



M48-50 Lithium-Ion Phosphate Battery

DANGER

HIGH VOLTAGE INSIDE



- * Do not disconnect, disassemble or repair by yourself.
- * Do not drop, deform, impact, cut or spearing with a sharp object.
- * Do not place near open flame or incinerate.
- * Do not sit or put heavy things on battery.
- * Keep away from moisture or liquid.
- * Keep out of reach of children, animals or insects.
- * Contact the supplier with 24 hours if anything wrong.

Emergency Situations

- * If leaking, fire, wet or damaged, switch off the breaker and go away from the battery.
- * Do not touch the leaking liquid. Do not use water, sand or dry powder extinguisher is usable.

Preface

The M48-50 lithium iron phosphate battery energy storage system can provide energy storage solutions for photovoltaic power generation users through parallel combination. During the day, the excess power of photovoltaic power generation can be stored in the battery. At night or when needed, the stored electrical energy can be used to supply power to the electrical equipment, which can improve the efficiency of photovoltaic power generation, peak load shifting, and emergency power backup.

This user manual details the basic structure, parameters, basic procedures and methods of installation and operation and maintenance of the equipment.

- Please connect wires properly while installation, do not reverse connect. To avoid short circuit, please don't connect positive and negative poles with conductor(wires for instance).
- For your safety, device shall be ground connected properly before normal use.
- Please do not mixed-use batteries from different manufacturers, different types and models, as well as old and new together.
- To assure the proper use please make sure parameters among the relevant device are compatible.
- For long-term storage, the battery should be recharged once every 6 months, and the amount of electric charge shall exceed 80% of the rated capacity.
- For your safety, please do not arbitrarily dismantle any component in any circumstances unless a specialist or an authorized one from our company, device breakdown due to improper operation will not be covered under warranty.



We have strict inspection to ensure the quality when products are shipped out, however, please contact us if case bulging or another abnormal phenomenon. Ambient and storage method could impact the life span and product reliability, please consider the operation environment abundantly to make sure device works in proper condition.

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1. General Safety information

- Before using the battery, read all instructions and cautionary markings on the battery of this manual.
- Please do not put the battery into water or fire, in case of explosion or any other situation that might endanger your life.
- Please do not stab, hit, trample or strike the battery in any other way.
- Please shut off the power completely when removing the device or reconnecting wires during the daily use or it could cause the danger of electric shock.
- Recommend that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your application.
- Always checking that existing wiring is in good condition and that wire is not undersized. Do not operate the batteries with damaged or substandard wiring.
- Please use dry powder extinguisher to put out the flame when encountering a fire hazard, liquid extinguisher could result in the risk of secondary disaster.

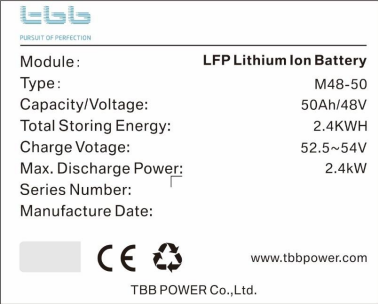
2. Introduction

2.1 Features

M48-50 energy storage product's anode materials are lithium iron phosphate, battery cells are managed effectively by BMS with better performance, the system's features as below:

- Comply with European ROHS, Certified SGS, employ non-toxic, non-pollution environment-friendly battery;
- Anode materials are lithium iron phosphate (LiFePO_4), safer with longer life span;
- Carries battery management system with better performance, possesses protection function like over-discharge, over-charge, over-current, abnormal temperature;
- Self-management on charging and discharging, Single core balancing function;
- Intelligent design configures integrated inspection module, with 3 remote functions (remote-measuring, remote-communicating and remote-controlling);
- Flexible configurations allow parallel of multi battery for longer supply time;
- Self-ventilation with lower system noise;
- Less battery self-discharge, then recharging period can be up to 6 months during the storage; No memory effect so that battery can be charged and discharged shallowly;
- With wide range of temperature for working environment, $-20^\circ\text{C} \sim +55^\circ\text{C}$, circulation span and discharging performance are well under high temperature;
- Less volume, lighter weight.

