



# Smart-Li battery series for communication lithium battery

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Shuangdeng Group Co., Ltd

# Preface

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Thank you very much for choosing SHOTO Smart-Li battery series communication lithium battery!



Before using this product, please read this user manual carefully.

This manual is mainly read for product maintenance personnel, installation personnel and technical support personnel.

Due to not complying with the precautions specified in the user manual, any failure and loss caused are not within the scope of the manufacturer's warranty, and the manufacturer does not bear any relevant responsibility. Please keep all the documents properly. If you have any questions, please contact the shuangdeng after-sales service personnel. thanks!

This user manual introduces the product introduction, use method, fault handling, transportation and storage of the lithium battery pack for Smart-Li battery series communication. The pictures of this article are for reference only, and the specific structure is subject to the physical object.

## Environmental requirements of this product

- ◆ Ambient temperature: 0~ + 40°C (recommended use temperature: + 20~ + 30°C)
- ◆ Relative humidity: 5% to 85% RH
- ◆ Altitude: not exceeding 4000m
- ◆ There is no conductive dust and corrosive gas site



Smart lithium battery series

Lithium battery pack for communication, user manual, product introduction

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# 1. Product profile

Shuangdeng Smart-Li battery series communication lithium battery pack consists of 15 series or 16 series of single lithium battery, battery management system (BMS) and chassis and other structural parts. It has better charge and discharge characteristics, cycle characteristics, longer service life and more intelligent self-management mode, simple and convenient operation, easy to maintain.

A single smart lithium battery pack can be used as an independent 48V module, and can also support multiple parallel use, while supporting parallel use with a conventional 48V lithium battery pack and 48V lead-acid battery pack.

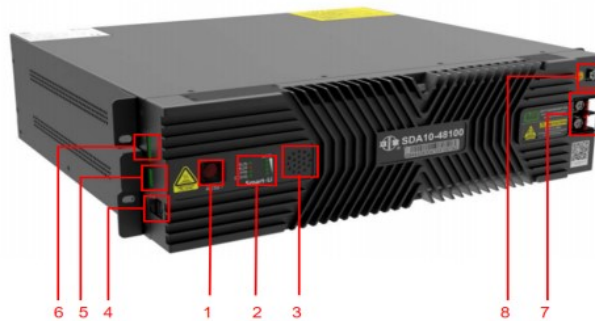


Figure 1 Smart lithium battery pack

order number	description	
1	Battery switch machine button	
2	RUN	Run LED
	ALM	Warning LED
	CHG	Charge LED
	DCHG	Discharge LED
	SOC	Residual capacity LED
3	buzzer	
4	communication interface	
5	Expand the reserved serial port	
6	Dry contact point	
7	Positive and negative terminal terminals	
8	earth terminal	

Table 1 Description of the interface of the Smart-Li battery battery pack

### 1.1 Application Scenario

This product is suitable for the backup power supply of lithium iron phosphate battery communication, which can provide overcharge, overdischarge, overcurrent, overtemperature, undertemperature, short circuit and reverse connection protection function, and also provide the voltage balancing function in the charging process. It can realize reliable multiple parallel groups through the CAN bus, and communicate with the upper computer or background monitoring through the RS485 bus, and the maximum number of parallel groups is 32 groups. Parameter configuration, data monitoring and software upgrade on the upper computer software or background monitoring platform.

Battery management system BMS is divided into two parts: BMU and BDC. BMU (Battery Management Unit) realizes the functions of voltage and temperature monitoring, SOC calculation, operation logic strategy control, parameter setting, and external communication of single cells. BDC (Bidirectional Direct Current Converter) is a two-way DC conversion circuit between the battery pack and the main circuit of the communication backup power supply, which is used to perform the functions of battery constant current, constant voltage charge and discharge, standby, protection and other functions.

