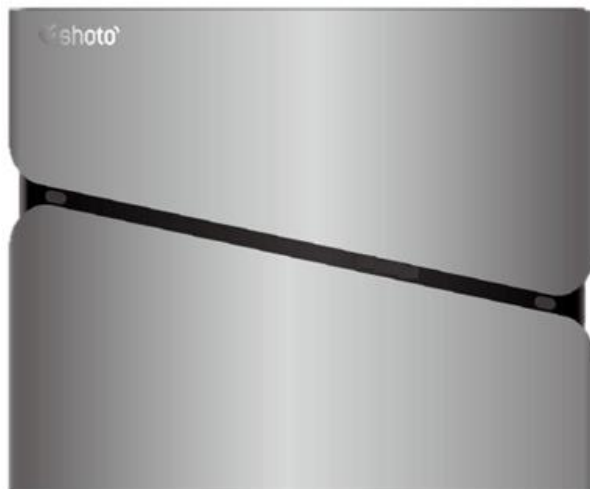




Home Power Lithium-Ion Battery (HP10-Box5 Pro) Product Manual




Edition: V1.1
Release Date: 2023-09-08

Shuangdeng Group Co., Ltd

Copyright © 2021 Shuangdeng Group Co., Ltd. reserves all rights.

No part of this document may be reproduced or transmitted in any form or by any means without the prior written permission of Shuangdeng Group Co., Ltd.

Trademarks and Licenses

 and other Shoto trademarks are trademarks of Shuangdeng Group Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Statement

The products, services and functional parts purchased are stipulated in the contract between Shuangdeng and the customer. All or part of the products, services and features described in this document may not be within the scope of purchase or use. Unless otherwise specified in the contract, all statements, information and suggestions in this document are provided "as is" without any warranty, guarantee or representation, express or implied.

The information in this document is subject to change without notice. While preparing this document, we have made every effort to ensure the accuracy of the content, but all statements, information and suggestions in this document do not constitute any form of express or implied warranty.

Contents

Contents.....	3
About this document	4
1. Safety Precautions.....	5
1.1、Reminding.....	5
1.2、Warning.....	6
1.2.1、Before Using.....	6
1.2.2、In Using.....	6
2. Product advantages	7
3. Specifications.....	8
4. System panel instructions	9
4.1、The main information of panel battery products as follows:	9
4.2、Communication interface	10
4.2.1、Cascade communication interface.....	10
4.2.2、Communication wire	11
4.2.3、CAN	11
4.2.4、Power Terminals	11
4.2.5、LED Status Indicators	12
5. Safe handling of lithium batteries Guide	14
5.1、Schematic Diagram of Solution.....	14
5.2、Explanation of Symbol	15
5.3、Tools.....	15
5.4、NOTE.....	16
5.5、Safety Gear.....	16
5.6、Installation.....	16
5.6.1、Battery System Description.....	16
5.6.1、Package Items	21
5.6.2、Installation Location.....	27
6. Trouble Shooting Steps.....	27
6.1、Problem determination based on:	27
6.2、Preliminary determination steps:.....	27
6.3、The battery cannot be charged or discharged.....	28
7. Emergency Situations	28
7.1 Emergency treatment measures for serious safety accidents	28
7.1.1、Leaking Batteries	28
7.1.2、Wet Batteries	28
7.1.3、Battery bulging.....	29
7.1.4、Smoke or burning of battery.....	29

About this document






Role of this article

This manual introduces HP10-Box5 Pro from Shoto. Please read this manual before you to install the battery and follow the instruction carefully during the installation process. Any confusion, please contact Shoto immediately for advice and clarification.

Target Readers

- Maintenance Engineer
- Sales Engineer
- Technical support engineer

Symbol Description

Symbol	Explain
 Danger	Indicates an emergency hazardous situation that, if not avoided, may result in serious injury or death.
 Warning	Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death.
 Watch out	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
 Be careful	Indicates a potentially hazardous situation that, if not avoided, may result in equipment damage, data loss, performance degradation, or other accidents. "Attention" is used to mark behaviors unrelated to
 Notes	Indicates attention to important information, best practices, and tips. "Note" is used to mark information irrelevant to personal injury, equipment damage and environmental degradation.

1. Safety Precautions

1.1. Reminding

1) It is very important and necessary to read the user manual carefully (in the accessories) before installing or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or can damage battery, potentially rendering it inoperable.

2) It is strictly forbidden to immerse the battery in water or rain.

3) Prohibit using and shelving the battery beside the high temperature source. Forbid discarding the battery into fire or heater.

4) Please use the module according to the charge and discharge parameters specified in this manual.

5) It is prohibited to connect the battery and AC power directly.

6) Forbid breaking up the battery and its part. Forbid to rap, stomp and throw the battery.

7) Even if the grid is cut off, the battery module still has the voltage output, please take care to avoid electric shock or short circuit when using battery module.

8) If the battery is stored for long time, it is required to charge them every six months, and the SOC should be no less than 80%. Battery needs to be recharged within 12 hours, after fully discharged.

9) All the battery terminals must be disconnected for maintenance.

10) Do not connect battery with PV solar wiring directly.

11) Please contact the supplier within 48 hours if there is something abnormal.

12) In areas with poor environmental conditions, effective protective measures must be taken for battery module, such as good grounding, sun shading board, rain cabinet and dust screen, to avoid lightning, rain, snow, high temperature, dust damage battery module and impact battery life.

13) For being used in high temperature areas, the battery must be used in cabinets with corresponding heat dissipation equipment (fans or air conditioners). In low temperature areas, the battery must be used in cabinets with corresponding heating equipment (heating plates or air conditioners). In coastal areas, the battery must be used in a cabinet with the corresponding salt spray protection capability.

14) Unless otherwise specified, the charging and discharging current for the battery module and battery module is recommended to be set at $0.5C_3$.

15) Please read the product manual carefully before installation and application, The warranty claims are excluded for direct or indirect damage due to items above.

1.2 、 Warning

1.2.1、 Before Using

- 1) After unboxing, please check product and packing list first, please read the product manual carefully before installation and application, if product is damaged or lack of parts, please contact with the local retailer;
- 2) It is prohibited to connect the battery and AC power directly;
- 3) Before installation, the cable must not be reversed and make sure the battery is in the turned-off mode;
- 4) Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device;
- 5) The battery please DO NOT connect battery in series;
- 6) Battery system must be well grounded and the resistance must be less than 1;
- 7) Please ensured the electrical parameters of battery system are compatible to related equipment;
- 8) Keep the battery away from water and fire.

1.2.2、 In Using

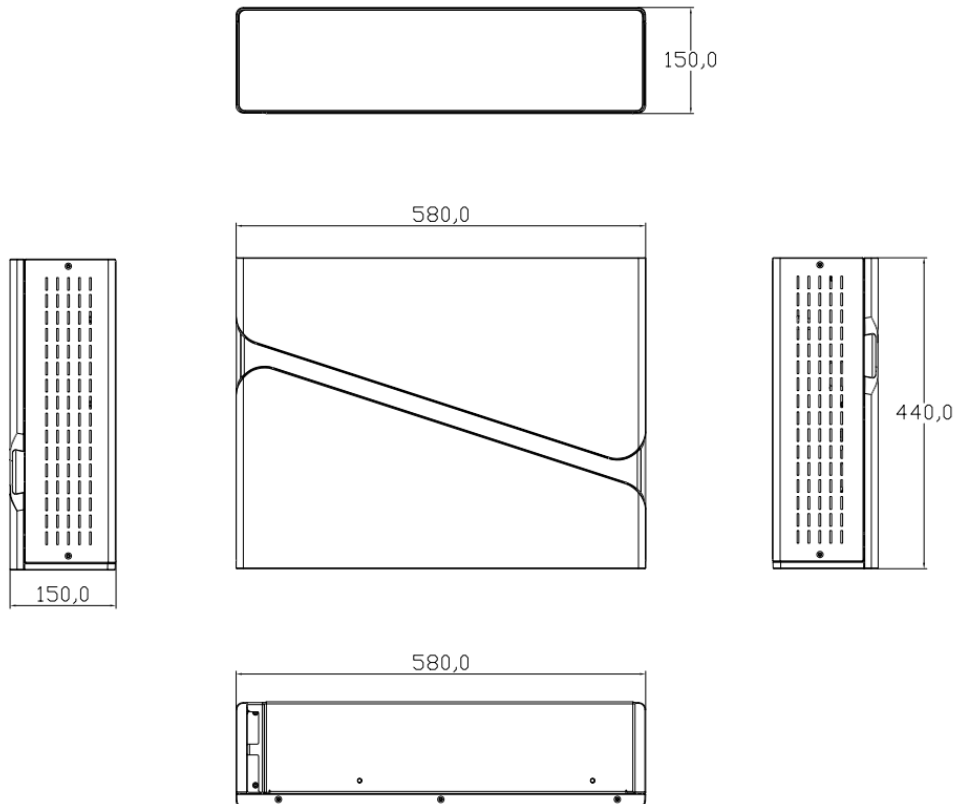
- 1) If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shut down;
- 2) It is prohibited to put the batteries working with faulty or incompatible inverter;
- 3) In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited.
- 4) It is forbidden to connect the battery with different types of battery.
- 5) If the battery pack bulges, leaks, or smokes, stop using it immediately and contact shoto or an authorized dealer.

