

# SEPLoS 106KWH C&I ENERGY STORAGE CABINET SOLUTION



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## 1 Scope of application

This product specification is applicable to the 50kW/106kWh medium-sized energy storage products independently developed by SEPLoS. 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 installations
GB/T 50065-2011	Design code for grounding of AC electrical installations .
NB/T 42091-2016	Technical specifications for lithium- ion batteries used in electrochemical energy storage power stations.
GB 51048-2014	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 installations
GB/T 10125-1997	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: 50kW/106kWh

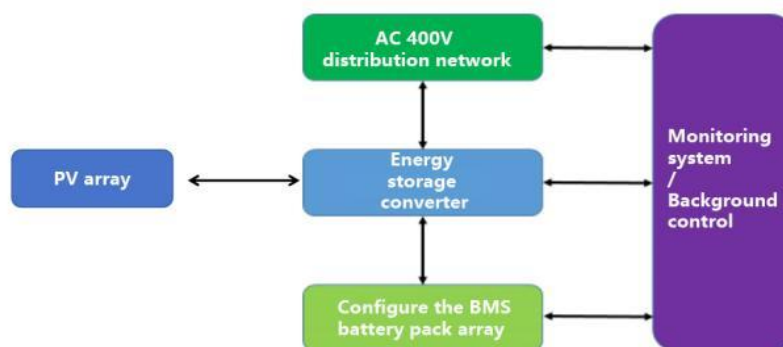
4.3Productmodel:HV-R010600P50-M

## 5 Product overview

### 5.1 Product introduction

The medium- sized energy storage system is an energy storage system independently developed by SEPLoS 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)	104
	Rated Voltage (V)	3.2
	Working voltage range( V)	2.5-3.65
Battery module	Monomer battery quantity	16
	Series and parallel	1P16S
	Working voltage range( V)	43.2-57.6
Battery system	Number of battery modules	10
	Battery in series and parallel mode	1P16S
	Working voltage range(V)	432-584
	Installed power ( kWh)	106

### 5.4 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	20	set
7	High and low voltage wiring harness	1	set

## 5.5 Product system performance parameter characteristic table

Product specification	HV-R0106P0050-M
<b>System parameter</b>	
DC side voltage rage	432V~584V
Output voltage	380V@AC
System configuration	1P160S
Rated power	50kW
Match PCS	50kW
Nominal energy of the battery system	106kWh
Battery upload request value	5%-95%
Battery protection value	2.7V-3.6V
Discharge energy	≥95.4kwh
Battery cycle efficiency	≥90%@AC
Dimension(L*W*H)	1950*1180*2160mm
Weight	1900kg
IP grade	IP54
Operating temperature range	-10-50℃
Operating humidity range	≤95%(No condensation)
Maximum working altitude	3000m( > 2000m need to derate)
Battery temperature control method	Air cooling
Fire fighting system	aerosol