### 1.2 Working principle of the system

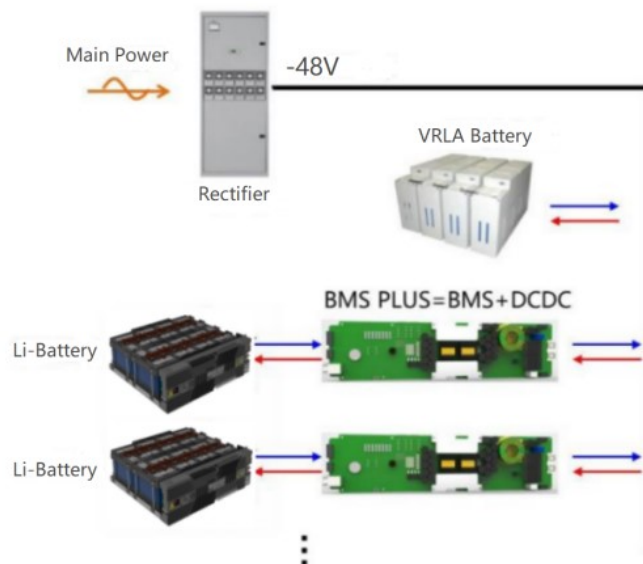


Figure 2 Working description of the Smart-Li battery pack system

### 1.3 Product characteristics

- ❖ The Smart-Li battery pack can be used directly in parallel with the conventional lithium battery or lead-acid battery of the site, meeting the demand of the battery and the smooth expansion of the station.
- ❖ A single Smart-Li battery pack, the standard rated power of 4800W.
- ❖ The Smart-Li battery pack supports the boost DC remote supply to avoid the problem of insufficient voltage at the load end caused by the power supply line loss.
- ❖ The Smart-Li battery pack realizes the discharge average flow control through the adaptive flow balance strategy operation, or adopts the adaptive capacity balance strategy operation to realize the optimal capacity matching charge and discharge.
- ❖ The EMC meets the following criteria:
  - CE: EN55032/CISPR32 CLASS A
  - RE: EN55032/CISPR32 CLASS B

### 1.4 Product specifications and models

NO.	Capacity	width	altitude	degree of depth
1	50Ah	442mm	133mm	400mm
2	100Ah	442mm	133mm	410mm
3	150Ah	442mm	177mm	540mm
4	150Ah	442mm	133mm	540mm
5	200Ah	442mm	222mm	520mm

**Table 2 Specifications and models of Smart-Li battery pack series products**



Note: The size in the table above table is only the size of the battery box, excluding the size of the hanging ear, handle, cabinet, rack, rain box, etc.





Smart-Li 4850



Smart-Li 48100



Smart-Li 48150



Smart-Li 48150



Smart-Li 48200

### 1.5 Description of the interface definition

#### RESET key



Figure 3 The RESET key interface

NO.	pattern	method
1	Maintenance mode	press the button for 15-30s to enter or exit the maintenance mode
2	shut down	press the button for 5~10s
3	starting up	press the button for 3~5s
4	Resume restart	press the key for > 30s

Table 3. Description of the RESET key definition


#### LED pilot LED



Figure 4. LED LED

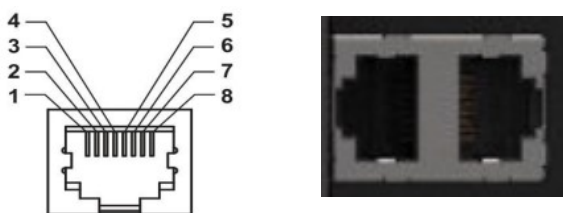
state	Normal / alarm / protection	RUN	ALM	CHG	DCHG	explain
		●	●	●	●	
shut down	dormancy	OFF	OFF	OFF	OFF	All OFF
await the opportune	normal	ON	OFF	OFF	OFF	stand by
	alarm	Flash 1	OFF	OFF	OFF	Temperature

<b>moment</b>						alarm ALM flash 3
<b>maintenance</b>	Maintenance installation	Flash 2	Flash 2	Flash 2	Flash 2	
<b>charge</b>	normal	ON	OFF	ON	OFF	
	Alarm (without temperature)	Flash 2	OFF	ON	OFF	Temperature alarm ALM flash 3
	Overcharge protection	Flash 1	OFF	OFF	OFF	
	Overtemperature, undertemperature, and overcurrent protection	Flash 1	Flash 2	Flash 1	OFF	The CHG LED is off when cut off
<b>discharge</b>	normal	ON	OFF	OFF	ON	
	alarm	ON	Flash 3	OFF	ON	Discharge overflow alarm ALM does not flash
	Over-discharge voltage protection	Flash 1	OFF	OFF	OFF	
	Temperature, current, and short-circuit protection	Flash 1	Flash 2	OFF	Flash 1	DCH LED is off when cut off

	fault	OFF	ON	OFF	OFF	Refers to the BMS hardware failure
 <b>Notes:</b> <ol style="list-style-type: none"> <li>1、The SOC LED is in standby state according to the electric quantity indication;</li> <li>2、Flash 1 represents 0.25s, 3.75s;</li> <li>3、Flash 2 represents 0.5s, 0.5s;</li> <li>4、Flash 3 represents 0.5s, 1.5s;</li> </ol>						

