Module Pro
Installation & Operation Manual

Models:
LIBM048050-G01
LIBS048150-G03
LIBS048200-G04

EXIDE TECHNOLOGIES / ENERGIZING A NEW WORLD

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1 Introduction

Thank you for choosing a Sonnenschein® Lithium Battery System.
After unpacking the parts, please examine them for possible damage. If any damage is found, please do not use the product; if in doubt, please contact the distributor or manufacturer.
The described product is a Lithium Iron Phosphate (LFP) rechargeable battery system for use in solar energy storage in on-grid or off-grid, single, dual or three phase applications.
Technical data is located in Appendix A of this document.

2 Safety Instructions

Before installing, using, or servicing the product, be sure to read the manual carefully and follow the safety precautions required by the manual. The safety precautions mentioned in this manual are only intended to supplement local regulations. Only suitably qualified installers who are familiar with local regulations and are experienced in design and installation of Lithium Battery Systems may undertake the installation of this product.

2.1 Safety Precautions

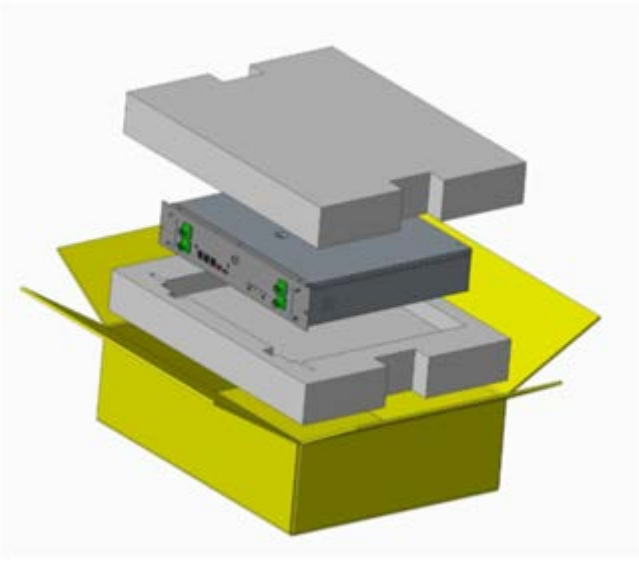
- The product must be installed and maintained by suitably qualified professionals in accordance with local standards and regulations, in strict accordance with the manual installation steps.
- Before installing or maintaining, you must make sure that the power is off to prevent electric shock or fire.
- During normal operation, it is strictly prohibited to directly touch the terminals such as output and input to avoid the danger of electric shock.
- Do not open the cabinet of the battery system directly during normal operation, otherwise it may result in electric shock.
- Keep equipment away from flammable and explosive materials and keep away from heat.
- Modification of the equipment is prohibited as it may result in serious injury and will void warranty.
- The battery contains a BMS with integrated protection and with the capability to disconnect all battery power resulting in 0 Volts and 0 Amps.
- A battery that has been disconnected by the BMS during use can lead to immediate loss of function for connected equipment. Do not install or use in systems where sudden loss of battery power may lead to dangerous situations or result in malfunction or damage of connected equipment.

2.2 Cautions

	Definition		Definition
	Observe these Instructions and keep them located near the battery for future reference Work on the battery should only be carried out by qualified personnel.		Explosion and fire hazard. Avoid short circuits. Avoid electrostatic charges and discharges or sparks. Batteries may explode if placed next to heat source or fire
	While working on batteries wear protective eyeglasses and clothing.		Keep children away from batteries.
	Caution - parts of the battery may carry dangerous voltages. Be careful when handling cables.		Do not step on.
	Pressure washing is not allowed		Protective grounding!
	Wait 5 minutes after power off to ensure electronics are fully discharged		Grounding general identification!
	. Do not dispose of the batteries in a fire!		This face should not be tilted or upside down.
	Follow local Li-Ion battery recycling regulations. Contact Exide or regulatory authorities for further information.		DO NOT dispose of the battery in normal waste. DO NOT include battery with Lead Acid battery recycling
	- Lithium batteries are heavy. Make sure they are installed securely. - Handle with care, the batteries are sensitive to mechanical shock. - Do not lift or pull on the poles or communication cables. - Do not wear any metallic items such as watches, bracelets. etc. - Never try to open the battery modules. The modules are not user serviceable. The electrolyte is very corrosive. During normal operation, contact with the electrolyte cannot happen. - If the battery housing is damaged, any direct contact with the exposed electrolyte or powder may result injury, as the material is corrosive. - Charging the Li-ion battery after it has been discharged below the cut-off voltage or if the Li-ion battery is damaged or taking it over the nominal charge voltage can release a harmful mixture of gasses. - Use certified insulated safely tools for installation. Any work procedures and tools used should comply with local standards. - The SDS should be read and understood. - Note! Failure to operate according to manual may result in injury to the person and damage to the product!		