2. Product advantages

- 1) The battery positive electrode is made of LFP, which has long cycling life and good safety.
- 2) The battery module adopts the high-performance BMS, which has the protective functions of current, voltage and temperature etc..
- 3) The system can seamlessly turn on after the public electricity fails.
- 4) Adopting the self-cooling method, the system has extremely low noise.
- 5) Good temperature characteristics : working environment temperature can reach -20~+50°C(Charging -5~50°C; discharging -20~50°C, recommended temperature: +15~+35°C).
- 6) LFP battery has excellent rate discharge performance, which enables LFP battery with small capacity to meet large current discharge requirements.

3. Specifications

Model	HP10-Box5 Pro
Nominal Capacity (kWh)	5.12
Depth of Discharge	90%
Usable Capacity (kWh)	4.10(recommend),5.12(maximum)
Charge Voltage (V)	54.0-56.4
Discharge Voltage (V)	45.0-53.0
Nominal Voltage (V)	51.2
Charge/Discharge Current(A)	Recommend 50 (0.5C)
	Max 100 (1C)
Communication Port	RS485 & CAN
Dimensions (W*H*D)mm	580mm*440mm*150±2mm
Operating Temperature(°C)	Charge: -5°C~+50°C
	Discharge: -20°C~+50°C
Recommend Operating Temperature(°C)	Charge: +15°C~+35°C
	Discharge: +15°C~+35°C
	Storage: -20°C~+35°C
Humidity	5%-95%
Altitude	≤4000m
Cycle Life	6000 cycles




4. System panel instructions



Pic.1 HP10-Box5 Pro Schematic of lithium-ion battery system panel

4.1、The main information of panel battery products as follows:

Table 1 HP10-Box5 Pro The main panel details of lithium-ion battery system

Number	Designation	Loge	Descriptions
1	Capacity indicator	SOC	4 green lights, green LEDs to show the battery's current capacity, each light indicates 25% capacity.
2	Stand by lamp	ALM	1 red light, red LED flashing to show the battery has alarm, and lighting to show the battery is under protection.
3	Communication running lights	RUN	1 green light, running lights
4	ADD switch	ADD	Used to set the battery correspondence address
5	On-off key	RESET	Standby button, the duration is 3 seconds, the battery can be shut down; Turned off the key, the duration is 3 seconds, the battery can power on, power can be automatically activated battery system.
6	CAN communication port	CAN	CAN Communication Terminal: (RJ45 port) follow CAN protocol, for output batteries information
7	485A communication port	RS485A	Used to communicate with the computer PC or cascade communication
8	485B communication port	RS485B	Used to communicate with the computer PC or cascade communication
9	Input and output interfaces: anode	“+”	One way anode battery input and output
10	Input and output interfaces: cathode	“-”	One way cathode battery input and output
11	Grounding terminal		Used for battery grounding

4.2、 Communication interface

4.2.1、 Cascade communication interface

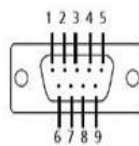
The number of “7”and“8” in Table 1 represents RS485 communication ports, R485 Communication Terminal (RJ45 port) follow RS485 protocol, for output batteries information, RS485 definition is shown in Table 2-1.



Table 2-1 The pins definition of the RS485 port

Pin	Definitions
1	RS485-B
2	RS485-A
3	GND
4	NC
5	NC
6	GND
7	RS485-A
8	RS485-B

Pic. 2 shows the communication wire with that of DB9 (first wire and sixth wire are not connected).



USB to RS485(DB9) line:

PIN1:RS485-A

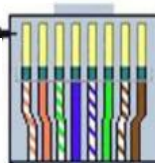
PIN2:RS485-B

RS485-A:pin2

RS485-B:pin1



Pin1



RS485(DB9) to RJ45 Plug line:

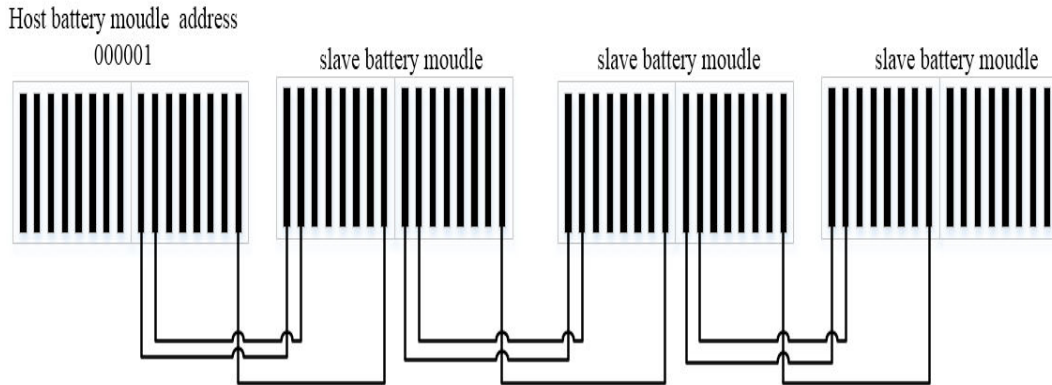
PIN1:RS485-B

PIN2:RS485-A

RJ45 Plug

4.2.2、 Communication wire

Pic. 3 shows the cascade communication wire connections of RS485.



4.2.3、 CAN

CAN Communication Terminal: (RJ45 port) follow CAN protocol, for output batteries information.



Table 2-2 the pins definition of the CAN port

Pin	Definitions
1	NC
2	NC
3	GND
4	CAN-H
5	CAN-L
6	GND
7	NC
8	NC

4.2.4、 Power Terminals

Power cable terminals: there are two pair of terminals with same function, one connect to equipment, the other one paralleling to other battery module for capacity expanding. For each single module, each terminal can achieve charging and discharging function.



