

MOTOMA®

Power into the Future

USER MANUAL

Energy Storage Battery

Version: V23A



48V 100Ah/150Ah/200Ah

51.2V 100Ah/150Ah/200Ah

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1 Introduction

The Energy storage battery is an essential component of the PV power generation system. It can provide electricity power for the connected loads, and it can also store the electricity power from PV modules, diesel generators, or wind energy generators. When the sun goes down, energy demand is high, or there is a power outage, you can use the energy stored in the system to meet your energy needs at no additional cost. In addition, the Energy storage battery can help you achieve energy self-consumption and ultimately achieve the goal of energy independence.

According to different power consumption, the Energy storage battery can output power during peak power consumption, and can also store energy during low power consumption. Therefore, the PV arrays and inverter are required to match the battery to achieve the highest operating efficiency. For a simple diagram of a typical energy storage system, see Figure 1.

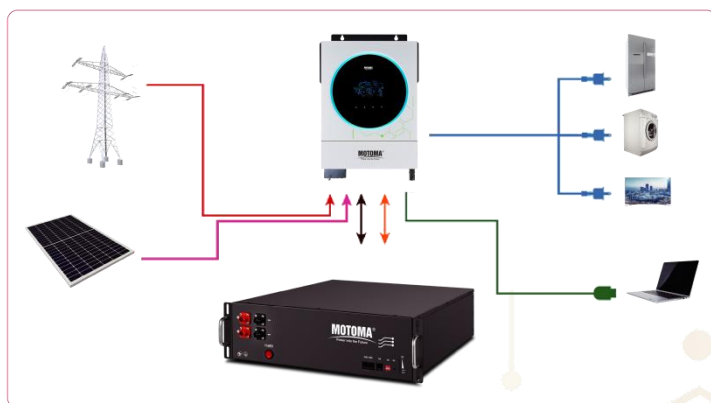


Figure 1 Energy storage System Overview

- It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, death, or may damage the battery and the whole system.
- If the battery is stored for a prolonged time, it is requirement that they are charged every three to six months, and the SOC should be no less than 80% , after fully discharging, The battery needs to be recharged within 12 hours.
- Do not expose cable outside; do not use cleaning solvents to clean the battery.
- All battery terminals must be disconnected before maintenance.

2 Safety Warning

- Do not expose the battery to flammable or harsh chemicals or vapors.
- Do not paint any part of the battery; include any internal or external components.
- Do not connect battery with PV solar wiring directly.
- Any external object is prohibited to be inserted into any part of the battery.
- Any warranty claims are excluded for direct or indirect damage due to items above.
- Parallel connection within 10 batteries, the maximum 15 batteries, Series connection is NOT allowed.

2.1 Before Connecting

- After unpacking, please check the battery and packing list first, if the battery is damaged or spare parts are missing, Please contact the dealer.
- Before installation, be sure to cut off the grid power and make sure the battery is in the turned off mode;
- Wiring must be correct, do not mix-connect the positive and negative cables, and ensure no short circuit with the external device;
- It is prohibited to connect the battery with AC power directly;
- The BMS in the battery is designed for 48 VDC, DO NOT connect battery in series;
- It is prohibited to connect the battery with different type of batteries;
- Please ensure the electrical parameters of battery system are compatible to inverter;
- Keep the battery away from fire or water.

2.2 During Operation

- If the battery system needs to be moved or repaired, the power must be cut off first and the battery is completely shutdown;
- It is prohibited to connect the battery with different type of battery;
- It is prohibited to put the batteries working with faulty or incompatible inverter;
- In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited;
- Please do not open, repair or disassemble the battery. We do not undertake any consequences or related responsibility due to violation of safety operation or violating of design, production and equipment safety standards.

3 Unpacking & Overview

3. 1 Packing List

You will receive the following parts (Not a full set), sample as follow picture. For customized requirements, please place an order with the manufacturer.

Battery pack	Power output positive cable	Power output Negative cable
		
Inverter COM . cable	Parallel COM . cable(RJ45)	Manual
		
Mounting brackets	Mounting frame screw	Round- head screws
		
* Combiner box	* Combiner out- cable	* Combiner out- cable
		
* RS232 COM . box	* RS485 COM . box	* CAN COM . box
		

* NOTE: * types of communication tools need to place an order.