3 Packaging, Transportation, Storage

- The system cabinet is packed in wooden cases and the internal PE packaging bag is moisture-proof.
- EPE pearl cotton foam pad packing is used to prevent damage to the system during handling and transportation.
- Modules may be pre-installed or each battery module may individually packaged depending how the product was ordered. The outer packaging box should be checked for damage.
- Transportation must comply with UN3480/UN3481 dangerous goods transportation regulations and any local regulations must also be observed. During transportation, the product should be protected from severe vibration, impact or exposure to prevent sun and rain damage.
- The system is heavy, use the appropriate material handling equipment.
- Transportation temperature: -10℃ to 40℃.
- The equipment and packaging cannot be sprayed, so it cannot be transported in the open air.
- Storage temperature: -20°C to 25°C, 12months
  -20 °C to 45 °C, 3months
  -20 °C to 60 °C, 1months
- The SOC before storage must be in the range of 40% to 60% and must be maintained in this range throughout the storage period by refresher charging as required.
- Storage humidity: 10% to 80% RH.
- The storage room should be well ventilated, the room should be clean and dry, and the product should be protected from dust, moisture and exposure to direct sunlight.
- The storage time can be up to 12 months providing the SOC is maintained in the 40% to 60% range. It is recommended to charge and discharge the system for several cycles during commissioning after prolonged storage.
- The system must not be stored in direct sunlight.

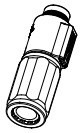


4 Packing List

Please check that the appearance of the equipment is in good condition before installation, and check whether the parts in the package are consistent with the list.

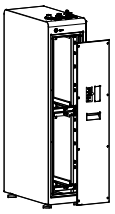
Note: If the battery system is shipped pre-assembled, please check whether the components inside the battery cabinet are consistent with Table 4-2.

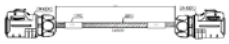
Table 4-1 Battery system list

NO.	Picture	Material Name	Specification Model	QTY.	Unit	Remark
1		9.6kWh ESS*	550mm*1150mm*300mm（W*H*D）	1	PCS	white
2		Hexagonal expansion bolt	M10X70	8	PCS	
3		DC Pos connector to inverter	C10-731951-011 8.0mm 1000V 200A orange IP67 180° Keyway	1	PCS	Used for power wiring connection between battery cabinet and inverter
4		DC Neg connector to inverter	C10-731951-110 8.0mm 1000V 120A black IP67 90° Keyway	1	PCS	Used for power wiring connection between battery cabinet and inverter
5		PCE-CAN Communications wiring harness	24AWG 2000mm	1	PCS	This cable is inverter specific, refer to page 39 for available options.
6		Cable tie	Length150mm,width1.8mm, white	20	PCS	Used to bind cable fixing cables.
7		Insulated crimp terminal	RNYD5-6	2	PCS	
8		CAN wiring harness	UL2835 grey 1010mm 5619100025851	1	PCS	Parallel CAN cable installed in the cabinet
9		User manual	User manual	1	PCS	

* For the detailed parts list of the battery cabinet, please refer to Table 4-2.

Table 4-2 battery cabinet assembly list

NO.	Picture	Material Name	Specification Model	QTY.	Unit	Remark
1		Battery module	LIBM048050-G01	4	PCS	white
2		Battery cabinet	9.6kWh	1	PCS	
3		Power line	UL10269 3AWG(27mm^2)600V Orange185mm 5619100033951	2	PCS	Used for positive connection between two battery modules
4		Power line	UL10269 3AWG(27mm^2)600V Black1400mm 5619100023351	2	PCS	Used for negative connection between two battery modules
5		Cable	24AWG(0.2mm^2) cable grey 150mm 5619100023541	2	PCS	For CAN communication between two battery modules
6		Cable	24AWG(0.2mm^2)cable grey 800mm 5619100023551	1	PCS	For CAN communication between two battery modules
7		Cable	24AWG(0.2mm^2)cable grey 500mm 5619100025291	1	PCS	For CAN communication between battery cabinet
8		Cable	24AWG(0.2mm^2)cable grey 500mm 5619100025831	1	PCS	For Modbus communication between two battery cabinet
9		Power on button cable	UL2464 22AWG(0.32mm^2)300V brown/black 5619100034351	1	PCS	Installed in the cabinet