**Table 4 Description of LED lights**

### communication port

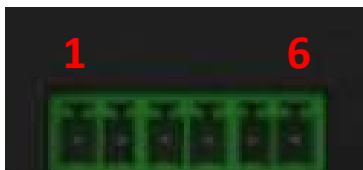


**Figure 5. Communication port**

order number	Signal name	function	Signal description
1	RS485_A	RS485	RS485 Signal A
2	RS485_B	RS485	RS485 Signal B
3	RS485_A	RS485	RS485 Signal A
4	RS485_B	RS485	RS485 Signal B
5	RS485GND	RS485	RS485 Signal ground
6	NC		
7	CANH	CAN	CAN tall
8	CANL	CAN	CAN low

**Table 6 Definition of the RJ 45 interface**

## Dry contact interface



**Figure 6 Dry contact interface**

Support 1 dry contact input;

Support the output of 2 dry contact. Under normal working state, 2 dry contact is disconnected state. After abnormal alarm, the corresponding dry contact is closed.

Dry contact point 1: cell failure (cell voltage 1V is too low, voltage difference is too large 800 mV).

Dry contact point 2: BMS, failure (charging MOS damage, discharge MOS damage, NTC disconnection).

The interface is defined as follows:

order number	Signal name	function	Signal description
1	DO1_NO	Output	DO 1
2	DO1_M	Output	
3	DO2_NO	Output	DO 2
4	DO2_M	Output	
5	OV	Input	-48V positive electrode (dry contact input power supply)
6	DI1	Input	DI1 signal input (short ted with 0V, disconnect)

**Table 7 Definition of the dry contact interface**

## Reserve interface



**Figure 7 The reserved interface**

Can according to different needs to expand wireless, bluetooth, GPS, gyroscope module and other customized modules or sensors to achieve wireless transmission, Bluetooth monitoring, positioning and gyroscope anti-theft function, the interface can expand to the chassis can also expand to the chassis, BMS board has corresponding row and reserved interface one-to-one correspondence,

The following table is defined:

order number	Signal name	function	Signal description
1	+12V	Input	The extension module provides the power supply to 12V
2	RX	Output	The extension module receives the signal
3	TX	Input	The extension module sends a signal
4	GND	Input	GND

**Table 8 The reserved interface definitions**

## 2. Methods of use

### 2.1 Prepare the tools

		
bolt driver	jacket	Nylon band
		
Electrician tape	paricostellae	RJ 45 Crystal head
		
Network wire cLED	notebook PC	Turn USB to RS485 communication line
		
Clip flow table	multimeter	diagonal pliers
		
connection cover cutting pliers	heat-shrinkable tubing	insulating gloves

Table 9: Common Tools



Note: Only some common tools are listed above, based to the actual requirements.

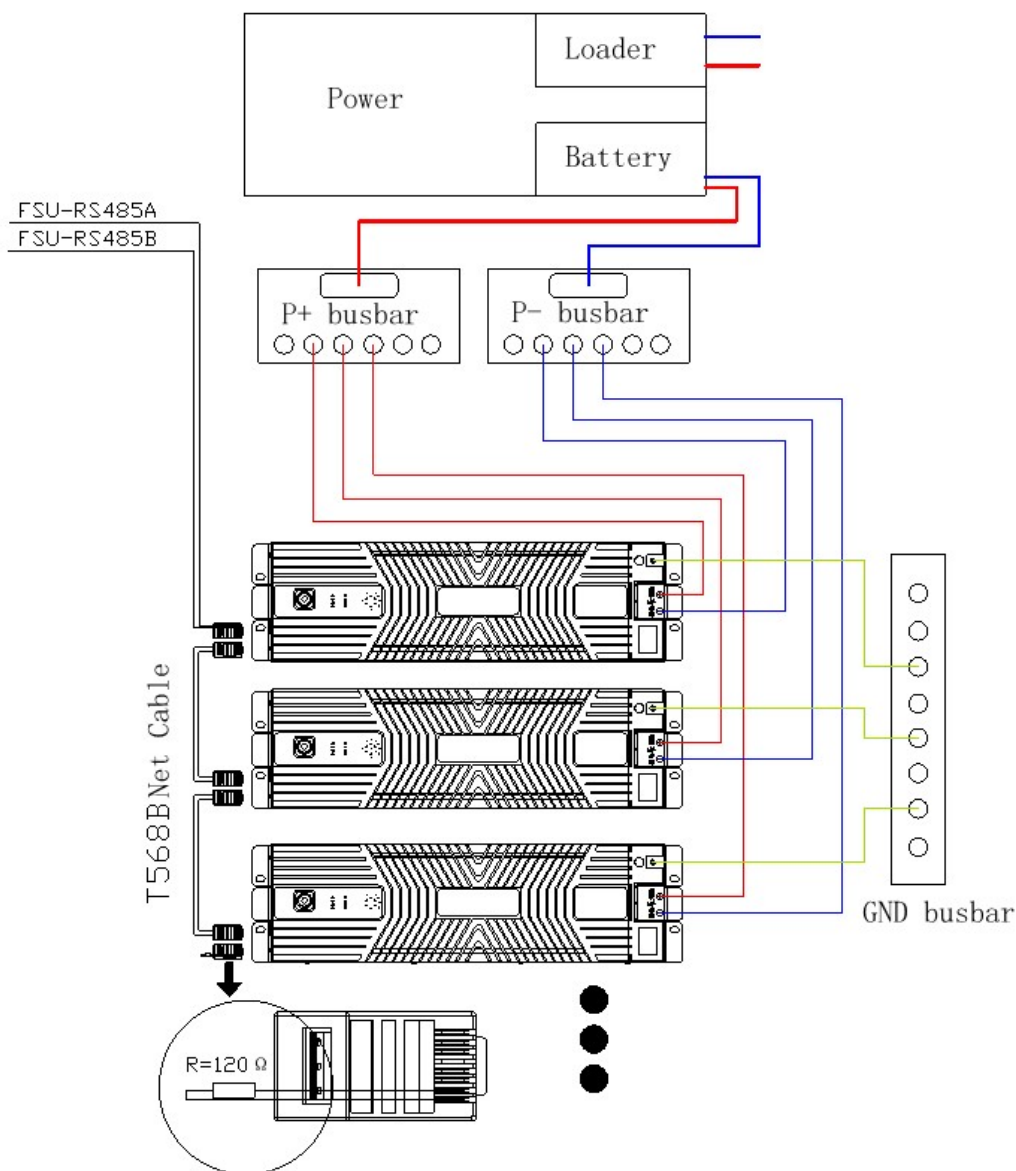
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## 2.2 Wiring diagram

