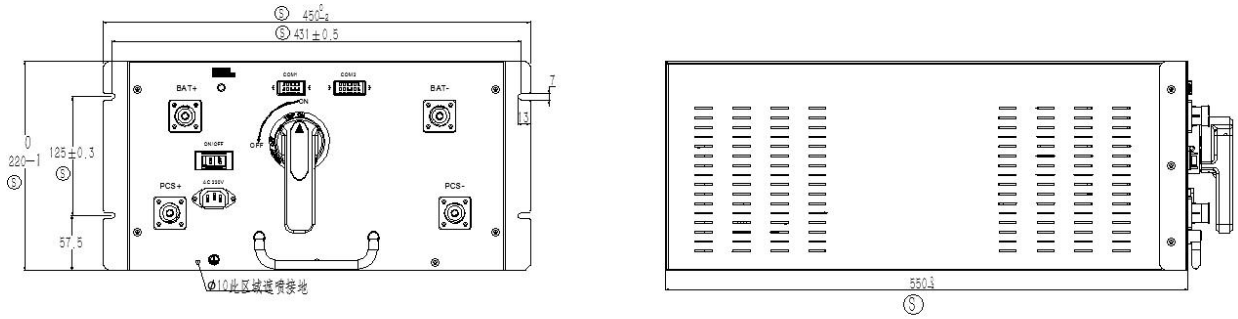
Product specification	HVS-R215P100-M
System parameter	
DC side voltage rage	594V~792V
Output voltage	380V@AC
System configuration	1P220S
Rated power	100kW
Match PCS	100kW
Nominal energy of the battery system	215kWh
Battery upload request value	5%-95%
Battery protection value	2.7V-3.6V
Dischargeable energy	⩾193.5kwh
Battery cycle efficiency	≥90%@AC
Dimension(L*W*H)	2250*1050*2360mm
Weight	2500kg
IP grade	IP55
Operating temperature range	-20-50℃
Operating humidity range	≤95%(No condensation)
Maximum working altitude	3000m(> 2000m need to derate)
Battery temperature control method	Air cooling
Fire fighting system	aerosol

5.7 Product key component details

5.8 High voltage box module

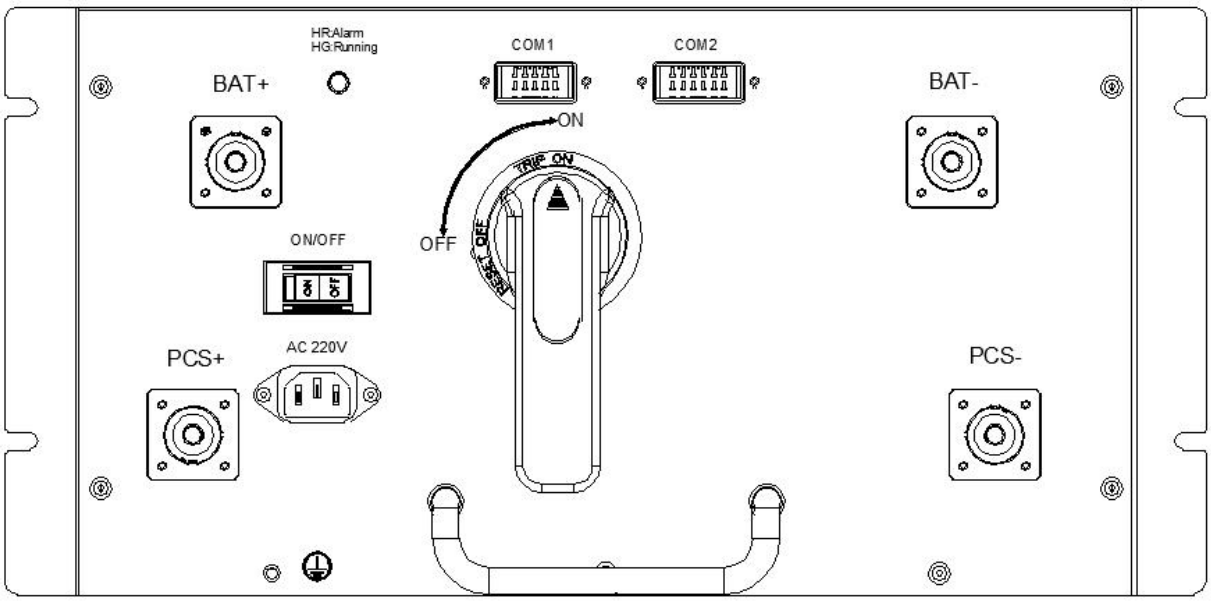
5.9 Appearance and structural dimensions of high voltage box





