



Dongguan Xinrex Energy Technology Co., LTD

Product Name

Specification

Model number

CES-257-A

Version/edition

A/0

pages

1 of 57

# Product specification

High-voltage commercial energy storage system

Model : CES-257-A

Fiction	Check	Ratify



Dongguan Xinrex Energy Technology Co., LTD

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### The change record

Edition	The change conten	Date	Preparation
A/0	The first released edition	2024-6-5	



# catalogue

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## 1. Scope of application

This product specification is applicable to the commercial storage product description developed and produced by Xinrex Energy Technology Co., LTD.

For the commercial energy storage application scenarios, the CES-257-A integrated system launched by Xinrex adopts the integration concept of all-in-one machine, and integrates the LFP battery, BMS, PCS, EMS, air conditioning, fire protection and other equipment in the outdoor energy storage cabinet. Adopt modular design, energy storage battery cell-battery module-battery rack-battery system modular level, distinct, clear structure, perfect function, should contain perfect battery rack, battery management system (BMS), air conditioning and temperature control system, fire detection and automatic fire extinguishing system, security system, emergency system, surge device, grounding protection device CES-257-A integration system for different application scenarios to build low carbon high yield solution, make each kilowatt source more green, make each kilowatt to more valuable, build A new zero carbon ecology.

## 2. reference standard

The supplied products shall comply with the National Standard of the People's Republic of China (GB), the Electric Power Industry Standard of the People's Republic of China (DL), the former Ministry of Hydropower Standard (SD) and the relevant IEC standards.

In the above standards, the national standards of the People's Republic of China and the electric power industry standards shall be adopted preferentially. When the domestic standards are missing, the corresponding international standards or other national standards shall be selected, and the selected standards shall be the latest version issued before the signing of the contract.

All threads, nuts, bolts, screws, shrapnel, gaskets, etc. shall be specified in the metric system of GB standard.

The main reference criteria are as follows:

GB / T 4208-2008 <Shell Protection Level> (IP Code)

GB / T191-2008 < Packaging and Storage and Transportation Map Mark>

GB / T36276-2018 <Lithium Battery for Electric Energy Storage>

GB / T 34131-2017 <Technical Specification for Management System of Lithium-ion Battery for Electrochemical Energy Storage Power Station>

QGDW 1884-2013 < Technical Specification for Energy Storage Battery Pack and Management System>


GB T36558-2018 <General Technical Conditions for Electrochemical Energy Storage System in Power System>

GB 14048.1-2006 < Low-voltage switchgear and Control Equipment- -Part 1: General Provisions>

## 3. Commercial storage integrated cabinet system architecture

### system composition

The system has a capacity of 257kWh battery cluster, a single cluster battery cluster consists of 16 battery box (including cell + BMS), 1 high voltage box (including circuit breaker + BMS + high voltage protection components, etc.), EMS, PCS, fire protection and air conditioning system, and overall consists of lithium battery management system, display screen, high voltage distribution module, standard battery module system battery module 819.2V 314Ah.

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### List of key material contained in 257kWh


No.	Name	Model	Unit	Quantity	Remarks
1	The cell	3.2V/314Ah	pcs	256	
2	Cell module	Single cell 8S1P, includes matching fittings	set	32	
3	battery box	Two 8S1P cell modules are connected in series, including BMU and supporting links	pcs	16	
4	high-voltage compartment	The BMU + high-voltage components	set	1	
5	controller	PDU controller	set	1	
6	PCS	Rated charging power is 125kW	pcs	1	
7	EMS	Power supply input is D C24V	pcs	1	

#### 4. Cell parameters

**Note that this plate is a cell specification parameter, not the parameter of CES-257-A, while the parameters of CES-2575-A are based on the parameters of the cell**



No .	Profect	parameter	condition
1	Cell capacity	314Ah	Standard charge-discharge charge-down test
2	Rated voltage	3.20V	489.6W(0.5P) Constant power discharge
3	Operating voltage range	2.5~3.65V 2.0~3.65V	temperature T>0°C temperature T≤0°C
4	Battery internal resistance (1 KHz)	0.18±0.05mΩ	New battery with 40% SOC status
5	Shipping capacity	96Ah	40%SOC
6	Operating temperature (charging)	0 ~ 60°C	
7	Operating temperature (discharge)	-20 ~ 60°C	
8	Cycle life	5200 timws, capacity≥80%SOH	25±2°C,standard charge / discharge process, stand for 30min
9	Looping attenuation	≤5%	25 ± 2°C initial clamp force 300 Kgf, standard charge / discharge test cycle 180 laps
10	Battery weight	5.49±0.30kg	
11	Self-discharge rate	≤3.5%/月(首月) ≤3.0%/月(首月后)	Three months after the shipment of the cell, the standard charge to 30% SOC, 25 ± 2°C storage
12	Charge and discharge times	≥7000Cycles	The average temperature of the battery during the cycle is 25 ± 2°C, the initial clamping force is 300Kgf, the standard charge-discharge test, 80% SOH


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### Standard charging mode

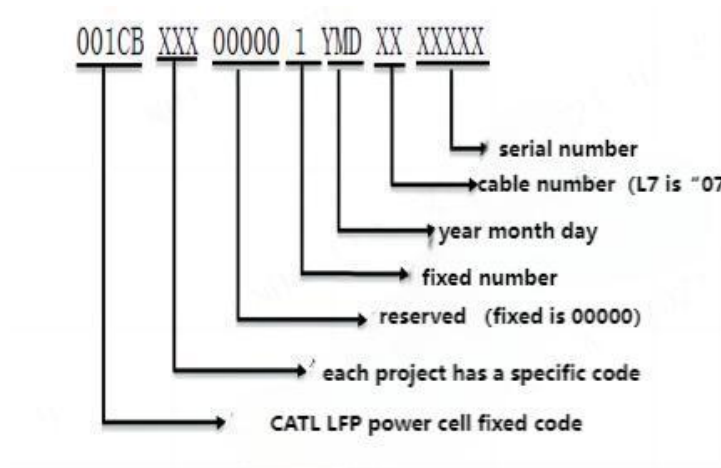
No.	Profect	parameter	condition
1	Standard charging power	0.5P	25°C
2	Standard charging voltage	The maximum voltage of the monomer was 3.65V	
3	Standard charging mode	Charge 0.5P constant power to 3.65V, and let 5min,0.1P constant power to 3.65V	
4	Standard charging temperature	25± 2°C	Battery temperature

### Standard discharge mode

No.	Profect	parameter	condition
1	Standard discharge power	0.5P	25°C
2	Standard charging mode	The average temperature of the battery 25±2°C,0.5P constant power discharge to 2.5V, and the static 5min,0.1P constant power discharge to 2.5V.	
3	Standard discharge temperature	25±2°C	Battery temperature


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**Cell traceability qr code coding rules**




Year rules							
Year (a particular year)	Code (code)	Year (a particular year)	Code (code)	Year (a particular year)	Code (code)	Year (a particular year)	Code (code)
2011	1	2021	B	2031	M	2041	1
2012	2	2022	C	2032	N	2042	2
2013	3	2023	D	2033	P	2043	3
2014	4	2024	E	2034	R	2044	4
2015	5	2025	F	2035	S	2045	5
2016	6	2026	G	2036	T	2046	6
2017	7	2027	H	2037	V	2047	7
2018	8	2028	J	2038	W	2048	8
2019	9	2029	K	2039	X	2049	9
2020	A	2030	L	2040	Y	2050	A



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Month rules							
Month (month)	Code (code)	Month (month)	Code (code)	Month (month)	Code (code)	Month (month)	Code (code)
1	1	4	4	7	7	10	A
2	2	5	5	8	8	11	B
3	3	6	6	9	9	12	C

Day rules					
Date (date)	Code (code)	Date (date)	Code (code)	Date (date)	Code (code)
1	1	12	C	23	P
2	2	13	D	24	R
3	3	14	E	25	S
4	4	15	F	26	T
5	5	16	G	27	V
6	6	17	H	28	W
7	7	18	J	29	X
8	8	19	K	30	Y
9	9	20	L	31	O
10	A	21	M		
11	B	22	N		

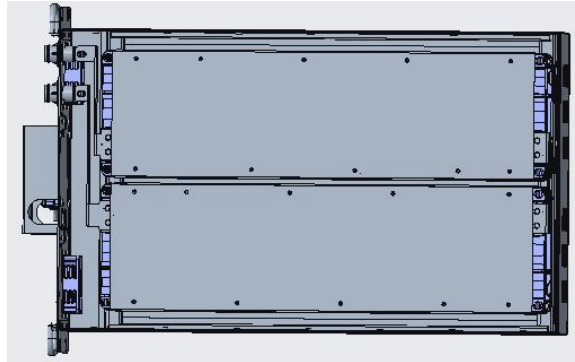
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## 5. Battery box parameters

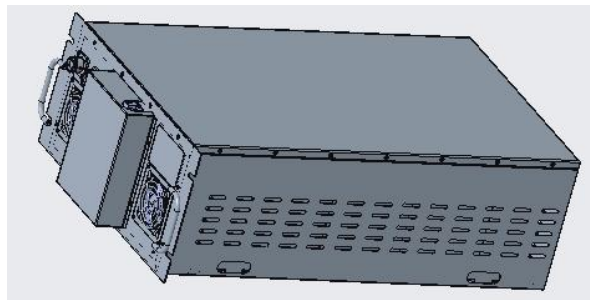
No.	project	Conventional parameters	remarks
1	nominal capacity	314Ah	
2	rated voltage	51.2V	16S
3	Discharge cut-off voltage	44.8V	
4	Charging cut-off voltage	58.4V	
5	Continuous charge of the maximum current	157A	
6	Continuous discharge of the maximum current	157A	
7	energy content of battery	16.076kWh	
8	communication interface	RS485/CAN/LAN	
9	Discharge working temperature	-20°C~55°C	
10	Charging working temperature	0°C~55°C	
11	Storage temperature	-10°C~45°C	
12	relative humidity	5~90%	
13	above sea level	≤2000m	
14	life span	10 years	
15	levels of protection	IP21	
16	memory time	3 months	
17	dimension	Length: 741mm Width: 480mm Height: 230mm	
18	weight	About 108kg	
19	Cycle life	7000 times	100% DOD 25°C@70% remaining capacity

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## 6. Battery box structure



Internal layout diagram of the battery box




External layout diagram of the battery box

## 7. High voltage box structure

High voltage box includes communication module, BCM main control board, breaker(swith), DC / DC module, relay, shunt, pre-charging pack, fuse, etc



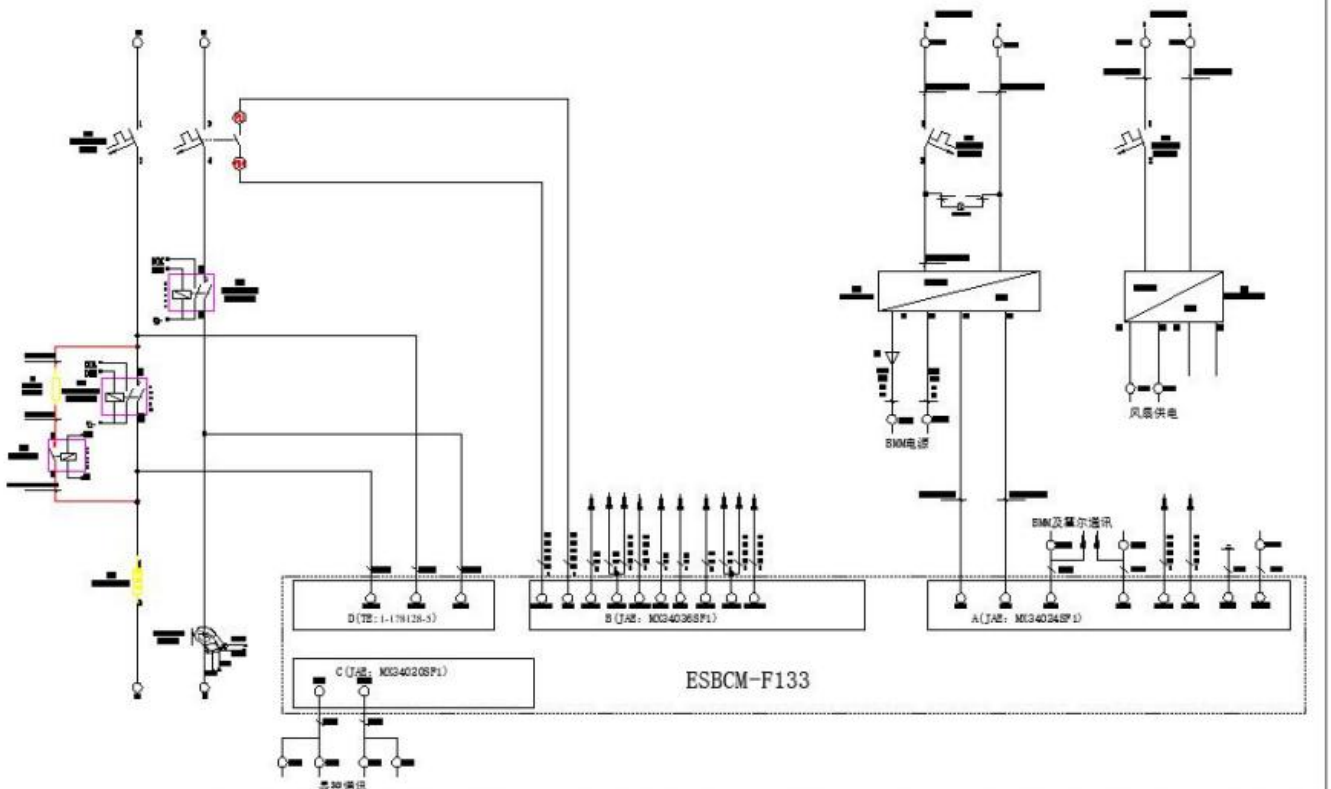
Appearance dimension diagram of the high-voltage line