### 2.2.1 Only Smart-Li battery use

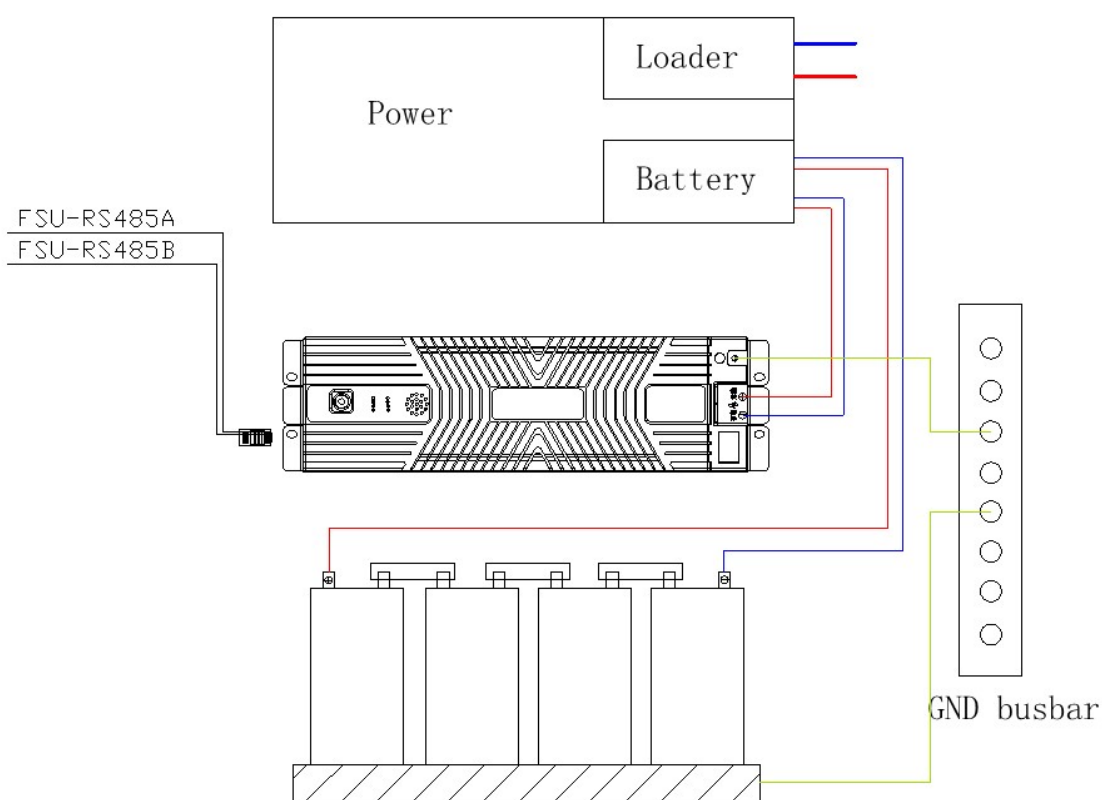
NO.	Parameter	Default value
1	Battery type	LFP battery
2	Boost charge voltage	54.0V
3	Float charge voltage	54.0V
4	Temp. Comp. Para	0