High voltage box appearance dimensional drawing

5.10 Interface definition



Panel interface diagram

COM1 INTERFACE					
NO	**PIN**	**INSTRUCTION**	**NO**	**PIN**	**INSTRUCTION**
B3	Yellow LM1	DAISY COMMUNICATION1	A3	Green LP1	DAISY COMMINICATION1
B1	Red 16AWG	L line	A1	Red 16AWG	L line
B5	Black 16AWG	N line	A5	Black 16AWG	N line

COM2 INTERFACE					
NO	**PIN**	**INSTRUCTION**	**NO**	**PIN**	**INSTRUCTION**
A1	Red 18AWG	24V+	B1	Black 18AWG	24V-
A3	Yellow 0.5mm^2	CHG_CANH（pcs）	B3	Green 0.5mm^2	CHG_CANL（pcs）
A5	Yellow 0.5mm^2	VE_CANH（Debug）	B5	Green 0.5mm^2	VE_CANL（Debug）
A4	Yellow 0.5mm^2	RS485_A2(LCD)	B4	Green 0.5mm^2	RS485_B2(LCD)
A6	Yellow 0.5mm^2	RS485_A3(EMS)	B6	Green 0.5mm^2	RS485_B3(EMS)

AC220V INTERFACE					
NO	**PIN**	**Instruction**	**NO**	**PIN**	**Instruction**
1	L	LIVE WIRE	2	N	NERTUAL WIRE
3	PE	GROUND WIRE			

5.11 BCU The main technical parameters

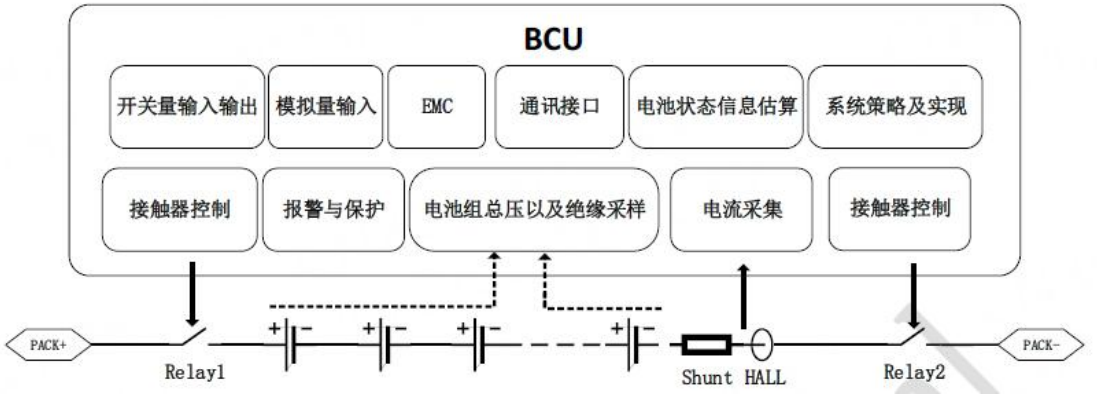
The energy storage lithium battery system should have a battery management system (BMS). The BMS is designed in accordance with GB/T34131-2017 to achieve comprehensive control and protection of the energy storage battery stack and to communicate with PCS and EMS.

The BMS should achieve high-precision and high-reliability collection of battery cell voltage and temperature, and at the same time, perform high-precision estimation of the state of charge (SOC) of the battery energy storage device, and achieve power balance between battery cells through the balancing control circuit. In the case of abnormal battery data, fault alarm and protection are provided.

The topology configuration of the BMS should match and coordinate with the topology of the PCS and the battery grouping method, and optimize the control and comprehensive management of the battery operating status. The specific implementation level of each function in the BMS functional requirements is determined by the topology configuration of the BMS, and should be implemented on-site in layers. The slave BMU is responsible for collecting battery voltage and temperature. Each battery box is equipped with 1 BMU to collect 18 battery cell voltages, 10 battery temperatures, and 2 battery B+/B- pole temperatures; the BMU external communication interface must For the CAN physical interface, it uses 24VDC power supply and needs to support CAN bus upgrade. The main control BCU is placed in the high-voltage box and communicates with the slave control BMU via CAN. It is responsible for collecting the bus current, bus voltage and precharge voltage, controlling the on and off of each high-voltage relay, and estimating core algorithms such as SOC/SOH/SOP and insulation resistance.