4.2.5、LED Status Indicators

4.2.5.1、LED lights order

1 RUN LED, 1 ALM LED, 4 SOC LED.

●	●	●	●	●	●
SOC				ALM	RUN

4.2.5.2、Capacity indicator

Statuses		Charge			
Capacity Light		L4 ●	L3 ●	L2 ●	L1 ●
SOC	0%~25%	OFF	OFF	OFF	Flash
	25%~50%	OFF	OFF	Flash	Light
	50%~75%	OFF	Flash	Light	Light
	75%~100%	Flash	Light	Light	Light
Run Light ●		Long lighting			

Statuses		Discharge			
Capacity Light		L4 ●	L3 ●	L2 ●	L1 ●
SOC	0%~25%	OFF	OFF	Light	Light
	25%~50%	OFF	Light	Light	Light
	50%~75%	Light	Light	Light	Light
	75%~100%	Light	Light	Light	Light
Run Light ●		Flashing			

4.2.5.3、Flashing instructions

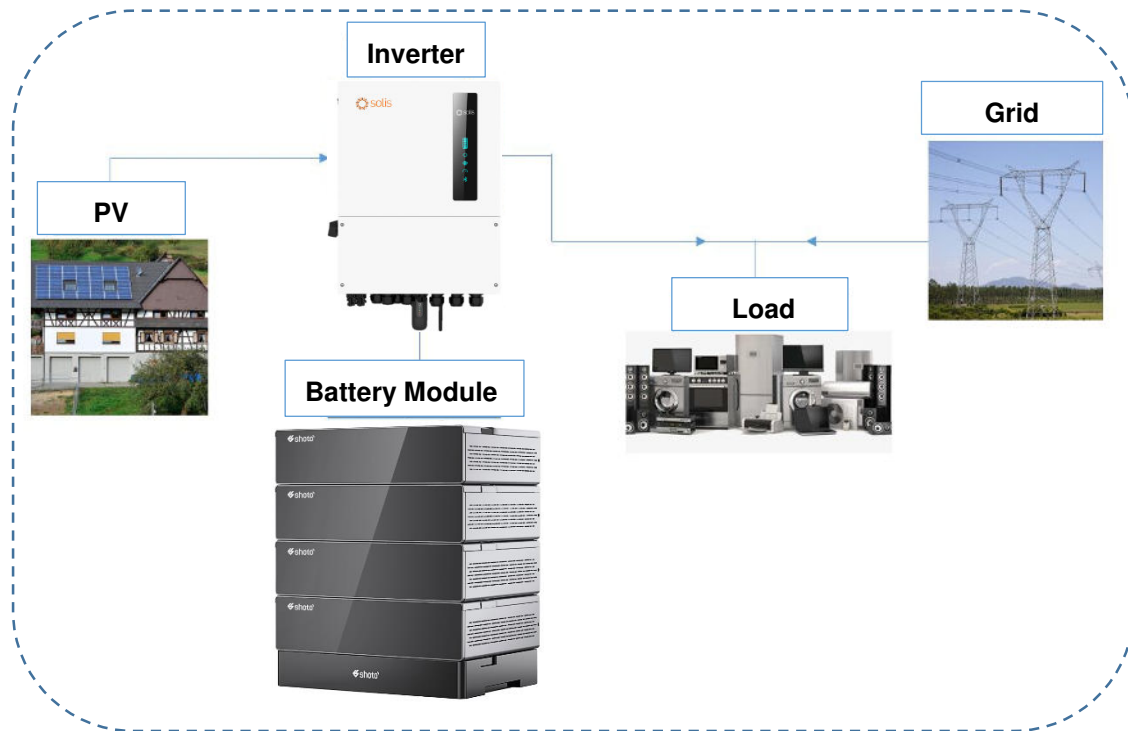
Flashing way	Light	OFF
Flash 1	0.25s	3.75s
Flash 2	0.5s	0.5s
Flash 3	0.5s	1.5s

4.2.5.4、 Status indication




System status	Operation status	SOC				ALM	RUN	Remark
		●	●	●	●	●	●	
Shut down	Dormancy	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Normal	Indicating according to actual capacity				OFF	Light	Standby
Charge	Normal	Indicating according to actual capacity				OFF	Light	The highest LED flash 2
	Over current alarm	Indicating according to actual capacity				Flash 2	Light	The highest LED flash 2
	Over voltage protect	OFF	OFF	OFF	OFF	OFF	Flash 1	
	Temperature and overcurrent protection	OFF	OFF	OFF	OFF	OFF	Flash 1	
Discharge	Normal	Indicating according to actual capacity				OFF	Flash 3	Indicating according to actual capacity
	Alarm	Indicating according to actual capacity				Flash 3	Flash 3	
	Temperature, over current, short circuit and other protection	OFF	OFF	OFF	OFF	Light	OFF	Stop discharging, power offline 48h after no action forced hibernation
	Low voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	Stop discharging, all light off.

5. Safe handling of lithium batteries Guide

5.1. Schematic Diagram of Solution



5.2、 Explanation of Symbol

Name: Rechargeable Li-ion Battery System
Model: HP10 – Box5 Pro
Capacity/Voltage/Power: 100Ah/51.2V/5120Wh
Input: 54.0V—56.4V  ; (16S)
Output: 45.0V—53.0V  ; (16S)
Anode: LFP Cathode: Graphite
Origin: Made in China
SN: 

DANGER

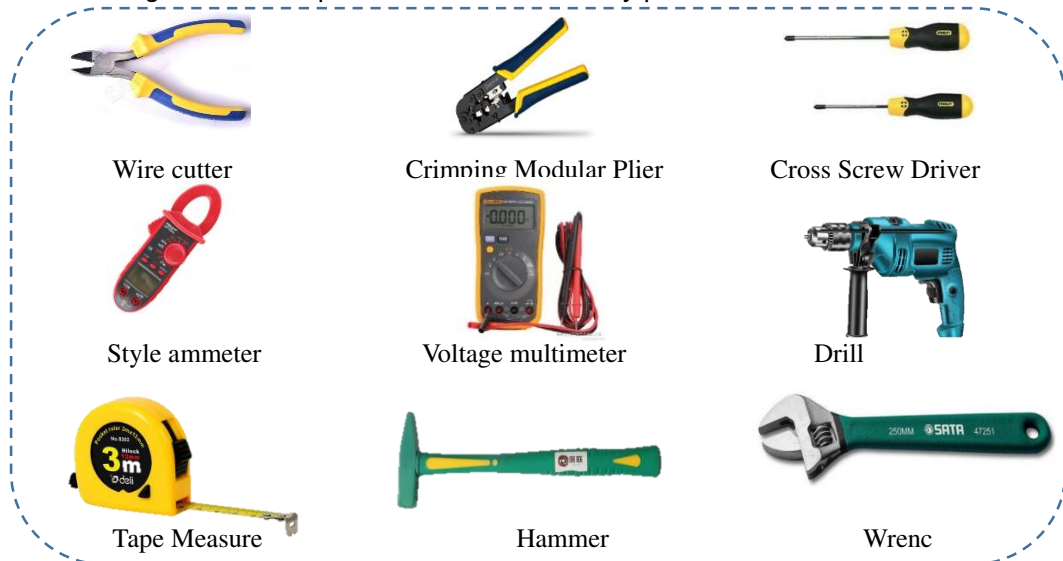
DANGER LOW DC VOLTAGE INSIDE
DANGER ARC FLASH & SHOCK HAZARD

- * Do not disconnect or disassemble by non-professional personnel.
- * Do not connect the battery pack output positive and negative ports reversely.
- * Do not drop, deform, impact, cut or spearing with a sharp object.
- * Do not place near open flame or flammable material.
- * Do not cover or wrap the product case.
- * Do not sit or put heavy things on battery.
- * Avoid of moisture or liquid.
- * Follow the product manual to makewiring connection.
- * Keep out of reach of children, animals or insects.
- * Contact your supplier within 24 hours if anything failure happens.



5.3、 Tools

The following tools are required to install the battery pack.



5.4、 Note

Use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

5.5、 Safety Gear

Wear the following safety gear when dealing with the battery system.