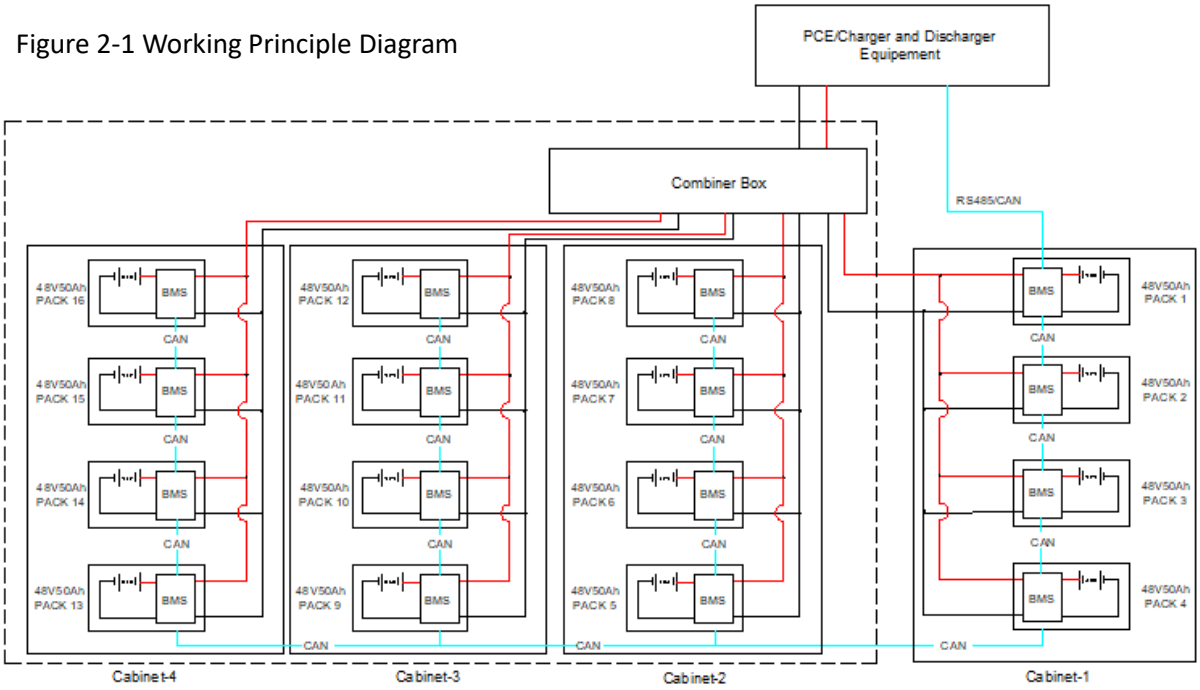
10		Power line	UL10269 3AWG(27mm^2)600V black 205mm, one end with M5 OT terminal 5619100033331	2	PCS	Installed in the cabinet
11		Power line	UL10269 3AWG(27mm^2)600V orange 820mm, one end with M5 OT terminal 5619090043341	2	PCS	Installed in the cabinet
12		Ground line	UL10269 8AWG(8mm^2) yellow-green 150mm	2	PCS	Installed in the cabinet
13		Ground line	UL10269 8AWG(8mm^2) yellow-green 250mm	2	PCS	Installed in the cabinet
14		Combination screw	M6*12	12	PCS	
15		Terminal resistance	120Ω	1	PCS	
16		Inter Cabinet CAN wiring harness	24AWG(0.2mm^2)cable grey 2000mm 5619100037631 (Optional)	1	PCS	One required for each additional cabinet installed in parallel

5 Product Description

5.1 Product Overview

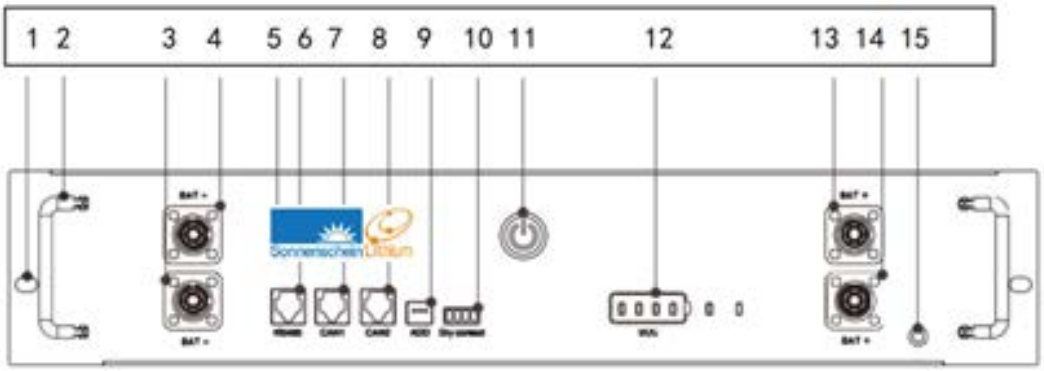
- This product is a lithium battery storage system based on a lithium iron phosphate (LFP) cell chemistry and adopts a modular parallel design.
- The system output can be used with Power Conversion Equipment (PCE) with communication via CAN Bus or RS485.
- The IP55 cabinet supports up to four 48V 50Ah battery modules in parallel and can be installed indoors or outdoors.
- Indoor installation using 19 inch racks is also possible, note that the individual modules are rated IP20 so the installation location must be selected accordingly or incorporated within a suitable IP rated product.
- The battery modules do NOT produce toxic or flammable gases during normal operation in accordance with the instructions in this manual. There is no requirement for mechanical ventilation. However, consideration should be given to providing some air circulation to maintain operating temperatures within the limits indicated in this manual.
- The system supports up to four cabinets (sixteen modules) connected in parallel so is expandable to 38.4kWh. Up to 16 modules can also be connected directly to a compatible inverter without the cabinet since each module contains its own independent BMS creating the same master/slave arrangement as the cabinet installation. Connection methods for power and communications are the same regardless of the modules being installed in a cabinet or as a standalone arrangement.
- The battery management system (BMS) provides data acquisition, status monitoring and control to ensure safe and reliable operation of the system.
- Each battery module contains a BMS with integrated protection and with the capability to disconnect all battery power resulting in 0 Volts and 0 Amps.
- A battery that is disconnected by BMS during use can lead to immediate loss of function for connected equipment. Do not install or use in systems where sudden loss of battery power may lead to dangerous situations or result in malfunction or damage of connected equipment.
- Battery modules inside each cabinet are connected in parallel. A CAN Bus communication connection is made between the modules, cabinets and the PCE.
- RS485 communication is provided for optional remote monitoring of the battery modules via computer or communication to the PCE.
- Install according to local electrical code requirements, for Australia and New Zealand refer to AS/NZS 5139 Electrical Installations – Safety of battery systems for use with power conversion equipment).