4 Product Overview

4.1 General Battery Shape

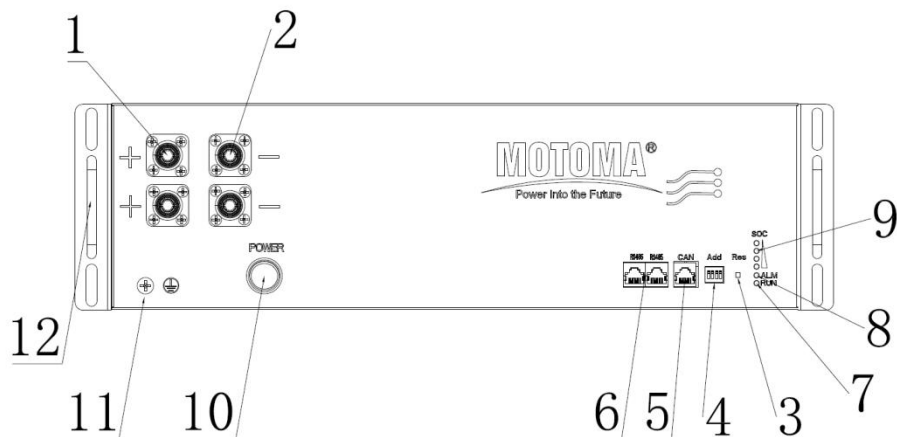


Figure 2 Front View

No.	Description	Silk- screen	Remark
1	Battery positive pole	+	Output terminal
2	Battery negative pole	-	Output terminal
3	Res	RST	
4	Add Coder	Add	Set Battery address code
5	CAN/RS485 communication port	CAN/RS485	Connect to inverter
6	RS485 communication port	RS485	Parallel use
7	Run LED indication	RUN	
8	ALARM LED indication	ALM	Lift heavy objects
9	Capacity LED indication	SOC	
10	Power switch	POWER	ON/OFF
11	handle		
12	GND		

4.2 Combiner Box:

4 ports in , 4 ports out .

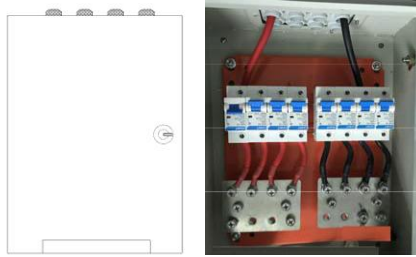


Figure 3 Combiner box

5 Installation

5.1 Selecting Mounting Location

Consider the following points to install the Energy storage battery:

- Do not mount the battery on flammable wall. Mount on a solid wall;
- For proper air circulation to dissipate heat, please leave a gap of about >30cm from the ground, 30 cm from the side of the device.
- The ambient temperature should be between 0°C and 40 °C and relative humidity should be between 25% and 85% to ensure optimal operation.
- The recommended installation is vertical adherence.
- Install the battery in a dry, protected area with no excessive dust and sufficient air circulation. Do not operate in locations where the temperature and humidity are out of the specified range.

5.2 Mounting The Battery

WARNING! ! Remember that the Battery is heavy so please be careful when removing it from the package, or install it.

When installing the Battery bracket, use appropriate screws to fix it. After that, the equipment should be firmly bolted. The Battery can be run indoors or outdoors. However, only professional personnel can enter this area for installation or maintenance.

Step 1 :

When receiving the product, first check whether all parts is complete, if not, please report to the Dealer.

Step 2 :

Ensure that the Battery will be installed against the solid wall. Choose a suitable installation location and ensure a safe distance at least 30cm from the ground, more than 2cm safe distance between batteries.

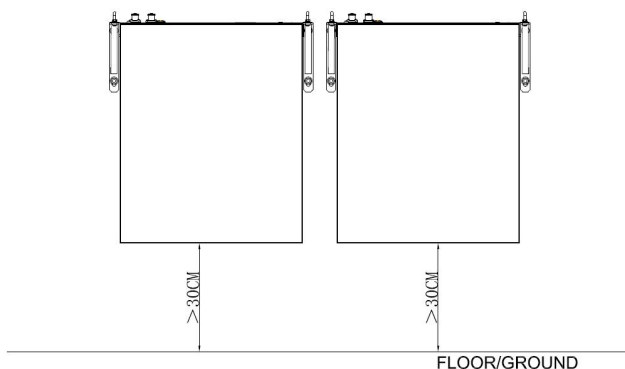


Figure 4 Mount distance

Step 3 :

Use the mounting bracket to mark the location of the positioning screw hole on the wall, and drill the hole. see Figure5 & 6. Need to be drilled with a drill of appropriate diameter.