5.6 Product key component details

5.7 High voltage box module

5.8 Appearance and structural dimensions of high voltage box

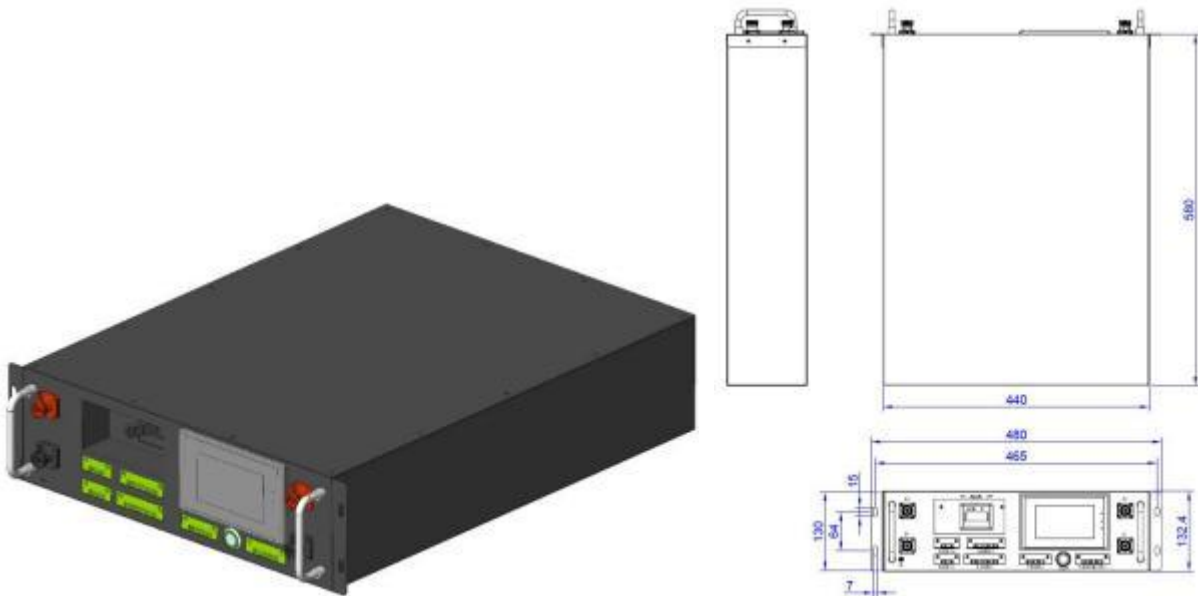


Figure 3.1. 1 - 1 Appearance and Dimensional Drawing of High Voltage Box

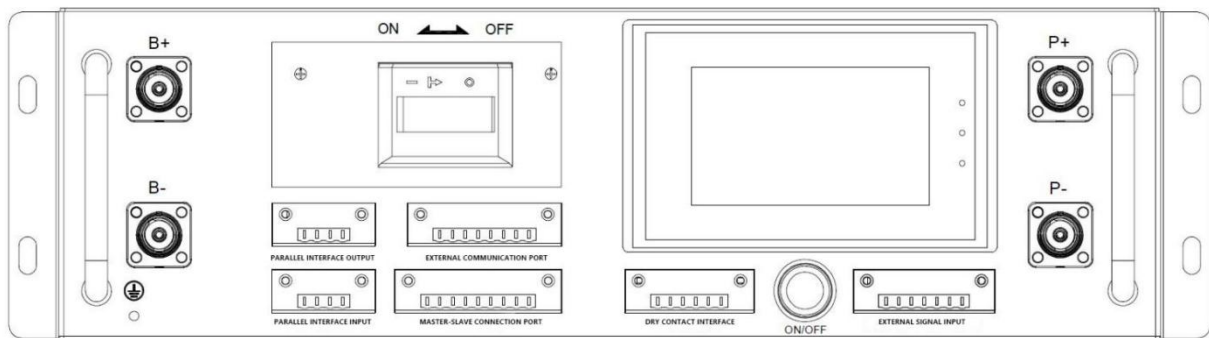


Figure3.2.2 Panel interface diagram

## 5.9 Interface definition

Dry contact interface					
NO	PIN	Instruction	NO	PIN	Instruction
1	RLY-OUT1+	Dry contact 1 output positive terminal	4	RLY-OUT2-	Dry contact 2 output negative terminal
2	RLY-OUT1-	Dry contact 1 output negative terminal	5	NC	Vacant
3	RLY-OUT2+	Dry contact 2 output positive terminal	6	NC	Vacant
External signal input interface					
NO	PIN	Instruction	NO	PIN	Instruction
1	5VO	Output DC5V/1A	5	SIN1-	Input test1
2	5V_GND	Output DC5V/1A	6	SIN2+	Input test2
3	DOPWM	Output PWM	7	SIN2-	Input test2
4	SIN1+	Input test1			
Parallel output interface					
NO	PIN	Instruction	NO	PIN	Instruction
1	ADDR_out	Native CAN encoding output	3	CAN-H2	Native CAN communication
2	CAN-L2	Native CAN communication	4	CAN-GND	CAN communication ground
Parallel input interface					
NO	PIN	Instruction	NO	PIN	Instruction
1	ADDR_IN	Native CAN encoding output	3	CAN-H2	Native CAN communication
2	CAN-L2	Native CAN communication	4	CAN-GND	CAN communication ground
External communication interface					
NO	PIN	Instruction	NO	PIN	Instruction
1	RS485-A1	Native 485 communication	5	RS485-A3	Reserve 485 communication
2	RS485-B1	Native 485 communication	6	RS485-B3	Reserve 485 communication
3	GND_A1	485_A1 communication location	7	CAN-L3	PCS communication
4	GND_A3	Reserve 485_A3 communication location	8	CAN-H3	PCS communication

Master-slave connection port					
NO	PIN	Instruction	NO	PIN	Instruction
1	VO	The slave control power supply output is positive (BMU)	6	DC24V+	24V power input positive pole
2	CAN-L1	Slave control CAN communication (BMU)	7	DC24V-	24V power input negative pole
3	CAN-H1	Slave control CAN communication (BMU)	8	DC24V+	24V power input positive pole
4	PGND	The slave control power supply output is negative (BMU)	9	DC24V-	24V power input negative pole
5	DN-OP	Slave control code output			

### 5.10 BCU The main technical parameters

Technical Parameters		
Applicable platforms	< 1000V	
Supply voltage	12-30V	
Power consumption	Rated power consumption	< 3W
	Static power	0
Total pressure sampling	Sampling range	50~1650V
	Sampling accuracy	±0.3%FSR
Current sampling	Sampling range	< 300A (Default shunt) / > 300A (Hall)
	Sampling accuracy	0.5%
	sampling period	20ms
temperature sampling	Sampling range	-40~125°C
	Sampling accuracy	±2°C
	sampling period	200ms
	sampling channels	5 channels
Insulation testing	Range	> 1MΩ/kV
	Accuracy	> 100K 10%、100K以下15%、Min10K, < 2MΩ treated as malfunction
status estimate	SOC	≤5%
	SOH	≤10%
	CAN-1	Slave control level

Communication Interface		(125k ~ 1000kbps) , Default baud rate : 250K		
	CAN-2	Cluster parallel machine (125k ~ 1000kbps) , Default baud rate : 500K		
	CAN-3	Connect to PCS, the baud rate is according to the protocol provided by the customer		
	RS485-1	Host computer (9600~115200bps) , Default baud rate : 57600		
	RS485-2	Display (9600~115200bps) , Default baud rate : 9600		
	RS485-3	Reserve		
Relay adhesion detection	Fault diagnosis		CAN matching resistor	External
DOH	-		Automatic encoding	Support/with coding line
DOL	6pic		Data storage	128M
DO output range	Depending on supply voltage		range of working temperature	-40~85°C
DO output current	-		Working humidity range	5~90%
Dry contact	2pic		DI detection (12V withstand voltage)	2-way DI, external dry node signal (high voltage interlock, emergency stop)
Dry contact maximum power withstand	Maximum withstand power 60W		Installation method	wall hanging

### 5.11 Technical parameter

Name	Quantity	Describe	Min	Typ.	Max	Unit	illustrate
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 sampling accuracy are affected by shunt

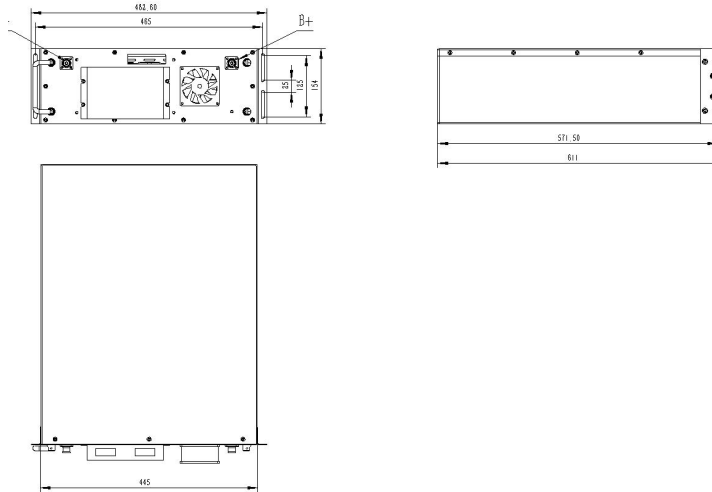
							selection
		Sampling accuracy	-	-	0.5	%	
Hall current sampling	3	Sensor supply voltage 1	-	5±1%	-	V	Supports voltage-type Hall, CAN Hall, current-type Hall respectively, 3 types of Hall current sampling, among which current-type Hall is optional; Hall supply voltage 2 requires a power supply greater 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 channels for temperature (NTC) sampling, 2 channels for voltage type Hall sampling input
		Temperature sampling accuracy	-	-	±2	°C	
Digital input and	7	VIL	0	-	0.5	V	8-channel IO input and output status

output							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 master address allocation
High side switching output	8	current	-	1	4A@100mS	A	Maximum simultaneous output current 6A
High voltage relay status detection	2	-	-	-	-		
SOC	-	SOC calculation error	-	-	5	%	
	-	Capacity display range	0	-	1000	Ah	
Isolate CAN communication	2	baud rate	-	-	500	Kbps	
Isolation 485 Communication	3	baud rate	-	-	57600	bps	
environme	-	working	-25	-	65	°C	