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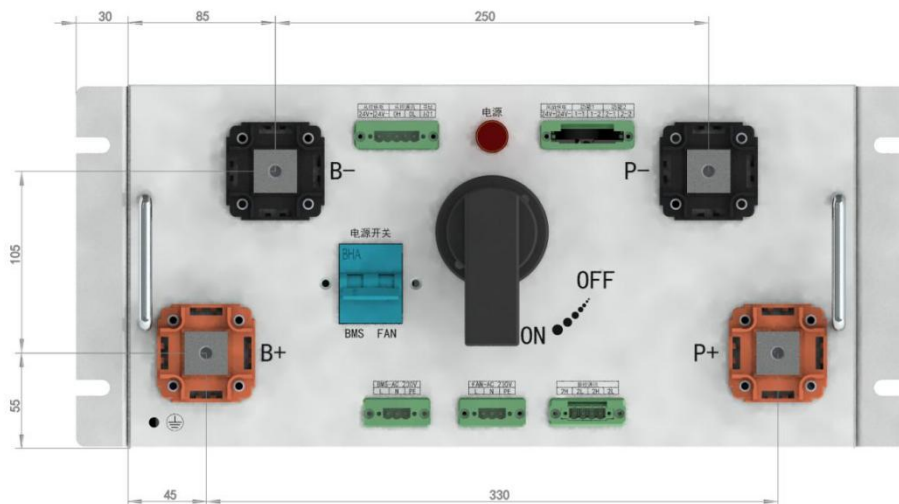
### 7.1 Key components of the high-voltage box

No.	Name	Specifications(brand)	Unit	Quantity
1	Plastic outside Shell broker	NDM 3 Z-250 liangxin electricity Device / CM3DC-250 Changshu Switchgear / GM5-250P Renmin Electric	PCS	1
2	DC connection contactor	1,000 Vdc 250A- -BYD / 1000Vdc 250A-ALQ /1000Vdc 250A-YM	PCS	2
3	Pre-charge contactor	1,000 Vdc 40A- -BYD / 1000Vdc 30A-Ann /1000Vdc 50A-YM	PCS	1
4	fuse	Medium melt-315A / medium-315A	PCS	1
5	Hoare	LEM-CAB500 / LEMS-118 / c STB-CAB500	PCS	1
6	Fan power source	24V350W Delta / 24V600W Delta	PCS	1
7	Master control mode block	ESBCM-F133	PCS	1
8	Breaker switch	AC230V / 10A / 1P / SHILIN ELECTRIC	PCS	2
9	BMS source	24V150W Delta	PCS	1
10	precharge resistor	5Ω/RXLG200W-5R/-55~125°C / Shuanghuan electron	PCS	1
11	Power socket	70 square / socket (orange + black) And / 300A /SML	group	2
12	Low voltage terminal	LX-2 ED GWC-5.08 series /Through-wall terminal/ 15A	PCS	several


7.



### 7.3 Definition of the HV box port

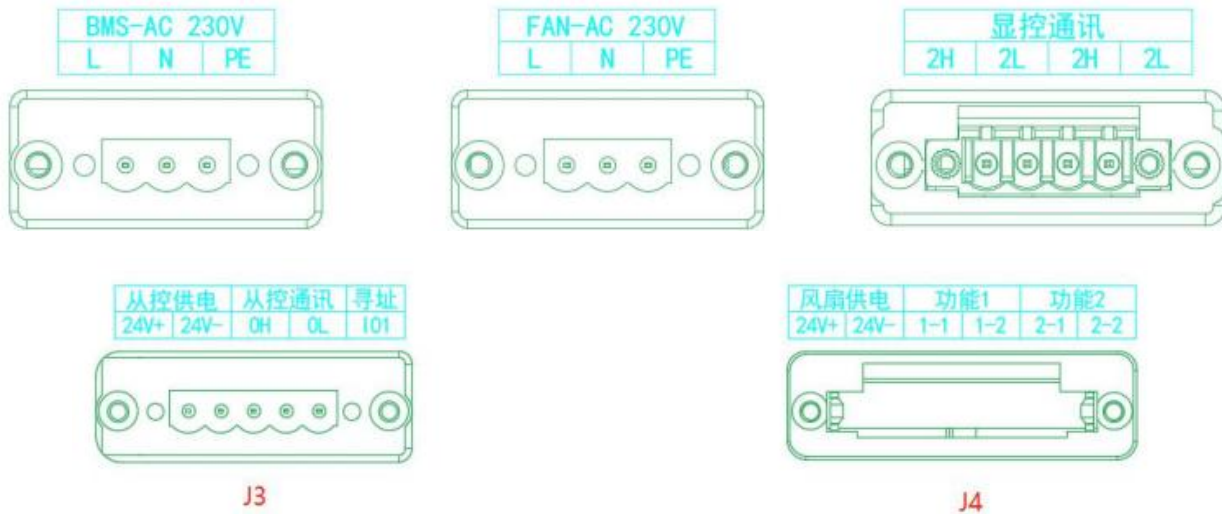


PCS high-voltage box interface

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COM Port definition	Function	Remarks
B +	Battery cluster input positive end	Connect the positive end of the battery cluster, and the interface is the M8 pole column
B -	Battery cluster input negative end	Connect the negative end of the battery cluster, and the interface is the M8 pole column
P+	Positive end of the high-voltage box output	The high voltage box is output to the combiner cabinet / PCS front end, and the interface is M8 pole column
P-	Negative output end of the HV box	The high voltage box is output to the combiner cabinet / PCS minus end, and the interface is M8 pole column
BMS power switch	BMS power switch	BMS power switch button to control the up and down of BMS
FAN power switch	Fan power switch	Fan power switch push button
Battery cluster switch	Battery cluster switch	Manual control of battery cluster high voltage output (circuit breaker handle)

#### 7.4 High voltage box, definition of port pin



#### COM PORT J0

Port name	Terminal number	Port definition	Function	Remarks
BMS-AC220 V	1	L	External AC200V power input to supply the internal BMS switch power to the high voltage box	
	2	N		
	3	P E	Hanging	

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### Port J 1

Port name	Terminal number	Port definition	Function	Remarks
BMS-AC220 V	1	L	External AC200V power input to the internal fan switch power supply of the high voltage box	
	2	N		
	3	P E		

### Port J 2


Port name	Terminal number	Port definition	Function	Remarks
Display control communication	1	2H	Main control and display control communication in high voltage box, CAN-H	
	2	2L	Main control and display control communication, CAN-L	
	3	2H	Main control and display control communication in high voltage box, CAN-H	
	4	2L	Main control and display control communication, CAN-L	

### Port J 3

Port name	Terminal number	Port definition	Function	Remarks
In-cluster communication power supply	1	Slave control supply power -24V +	The high voltage box supplies power the slave control module 24V in the cluster	
	2	Slave control supply power-24V-		

### Port J 4


Port name	Terminal number	Port definition	Function	Remarks
Fan supply power and others	1	Fan supply power-24V +	The high voltage box supplies power the cluster fan module 24V	Single-circuit power supply current 12A (continuous)
	2	Fan supply power-24V-		
	3	Functions 1-1	Reserve port	Generally used for: CAN 1, DO, multi-channel fan 24V output, etc
	4	Functions 1-2	Reserve port	
	5	Functions 2-1	Reserve port	
	6	Functions 2-2	Reserve port	

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## 8. system parameter

Grid-connected parameters	
rated voltage (V)	230/400
voltage deviation	-15%~+15%
AC output type	(3W + PE) three-phase three line / (3W + N + PE) three-phase four line
Rated output power (kW)	125
Maximum output power (kW)	138
maximum current (A)	200
Rated Grid Frequency (Hz)	50/60
power factor	0.99
Power factor range	1 (advance) ~1 (lag)
Current distortion rate	<2% (rated power)
direct component	0.5%
overload capacity	110% Long term
Battery parameters	
Battery type	lithium iron phosphate
rated capacity	314Ah
rated energy	257.228kWh
rated voltage	819.2V
Operating voltage range	716.8V~934.4V
compound mode	1P256S
multiplying power	≤0.5C
Parameter system	




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radiation system	industrial grade air conditioning / forced air cooling
fire extinguisher system	aerosol
operating ambient temperature	-20°C~50°C
noise	≤60dB
levels of protection	IP54 (outdoor)
height	≤3000m
dimension	Approximately2007mm * 1192mm * 2301mm (length * width * height)
altitude	Admidia 2.8 tons
System conversion efficiency	≥86%

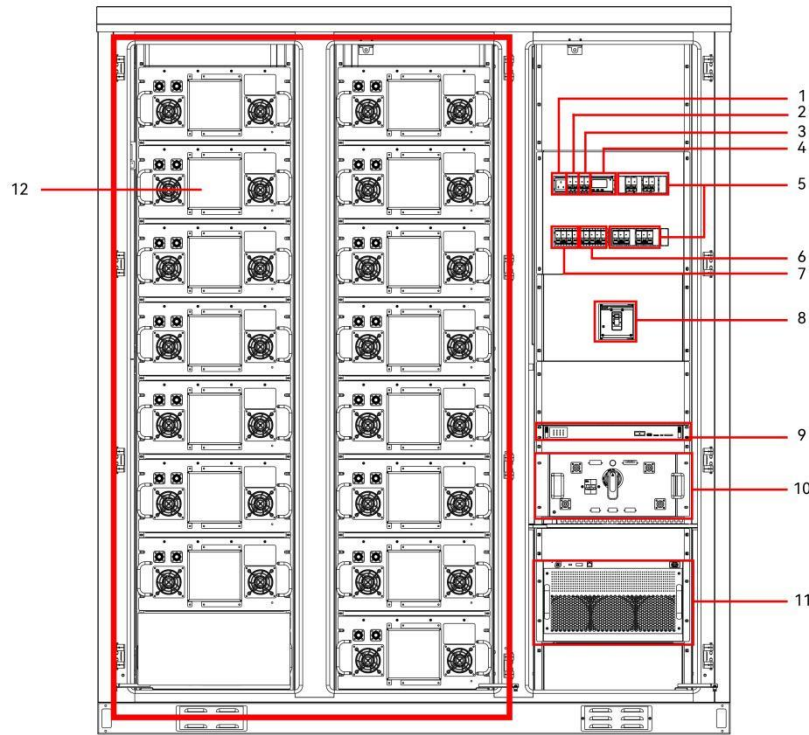
**The appearance of the whole commercial storage machine**




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### Electrical warehouse of commercial storage machine

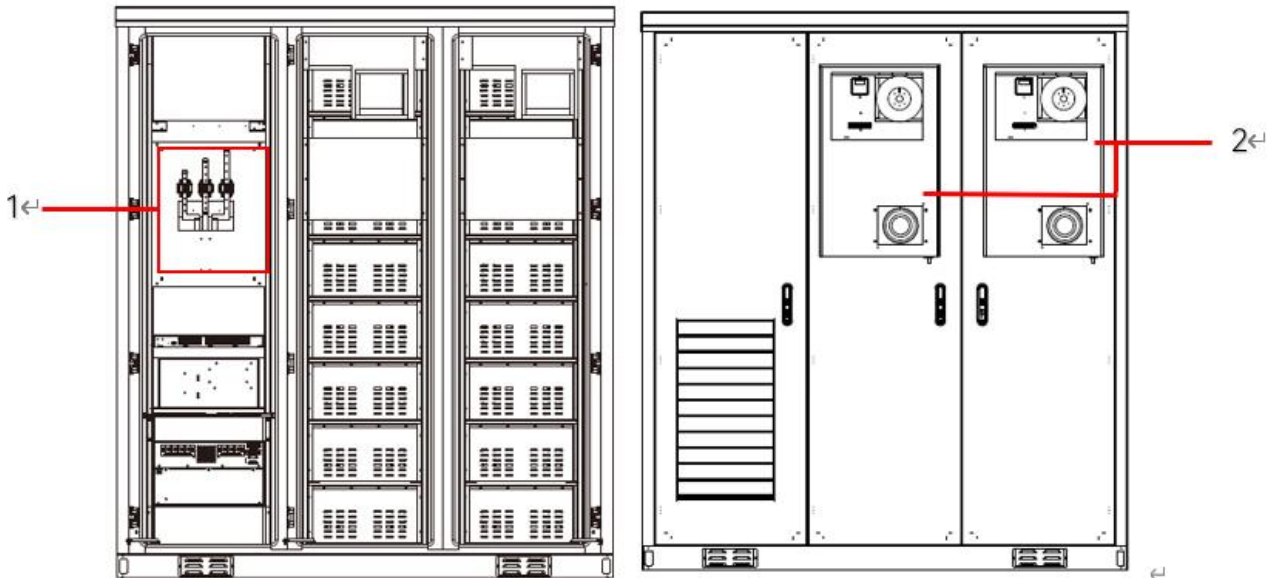
The electrical warehouse includes PCS, PDU, smart electricity meter, circuit breaker, etc



No.	name	quantity	statement
1	jack	1	Communication output
2	Air-conditioning power supply circuit breaker	1	Air conditioning switch
3	Internal voltage circuit breaker	1	Internal power supply circuit breaker
4	Meter meter	1	calculate
5	reserved	/	reserved
6	Lightning protection circuit breaker	1	Lightning protection switch.
7	Lightning protection surge protector	1	lightning protection
8	Total circuit breaker of the system	1	main switch
9	EMS	1	Local energy management system, responsible for the energy scheduling and internal communication of the energy storage system.