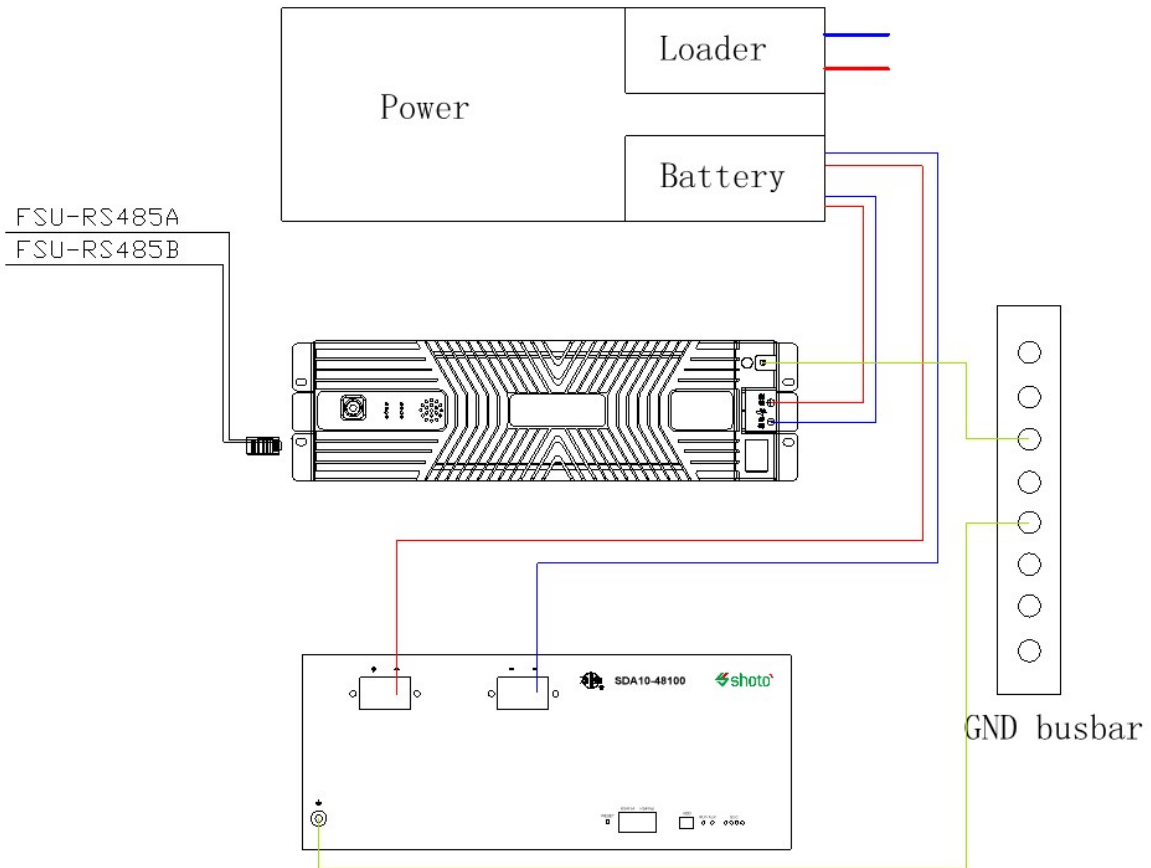
### 2.2.2 Smart-Li battery and lead-acid mixed use

NO.	Parameter	Default value
1	Battery type	LFP battery and lead-acid battery
2	Boost charge voltage	56.4V (Set according to lead-acid battery requirements)
3	Float charge voltage	53.5V (Set according to lead-acid battery requirements)
4	Temp. Comp. Para	Set according to lead-acid battery requirements