Figure 2-1 Working Principle Diagram



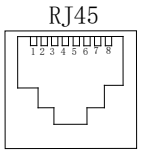
5.2 Battery Modules

5.2.1 Front Panel

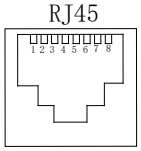


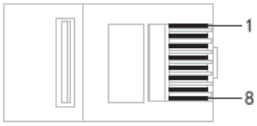
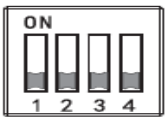
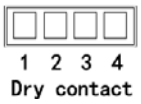
No.	Description	Function	Remark
1	Mounting holes	Battery module and cabinet fixing hole	
2	handle	Battery module handle	
3,4	Input and output negative	Battery module power output negative interface	
5	logo	Manufacturer description information	
6	RS485	RS485 communication interface	RJ45-8P
7,8	CAN Bus	CAN communication interface	RJ45-8P
9	Address	Battery box dial switch	
10	Dry node	Multiple battery boxes in parallel with one button to start the interface	
11	button	Battery box start/stop button	
12	Status Display	Power and operation fault display	
13,14	Input and output positive	Battery box power output positive interface	
15	Grounding hole	Used to pick up the earth	

5.2.2 Module Port Configuration

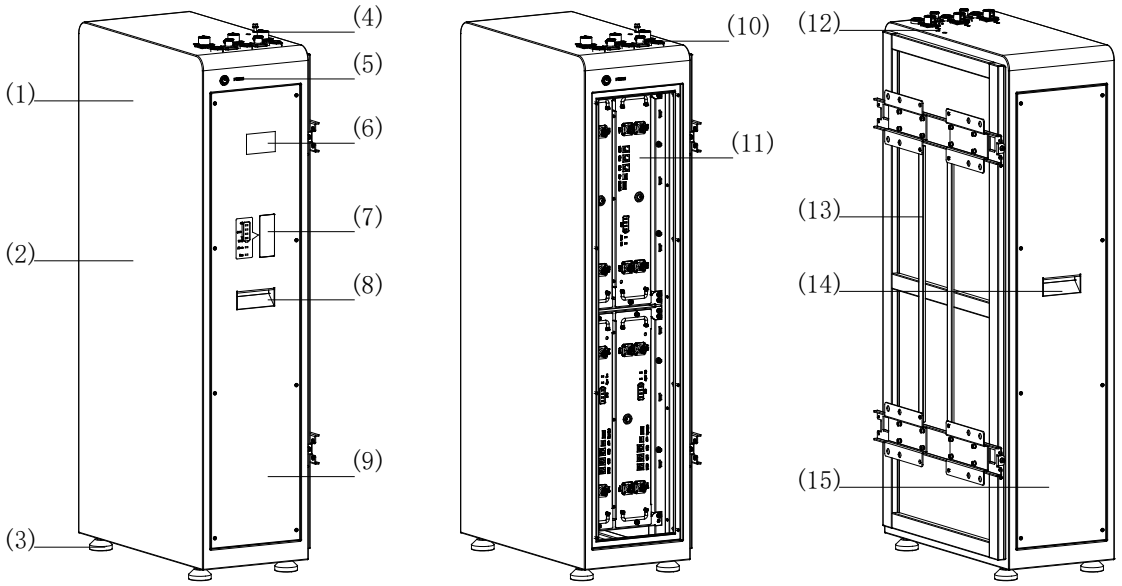
Name	Port	Pin	Function	Description
RS 485 Port		1	RS485B	RS485 communication line B
		2	RS485A	RS485 communication line A
		3	NC	
		4-5	NC	
		6	GND	
		7-8	NC	

*Pre Nov 2021 use 6pin RS485 port on the module and 8 pin on the cabinet port designations for pins 1&2 remain the same.

CAN Bus Port		1	CANL	CAN communication line Low
		2	CANH	CAN communication line High
		3	NC	
		4-5	NC	
		6	GND	
		7	NC	
		8	NC	

Name	Port	SN	Description
CAN Bus Terminator	 RJ45-8P8C	1-2	The termination plug contains a 120 ohm resistor in 1 - 2pins for parallel CAN communication, this is required to terminate the CAN bus. When multiple battery cabinets are combined in parallel, an 8- PIN terminator with a 120 ohm resistor is inserted in the CAN port 2 of BAT4 in the last parallel connected cabinet.
DIP switch		1-4	The dipswitch sets the module address and the operating mode. The "ON" side indicates "1" and the other side indicates "0" For detailed description of the DIP switch settings, refer to Section 6.3.9.
Dry contact		1-4	For connection of the cabinet start button, boot line cable.