2.2 Product identity definition

	Battery voltage is higher than safe voltage, direct contact with electric shock hazard
	Be careful with your actions and be aware of the dangers
	Read the user manual before using
	The scrapped battery cannot be put into the garbage can and must be professionally recycled
	The battery can continue to be used after it recycled by the professional recycling organization and do not discard it at will
	This battery product meets European directive requirements
	This battery product passed the TUV certification test
	Dangerous goods warning label on the top of the battery module
	Nameplate Label

2.3 Product Specification

2.3.1 Size and Weight

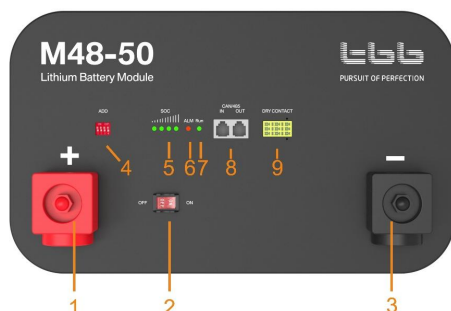
Product	Nominal Voltage	Nominal Capacity	Dimension	Weight
M48-50	DC48V	50Ah	368mm*216mm*312mm(Not include the height of the top terminal)	≈28.2kg



2.3.2 Performance Parameter

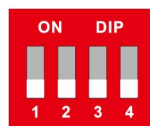
Nominal Voltage	48V
Work Voltage Range	42~54.75V
Nominal Capacity	50Ah
Nominal Energy	2.4kWh
Nominal Power	0.7KW
Max Power	2.4KW
Rated Charging Current	25A
Rated Discharging Current	25A

2.3.3 Interface Definition



No.	Name	Definition
1	Positive Terminal	Battery output positive or parallel positive cable
2	Power Switch	OFF/ON, must be in the "ON" state when in use
3	Negative Terminal	Battery output negative or parallel negative cable
4	ADD	DIP switch, definition in 2.3.4
5	SOC	green lights on shows the remaining battery power, details in table2.3.7
6	ALM	The red light shows the status of alarm and protection, details in table2.3.7
7	RUN	Green light flashing during standby and charging mode, details in table2.3.7
8	CAN/485	Communication cascade port, support CAN/ RS485 communication, interface definition in 2.3.6
9	DRY CONTACT	Dry contact, for specific definition, see dry contact 2.3.5 function description

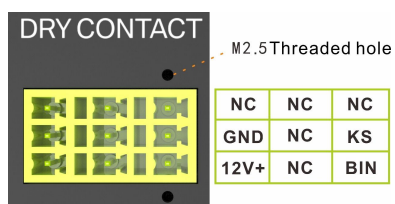
2.3.4 ADD DIP switch definition and description



No	Definition
1	Communication protocol selection (standby), the normal state is OFF
2	Communication protocol selection (standby), the normal state is OFF
3	Distinguish between master and slave. For the master module, it should be dialed up to ON; For the slave module, it should be at OFF state;

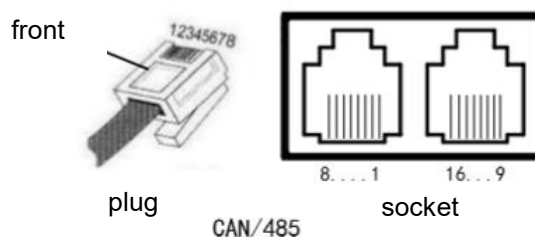
No	Definition
4	Baud rate selection, generally default to OFF; Dial up to ON: CAN 250K RS485 115200 Dial to OFF: CAN 500K RS485 9600

2.3.5 DRY CONTACT Description of dry contact function



PIN	Definition
GND	BMS output 12V- (It is only used for the battery supporting lamp board, not for external use)
12V+	BMS output 12V+ (It is only used for the battery supporting lamp board, not for external use)
KS	Power on/off signal, associated with BIN, battery start when these two signals are conducting; Battery shut down when they are disconnected.
BIN	Power on/off signal, associated with KS, battery start when these two signals are conducting; Battery shut down when they are disconnected.