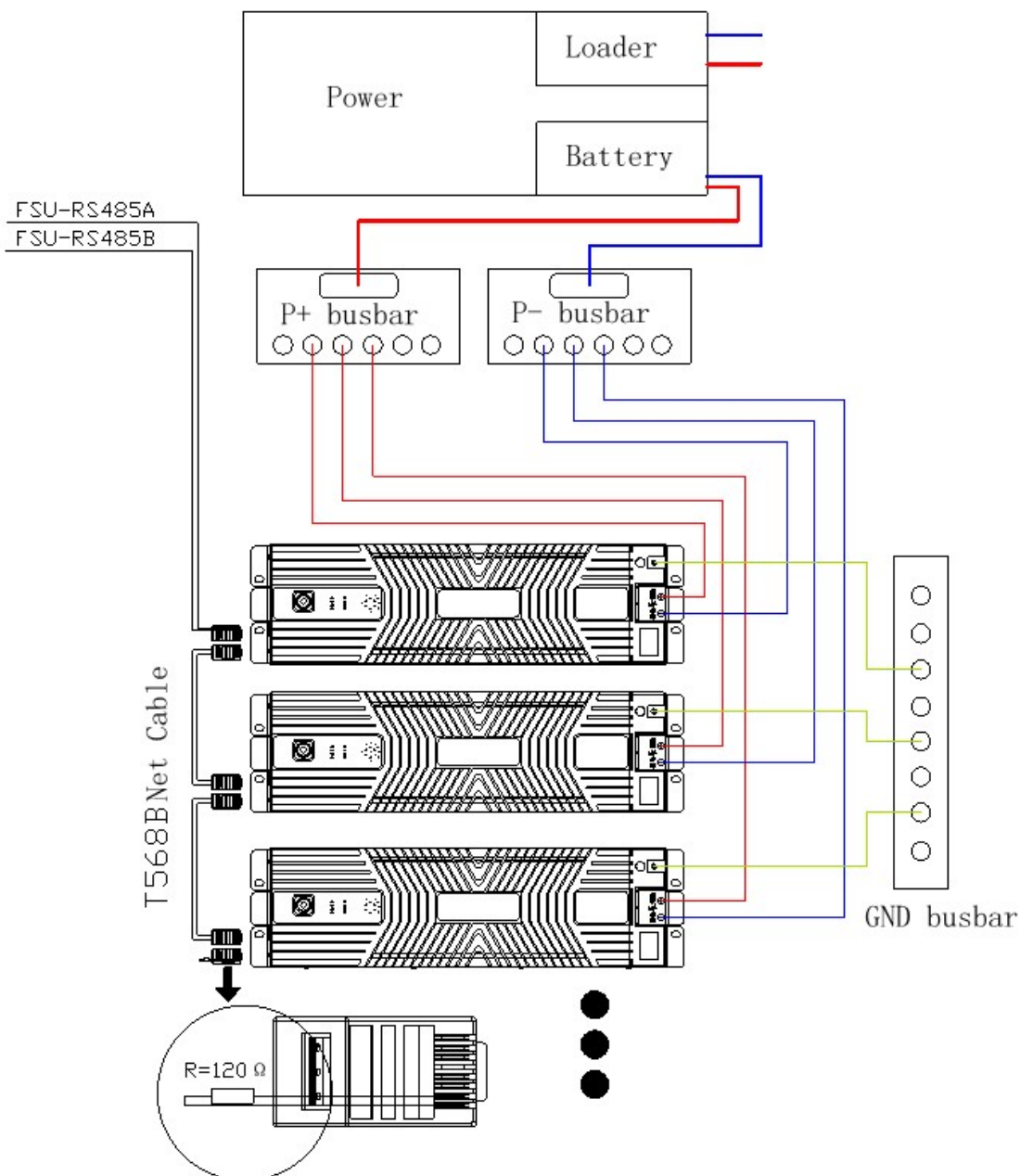
2.2.3 Smart-Li battery and conventional LFP battery mixed use

NO.	Parameter	Default value
1	Battery type	LFP battery
2	Boost charge voltage	56.4V
3	Float charge voltage	56.4V
4	Temp. Comp. Para	0



2.2.4 Peak shaving and valley filling boost discharge mode use

NO.	Parameter	Default value
1	Battery type	LFP battery
2	Boost charge voltage	57.0V
3	Float charge voltage	57.0V
4	Temp. Comp. Para	0



 Notes:

- 1、 A single Smart-Li battery pack can support 4800W continuous discharge, the maximum peak power is not more than 4900W, in the use of Smart-Li battery pack alone can not exceed the maximum power with load, otherwise there may be insufficient load power supply and other problems;
- 2、 When the load power exceeds a single Smart-Li battery pack, the corresponding number of Smart-Li battery pack should be used in parallel according to the corresponding power, and the number of parallel machines is not more than 32 groups;
- 3、 Each Smart-Li battery pack must be separately connected to the switch power supply parent bar when merging the machine. The Smart-Li battery pack can only be used in parallel, not in series.
- 4、 Please wear insulating gloves during the operation. Do not use the wiring when the battery pack is turned on.
- 5、 **When connecting the power cable of a new battery in parallel, it is forbidden to connect the cable while the installed battery is in a charging or discharging state.**