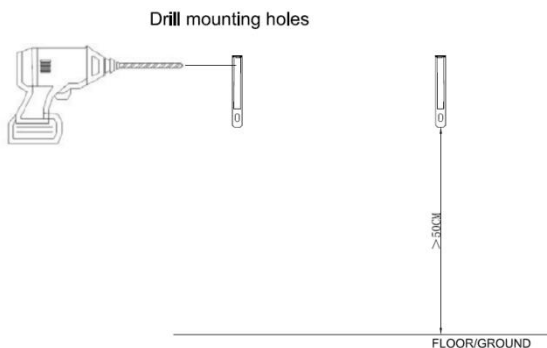


Figure 5 Drill Hole

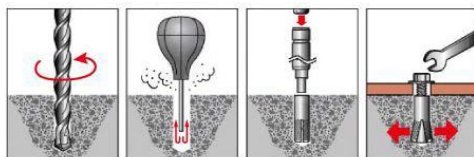


Figure 6 Tighten screw

Step 4 :

Insert frame screws, then place the bracket, and use screws lock it .

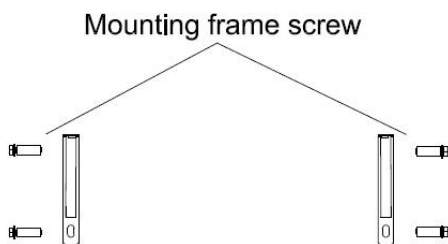


Figure 7 Mount bracket

Step 6 :

As below figure , install the battery pack. The battery is too heavy; please use a special lifting device to lift the battery for operation and safety protection. Lift the battery and put it into the slot of the fixing bracket from the front.

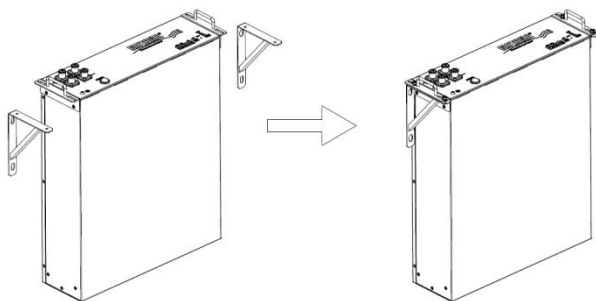


Figure 8 More Battery Packs

Step 7 :

When more than 3 PCS batteries are connected in parallel, we recommend to install the combiner box. Better in Top or Bottom location.

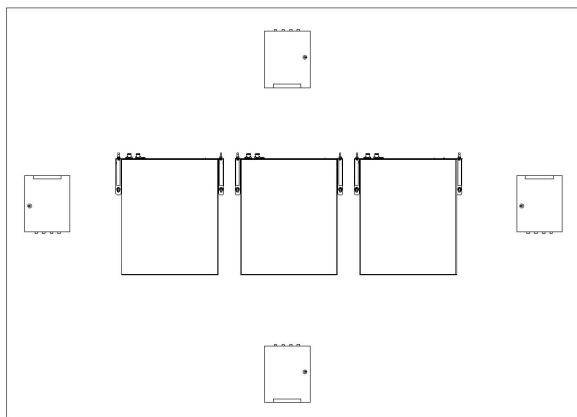


Figure 9 Batteries in parallel

Step 8 :

Connection as below. see figure 10 . If inverter needs CAN BUS port /RS485 port. please insert communication cable (RJ45) to CAN port, RS485 only be used for battery packs parallel mode.