The product adopts a modular design, with the four battery modules assembled in cabinet for ease of handling.

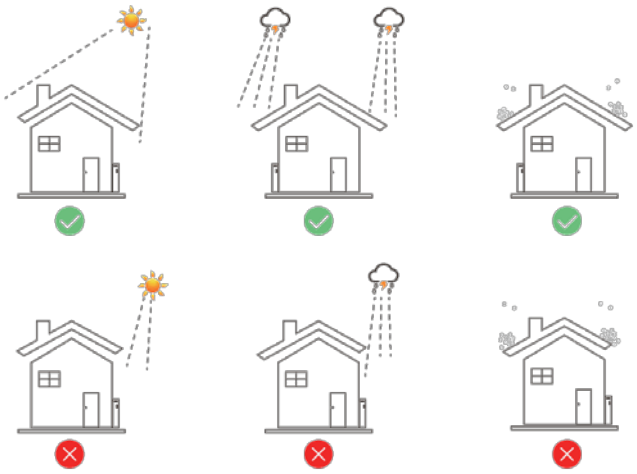


(1) Logo
(2) Front
(3) Leveling Feet
(4) Communication terminals
(5) Start button
(6) Rating plate
(7) Observation window
(8) Handle
(9) Right door
(10) Power terminal
(11) Battery Modules
(12) Ground point
(13) Wall bracket
(14) Handle
(15)Left door

6 Product Installation

6.1 Installation Precautions

- Please read the User Manual carefully before installing the battery.
- Check whether the ambient temperature of the installation site is within the specified range of -20 °C to +55 °C (recommended at 0℃ to 40℃).; if the product is working in an environment below 0 °C for a long time, the battery life will be reduced.
- The area where the product is placed needs to be well ventilated, away from dangerous substances such as water, flammable gases sources of heat and corrosive agents; it is prohibited to install and operate in salt spray environment.
- The battery must not be tilted or placed on its sides.
- Clearance of at least 300mm is required at the top, front and sides for heat dissipation.
- The ground or wall surface must meet the load bearing requirements of the battery.
- The battery must be installed in a location that avoids direct exposure to sunlight, rainfall and snow accumulation.
- The battery must be professionally installed by suitably qualified personnel. Check all local installation regulations to ensure compliance with all local requirements and laws.
- If the product is disassembled or stored under low temperature or high humidity, condensation of water droplets may occur. The equipment must be installed after the product is completely dry, otherwise there is danger of electric shock.



6.2 Installation

6.2.1 Installation Instructions

The battery system cabinet can be installed on the floor or wall mounted. The system adopts the natural convection method for heat dissipation. The bottom of the fixed installation bracket is used as the standard. The top, left and right sides of the cabinet must have 300mm cooling space clearance.

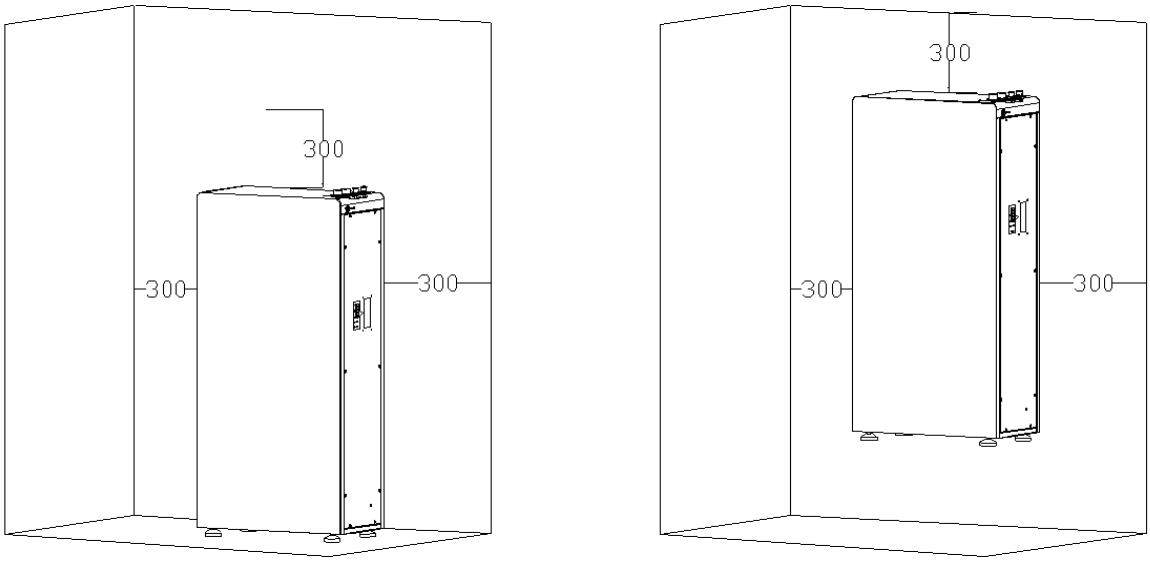


Figure 6-1 Installation Diagram

6.2.2 Installation Guide

(1) Detach the mounting bracket: Use a screwdriver to unscrew the 4 fixing screws on the mounting bracket and remove the bracket.