5.13 battery box

5.14 Battery box dimensions



5.15 Battery specifications

Item	Content
Rated capacity(kWh)	53.2KWh*2
Type	LFP
Cell configuration	10*16S1P*2
Rated voltage(V)	512V
Rated capacity(Ah)	104Ah*2
Working voltage range(V)	432-584V
Rated charge and discharge current(A)	100A *2
Rated charge and discharge power(kW)	51 KW*2
Communication	CAN/RS485
Cycle time	6000 ( 80%DOD 25±2℃ )
Working temperature range(°C)	-15-45
Relative humidity(%)	5%-85%
Maximum working altitude(m)	
Use beyond derating	2000m



## 5.16 Battery protection parameters

NO	Indicator items		Default parameters	Whether configurable	Remark	
1	Cell over voltage protection	Level 1	alarm	3500mV	configurable	Level 1/2 only alarm,not cut off charging ,Level3 cut off charging.
			delay	3.0S	configurable	
			alarm recover voltage	3400mV	configurable	
			alarm recover delay	2.0S	configurable	
		Level 2	alarm	3550mV	configurable	
			delay	2.0S	configurable	
			alarm recover voltage	3450mV	configurable	
			alarm recover delay	2.0S	configurable	
		Level 3	Protect voltage	3630mV	configurable	
			Protect delay	3.0S	configurable	
			Protect release voltage	3380mV	configurable	
			Protect release delay	3.0S	configurable	
		Cell high voltage Protect release		Discharge release	Discharge current >5.0A	
	2	Cell low voltage protection	Level 1	alarm	3000mV	
delay				3.0S	configurable	
alarm recover voltage				3100mV	configurable	
alarm recover delay				2.0S	configurable	
Level 2			alarm	2900mV	configurable	
			delay	2.0S	configurable	
			alarm recover voltage	3000mV	configurable	
			alarm recover delay	2.0S	configurable	
Level 3			Protect voltage	2700mV	configurable	
			Protect delay	3.0S	configurable	
			Protect release voltage	3000mV	configurable	
			Protect release delay	3.0S	configurable	
Cell low voltage Protect release			charge release	charge current >5.0A	Time > 3S	
3		Total high Voltage protect	Level 1	alarm	560 V	configurable : (560)V
	delay			3.0S	configurable	
	alarm recover voltage			544V	configurable : 544V	
	alarm recover delay			2.0S	configurable	
	Level 2		alarm	568 V	configurable : 568V	
			delay	2.0S	configurable	
			alarm recover voltage	552 V	configurable : 552V	
			alarm recover delay	2.0S	configurable	
			Protect voltage	580.8V	configurable :	

		Level 3			580.3V				
			Protect delay	3.0S	configurable				
			Protect release voltage	540.8 V	configurable : 540.8 V				
			Protect release delay	3.0S	configurable				
Total over voltage protect release			Discharge release	Discharge current >5.0A	Time > 3S				
4	Total low Voltage protect	Level 1	alarm	480V	configurable : 480 V				
			delay	3.0S	configurable				
			alarm recover voltage	496V	configurable: 496V				
			alarm recover delay	2.0S	configurable				
		Level 2	alarm	464V	configurable : 464V				
			delay	2.0S	configurable				
			alarm recover voltage	480V	configurable: 480V				
			alarm recover delay	2.0S	configurable				
		Level 3	Protect voltage	432 V	configurable : 432V				
			Protect delay	3.0S	configurable				
			Protect release voltage	480 V	configurable: 480 V				
			Protect release delay	3.0S	configurable				
		Total over discharge protect release			charge release		charge current >5.0A	Time > 3S	
		5	Charging over current protection	Level 1	current		90A	configurable	1. Appears 10 times in a row. This status will be locked and will no longer be automatically released.
delay	2.0S				configurable				
recover current	85A				configurable				
recover delay	2.0S				configurable				
Level 2	Protect current			95A	configurable				
	Protect delay			2.0S	configurable				
Level 3	Protect current			100A	configurable				
	Protect delay			1.0S	configurable				
Charging over current protection release					Automatically release	Automatically cancel after 1 minute	configurable		
					Discharge release	Discharge current	Time > 3S		

				>5.0A		
6	Discharge over current Protect	Level 1	current	-90A	configurable	Appears 10 times in a row
			delay	2.0S	configurable	
			recover current	-90A	configurable	
			recover delay	2.0S	configurable	
		Level 2	Protect current	-98A	configurable	This state will be locked and will no longer be automatically released.
			Protect delay	2.0S	configurable	
		Level 3	Protect current	-102A	configurable	
			Protect delay	1.0S	configurable	
		Discharge over current protection released	Automatically release	Automatically cancel after 1 minute	configurable	
			Charge released	Charging current >5.0A	Duration is greater than 3S	
7	Cell Charging high temperature protection	Level 1	Alarm temperature	45°C	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover temperature	40°C	configurable	
			Alarm recover delay	3.0S	configurable	
		Level 2	Alarm temperature	50°C	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover temperature	46°C	configurable	
			Alarm recover delay	2.0S	configurable	
		Level 3	Alarm temperature	53°C	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover temperature	45°C	configurable	
			Alarm recover delay	3.0S	configurable	

Cell Discharge high temperature Protect	Level 1	Alarm temperature	45°C	configurable
		Alarm delay	3.0S	configurable
		Alarm recover temperature	42°C	configurable
		Alarm recover delay	3.0S	configurable
	Level 2	Alarm temperature	50°C	configurable
		Alarm delay	2.0S	configurable
		Alarm recover temperature	47°C	configurable
		Alarm recover delay	2.0S	configurable
	Level 3	Alarm temperature	58°C	configurable
		Alarm delay	3.0S	configurable
		Alarm recover temperature	52°C	configurable
		Alarm recover delay	3.0S	configurable
Cell Charging low temperature Protect	Level 1	Alarm temperature	7°C	configurable
		Alarm delay	3.0S	configurable
		Alarm recover temperature	10°C	configurable
		Alarm recover delay	3.0S	configurable
	Level 2	Alarm temperature	5°C	configurable
		Alarm delay	2.0S	configurable
		Alarm recover temperature	7°C	configurable
		Alarm recover delay	2.0S	configurable
	Level 3	Alarm temperature	2°C	configurable
		Alarm delay	3.0S	configurable
		Alarm recover temperature	5°C	configurable
		Alarm recover delay	3.0S	configurable
		Alarm temperature	-5°C	configurable
		Alarm delay	3.0S	configurable