2.3.6 CAN/485 Interface definition



PIN port	Color	Definition
PIN1	Orange/White	485A
PIN2	Orange	XGND
PIN3	Green/White	485B
PIN4	Blue	CANH
PIN5	Blue/White	CANL
PIN6	Green	Reserve
PIN7	Brown/White	XIN

PIN port	Color	Definition
PIN8	Brown	Reserve
PIN9	Orange/White	Reserve
PIN10	Orange	XGND
PIN11	Green/White	Reserve
PIN12	Blue	CANH
PIN13	Blue/White	CANL
PIN14	Green	Reserve
PIN15	Brown/White	XOUT
PIN16	Brown	Reserve

2.3.7 SOC/ALM/RUN Light instructions

Battery state	SOC	LED1	LED2	LED3	LED4	ALM	RUN
Shut down	-	off	off	off	off	off	off
Standby	$75\% \leq \text{SOC} \leq 100\%$	on	on	on	on	off	Flash1
	$50\% \leq \text{SOC} < 75\%$	on	on	on	off	off	Flash1
	$25\% \leq \text{SOC} < 50\%$	on	on	off	off	off	Flash1
	$5\% < \text{SOC} < 25\%$	on	off	off	off	off	Flash1
	$0\% < \text{SOC} \leq 5\%$	on	off	off	off	off	Flash1
	SOC=0	off	off	off	off	on	Flash1
Charging	SOC=100%	on	on	on	on	off	on
	$75\% \leq \text{SOC} < 100\%$	on	on	on	Flash2	off	on
	$50\% \leq \text{SOC} < 75\%$	on	on	Flash2	off	off	on
	$25\% \leq \text{SOC} < 50\%$	on	Flash2	off	off	off	on
	$0\% < \text{SOC} < 25\%$	Flash2	off	off	off	off	on
Discharging	$75\% \leq \text{SOC} \leq 100\%$	on	on	on	on	off	Flash3
	$50\% \leq \text{SOC} < 75\%$	on	on	on	off	off	Flash3
	$25\% \leq \text{SOC} < 50\%$	on	on	off	off	off	Flash3
	$5\% < \text{SOC} < 25\%$	on	off	off	off	off	Flash3
	$0\% < \text{SOC} \leq 5\%$	on	off	off	off	off	Flash3
	SOC=0	off	off	off	off	on	Flash3

Flash1: on 0.25S, off 3.75S

Flash2: on 0.5S, off 0.5S

Flash3: on 0.5S, off 1.5S

3. Installation and Configuration

3.1 Ready for installation

3.1.1 Safety Requirement

This system can only be installed by personnel who have been trained in the power supply system and have sufficient knowledge of the power system. The safety regulations and local safety regulations listed below should always be followed during the installation.

- All circuits connected to this power system with an external voltage of less than 48V must meet the SELV requirements defined in the IEC60950 standard.
- If operating within the power system cabinet, make sure the power system is not running. Battery devices should also be switched off.
- Distribution cable wiring should be reasonable and has the protective measures to avoid touching these cables while operating power equipment.
- when installing the battery system, must wear the protective items below:



isolation gloves



safety goggles



Safety shoes

3.1.2 Environmental requirements

- Working temperature: $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$
 - Charging temperature range is $0^{\circ}\text{C} \sim +55^{\circ}\text{C}$
 - Discharging temperature range is $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$
- Storage temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- Relative humidity: 5%~85% RH
- Elevation: no more than 4000m
- Operating environment: Indoor installation, sites avoid the sun and no wind, no conductive dust and corrosive gas.



location should be away from the sea to avoid brine and high humidity environment. The ground is flat and level. There is no flammable explosive near to the installation places. The optimal ambient temperature is 15~30℃. Keep away from dust and messy zones

3.1.3 Tools and data

Tools and meters that may be used are shown in table:

Name	
Screwdriver (Slotted、Phillips)	Multimeter
Torque wrench	Clamp current meter
Diagonal pliers	Insulation tape
Pointed nose pliers	Temperature meter
Pliers to hold the wire	Anti-static bracelet
Stripping pliers	Cable tie
Electric drill	Tape measure

3.1.4 Technical preparation

➤ Electrical interface check:

- Devices that can be connected directly to the battery can be user equipment, power supplies, or other power supplies. Confirm whether the user's PV power generation equipment, power supply or other power supply equipment has a DC output interface, and measure whether the DC power output voltage meets the voltage range requirements in Table 2.3.2.
- Confirm that the maximum working current of the battery-powered user equipment (inverter DC input) should be less than the maximum discharge current of the products used in Table 2.3.2.