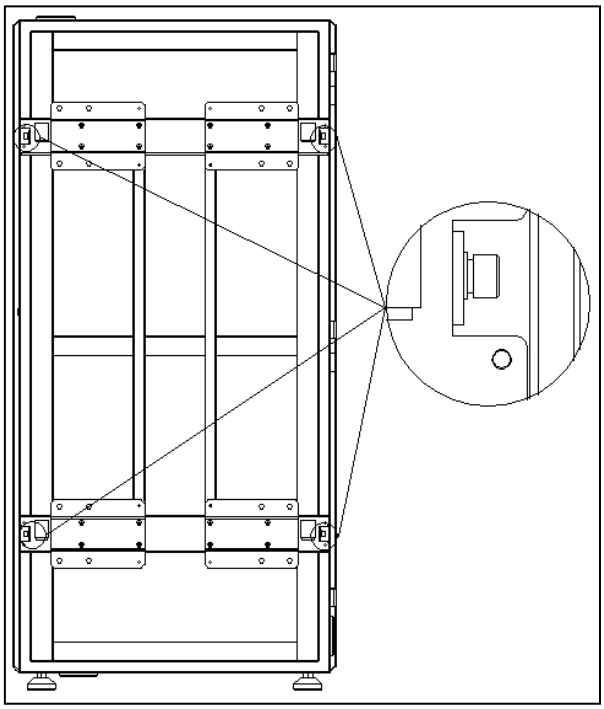
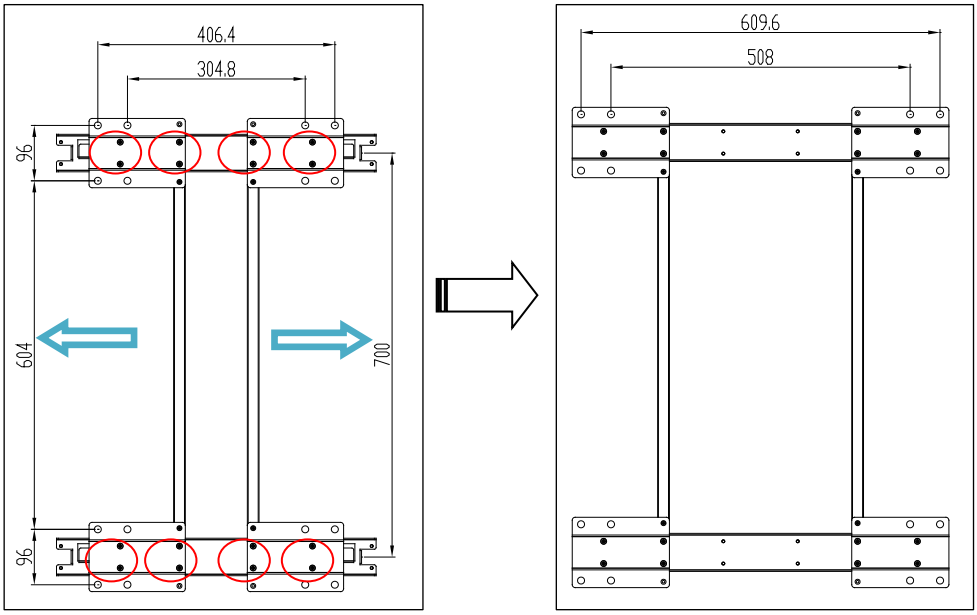


Figure 6-2 Disassembly and Assembly Bracket Diagram

(2) Adjust the mounting bracket.



The original mounting bracket is suitable for 304.8 or 406.4mm (12- 16-inch) installation spacing. It is also suitable for installation of 508 or 609.6mm (20 - 24 inch) spacing, remove the screws in the red circle in the figure above, and move the removed parts to the left and right by a screw hole position according to the direction of the arrow to fix the screws. The adjusted bracket is now suitable for installation spacing 508 or 609.6mm (20 - 24 inch).

(3) Fixed installation bracket:

Place the mounting bracket at a suitable position on the wall, mark the mounting hole positions, and drill ϕ12mm holes at a depth of 70mm. Insert the expansion screw seat into the hole and knock to the end; the mounting bracket can now be fixed to the wall, tighten the screws with a wrench.