Insulated shoes



Safety gloves





Safety goggles

5.6、 Installation

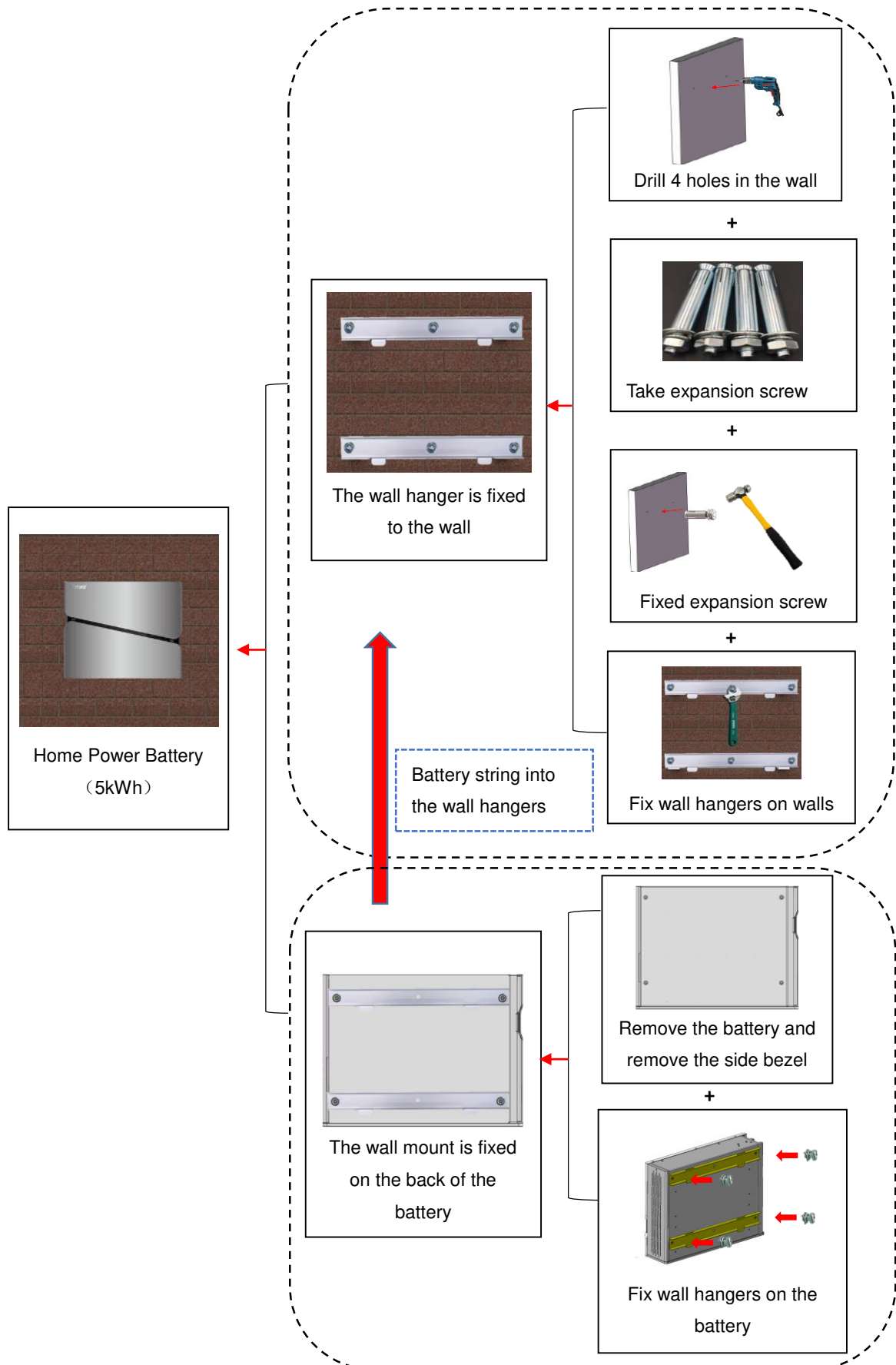
5.6.1、 Battery System Description

The Battery HP10-Box5 is used as a connected battery for the intermediate storage of excess PV energy in an inverter system. The assembly parts of the battery pack system are as follows.

 QUALIFIED PERSON
 CAUTION
<p>Risk of injury due to weight of the battery module.</p> <p>Injuries may result if the battery module is lifted incorrectly or dropped while being transported or installed.</p> <ul style="list-style-type: none">• Transport and lift the battery module carefully. Take the weight of the battery module into account.• Wear suitable personal protective equipment for all work on the battery system.• Put the installed base and feet along the wall, and keep the distance of 100 mm between the wall and the base.• Install the battery string on a solid wall.• Do not install battery strings on flammable materials.

HP10-Box5 household energy storage battery module can be stacked and wall mounted, the specific installation steps are as follows:

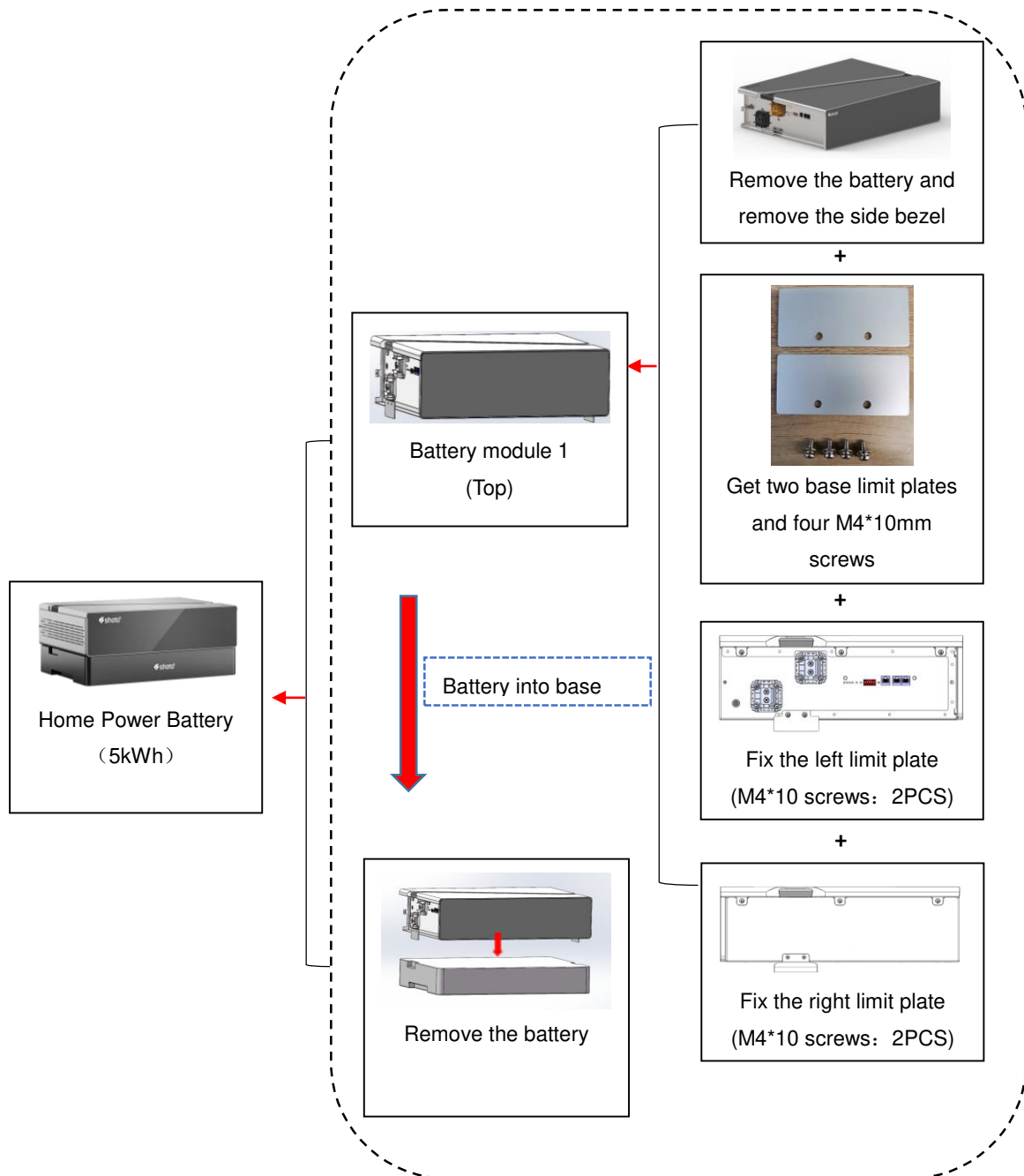
Installation Method 1 (Wall mounted type) :



Installation Method 2 (Stack up type-Single layer) :



A	Base
B	Battery module 1 (Top)



