REVO

Product user manual

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Term definition

The following acronyms meaning used in this manual

BMS	Battery Management System
SOC	State Of Charge
SOH	State Of Health
UPS	Uninterruptible Power Supply
OT	Over temperature
OV	Over voltage
UV	Under voltage
HMI	Human Machine Interface
Charge OC	Charge over current
Discharge OC	Discharge over current
Cell OV	Cell over voltage
Pack OV	Pack over voltage

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1 Overview

Range of application

This manual introduces VISION REVO series product information, operation and maintenance and others .VISION REVO system developed by **SHENZHEN CENTER POWER TECH.CO.,LTD**. is suitable for high-voltage lithium battery system, which is widely used in UPS backup Power, large energy storage and other applications.

For the reader

This manual is suitable for Lithium battery professional technicians of installation, operation and maintenance, as well as for relevant end users who may need view technical information .

This product manual is suitable for the installation of all lithium batteries cabinet for the TP, TPH and TPL series of **REVO**.

User manual

The user manual should be carefully checked before using the product, and the manual should be properly stored and placed at an accessible place;All the information in the user manual, including the pictures and symbols used, are owned by **SHENZHEN CENTER POWER TECH.CO.,LTD**..Non-internal personnel of **SHENZHEN CENTER POWER TECH.CO.,LTD**. shall not use part or all of the content without authorization;

The contents of this manual will be constantly updated and revised, and the user shall refer to the products purchased;More information,please browse http://www.vision-batt.com/ or through the sales channel for the latest user manual .

2 Product description

Brief introduction

REVO series lithium battery system is developed by **SHENZHEN CENTER POWER TECH.CO.,LTD**. which is suitable for high-voltage lithium battery system. It is mainly used in UPS backup Power field or energy storage field.High precision multi - string (16S) cell voltage and temperature acquisition.The module adopts passive equalization, and the maximum equalization current reaches 300mA.The external communication interface adopts isolated CAN bus to realize the cascade communication of up to 15 BMU.This manual describes the type and size, performance, technical characteristics, warnings and precautions of REVO series lithium battery system.This specification only applies to backup battery products provided by **SHENZHEN CENTER POWER TECH.CO.,LTD**.

Solution introduction

REVO series uses VISION high-rate LFP batteries and self-developed BMS system, integrated remote cloud management system and intelligent fire protection module, **with high reliability, good stability, long service life and excellent safety performance.**

Product functions and advantages

REVO series has four levels of safety protection to ensure the safety and reliability of the system throughout the life cycle; adopts a three-level management architecture design to accurately monitor the status of each component in the system to ensure stable system performance and ensure the safety of user load power supply .

3 Safety instruction

3.1 Label description

In order to ensure the users personal safety when using this product, the manual provides relevant identification information and uses appropriate symbols to remind users.

Please read carefully the following list of symbols used in this manual.

Table 3.1 safety symbols

	Low potential danger, if not avoided, that may result in mild or moderate injury .
	Indicates that there is a high risk of serious injury or death if not avoided.
	Indicates there is high voltage inside the cabinet, touch may lead to electric shock danger.
	Wear safety goggles all time during installation or maintenance
	Service by properly trained and qualified personnel only. Disconnect charger and verify no voltage present before maintenance. Turn Off the battery system and lock-out/tag-out before maintenance.
	Please recycle your lithium-ion battery,don’t discard.
	Indicates that in order to protect the grounding terminal (PE), it is necessary to firmly grounding to ensure the safety of operators
	To emphasize and supplement the content, there is a quick way for you to quickly master this step, saving you time.

3.2 Installation tools

Table 3.2 tools

Tools prepared before installation as follow:

Items	Tools		
Tools	Multi-meter 	Protective gloves 	Insulated shoes 
	Protection suit 	Safety goggles 	ESD wrist strap 
Installation tools	Electric screwdriver 	Cross screwdriver 	Socket spanner 
	slot type screwdriver 	wire stripper 	
Test tools	Clamp meter 	Laptop 	

3.3Attention Items

3.3.1 Manual custody

This manual contains important information about REVO series Lithium battery. Reading this manual carefully before the operation of REVO series products will help you get familiar with this product.

- This manual should be placed in good storage, to ensure that maintenance personnel and other personnel easy to access at any time.
- Please operate REVO series products strictly according to the description, otherwise, it may cause equipment damaged, casualties, property loss and so on.

3.3.2 Identity protection

- The warning labels on the REVO series contains important and safe protection information of the product. Tear and damage are strictly prohibited
- REVO series back panels and front doors are equipped with nameplates that contain product important information .Tear and damage are strictly prohibited

3.3.3 Safety warning label

In the process of installation, daily maintenance, overhaul and other operations of REVO series products, in order to prevent irrelevant personnel misoperation ,be near or accidents ,the following agreements shall be observed:

- The front and rear switches of REVO products should be clearly marked to prevent accidents caused by false switching.
- Set up warning signs or safety warning belts near the operation area to prevent irrelevant personnel from approaching.

- ❖ After maintenance and overhaul, be sure to pull out the cabinet door key and keep it properly

3.3.4 Personnel requirement

- ❖ Only qualified personnel can carry out various operations on the product
- ❖ Operators should be fully familiar with the entire REVO series of product system composition and working principle
- ❖ The operator shall be fully familiar with the user manual of this product.

3.3.5 Battery protection

There is a deadly high voltage between the energy storage backup battery and the positive and negative poles of the battery system! During installation or maintenance, make sure that the connection between the battery pack and the UPS is completely disconnected

3.3.6 Electric measurement

After the installation of the energy storage backup battery, there is a high voltage, and accidental contacting with the positive and negative poles may lead to deadly injury. Therefore, please pay attention when you need to measure the power

- ❖ Be prepared for insulation protection (e.g. wearing insulating gloves, etc.)
- ❖ Must be accompanied to ensure personal safety

3.3.7 Measuring instrument

In order to ensure that the electrical parameters meet the requirements, relevant electrical measuring equipment, such as multimeter and power meter, should be used during the electrical connection and trial operation of the **REVO** system .

The measuring equipment with appropriate measuring range and in line with the field working conditions

- Ensure the electrical connection of the instrument is correct, standard and avoid the risk of arcing

3.3.8 Maintenance and repair

After the energy storage battery cabinet and UPS are disconnected, be sure to confirm that they are disconnected before opening the front door to maintenance or overhauling .

In the maintenance and overhauling operation, the following items should be concerned:

- Ensure the energy storage battery cabinet is not accidentally recharged
- Use a multimeter to ensure that the energy storage battery cabinet is without electricity.
- Use insulation material to insulate the likely electric part of REVO .
- Necessary ground connection

It is strictly prohibited to carry out maintenance or repair when the equipment is electric. At least two persons must be on site during maintenance or overhaul of the equipment. The maintenance operation cannot be carried out until the equipment cut off and the charging or discharging has been completed .

4 Module

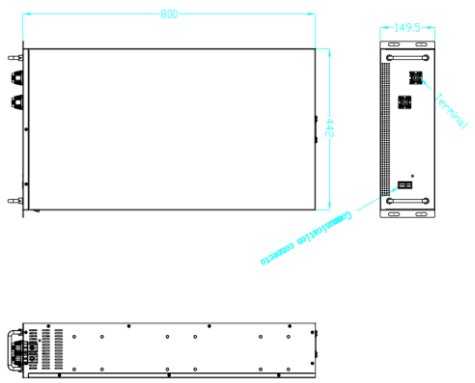
4.1 Module Specification

VISION REVO TP series back up batteries adopt the industry high capacity, high safety

LFP battery pack integration. Modules are divided into TP series,TPH series,TPL series. Integrated high-precision BMU units within the module, real-time monitoring and acquisition module voltage and temperature. Realize intelligent temperature control at electric core level and intelligent balance function of battery cell. Thus improving system efficiency and battery cycle life. The module is designed by filling the inside of the cold-rolled sheet metal shell. Achieve high safety, high reliability requirements. At the same time, the module is designed with high stability and disturbance immunity to ensure the safe and reliable operation of the battery cluster after it is integrated into the system.

4.2 Module size

Figure 4.1 Module overview

TP20 -51.2V100Ah

Weight:74KG

5 Cabinet BMS Specification

5.1 CBMS overview

BMS system consists of three levels of architecture. **The cabinet-level management system is Cabinet BMS,hereinafter referred to as CBMS.** CBMS is responsible for

battery current detection, data collection and analysis, alarm and protection control, communication with upper and lower levels, etc. CBMS consists of main circuit circuit breaker, charging and discharging dual-circuit control switch circuit, high-voltage isolation detection circuit, parallel processing circuit, high-voltage power supply and DC starting circuit, LCD display screen, CBMS chassis and related wiring harness. CBMS state management and action protection of over charge, over discharge, over current, short circuit and insulation detection are realized for the whole system to ensure the safety and reliability of the frame.

5.2 Explanation Type

Figure 5.1 CBMS type overview

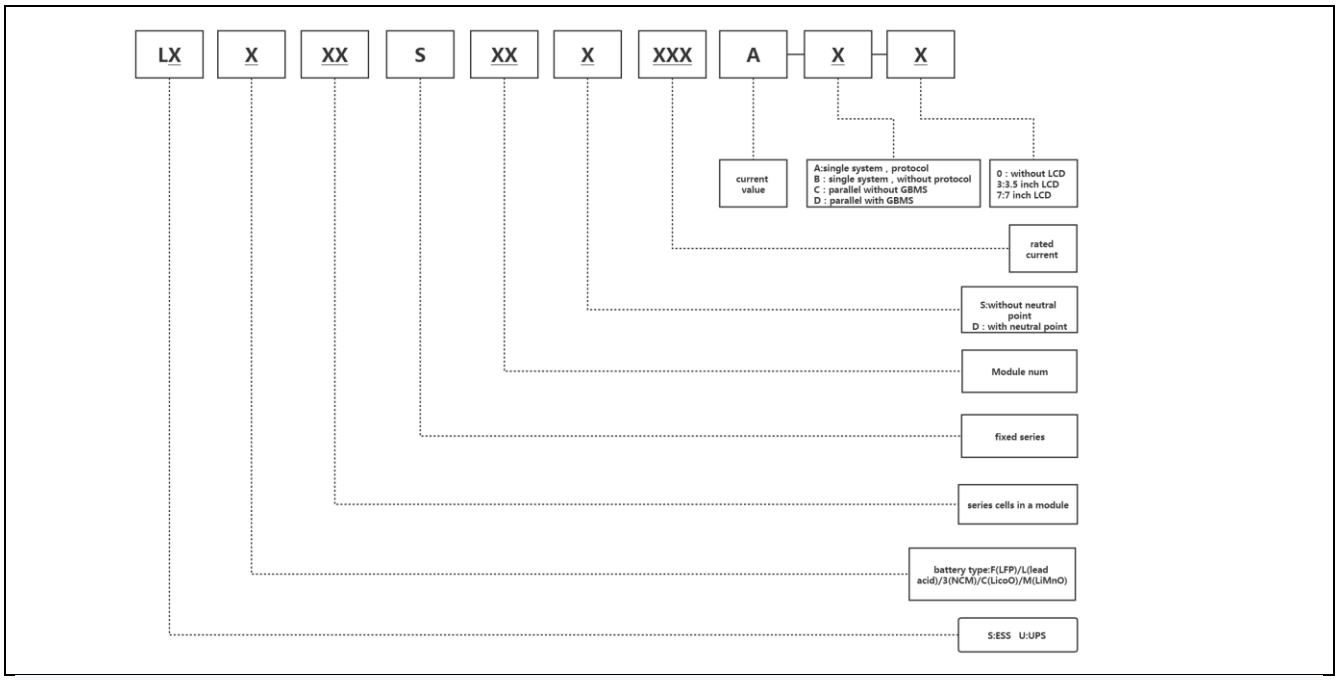


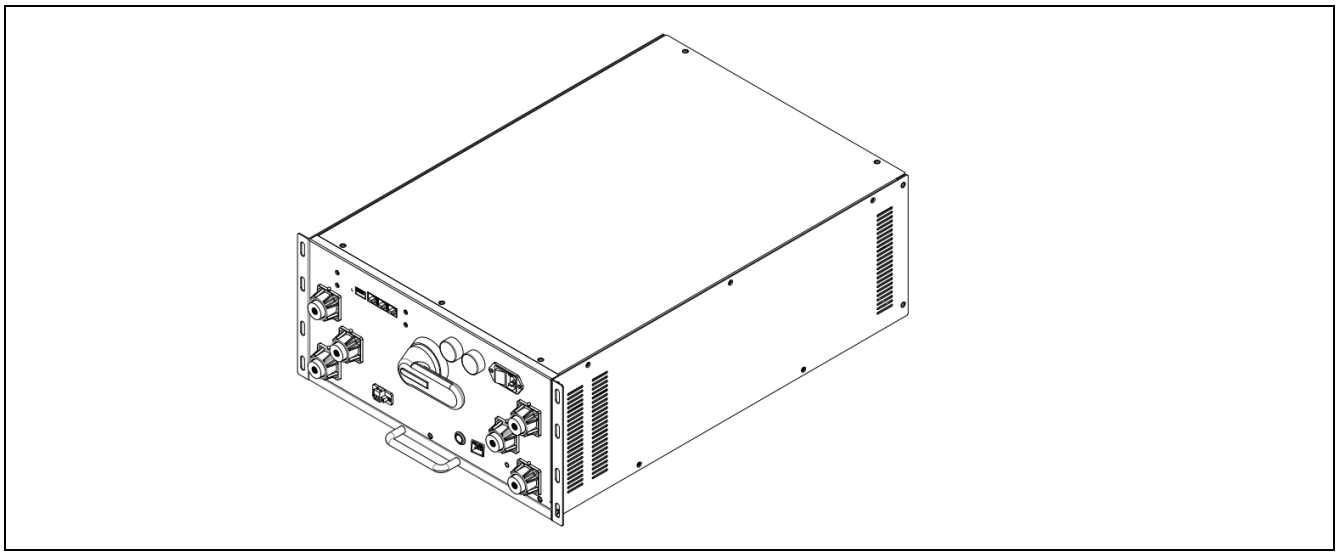
Table 5.1 Description of typical CBMS models

Type	Rated power（KW）	Rated dc voltage（V）
LUF16S10D250A-D-7	93	512
LUF16S10D630A-D-7	**186**	

LUF16S14D250A-D-7	130	716

5.3 CBMS appearance

Figure 5.2 CBMS appearance



LUF16S10D630A-D-7 CBMS

This picture is for reference only, the specific appearance is subject to the actual object.

The panel specification is illustrated with the example of **LUF16S10D250A-D-7**：

Figure 5.3 CBMS Define mark

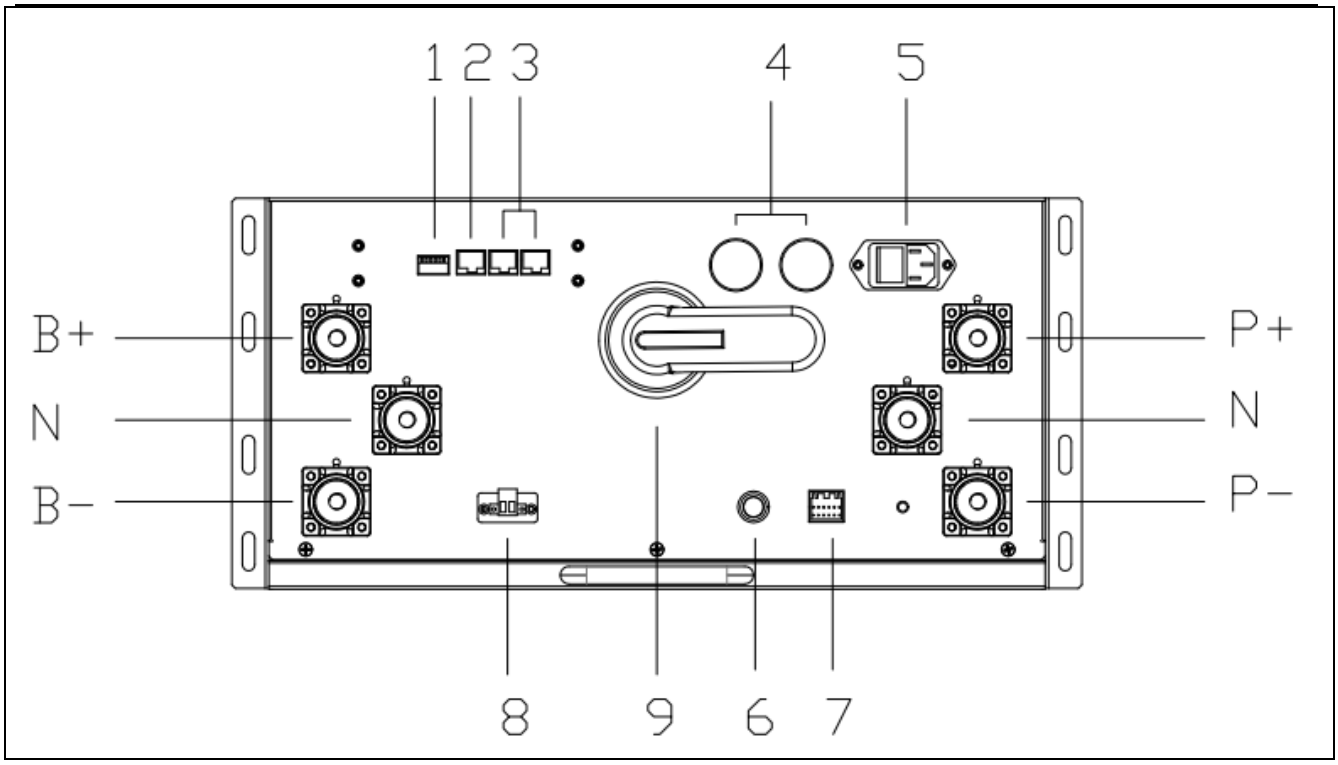


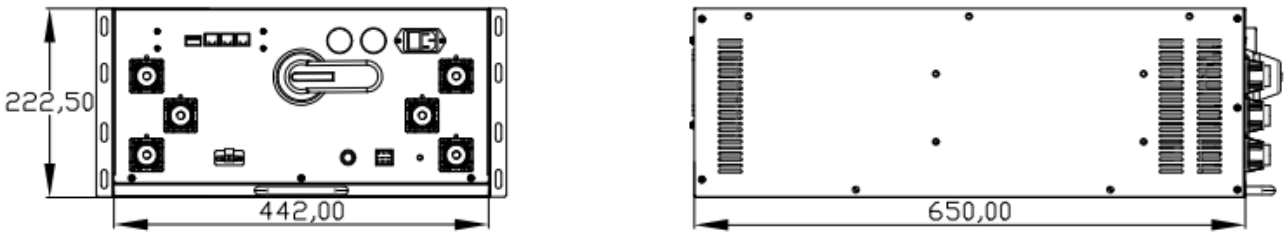
Table 5.3 CBMS Define Description

Item	Name	Description	Remark
1	Dial switch	Set up CBMS ID address	Address field 0-16)
2	LAN	LAN interface	update BMS firmware and monitor software
3	COM	COM1 COM2 interface with GBMS (Parallel use)/ UPS(Not Parallel use) communication	CAN communication
4	Indicator light	Indicates the current working status of CBMS	Charge and discharge,

			static, fault state
5	AC 220V	CBMS AC power supply interface	AC power supply for public electricity
6	DC Switch	DC start switch	Start up press 1-3s
7	BMU Communication interface	Interface for communication with battery modules	CAN Communication interface
8	24V	24V DC output for GBMS power supply	24VDC output and used for GBMS power supply
9	Breaker	Used to control dc output shutdown	Shunt trip, short circuit protection function

5.4 Size & weight

Figure 5.4 CBMS Size



❖ The picture of the above model LUF16S10D630A-D-7 is for your reference. The specific size is subject to the actual object

Table 5.2 CBMS type

Type	Size （mm）	Weight(KG)
LUF16S10D630A-D-7	650*442*222	38
LUF16S10D250A-D-7	600*440*178.5	26
LUF16S14D250A-D-7		26

5.5 LED Indicator status and definition

As a human-computer interface, LED indicator indicates the current working status of lithium battery system. The explanation is as follows:

Table 5.3 LED Indicator status

Status	Normal/protection/ warning	Switch ON	Status	Mark
		●	●	
Power off	Dormant	●	●	OFF
Standby	Normal	●	●	Normal
	Warning	●	●	
Charge	Normal	●	●	Normal charging
	Warning or Protect	●	●	

Discharge	Normal	●	●	Normal discharge
	Warning or Protect	●	●	
Failure		●	●	Stop charging and discharging

● Black out，●A red light is always on，●A green light is always on

●Red light flashing ●Green light flashing

5.6 Breaker

Each CBMS models are equipped with a circuit breaker to control the DC terminal (P+/P-/N) output . The circuit breaker switch can safely disconnect electrical connections with UPS. ON：Normally close circuit breaker: rotate clockwise to blue position