### 2.3 Connect to the communication lines

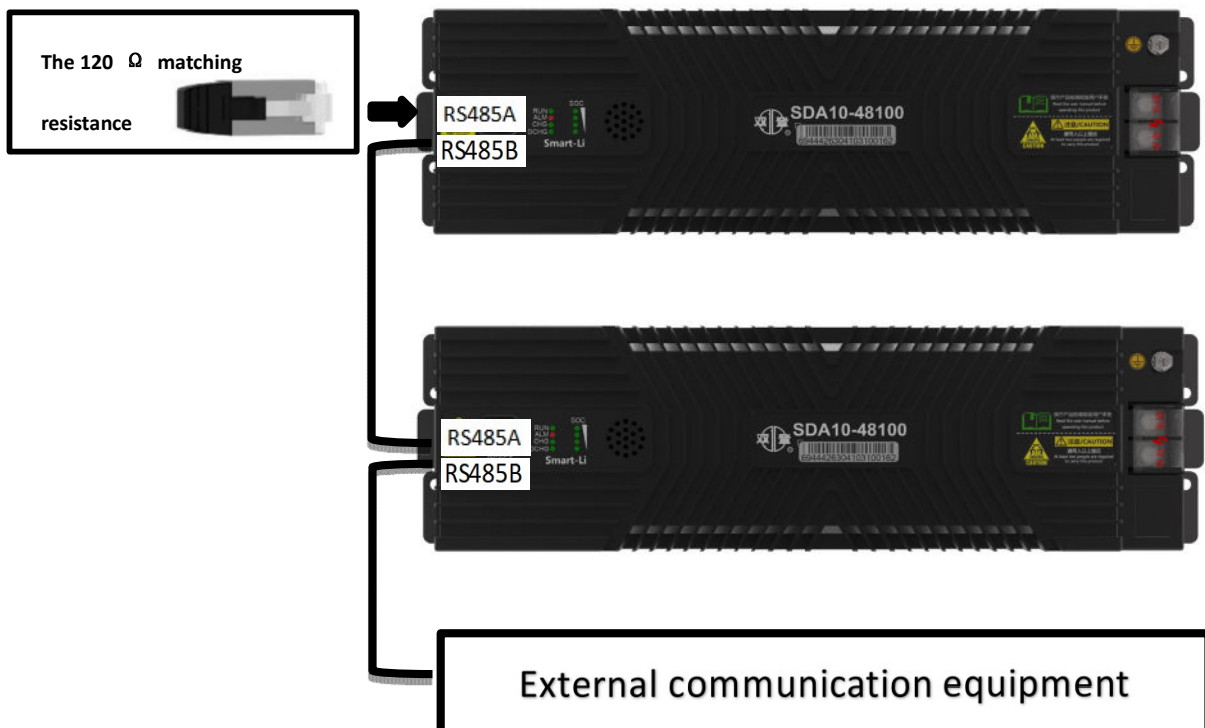


Figure 9. Schematic diagram of parallel machine communication



Notes:

- 1、 The battery communicates externally through the RS485, and the battery communicates through the CAN, requiring the matching resistance of 120 Ω at the end, the address allocation automatically, and communicates with the terminal device through the RS485.
- 2、 The conventional 8-core direct network wire can be used for parallel communication between batteries, and the first and second feet of the RJ 45 crystal head are used as the AB wire of RS485.
- 3、 **It is prohibited to connect cable for parallel communication when the battery is in a charging or discharging state.**

## 2.4 Power-up and start-up steps

Step 1: Install the Smart-Li battery pack according to the above installation method;

Step 2: After confirming that the wiring is correct, manually press the RESET button for 5~10s, the battery is activated, the battery RUN LED will turn on, the ALM LED off, the SOC LED will follow the power indicator, under the normal main power CHG LED will turn on, and the battery enters the charging state;



Notes:

1. When activating the battery with the RESET button, we must ensure that the positive and negative terminals of the battery are connected correctly, and we can not connect the reverse or short circuit;
2. After manual RESET button shutdown, the battery must be activated by manual reset button to work normally.