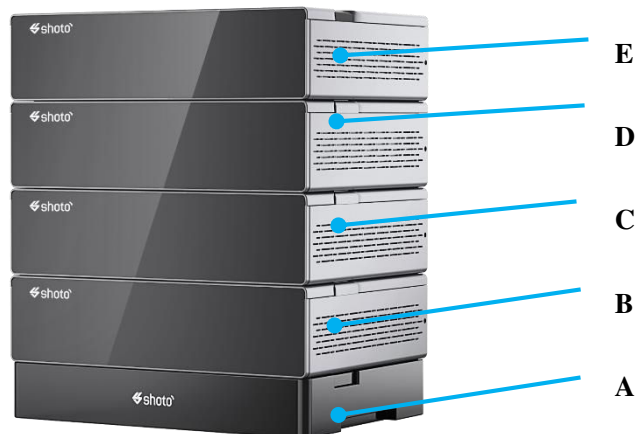
Installation Method 3 (Stack up type-multiple layers) :



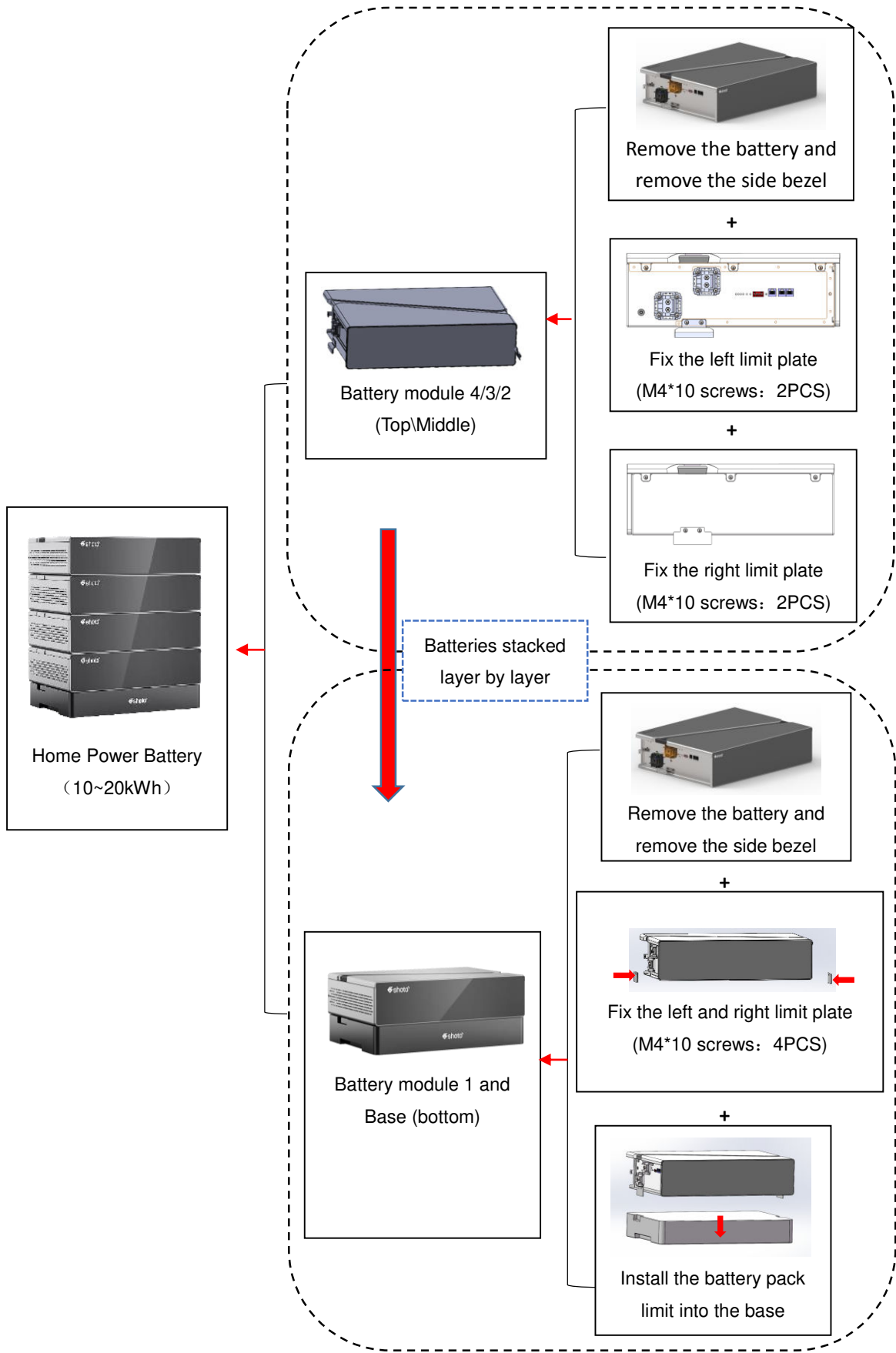
A	Base
B	Battery module 1 (bottom)
C	Battery module 2 (Top)



A	Base
B	Battery module 1 (bottom)
C/D	Battery module 2\3 (Middle/ Top)



A	Base
B	Battery module 1 (bottom)
C/D/E	Battery module 2\3\4 (Middle/ Top)




Note: Installed system must keep the distance of 50mm between the wall and the base.

5.6.1、 Package Items

Unpacking and check the Packing List.

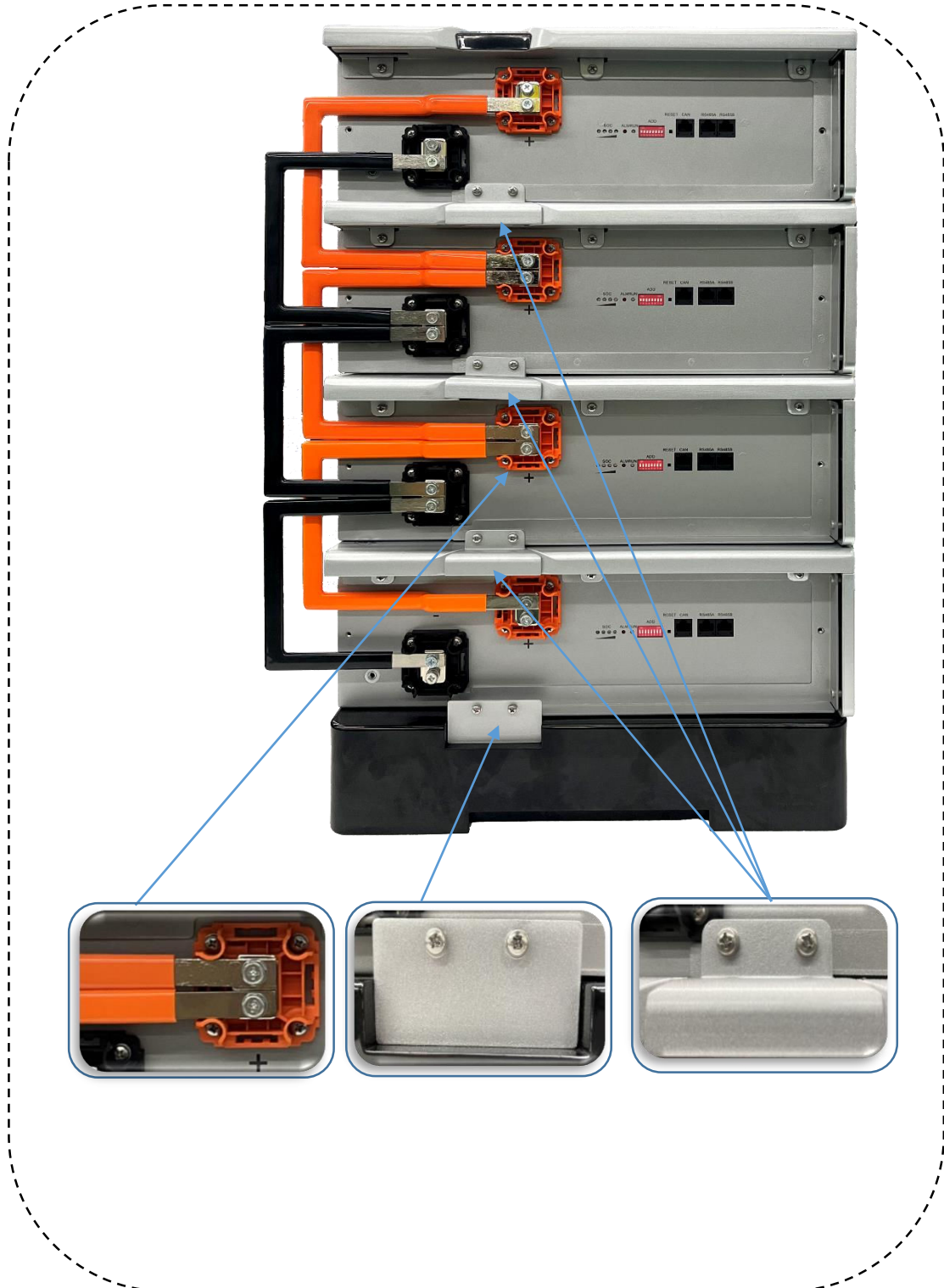
1) For battery module package: (1 Pcs Battery HP10-Box5 Pro)