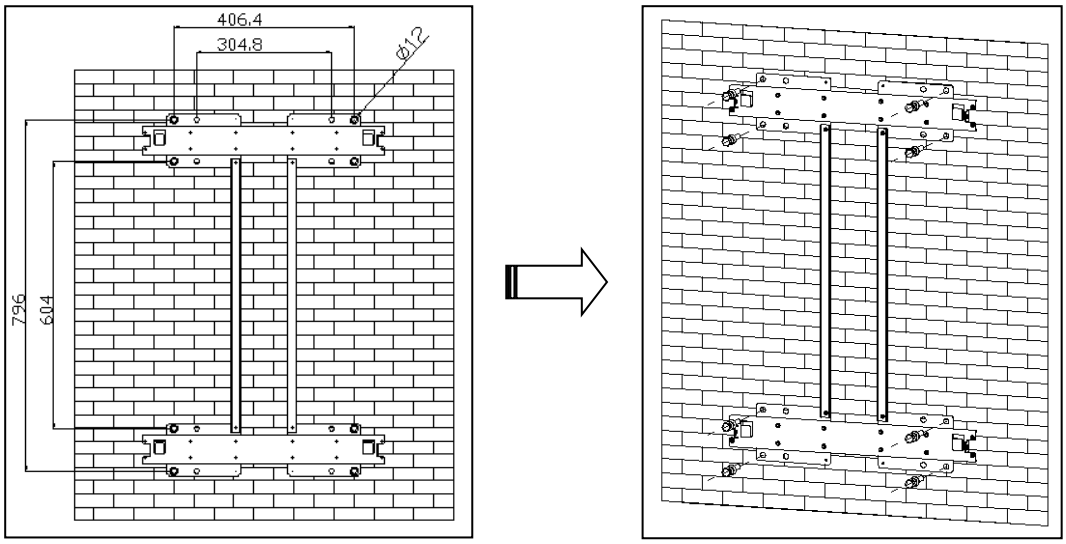
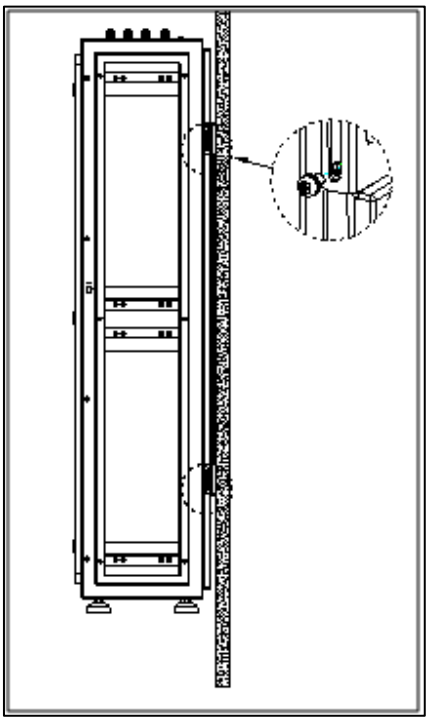


Figure 6-3 Intent of the fixed mounting bracket

(4) Installing the cabinet: Hang the cabinet to the mounting bracket, fix the 4 screws removed in the first step, and complete the installation.



Note: When installing on the ground, the height of the wall drill hole positions must ensure that the cabinet feet can touch the ground, and then adjust the feet locking nuts with a wrench.

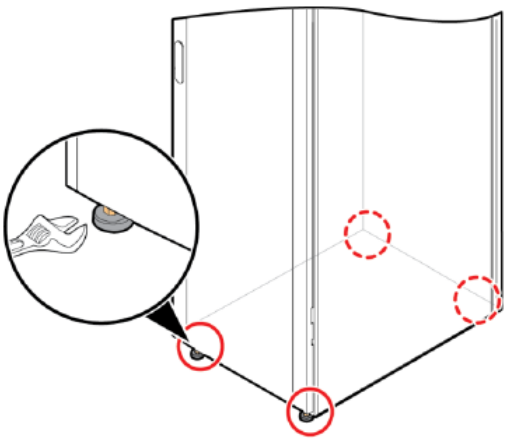


Figure 6-4 Adjusting the feet

(5) Unscrew the fixing screws on the right door with a screwdriver, and remove the left and right doors.

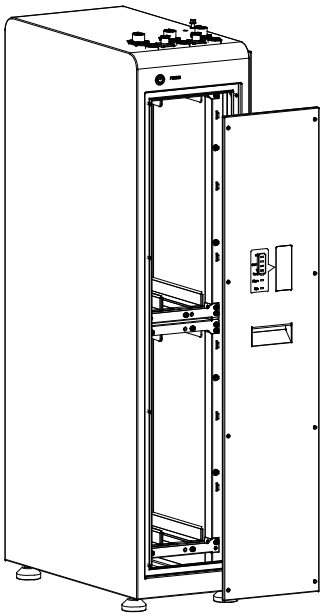


Figure 6-5 Open the side door

(6) Push the battery modules into the cabinet one by one along the card slot, and fix the battery pack with M6×12 screws.