The main control unit BCU is the control core of the battery management system. It detects battery cell voltage, temperature, etc. through communication with the slave control unit, and detects external characteristic parameters such as the total voltage of the battery pack, charge and discharge current, and insulation resistance to ground. , Estimate and monitor the

internal status of the battery (capacity, SOC, SOH, etc.) according to appropriate algorithms. On this basis, the charge and discharge management, thermal management, insulation detection, cell balancing management and fault alarm of the battery pack are realized; It can realize data exchange with PCS, EMS, human-machine interface and other devices through the communication bus, and communicate with the BMU through the daisy chain. The main control application diagram is shown below:



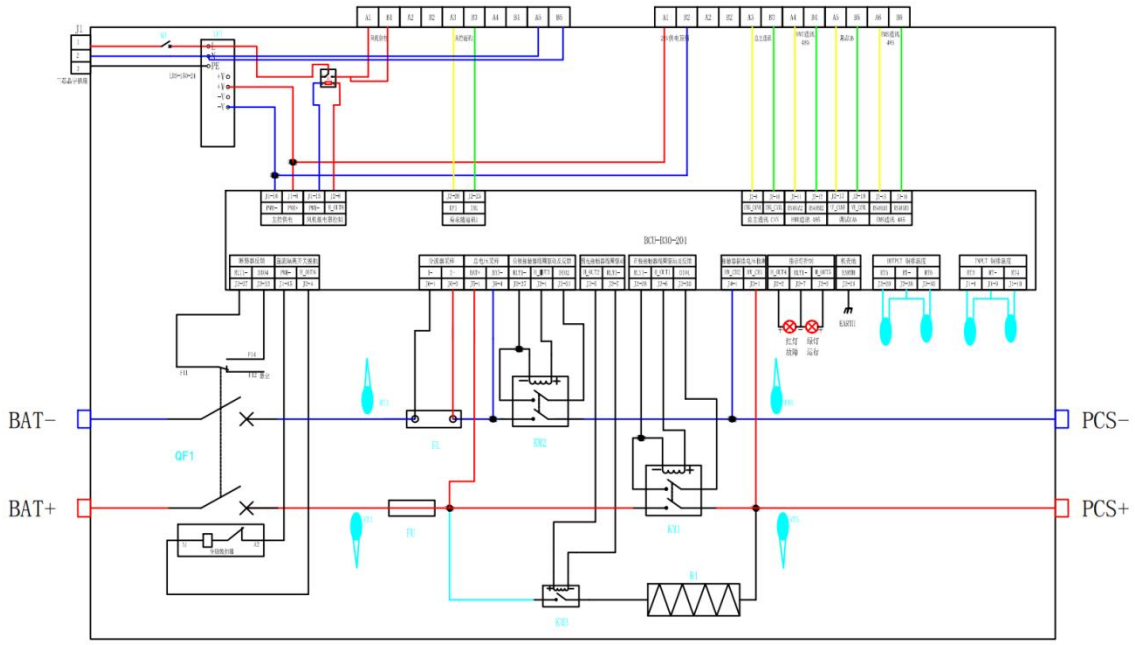
The BMS system uses distributed power supply and is powered by AC220V. Each high-voltage box has built-in AC/DC power conversion in cluster units.

5.12 Technical Data Sheet

NAME	QUANTITY	DESCRIPTION	MIN	TYPICAL	MAX	UNIT	INSTRUCTION
Auxiliary voltage	1	Working voltage	9	24	32	V	DC 24V or battery, no external load
		Working current	-	80	-	mA	
Total voltage sampling	1	Voltage range	50	-	1500	V	Total voltage、Precharge
		Sampling accuracy	-	-	1	%	
Shunt current sampling	1	Current range	-500	-	500	A	Sampling range and accuracy are affected by shunt selection
		Sampling accuracy	-	-	0.5	%	
Hall current sampling	3	Sensor supply voltage 1	-	5±1%	-	V	Supports voltage-type Hall, CAN Hall, current-type Hall respectively, 3 types of Hall current sampling, among which current-type Hall is optional; Hall supply voltage 2 requires a power supply greater than 12V for normal output
			-	-	80	mA	