- 1 battery, 1 Inverter. Single mode

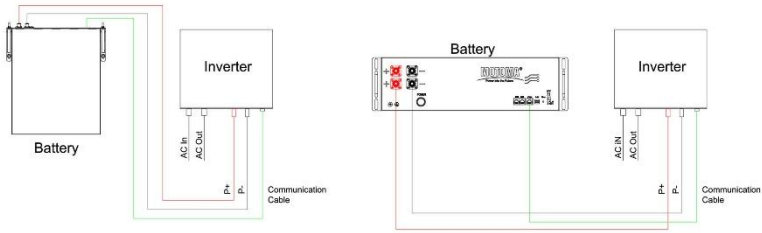


Figure 10 Connection between 1 pc inverter and 1 pc battery

- 2 batteries--- 1 Inverter. battery 1 is slave ; battery 2 is master;
Negative and Positive power cable are the same length.

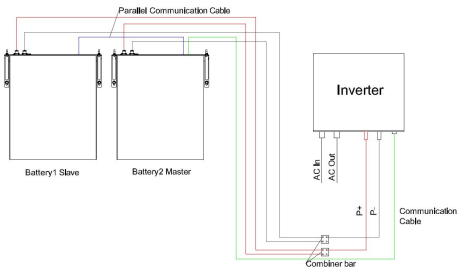


Figure 11 Connection between 1 pc inverter and 2 pcs batteries

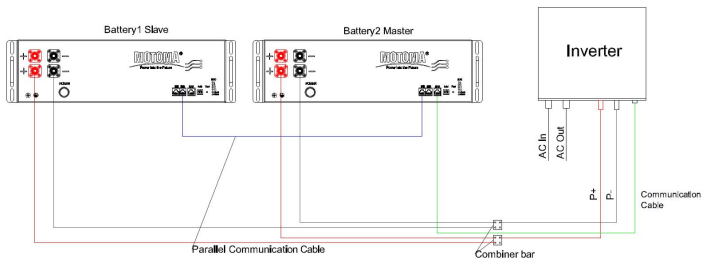


Figure 12 Connection between 1 pc inverter and 2 pcs batteries bottom view

- 3 batteries--- 1 Inverter. battery 1, 2 is slave; battery 3 is master.

More batteries in parallel, one battery is master, others are slave . Negative and Positive power cables are the same .

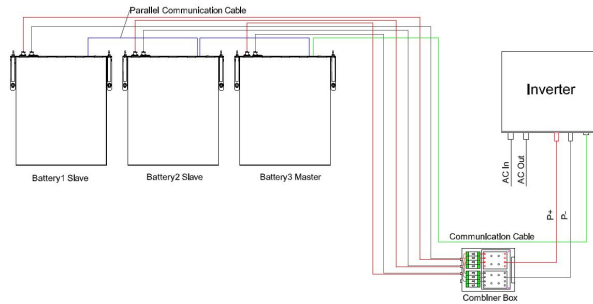


Figure 13 Connection between 1 pc inverter and 3 pcs batteries

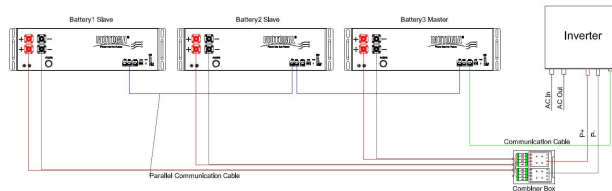


Figure 14 Connection between 1 pc inverter and 3 pcs batteries bottom view

- 3 batteries--- 3 Inverters .

Mainly cable for 3-phase inverter. battery 1, 2 is slave; battery 3 is master. more batteries in parallel, one pack is master, other are slave . 3- phase inverter output 380V AC . one inverter is master, others are slave. Please refer to the operation manual of the corresponding inverter for the parallel connection method of the inverter, here is only an example .

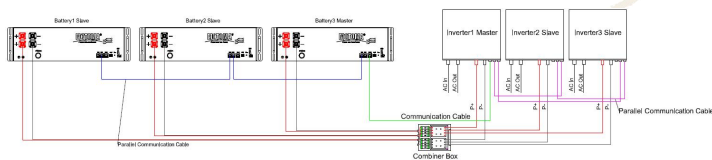


Figure 15 Connection between 3 pcs inverters and 3 pcs batteries bottom view

Step 9:

Set the battery address, there are 4 bit coders in bottom of battery.