8	Cell Discharge low temperature Protect	Level 1	Alarm recover temperature	-2°C	configurable		
			Alarm recover delay	3.0S	configurable		
		Level 2	Alarm temperature	-10°C	configurable		
			Alarm delay	2.0S	configurable		
		Level 3	Alarm recover temperature	-7°C	configurable		
			Alarm recover delay	2.0S	configurable		
		Level 3	Alarm temperature	-20°C	configurable		
			Alarm delay	3.0S	configurable		
		8	Ambient high alarm temperature	Level 1	Alarm temperature	55°C	configurable
					Alarm delay	3.0S	configurable
				Level 2	Alarm recover temperature	52°C	configurable
					Alarm recover delay	3.0S	configurable
Level 2	Alarm temperature			60°C	configurable		
	Alarm delay			2.0S	configurable		
Level 3	Alarm recover temperature			57°C	configurable		
	Alarm recover delay			2.0S	configurable		
Level 3	Alarm temperature			65°C	configurable		
	Alarm delay			3.0S	configurable		
Level 1	Alarm recover temperature			55°C	configurable		
	Alarm recover delay			3.0S	configurable		
Level 1	Alarm temperature	-10°C	configurable				
	Alarm delay	3.0S	configurable				
	Alarm recover temperature	-7°C	configurable				

	Ambient low alarm temperature	Level 2	Alarm recover delay	3.0S	configurable			
			Alarm temperature	-15°C	configurable			
			Alarm delay	2.0S	configurable			
			Alarm recover temperature	-12°C	configurable			
			Alarm recover delay	2.0S	configurable			
		Level 3	Alarm temperature	-20°C	configurable			
			Alarm delay	3.0S	configurable			
			Alarm recover temperature	-10°C	configurable			
			Alarm recover delay	3.0S	configurable			
		9	Charging relay High temperature protection	Level 1	Alarm temperature	80°C	configurable	
					Alarm delay	3.0S	configurable	
					Alarm recover temperature	75°C	configurable	
Alarm recover delay	3.0S				configurable			
Level 2	Alarm temperature			90°C	configurable			
	Alarm delay			2.0S	configurable			
	Alarm recover temperature			85°C	configurable			
	Alarm recover delay			2.0S	configurable			
Level 3	Alarm temperature			100°C	configurable			
	Alarm delay			3.0S	configurable			
	Alarm recover temperature			85°C	configurable			
	Alarm recover delay			1.0S	configurable			
				Level 1	Alarm temperature	80°C	configurable	
					Alarm delay	3.0S	configurable	
					Alarm recover temperature	75°C	configurable	
					Alarm recover delay	3.0S	configurable	

	Discharge relay device temperature protection	Level 2	Alarm temperature	90°C	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover temperature	85°C	configurable	
			Alarm recover delay	2.0S	configurable	
		Level 3	Alarm temperature	100°C	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover temperature	85°C	configurable	
			Alarm recover delay	1.0S	configurable	
	negative relay High temperature protection	Level 1	Alarm temperature	80°C	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover temperature	75°C	configurable	
			Alarm recover delay	3.0S	configurable	
		Level 2	Alarm temperature	90°C	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover temperature	85°C	configurable	
			Alarm recover delay	2.0S	configurable	
Level 3		Alarm temperature	100°C	configurable		
		Alarm delay	3.0S	configurable		
		Alarm recover temperature	85°C	configurable		
		Alarm recover delay	1.0S	configurable		
10 Terminal high temperature	Level 1	Alarm temperature	100°C	configurable		
		Alarm delay	3.0S	configurable		
		Recover temperature	95°C	configurable		
		Recover delay	3.0S	configurable		
	Level 2	Alarm temperature	105°C	configurable		
		Alarm delay	2.0S	configurable		
		Recover temperature	100°C	configurable		

	protection	2	Recover delay	2.0S	configurable	
		Level	Protect temperature	110°C	configurable	
		3				

			Protect delay	3.0S	configurable	
			Terminal three-level high temperature protection release	105°C	configurable	
			Terminal three-level high temperature protection release delay	1.0S	configurable	
11	SOC high protection	Level 1	Alarm	90%	configurable	BMS itself does not SOC as protection According to SOC Pass it to EMS for adjustment Spend
			Alarm delay	3.0S	configurable	
			Alarm recover	88%	configurable	
			Recover delay	3.0S	configurable	
		Level 2	Alarm	95%	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	93%	configurable	
		Level 3	Recover delay	2.0S	configurable	
			Protect	100%	configurable	
			Protect delay	3.0S	configurable	
		Level 3	Recovery capacity	95%	configurable	
			Recovery delay	3.0S	configurable	
		SOC high protect release		Discharge release	Discharge current >5.0A	Continuous current 3S
	SOC low	Level 1	Alarm	10%	configurable	BMS itself does not SOC as protection According to SOC Pass it to EMS
			Alarm delay	3.0S	configurable	
			Alarm recover	12%	configurable	
			Recover delay	3.0S	configurable	
		Level	Alarm	6%	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	8%	configurable	



12	protection	2	Recover delay	2.0S	configurable	for adjustment Spend
		Level	Alarm	2%	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover	7%	configurable	
		3	Recover delay	3.0S	configurable	
	SOC low protect release	charge release	Charge current >5.0A	Continuous current 3S		
13	Positive insulation failure	Level 1	Alarm	1000Ω/V	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover	1200Ω/V	configurable	
			Recover delay	3.0S	configurable	
		Level 2	Alarm	600Ω/V	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	800Ω/V	configurable	
			Recover delay	2.0S	configurable	
		Level 3	Protect	200Ω/V	configurable	
			Protect delay	3.0S	configurable	
			Recovery capacity	700Ω/V	configurable	
			Recovery delay	3.0S	configurable	
		Level 1	Alarm	1000Ω/V	configurable	
		negative insulation failure		Alarm delay	3.0S	configurable
	Alarm recover			1200Ω/V	configurable	
Recover delay	3.0S			configurable		
Level 2	Alarm		600Ω/V	configurable		
	Alarm delay		2.0S	configurable		
	Alarm recover		800Ω/V	configurable		
	Recover delay		2.0S	configurable		
Level 3	Protect		200Ω/V	configurable		
	Protect delay		3.0S	configurable		
	Recovery capacity		700Ω/V	configurable		