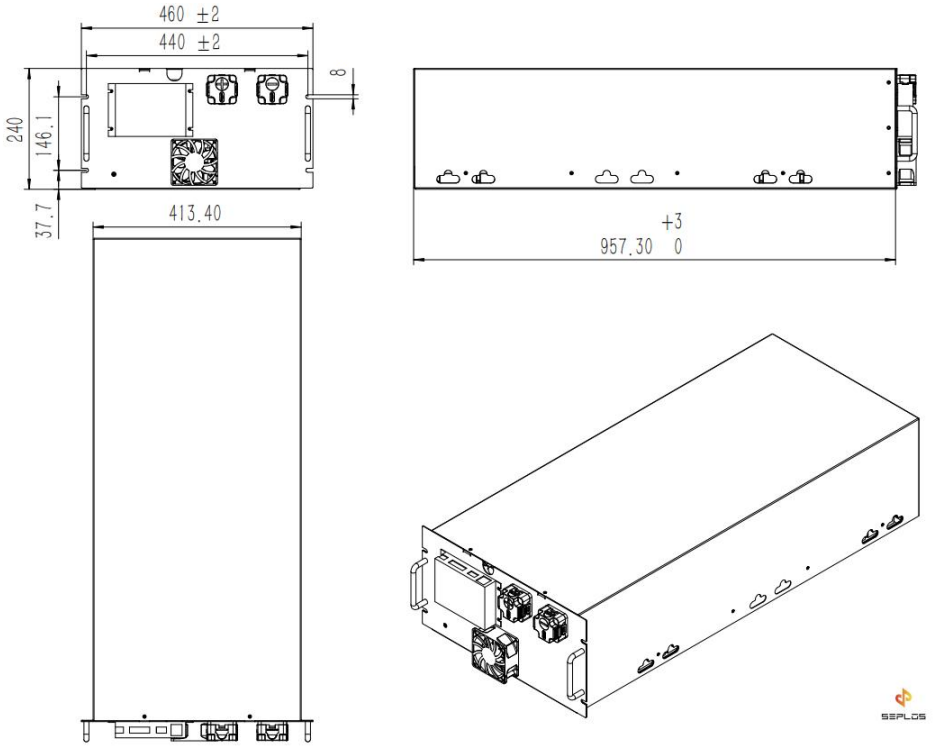
		Sensor supply voltage 2	-	12±3%	-	V	
			-	-	200	mA	
Analog input	8	VOLTAGE RANGE	0	-	3.3	V	6 ways for temperature (NTC) sampling, 2 ways for voltage type Hall sampling input
		Temperature sampling accuracy	-	-	±2	℃	
Digital input and output	7	VIL	0	-	0.5	V	8-way IO input and output status can be flexibly configured through software DIO output has no driving capability
		VIH	3	-	PWR+	V	
		VOL	0	0.04		V	
		VOH	-	2.98	3.3	V	
Address allocation	1		-				Isolated address allocation
High side switching output	8	CURRENT	-	1	4A@100mS	A	Max. Output current 6A
High voltage relay status detection	2	-	-	-	-		
SOC	-	SOC calculation error	-	-	5	%	
	-	Capacity display range	0	-	1000	Ah	
Isolation CAN COMMUNICATION	2	Baud rate	-	-	500	Kbps	
Isolation 485 COMMUNICATION	3	Baud rate	-	-	57600	bps	
Environment	-	WORKING TEMPERATURE RANGE	-25	-	65	℃	
	-	WORKING HUMIDITY	-	-	95	%	
	-	WORKING ALTITUDE	-	-	4000	m	

5.13 Electrical schematic diagram



5.14 battery box

5.15 Battery box dimensions



5.16 BMU slave control unit

5.17 Overview of the slave control unit

The slave control unit is an important part of the energy storage battery management system (BMS). It plays a decisive role in the safe application and life extension of the energy storage battery pack when used in groups. The slave control unit realizes real-time monitoring of battery status by accurately collecting the voltage and temperature of each single battery. The module has reliable data communication function. During system operation, it can communicate with the main control unit of the battery management system or other necessary equipment. The design adopts a highly reliable automotive-grade control chip and utilizes the latest acquisition technology to achieve high acquisition accuracy, which provides a good physical basis for SOC estimation.

5.18 Functions and features of slave control unit

1.The battery cell voltage function has the characteristics of high acquisition accuracy and fast speed; it can be widely used in various battery types and is compatible with lithium iron phosphate, lithium manganate, lithium titanate, and ternary batteries.

2. Temperature sampling function: The collection has the characteristics of high precision and high reliability. The number of samples can be configured. 24 strings can sample up to 28 channels of external temperature.

3. Passive balancing function: can provide a maximum balancing current of 80mA.

4. isoSPI communication: The slave control sampling information is uploaded to the master control through isoSPI communication. Up to 16 slave controls can be connected in series on a single isoSPI communication. If the number is greater than this, you need to communicate with the technical personnel for confirmation.

5.485 communication function: realizes communication between master and slave control, and can be used for program upgrade, fan control and diagnosis, automatic address allocation and other functions.

6.2 high-side outputs: A single high-side switch has a maximum sustainable output of 1A. When both are turned on at the same time, the total output current is a maximum of 2A. Internal status detection is provided to realize hardware self-test.

7.GPIO output and input: 2 I/O open-drain outputs, 2 I/O inputs.

8.It has rich self-diagnostic functions and supports functional safety certification requirements.

9.All plastic components comply with UL-94V0 flame retardant rating.

10.Complies with 1500V safety requirements and supports UL certification for 1500V systems.

5.19 Electrical parameter table

The main technical parameters		minimum value	Typical value	maximum value	Unit	remark
Low voltage power supply	Voltage	9	12/24	32	V	
	current		0.01	2	A	When 2 high-side outputs are turned on at the same time, the maximum is 2A
Single cell voltage	voltage range	0		5.0	V	
	Sampling accuracy			±3.0	mV	2.5V~4.5V,-30℃~85℃
temperature sampling	temperature range	-40		125	℃	storage temperature
	Sampling points			28	PCS	14 points per 12 strings
	Sampling accuracy		1	2	℃	-30℃~85℃
High side switching output	continuous current			1	A	single output
	Voltage value		24		V	Consistent with power input
Digital input signal	Input voltage value	0	-	32	V	Internal 150K pull-up to 5V
	Input current value		1		mA	
Digital output	output			32	V	Open drain output,