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10	PDU	1	Energy storage battery management system (16 battery packs + 1 high voltage box), responsible for the management, protection and monitoring of battery packs.
11	Battery module	16	
12	PCS	1	The 125kW energy storage converter, responsible for the energy conversion between the battery pack and the power grid.



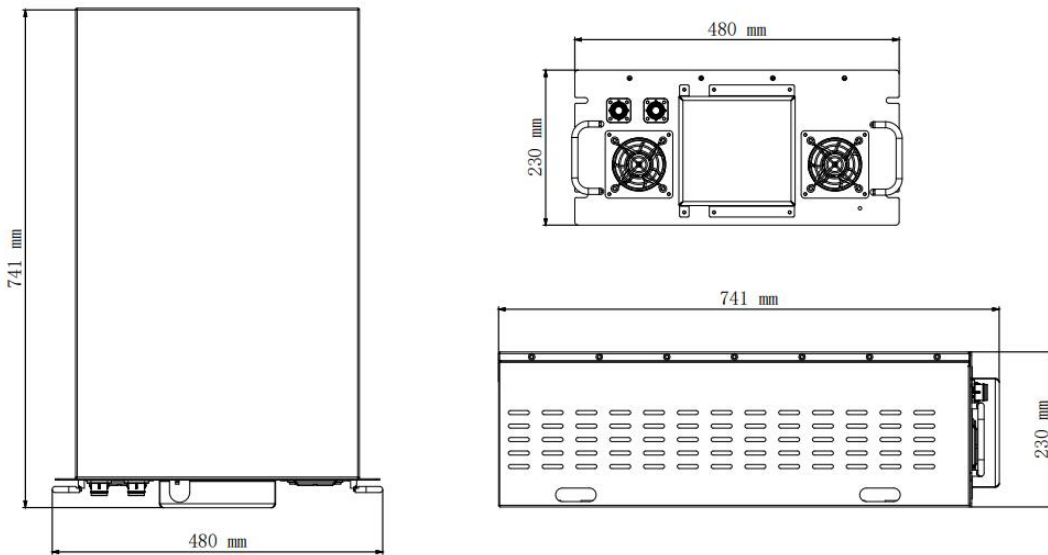
No.	name	quantity	statement
1	Hall Sensor	3	Detection of current
2	air-conditioning	2	Cooling the battery system

PS: The energy storage system adopts 3-phase 4-wire system (A / B / C / N) wiring, open the front door of the control cabinet -open the lower right panel, the grid side line A / B / C is connected to the lower port of the grid connection switch. For details, the screw hole used in the wiring terminal of the grid side line is M8, and the diameter of the AC access cable is not less than 50mm<sup>2</sup>.

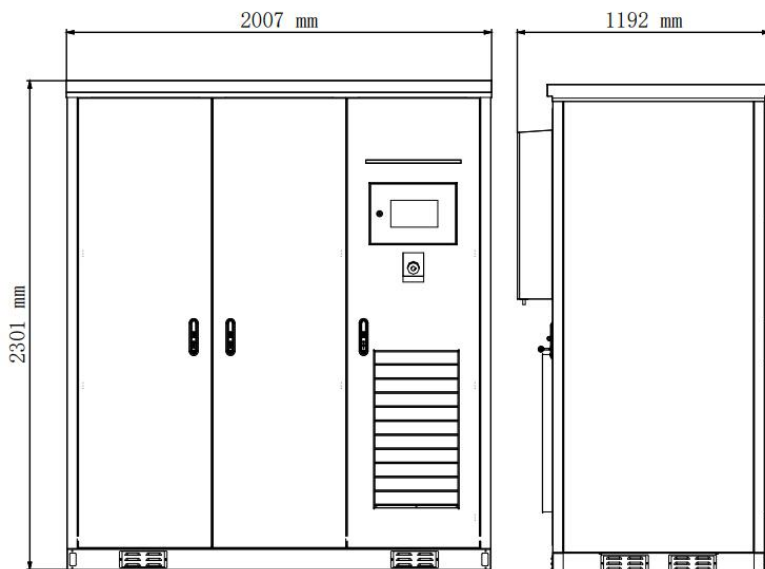
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## 9. Product shape and dimension

Dimension of commercial storage battery module: 741×480×230mm



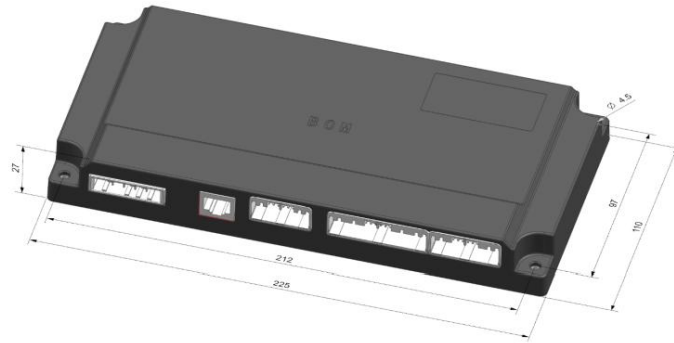
Commercial storage 257kWh whole cabinet dimension: : 2007mm\*1192mm\*2301mm



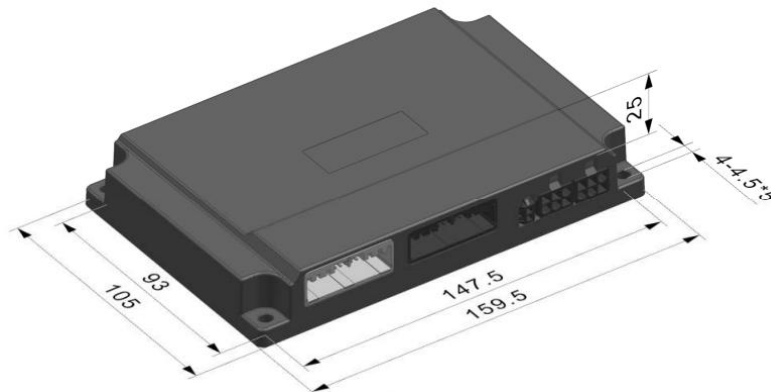
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## 10. BMS

### 10.1 Outline and dimensions of the main and slave plate

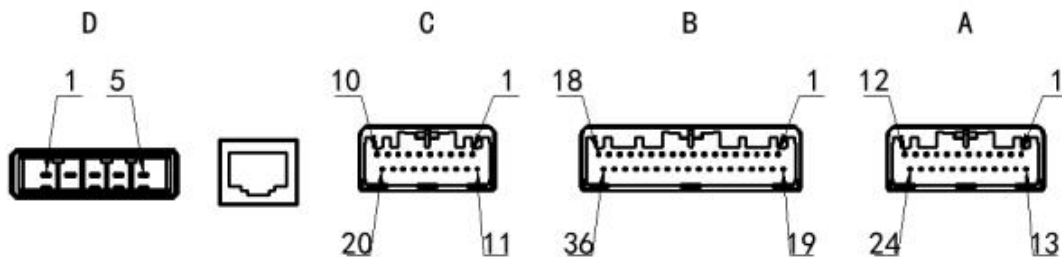



Main board appearance



Main board appearance


### 10.2 Master port type and pin



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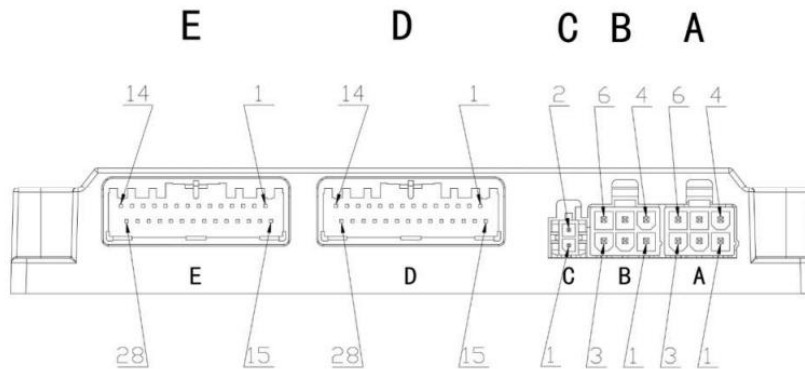
**BMS master board interface:**


Port name	Pin number	Port definition	Function	Remarks
A	1/13	V+	Power supply positive electrode input	
	2/14	V-	Power supply negative electrode input	
	3	SLP	Module awaken pin	
	15	P E	by the numbers	
	4	+12V	12V power supply output positive electrode	
	16	GND	12V power supply output negative electrode	
	5	+5V	5V power supply output positive electrode	
	17	GND	5V power supply output negative electrode	
	6/18/7	OUT1/OUT2/OUT3	Hall signal input	
	8/10/20/22	T0~T3	Temperature signal output	NTC, with a typical resistance value of 10K
	9/21	GND	Temperature signal reference ground	
	11/23	IO1/IO2	5V digital quantity input and output	
12/24	0H/0L	CAN 0 communication		
B	1/2/3	DO1H/DO2H/DO3H	DO high effective output	
	19/20/21	V-	High effective DO output negative electrode	
	4/5/6	V+	Low effective DO output positive electrode	
	22/23/24	DO4L/DO5L/DO6L	The DO has a low effective output	
	7/25	DO7+/DO7-	Passive switch output	
	8/26	DO8+/DO8-	Passive switch output	
	12/13/14	DI1L/ DI3L/DI5L	Low effective digital quantity detection	
	30/31/32	DI2H/DI4H/DI6H	High effective digital quantity detection	
	15/33	DI7+/DI7-	Digital quantity detection	
	16/34	DI8+/DI8-	Digital quantity detection	
	18/36	A/B	RS485 Communication	

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C	1/11	R_1H/R_1L	CAN 1 terminal resistance jump cords	Both short circuit, then the CAN 1 has a terminal resistance
	2/12	1H/1L	The CAN 1 communication	
	4/14	R_2H/R_2L	CAN 2 terminal resistance jumpers	If both short circuit, CAN 2 has a terminal resistance
	5/15	2H/2L	The CAN 2 communication	
	9/19	IP2/IM2	Reserved	
	10/20	IP1/IM1	Reserved	
R J 45		LAN0	Ethernet communication	
D	1	HV+2	Main voltage test of the load	
	3	HV-	Battery main negative	
	5	HV+1	Battery main positive	

### 10.3 slave control board port type and pin



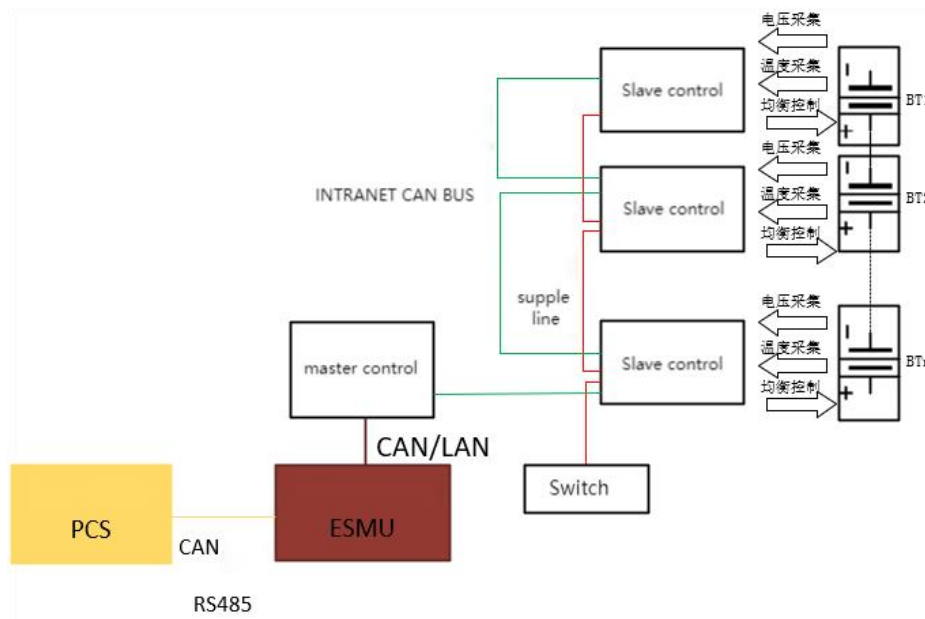
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**BMS slave control board interface:**