		3	Recovery delay	3.0S	configurable	
14	Charging voltage difference protection	Level 1	Alarm	80mV	configurable	
			Alarm delay	3.0S	configurable	
			Alarm recover	50mV	configurable	
			Recover delay	3.0S	configurable	
		Level 2	Alarm	120mV	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	100mV	configurable	
			Recover delay	2.0S	configurable	
		Level 3	Protect	300mV	configurable	
			Protect delay	3.0S	configurable	
			Recovery capacity	200mV	configurable	
			Recovery delay	3.0S	configurable	
	Charging voltage difference protection released	Discharge release	Discharge current >5.0A	Continuous current 3S		
	15	Discharge voltage difference protection	Level 1	Alarm	100mV	configurable
Alarm delay				3.0S	configurable	
Alarm recover				70mV	configurable	
Recover delay				3.0S	configurable	
Level 2			Alarm	150mV	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	120mV	configurable	
			Recover delay	2.0S	configurable	
Level 3			Protect	450mV	configurable	
			Protect delay	3.0S	configurable	
			Recovery capacity	250mV	configurable	
			Recovery delay	3.0S	configurable	
Discharge voltage difference		charge release	charge current >5.0A	Continuous current 3S		

	protection released				
16		Level 1	Alarm	5°C	configurable
			Alarm delay	3.0S	configurable
			Alarm recover	3°C	configurable
	Charging temperature difference protection	Level 2	Recover delay	3.0S	configurable
			Alarm	8°C	configurable
			Alarm delay	2.0S	configurable
			Alarm recover	6°C	configurable
			Recover delay	2.0S	configurable
		Level 3	Protect	10°C	configurable
			Protect delay	3.0S	configurable
			Recovery capacity	5°C	configurable
			Recovery delay	3.0S	configurable
17	discharging temperature difference protection	Level 1	Alarm	5°C	configurable
			Alarm delay	3.0S	configurable
			Alarm recover	3°C	configurable
			Recover delay	3.0S	configurable
		Level 2	Alarm	8°C	configurable
			Alarm delay	2.0S	configurable
			Alarm recover	6°C	configurable
			Recover delay	2.0S	configurable
		Level 3	Protect	20°C	configurable
			Protect delay	3.0S	configurable
			Recovery capacity	5°C	configurable
			Recovery delay	3.0S	configurable
		Level 1	Alarm	4°C/S	configurable
			Alarm delay	3.0S	configurable
			Alarm recover	1°C/S	configurable
			Recover delay	3.0S	configurable

18	cell temperat ure rise protectio n	Level 2	Alarm	6°C/S	configurable	
			Alarm delay	2.0S	configurable	
			Alarm recover	1°C/S	configurable	
			Recover delay	2.0S	configurable	
		Level 3	Protect	8°C/S	configurable	
			Protect delay	3.0S	configurable	
			Recovery capacity	6°C/S	configurable	
			Recovery delay	3.0S	configurable	
19	cell sampling abnormali ty	Level 1	delay	10.0S	configurable	
			Recover delay	3.0S	configurable	
		Level 2	delay	20.0S	configurable	
			Recover delay	3.0S	configurable	
		Level 3	delay	30.0S	configurable	
			Recover delay	65.5S	configurable	
20	NTC sampling abnormali ty	Level 1	delay	1.0S	configurable	
			Recover delay	10.0S	configurable	
		Level 2	delay	3.0S	configurable	
			Recover delay	30.0S	configurable	
		Level 3	delay	5.0S	configurable	
			Recover delay	30.0S	configurable	
21	slave fan control	on	The cell temperature is greater than 40°C or the terminal temperature is greater than 85°C	configurable		
		off	The cell temperature is less than 35°C or the	configurable		

			terminal temperature is less than 75 °C		
22	short circuit	Short circuit protection delay	300us	configurable	
		Severe over-discharge voltage	2600mV	configurable	
23	Cell failure	Level 1 cell fault voltage	1000mV	configurable	
		Level 1 cell fault voltage delay	5.0S	configurable	
		Level 1 cell fault recovery voltage	500mV	configurable	
		Level 1 cell recovery voltage	1.0S	configurable	
24	Relay failure	Relay sticking	Relay is fully powered off	Time 1S	
25	Balance function	Balanced turn-on voltage	3400mV	configurable	
		turn-on voltage	30mV	configurable	
26	Cell failure protection	Cell voltage difference	Voltage difference > 1V	Can not configurable	Can not configurable
27	Full of judgment	Full charging voltage	Total voltage > cell package voltage * BMU number V	Configurable cell > 3.5V	Stop charging when both are satisfied, and update SOC to 100%
		cut-off current	< 2A	configurable	
28	Current consumption	Self-consumption of electricity while working		≤ 3W (Does not include relay drive current)	
		Shutdown mode current		≤ 0.3W	

## 6. BMU slave control unit

### 6.1 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.

### 6.2 Functions and characteristics 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, which can be used for program upgrade, fan control and diagnosis, automatic address allocation and other functions.
6. 2 channels of high-side output: A single high-side switch has a maximum sustainable output of 1A. When both channels are turned on at the same time, the sum of the output currents can reach 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-diagnosis functions and supports functional safety certification requirements.

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

10. Comply with 1500V safety requirements and support 1500V system UL certification.

### 6.3 Electrical parameter table

Main technical parameters		Min	Typ	Max	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
cell voltage	Voltage range	0		5.0	V	
	Sampling accuracy			±3.0	mV	2.5V~4.5V,-30°C~85°C
temperature sampling	temperature range	-40		125	°C	storage temperature
	Sampling points			28	PCS	14 points per 12 strings
	Sampling accuracy		1	2	°C	-30°C~85°C
High side switching output	continuous current			1	A	One 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 consumption	low voltage area			240	mW	Every 12 string sampling unit
	high voltage area		75		mW	
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.				

#### 6.4 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	°C	
	humidity	5	95	%	
	altitude		4000	m	
storage temperature		-40	125	°C	



ESD protection	-	Air 15 Contact 8	kV	
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### 6.5 Interface definition

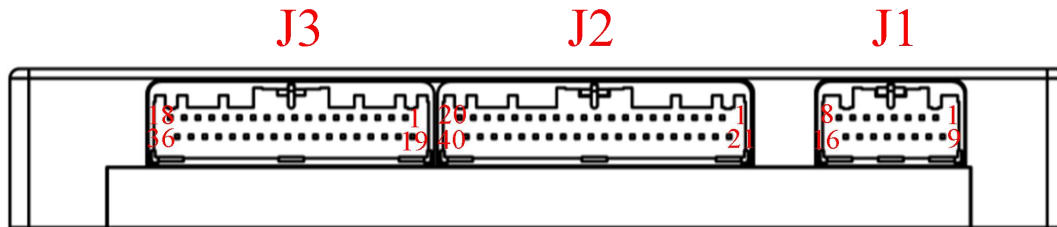


Figure 1 Front view of passively balanced 24-bit serial interface

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/Suitable for 0.22~0.35mm<sup>2</sup>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+	BAT	BAT	BAT	BAT	BAT	BAT	NC	NC	NC
	1	11A	9A	7A	5A	3A	1A			
pin	20	19	18	17	16	15	14	13	12	11

definition	RT 1A	GNDA	RT4A	RT5A	GNDA	RT8A	RT9A	GND A	RT 12A	RT 13A
pin	30	29	28	27	26	25	24	23	22	21
definition	BAT 12A	BAT 10A	BAT 8A	BAT 6A	BAT4A	BAT2A	BAT0A	PW-1	NC	NC
pin	40	39	38	37	36	35	34	33	32	31
definition	RT 2A	RT3A	GNDA	RT6A	RT7A	GNDA	RT10A	RT 11A	GN DA	RT 14A

J3 (male end) : AAUS01AP2-036K02									
pin	9	8	7	6	5	4	3	2	1
definition	RT 13B	PW+2	BAT11B	BAT9B	BAT7B	BAT5B	BAT3B	BAT1B	NC
pin	18	17	16	15	14	13	12	11	10
definition	RT 1B	GNDB	RT4B	RT5B	GNDB	RT8B	RT9B	GNDB	RT12B
pin	27	26	25	24	23	22	21	20	19
definition	RT 14B	BAT12 B	BAT10B	BAT8B	BAT6B	BAT4B	BAT2B	BAT0B	PW-2
pin	36	35	34	33	32	31	30	29	28
definition	RT 2B	RT3B	GNDB	RT6B	RT7B	GNDB	RT10B	RT11B	GNDB

## 6.6 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 switch output can be used to control external devices such as fans, contactors, etc.
	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.