Item picture	Name and model	Number
	Positive parallel copper row (orange)	1
	Negative parallel copper row (black)	1
	Ground wire -0.3m	1
	Parallel network line -0.7m	1
	Terminal screws M6*16mm	4
	Grounding screws M5*8mm	1
	Side panel fixing screws M5*12mm	4

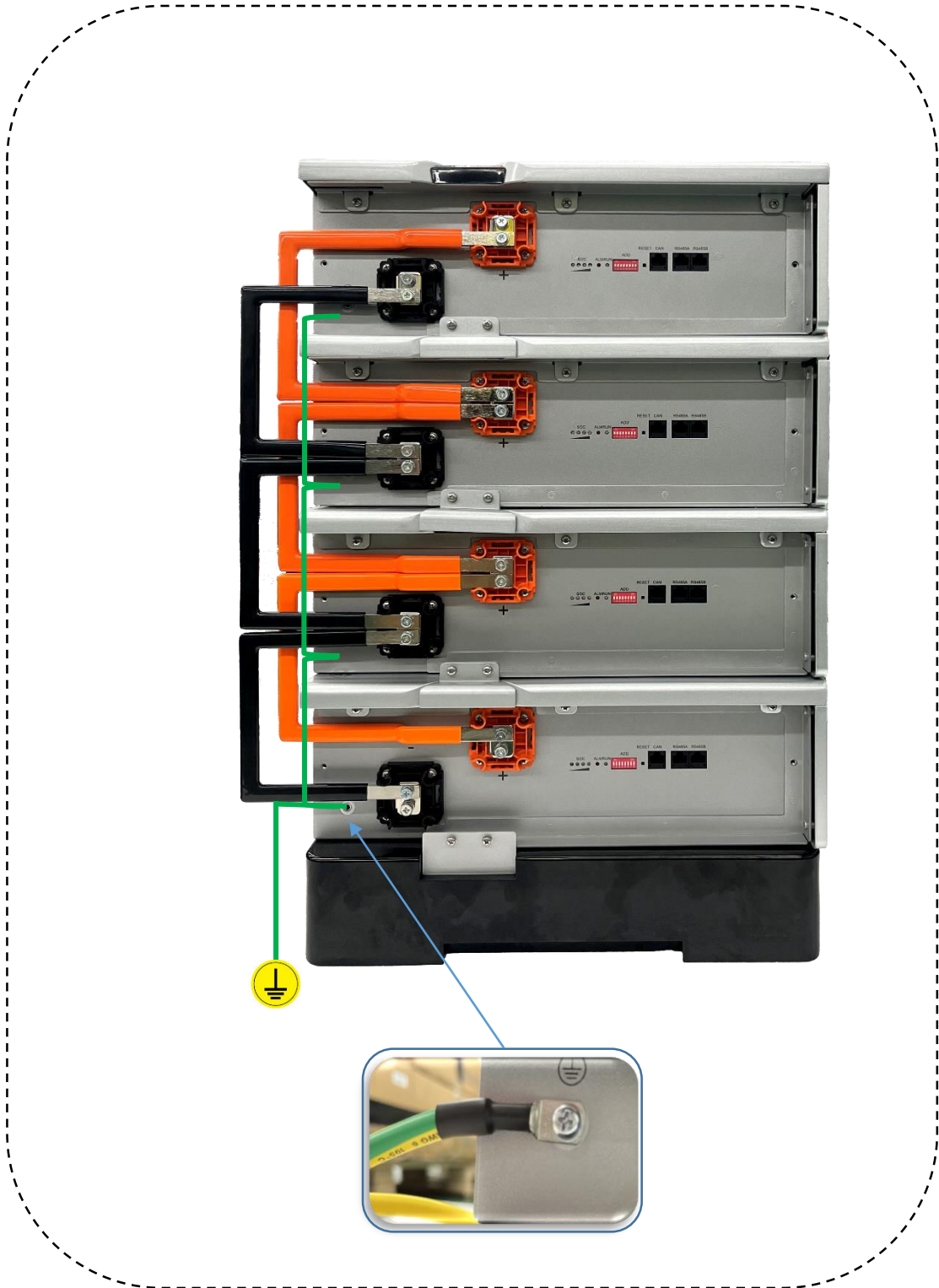
2) Electrical connection:

HP10-Box5 Pro home energy storage battery module can be stacked and wall mounted, the specific installation steps are as follows:

- ※ Use copper bars to connect modules in positive and positive parallel, negative and negative in parallel.