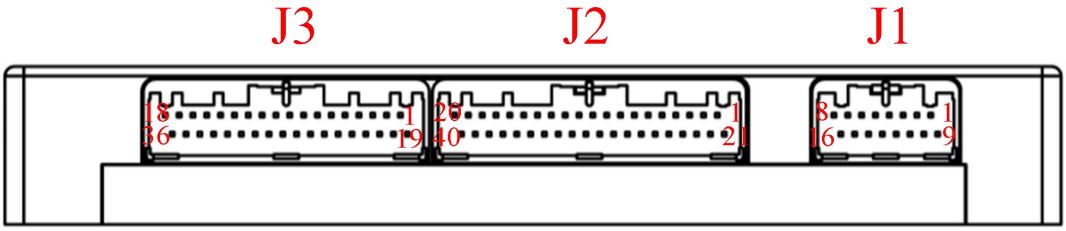
	voltage					supports PWM output, maximum frequency 25KHZ
	Output current			20	mA	
passive balance	current			80	mA	
working power consumption	low voltage area			240	mW	
	high voltage area		75		mW	Every 12 string sampling unit
Sleep power consumption	high voltage area		5.5		uA	
Insulation and voltage resistance	Insulation resistance	100			MΩ	Voltage sampling terminal, housing and digital interface terminal
	Rated working voltage			1500	V	
	Voltage resistant	A 50Hz 3000Vac test voltage is applied between the voltage sampling terminal, the shell and the digital interface terminal, and there is no breakdown or flashover in 1 minute.				

5.20 Maximum limit parameters

characteristic		MIN	MAX	Unit	remark
BAT2~BAT1 input voltage		-0.3	5.0	V	
BAT1~GND output voltage		-0.3	5.0	V	
Usage environment	Temperature	-30	85	℃	
	Humidity	5	95	%	
	altitude		4000	m	
storage temperature		-40	125	℃	
ESD protection		-	Air 15	kV	

		Touch 8		

5.21 Interface definition



Passive balanced 24 serial interface front view

J1 control connector: (black)

Code：53.19.001.1342（Male end）/53.19.003.0477（Female end） Model：AAUS01AP2-016K02（Male end）/ AAUS01AS0-016K01（Female end）Number of pins：16pin

J2 sampling connector：(black)

Code：53.19.001.1348（Male end）/ 53.19.003.0483（Female end） Model：AAUS01AP2-040K02（Male end）/ AAUS01AS0-040K01（Female end）Number of pins：40pin

J3 sampling connector：(black)

Code：53.19.001.1347（Male end）/ 53.19.003.0482（Female end ） Model：AAUS01AP2-036K02（Male end）/ AAUS01AS0-036K01（Female end）Number of pins：36pin

Code：53.19.003.0485（spring terminal）Connector pins：AAUS004-036K03B/adaptation 0.22~0.35mm2 wire diameter

J1（Male end）： AAUS01AP2-016K02								
PIN	8	7	6	5	4	3	2	1
Definition	IN_IPA	OUT_IPB	485_A1	DIO1	DIO3	HSD2	HSD1	PWR+
PIN	16	15	14	13	12	11	10	9
Definition	IN_IMA	OUT_IMB	485_B1	DIO2	DIO4	485_A2	485_B2	PWR-

J2（Male end）： AAUS01AP2-040K02										
PIN	10	9	8	7	6	5	4	3	2	1
Definition	PW+ 1	BAT11A	BAT9A	BAT7A	BAT5A	BAT3A	BAT1A	NC	NC	NC
PIN	20	19	18	17	16	15	14	13	12	11

Definition	RT1A	GNDA	RT4A	RT5A	GNDA	RT8A	RT9A	GNDA	RT12A	RT13A
PIN	30	29	28	27	26	25	24	23	22	21
Definition	BAT12A	BAT10A	BAT8A	BAT6A	BAT4A	BAT2A	BAT0A	PW-1	NC	NC
PIN	40	39	38	37	36	35	34	33	32	31
Definition	RT2A	RT3A	GNDA	RT6A	RT7A	GNDA	RT10A	RT11A	GNDA	RT14A

J3（Male end）：AAUS01AP2-036K02									
Pin	9	8	7	6	5	4	3	2	1
Definition	RT13B	PW+2	BAT11B	BAT9B	BAT7B	BAT5B	BAT3B	BAT1B	NC
Pin	18	17	16	15	14	13	12	11	10
Definition	RT1B	GNDB	RT4B	RT5B	GNDB	RT8B	RT9B	GNDB	RT12B
Pin	27	26	25	24	23	22	21	20	19
Definition	RT14B	BAT12B	BAT10B	BAT8B	BAT6B	BAT4B	BAT2B	BAT0B	PW-2
Pin	36	35	34	33	32	31	30	29	28
Definition	RT2B	RT3B	GNDB	RT6B	RT7B	GNDB	RT10B	RT11B	GNDB