➤ The security check:

- No flammable, explosive and other dangerous articles are placed beside the battery. Firefighting equipment should be provided near the equipment, such as portable dry powder fire extinguisher. If necessary, an automatic fire fighting system should be equipped.

3.1.5 Unpacking inspection

- When the equipment arrives at the installation site, loading and unloading should be carried out according to the rules and regulations, to prevent from being exposed to sun and rain. Before unpacking, the case shall be checked for good condition.
- In the process of unpacking, handle with care and protect the surface coating of the object.
- Open the package, the installation personnel should read the technical documents, verify the list, according to the configuration table and packing list, ensure objects are complete and intact, if the internal packing is damaged, should be examined and recorded in detail.

Packing list is as follows:

Item	Specification	QTY	Figure
M48-50 module	48V50Ah 368mm*216mm*312mm (Not include the height of the top terminal)	1	
Module fixing bracket	L-shaped bracket	2	
Bolt	M6×14 External hexagon internal cross three combination bolt	6	
Dry contact plug	PLTB1.5-03-BF-3.81	1	

3.1.6 Engineering coordination

Attention should be paid to the following items before construction:

- The power cable specification shall meet the requirements of maximum discharge current for each product.
- Make sure that the battery has enough space to install, and that the battery rack and bracket have enough load capacity.
- Make sure the power line and ground wire are reasonable. Not easy to short-circuit, wading and corrosion.

3.2 Equipment installation

Prepare equipment and tools for installation, confirm that the ON/OFF switch on the front panel of B4850 unit is at the “OFF” state to ensure no live operation.

3.2.1 Mechanical installation

- Firstly fix the L-shaped bracket to the bottom of the battery module, the fixed bolt is the matching bolt M6*14, the tightening torque is controlled at 9-12NM, the schematic diagram is as follows:



- After installation, as shown in the figure below, the left and right side brackets are fixed in the same way:



- Fix the L-shaped bracket to the RV body structure or other structure in the installation scene that needs to be fixed.

3.2.2 Electrical installation

Before connecting the power cable and ground wire, it is recommended to use a multimeter to measure the continuity of the cable, whether it is short-circuited, and confirm the positive and negative.

Measuring methods:

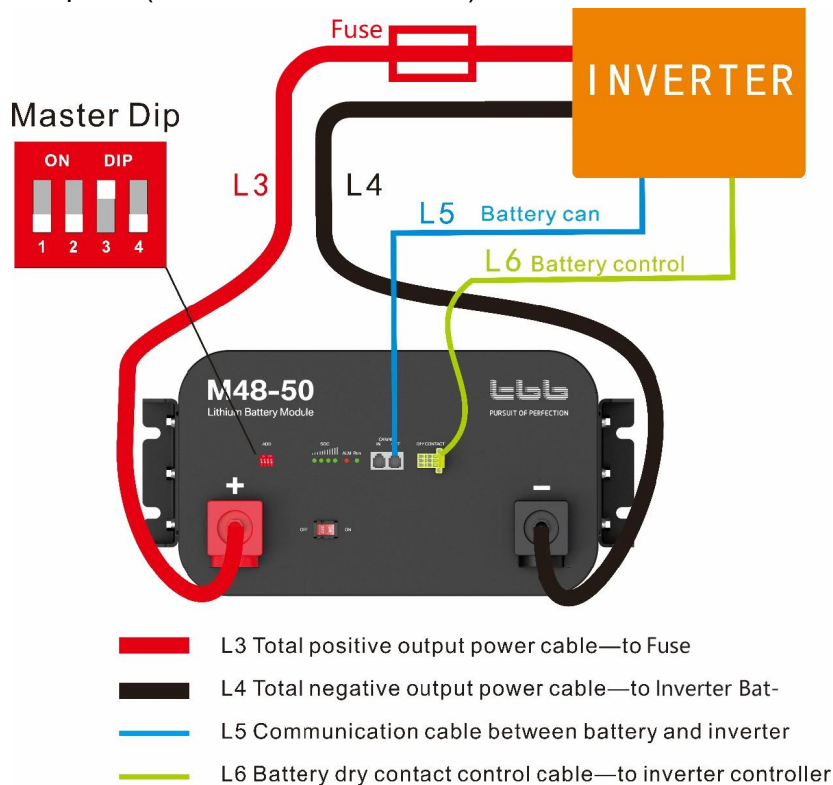
- Short circuit judgment: select the multimeter resistance file, use the probe to measure the positive and negative poles of the same end, if the resistance shows infinity, it means the cable is available.
- Positive and negative poles: After the power cable is connected visually, the positive and negative poles of the battery should be connected to the positive and negative poles of the opposite device respectively.
- Selection requirements for Fuse:

Voltage: $U > 60V$

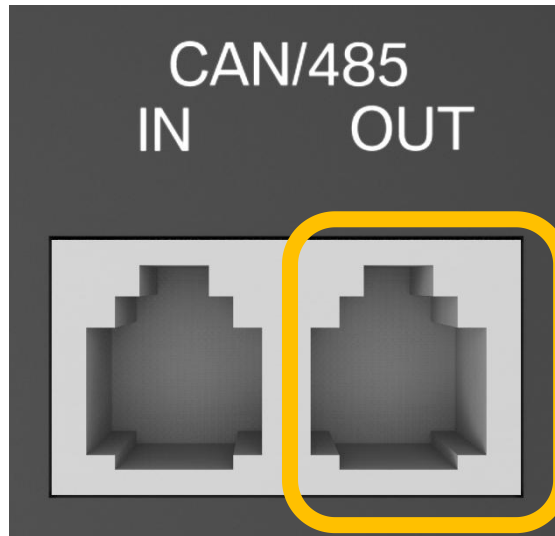
Current: $I = 1.5 * \frac{\text{Inverter power}}{45V}$

3.2.2.1 Wiring diagram for single module use

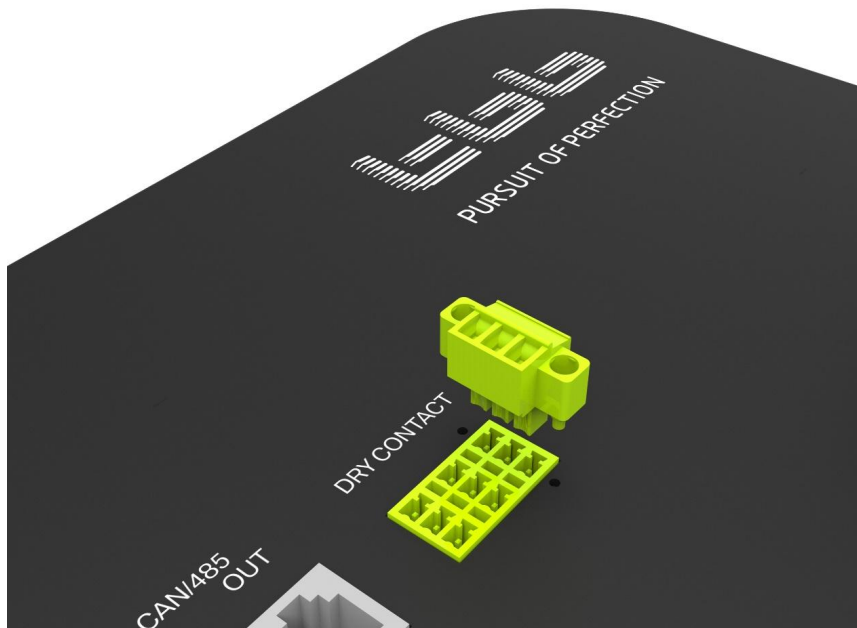
After the battery power cable is connected to Fuse, connect the communication cable and the dry contact cable according to the following figure. The communication cable is plugged into the CAN OUT interface on the panel (note that it is not CAN IN).