Figure 5.5 MCB ON

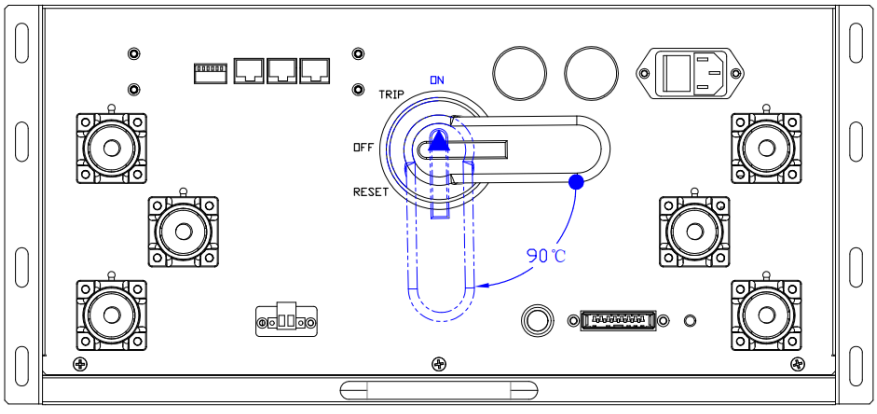
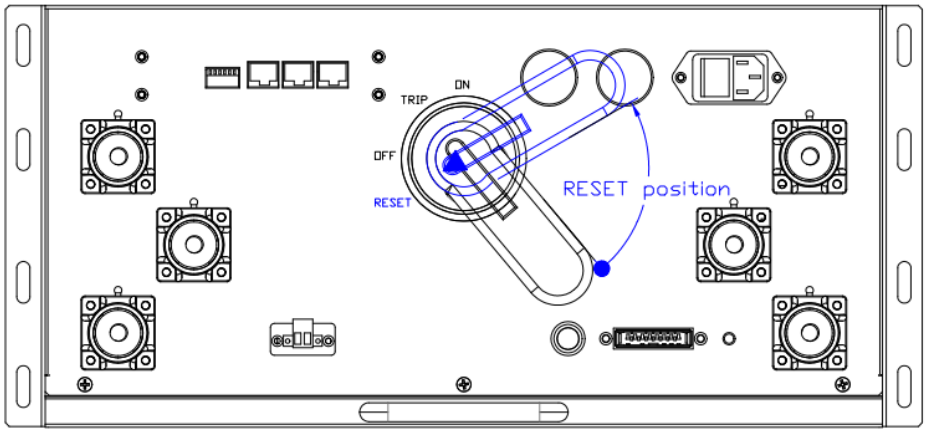


Figure 5.6 MCB Reset

RESET：After tripping, MCB rotates counterclockwise to the reset position,turn the breaker to be normal,as follow：



In order to prevent the circuit breaker from being damaged, it is forbidden to switch on again within 5 minutes after the circuit breaker trip

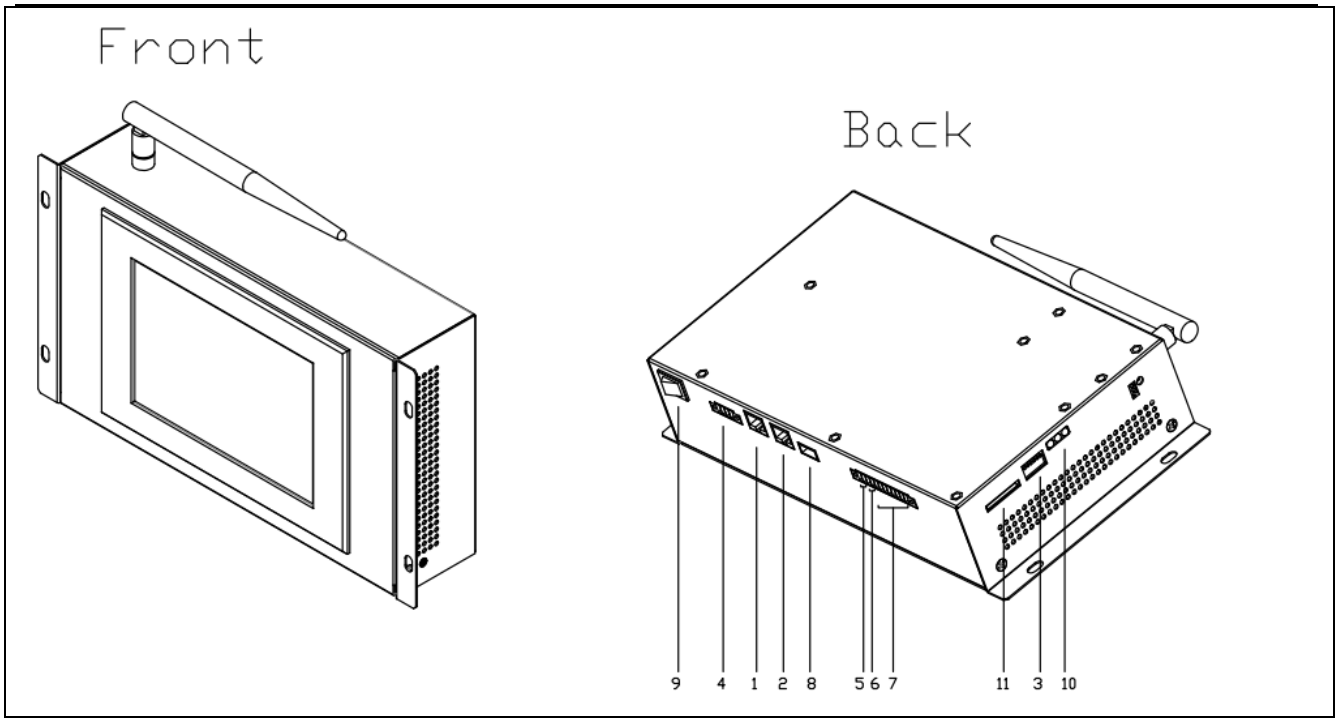
6 GBMS specification

6.1 GBMS overview

GBMS is the top layer BMS of lithium battery system and it is integrated display for the all system. It is responsible for the information collection and processing of lower CBMS, real-time analysis of CBMS operation status, display the system operation status to the display screen in the control cabinet level, and information interaction with UPS through CAN/RS485/ dry contact point to ensure the system reliable and safe operation in the whole life cycle.

6.2 GBMS appearance

Figure 6.1 GBMS description



In order to unify the manual, this manual is written according to the GBMS version with cloud box, but it is an optional product without cloud box by default.

Figure 6.1 GBMS Define Description

Item	Designation	Description	Remarks
1	CBMS interface	The connector port with CBMS	
2	LAN	LAN interface	Updating GBMS program
3	Dial switch	Reserved function	
4	DC24V-IN	Supply power port to GBMS	Supplied by CBMS

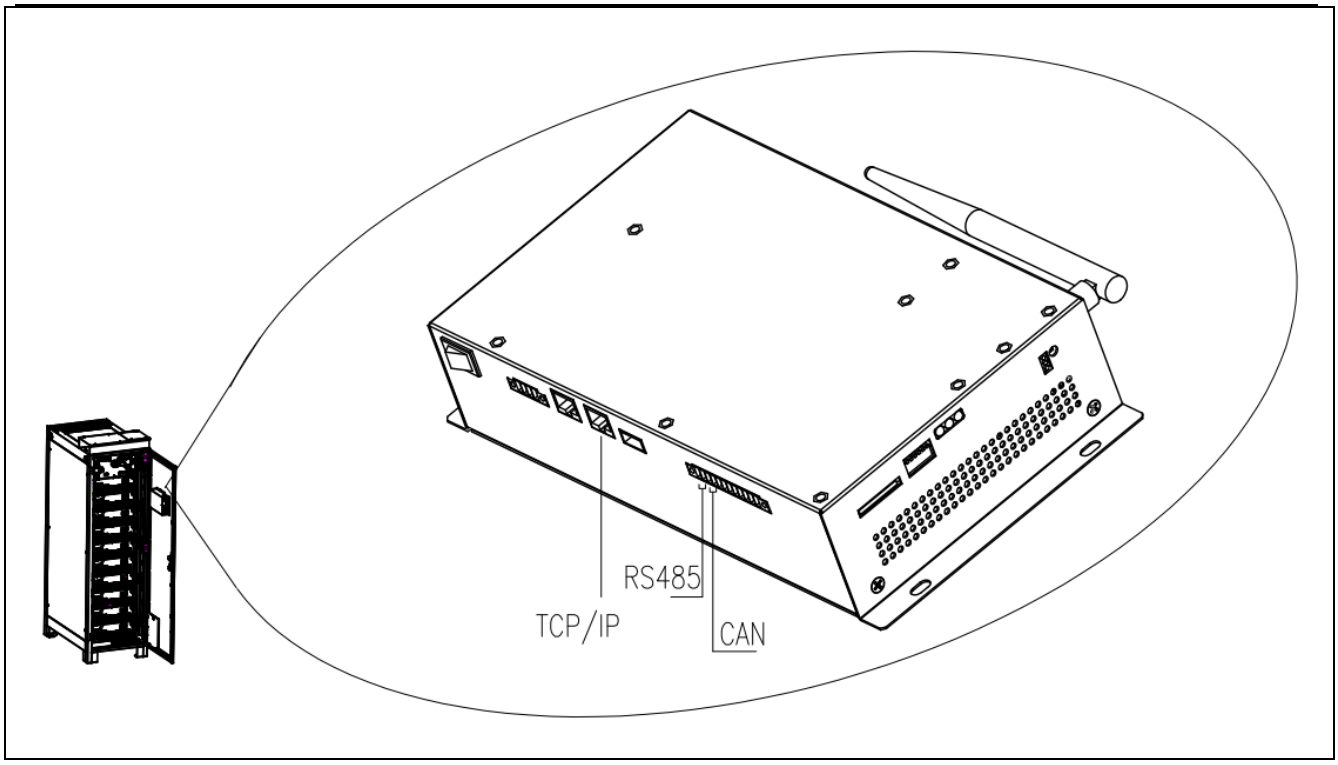
5	CAN	Communicate port with UPS	CAN2.0
6	RS485	Communicate port with UPS	Modbus RTU protocol
7	Dry contact	Input dry contact I1，Output dry contact D1~3	
8	HMI update	Update the HMI interface	
9	ON/OFF	GBMS DC power supply switch	
10	Indicator	GBMS running indicate	
11	SD card	GBMS running data store	

7 Communication scheme

7.1 Communication with UPS

REVO series Li-ion battery system through the top integrated GBMS communication with UPS, which transfers all the lithium battery working status information (overcharge, discharge, over current, short circuit, over temperature, etc.) to UPS . UPS system, according to lithium battery system running state of alarm or protection status , provide the whole system running safety, communications with CAN and RS485 communication type. RS485 protocol can support the MODBUS RTU MODBUS/TCP protocol, the communication signal of REVO I lithium electricity system is as the following figure:

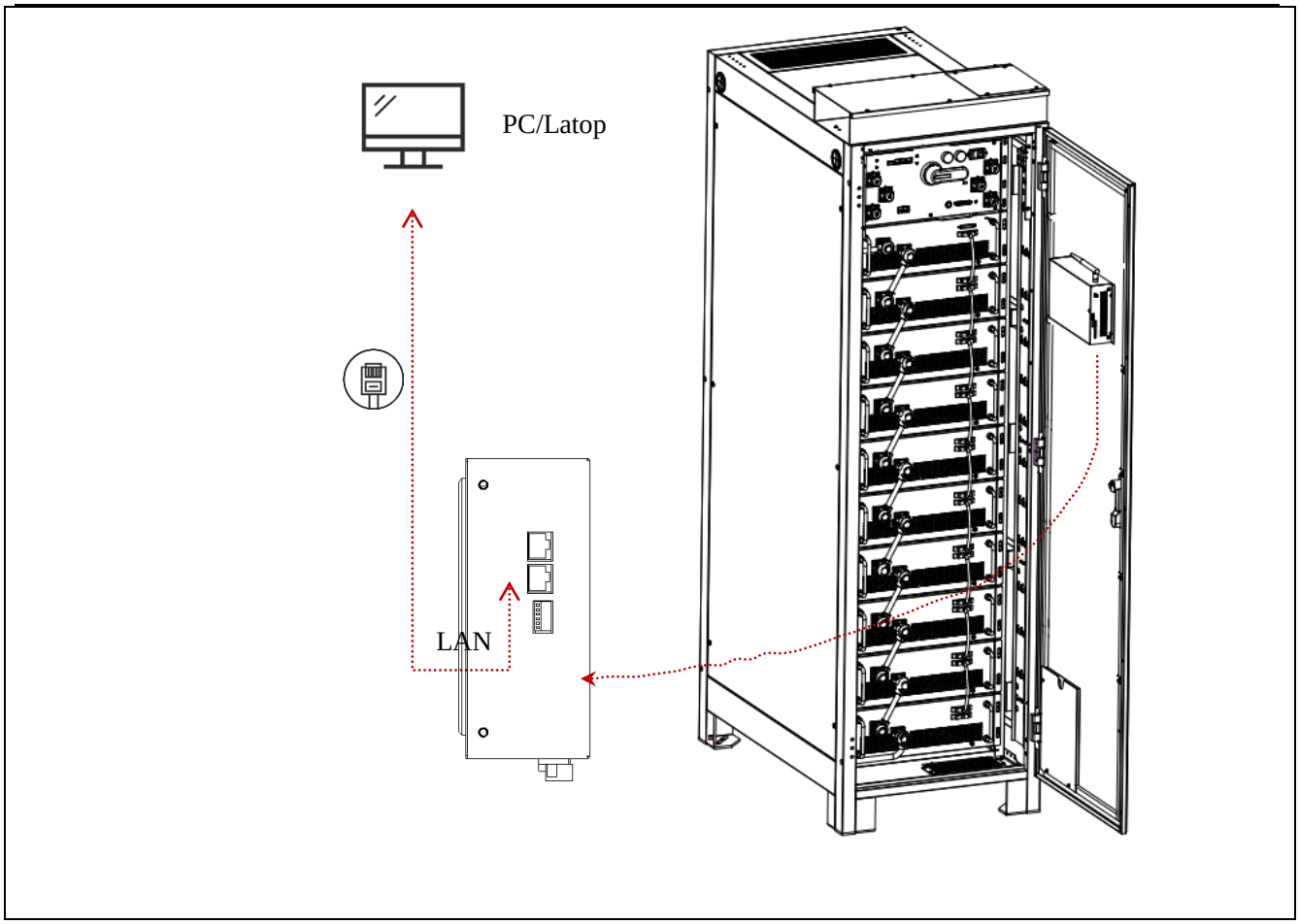
Figure 6.1 GBMS description



7.2 Ethernet communication

REVO series lithium battery system can support Ethernet communication mode. Single or multiple lithium battery systems can directly connect the RJ45 interface on GBMS LAN port through network cable. Real-time monitoring schematic diagram is conducted by PC monitoring software.

Figure 7.1 Ethernet connect



8 Junction box (Optional)

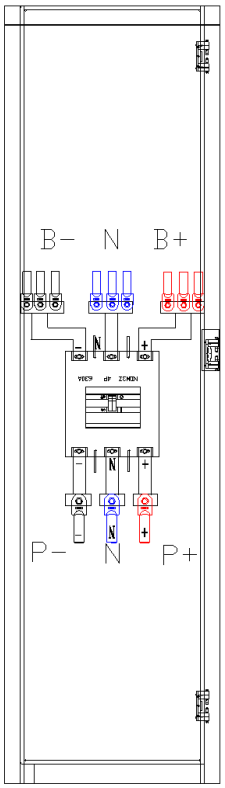
8. Junction box overview

DC COMBINER BOX used for UPS power back up system ensure the system is easy to cut off the electrical connection during the installation or maintenance, ensure the personnel safety, and at the same time reduce the connecting line between lithium batteries and UPS, reduce the problems point, and it is convenient for maintenance, improve reliability.In general big system ,it need a combiner box in the lithium battery system

between UPS and it will ensure the DC bus orderly connected with UPS, reduce the difficulty of cable line and ensure electrical safety.

Refer to 630A/1000VDC, see specifications as below

Table 8.1 junction BOX

Schematic diagram	Items	Specifications
	Rated voltage U	＜1000V DC
	Rated current(A)	1300A
	Input Numbers	More than 3 roads
	Output Numbers	1 Road
	Weight	100KG
	Size(mm)	550*600*2000
	Waterproofing grade	IP54
	Protection Function	Under voltage protection, short circuit protection,

9 System Installation

9.1 Unpacking and Inspection

REVO lithium battery system has passed test and quality control strictly and completely before leaving the factory. Please make a detailed inspection of the products before signing the receipt. If anything is damaged, please contact with Vision and provide details of the damage .

The inspection items are as follows:

- ❖ Please Check whether the package material is intact or damaged .
- ❖ Please check the quantity of the goods and type on packing list
- ❖ Please check the internal equipment (including modules, main control box, GBMS, etc.) for any damage

9.2 Loading list

Take the TP200(512V100Ah) module with GBMS (display screen) as an example. The other modules shall be subject to the material list actually attached to the cabinet:

Table 9.1 Loading list

Item	Name	Description	unit（PCS）
1	Cabinet	600*1000*2000mm，As shown in the drawings	1
2	Battery Module	51.2V100Ah，442*800*149mm	10
3	CBMS	LUF16S10D630AD0，CBMS	1
4	GBMS Assembly	Integrated display, GBMS+ display	1
5	GBMS Supply lines	Wire Length 1.5mm, both ends with terminal	1
6	Network cable	Six class line ,length 3m with adding gold-plated crystal heads at both ends	1
7	Terminal resistance	CAN Terminal resistance of communication line	1
8	Copper nose	SC95-10	3
9	Power cable 1	95x91x8， Module connection， Red and blue yarn	11
10	Power cable 2	95x120x8，connect with B- ， Blue and	1

		blue yarn	
11	Power cable 3	95x1550x8,connect with B+，Red and red yarn	1
12	Power cable 4	95x1000x8，connect with neutral，with SC95-8，Blue yarn	1
13	Power output cable 1	95mm2 Blue insulator cap，Blue insulator cap	2
14	Power output cable 2	95mm2 Red insulator cap，Red insulator cap	1
15	Communication cable	Doubling piece with connector ,Length：180mm	11
16	Module fixed screw	Stainless steel cross pan head bolt spring washer flat washer assembly :M6*12	66
17	Bolt	Stainless steel cross groove recessed hexagon head bolt spring gasket flat gasket assembly M8*20 GB9074.13	34
18	DC breaker	NDM3Z-630/4341/630A DC24V	1

SUGGESTED value			
Working temperature	Working humidity	Storage temperature	Storage humidity
15 to 35 ℃	35 to 85%	0 to 40 ℃	5 to 85%

9.3 Mechanical Installation

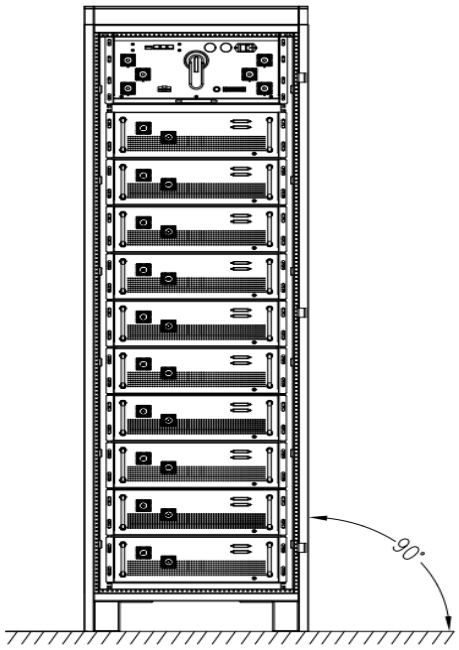
9.3.1 Installation Place

The installation location of lithium battery plays a key role in its safety,service life time and performance.It is recommended to install the lithium battery in a air-conditioned room.

The system should be in a place where wiring is convenient and easy to maintain and operation

9.3.2 Installation requirements

Figure 9.1 cabinet installation



- In order to ensure the effective ventilation and heat dissipation of the lithium battery system, the REVO series heat dissipation adopts forced air cooling, and the heat dissipation channel is the return air. The REVO series can be installed against the wall. If you need to add ventilation equipment on the top, please contact Center power Technical".

Figure 9.2 cabinet installation

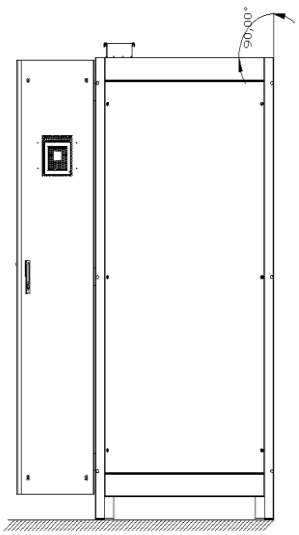
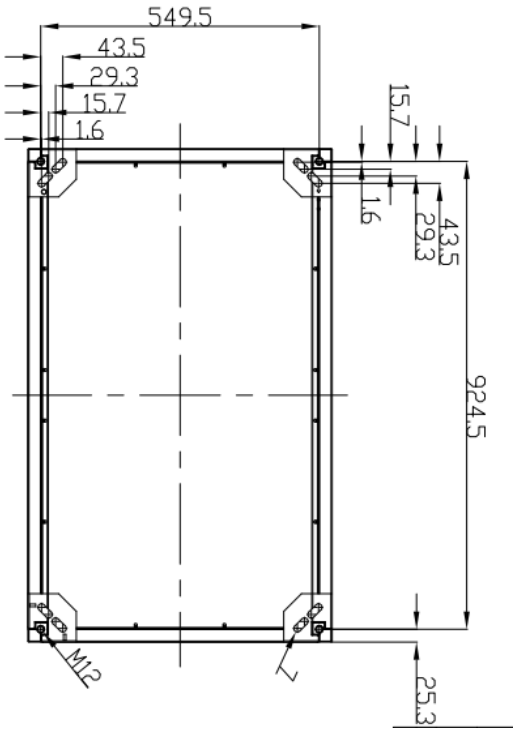


Figure 9.3 Fixed foot installation



9.3.3 Module Handling

After determining the position of the cabinet, it is necessary to move the module to the position of the installation point. It is recommended that two people carry the module and wear anti-smash shoes and anti-slip gloves. Manual or machine handling can be decided according to the site situation

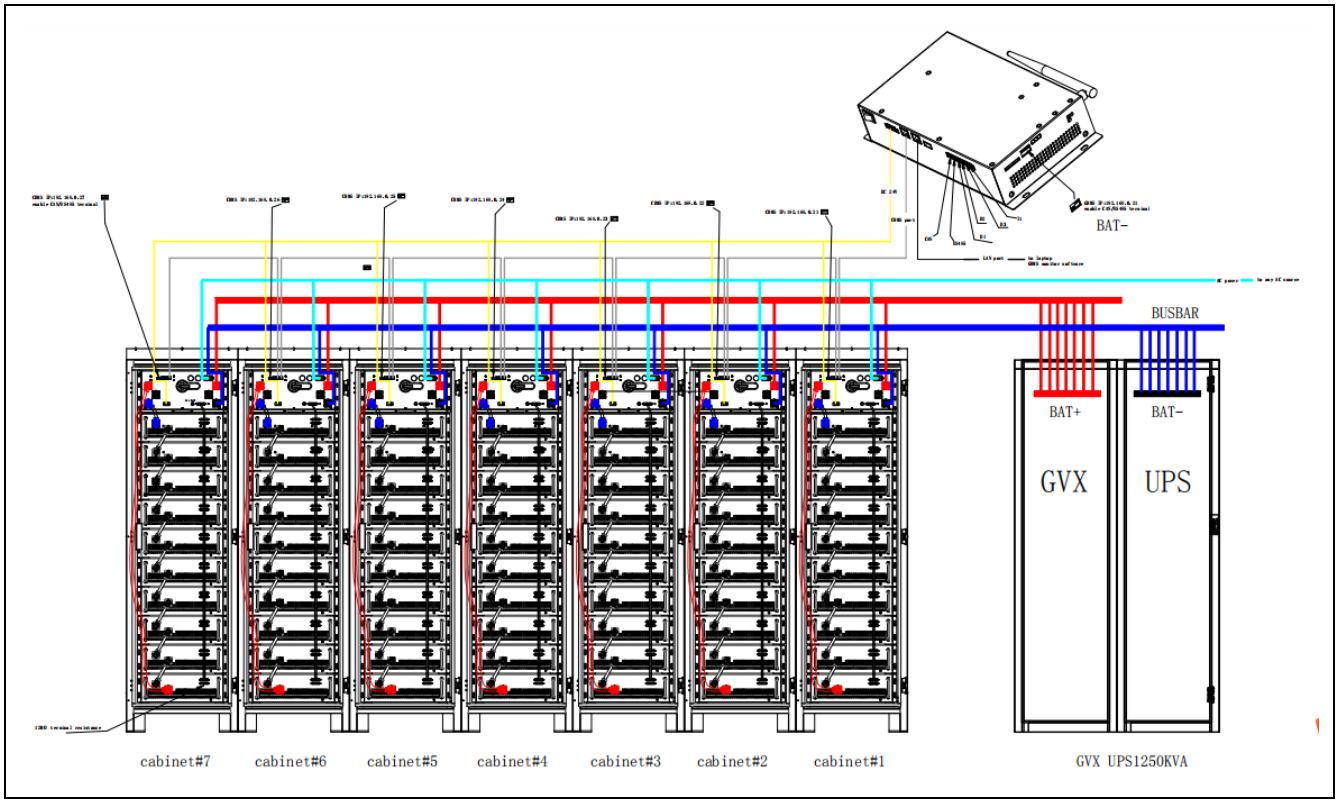
Caution: Pay attention to the weight of the module. It is recommended to carry at least two people to avoid personal safety caused by improper handling. At the same time, wear anti-smashing shoes and anti-slip gloves.