## 6.5 Air conditioning parameters

Type	Name	Unit	Parameter
Dimensions and installation	Overall dimensions (H*W*D)	mm	795*495*195
	Including flange dimensions (H*W*D)	mm	845*545*195
	weight	Kg	32
	Installation method	Embedded	
	Installation Environment	outdoor	
environment and protection	Working temperature	°C	-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	2000
	rated power(L35/L35)	W	780
	Rated current(L35/L35)	A	5.0
	Maximum working current	A	10.0
	Heating capacity (optional)	W	1000
	Circulating air volume	m3/h	380

## 6.6 Inverter parameters

<i>Model</i>	<i>SUN-29.9K- SG01HP3- EU-BM3</i>	<i>SUN-30K- SG01HP3- EU-BM3</i>	<i>SUN-35K- SG01HP3- EU-BM3</i>	<i>SUN-40K- SG01HP3- EU-BM4</i>	<i>SUN-50K- SG01HP3- EU-BM4</i>
<b>Battery Input Data</b>					
Battery Type	Li-Ion				
Battery Voltage Range(V)	160~800				
Max. Charging Current(A)	50+50				
Max. Discharging Current(A)	50+50				
Max. Charging/Discharging Power(W)	29900	33000	38500	44000	55000
Number of battery input	2				
Charging Strategy for Li-Ion Battery	Self-adaption to BMS				
<b>PV String Input Data</b>					
Max. DC Input Power(W)	38870	39000	45500	52000	65000
Max. DC Input Voltage (V)	1000				
Start-up Voltage(V)	180				
MPPT Range(V)	150-850				
Full Load DC Voltage Range (V)	360-850	360-850	420-850	360-850	450-850
Rated DC Input Voltage (V)	600				
PV Input Current(A)	36+36+36			36+36+36+36	
Max.PV Isc(A)	55+55+55			55+55+55+55	
No. of MPPT Trackers	3			4	
No. of Strings Per MPPT Tracker	2+2+2			2+2+2+2	
<b>AC Output Data</b>					
Rated AC Output and UPS Power(W)	29900	30000	35000	40000	50000
Max. AC Output Power(W)	29900	33000	38500	44000	55000
Peak Power(off grid)	1.5 time of rated power, 10 S				
AC Output Rated Current(A)	45.4/43.4	45.5/43.5	53.1/50.8	60.7/58.0	75.8/72.5
Max. AC Current(A)	45.4/43.4	50/47.9	58.4/55.8	66.7/63.8	83.4/79.8
Max. Three-phase Unbalanced Output Current (A)	60	60	60	70	83.3
Max. Continuous AC Passthrough(A)	200				
Power Factor	0.8 leading to 0.8 lagging				
Output Frequency and Voltage	50/60Hz; 3L/N/PE 220/380, 230/400V ac				
Grid Type	Three Phase				
Total Harmonic Distortion (THD)	<3% (of nominal power)				
DC current injection	<0.5% In				
<b>Efficiency</b>					
Max. Efficiency	97.60%				
Euro Efficiency	97.00%				
MPPT Efficiency	>99%				
<b>Protection</b>					
PV Input Lightning Protection	Integrated				
Anti-islanding Protection	Integrated				
PV String Input Reverse Polarity Protection	Integrated				
Insulation Resistor Detection	Integrated				
Residual Current Monitoring Unit	Integrated				
Output Over Current Protection	Integrated				
Output Shorted Protection	Integrated				
Over Voltage Category	DC Type II / AC Type III				
Battery Over Current Protection	Fuses				

<b>Certifications and Standards</b>	
Grid Regulation	VDE4105,IEC61727/62116,VDE0126,AS4777.2,CEI 0 21,EN50549-1, G98,G99,C10-11,UNE217002,NBR16149/NBR16150
EMC/Safety Regulation	IEC62109-1/-2, NBT32004-2018, EN61000-6-1,EN61000-6-2, EN61000-6-3, EN61000-6-4
<b>General Data</b>	
Operating Temperature Range(°C)	-40~60 °C, >45 °C Derating
Cooling	Smart cooling
Noise(dB)	≤65 dB
Communication with BMS	RS485; CAN
Weight(kg)	80
Cabinet size(mm)	527W×894H×294D (Excluding connectors and brackets)
Protection Degree	IP65
Permissible Altitude	2000m
Installation Style	Wall-mounted
Warranty	5 years

## 7.Fire technical parameters

### 7.1Fire 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.

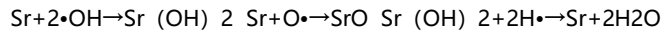
#### (1) The cooling and fire extinguishing effect of endothermic decomposition

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:

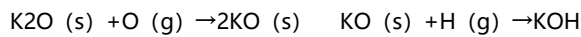
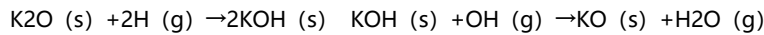


By repeating this process, a large amount of active groups in combustion are consumed, the concentration continues to decrease, and combustion is suppressed.

(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:



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.

**7.2 Technical Parameters**

Item	Parameter	Item	Parameter
Model specifications	QRR0.3G/S-Q	One set net weight	860g±30g
Working environment temperature range	-50℃~+90℃	Standard sizes	68.5×46×255mm
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	Multiple link mode	Combination series

		400°C, 200°C and 75°C are 0.05m, 0.12m and 0.3m respectively	Feedback signal	Passive switching signal
Shell surface temperature		≤150°C	Fire extinguishing efficiency	100g/m <sup>3</sup> -130g/m <sup>3</sup>
Oxidant name and content	Potassium nitrate, strontium nitrate 50%~70%		Validity period	Ten year

## 8 Sign 、 Package 、 Transport 、 Storage

### 8.1 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.

### 8.2 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 ~ 50% 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.