Port name	Pin number	Port definition	Function declaration	Remark
A/B	1	V+	Power supply positive electrode input	
	2	DI1	Digital quantity input detection	
	3	H	CAN communication H	
	4	V -	Power supply of the negative electrode input	
	5	IO1/IO2	Automatic address encoding	
	6	L	CAN communication L	
C	1、2	DO+/DO-	Passive DO output	
D/E	1~28		Passive DO output	

**10.4 Typical structure of the main control board:**

**System topology**

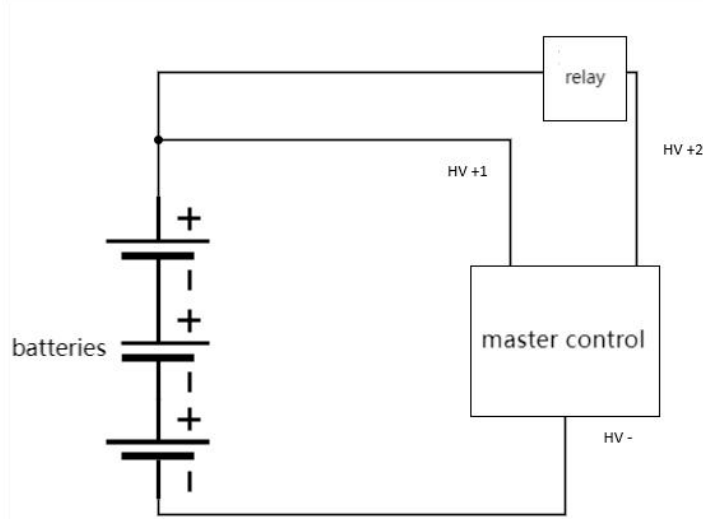




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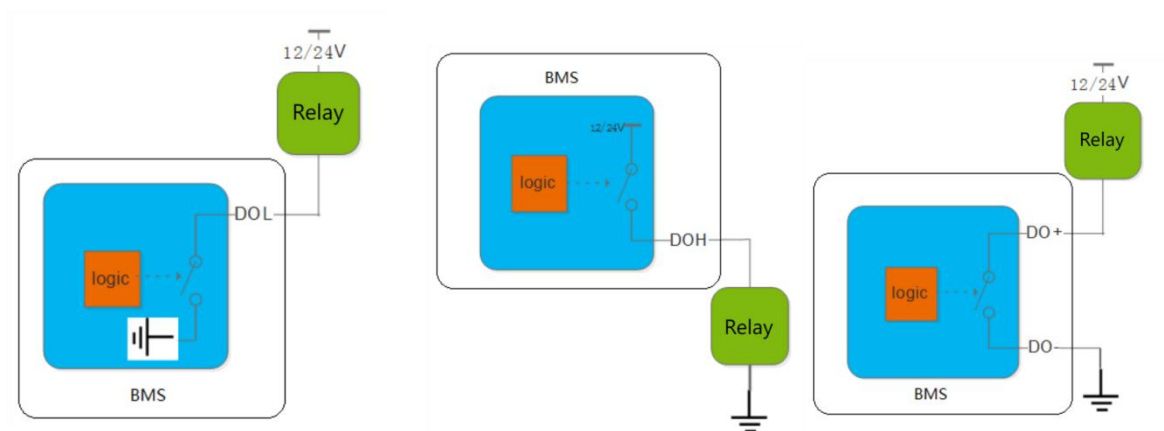
### Collection usage at the group end


The voltage collection of the battery management master module ESBCM-F133-L can realize the voltage acquisition before and after the battery cluster relay, HV + 1 collects the positive end voltage of the battery pack, and HV + 2 collects the PCS voltage after the relay. Group terminal voltage collection and insulation resistance acquisition circuit reuse. Under normal circumstances of group terminal voltage acquisition, group terminal insulation resistance and leakage current can also be calculated. The specific wiring diagram is as follows:



### DO output

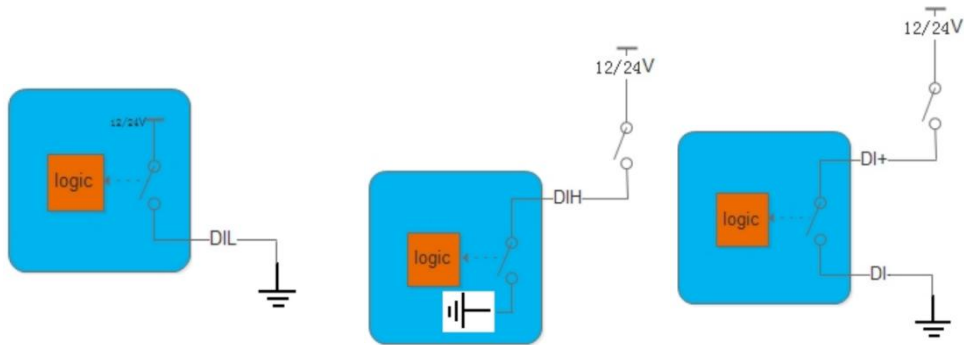
ESBCM-F133-L module has 8 channels and 3 types of DO output channels, which can be connected to relays or other DC appliances (such as DC fan). See the following below:



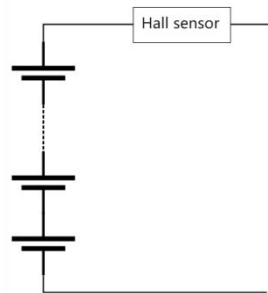
	Dongguan Xinrex Energy Technology Co., LTD				
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### DI output

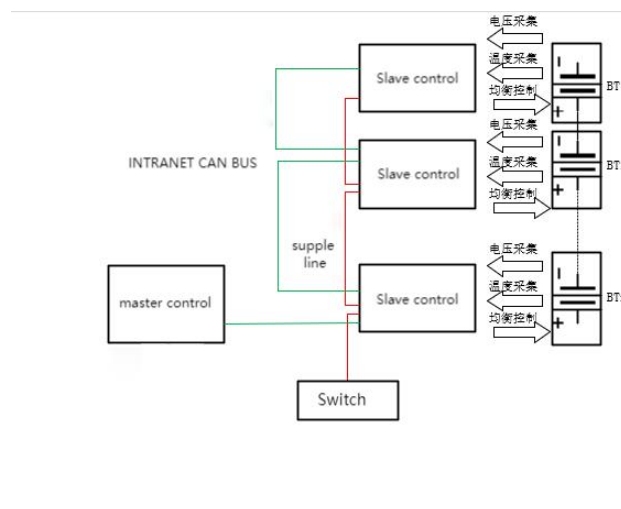
The ESBCM-F133-L module has 8 channels and 3 types of DI input channels, which can receive relay feedback signals or other digital input letters.




Hall current acquisition sets the Hall current sensor in the trunk loop, the cable diameter is slightly less than the aperture and the center is conducive to reduce the error and improve the acquisition accuracy; Hall acquisition line is connected with shielded twisted pair.

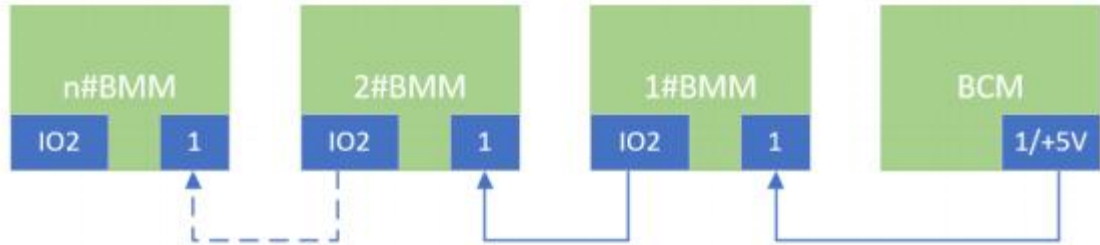


### 10.5 Typical structure of the slave control panel:



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### Automatic address coding of slave control module




- ① If there are multiple ESBMM-2412-F modules in the project application, if the slave automatic address coding function is required, the I/O port of the ESBMM-2412-F module should be connected. If the slave automatic address coding function is not required, the I/O port should be left blank.
- ② Ports A and B of the ESBMM-2412-F module have the same function. In the automatic address coding, you do not need to connect A to B or B to A. You can connect the IO port of the ESBMM-2412-F module to port O of another module. Can A be connected to A, can A be connected to B, can B be connected to B;
- ③ The ESBMM-2412-F automatic address code needs to be connected to the main control, and connected to Hall sensor +5V power output in port C of the main control ESBCM-8133/A133/C133 module or IO1 port of ESBCM-F133.
- ④ After the connection is complete, the address is automatically coded. The address of the connection master ESBMM-2412-F is 1, and the number is increased according to the hardware connection.

### 10.6 Main function parameters of the battery management system (BMS)

In order to ensure safety, the charger and protection circuit should meet the following requirements. Standard charging method is CC/CV (constant current/constant voltage)

Content	Specification parameter	Unit	Remark
Voltage acquisition accuracy	$\pm 0.1\%FS$ (See main control board)		
Current acquisition accuracy	$\pm 0.1\%$ (See main control board)		Normal temperature
Temperature acquisition accuracy	$\pm 1$	$^{\circ}C$	$-25^{\circ}C \sim 65^{\circ}C$ (new)
Overcharge release voltage	$3.6 \pm 0.01$	V	
Overdischarge release voltage	$2.8 \pm 0.01$	V	
Charge balance current	100	mA	Internal 33 Ohm resistance (new)

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**Note:**

**1.BMS power supply requirements:**

The switch is off , the BMS enters hibernation mode. The switch is on, the BMS enters the working mode.

**2. Charge and discharge control strategy:**

Charging: when there is a single overvoltage alarm, charging high temperature alarm, charging low temperature alarm, charging overcurrent alarm,cut off the relay;


Discharge: When there is a monomer undervoltage warning, discharge high temperature warning, discharge low temperature warning, low capacity warning,no processing ;

When there is a monomer undervoltage alarm, discharge high temperature alarm, discharge low temperature alarm, low capacity alarm, cut off the relay;

**3, BMS self-protection:**

Monomer overvoltage, charging overcurrent, charging high temperature, charging low temperature alarm , relay disconnect;

Monomer undervoltage, discharge overcurrent, discharge high temperature, discharge low temperature alarm , relay disconnect.

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## 11. Communication and Instructions:

BMS CAN communicate with the computer through CAN.

### 11.1 CAN

Used for communication with computer upper computer Establish data communication between BCM and battery management unit (BMM) and battery array management unit (ESMU);

Collect ESBMM battery real-time data information, and realize the management and control of battery pack/cluster charge and discharge after processing;

CAN1 and CAN2 are isolated communication, CAN0 has a 120Ω terminal resistance, and the 120Ω terminal resistance of CAN1 and CAN2 can be selected through the interface jumper match;

Used for communication between the main control module ESBCM and the display control unit ESMU;

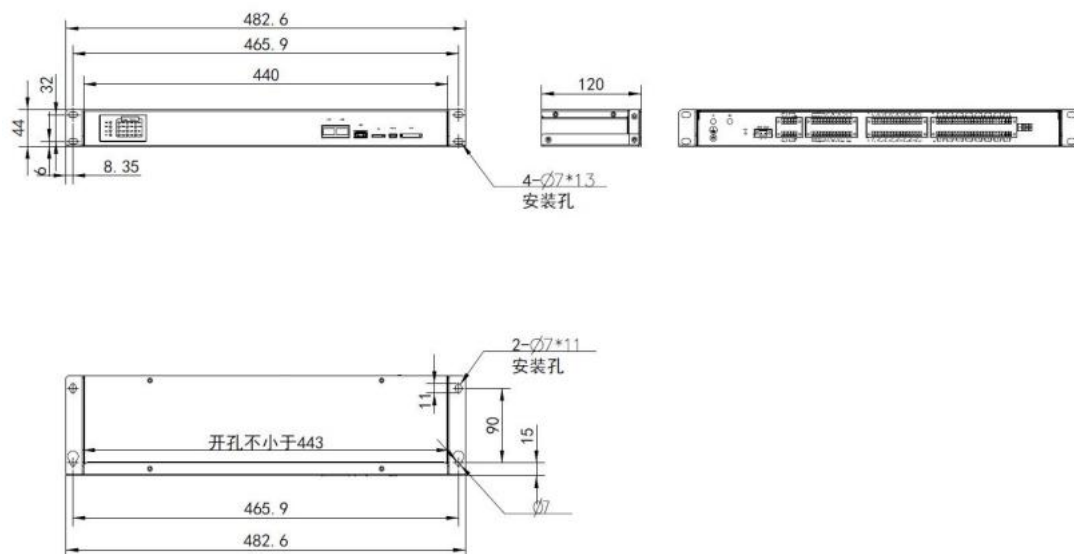
Used to display the communication between the control unit ESMU and the energy storage converter PCS;


### 11.2 RS485

Used to display the communication between the control unit ESMU and the energy storage converter PCS;

## 12. EMS:


### 12.1 Dimension



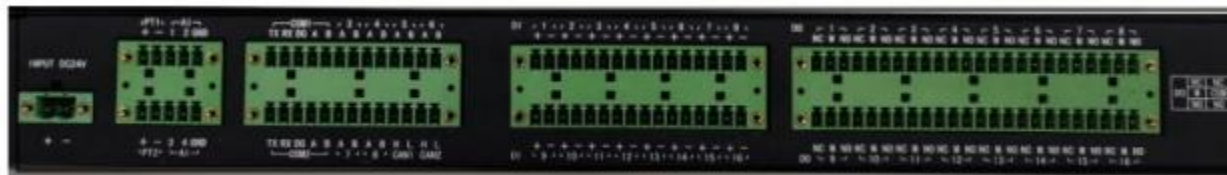
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## 12.2 Specification