## 2.5 Charge and discharge parameters setting

<b>charging voltage</b>	The charging voltage limit of the battery pack is 53.5V~57.6V, and it is recommended 54.0V.  When there is a lead acid battery, the switching power supply floating charge management is implemented according to the original setting
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	without change.
<b>charging current</b>	Charging current range of the battery pack: 0 to 100A. BMS has autonomous flow limiting function. When the charging current is greater than the charge limit value of the battery pack, the charging current is maintained at the charge limit value without increasing. The charging flow limit point can be set, and the flow limit point is adjustable range: 5~ 100A, Default value of 15A.
<b>discharge voltage</b>	The discharge voltage limit range of the battery pack is 43.2V~57.0V, the battery pack supports constant voltage discharge, the constant voltage discharge range is 44.0V~57.0V, and the default value is 53.0V.
<b>discharge current</b>	Discharge current range of the battery pack: 0 to 10 I <sub>10</sub> . BMS has the function of autonomous current limiting. When the discharge current is greater than the maximum discharge limit value of the battery pack, the discharge current is maintained at the discharge limit value and does not increase.
<b>Discharge power</b>	In the natural convection environment, -10°C ~55°C ambient temperature, the battery pack output voltage range of 48V~57V, the rated discharge power is 4800W.
<b>Parallel discharge power</b>	When the battery pack is in parallel, its parallel discharge capacity meets: the maximum output power of N group in parallel = the maximum output power of a single group * N (2 N 32).

Table 10 Settings of charge and discharge parameters

# 3. Troubleshooting

## 3.1 LED alarm instructions and handling

When the system fails, the alarm signal will be given according to the fault situation. All the faults will have audible and optical alarm and text prompt. During the alarm, the red alarm light on the monitoring unit is on and sends an alarm message to the remote monitoring center. When an alarm is generated in the system, the remote monitoring center receives the alarm information. The maintenance personnel should immediately check the corresponding equipment according to the alarm information prompted by the monitoring unit, determine the fault type and location, and take corresponding countermeasures.

At the same time, the possible faults and handling methods can be simply determined by the LED LED, as shown in the table below:

order number	LED LED status	Determine the state	method of disposition
1	All off	The battery is empty and turned off	Press the reset button to activate the battery
		BMS damage	Report for repair after handling method 1 is invalid
2	RUN LED is constant, and ALM LED is off	normal	No need to deal with
3	RUN LED constant, ALM LED flash 2	overcurrent protection	Check whether the load current and the charge current are too large
		Charging for high and low temperature protection	Check the ambient temperature for too high or too low
4	RUN LED constant, ALM LED flash 3	BMS components failure	Contact the manufacturer to replace the BMS
		The temperature NTC fails	Contact the manufacturer to replace the temperature NTC

Table 11. Common fault handling methods

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### 3.2 Handling of special cases

#### (1) Power failure

AC power outage is the most common situation in the operation of the system. When the power outage is not long, the DC power supply is provided by the lithium battery pack in the system. If the power outage is unknown or the time is too long, the power outage should pay attention to the power supply time of the system.

#### (2) Disaster change and accident

Disaster accidents include communication equipment failure caused by lightning strike, flooding, earthquake, fire and other disasters. The prevention and control of disasters that may seriously affect the communication security should be mainly prevention. At the same time, the communication station should have the countermeasures to deal with these disasters and the corresponding human and material resources, and the communication station should have the emergency management regulations and the emergency repair regulations of major accidents.



# 4. Transportation and storage

## 4.1 Transportation

Adapt to the car, ship, aircraft transportation, transportation should be shelter, sun protection, civilized loading and unloading. The packing box with products is allowed to be transported by any means of transportation. In the process of loading and unloading, the battery should be moved and put gently to strictly prevent throwing, rolling and overloading. Direct shower and mechanical impact of rain and snow should be avoided in transportation.

## 4.2 Storage

After purchasing Smart-Li battery pack, it is not recommended long-term storage, it is recommended to use on the station in time.



Notes:

- 1、Smart-Li battery should be placed in a dry warehouse, not sun exposure and rain;
- 2、 Warehouse does not allow harmful gas, flammable, explosive products and corrosive chemicals, avoid mechanical impact, pressure and strong magnetic field, avoid direct sunlight, distance from the heat source should not be less than 2m, packing box should be at least 20cm high from the ground, at least 50cm from the wall, window or air entrance;
- 3、 Under these specified conditions, products with storage period of more than 3 months should be recharged once, products with storage period of more than 6 months must undergo capacity verification test, and products with storage period of more than 1 year must be re-inspected and can be used after passing.

## 4.3 Recharge

When the storage time of the smart lithium battery pack exceeds 6 months, it must be recharged. After connecting the DC power supply, press 5~10s to activate the battery.



Figure 10 Schematic diagram of the power supplement



Notes:

- 1、 The supplementary voltage of DC power supply is set 54.0V, and the current setting does not exceed 100A;
- 2、 The SOC LEDs are all on, and the CHG LED is completed after the power is off;
- 3、 If the Smart-Li battery pack is found to be bulge, leakage and other phenomena no matter how long the storage should be immediately stopped.