10 Cable Connection

10.1 Connection overview

The system is electrically connected to the UPS, including the lithium system to the bus cabinet, and the communication cable connection is shown below,take TP200 as example.

Figure 10.1 connection overview



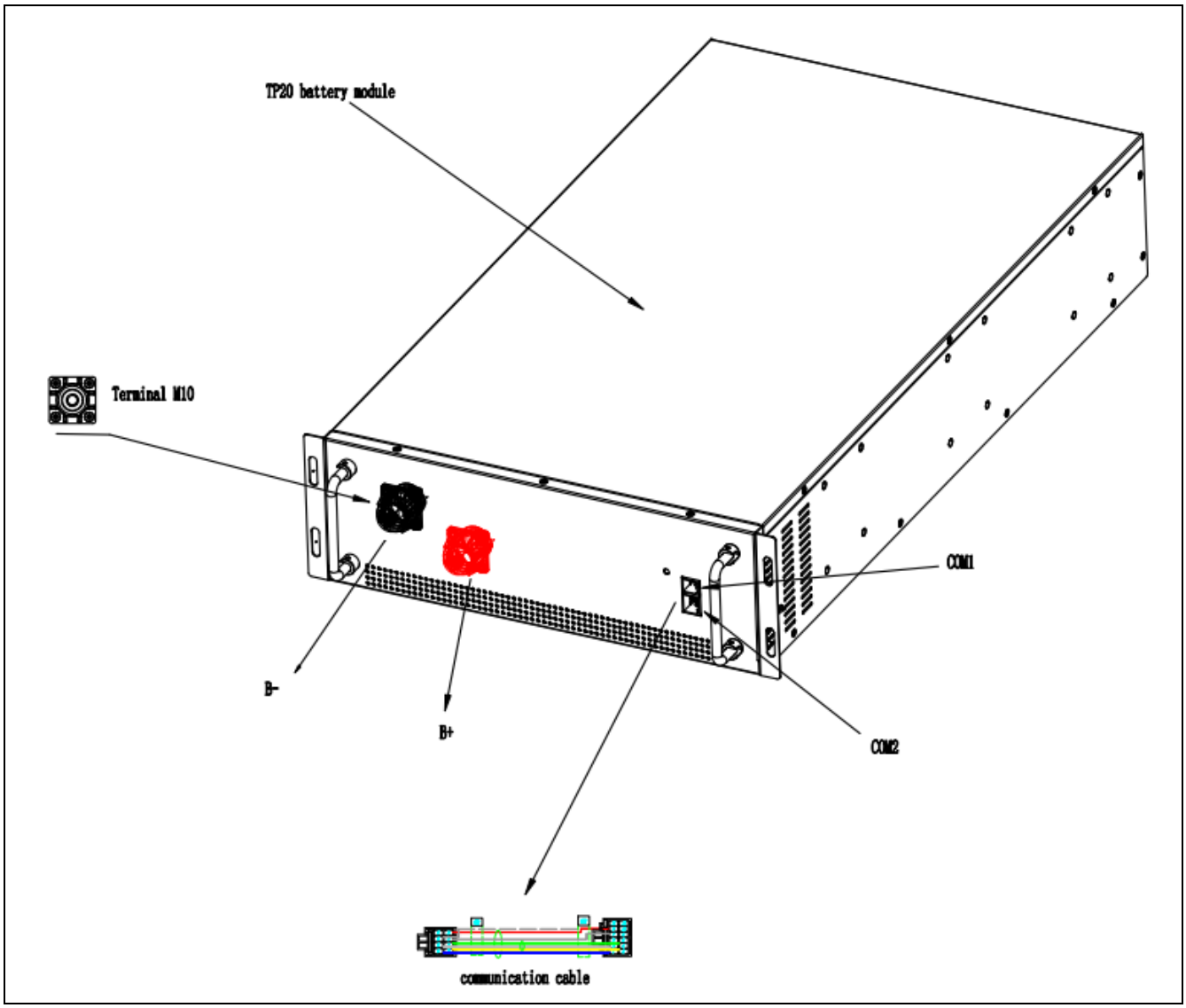
Cable connection overview includes power cable, communication cable, BMS ID dial code, etc.

10.2 Terminal introduction

10.2.1 Power terminal

The TP20 battery module terminal figure as below：

Figure 10.2 terminal overview

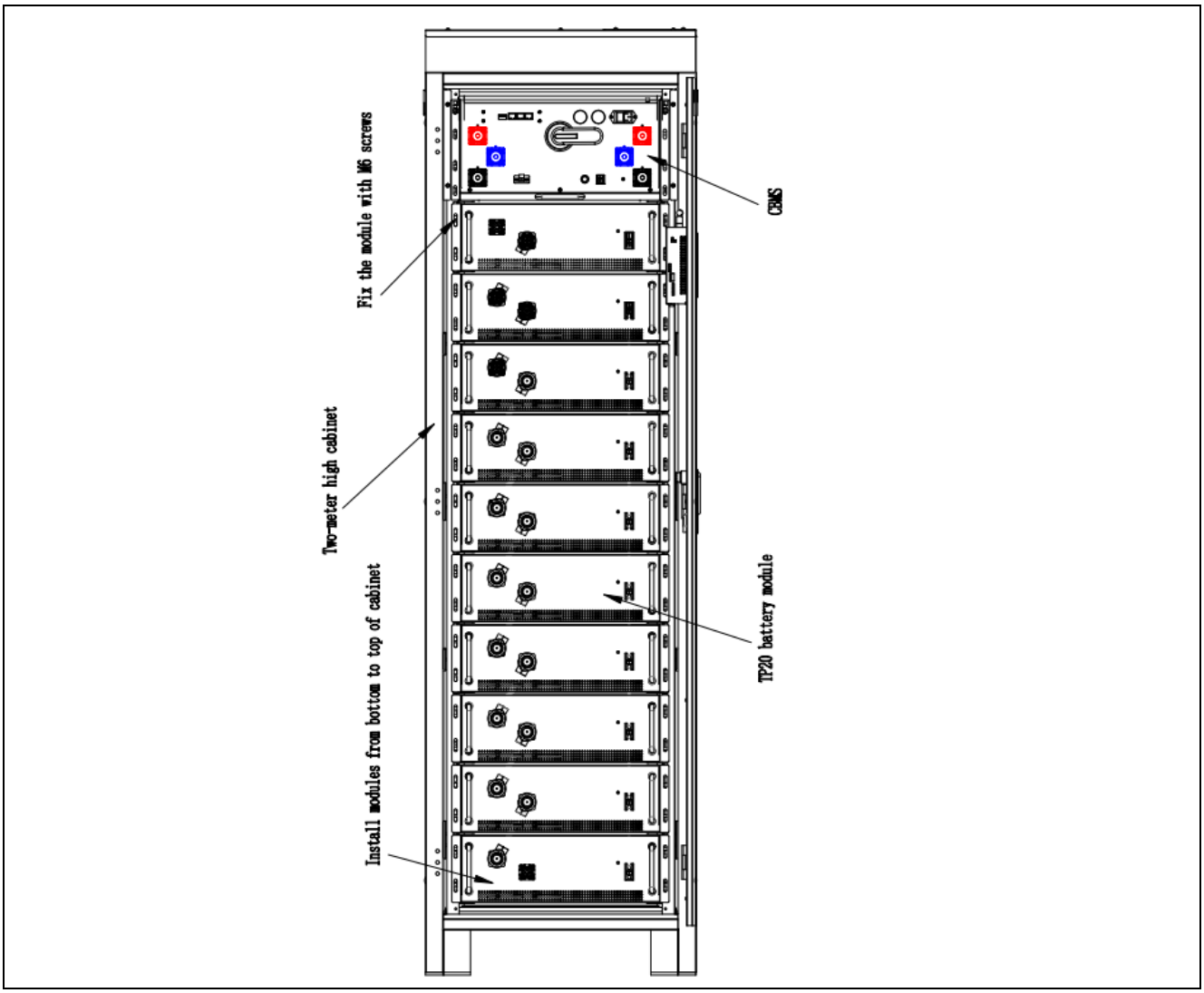


10.3 Rack Connection procedure

10.3.1 Electrical connection

- **Step 1:**Install the main control CBMS and 10pcs TP20 battery modules from bottom to top on the specified cabinet, and fix modules on the cabinet with cross head bolts, as shown below

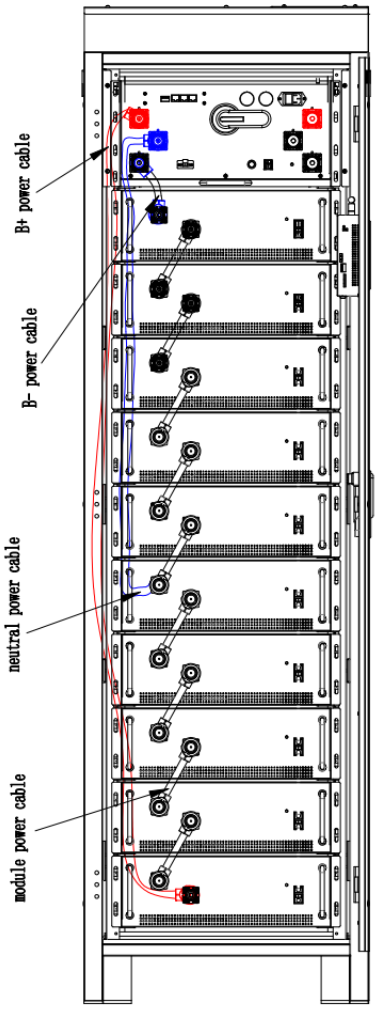
Figure 10.3 install overview



❖ **Step 2： power cables connection for 3 wires**

Use the provided power cable to connect as shown in the figure. Wear insulation gloves when connecting and use Insolated torque wrench to tighten the bolts. The standard torque is 35 N•m.

Figure 10.3 power cable connection overview

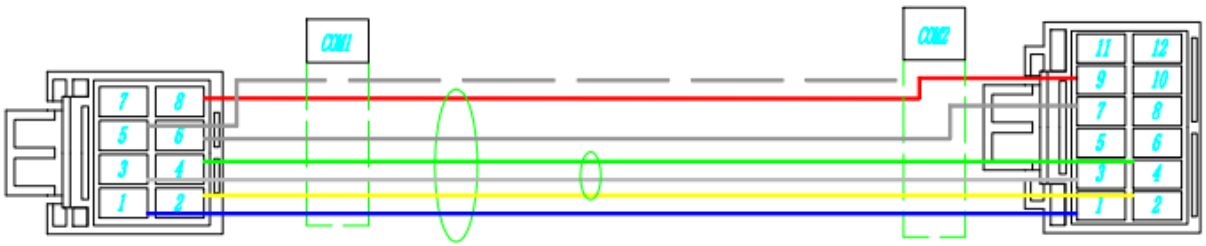


Note the connection position of the neutral point, as shown in the blue cable above(neutral power cable)

❖ **Step 3**：Module communication cable connection

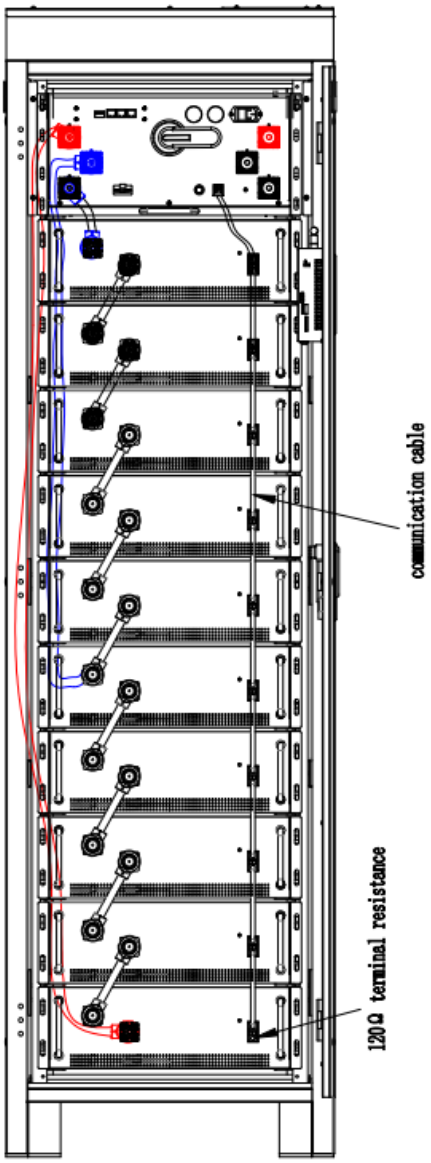
The double twisted shielded wire communication cable is shown in the figure below：

Figure 10.4 communication cable overview



Connect to CBMS from bottom to top according to the communication line connection as shown below, and pay attention to the order of **COM1\COM2**.

Figure 10.5 communication cable connect

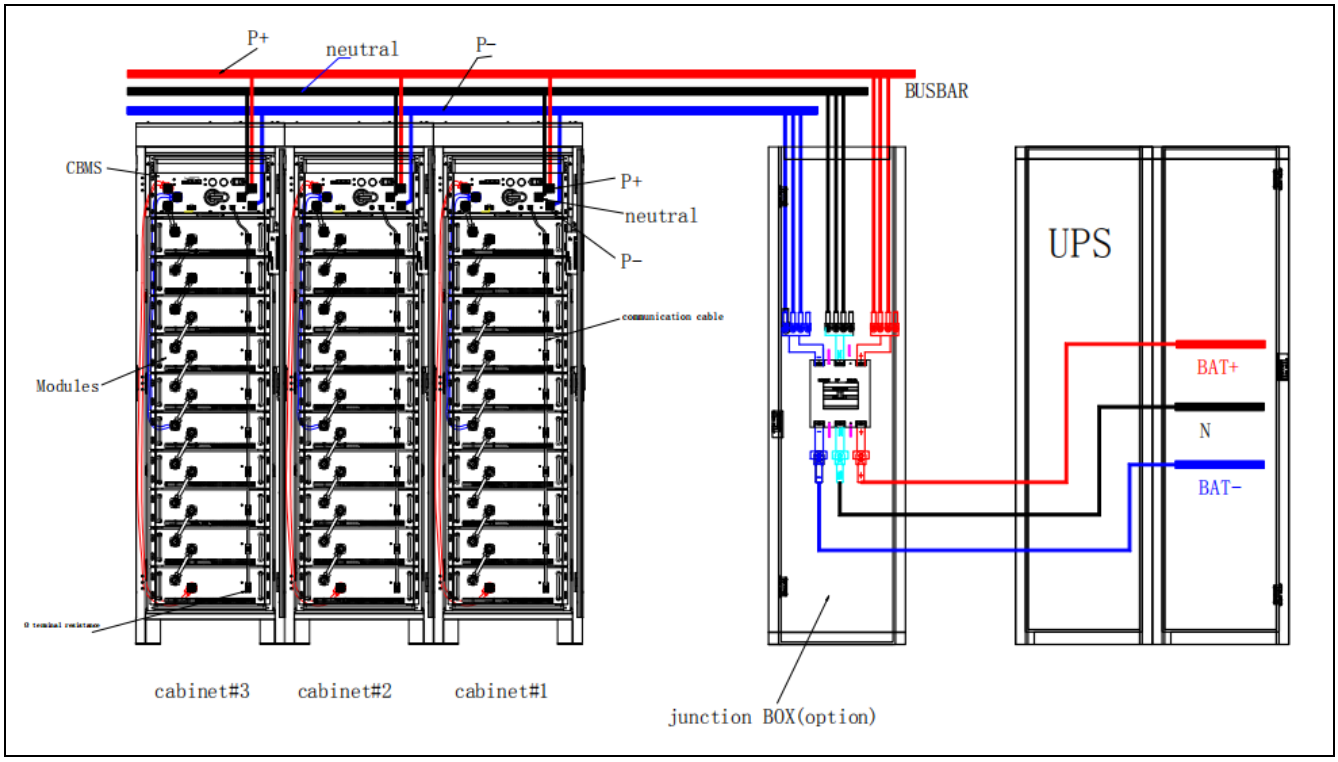


- In order to reduce the signal reflection of communication cables, ensure that the impedance matching continuously in the process of communication, enhance communication stability, in module #10 COM2 connected to 120 Ω terminal resistance.
- When multiple cabinets are used in parallel, the battery cabinets

should be connected separately, and after the self-checking is successful, confirm that each battery cabinet is normal, then connect to the UPS.

❖ **Step 4.**output cables connect for parallels(battery-busbar-UPS)

Figure 10.6 power cable connect for parallels



❖ **Step 5.** GBMS 24V power connection

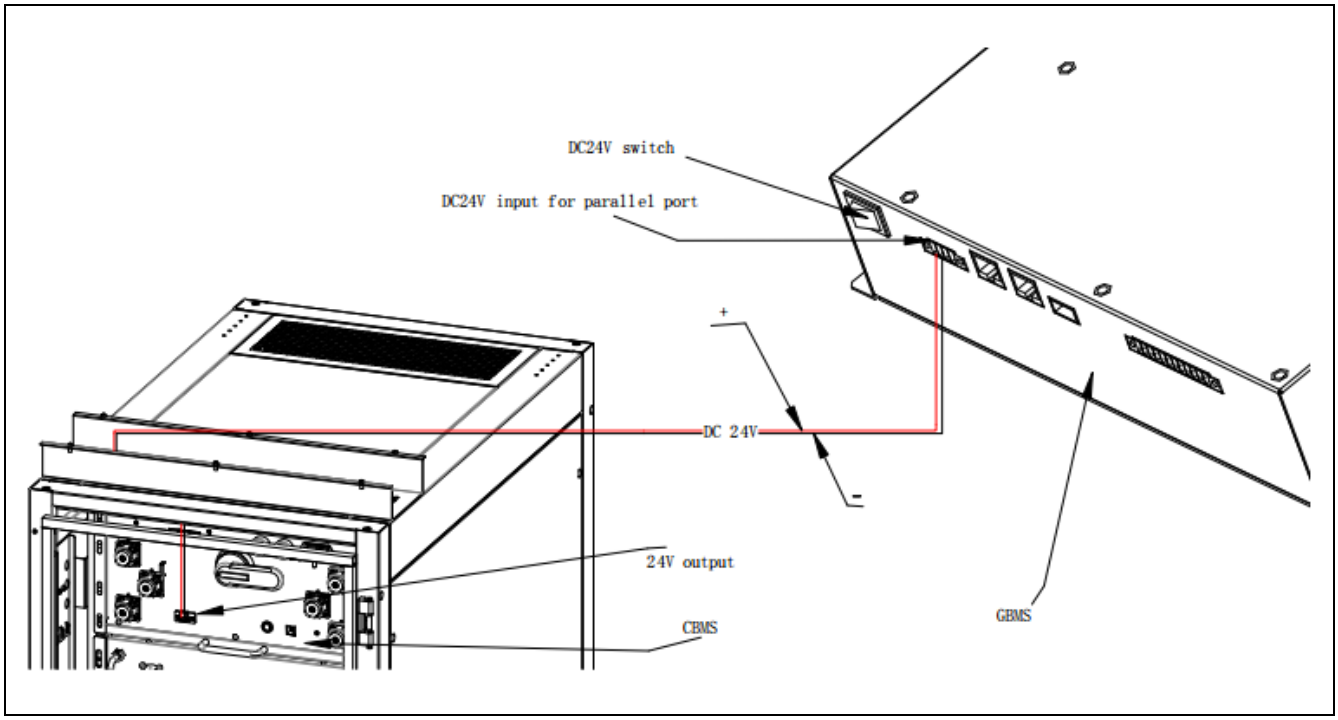
Integrated GBMS has been introduced in section 6.2.