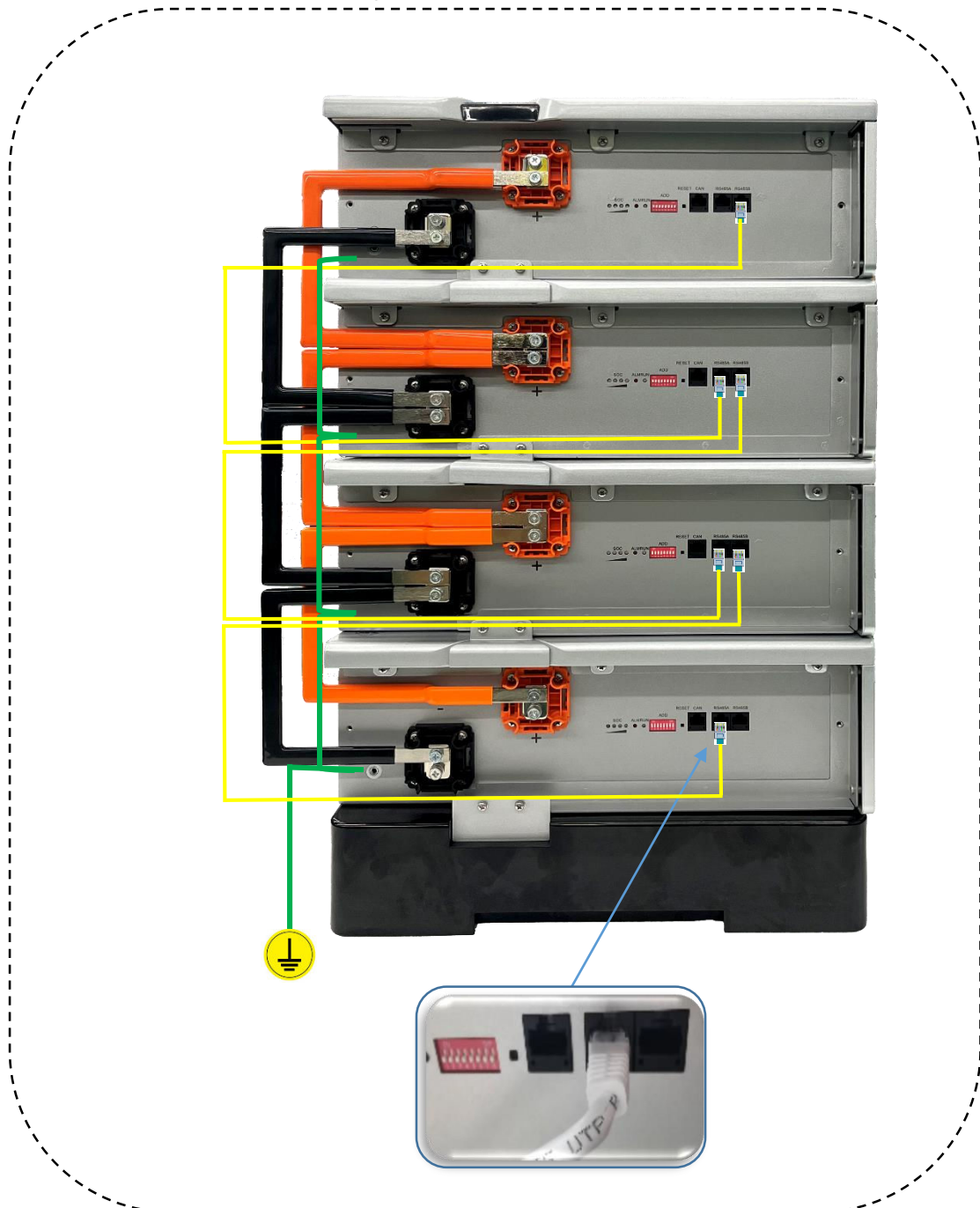


- ※ Use grounding wire to connect the module grounding holes in parallel and ground them reliably. Grounding cables use 10AWG yellow-green cables.

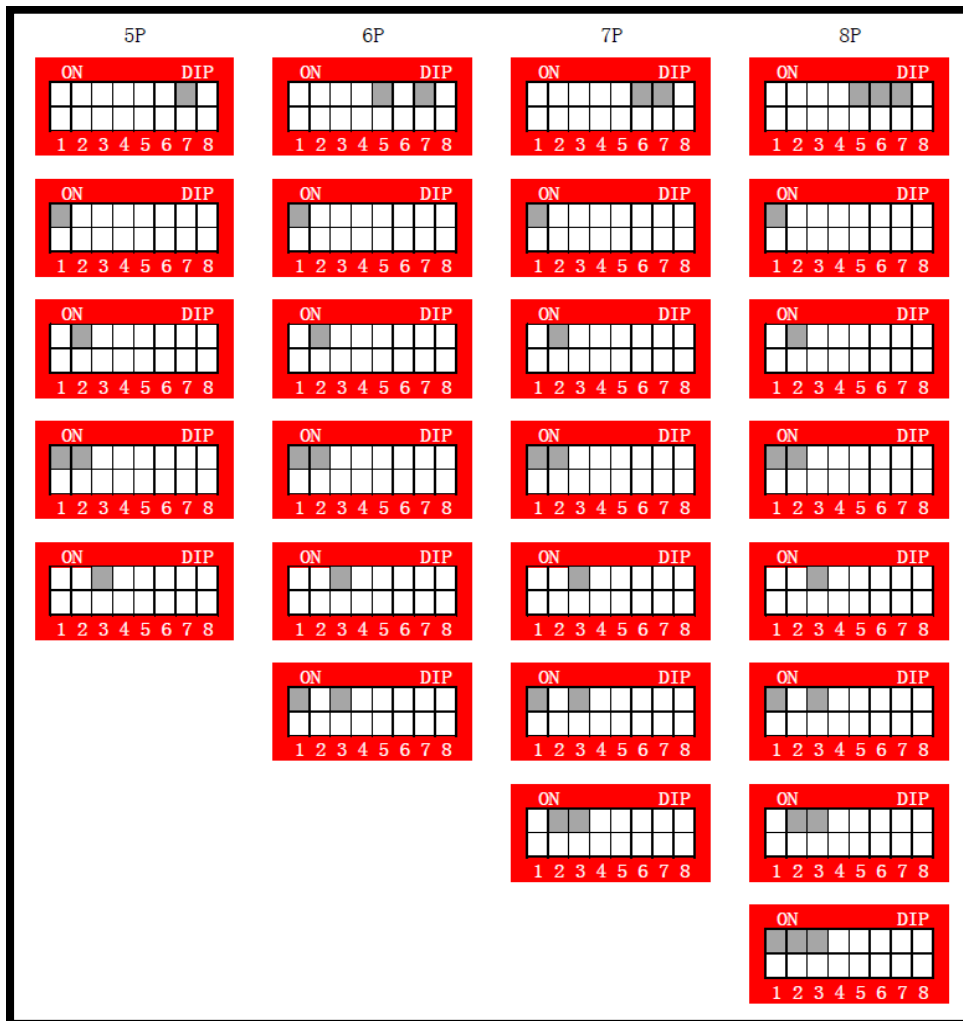
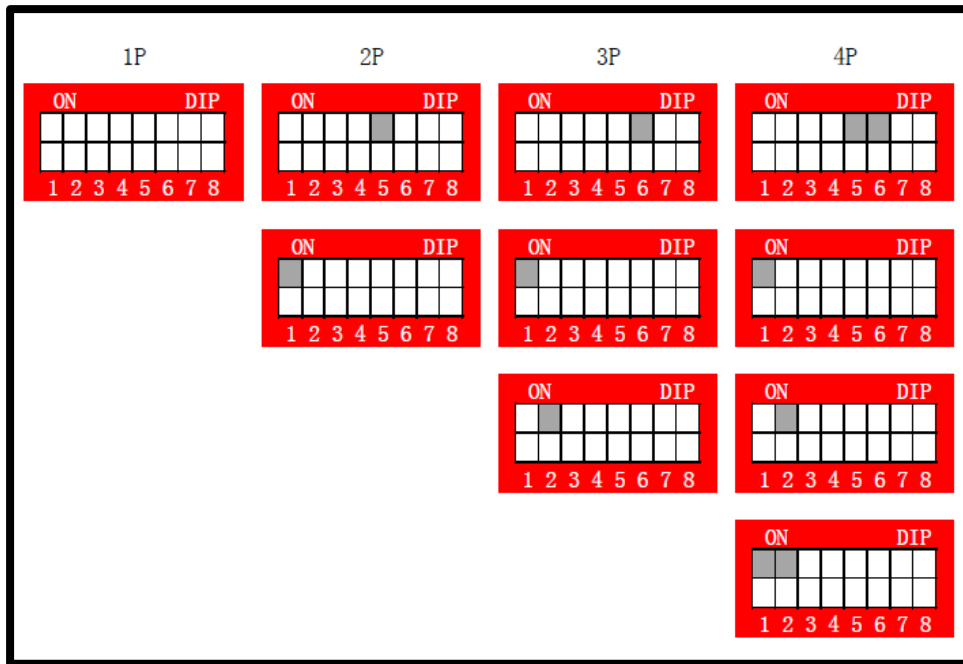


※ Use the communication cable to connect the previous module RS485B to the RS485A of the next module. The cable length and quality affect the quality of the signal. Observe the following cable requirements.