### 8.3 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% .

## 9 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.

## 10 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

## 11 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;

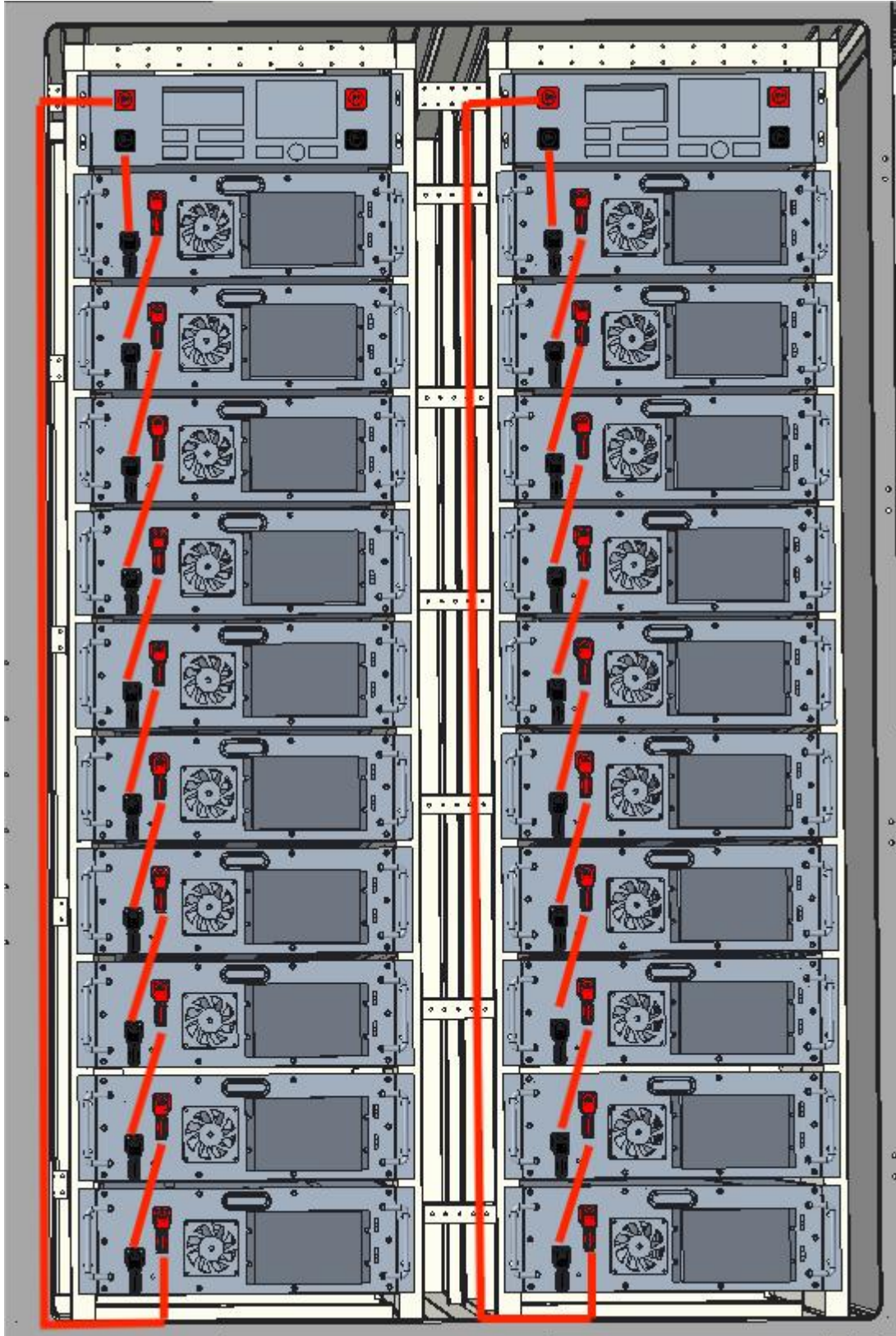
- 3 ) The product is a direct current high voltage, except for professionals, other people should stay away from it without permission, and must not touch or operate it;
- 4 ) Before any installation and maintenance work, first disconnect the circuit breaker on the grid side, then disconnect the DC switch on the battery side, and use relevant equipment for testing;
- 5 ) During the use of this product, do not plug 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.

## 12 Danger warning

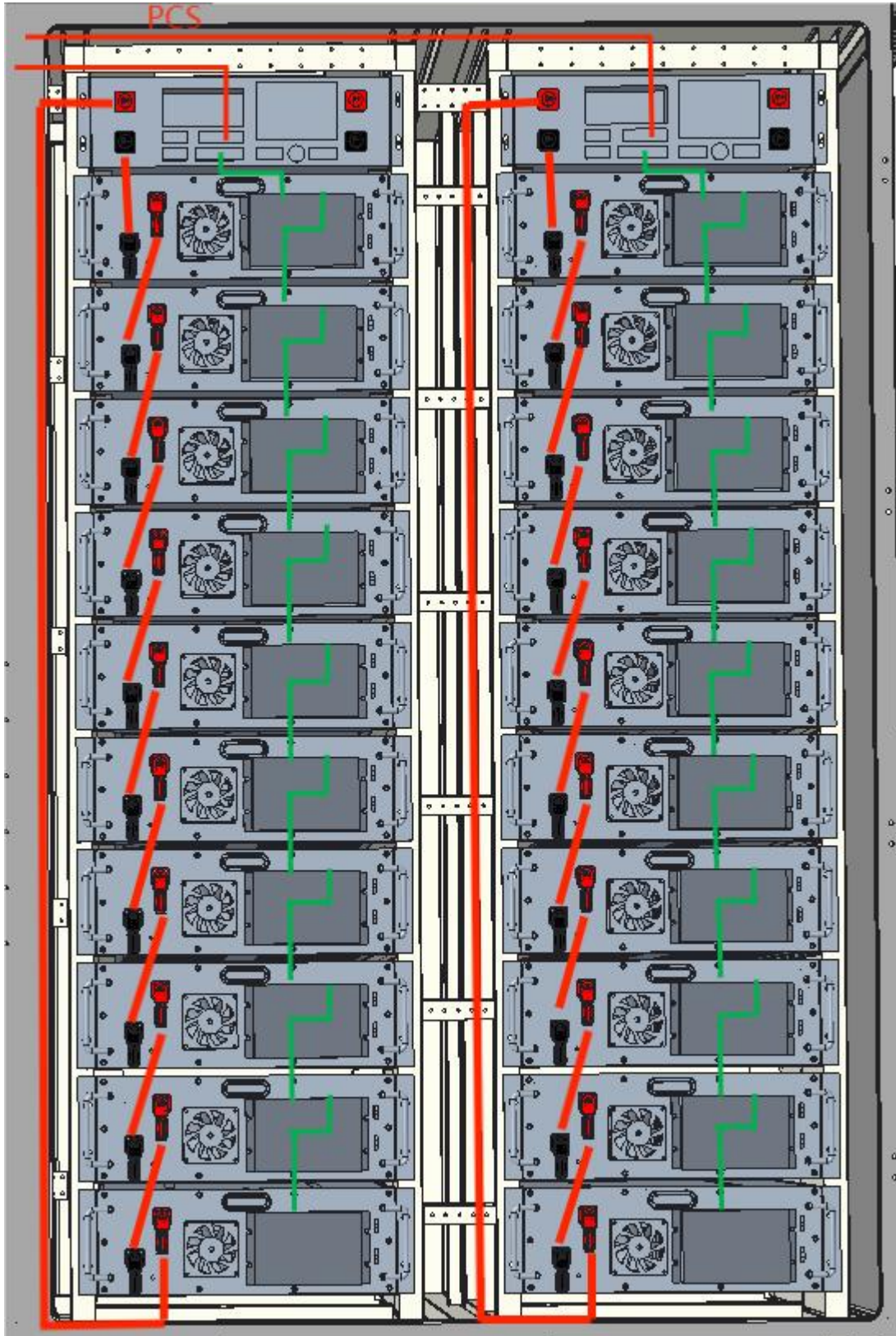
- 1 ) Forbidden to disassemble and install the product and the battery inside the product without authorization. There are protective mechanisms and protective circuits inside the product to avoid danger. Improper disassembly and assembly will damage the protection function and cause the battery to heat 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.