The GBMS power supply cable is connected from CBMS(dc24v-out) to GBMS (dc24v-in) .

Pay attention to the sequence of 24V positive and negative poles to avoid the risk of burning GBMS, and make sure to tighten the wire with Slotted screwdriver.

- The 24V power supply of GBMS is controlled by an isolating switch with fuse.

Figure 10.7 DC24V connect for parallels



❖ **Step 6**.CBMS parallel communication connect

CBMS parallel communication adopts RJ45 physical interface, which is realized by COM1/COM2 of CBMS.Refer to section 5.3 for an introduction to the CBMS interface.The figure below is the schematic diagram of REVO series for parallels. The system realizes communication connection in the form of communication Daisy chain. For non-IPC(Industrial Personal Computer) version, the parallel number shall be ≤15 cabinets

Figure 10.8 CBMS parallels communication connection(For 3 cabinet)

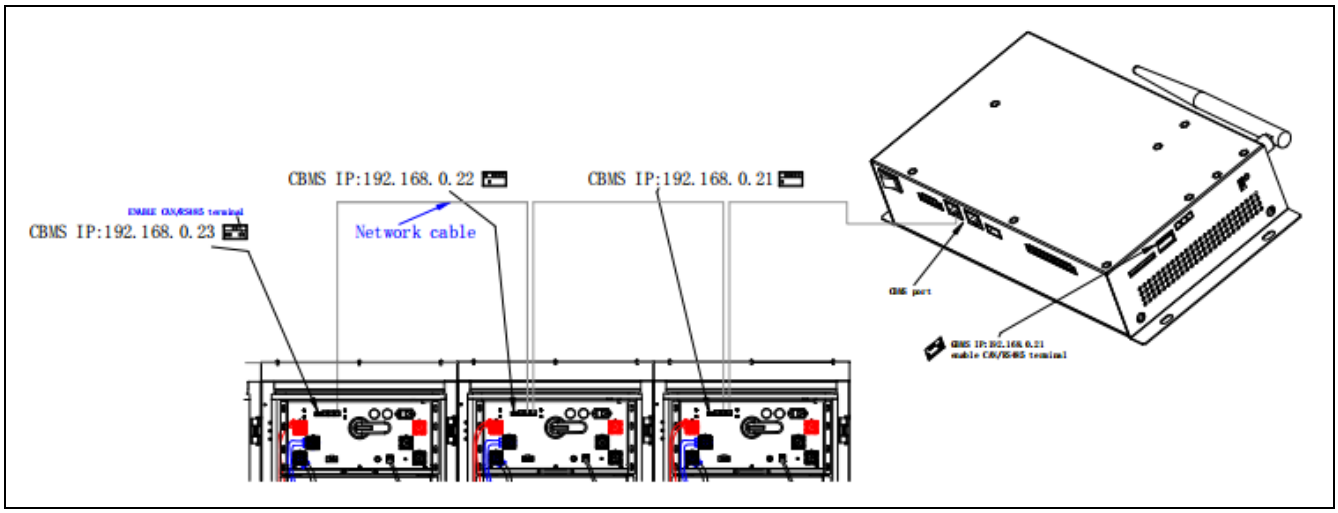
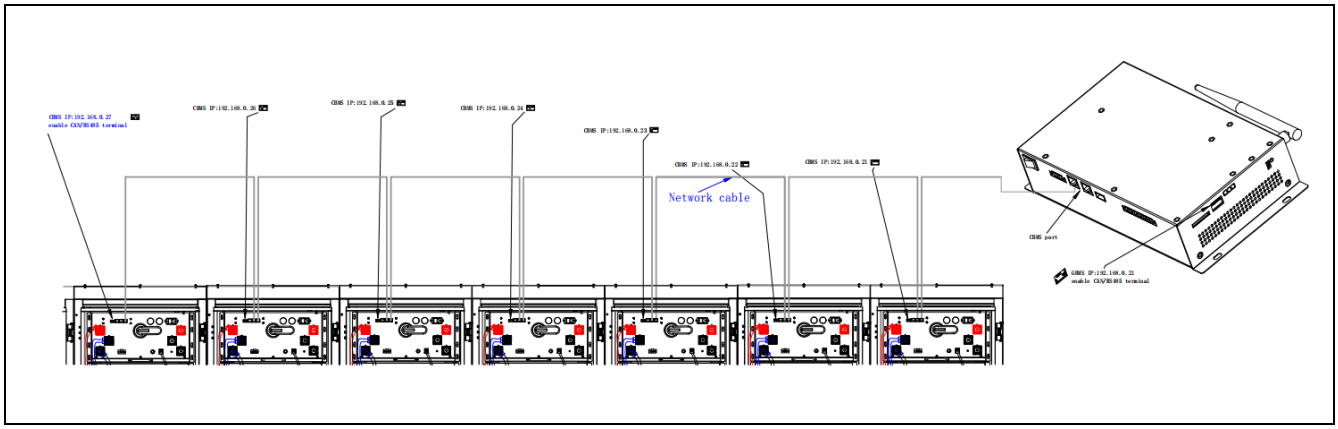


Figure 10.9 CBMS parallels communication connection(For 7 cabinet)



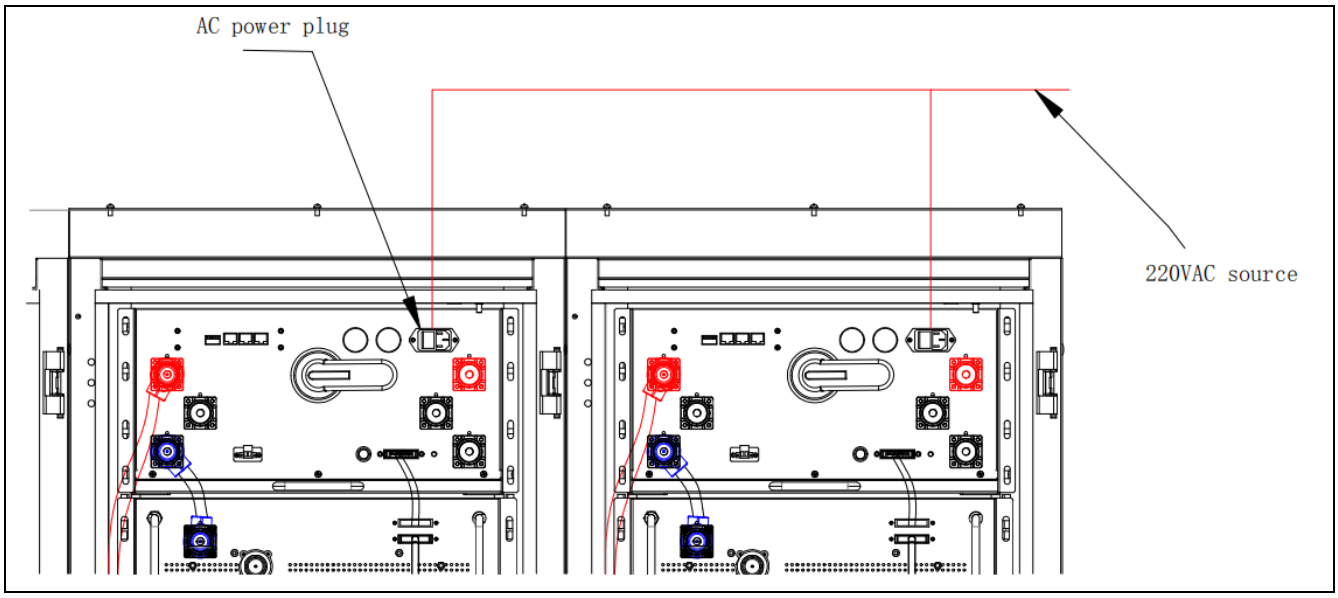
When multiple cabinets are in parallel, the above method has been deduced by analogy, pay attention to enable the CAN/RS485 terminal resistance of CBMS and GBMS is ON

❖ **Step 7.**AC power connection

The CBMS main control unit of REVO series system adopts DC and AC double safety power supply mode. When the mains power is normal, the mains power will be supplied by AC first. The specification is 85~264VAC (±5% variation range), and the frequency is 47~63Hz.

AC connection source can be from UPS output or other mains AC

Figure 10.10 CBMS parallels communication connection(For 2 cabinet)



❖ **Step 8:** set the dial switch

In order to ensure the overall stability of the system, the parallel communication of lithium battery system adopts CANBUS mode. In order to distinguish the address access of its equipment for communication during the parallel state, it is necessary to set reasonable addresses of different equipment through the dial code switch on the CBMS panel to ensure the communication quality so as to facilitate the differential access of GBMS/ upper computer, as shown in the figure.

The dialing address of CBMS and GBMS should start from 1, because 0 is used as the broadcast address

Figure 10.11 DIP switch overview

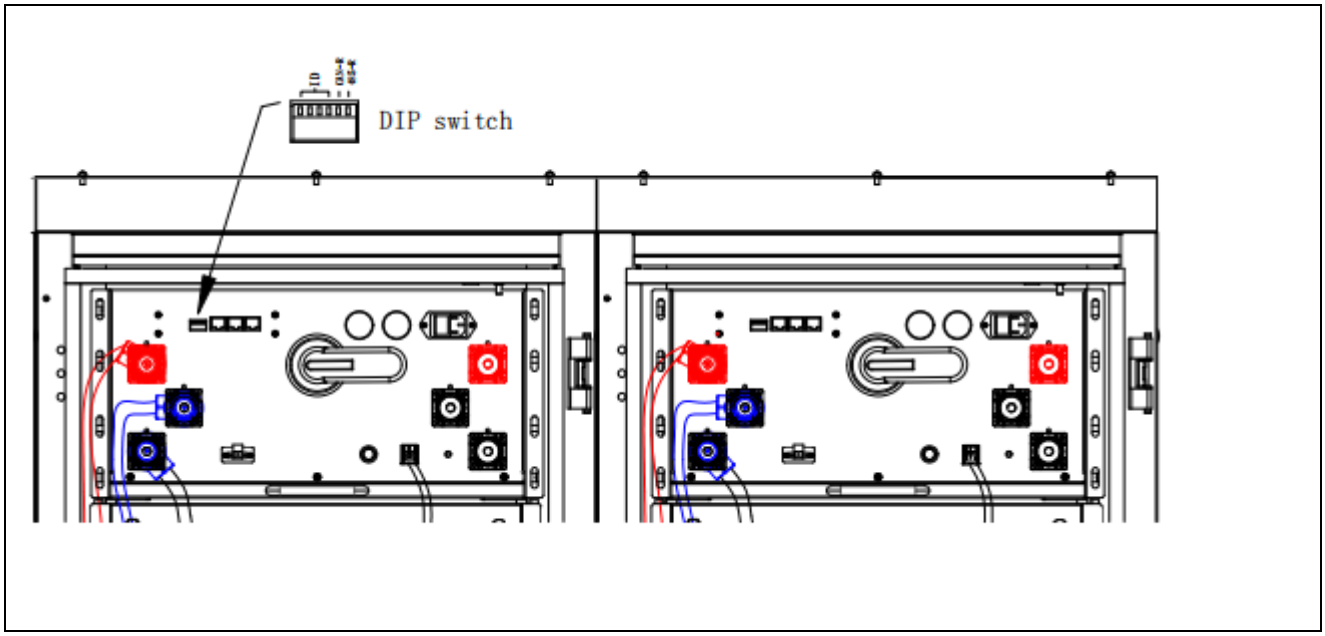
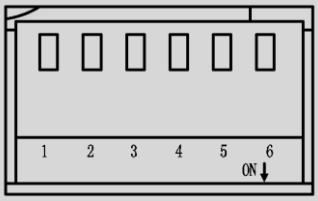
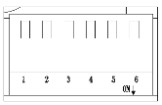
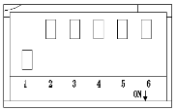
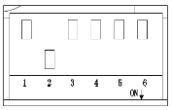
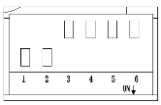
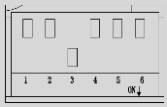
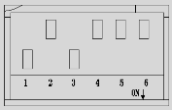
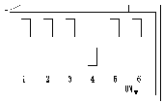
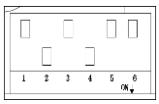
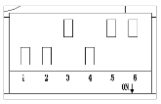
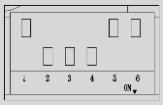


Table 10.1 DIP dial code

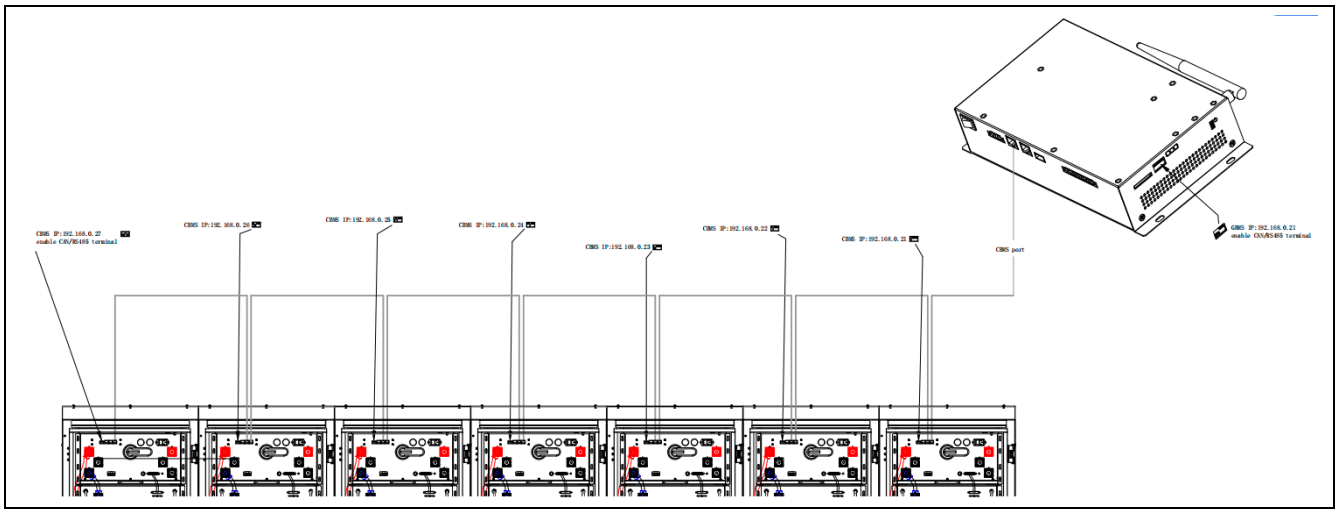
	The dial-code switch is DIP switch, which is effective when dialed to ON side, indicating that the switch is ON, The four ID dial code keys are independent, for 0/1 binary encoding, 4 ID dial code a total of 16 encoding definition address.

 ID：0	 ID：1	 ID：2	 ID：3
 ID：4	 ID：5	 ID：6	 ID：7

 ID：8	 ID：9	 ID：10	 ID：11
 ID：12	 ID：13	 ID：14	 ID：15

In general, the dial code of the lithium battery system connected to GBMS is 1, and the addresses of other cabinets are increased successively according to the above table. The system of the last address should enable can-r / 485-r functions, as shown in the figure below

Figure 10.12 CBMS parallels communication connection(For 7 cabinet)

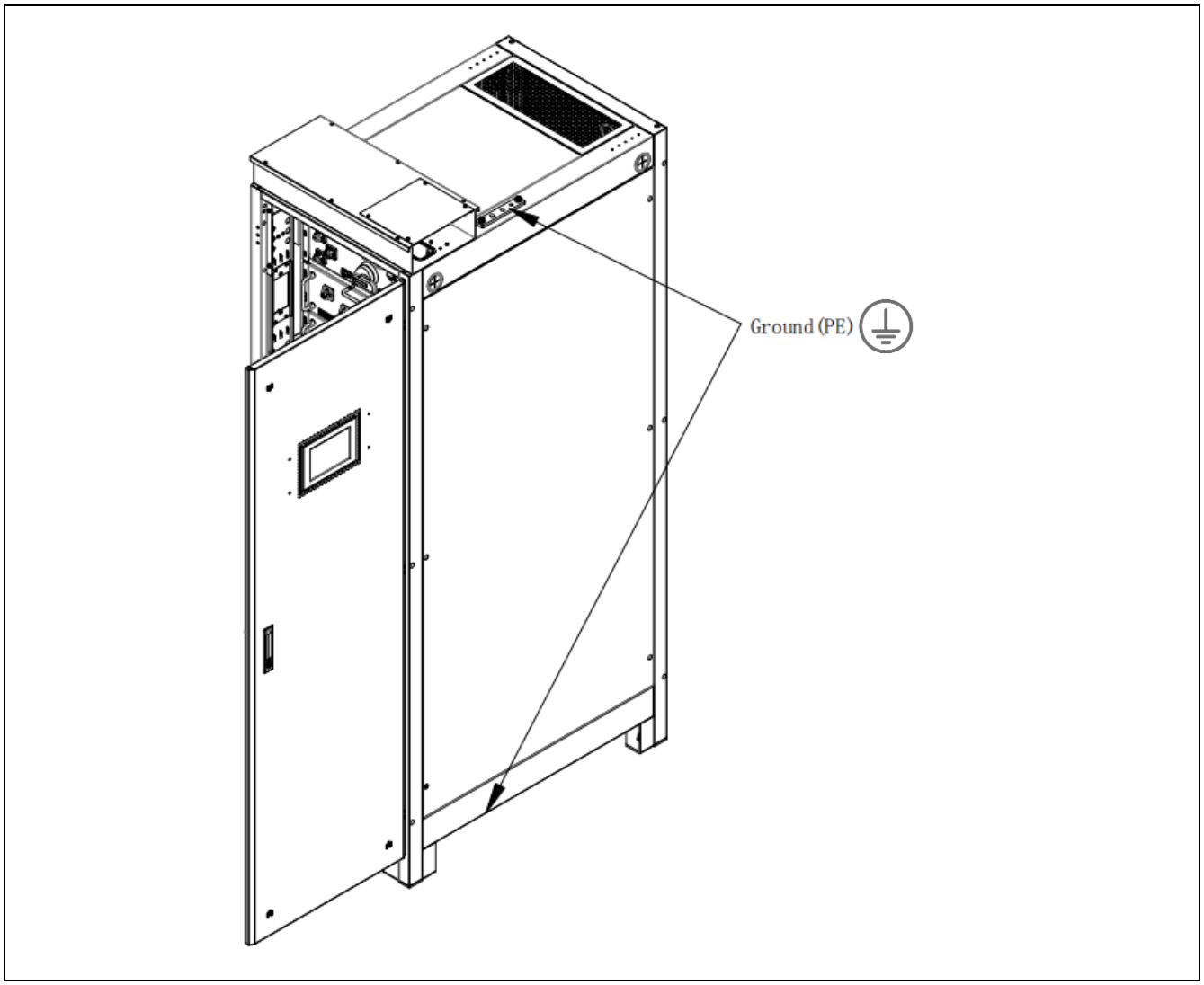


Dial the code switch to the ON direction effectively, at the same time pay attention to address the system through dial code CAN-R /485 - R 120Ω terminal resistance enable.Re-dial code under power supply, need to restart CBMS

❖ **Step 9** ground connection

In a lithium-ion power system, all non-current-carrying metal components and equipment casings should be connected to the ground and nearby.In each device with protective connection, the main grounding terminal shall be configured. In the case of multi-system parallel operation, the main grounding terminal of each device shall be connected to the conductor.The grounding conductor shall be copper conductor, the minimum section of protective ground wire (PE) shall be no less than 6mm2, copper terminal must be installed, and must be firmly pressed.

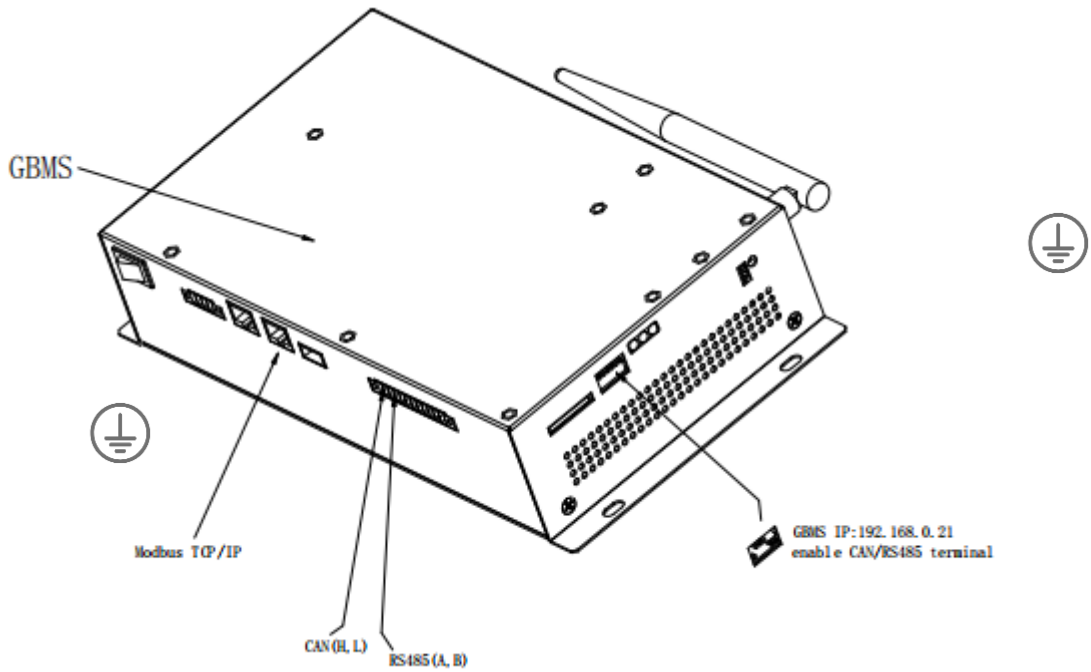
Figure 10.13 Ground(PE) connect



Step 10：CAN/RS485 with UPS

REVO series lithium battery system provides a variety of communication methods to meet the needs of users :CAN/RS485. The communication interface is unified and integrated on the integrated GBMS. GBMS is responsible for communicating with external equipment to realize information sharing.