- Communication interface to inverter CAN OUT

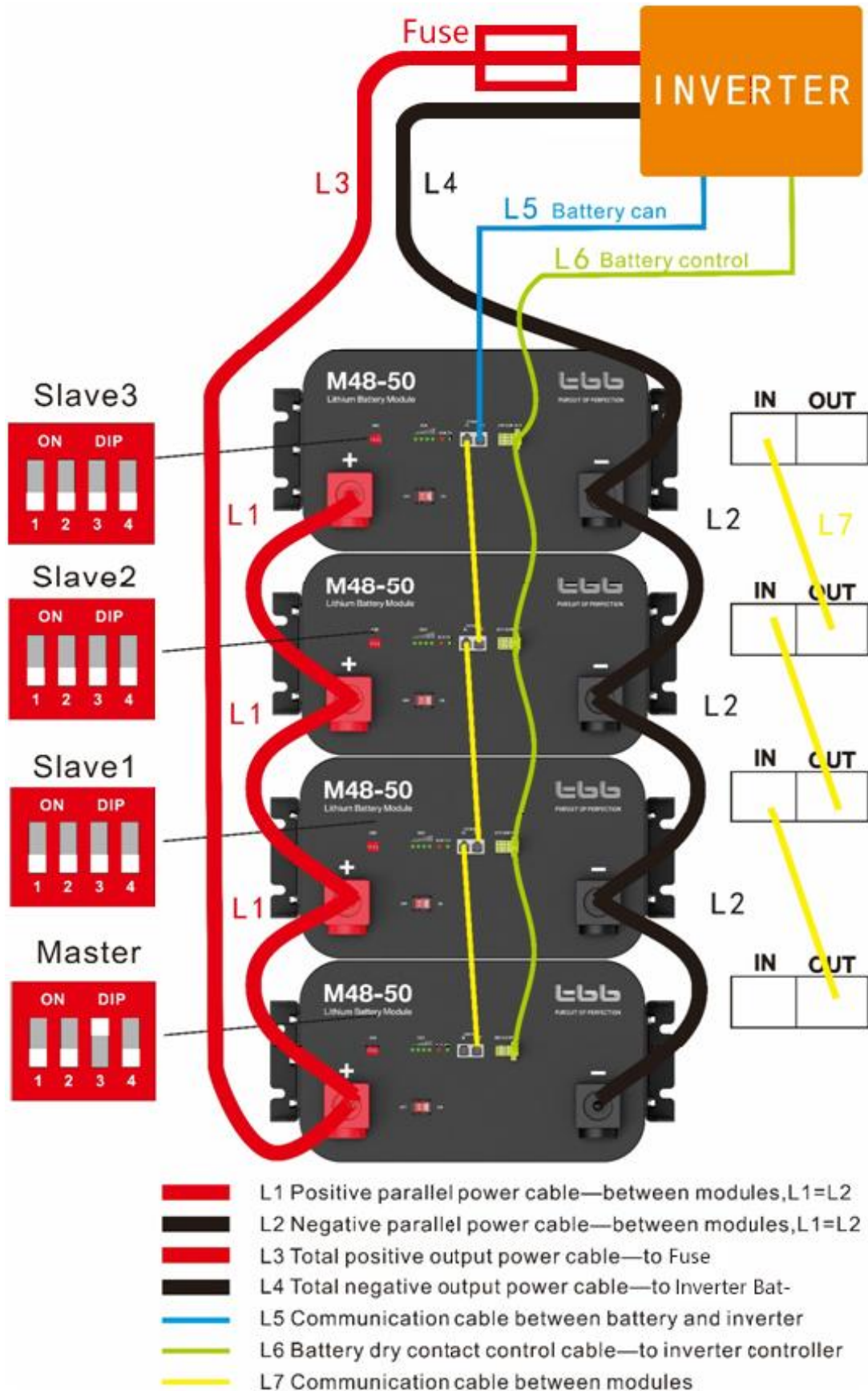


- The dry contact plug is connected as shown in the figure below. After inserting the position in the figure below, use a flat-blade screwdriver to tighten the screws on the terminal.