5.22 Interface definition description

Connector	NAME	Explanation of meaning
J1 control Connector	PWR+	External power supply positive terminal
	PWR-	External power supply negative terminal
	HSD1 HSD2	Power switching output can be used to control Fans, contactors and other external equipment
	DIO1 DIO2	Open drain output, supports PWM
	DIO3 DIO4	I/O input for fan fault diagnosis
	485_A1,485_B1 485_A2,485_B2	485 communication interface, 485_A1, 485_B1 communicate with the upper-level master or slave control. 485_A2, 485_B2 communicates with the next level slave control

	IN_IPA, IN_IMA, OUT_IPB, OUT_IMB	isoSPI communication IN_IPA, IN_IMA, connected to the upper level slave control or master control OUT_IPB, OUT_IMB connect to the next level slave control
J2,J3 Battery sampling Connector	Bat0 A/B,Bat1 A/B,...,Bat11A/B,Bat12 A/B	Sampling line 00 to sampling line 12
	PW+,	The sampling power supply is positive and connected to the highest battery cell at the battery pole end.
	PW-	The sampling power supply is negative and connected to the lowest battery at the battery pole end.
	RT1A/B,RT2A/B,...,RT13A/B, RT14A/B	28 channels of NTC temperature sampling, supporting 100K and 10K external NTC
	GND A/B	Temperature sampling line ground wire. When customizing the wiring harness, you can choose to share one ground for every two temperature sampling points.

5.23 6 Advanced Microgrid Controller

5.24 Introduction to Advanced Microgrid Controllers

The advanced microgrid controller IMGCB01 uses ARM Cortex-A7, 4-core 1.2GHz processor as the core, adopts full industrial-grade devices, has complete interface protection functions and electrical isolation measures, and can operate stably for a long time in harsh environments. It has passed remote Mobile terminal equipment type testing and CE certification. The product has various interfaces and functions such as RS485, CAN, Ethernet, 4G, wifi, input and output, voltage and frequency direct acquisition, etc. to meet the needs of different occasions. It is mostly used for data collection, transmission and control in electrical systems, integrated energy systems, corporate campuses, etc.

IMGCB01 Advanced Microgrid Controller

5.25 Hardware parameters

Hardware name	A detailed description
CPU	ARM Cortex-A7 4 cores 1.2GHz

RAM	DDR3 1G
ROM	eMMC 8G(can be expanded additionally)
Ethernet	2-way, standard RJ45 socket,100Mbps
RS485	5-way, magnetic isolation; Configurable baud rate; Interface: 3.81mm Phoenix terminal
CAN	2-way, magnetically isolated; Configurable baud rate; Interface: 3.81mm Phoenix terminal
Switching output	5-way, relay isolation. Contact rating：5A 250VAC/30VDC Rated coil power:180mW action time：＜10ms time of return：＜5ms
Switch input	5 channels, optocoupler isolation. DC 24V standard input Rated current: 1.1mA
Voltage frequency direct acquisition	AC voltage 10-380V, frequency 40-70Hz
RTC	Onboard farad capacitor can maintain running time for at least 7 days in case of power outage
4G	4G full network, supports GNSS positioning function
wifi	Supports IEEE 802.11b/g/n standards
power supply	Rated voltage 24VDC, ±10% fluctuation allowed
indicator light	The power indicator light is always on after power on; The running indicator light device is always on when running;
Screen	Support touch screen expansion through network port or DVI: support 7-inch screen, 10-inch screen, 15-inch screen and other models
dimension	190mm*170mm*46mm
working	Temperature：-40℃~85℃

environment	Humidity： 5%~95% No condensation

5.26 Interface definition

The interface diagram of the advanced microgrid controller IMGCB01 is as follows:

Left view

Right view

The identification description is shown in the table below

Expansion board interface	Interface signal identification	Remark
power input （DC 24V）	24V+	DC24V Positive pole
	24V-	DC24V Negative pole
	PE	GND
Open (24V)	DI1	OPEN1
	DI2	OPEN2

	DI3	OPEN3
	DI4	OPEN4
	DI5	OPEN5
	DIC	Open negative common terminal
draw out (Normally open, not maintained)	DO1+	Open 1 input
	DO1-	Open 1 output
	DO2+	Open2input
	DO2-	Open2output
	DO3+	Open3input
	DO3-	Open3output
	DO4+	Open4input
	DO4-	Open4output
	DO5+	Open5input
	DO5-	Open5output
AC voltage input	L	Firewire input
	N	Neutral input
	E	GND
CPU board interface	Interface signal identification	
RS485	A1	RS485 first way A
	B1	RS485 first wayB
	A2	RS485second wayA
	B2	RS485second wayB
	A3	RS485 Third way A
	B3	RS485Third way B
	A4	RS485 fourth way A
	B4	RS485fourth way B
	A5	RS485 fifth way A
	B5	RS485fifth way B
RS232	TX	RS232 output TX
	RX	RS232 input RX
	GND	RS232 GND
CAN	H1	CANfirst way H
	L1	CANfirst way L
	H2	CAN second wayH
	L2	CAN second way L
Ethernet LAN	LAN1	Ethernet port first channel
	LAN2	Ethernet port second channel
antenna	4G	4G network
	GPS	Global Positioning
	WiFi	wireless network