Figure 10.14 Ground(PE) connect

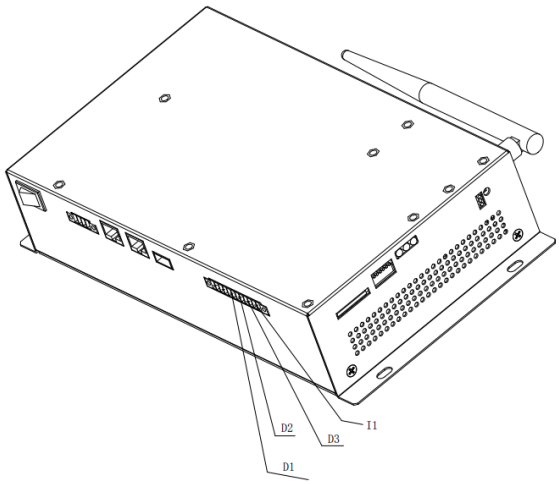


The specification of CAN/RS485 communication cable shall be A shielded twisted pair, and the communication terminals are at the bottom of GBMS, respectively printed with B A/H L. Please select according to the actual communication requirements. If you have any questions about the communication protocol provided by our company, please contact our technical personnel in time.

❖ **Step 11**：dry contact connection

In order to provide or accept quick response fault/danger protection actions, our REVO system provides 1 input dry contact I1 and 3 output dry contact D1 D2 D3.Its fault input and output dry contacts are shown in the figure below

Figure 10.14 dry contact define



DO dry contact is passive dry contact, normally open in normal state. I1 dry contact can be defined as EPO, and dry contact fault is defined as factory mode by default. Please refer to relevant documents of our company.If you have special needs, please contact us.

Item	Definition	Description
D1	Charger shutdown signal	The battery is fully charged or the number of primary protection cabinets in the battery system exceeds the redundant number,D1 is valid to normally close.
D2	Discharge prohibited signal	When discharging, the number of battery cabinets with primary protection or failure exceeds the redundant number,D2 is valid to normally close.
D3	Secondary protection signal	If any CBMS circuit breaker is open or trip, D3 is valid to normally close.
I1	EPO(input)	After this signal input is valid, the circuit breakers of all

	battery cabinets will be opened to cut off the output, usually used as an EPO signal

The cross-sectional area of dry contact cable should be between 1mm2 and 1.5mm2

11 TEST RUNING

11.1 Starting up

11.1.1 Starting up checking

- After installation or maintenance, the lithium battery system needs be started up. Before starting up, please check the following notes carefully to ensure that there is no error.
- All electrical connections must be performed in accordance with the manual electrical diagram
- The DC combiner box must be open status
- Reasonable distribution of cables, no mechanical damage and correct connection and fastening
- The internal protection device in the junction box must be firmly installed
- No extraneous parts or conductive materials remain in each cabinet
- The bus cable of combiner box output line is properly connected to the UPS terminal

11.1.2 SOC validation and calibration

- After the first boot, check the SOC status, the SOC range is generally 30%~50%
- Do a charge/discharge cycle to calibrate the SOC，1. Charge the freshly assembled battery to the UPS cutoff voltage ， 2. The battery is then discharged to the cut-off voltage set by the UPS，3. Then charge the battery fully. SOC display will be normal

❖ If the battery is in the charging and discharging working state and the SOC does not change, please contact the manufacturer

11.1.3 Start up steps

When lithium battery system is in normal operation, it is controlled by BMS intelligently without manual interference or control.When the lithium battery cabinet is in normal operation, the cabinet door should be locked tightly and the key of the cabinet door should be pulled out.

According to different on-site installation conditions, please refer to the following flowchart when starting up

11.2 Troubleshooting and maintenance

11.2.1 LED Display Fault

Table 11.1 LED fault

LED status	Remarks
Breaker on the indicator light is off	If the light is off, it means that the breaker has been off or disconnected, and the CBMS has not received high voltage power supply, please check whether there is any abnormality in the electrical connection of the system, and try to restore the system DC voltage . If the light is still not on, please contact our after-sales service.
Status indicator light is off	The light is yellow in normal static state, red in fault protection state, yellow flashing when charging and red flashing when

	discharging. If it is off that means CBMS has failed to power the indicator light. Try to power on again. If it doesn't turn on, we need to open the box for inspection and contact our after-sales department .

11.2.2 Troubleshooting

The following table shows the possible fault types and troubleshooting methods of our company in the series of products

Table 11.2 Troubleshooting list

fault type	Cause	Process mode
System over voltage	The system DC voltage is higher than the maximum setting value	1、Check whether the charging voltage of the UPS terminal is reasonable. If the charging voltage of UPS is higher than the setting value, please contact the UPS manufacturer for solution 2、Check the maximum setting voltage of battery terminal, and check the setting of protection parameters through LCD or VISION APP
System under voltage	The system DC voltage is below the minimum setting voltage	Check the minimum set voltage of the whole set of battery terminal, and check the protection parameter setting through LCD or VISION APP
Charging over current	The system charging current is higher than the maximum setting current	1. Check whether the charging current of the UPS terminal is reasonable. If the charging current of UPS is higher than the setting

		value, please contact the UPS manufacturer for solution. 2. Check the maximum charging current set at the battery end, and check the protection parameter setting through LCD or VISION APP.
Discharge over current	The main control CBMS has short circuit or internal components are damaged	1. Check whether the output power of UPS terminal is overloaded or not, and whether the actual value conforms to the design power. If the output power of UPS is higher than the setting value, please contact UPS manufacturer to solve it with Vision. 2、Check whether there is any problem with the internal control circuit of the main control CBMS, and please contact our company
Low Temperature Charging	Module temperature is below the minimum charging temperature	Check whether the indoor environment temperature is reasonable. If reasonable, check the minimum charging temperature parameter set by the system, and check the protection parameter setting through LCD or VISION APP. When the temperature rises to the reasonable range , the battery is recharged. After setting, if repeated, such as the system completely power off, then the battery module need be checked

Discharge low temperature	The module temperature is below the minimum discharge temperature	Check whether the indoor environment temperature is reasonable. If reasonable, check the minimum allowable discharge temperature parameter set by the system, and check the protection parameter setting through LCD or VISION APP. When the temperature rises to the reasonable range of lithium battery system, re-charge and discharge. After setting, if repeated, such as the system completely power off, maintenance module
Cell over voltage	The cell voltage is higher than the set cell maximum voltage	1、Please check the charging voltage of the UPS terminal and whether the setting value is reasonable. If the charging voltage of UPS is indeed higher than the set value, please contact the UPS manufacturer for solution 2、Please check the maximum setting cell voltage of the battery, and check the protection parameter setting through LCD or VISION APP After the above conditions are checked, the charging voltage can be reduced appropriately to alleviate this phenomenon. There is a certain of the battery difference, cell overpressure is a normal phenomenon .
	The cell voltage is lower	Please check the minimum setting cell

Cell under voltage	than the minimum voltage set value	protection voltage, and check the protection parameter setting through LCD or VISION APP; If it is confirmed that the setting parameters are reasonable and the single undervoltage protection fault occurs prematurely, please contact with Vision .
Charging high temperature	Module temperature is higher than the maximum charging temperature	Please check whether the charging time of the system is reasonable after the discharge; If reasonable, after the system is completely cut off, overhaul the module and overhaul the cooling fan
Discharge of high temperature	The module temperature is higher than the maximum discharge temperature	Please check whether the maximum set discharge protection temperature of the battery are reasonable and check the setting of protection parameters through LCD or VISION APP. If reasonable, after the system is completely cut off, overhaul the module and overhaul the cooling fan
CBMS Fault	Parallel communication fault	Please check whether the network cable connected by CBMS is loose or correctly connected. If the connection is normal and communication is still abnormal, please contact Vision
Power on system Self-checking failure self-check	Internal communication failure	Failure of communication between modules, maintenance of modules after complete power cut off

failed		
Fan error	Fan block or failure	1、Please check whether the system is in normal operation and whether there is blockage near fans. If so, remove the foreign body .If it cannot operate still after removing the foreign body. Replace the fan after the system is completely cut off
Insulation impedance alarm	Due to poor ground insulation or damp environment	1、Please Check whether the insulation impedance protection parameter setting is normal through LCD or VISION APP; 2、Please check the impedance of the module and the DC cable to the ground, and confirm whether there is voltage to the ground or the insulation impedance is less than the specified alarm value 3、Please check the BMS insulation impedance to the ground , and confirm whether there is voltage to the ground or the insulation impedance is less than the specified alarm value 4、Confirm whether there is short circuit or mechanical damage of cable insulation skin 5、If the cable is normal, the insulation fault occurs in wet weather. Please confirm again when the weather is good .
The LCD screen	The power supply line of the	Please check whether all wiring is normal or

cannot start up or displays abnormal	display screen is loose, the communication cable is connected in reverse or loose	firmly connected (power supply line and communication line), confirm whether the A/B line is connected in reverse. If all above are normal, please replace the LCD display screen or contact with Vision
Dynamic dropout voltage : single cell dropout voltage is much different when discharging	Loose copper strip of battery connection or weak welding of nickel strip; The self-discharge of cell is over discharge, and the capacity of other cells is different.	1、Determine the position of the defective cell module, unpack and inspect the welding place of the battery connection copper strip or nickel strip, and tighten the bolts there 2、Charge and discharge the battery or replace the module.

11.2.3 Routine maintenance

Table 11.3 maintenance

Maintain Items	Check methods and standards	Maintenance period
Power cable connection	Please check whether there is mechanical damage to the power cable, whether there is the phenomenon that the insulation wrapping of the terminal is falling off, if there is, it must be repaired or replaced Please check the connection is loose, whether it is loose or not, please screw it again with standard torque Please check whether there is screw loose or color change in wiring copper bar	Once every six months
Communication terminal connection	❖ Check whether the parallel communication network cable is loose, please use a screwdriver to tighten it again ❖ Check whether the communication cable peeling or	Once every year

	color change, if so, it must be replaced	
Fan	❖ Please check whether there is noisy, fan clog or fan blade physical defect during operation for fans. If yes, replace the fan	Once every year
System clean	❖ Please check whether the front and back door of the cabinet and modules are attached with dust. Please clean the dust at the outlet in time and check and clean the CBMS panel	Every six months to one year
System running state	❖ Check the monitor LCD panel for any abnormal faults ❖ Check whether all parameters are normal when the system is running (total voltage, insulation, etc.) ❖ Check whether the main components of the system are normal or not, including the circuit breaker switch whether the mechanical closure is good;Whether the contactor is in good mechanical condition (including auxiliary switch) ❖ Check whether the ventilation duct of the system inlet and outlet is abnormal and clean it in time	Every six months once time
Software maintenance and data preservation	❖ Check whether the parameters in the software Settings are reasonable or have been artificially changed ❖ Read LCD software operation data and save the operation data (including various parameters and Japanese files).	1 times a month
Charge and discharge maintenance	❖ Check whether SOC and SOH status of lithium battery system are normal, with light load and shallow discharge and charge, it is recommended to shallow discharge DOD: 10%, and observe whether charging and discharging current and voltage collected by the system are consistent with operation	Every six months

❖ Take good protective measures during maintenance, wear insulating gloves and insulate metal tools

❖ At the end of maintenance, be sure to return the objects that need to be removed to their original state and ensure that all screws are

fastened in place

12 System Monitoring

12.1 Vision APP Software download and installation

12.1.1 App brief introduction

VISION APP is an APP specially developed by Vision for intelligent management of REVO series of systems. It can establish connection with REVO system through GPRS signal, and users can conduct information query, alarm protection status query, parameter setting and other operations on all running states of the system by using VISION APP .

12.1.2 Download and installation

Method 1:

VISION APP can be downloaded and installed through the application market of each operator

- App treasure (android user)
- App store (ISO user)

Method 2:

Scan the below QR code for download and installation

Note:regarding the APP ,EMEA is not available now

12.2 Monitor software

12.2.1 monitor software connection

The monitor software is a battery monitoring system running on the PC, please refer to the following steps , that means click here.

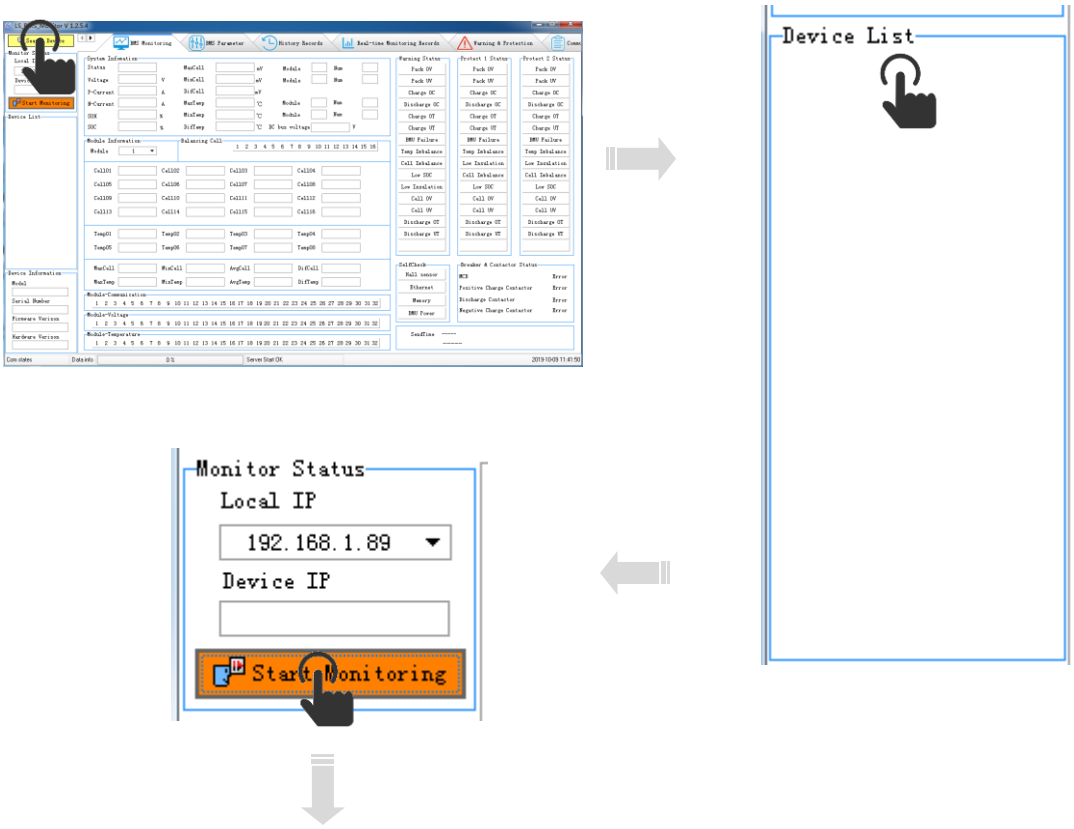
Step 1: Set the IP address of the laptop, set as follows:

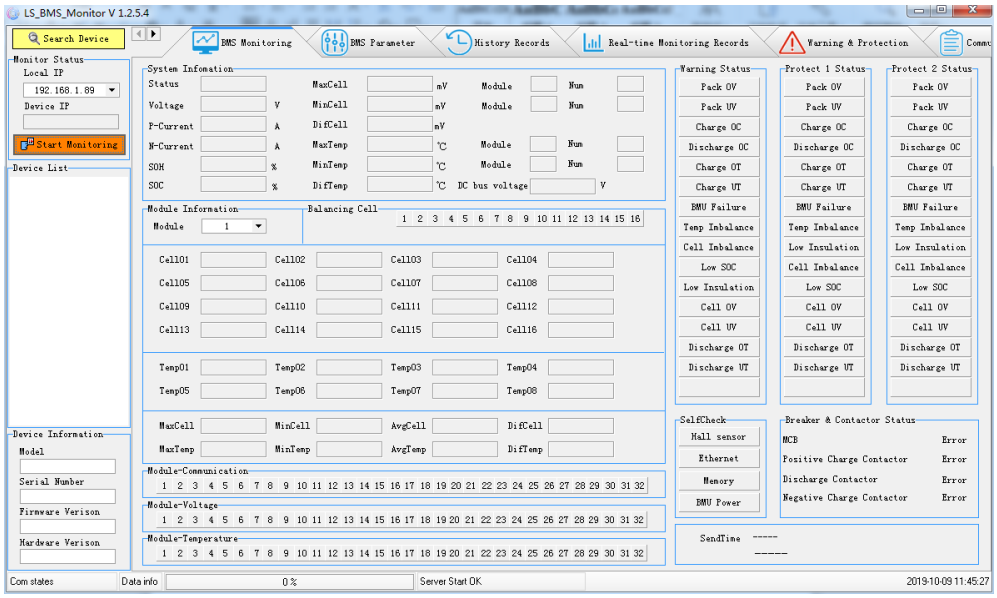
IP address	192.168.0.110
Subnet mask	255.255.255.0
Default gateway	192.168.0.1
Preferred DNS server	192.168.0.1

Step 2: connect the laptop with the router with the network cable, refer to the figure in section 7.2.

Step 3: open the monitor software LS_BMS_Monitor

Step 4: click the top left corner of the software to find the device, and the IP address of the device appears in the device list. After selecting the IP address, click the start monitoring button to implement monitoring.


Device List
Monitor Status
Local IP
192.168.1.89
Device IP
Start Monitoring



12.2.2 monitor software

home page: BMS real-time monitoring

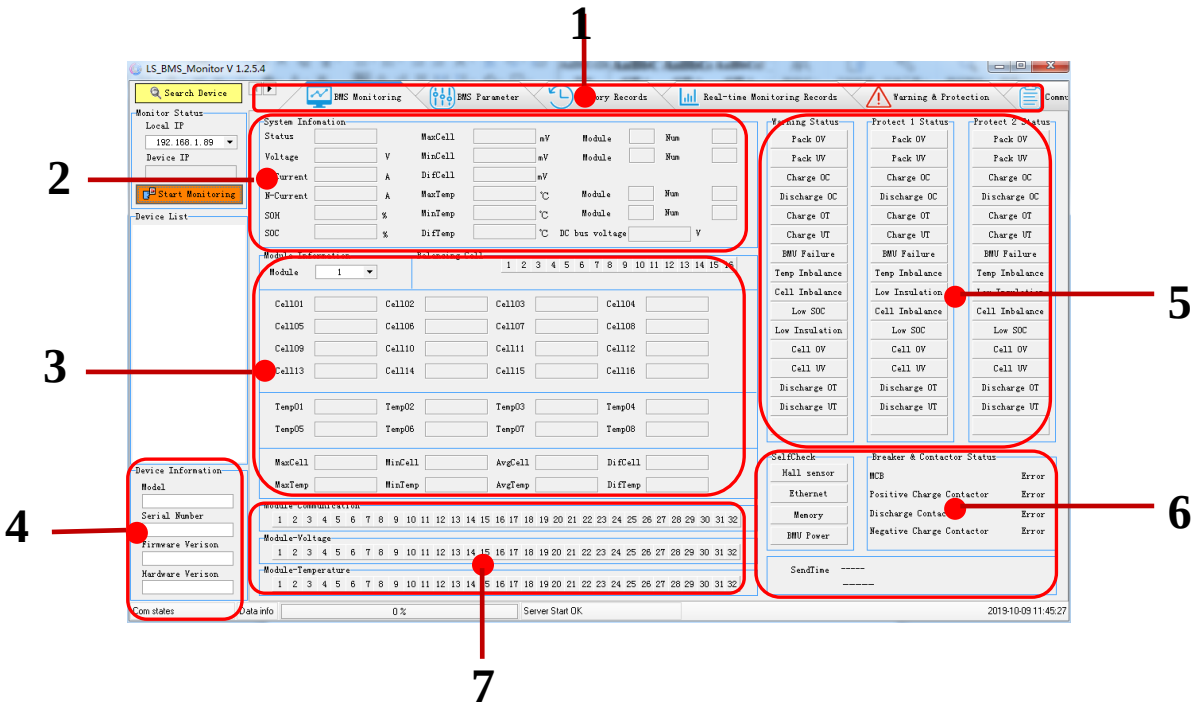
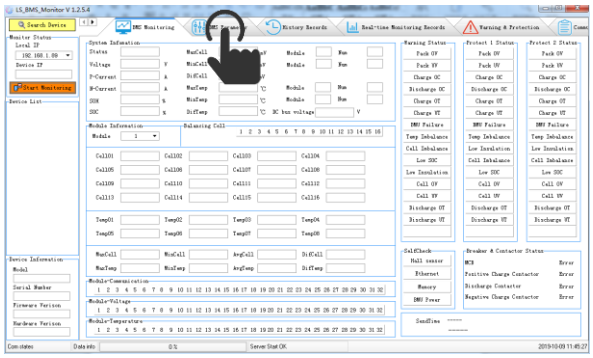


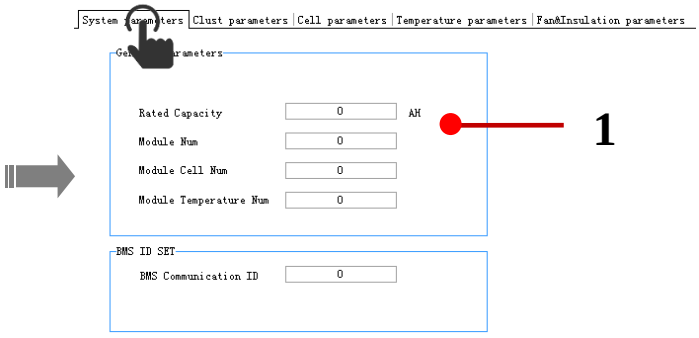
Table 12.1 monitor software overview

item	Designation	Description
1	Navigation area	Display monitoring software different monitoring Settings functional area
2	Overall monitoring area of the system	Displays the current running state of the system
3	Module information area	Display the system module state, temperature voltage state
4	Device information	Display product model, software version, etc
5	Warning /Protection status	Displays current warning and protection status information
6	MCB, contactor status	Displays the current system's self-check status, circuit breaker and contactor on and off status
7	Module status area	Display module voltage, temperature, communication status information

12.2.3 BMS parameter setting

Click BMS parameter Settings in the software navigation area  ,the system parameter ,battery parameter ,single cells parameter and temperature .