Item	Specification	Description
Control function	Peak-fill, backup power	
User interface	7 "/10.1" display	
SD	SD card interface	Reserve
USB-HOST	Usb interface	For software upgrade
RS	Reset port	This command is used to reset the local controller
Communication interface	2 Ethernet channels, 8 RS485 channels, 2 CAN channels, 1 4G channels	
Communication protocol	Ethernet: Modbus TCP RS485: Modbus RTU CAN: function reserved	
DI input	16 channels, internal power supply, support passive dry contact input signal	Passive dry contact signal
DO output	Supports 16 channels, normally open or normally closed	Relay output, relay specifications: 250Vac/3A or 30Vdc/3A
Analog input	6 channels	Reserve
Pilot lamp	Power light, running light, warning light, communication light, etc	
RF	Wireless antenna interface	
GPS	GPS antenna interface	
Power supply input	DC24V	
Operating ambient temperature	-20 ~ 55°C	
Altitude	≤2000m	
Ambient relative humidity	5 ~ 95%	
Class of protection	IP20	
Length, width and height	440mm*120mm*44mm	
Installation mode	Rack or wall mount	
weight	1.84 kg	


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### 12.3 interface definition



The following table defines the EMS interface


Catalog	Silk screen	Name	Description	
Power input	INPUT DC24V	+	Dc 24V input positive	
		-	Dc 24V input negative	
Analog input	PT1, PT2	+	Analog input	Function preservation
		-		
	AI1~AI4	1、2、3、4		
		GND		
Communication port	COM1~COM2	TX	RS232 communication port	RS232 and RS485 cannot be used at the same time and support baud rates of 4800 to 38400bps
		RX		
		GD		
	COM3~COM8	A	RS485 communication port	The baud rate ranges from 4800 to 38400bps
		B		
	CAN1~CAN2	H	CAN communication port	
L				
Digital input	DI1~DI16x	+	Passive dry contact input interface	Internal power supply
		-		
4G antenna por		RF	4G antenna port	Internal power supply
GPS antenna port		GPS	GPS antenna port	function preservation
Digital output	DO1~DO16	NC	Relay output normally closed contact	Relay specifications: 250Vac/3A or 30Vdc/3A
		M	Relay output common port	
		NO	Relay output normally open contact	

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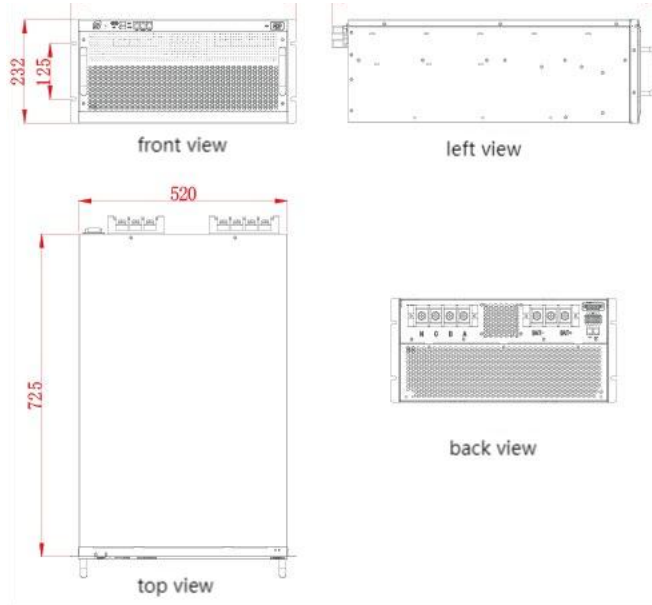
#### 12.4 EMS system functions

Fuction	Description
Overall monitoring of energy storage system	Real-time monitoring of the energy storage system's operating status, working status, power, SOC,Such as SOH and alarm information.
PCS monitoring	Including PCS operating status, three-phase AC voltage, three-phase AC current, active power rate, reactive power, power factor, AC frequency, DC voltage, DC current,Charge and discharge information, temperature, DC power, alarm fault information, etc.
BMS battery cluster monitoring	Includes battery cluster voltage, current, SOC, SOH, average temperature, insulation resistance, alarm information, as well as maximum/minimum voltage, temperature, SOC and corresponding cell number , etc.
Meter monitoring	Forward active total energy, reverse active total energy; Total energy of forward high peak/peak/flat/valley; Total energy of reverse high peak/peak/flat/valley; Total active power, total reactive power.
Air conditioning, fire and other monitoring	Monitor air conditioning or liquid cooling units, fire, temperature and humidity sensors, access control, water flooding and other transportation, Row data and status.
Policy management	<ol style="list-style-type: none"> <li>1. Timed charge and discharge: any time period control, 30 minute interval control;</li> <li>2. Optical storage machine: load priority, peak cutting and valley filling, battery priority, oil machine mode;</li> <li>3. Battery overcharge and overdischarge protection strategy;</li> <li>4. The charging strategy is intelligently adjusted according to the remaining capacity of the transformer to prevent transformer overload Protection;</li> <li>5. The discharge strategy has the ability to follow the load and the ability to control the demand, so as not to cause Situations where electricity is wasted or even sent backwards;</li> <li>6. With reverse power protection, with the ability to prevent reverse power transmission;</li> <li>7. Temperature control, fire protection and energy storage linkage strategy;</li> <li>8. Support automatic, manual, remote scheduling three modes;</li> <li>9. Diesel engine control: intelligent control of diesel engine start/stop.</li> </ol>
fault warning	<ol style="list-style-type: none"> <li>1. Alarm severity classification.</li> <li>2. Display and store current and historical alarms.</li> </ol>



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### 13. PCS:




#### 13.1 technical specifications

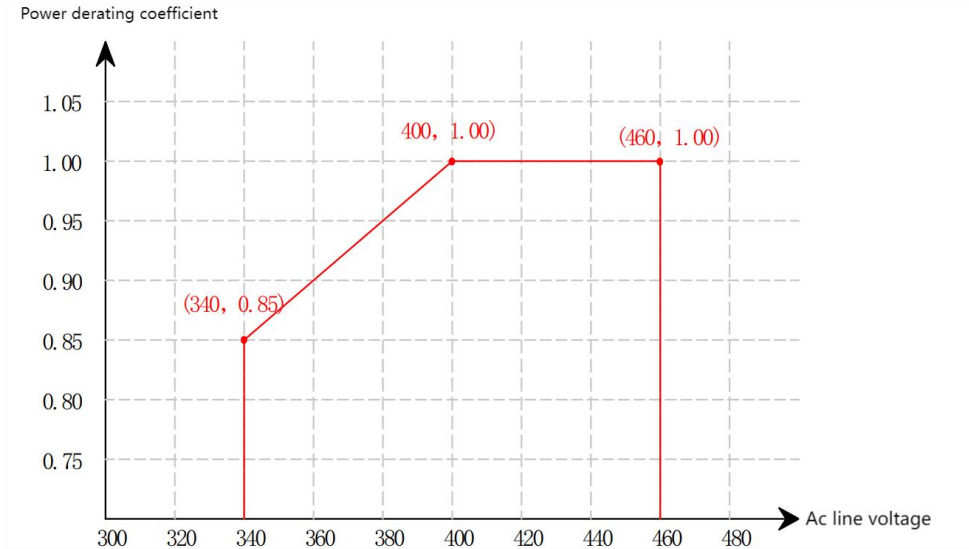
Technical Specifications	125kW
Direct current side	
Operating voltage range (V)	615~950 (3W+PE) /650~950 (3W+N+PE)
Full load voltage range (V)	615~950 (3W+PE) /680~950 (3W+N+PE)



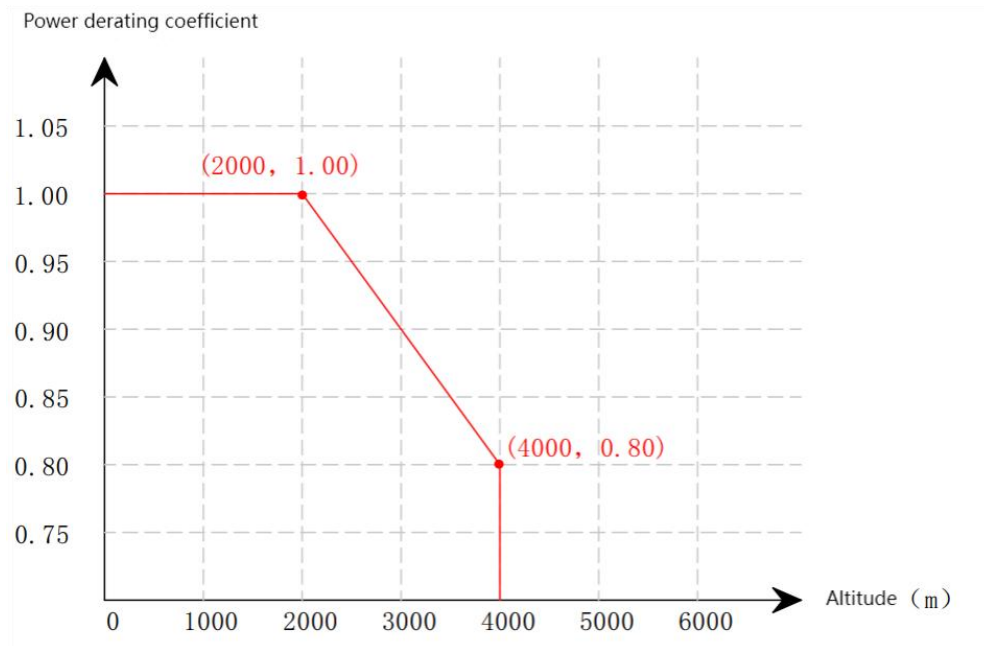
Input path number	1
Maximum current (A)	203
alternating current side (on grid)	
Rated voltage (V)	230/400
Voltage deviation	-15%~+15%
Ac output type	(3W+PE) three-phase three-wire /(3W+N+PE) three-phase four-wire
Rated output power (kW)	125
Maximum output power (kW)	138
Maximum current (A)	200
Rated network frequency (Hz)	50/60
Power factor	0.99
Power factor range	1(lead) ~1(lag)
Current distortion rate	< 2% (rated power)
Dc component	0.5%
Overload capacity	110% long term
Maximum discharge efficiency	98.5%
alternating current side (off grid)	
Rated output voltage	230/400
Ac voltage harmonics	<3%(linear load)
Rated frequency (Hz)	50/60
Rated output power (kW)	125
Maximum apparent power (kVA)	138
Maximum output current (A)	200

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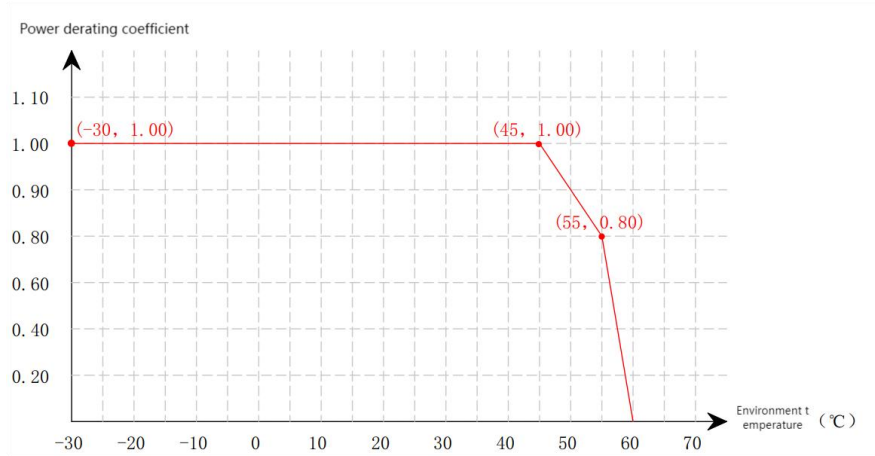
**13.4 Power curve**