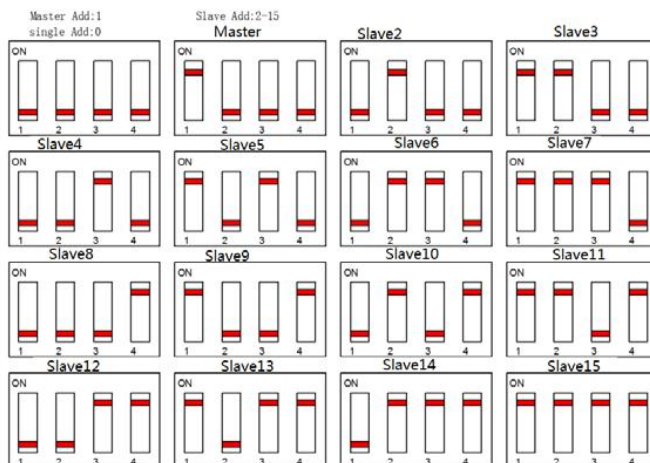


Figure 16 Dial address

Step 10:

Connect the parallel COM. cable (blue network line). Each battery has 2 PCS RS485 port for parallel communication, 1 PC CAN port for inverter or other device. RS485 port only used for host software and update the firmware.

Figure 17 . this is 4 bits coder and communication port. CAN port and RS485A port can be selected as the same time .

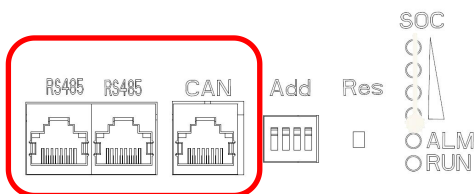


Figure 17 RS485 and CAN Port

Parallel communication		RS485 B-8P8C		RS485 B-8P8C	
		RJ45		RJ45	
		1,8	RS485- B	9, 16	RS485- B
		2,7	RS485- A	10, 15	RS485- A
		3, 6	GND	11, 14	GND
		4,5	NC	12, 13	NC
External communication		RS485A/CAN port		CAN port	
		RJ45		RJ45	
		1	RS485- B1	5	CAN-H
		2	RS485- A1	6	GND
		3	GND	7	RS485- A1
		4	CAN-L	8	RS485- B1

NOTE: The output connected to the communication cable with a waterproof plug is listed according to the order requirements, which are customized products, and are not listed here.

Step 11:

Process of battery turn - on & turn - off . Confirm that the operation is correct, and the battery function can be turned on after the cable connection is correct, and You can press power switch (ON/ OFF) 3 seconds, then the battery start working, it enter standby mode(if there is no power switch, please press the RESET button 3- 6 seconds, like as follow picture, LED indicate all running status and check it' s self) .

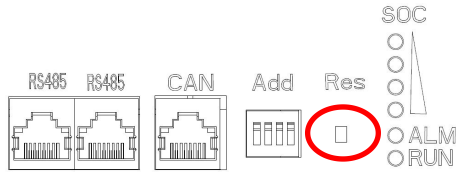


Figure 18 Reset battery

Step 12:

Run the device, set the external charger or inverter, please set according to the corresponding operation manual. Can not exceed the rated parameter requirements.

Battery Pack Parameters:

No	Item	General Parameter	
1	Combination method	48V	51.2V
2	Rated Capacity(Ah)	100/ 150/200	100/150/200
3	Factory Voltage(V)	48-50	51-53
4	Rate power(Wh)	4800/7200/9600	5120/7680/10240
5	Charging Voltage(max V)	54.75	58.4
6	Charging Current (max A)	0.5C	0.5C
7	Float charge Voltage(V)	53.5	56.5
8	Discharge Cut- off Voltage(V)	≤42V	≤44V
9	Max Discharging current(A)	100	100
10	Charging Current limits(A)	20	20
11	Charge over Current protect(A)	110	110
12	Discharge over Current protect(A)	110	110
13	Internal resistance	≤60mΩ	≤60mΩ
14	Communication protocol	CAN/RS485	CAN/RS485
15	Host software and communication protocol	RS485	RS485
16	Operation Temperature Range	Charge:0~45℃	
		Discharge: -20~60℃	
17	Storage Temperature Range(recommend)	0℃~25℃	

Battery Pack Parallel Parameters:

No	Item	General Parameter	
1	Combination method	48V	51.2V
2	Rated Capacity(Ah) * Parallel	PACK	PACK
3	Factory Voltage(V)	48-50	51-53
4	Charging Voltage (max V)	54.75	58.4
5	Charging Current (max A)	0.2C	0.2C
6	Float charge Voltage(V)	53.5	56.5
7	Discharge Cut- off Voltage(V)	≤42V	≤44V
8	Max Discharging current(A)	0.5 C(total)	0.5 C(total)
9	Charging Current limits(A) * Parallel	20	20
10	Charge over Current protect(A) * Parallel	110	110
11	Discharge over Current protect(A)	110	110
12	Internal resistance	≤60mΩ	≤60mΩ
13	Communication protocol	CAN or 485	CAN or 485
14	Host software and communication protocol	RS232/485	RS232/485
15	Operation Temperature Range	Charge:0~45℃	
		Discharge: -20~60℃	
16	Storage Temperature Range(recommend)	0℃~25℃	

Step 13:

Monitors are in running status, and record all parameters, if any mistake, please record it . After start the system, every battery is on, and LED indicate these status.

A : LED indicates

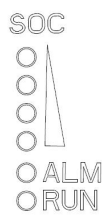


Figure 19 LED

Chart 1 : Battery Status







					
RUN	ALM	SOC			

Chart 2 : Battery Capacity















Status	Charge				Discharge			
SOC (%)	L4	L3	L2	L1	L4	L3	L2	L1
0- 25%								
0- 25%	OFF	OFF	OFF	Flash2	OFF	OFF	OFF	Light
26-50 %	OFF	OFF	Flash2	Light	OFF	OFF	Light	Light
51-75 %	OFF	Flash2	Light	Light	OFF	Light	Light	Light
76-100 %	Flash2	Light	Light	Light	Light	Light	Light	Light
RUN LED	Light				Flash (Flash3)			

Chart 3 : LED flash and buzzer mode (Off by default)

Mode	ON	OFF
Led Flash 1	0.25S	3.75S
Led Flash 2	0.5S	0.5S
Led Flash 3	0.5S	1.5S

Chart 4 : LED flash mode

System status	Run status	RUN	ALM	SOC				REMARK
								
Power off	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	All led off
Stand by	Normal	Flash 1	OFF	Lighting for SOC				Stand by mode
	Alarm	Flash 1	Flash3					Low volt alarm
Charge	Normal	Light	OFF	Lighting for SOC (The LED flash2, while it is the high SOC) Alarm LED do not flash, when the BMS into OVP mode.				
	Alarm	Light	Flash3					
	OVP	Light	OFF	Light	Light	Light	Light	No charge in, into standby
	OTP, OCP Fail	OFF	Light	OFF	OFF	OFF	OFF	Stop charge
Discharge	Normal	Flash 3	OFF	Lighting for SOC				
	A larm	Flash 3	Flash3					
	UVP	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
	OTP, OCP, SCP, Invert connect, Fail	OFF	Light	OFF	OFF	OFF	OFF	Discharge off
Fail		OFF	Light	OFF	OFF	OFF	OFF	NO charge or discharge

Step 14:

Stop running battery pack.

When it is necessary to stop the charging and discharging of the battery or troubleshooting, please stop the external equipment first, cut off the input and output circuits, and then press the power-off switch for each battery.

6 Host Soft Operation

When the equipment manufacturer confirms that it is necessary, it can authorize to provide the customer with the host software and operating instructions.

Config	2022-09-15 8:52	文件夹	
Monitoring	2022-07-28 23:42	应用程序	1,097 KB
Monitoring.exe.config	2023-02-21 12:02	CONFIG 文件	1 KB
UserControls.dll	2022-05-21 21:08	应用程序扩展	42 KB

Figure 20 File location



Figure 21 Main Window

7 Trouble Shooting

- Battery pack stops work .
- A. Turn on switch; be sure it is ON; if battery is low SOC;it needs to charging in.
- B. Battery pack low volt or enter sleep mode, there you will press down RST button3- 6 seconds, or charging in.