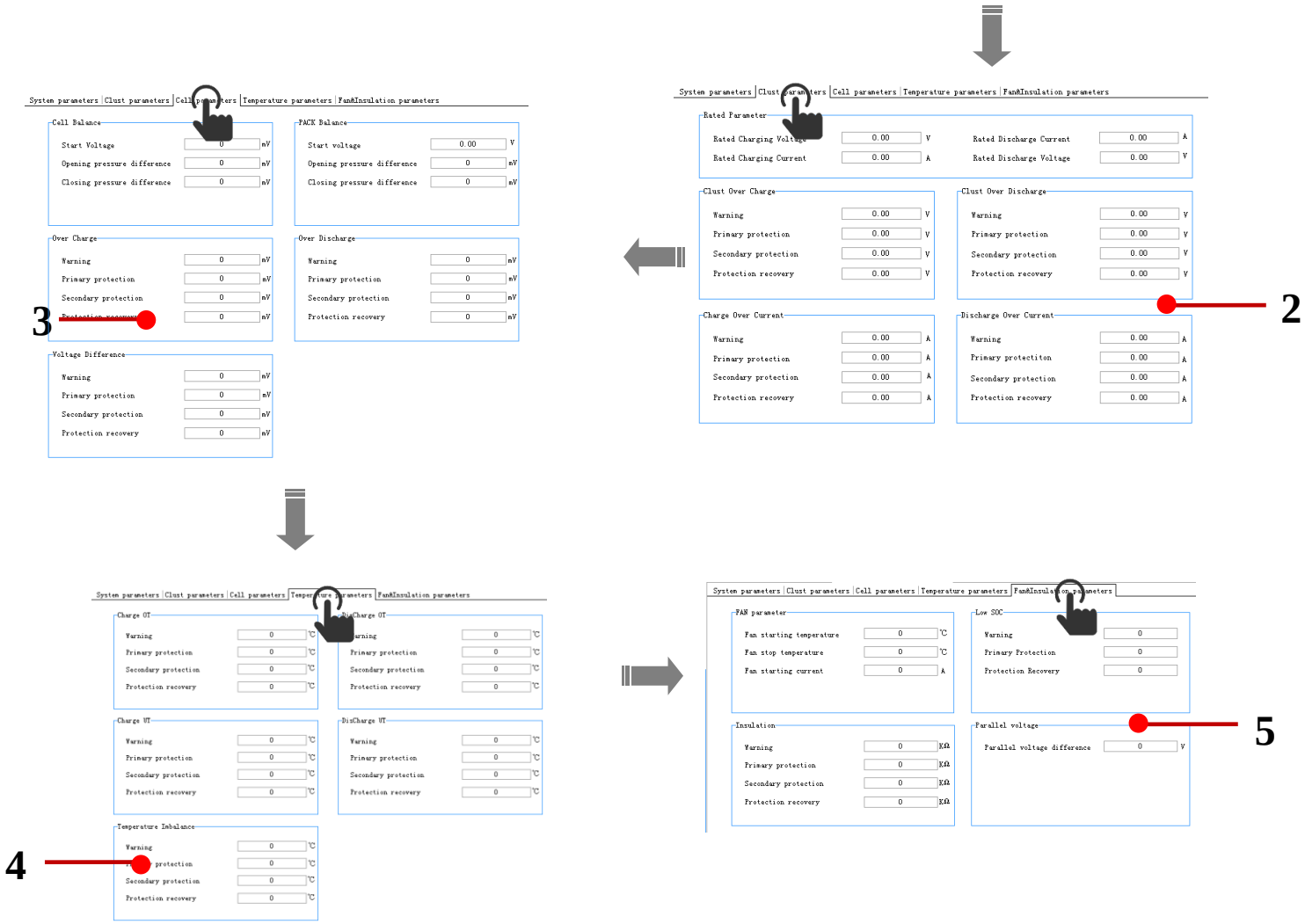


Table 12.2 BMS parameter overview

Item	Designation	description
1	System parameter	Used for setting system information, including rated capacity, number of modules, etc
2	Battery module parameters	Used to set the overall protection value of the system, charging and discharging current value
3	Single cells parameters	It is used to set over voltage and under voltage protection value and equalization parameters of single battery

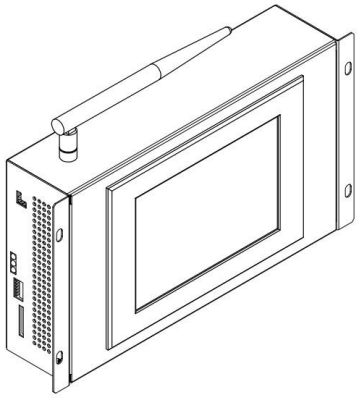
4	temperature parameter	Used for setting the protection value of charging and discharging at high temperature and low temperature
5	Others	Used for setting fan control parameters, parallel voltage parameters, etc

When the product leaves the factory, the parameters are set by default to ensure the system safe operation of the system. If you need to modify, please contact our technical staff for assistance

12.3 HMI monitoring

12.3.1 Product specifications

Figure 12.1 BMS parameter overview



12.3.2 Performance

Table 12.3 GBMS performance specification

Item	Designation	description
1	Communication interface with CBMS	CAN/RS485
2	Communication interface with UPS	CAN/RS485

3	Support IAP upgrade	Y
4	Support HMI display and parameter setting	Y
5	Dry contact output	3 output (0.5A@125VAC;1A@24VDC)
6	Dry contact input	1 input
7	Number of CBMS supported for management	⩽15
8	powered by	24VDC(18~28V)
9	Power consumption	15W MAX.4.8W Normal
10	Dimensions	66*280*170mm

12.3.3 Homepage

Figure 12.2 GBMS homepage preview

After the HMI starts, the home page will be displayed, and the content of the home page is as follows:

Table 12.4 HMI interface overview

Item	Description
check	System self-check status, self-check failure is red cross, pass is green tick
Status	Display real-time charge and discharge status
Power	Display real-time power
Current	Display real-time system current
Voltage	Display real-time system voltage
Monitor	Click to display the system monitoring page
Cell Data	Click to view the system cell data
Warning	Click to view the alarm status of the system and each CBMS
Setting	Click to set system related parameters

12.3.4 Real-time monitoring

Click the icon on the homepage to enter the real-time monitoring page.

Figure 12.3 GBMS homepage preview

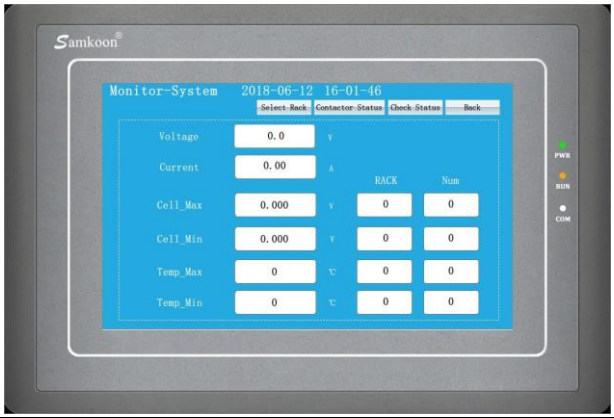


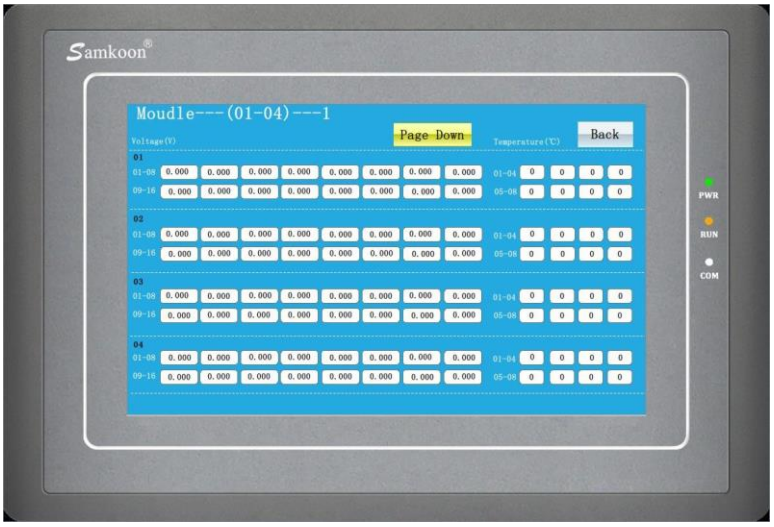
Table 12.5 HMI homepage overview

Item	Description
Voltage	System voltage
Current	System current
Cell_Max	Maximum cell voltage
Cell_Min	Minimum cell voltage
Temp_Max	Maximum cell temperature
Temp_Min	Minimum cell temperature
RACK	CBMS number of Maximum value
Num	Module number of Maximum value

12.3.5 Cell data

After clicking the icon  on the home page, enter the cabinet selection page, you can click "+" or "-" to select the cabinet, or you can directly enter the cabinet number, click the "View" button to enter the single battery data page, each page displays 4 modules For group single battery data, you can click "Page Down" to view the data of the next 4 modules, and click "Page Up" to view the data of the last 4 modules. Each module has up to 16 voltages and 8 temperatures. If the actual number of battery cells in the module is less than 16, the unconnected battery is displayed as empty. The unconnected temperature displays 200.

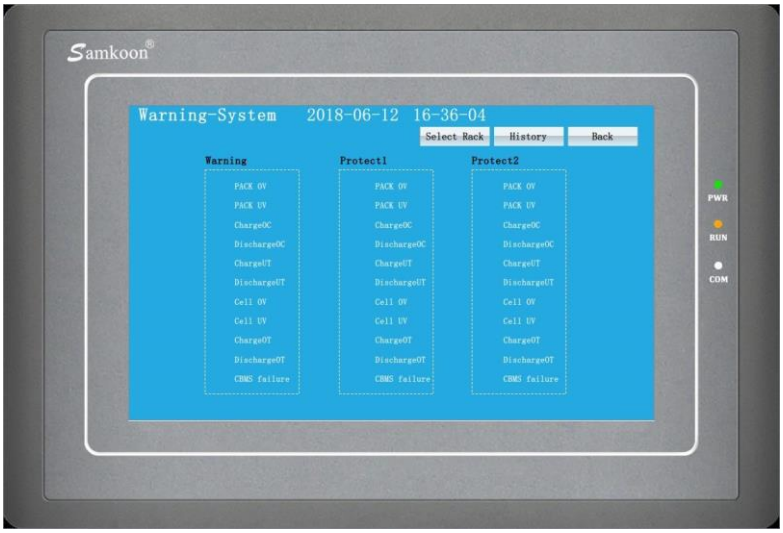
Figure 12.4 Cell data preview



12.3.6 Alarm/protection page

Click the icon  on the homepage to enter the alarm protection page.

Figure 12.4 Alarm/protection preview



12.3.6 Parameter setting page

After clicking the icon  on the homepage, enter the password: 8888 in the pop-up login box to enter the parameter setting page. Currently, it only supports setting the parameters of GBMS itself,GBMS needs to set the rated capacity of the system, the number of modules in a single cabinet, the number of battery strings in the module, the number of temperatures in the module, and the number of CBMS that need to be managed

Table 12.6 GBMS parameter setting overview

Item	Name	Description
1	Rated capacity	The total parallel capacity of the entire system
2	Module Num	Number of modules connected in series
3	Cell In Module	Number of batteries in series in the module
4	Temp sensor in Module	Number of temperature sensors in the module
5	CBMS Num	CBMS parallel number of the system
6	Redundant Num	Number of battery rack redundancy
7	Intermittent Charging	System recharge time, the default is 28 days, usually shown as reset D1 dry contact

13 Firmware upgrade

13.1 Prepare before upgrade

Table 13.1 GBMS parameter setting overview

Item	Name	Description
1	Laptop or PC	Windows 7 and above version system
2	Upgrade software	BMS_Upgrade_Tool.exe
3	Ethernet cable	connect BMS LAN port and computer/laptop

13.2 Upgrade Steps

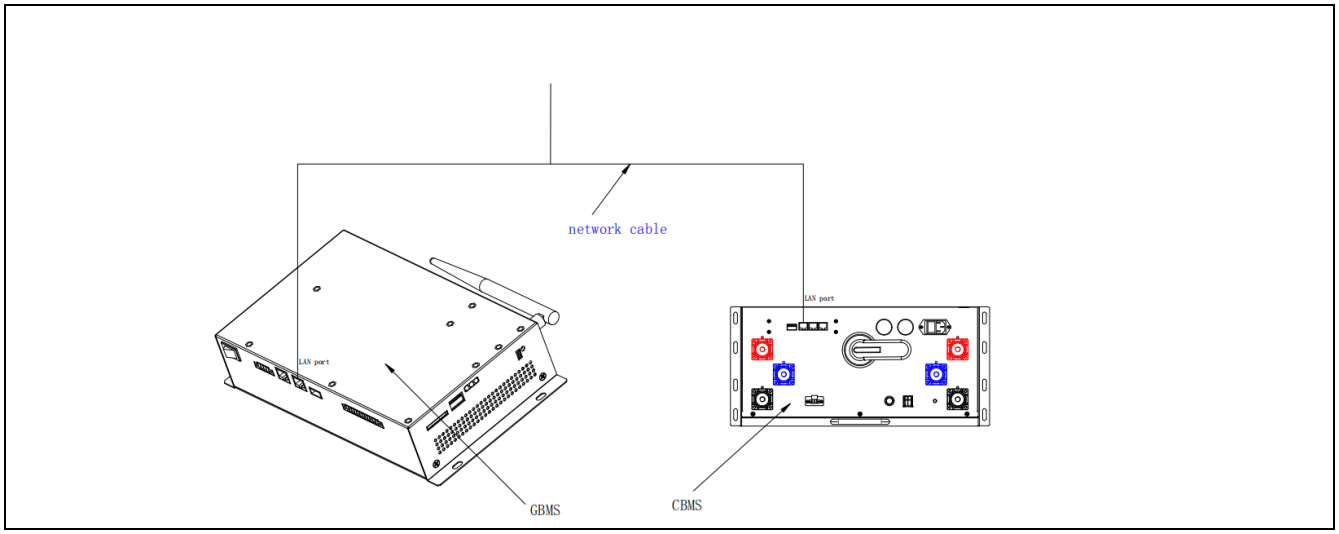
❖ **Step 1**

Close the anti-virus software of the security guard on the computer, close the firewall of the computer itself, and prevent the upgrade program from being intercepted by mistake

❖ **Step 2**

The upgraded CBMS/GBMS will be booted, and connect the LAN port on the CBMS/GBMS panel and the computer's network interface by the Ethernet cable.

Figure 13.1 Connect LAN between BMS and laptop



❖ **Step 3**

The IP address of the Laptop/computer's wired network card is set as follows:

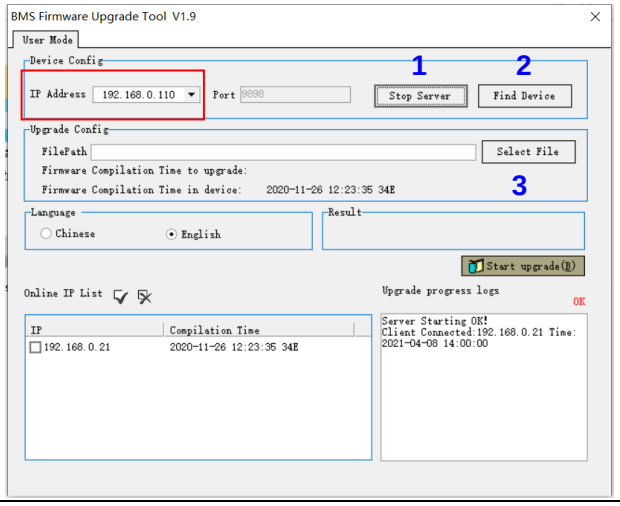
Table 13.2 IP address of the Laptop setting

IP address	192.168.0.110
Subnet mask	255.255.255.0
Default gateway	192.168.0.1
Preferred DNS server	192.168.0.1

❖ **Step 4**

Disable the computer's wireless network card (if it's a laptop). Open BMS_Upgrade_Tool.exe. As shown in the figure below, confirm that the server IP is the IP of the wired network card. Then click the **1**"Start Service" and **2**"Find Device" buttons in turn, and click the **3**"Select File" button to select the firmware to be upgraded (suffix is**.bin**).

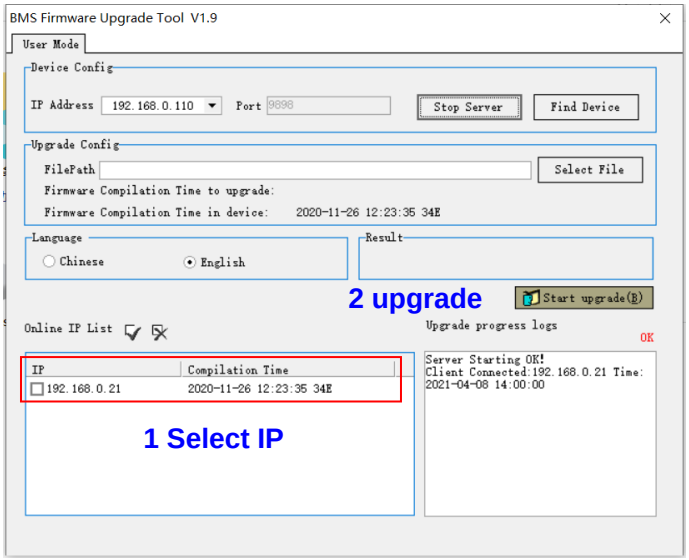
Figure 13.1 Connect LAN between BMS and laptop



❖ **Step 5**

When the device is connected, it will be displayed in the list of online devices on the left. At this time,check the device,then click the "Start Upgrade" button to start the upgrade.

Figure 13.1 upgrade firmware steps



❖ **Step 6**

After waiting a few seconds, the communication process will be displayed in the upgrade progress log of the upgrade software, and the upgrade result will be displayed above after the upgrade.

13.3 Trouble Shooting

Table 13.3 Fault when upgrade firmware

Item	Fault	Analysis of causes
1	BMS could not connect to the Laptop/computer.	1. Is the Wire Connection Normal? 2. Is the BMS power on? 3. Is the IP setting correct? 4. Is Antivirus Software Mistakenly Intercepted?

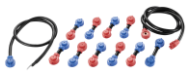
2	BMS can be connected, but the upgrade display failed	1. Is the ethernet cable loose during upgrade? 2. Is the equiment shutdown during upgrade?

14 Spare part

14.1 Spare part list

Spare parts are the main material basis for system repair, and timely supply of spare parts can shorten repair time, reduce system losses, and improve equipment reliability

Table 14.1 spare part overview

No.	Parts	specification	Pictures
1	Fan	48VDC,60×60×25mm（L:100mm)	
2	Communications plug	16SBMU Communication switching harness	
3	power cable	50mm2 Battery connector, module signal connector terminal wire harness	
4	Network cable	Super Category 6 wire, shielded，L:3m	
5	Screw	M6*12mm,Stainless steel ,cross	
6	CBMS	LUF16S10D630AD0	

7	Module	LFP51.2V module,442mm width	
8	GBMS	Display GBMS integrated	

14.2 spare part replacement

14.2.1 Module replacement

When the battery module has a cell failure or abnormal voltage/temperature/communication collection, we need to repair or replace the module.

When replacing a new module, we must pay special attention to the SOC of the new module. Generally speaking, it is necessary to recharge the new module to make the same SOC level with the older modules. When replacing the old module, please refer to the following steps.

❖ **Step 1**

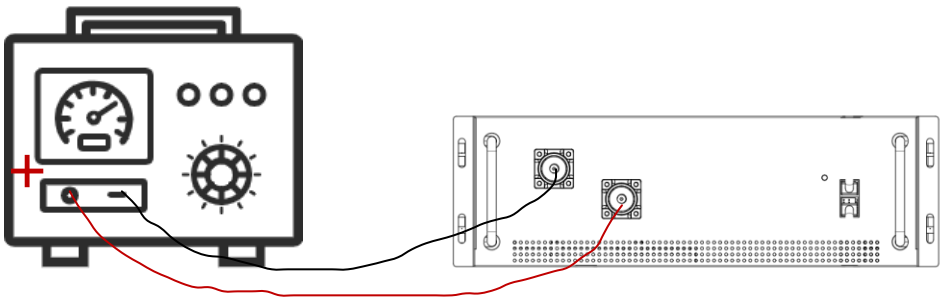
Confirm whether all the modules in the old battery cabinet are fully charged? If not, you need to start the UPS to recharge the old battery cabinet.Judge whether it is full through SOC, cabinet overall voltage or average cell voltage parameters

Recommend: UPS start boost charge (CC/CV mode), boost charge voltage: 544V (3.4V/cell), charge current 0.5C, cut-off current 0.1C

❖ **Step 2**

Confirm whether everything is normal for the new module, simply check the module voltage with a multimeter.Normal module voltage range is 52.8~54.08V.if okay,charge the new module with the Charger.

Figure 14.1 charge the New module

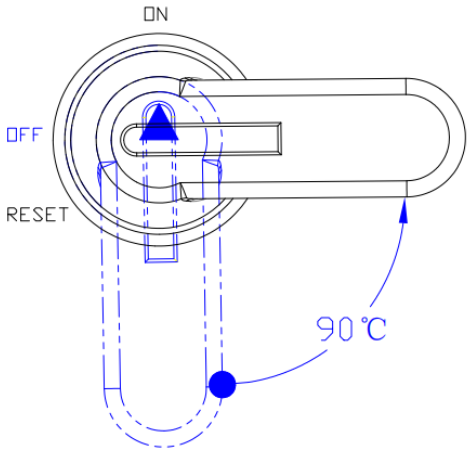


Recommend: start the charger (CC/CV mode), charge voltage: 54.4V (3.4V/cell), charge current 0.2C, cut-off current 0.1C

❖ **Step 3**

Disconnect the MCB of the cabinet CBMS where the abnormal module is located to ensure that we can remove the faulty module in the case of power off.