**13.HV-R0106P0050 project installation guide**

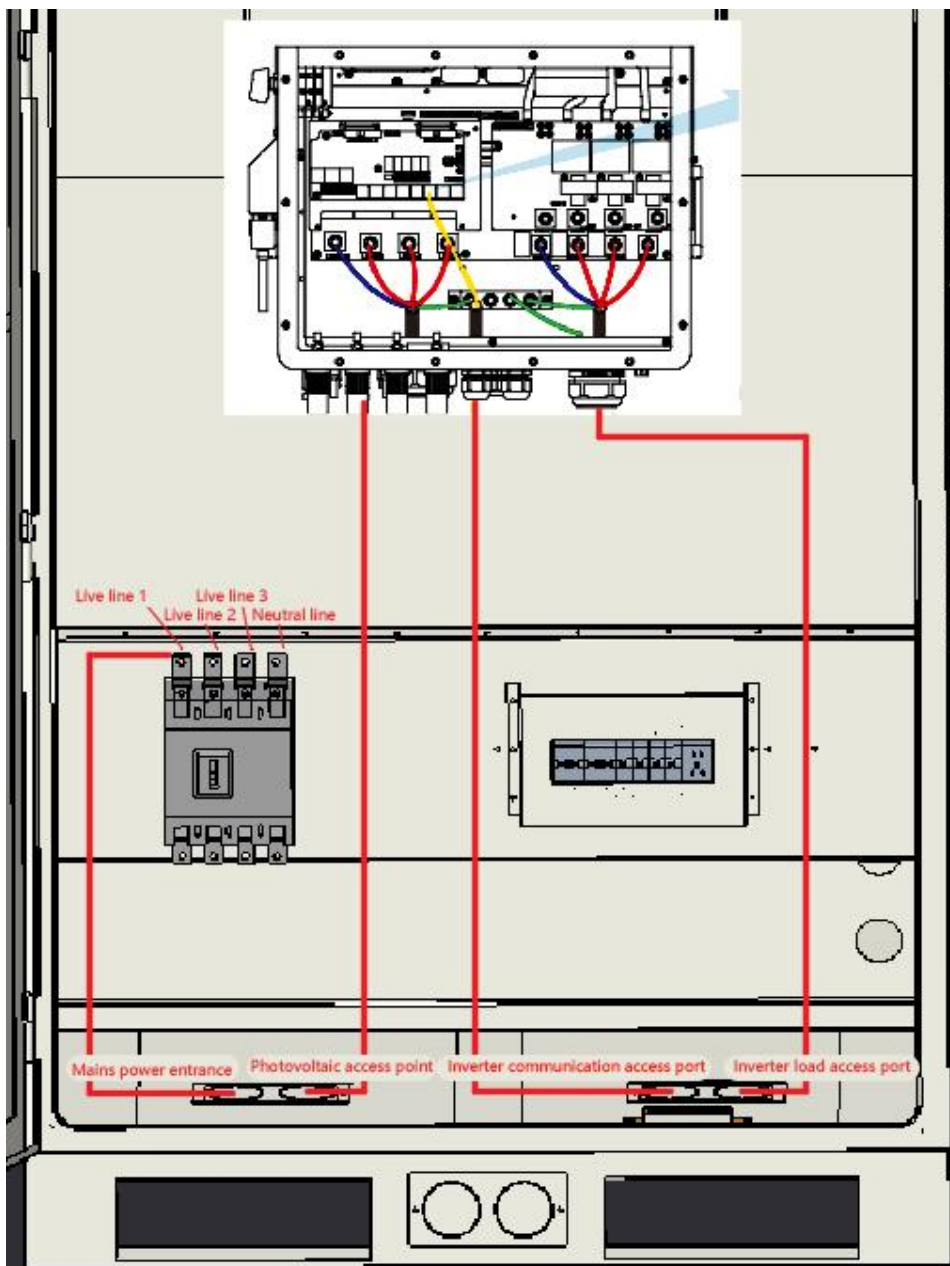
1.Place the main control box and battery box into the battery cabinet as shown in Figure 1 (red line), and connect the positive and negative main circuits as shown in the figure (check carefully, wiring errors may cause battery short circuit)



2. Connect the COM1 communication line end to end as shown in Figure 2 (green line), and be careful to find the appropriate length of communication line;



3. Connect the UPS AC220V OUT port to the Z-shaped terminal, turn on the ship switch to the ON position, and move the manual switch handle to the ON position. Wait for about 3 minutes. The indicator light turns green to indicate that the system is operating normally. After normal operation, turn off the boat switch to the OFF position, and close the manual switch handle to the OFF position;
4. Connect PCS+—inverter BAT+, PCS— —inverter BAT1.COM2 communication ports CAN-H and CAN-L corresponding to inverter BMS1 and BMS2 ports CAN-H and CAN-L.
5. Connect the mains power to the circuit breaker and turn on all the switches of the inverter. After the inverter is running normally, turn on all the switches in the electrical control area to complete the system installation.



Precautions:

1. Insulating gloves should be worn throughout the installation process
2. Read carefully before installation and install according to the instructions.
3. This system is a high-voltage product, and any exposed electrodes should not be touched during installation.
4. Inverter parameter settings, please refer to the attachment "Hybrid Inverter-SUN-50K-SG01HP3-EU-BM4 User Manual" for details.