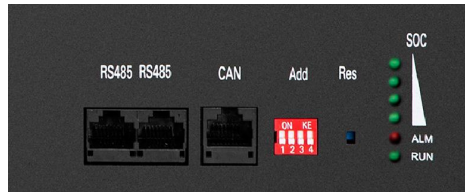


Figure 22 Reset for trouble shooting

- No communication, inverter can not received any DATA from BMS. A : Check whether if communication cable is OK,check RJ45 PIN , CAN : PIN4: CANH, PIN5:CANL; RS485A:PIN2:485-A,PIN1:485-B;
- A. Replace the communication cable. Please give feedback to the dealer and replace.
- C. Check inverter or other device which connect to BMS, update the firmware.
- D . If the communication function needs to be upgraded, please consult the agent or manufacturer.
- E . Confirm your inverter and battery protocol are correct, Different protocol or different connection will make a mistake .

- Battery pack report SOC is mistake .

A. Inverter received Data from Master BMS , but it' s SOC <total SOC, as : 9PCS packs has 1 800Ah, but inverter read DATA is 1600 Ah. So you may check any one is disconnected. check RS485 B COM . cable(blue), RS485 communication cable , replace the cable which is broken.

RJ45 PIN:

CAN: PIN4: CANH,PIN5: CANL;

RS485A: PIN2:485-A,PIN1:485- B;

B. SOC DATA has large tolerance .

Discharge the battery completely first, then charge it fully with a small current, and learn to discharge.

Any battery is mistake, we advice you read the BMS Data (When we authorize the terminal to use) with host software .then we reset the BMS and calibration.

- How to turn on the Battery to discharge

We recommend method is:

A : reset the single battery' s BMS, LED will flash and start work.

B : turn on the power switch on the bottom/front panel.

C : turn on power switch in the combiner box.

WARNING: The operating parameters of the equipment cannot exceed the rated working voltage and current of the battery , exceed the rated volt and current, Can cause damage to the battery or other failures.

Inverter or other external device can not connect the battery. We recommend method is :

- A. Check whether the working parameters of the device and battery are appropriate, and improper parameters cannot be matched .
- B. When the device is turned on, the current is too large, resulting in battery protection. At this time, you should be able to see the LED flashing from the battery panel. In this case; you can adjust your equipment parameters or contact the dealer to solve .
- C. It is necessary to update BMS parameters and match the device, then Reset BMS and restart your device .
- D. Replace bad battery.
- E. There is a bad battery , need to replace , please contact your supplier, need professional installers to operate it . We recommend replacing whole or choose battery has same voltage and same specification.

NOTE: When replacing the cells, the same module needs to be replaced at the same time, and the voltage should be the same.

Need to replace spare parts or emergency maintenance.

Some parts can be obtained from the sales or agency, and the excess parts need to be purchased separately . Be careful, turn off the power switch before replacing .

Need to place some safety device for keep a safety environment .

You'd keep a safe case for battery and external device, Please place safety device, as: fire-fighting sand, fire-fighting blankets, fire-fighting water pipes, Install Monitor sound, light, electricity, smoke and other equipment.

7.1 Emergency Process

7.1.1 The external device catches fire and explodes

- A. Under the condition of ensuring safety, non-operating personnel immediately move to a safe location;
- B. Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.
- C. Use fire-fighting equipment (the fire-fighting sand, fire-fighting blankets, fire-fighting water pipes)
- D. If you cannot completely extinguish the fire, please call the local fire department for help.
- E. Keep the accident site data so that the source of the accident can be traced.

7.1.2 The battery catches fire and explodes

- A. Under the condition of ensuring safety, non- operating personnel immediately move to a safe location;
- B. Under the condition of ensuring safety, the operator immediately cut off the external power supply of the equipment and the internal power supply.
- C. Use fire-fighting equipment (the fire-fighting sand, fire-fighting blankets, fire-fighting water pipes)
- D. If you cannot completely extinguish the fire, please call the local fire department for help.
- E. Keep the accident site data so that the source of the accident can be traced.

NOTE: When replacing the cells, the same module needs to be replaced at the same time , and the voltage should be the same.

After-sale Service Warranty Card

Product model	
Date of purchase	
Serial No	
Buying merchant	
Customer address	
Contact number	
Brief Introduction of Fault Problems	

MOTOMA®

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QUALITY CREATES BRAND
SERVICE ENHANCES VALUE



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