5.27 Air conditioning parameters

Type	Name	Unit	Parameter
Dimensions and installation	Overall dimensions (H*W*D)	mm	1300*500*250
	Including flange dimensions (H*W*D)	mm	1350*550*250
	weight	Kg	60
	Installation method	Embedded	
	Installation Environment	outdoor	
environment and protection	Working temperature	℃	-40 to +55
	noise	dB(A)	70
	life	Years	>10
	Protection level	IP55	
	refrigerant	R134a	
	RoHS certification	yes	
performance	Power range	220±15%VAC~50Hz	
	Refrigeration capacity(L35/L35)	W	3000
	rated power(L35/L35)	W	1110
	Rated current(L35/L35)	A	5.0
	Maximum working current	A	10.0
	Heating capacity (optional)	W	2000
	Circulating air volume	m3/h	850

5.28 Fire technical parameters

5.29 Fire extinguishing mechanism

The fire suppression effect of S-type hot aerosol is mainly reflected in the following aspects:

The fire extinguishing mechanisms of general fire extinguishing agents mainly include isolation method, suffocation method, cooling method and chemical suppression method. Different fire extinguishing agents have different fire extinguishing mechanisms. The fire-extinguishing mechanism of thermal aerosols is mainly reflected in two aspects: on the one hand, the cooling effect of endothermic decomposition, and on the other hand, the chemical inhibition effect of the gas phase and solid phase, which work synergistically with each other. In addition, the gas phase components in aerosol fire extinguishing agent products also play a certain auxiliary role.

（1） The cooling and fire extinguishing effect of endothermic decomposition

The cooling effect of hot aerosol fire extinguishing agents mainly relies on the endothermic decomposition of metal oxides and carbonates. The heat emitted by any fire in a short period of time is limited. If the solid particles in the aerosol can absorb part of the heat emitted by the fire source in a short period of time, the temperature of the flame will decrease and radiate to the burning surface. And the heat used to crack the gasified combustible molecules into free radicals will be reduced, and the combustion reaction will be inhibited to a certain extent.

（2） gas phase chemical inhibition

Under the action of heat, the vaporized metal ions such as Sr, K, Mg or cations that have lost electrons decomposed by the hot aerosol fire extinguishing agent exist in the form of vapor.

Multiple chain reactions occur with the active groups H•, •OH and O• in combustion. The following takes Sr as an example:

$$Sr+2{\bullet}OH \rightarrow Sr(OH)_2 \quad Sr+O{\bullet} \rightarrow SrO \quad Sr(OH)_2+2H{\bullet} \rightarrow Sr+2H_2O$$

By repeating this process, a large amount of active groups in combustion are consumed, the concentration continues to decrease, and combustion is suppressed.

（3） solid phase chemical inhibition

The solid particles in the hot aerosol fire extinguishing agent can adsorb the chain reaction intermediates •OH, H• and O•, and catalyze their reformation into stable molecules,

As a result, the branch chain reaction of the combustion process is interrupted. Take K as an example below:

$$K_2O(s)+2H(g) \rightarrow 2KOH(s) \quad KOH(s)+OH(g) \rightarrow KO(s)+H_2O(g)$$

$K_2O\ (s) + O\ (g) \rightarrow 2KO\ (s)$ $KO\ (s) + H\ (g) \rightarrow KOH$

In the above-mentioned fire extinguishing effect, several fire extinguishing mechanisms interact and work together. However, the transmission effect of gas and the endothermic cooling effect of metal oxides or carbonates only play a auxiliary effect, and the main fire extinguishing effect still relies on gas. , solid phase chemical inhibition.

5. 30 Technical Parameters

Item	Parameter	Item	Parameter
Model specifications	QRR0.3G/S-Q	Single unit net weight	860g±30g
Working environment temperature range	-50℃~+90℃	Standard sizes	68.5mm×46mm×255mm
Relative humidity of working environment	≤95%RH	Start mode	Electric start or hot start
Spray time	≤14S	Starting current	≥700mA
spray lag time	≤5S	Starting temperature	≥170℃
Nozzle thermal spacing	The thermal distances at 400℃, 200℃ and 75℃ are 0.05m, 0.12m and 0.3m respectively	Multiple link mode	Combination series
		Feedback signal	Passive switching signal
Shell surface temperature	≤150℃	Fire extinguishing efficiency	100g/m³-130g/m³
Oxidant name and content	Potassium nitrate, strontium nitrate 50%～70%	Validity period	Ten year

6 Sign、Package、Transport、Storage

6.1 Sign

This product has a nameplate, and the information on the nameplate includes: product name, model, connection mode, rated power, nominal voltage, rated capacity, and product number.
This product has hazard warning signs in obvious places.