- Check the connection of all the cables, after confirming that they are correct, dial ADD No"3" according to the above figure, press the boat switch to ON, activate the battery through the controller, the battery panel LED will be on.

3.2.2.2 Wiring diagram for parallel use of modules



4. Use, maintenance and troubleshooting

4.1 Instructions for use and operation of the battery system

After completing the electrical installation, follow the steps below to turn on the battery system:

- Refer to the wiring instructions of 3.2.2.1 or 3.2.2.2, do the preparation work before the battery pack is turned on, and then press the ON/OFF button to the ON state, start the dry contact controller to control the battery to turn on, and the RUN light is on after the self-test. SOC indicator is on (in the picture is 100%SOC state).



Caution:

After pressing the power button, if you find that the battery status indicator on the front panel is continuously red, please refer to "4.2 Alarm Description" to deal with it. If the fault cannot be eliminated, please contact the dealer in time.

- Use a multimeter to measure whether the voltages on the DC breaker connected to battery are more than 42V, and check whether the voltage polarity is consistent with the inverter input polarity; if the DC breaker side connected to battery has output voltage and is more than 42V, the battery has started working normally.
- After confirming that the battery output voltage and polarity are correct, turn on the inverter; Turn on the DC breaker.
- Check whether the indicator lights (communication indicator light and battery connection status indicator light) on the inverter are normal; if they are normal, the connection between the battery and the inverter is completed. If the indicator is abnormal, please refer to the inverter manual to find the reason or contact the dealer.

➤ Battery and inverter power matching table:

Hybrid inverter	Off-grid inverter	M48-50	
EPS(backup side)AC output power	AC output power	Min. parallel amount	System energy(kWh)
≤1.2kW		1	2.4
≤2.4 kW		2	4.8
≤3.6 kW		3	7.2
≤4.8 kW		4	9.6
≤6.0 kW		5	12.0
≤7.2 kW		6	14.4
≤8.4 kW		7	16.8
≤9.6 kW		8	19.2
≤14.4 kW		12	28.8

Equipment requirements	Charge	The battery's long-term continuous charging current should be ≤0.5C If the battery capacity is empty, please charge it within 48 hours after the battery is empty.
	Discharge	The long-term continuous discharge current of the battery should be ≤0.5C It is recommended Max. depth of discharge(DOD)of battery doesn't more than 80%.

4.2 Alarm description and processing

When the protection action or fault occurs in the system, the alarm signal will be given through the working status indicator on the front panel of the B4850. You can query the specific alarm categories through battery monitor. If the fault such as charging over-current, under-voltage protection, high-temp protection and other abnormalities which affects the output, please deal with it according to the Table:

State	Alarm category	Alarm indication	Processing
Charging state	Over-current	ALM light on	Stop charging and find out the cause of the trouble
	High temp	ALM light on	Stop charging
Discharging state	over-current	ALM light on	Stop discharging and find out the cause of the trouble
	High temp	ALM light on	Stop discharging

State	Alarm category	Alarm indication	Processing
	Total voltage under voltage	ALM light on	Charging
Discharging state	Cell voltage under voltage	ALM light on	Charging
Standby state	Short circuit protection	ALM light on	Check the circuit connected to the output of the battery, and check the power ratio between the battery and the inverter (some inverters have a large inrush current at the moment of startup, and there is a probability of triggering BMS short-circuit protection)
	Under voltage seriously	ALM light on	Use battery monitor to check whether the cell voltage is lower than 2V ,and if it is lower than 2V. The battery pack is prohibited from recharging.

4.3 Analysis and treatment of common faults

Analysis and treatment of common faults in the Table:

No	Fault	Analysis	Solution
1	The indicator does not respond after the power on	Power switch is broken	Power switch
		No dry contact start signal	Dry contact status
2	Red light on, and no DC output	Abnormal battery data status	Use battery monitor to read battery information
3	The DC power supply time is too short	Battery capacity become less	Storage battery replacement or add more modules
4	Battery can't be fully charged	Low charge voltage	Set the charge voltage to 53.5V
5	The power cable side sparks at the moment of power on, and the red light is on	Power connection short-circuit	Turn off the battery, check the cause of the short circuit

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