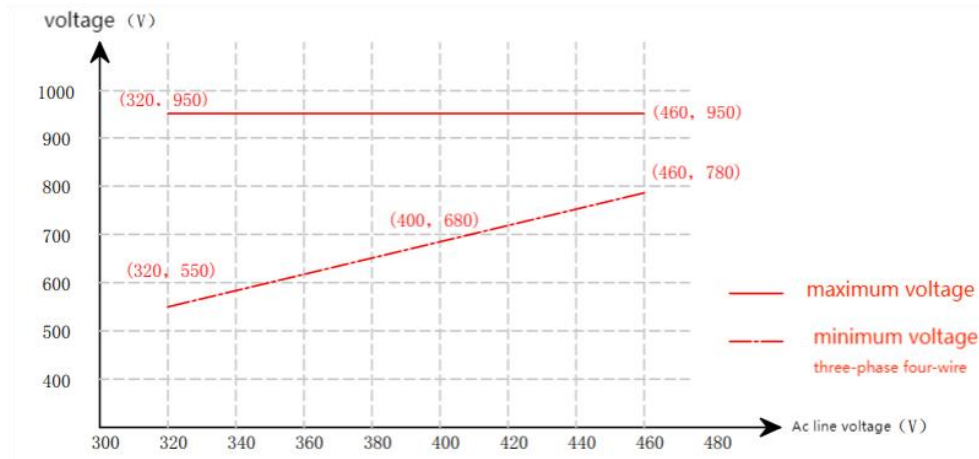
Ac voltage-derating curve



Altitude-derating curve



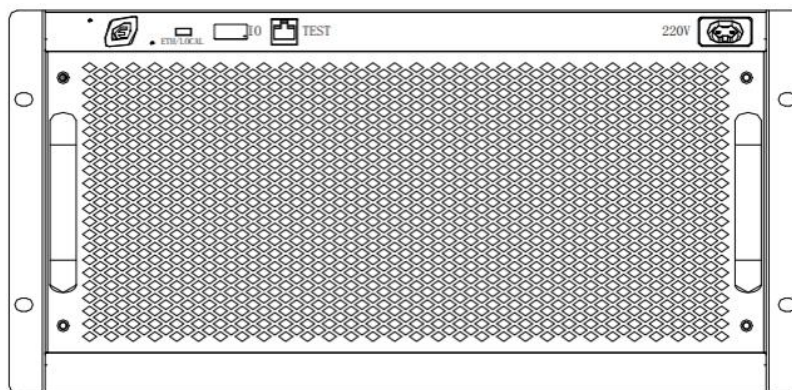
Ambient temperature-derating curve



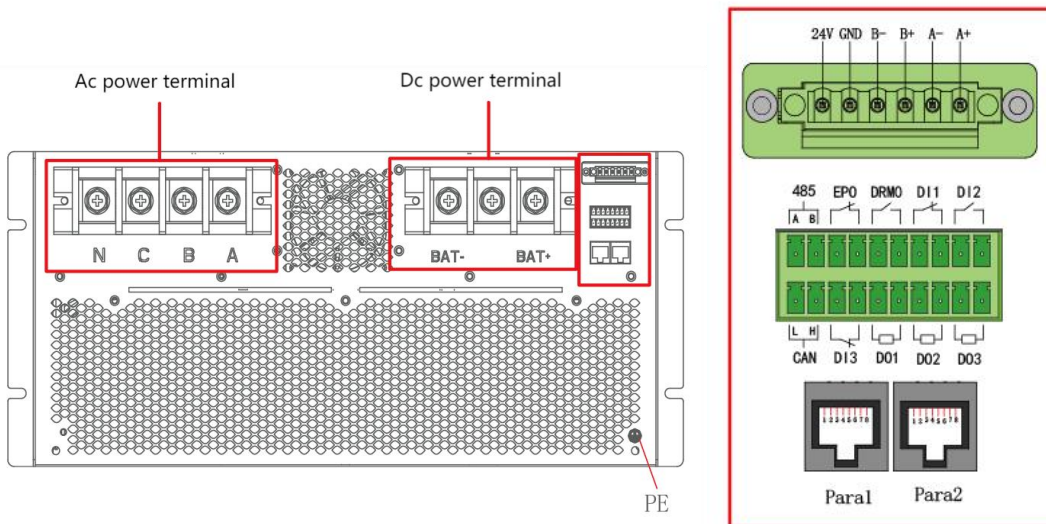
Three-phase four-wire battery voltage - AC voltage curve

### 13.5 PCS Interface description

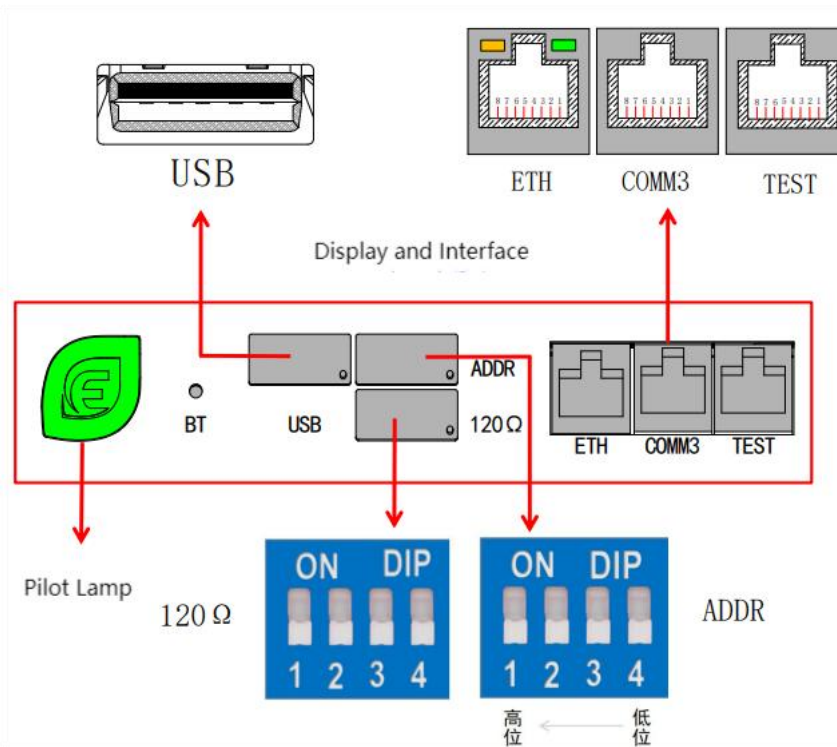
The front signal port of PCS module is shown as follows:




PCS-Rear wiring - Front view of terminal scheme




PCS-Front cable - DC side aviation terminal solution front view



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Display and interface description table

Name	Function
Pilot light	The running output power is green for a long time; In standby (0kW running) mode, the green light blinks at a quick rate of 0.5s. If the system is not powered on and no fault occurs, the green indicator blinks slowly for 1s. The red light remains on when the fault occurs
BT	Bluetooth indicator light; The blue light is on when the Bluetooth connection is successful
USB	The USB port is reserved for upgrading software or configuration files
ADDR	ADDR sets the DIP switch (binary) for the module address. The fourth bit is the lowest bit (carry from right to left).
120Ω	120Ω The port is a 4-bit binary DIP switch 1. The ARM_CAN1 reserves a CAN communication matching resistor, which dialing up is to connect to a 120Ω matching resistor 2. The ARM_CAN2 reserves a CAN communication matching resistor, which dialing up is to connect to a 120Ω matching resistor 3.SYNC_CAN1 Para CAN signal matching resistance, PCS parallel communication, dialing up is to connect to a 120Ω matching resistor 4. The CAN signal matching resistor in the DSP_CAN2 Phoenix terminal,dialing up is to connect to a 120Ω matching resistor
ETH	Ethernet port: supports Modbus TCP and connects to the EMS or switch
COMM3	Reserved
TEST	Background debugging interface
Debugging power interface	220V AC power input (for debugging)
DC (AC) power port	AC and DC power connection ports
PE	Ground interface (M6 screw)


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Communication port description table

Name	Function	Remark
24V/GND	24V DC output interface (reserved)	Not enabled
A+/A- B+/B-	Current sampling interface (reserved)	
485	485 Communication interface	485 communication with EMS is possible
EP0	E-stop signal input interface	Default normally closed
DRM0	DRM0 Monitors interfaces	Default normally open
DI1	BMS fault signal	Default normally closed
DI2	Pure off-grid manual start signal	Default normally open
DI3	External dry contact fault (Reserved)	Default normally closed
CAN	CAN communication interface	CAN communicate with BMS
D01	Fault status interface	24V active output signal
D02	Run status interface	
D03	Fan drive interface	
Para1、Para2	PCS parallel interface	PCS Parallel or PCS communicates with STS

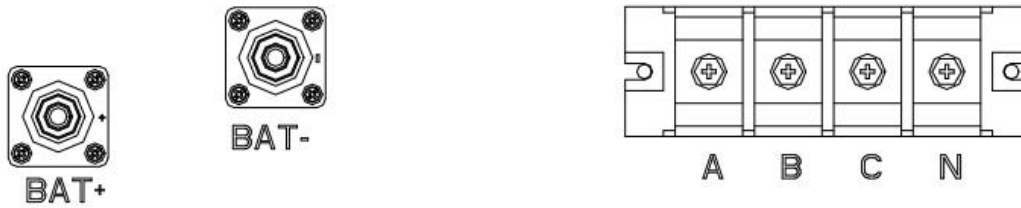
PIN	Definition	Description
1	CAN1-L	CAN Parallel signal
2	CAN1-H	
3	INV-SYNC	parallel signal processing
4	GN	Common signal terminal
5	CARRIER-SYNC	Internal carrier synchronization signal
6	GND	Common signal terminal
7	Not enabled	Not enabled
8	Not enabled	



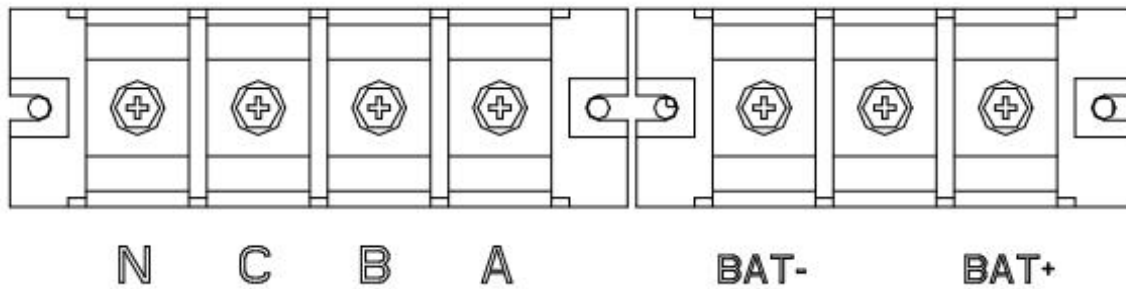
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### 13.7 Power port

PCS port diagram (Aviation terminal)




PCS Port diagram (conventional terminals)



PCS power port diagram & description sheet

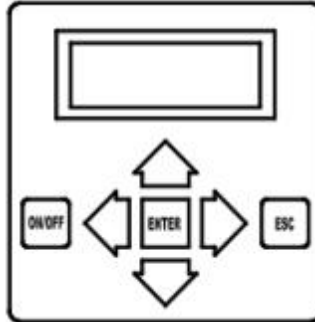
Terminal symbol	Function description	Screw specification
BAT+	Dc positive terminal	M10*25
BAT-	Dc negative terminal	M10*25
A	Phase A input	M10*25
B	Phase B input	M10*25
C	Phase C input	M10*25
N	Three-phase four-wire system center line input	M10*25



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## 14. Air conditioning system:

### 14.1 Operation panel



#### Key introduction

ON/OFF: On/off key, operate this key to turn on/off the unit;

↑ : Move up to select the previous record/menu or add the setting value (password only).

↓ : Move down to select the next record/menu or lower the setting value (password only);

← : Move the key left to increase the set value or select the previous digit during password operation;

→ : Move the key right to lower the set value or select the last bit of data when performing password operations;

ENTER: Enter key to confirm the input.

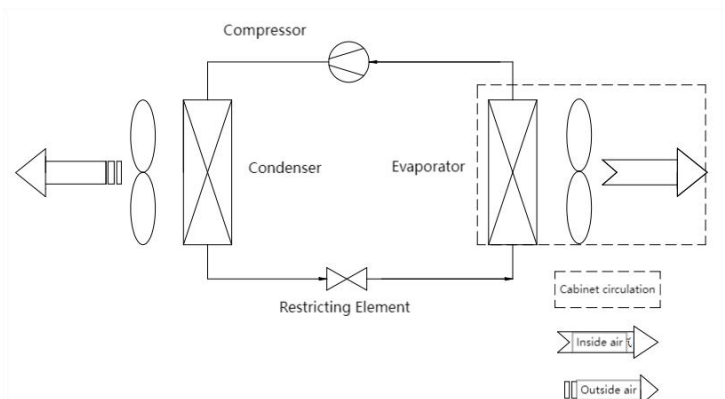
ESC: Exit to return to the menu on the previous screen.


If no keyboard operation is performed on any screen for 60 seconds, the system automatically returns to the normal screen.

After the system is powered on, press any key to turn on the backlight. If no keyboard operation is performed for 60 seconds, the backlight turns off.

The operation password of the unit is “0001” . On the normal screen, press Enter to enter the password input screen. Press the left key and the right key to select the desired digit, press up or down to modify the digit, and press Enter to confirm the input. If the password is incorrect, an error message is displayed and the group Settings cannot be modified. If the password is correct, enter the main menu, you can edit the group Settings.

### 14.2 Schematic diagram of air conditioning refrigeration



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### 14.3 Power grid application scope

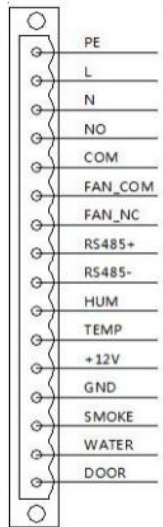
AC: 220VAC±15% 50Hz

AC: 220VAC±15% 50/60Hz(Supports 110 VAC dual live wire input;60Hz)

Note: The actual use of power system shall be based on the name plate.