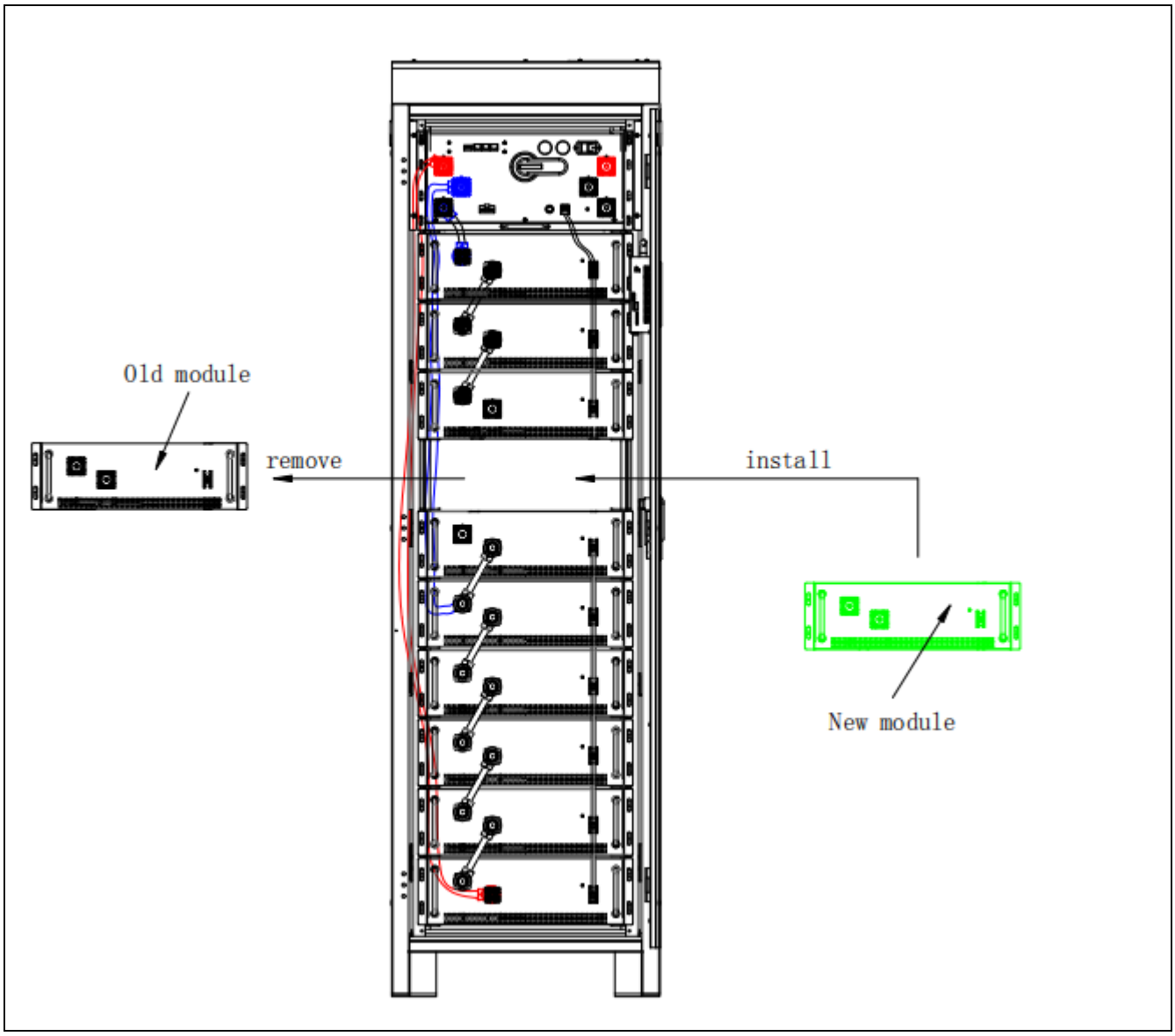
Figure 14.2 MCB OFF



❖ **Step 4**

Disconnect the power cable and fixing screws of the faulty module, remove the faulty module, pay attention to the weight of the module, it is recommended to use a lift truck to unload and transport the module.

Figure 14.3 module replacement



❖ **Step 5**

Reconnect the power and communication cable, power-on CBMS to self-check, check whether the system has returned to normal after replacement

Noted: Check whether all the states of the new module are restored to normal, including battery cell voltage, temperature, and communication status, which can be viewed through LCD or monitoring software

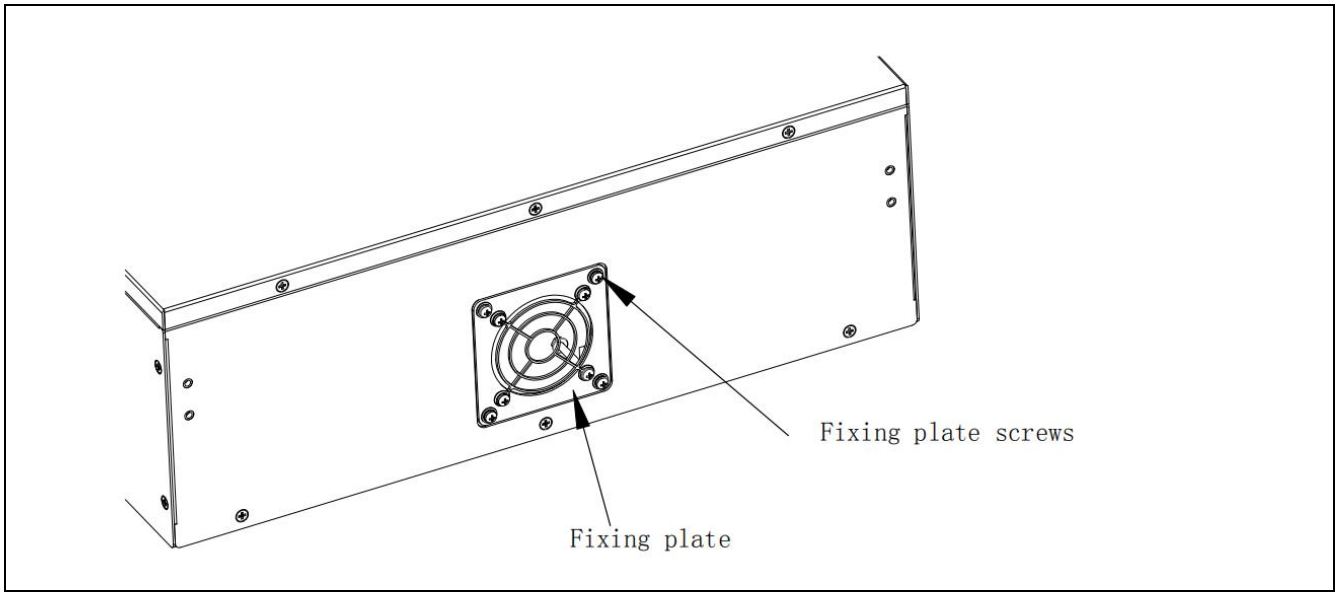
14.2.2 Fan replacement

The battery module is cooled by air, and the cooling fan is located behind the module, which is easy to disassemble and maintain.

❖ **Step 1**

Remove the fixing plate screws of the fan module

Figure 14.4 remove FAN fixing plate screws



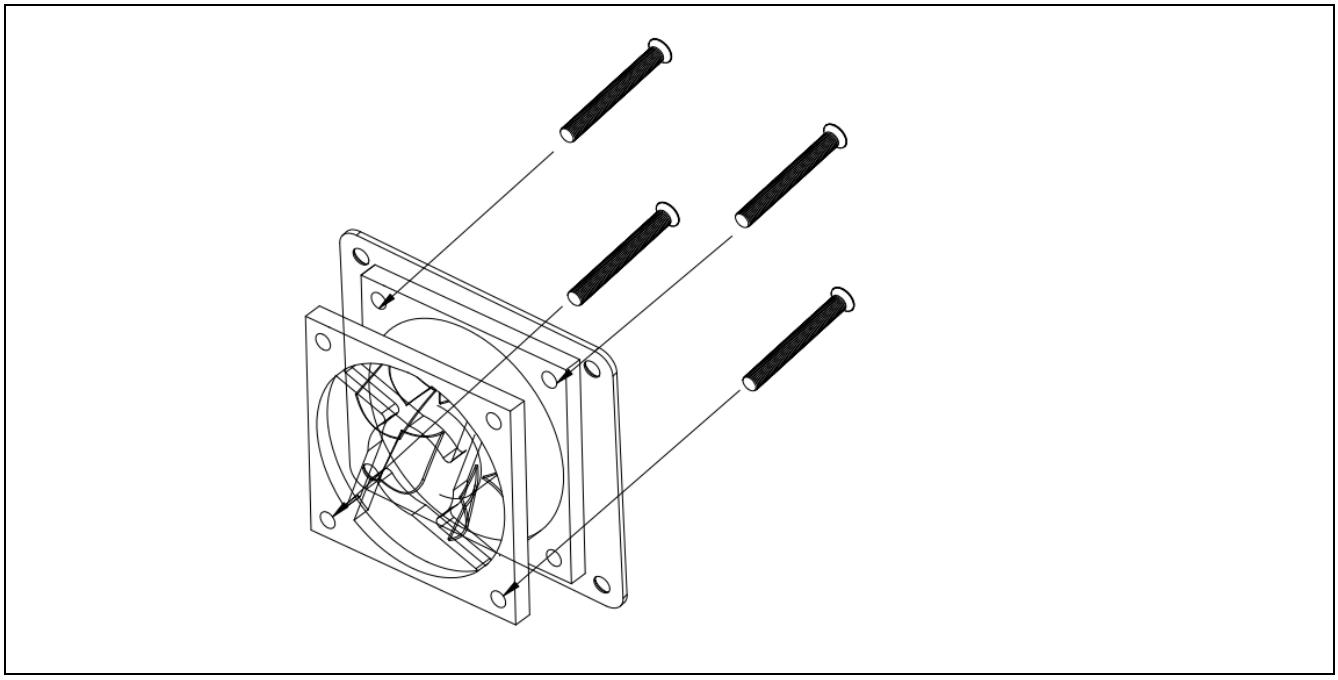
❖ **Step 2**

Take out the fan module and disconnect the fan power plug

❖ **Step 3**

Loosen the fan fixing screws

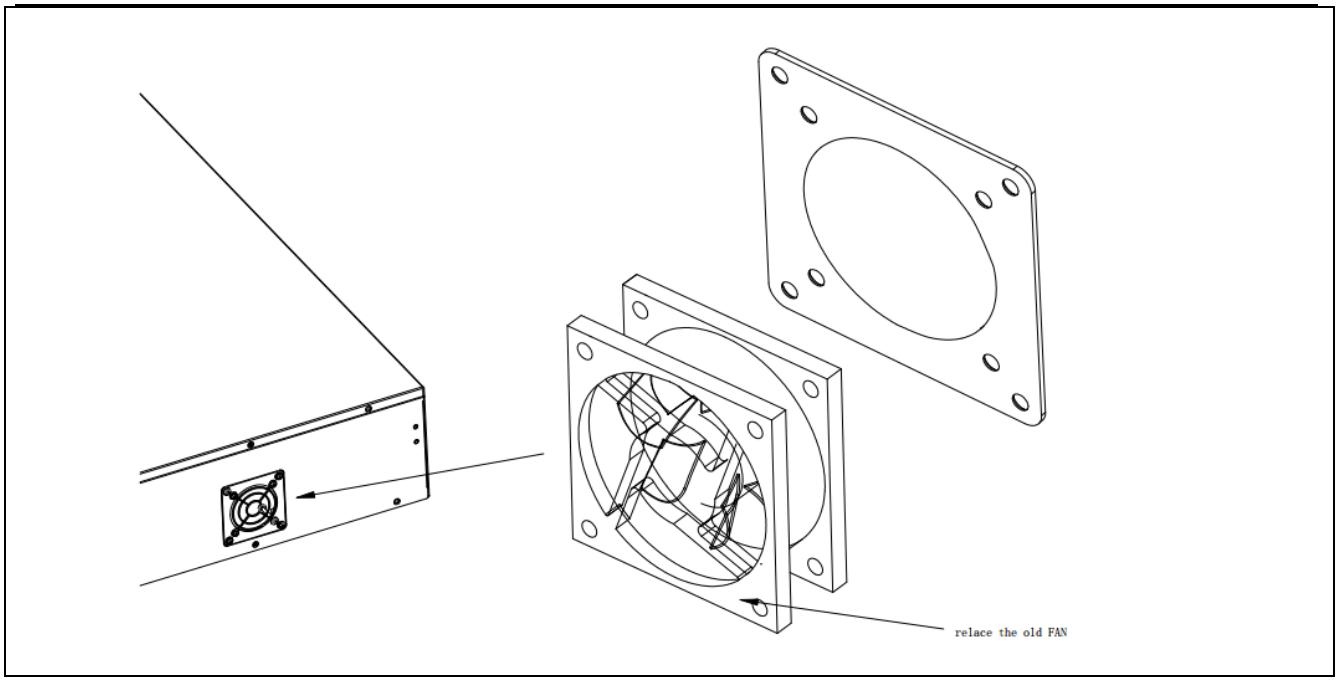
Figure 14.5 remove FAN fixing screws



❖ **Step 4**

Replace the FAN and fix it back again on the module plate

Figure 14.6 replace the FAN



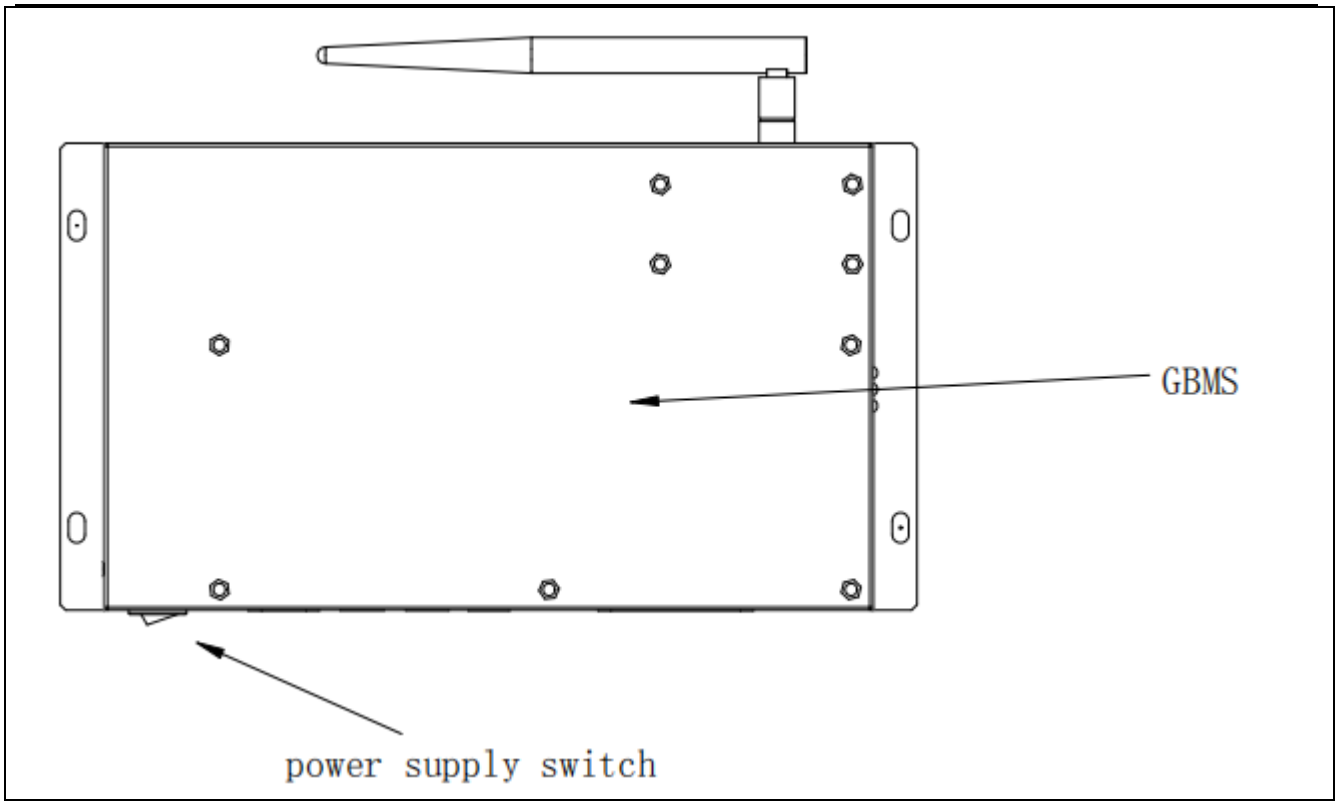
14.2.3 GBMS replacement

During system running, GBMS needs to be replaced when it cannot communicate or the display cannot work or other hardware problems. GBMS replacement is easy and will not affect the battery to supply power to the load online.Please check the following steps

- **Step 1**

Turn off the GBMS power supply

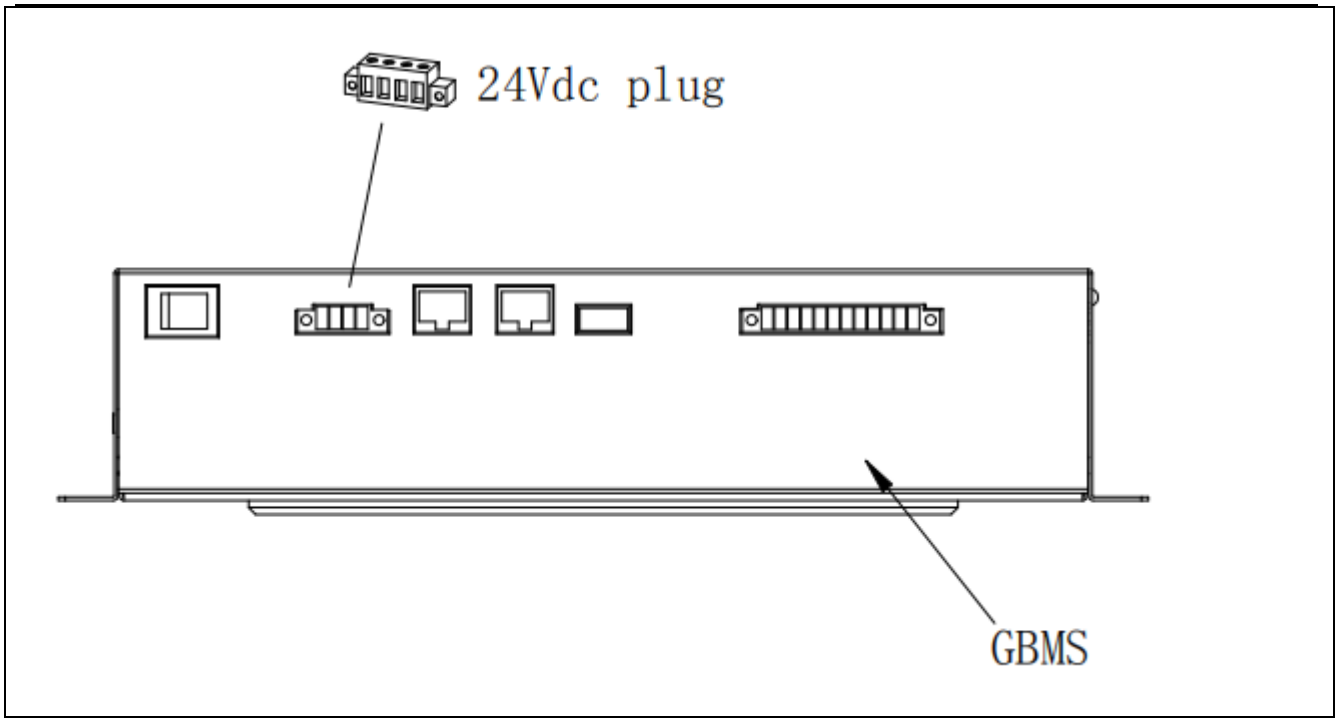
Figure 14.7 turn off GBMS



❖ **Step 2**

disconnect the GBMS 24Vdc plug

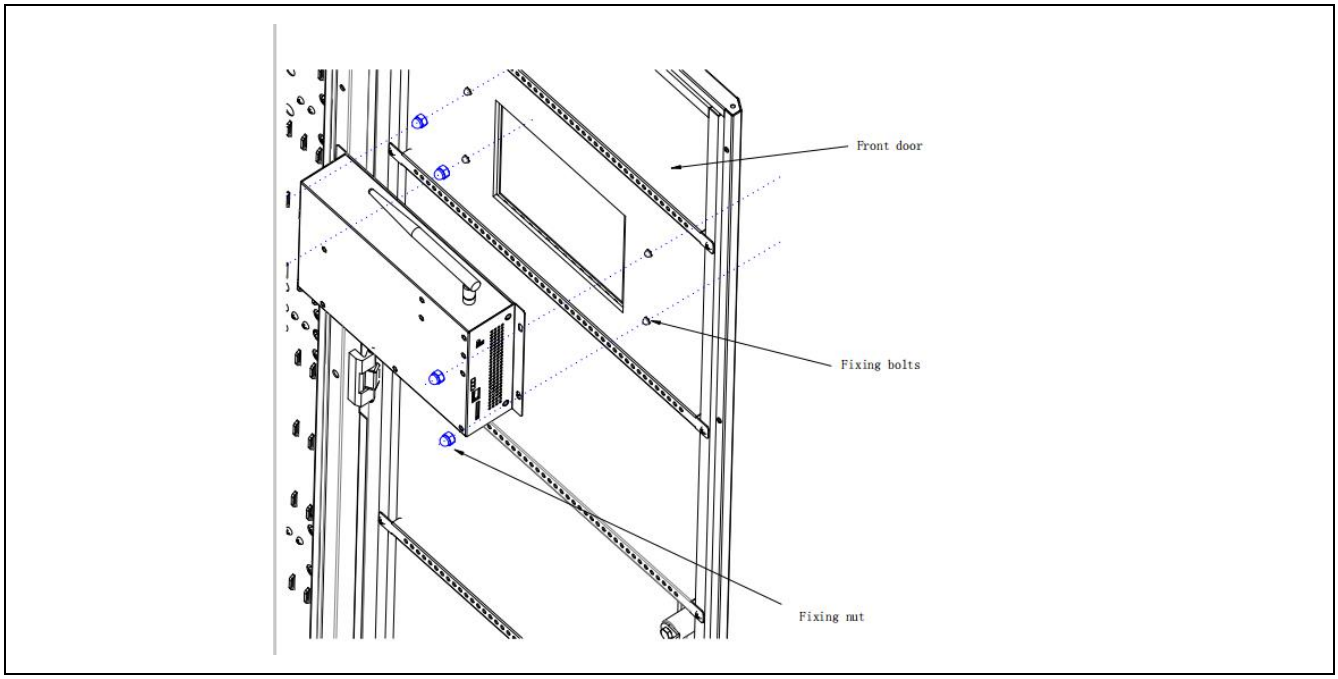
Figure 14.7 disconnect GBMS power plug



❖ **Step 3**

Loosen the GBMS fixing screw and remove it to replace.