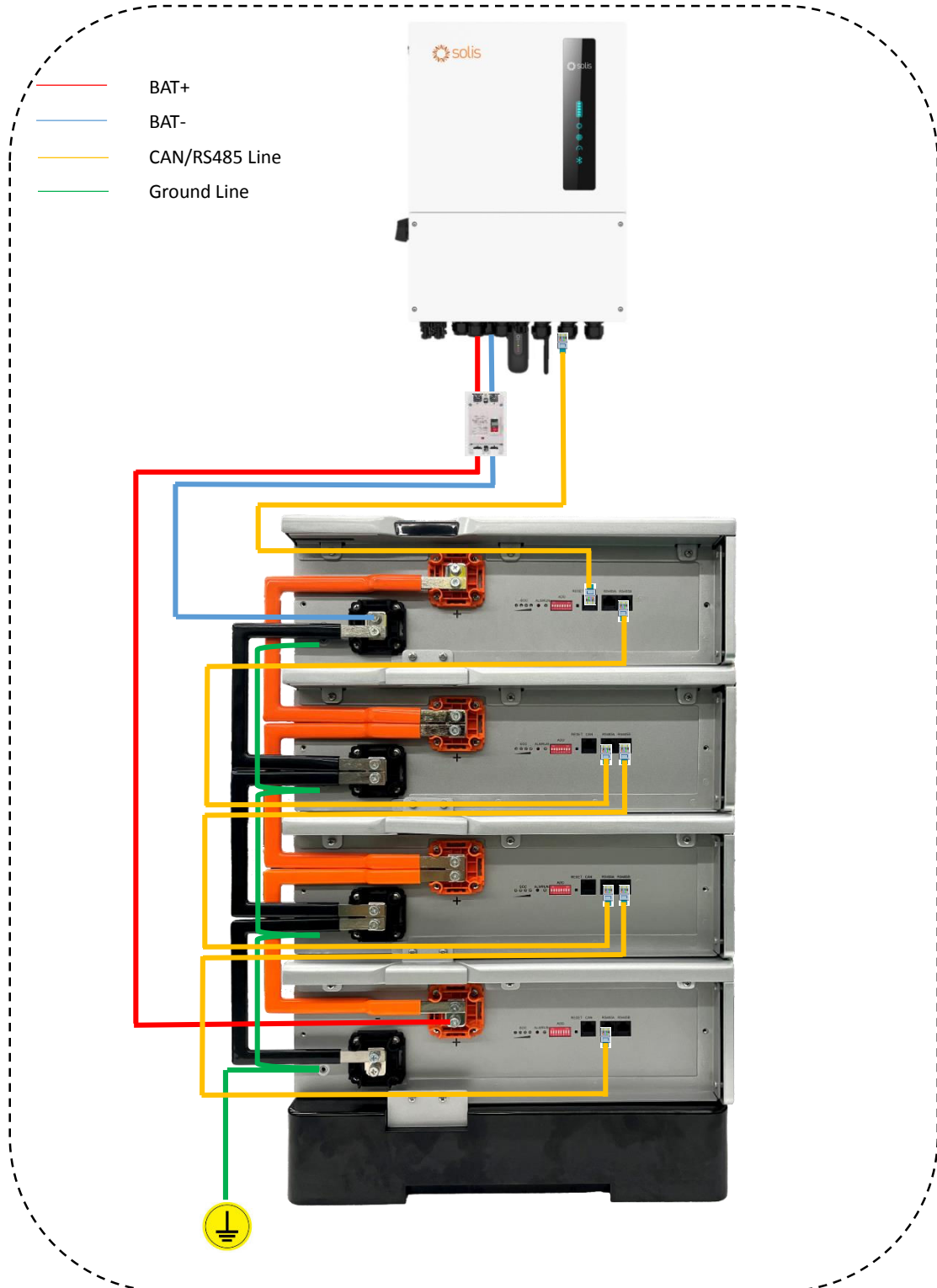
- Cable category: Cat5, Cat5e or higher
- Plug type: Metal Shielded RJ45 of Cat5, Cat5e or higher
- Shielding: Yes
- UV-resistant for outdoor use
- Straight-through wired cables
- Maximum cable length: 10 m.



※ Adjust the ADD Switch as defined in the figure below.



- ※ Connect the battery pack host CAN or RS485 interface to the inverter.
- ※ Connect the battery output “+” to the inverter Battery“+”, battery output “-” to the inverter Battery“-”.



5.6.2、 Installation Location

Make sure that the installation location meets the following conditions:

1) The area is completely water proof. The floor is flat and level.
2) There are no flammable or explosive materials.
3) The ambient temperature is within the range from -5°C to 45°C. The temperature and humidity is maintained at a constant level. There is minimal dust and dirt in the area.
4) The distance from heat source is more than 2 meters.
5) The distance from air outlet of inverter is more than 0.5 meters. Do not cover or wrap the battery case or cabinet.
6) Do not place at a children or pet touchable area. The installation area shall avoid of direct sunlight.
7) There is no mandatory ventilation requirements for battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.
8) CAUTION: If the ambient temperature is outside the operating range, the battery pack stops operating to protect itself. The optimal temperature range for the battery pack to operate is 25°C to 35°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery pack.

6. Trouble Shooting Steps

6.1、 Problem determination based on:

1) Whether the battery can be turned on or not.
2) If battery is turned on, check the red light is off, flashing or lighting.
3) If the red light is off, check whether the battery can be charged/discharged or not.

6.2、 Preliminary determination steps:

1) Battery cannot turn on, switch on the lights are all no lighting or flashing. If the battery RESET switch is turned on, the RUN light is flashing, and the external power supply voltage is 48V or more, the battery still unable to turn on, please contact distributor.
2) The battery can be turned on, but red light is lighting, and cannot charge or discharge. If the red light is lighting, that means system is abnormal, please check values as following: a) Temperature: Above 45°C or under -5°C, the battery could not work. Solution: To move battery to the normal operating temperature range between -5°C

and 50°C.

b) Current: If current is greater than 100A, battery protection will turn on.

Solution: Check whether current is too large or not, if it is, to change the settings on power supply side.

c) High Voltage: If charging voltage above 54V, battery protection will turn on.

Solution: Check whether voltage is too high or not, if it is, to change the settings on power supply side.

d) Low Voltage: When the battery discharges to 40.0V or less, battery protection will turn on. Solution: Charge the battery for some time, the red light turn off.

Excluding the four points above, if the faulty is still cannot be located, turn off power switch of the battery and repair.

6.3、 The battery cannot be charged or discharged

1) Cannot be charged:

Disconnect the power cables, measure voltage on power side, if the voltage is 50.0~53.5V, restart the battery, connect the power cable and try again, if still not work, turn off battery and contact distributor .

2) Unable to discharge:

Disconnect the power cables and measure voltage on battery side, if it <40V please charge the battery,if voltage is above 48V and still cannot discharge, turn off battery and contact distributor.

7. Emergency Situations

7.1 Emergency treatment measures for serious safety accidents

Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property. If the battery pack seems to be damaged, pack it in its original container, and then return it to Shoto or an authorized dealer.

7.1.1、 Leaking Batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below. Inhalation: Evacuate the contaminated area, and seek medical attention.

Contact with eyes: Rinse eyes with flowing water for 15 minutes, and seek medical attention.

Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.

Ingestion: Induce vomiting, and seek medical attention.

7.1.2、 Wet Batteries

If the battery pack is wet or submerged in water, do not let people access it, and then contact Shoto or an authorized dealer for technical support.

7.1.3、 Battery bulging

Possible causes	Emergency measures	Further measures
1. The battery is overcharge or discharge. 2. Application scenarios do not match, abuse or end of life occurs.	1. Stop charging and discharging the battery immediately and cut off the power supply.	1. Take out the battery and place it in an open area. 2. Replace the battery pack, check the ventilation system, fan and other ventilation systems and use conditions, avoid direct sunlight, and create a relatively ideal use environment as far as possible.

7.1.4、 Smoke or burning of battery

Possible causes	Emergency measures	Further measures
1. Short circuit inside or outside the electric core. 2. The battery is overcharge. 3. Serious external causes such as collision and extrusion. 4. Other external reasons.	1. Cut off the power immediately. 2. Evacuate people nearby. 3. Organize professionals to extinguish the fire or call 119.	1. Fire fighting measures shall be taken according to the fire situation. 2. If the smoke or fire is small, professionals should wear protective equipment and use fire extinguishers to calm the fire. Since lithium batteries will re burn, if they do not cool down, it is very important to use a lot of water to cool the batteries. It is important to water the batteries until they are completely extinguished to avoid explosion. 3. Call 119 directly when the fire is serious, and ask for support from the superior fire department. 4. After the battery is completely extinguished, take it out and place it in an open area away from people. 5. Check the damage of other equipment and resume communication as soon as possible.



Shuangdeng Group Co., Ltd. (Chinashoto)

S&T Park :Jiangyan Economic Development Zone, Taizhou,Jiangsu,China

Email: storagemarketing@chinashoto.com

WebSite: www.chinashoto.com

Zip code: 225500

Telephone: 0086 10-56533600 / +86 523-88521888

Fax: 0086 10-56533659 / +86 523-88521244