External circulation temperature: -40°C ~ 55°C

### 14.4 Terminal definition



PE	Power ground wire
L	Power live wire
N	Power neutral wire
RS485+	RS485 Interface D+ (host computer monitoring interface)
RS485-	RS485 Interface D- (host computer monitoring interface)

PS:257kWh

The battery cabinet is only connected to the power ground wire, live wire, ground wire and RS485

### 14.5 System function introduction


The operation of the air conditioner is automatically controlled according to the temperature inside the cabinet. The controller detects the return air temperature of the cabinet through the internal circulation temperature sensor and compares it with the set point to judge and control the work of the compressor or fan.

#### Refrigeration

Cooling start point = cooling start point + return difference. When the temperature inside the cabinet exceeds the cooling start point, the cooling starts. When the temperature inside the cabinet is lower than the cooling point, the cooling stops.

Cooling parameter setting point

Parameter	Default-value	Set Scope	Unit	Set point description
Refrigeration point	25	[15 ~ 50]	°C	The temperature point at which the refrigeration operation stops
Return difference	10	[1~10]	°C	Sensitivity of temperature control

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## Heating

Heating start point = hot spot - return difference. When the temperature inside the cabinet is lower than the heating start point, heating starts. When the temperature inside the cabinet is higher than the heating point, stop heating.

### Heating parameter setting point

Parameter	Default-value	Set Scope	Unit	Set point description
Heating point	15	[-15 ~ 50]	°C	The temperature point at which the heating stops
Return difference	10	[1~10]	°C	Sensitivity of temperature control

## Dehumidification

Dehumidification start point = dehumidification start point + return difference. When the humidity inside the cabinet is higher than the dehumidification start point, dehumidification starts. When the humidity inside the cabinet is lower than the dehumidification point, stop dehumidification.

### Dehumidification parameter setting point


Parameter	Default-value	Set Scope	Unit	Set point description
Dehumidification point	60	[40 ~ 90]	%	The temperature point at which dehumidification stops
Return difference	10	[1~30]	%	Sensitivity of temperature control

## 14.6 Common fault

Common faults and recovery measures		
Situation	Possible cause	Check items or procedures
The internal circulating fan does not start	If the return air temperature is low, the system enters the energy saving mode	In the operation setting, if the inner fan stop point is set to the cooling point, the inner fan will not stop
	Main power failure	Check whether the rated voltage of the input AC power phase is faulty or exceeds the 220V±15% range
	Fan stuck	Check whether any foreign matter is stuck in the fan



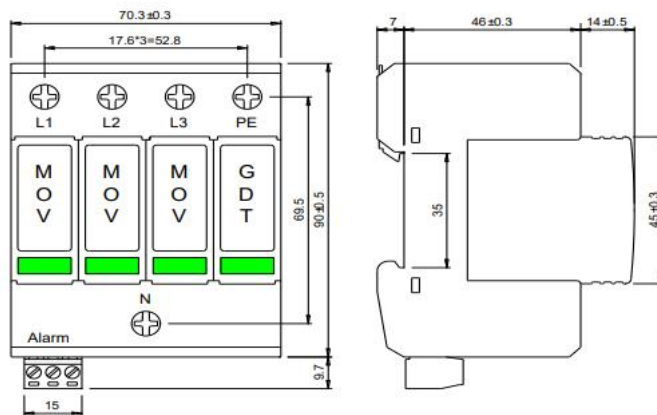
	Loose terminal	Check whether the fan docking terminal is loose
The fan works, but the control function does not work	Relay not working	Check whether the relay is faulty
		Check the relay coil for AC voltage. If there is voltage, replace the control board
Abnormal fan noise	Fan bearing wear	Replace the fan
	The fan blade scratches other objects	Check whether any cables interfere with the fan blades
Refrigeration system failure		
Situation	Possible cause	Check items or procedures
Compressor does not start	Power off (standby)	Check the main power switch and check whether the operation display interface is turned on.
	Loose circuit connection	Fastening circuit joint
	The compressor motor is burned out	Check the motor, if found defects, replace immediately
Compressor not working	No cooling requirement	Check the compressor output status on the temperature display in the cabinet and operation interface
	Shutdown delay	The compressor has a minimum downtime under normal conditions, and if the temperature rises again to the start point during this period, the compressor will still delay the start
	Compressor built-in temperature protection	Check whether the relay contact has 220V AC
	High voltage switch off	The reference exhaust pressure is too high
High exhaust pressure	The condenser is dirty and blocked	Clean condenser
	The condenser fan does not work	Check the fault of the fan
Compressor noise is too high	The refrigerant is flooding back into the compressor	Check suction superheat
	Bearing wear due to lubricating oil loss	Replace compressor
	The compressor or pipe support is loose	Fastening clamp


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	A connecting rod, valve, or other rotating gear is broken	Replace compressor
The compressor cycles intermittently	Sensor failure	Check whether there is a sensor fault alarm
	Insufficient refrigerant in the system	Check for leaks, repair leaks or add refrigerant
The compressor protector stops or cycles	Excessive exhaust pressure	Check whether the condenser filter is blocked and whether the condenser fan or fan motor is blocked
Controller failure		
Situation	Possible cause	Check items or procedures
Frequent voltage alarm	Power failure	Check the external power supply
	Circuit sensor fault	Board replacement

## 15. The surge protector

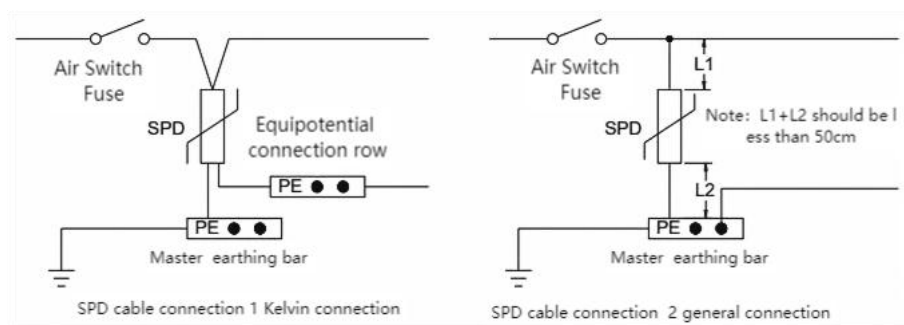
### 15.1 Structural dimension



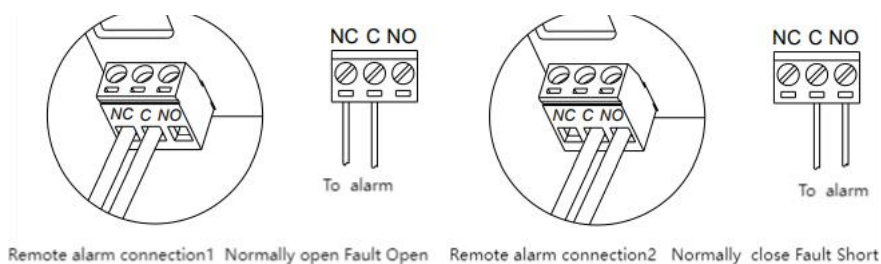
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### 15.2 Installation mode

Installation: Surge protectors should be installed and maintained by authorized professionals. This product is generally fixed in the distribution box (cabinet) of the equipment using 35mm standard guide rails. Kelvin connection is recommended for the surge protector. Parallel wiring can also be used, but the connection wire should be not less than 16mm<sup>2</sup> of the multi-strand copper core insulated wire, and the total length L is controlled within 0.5m (as shown in the figure). The cable strip length is 13 to 15 mm. The torque applied by the cable screw is 2.5 to 3Nm.




The alarm terminal of the surge protector is located below the surge protector. If you need to remotely monitor the surge protector, remove the cable plug, insert the wires on the alarm alarm into the corresponding wiring holes of the cable plug, tighten the screws, and insert the plug back into the original position (as shown in the following figure). After the wiring is complete, check the correct wiring and connection reliability again, switch on the power supply, and then put into use.



### Matters needing attention

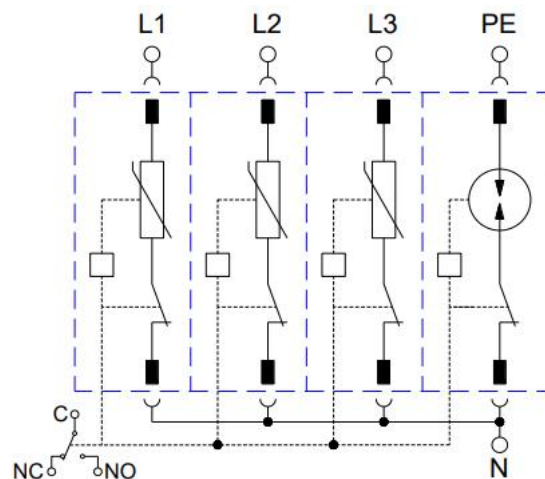
When installing and maintaining the base of the surge protector, the power supply must be disconnected. Live operation is strictly prohibited to prevent electric shock accidents. Do not bundle a protected line with an unprotected line or ground line. The cross-sectional area, length and wiring mode of the ground cable must meet relevant standards; otherwise, adequate protection may not be provided. There is no need for special maintenance when the surge protector is in normal use, only need to check regularly whether its connection wire is loose and whether the module indicator window is normal; If the indicator window of a surge protection module is red, it indicates that the surge protection module has failed and must be replaced in time. If a remote alarm is detected, the alarm will send an alarm signal.


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### 15.3 Technical specifications

Item	Technical parameters
Product model	M1L385-40II(3P+N)
Nominal operating voltage -Un	230V/400VAC
Rated operating frequency	48~62Hz
Maximum continuous operating voltage -Uc	385V(L-N)/255V(N-PE)
Nominal discharge current -In(8/20μs)	20kA(L-N;N-PE)
Max discharge current -Imax(8/20μs)	40kA(L-N;N-PE)
20kA 8/20μs	≤1.8kV(L-N)/≤1.0kV(N-PE)
5kA 8/20μs	≤1.5kV(L-N)/≤1.0kV(N-PE)
emporary Overvoltage (TOV) performance -UT	385V/5sec (L-N), 400V/5sec (L-PE),
Transient Overvoltage fault performance (TOV)	1430V/200ms(L-PE), 1200V/200ms(N-PE)
Withstand short circuit current	25kArms
Terminal range	1.5 m <sup>2</sup> ~25m <sup>2</sup> ( flexible)/35m <sup>2</sup> (rigidity)
Maximum operating current of the port for which the alarm is generated	250V/0.5A(AC)0.1A(DC); 125V/1A(AC)0.5(DC)

### 15.4 Protection principle (for reference only)



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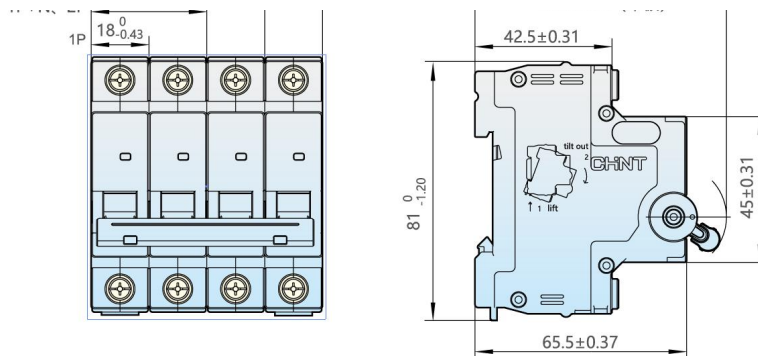
### 15.5 Applicable environment and safety

Item	Requirement specification
Operating temperature (°C)	-40°C~+85°C
Storage temperature (°C)	-40°C~+85°C
Relative temperature (°C)	5%~95%(25°C)
Applicable altitude (m)	≤4000m

This product should be installed in the equipment, the remote alarm circuit and the main circuit insulation withstand voltage is AC3750V, and meet the standard EN60950-1 safety requirements.