Figure 14.8 replace GBMS



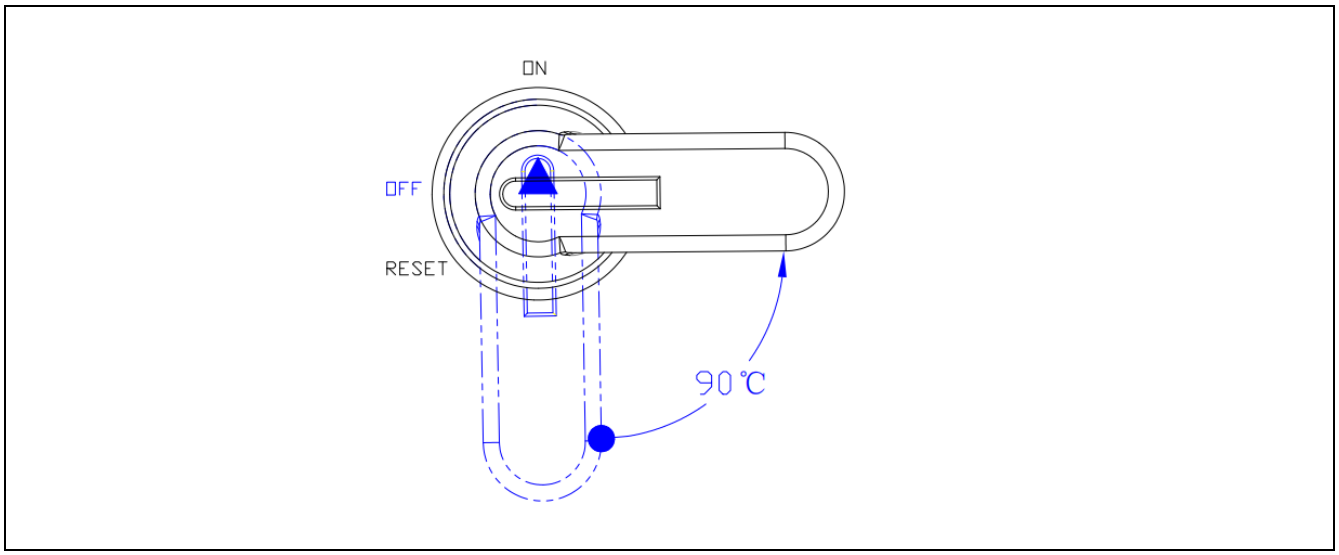
14.2.4 CBMS replacement

When the CBMS has a communication failure, the contactor cannot be closed due to the failure of the self-check, and the circuit breaker fails to close, etc., check if it is a hardware problem, consider replacing the CBMS.

❖ **Step 1**

All the MCB of the CBMS must be disconnected, CBMS DC bus voltage must be cut off for safety operation.

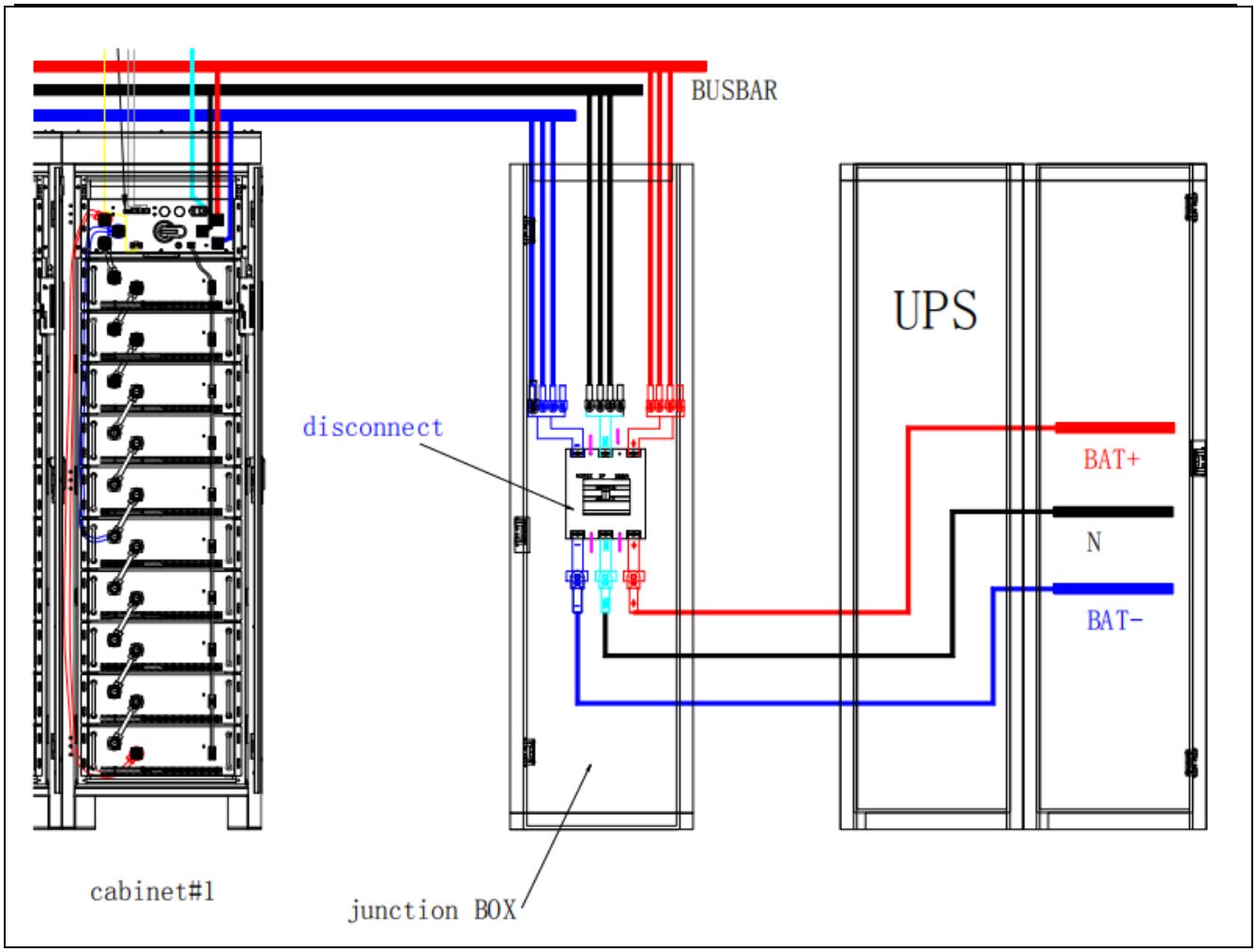
Figure 14.9 MCB OFF



❖ **Step 2**

If there is a junction cabinet between the UPS and the battery cabinet, you need to disconnect the junction cabinet switch between the UPS and the battery cabinet,make sure that the connection between the battery pack and the UPS DC bus must be cut off.

Figure 14.10 disconnect the junction box

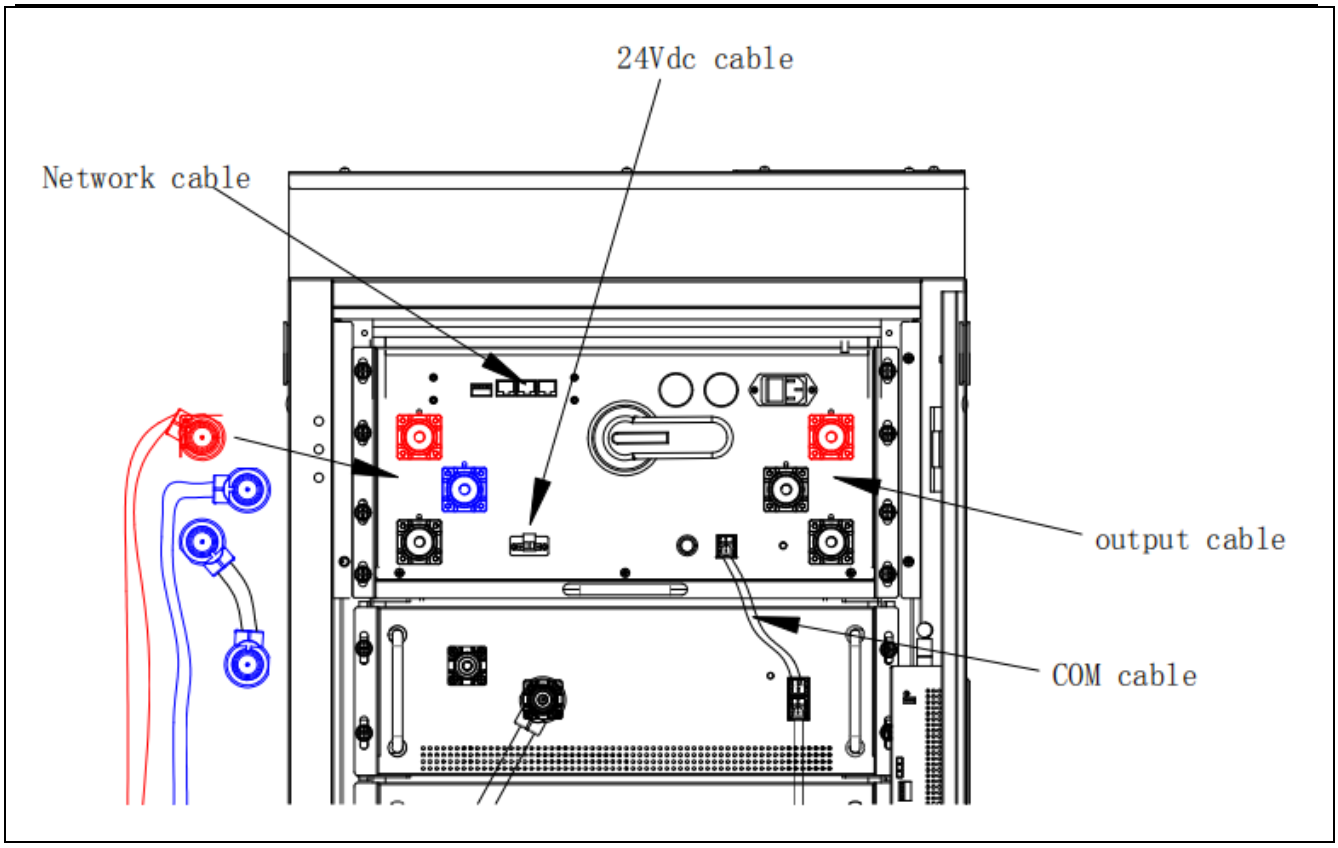


If there is no junction cabinet between the UPS and the battery cabinet, you need to turn the UPS to the bypass mode to make sure that no high DC Voltage output from the UPS DC side.

❖ **Step 3**

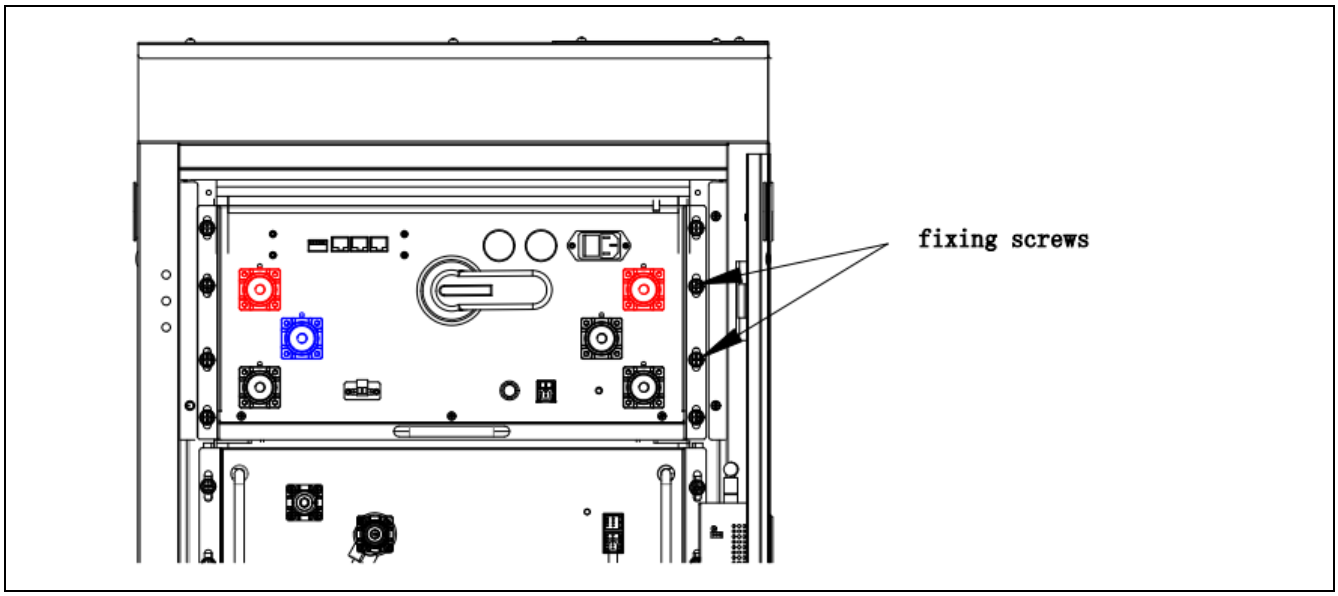
Disconnect the battery output DC cable.At the same time, pay attention to the insulation of the exposed output wire terminals

Figure 14.11 disconnect all the CBMS cable



❖ **Step 4**

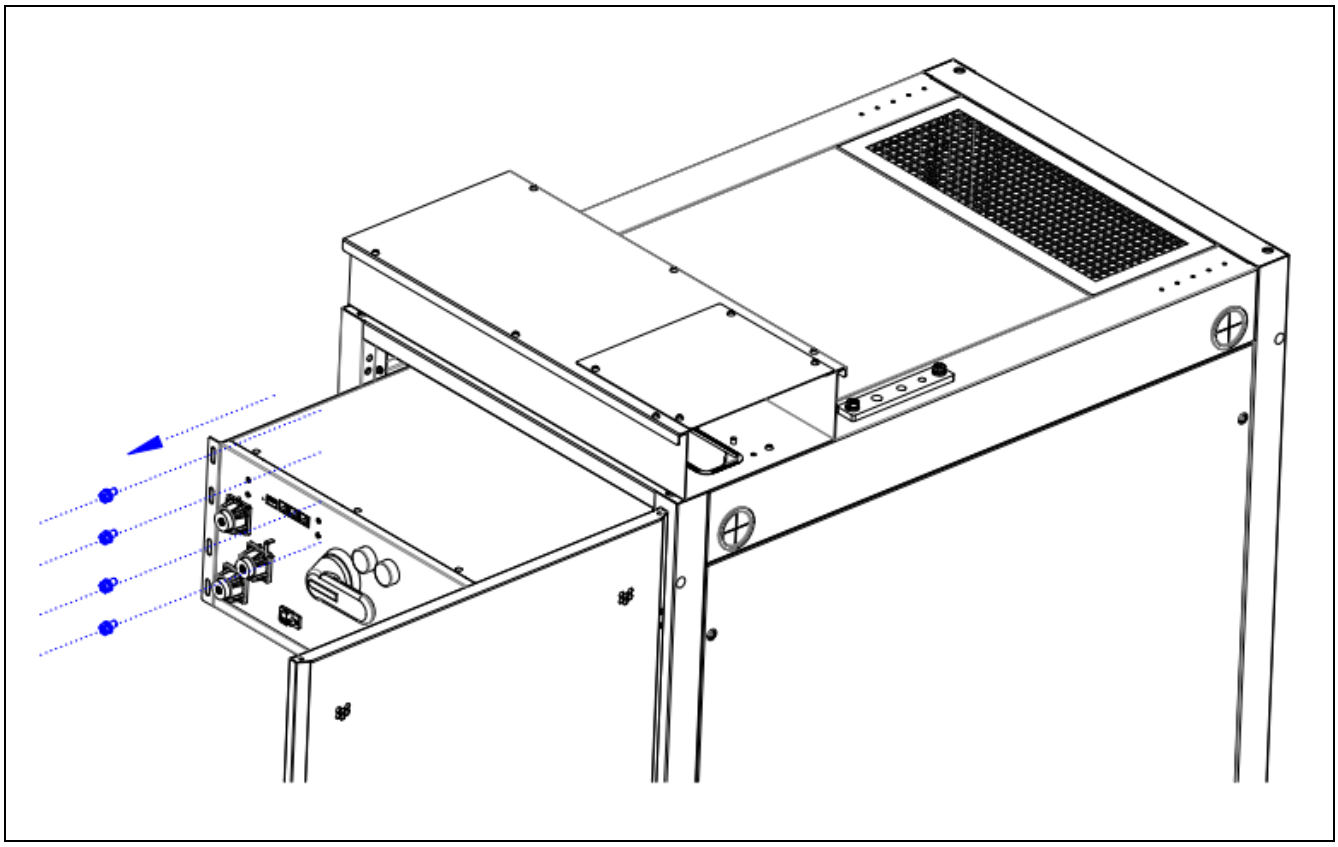
Figure 14.12 Remove all fixing screws of CBMS



❖ **Step 5**

Move out of CBMS, pay attention to the weight of CBMS.

Figure 14.13 move out of CBMS



Noted:

1)The tools used by installation and commissioning personnel must have insulation protection.

2) During installation, debugging and maintenance, you must wear insulated rubber gloves, goggles and insulated rubber boots as appropriate to avoid safety accidents as much as possible.

3) When maintenance is required, the main circuit breaker of the CBMS must be disconnected, and the connection between the battery pack and the PCS/UPS DC bus must be cut off.

15 Appendix

15.1 Factory Warranty

Our company promises that during the warranty period, any defective products of REVO system will be replaced with free of charge which customers must provide the purchase invoice and relevant warranty information of the products. Otherwise, our company has the right not to guarantee the quality.

15.2 Limitation of Liability

Liability exemption：

- Under the following cases, our company has the right not to provide quality assurance
- Customers does not install, use or modify properly accordance with following this manual
- Product damaged in transit
- Product failure caused by installation, replacement or unloading by non-relevant technical personnel or our company
- Product failure and damage caused by operating environment beyond manual specification or abnormal natural environment,Such as floods, typhoons, earthquakes, etc.
- Product failure or damage caused by failure to operate or install in accordance with relevant standards
- The products exceed the warranty period

In case of product failure or damage caused by the above reasons, if the customer requires replacement or maintenance services, we can provide corresponding paid replacement and maintenance services after our after-sales service confirm and evaluate the degree of product damaged .

15.3 About VISION

If you have any questions in the process of using or installing the product, please contact the relevant personnel of Vision in time. Our company will arrange relevant after-sales service in time. Contact information is as follows

16 Related annex

16.1 About storage

a. Short-term lithium storage：When the lithium battery is not used for a short period of time(≤6 months), the battery shall be store in a cool and dry environment.

b. the storage temperature range: 20℃~35℃, the relative humidity range is 35%~85%.

c. Long-term lithium storage: Lithium battery is not used for a long time(≥6 months), shall be charge to 50%-70% of the power, stored in a cool and dry environment,and charge once every 3 months, in order to avoid storage time is too long, the battery due to self-discharge caused by low power, resulting in irreversible capacity loss.

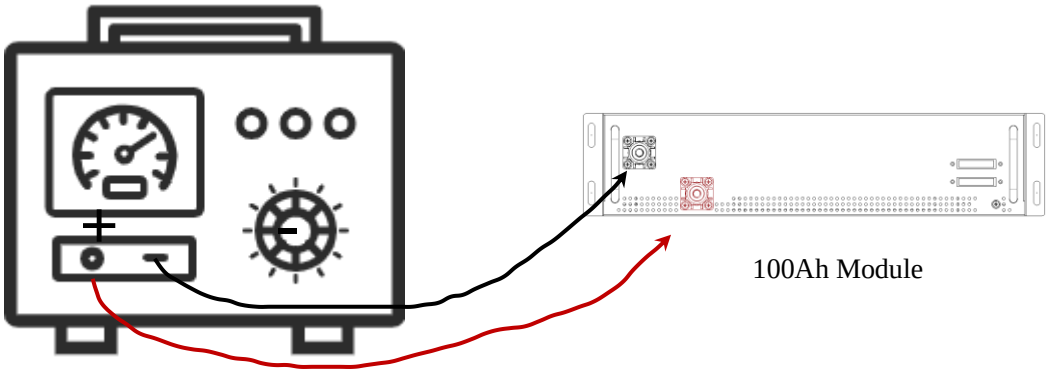
16.2 Maintenance

Step 1、Set Load equipment parameters

Connect the charger with the mains power, start up and adjust the parameter to CC/CV mode(constant current 0.2C/constant voltage 55.2V);

Step 2、Connect Load equipment to battery module

The positive and negative poles of the battery to be charged shall be correctly connected to the intput terminal of the charger, and the wire terminal must be tightened, otherwise the terminal resistance is too large to cause overheating.



Step 3、Turn on the charger

Start charging until charging is stopped automatically, it can be regarded as charging completed, and turn off charger equipment.