6.2 Transport

During loading and unloading, throwing, rolling and heavy pressure are prohibited. During transportation, the battery in the product should be transported in a half- charged state (30 ~ 5 0% SOC state) . During transportation, it should be protected from severe vibration, shock or extrusion, sun and rain, and inverted. Applicable Cars, trains, ships, planes and other common means of transportation.
The product is compatible with bottom forklift transportation and bottom hoisting. For overall lifting or transshipment of the product, please use a forklift or crane with a capacity of not less than 5 tons.

6.3 Storage performance

Medium- sized energy storage products in a half- charged state (SOC 30% - 50%) should be stored in a dry, ventilated, and clean warehouse. The temperature range is - 20°C~35°C, and the relative humidity should not be greater than 65% . Do not allow the product to be together with acids and other corrosive substances. Long- term unused use: When the battery system is left unused for a long time, the system should be charged every 3 months to make the SOC reach more than 30% .

7 Environmental protection

- This product has a sound insulation design, the noise is not greater than 75dB@ 1m;
- This product uses environmentally friendly materials, and there is no leakage of harmful substances;
- This product produces no sound or light pollution during normal use.

8 Product warning signs

The warning signs on and inside the cabinet of medium- sized energy storage products contain important information for safe operation of medium- sized energy storage products.

图1. 高压危险标识

图2. 接地标识

9 Precautions for use

The operator must be completed by professional technicians, and must follow the relevant regulations of the local or electric power industry; pay attention to the positive and negative poles, and do not reverse the positive and negative poles to avoid hazards .

Before using the product, please read the user manual and product warning labels carefully.

1) When using this product for the first time, please check whether the device is damaged or in other dangerous states; and check and confirm whether other external devices or circuit connections are in a safe state;

2) When using the product for the first time, you should conduct visual inspection, wiring inspection, control power inspection, and communication inspection. If you find that the product shell is seriously damaged or has abnormal phenomena such as peculiar smell, you cannot continue to use it, and you should return the product to the manufacturer;

3) The product is a direct current high voltage, except for professionals, other people should stay away from it without permission, and must not touch or operate it;

4) Before any installation and maintenance work, first disconnect the circuit breaker on the grid side, then disconnect the DC switch on the battery side, and use relevant equipment for testing;

5) During the use of this product, do not p lug or unplug the connector at will；

6) During the use of the product, if there is any abnormal smell or abnormal phenomenon, please immediately cut off the power and notify the relevant personnel;

7) During the use of the product, do not modify the important parameters on the control panel at will, so as not to affect the normal use of the product;

8) Long-term unused : When the battery system is unused for a long time, the main circuit breaker and DC miniature circuit breaker on the distribution box should be disconnected, and

the system should be charged every 3 months to make the SOC reach more than 30% . When the product is stored in a low charge state, it will cause the battery to be over- discharged, which will seriously affect the life of the product or even damage the product;

9) When remotely monitoring and operating the product, care should be taken to prevent virus intrusion;

10) If the user finds that the product has an abnormal phenomenon that cannot be solved, he should contact our company as soon as possible. It is strictly forbidden to disassemble the product or replace the battery in the battery pack without authorization.

10 Danger warning

1) Forbidden to disassemble and install the product and the battery inside the product without authorization. There are protective mechanisms and protective circuits inside the product to avoid danger. Improper disassembly and assembly will damage the protection function and cause the battery to heat up, smoke, deform or burn;

2) Do not short circuit the system. Do not connect the positive and negative poles of the product with metal, and do not store or move the product together with metal. When the system is short- circuited, a large current will flow, which will damage the battery and cause the battery to heat up, smoke, deform or burn;

3) Heating and incineration of the product is strictly prohibited. Heating and incinerating the battery will result in melting of the battery separator, loss of safety functions or combustion of the electrolyte. Overheating will cause the battery to heat up, smoke, deform or burn;

4) Do not expose to rain or throw the product into water. Otherwise, the function of the internal protection circuit of the battery will be lost and abnormal chemical reactions will occur, and the battery may generate heat, smoke, deform or burn;

5) Do not damage the product and battery. It is forbidden to chisel into the battery with metal, hammer or beat the product and battery, or otherwise damage the product, otherwise the battery will heat up, smoke, deform or burn;

6) Forbidden to touch the contacts, terminals, etc. inside the grid equipment connected to the energy storage products, which may cause death by electric shock or fire;

7) Forbidden to open the door of the battery cabinet or related equipment, which may cause electric shock accidents.