## 16. Breaker:

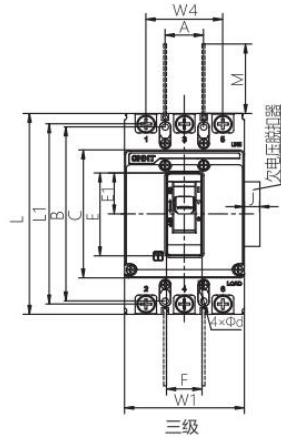
### 16.1 Shape and dimension



NXB Mini circuit breaker



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NXM The maximum length, width and height of the circuit breaker are 165\*105\*98mm

## 16.2 technical specifications

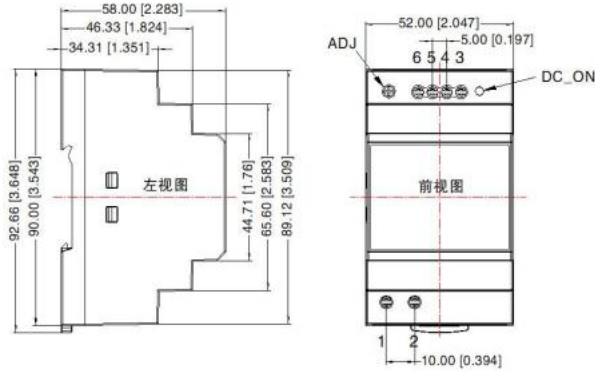
The following table shows the parameters of the NXB mini-circuit breaker

Rated operating current (Ue)	230V~(1P~2P、1P+N), 400V~(2P~4P、3P+N)
Rated insulation voltage (Ui)	500V
Frequency	50Hz
Mechanical life	20000 times
Electrical life	10000 times
Rated Short-circuit Breaking capacity (Icn)	6000A , 10000A(2P/230V)
Operating Short-circuit Breaking capacity (Ics)	6000A , 7500A(2P/230V)
Rated impulse withstand voltage (Uimp)	4kV
Working environment	-35°C~70°C
Arcing distance	≤50
Mechanical life (second)	20000
Electrical life (s)	10000

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## 17. AC/DC POWER :

### 17.1 Shape and dimension




### 17.2 Technical specification

Model	Power (W)	Nominal output voltage and current (Vo/Io)	Output voltage adjustable range ADJ(V)	Efficiency (230VAC, %/Typ.)	Maximum capacitive load(μF)
LI60-20B12PR2	54	12V/4.5A	10.8-13.8	88	10000
LI60-20B24PR2	60	24V/2.5A	21.6-29.0	90	4000

### Input performance


Item	Operating conditions	Minimum value	Typical value	Maximum value	Unit
Input voltage range	Ac input	85		264	VAC
	Dc input	120		370	Ac input
Input Frequency		47		63	Dc input
Input current	115VAC			1.2	A
	230VDC			0.8	
Impact current	115VAC		30		

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	230VDC		60		
leakage current	264VAC	0.25mARMS max.			
hot plug		nonsupport			

#### Output performance

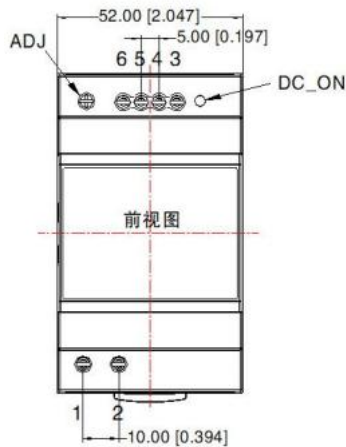
Item	Operating conditions		Minimum value	Minimum value	Maximum value	Unit
Output voltage accuracy	0% - 100% load			±2		%
Linear regulation ratio	Rated load			±0.5		
Load regulation ratio	230VAC			±1.5		
Ripple & Noise	20MHz Bandwidth (peak-to-peak)	5V output			100	mV
		12V output			120	
		15V output			120	
		24V output			150	
		48V output			240	
Temperature drift coefficient				±0.02		-- %/°C
Standby power consumption	230VAC input	5V/12V/15V/24V output			0.3	W
		48V output			0.4	
Short circuit protection			Burp type, sustainable short circuit, self-recovery			
Over current protection			≥120% Io, self-recovery			
Overvoltage protection	5V output		≤7.5V	Output voltage clamping or hiccups		
	12V output		≤16V			
	15V output		≤20V			
	24V output		≤36V			
	48V output		≤60V			
Minimum load			0			%
Starting time					3	S
Power-off hold time	115VAC				15	ms
	230VDC				80	

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### Common performance

Item	Operating conditions	Minimum value	Minimum value	Maximum value	Unit
Isolation voltage (input-output)	Test time 1 minute, leakage current<5mA	4000			VAC
Operating temperature		-40		+70	°C
Storage temperature		-40		+85	
Storage humidity				95	%RH
altitude				2000	m
Switching frequency				65	kHz

### 17.3 Product interface




Reference	
Number	AC(L)
1	AC(N)
2	+Vo
3	+Vo
4	+Vo
5	-Vo
6	-Vo

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### 18. Product electrical performance test:

No.	Items	Test Conditions	Requirements
1	Open circuit voltage	Open circuit voltage measured within 24 hours after standard charge	$\geq 819.2V$
2	Impedance	Under the condition of full power, the AC impedance of AC1kHz is measured	$\leq 50 m\Omega$
3	Capacity retention	Fully charging, store them at $(20\pm 5)^{\circ}C$ for 28 days, then discharge to $716.8V @ 0.2C$ .	Discharging time $\geq 300min$
4	Cycle Life @25°C	Discharge to $716.8V @ 0.2C$ , then Charge the battery @0.2C to reach $934.4V$ . Then charge the battery at constant $934.4V$ voltage until the charging current decreasing to $0.02C$ . Rest for 10 min. discharge to $716.8V @ 0.2C$ and rest for 10 min. Continue the charge/discharge cycles until discharge capacity lower than 80% of rated capacity.	Cycles life $\geq 5000$
5	Storage	Charge the battery to 40%~65% of its rated capacity using standard charging mode, then keep it in an $20^{\circ}C \pm 5^{\circ}C$ , humidity 45%~85% room for 12 months, fully charge and discharge it @0.2C until voltage down .(The testing sample should be within 3 months dated from production date)	Discharge time $\geq 360min$

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## 19. Mechanical characteristics of product

No.	Content	Testing method	Requirements
1	Vibration experiment	After standard charging, the battery is fixed on the vibration table and vibrates in X, Y and Z directions from 10Hz to 55Hz for 30min each, and the scanning rate is 1oct/min. Vibration frequency: 10Hz~30Hz; Shift amplitude/single amplitude: 0.38mm; Vibration frequency: 30Hz~55Hz; Shift amplitude/single amplitude: 0.19mm.	Electrical performance and appearance are not affected
2	Drop test	The battery sample is freely dropped from a height of 1m onto a steel plate placed on the concrete floor, and is freely dropped once in each direction from the two axes of the battery to the positive and negative directions (four directions)	Do not explode No fire
3	Extrusion test	The battery is pressed between the plates, and its pressure is applied through a hydraulic cylinder with a diameter of 32mm until the pressure reaches 17.2Mpa and the applied pressure is 13KN, when the pressure is reached, the pressure is relieved.	Do not explode No fire
4	Altitude simulation	The test cells and batteries are stored at a pressure equal to or below 11.6 kPa and an ambient temperature (20±5 °C) for at least 6 hours.	No leakage, no deflation, no disintegration, no cracking and no fire
5	Temperature test	The test cell and battery are stored at a test temperature equal to 72 °±2 °C for at least 6 hours, and then at a test temperature equal to -40 °±2 °C for at least 6 hours. The maximum time interval between the two extreme test temperatures is 30 minutes. This procedure was repeated 10 times and all test cells were then stored at ambient temperature (20.5 °C) for 24 hours. (For large cells and batteries, exposure to extreme test temperatures should be at least 12 hours.)	No leakage, no deflation, no disintegration, no cracking and no fire

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## 20. Product Characteristics

### 20.1 Test condition

Unless otherwise specified in the test item, the tests in this specification shall be performed under the following conditions:

Ambient temperature:  $25\pm 2^{\circ}\text{C}$ ;  
 Relative humidity:  $65\%\pm 20\%$   
 Atmospheric pressure: 101.325kPa


### 20.2 Test instrumentation and equipment requirements

Where the test sample requires full charging of the test items, unless otherwise specified, the battery pack is charged in the following ways: under normal temperature conditions, the rated current specified in the specification is charged, when the battery pack or battery terminal voltage reaches the charging limit voltage, it is converted to constant voltage charging, and when the charging current is less than  $0.025C$ , the charging is stopped.

The accuracy of the instrument measuring the voltage should not be less than 0.5,  
 and the internal resistance should not be less than  $10\text{K}\Omega/\text{V}$ ;  
 The accuracy of the instrument measuring the current shall not be less than 0.5  
 The accuracy of the instrument used for measuring time is not less than  $\pm 0.1\%$ ;  
 The instrument measuring temperature should not be lower than  $\pm 1^{\circ}\text{C}$ ;  
 The voltage output and detection accuracy of the battery charging and discharging tester are not less than  $\pm 0.5\%$ ;  
 Current output and detection accuracy is not less than  $\pm 0.1\%$ ;

### 20.3 Safety performance requirements

Item	Test method	Requirement
Capacity calibration	First, the battery is discharged in accordance with the method specified by the manufacturer and left to stand. Then charge according to the method specified by the manufacturer and let stand. Finally, the capacity calibration of the battery is qualified by analyzing the data.	The actual capacity of the cell sample should be greater than or greater than its rated capacity and in accordance with the standards in "NRT-QC-202207-001".
short-circuit	After the standard charging method is fully charged at $25^{\circ}\text{C}$ , the positive and negative electrodes of the discharge port of the battery pack are short-circuited with wires respectively. (Conductor electricity $80\pm 20\text{M}\Omega$ )1H	The battery pack should not leak, fire, or explode
overcharge	After charging in standard charging mode at $25^{\circ}\text{C}$ , set the constant current source to 1.25 times the nominal voltage and $0.1\text{I}(\text{A})$ , and charge the battery pack for 2H	The battery pack should not leak, fire, or explode
Electric discharge	Discharge the battery pack to the termination voltage or battery pack protection, and continue discharging at $0.1\text{I}(\text{A})$ for 5 hours	The battery pack should not leak, fire, or explode

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Constant humidity and heat test	After charging with standard charging method at 25°C, put into (40± 2) °C, In a constant temperature and humidity box with relative humidity of 90-95%, it lasts for 48H; Take out and leave for 7 hours before visual inspection	Visual appearance, should not leak, smoke, fire, explosion
High and low temperature impact	After charging in the standard charging mode at 25°C, place the battery pack at 75°C± 2°C for 6H, and then move it to -40°C for 6H. The time interval from the highest temperature to the lowest temperature should not exceed 3MIN. Repeat the above steps, after 10 cycles, remove and set aside for 24H, and then visually inspect.	Visual appearance, should not leak, smoke, fire, explosion
Overload protection	Overcurrent: After the protection device is activated, let it stand for 1min and perform 10 cycles. In the case of overdischarge, the discharge current is 1.2 times the overdischarge protection current (1.2Idp).	The overcurrent protection circuit of the battery pack should be activated on each cycle

## 21. Product appearance requirement

- 21.1 Battery pack edge sealing tapes must be neatly pasted and free of air bubbles
- 21.2 The position of the anti-vibration sponge affixed to the outside of the battery string is regular and neat
- 21.3 Battery pack appearance clean

## 22. Product packaging, transportation, storage requirements

### 22.1 Product packing requirements

Meet the requirements of product packaging diagram.


### 22.2 Product transportation requirements

- 22.2.1 The battery should be prevented from violent vibration, impact or extrusion during transportation, to prevent the sun and rain, and can be transported by cars, trains, ships and other means of transportation.
- 22.2.2 During the loading and unloading process, the battery should be handled lightly to prevent falling, tumbling and heavy pressure

### 22.3 Product storage requirements

- 22.3.1 Batteries should be stored in a clean, dry and ventilated room with an ambient temperature of -10 ° C to 45 ° C and a relative humidity of no more than 85%.
- 22.3.2 The battery should avoid disconnection with corrosive substances, and should be away from fire and heat sources
- 22.3.3 Battery storage SOC: The battery should be stored at room temperature and should be charged to 40% to 60%. In order to prevent overdischarge of the battery, it is recommended to charge it once every 3 months according to the standard charge and discharge mode, and then charge it according to the standard charge mode to 40% to 60% of the power.



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22.3.4 Long-term storage batteries should be checked regularly to ensure that their charge status is in the appropriate range and that there is no physical damage.

22.3.5 During storage, the battery should be avoided from severe vibration or shock to prevent damage to the battery structure.

22.3.6 During storage, ensure that the positive and negative terminals of the battery do not short circuit. Use an insulating gasket or place the battery in a non-conductive container to prevent short circuit accidents.

## 23. Other battery instructions and precautions

To prevent possible leakage, heating, and burning of the battery, please pay attention to the following precautions:

### ***Warning!***

- If the battery is not used for a long time, the switch must be turned off
- It is strictly prohibited to immerse the battery in water. When not in use, it should be placed in a cool and dry environment
- Products shall not be subjected to severe mechanical impact, exposure, rain
- Do not place the battery near the heat source, such as fire, heater and other devices
- Please use the charger recommended by the manufacturer when charging
- Do not charge the battery directly into the battery socket
- Do not remove the battery at will
- Do not knock or throw, step on the battery, etc
- Do not Pierce the battery with nails or other sharp objects
- Do not use metal to directly connect the positive and negative electrodes of the battery
- It is strictly prohibited to use the battery with the positive and negative electrodes reversed
- Do not mix battery modules in different packages

### ***cautious!***

- If the battery leaks and the electrolyte enters your eyes, please do not rub, rinse your eyes with water, and immediately send to the doctor for treatment, otherwise it will hurt your eyes
- If the battery emits an odor, heats up, discolors, deforms, or any abnormality occurs during use, storage, or charging, immediately remove the battery from the device or charger and disable it.
- If the positive and negative extremes are dirty, wipe with a dry cloth before use, otherwise it may lead to poor contact function failure
- The electrodes of the discarded batteries should be wrapped in insulating paper to prevent fire

## 24. Important note

Consumers must use the battery system in strict accordance with the relevant requirements of the product instruction manual to avoid misoperation affecting the battery life and safety. Dongguan Xinrui Energy Technology Co., Ltd. is not responsible for any accidents caused by overheating, fire, or explosion of batteries caused by misuse, and other operations not carried out in accordance with the specifications or instructions. The right of interpretation of this specification belongs to Dongguan Xinrui Energy Technology Co., LTD.