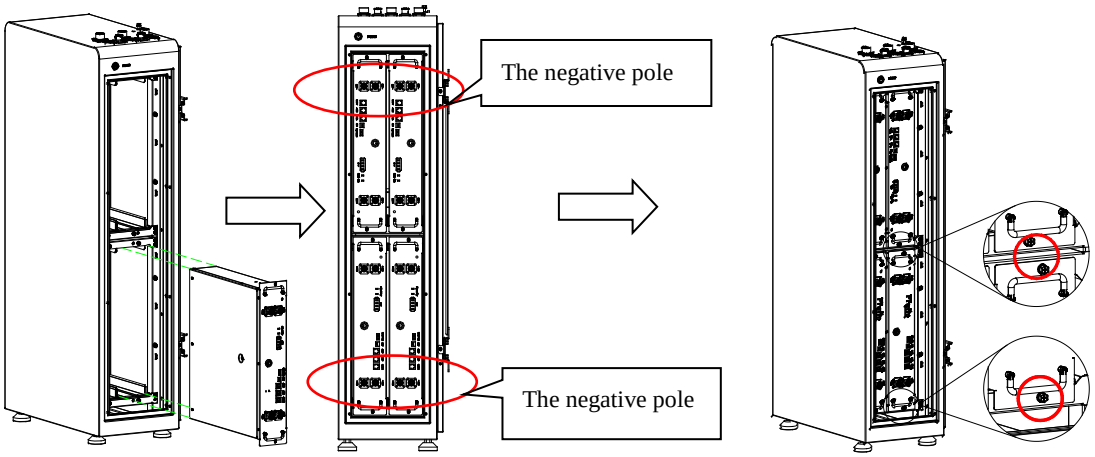


Figure 6-6 install the battery modules

6.3 System wiring

Note: Before wiring, make sure the each battery module is turned off.

6.3.1 Battery modules grounding

Screw one end of the yellow green ground wire (labelled BAT / GND) to the ground point of the battery box panel, and the other end to the frame ground point. Tighten the screw with a screwdriver.

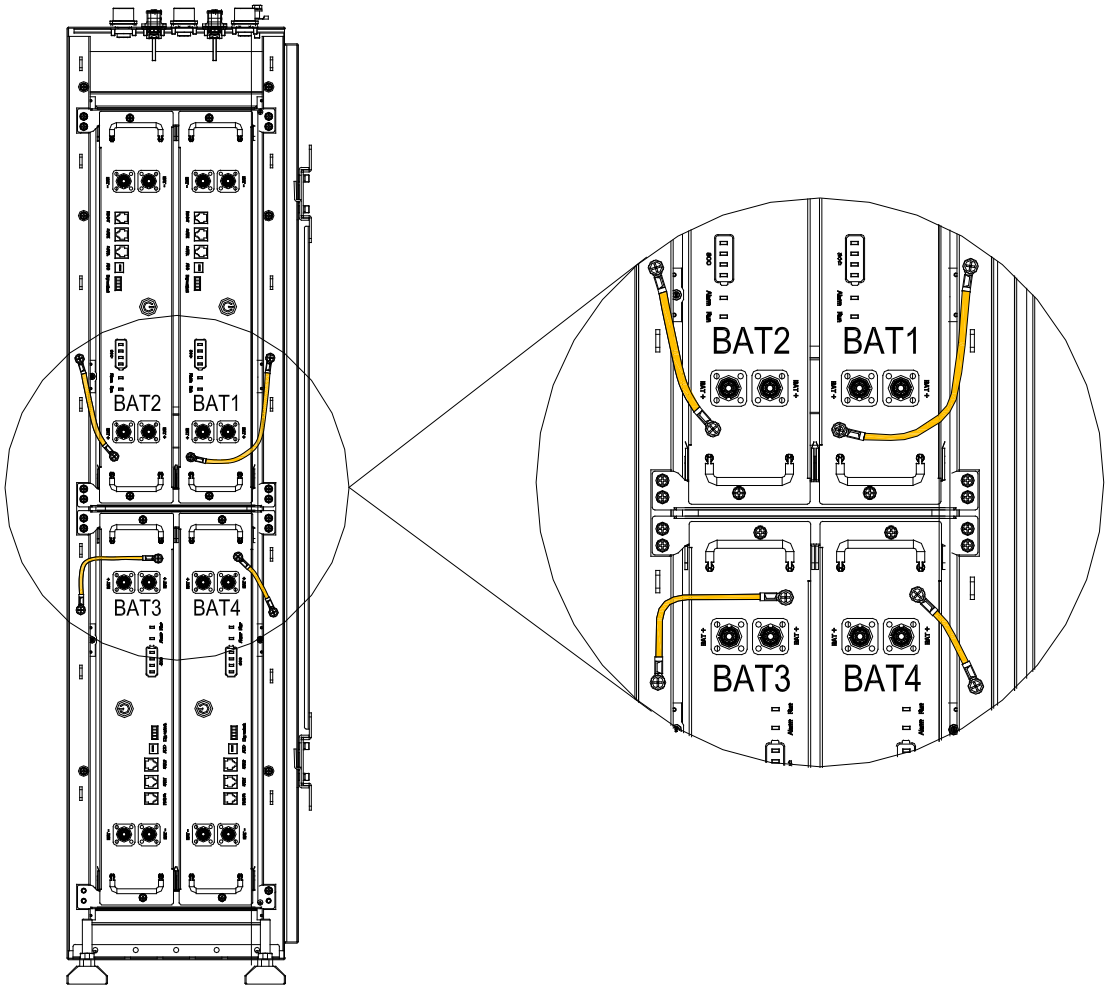
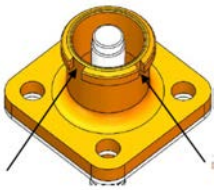


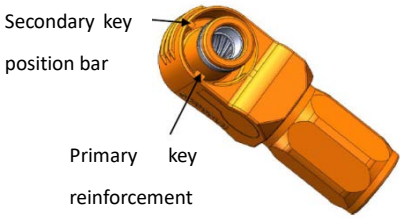
Figure 6-7 Grounding diagram of battery modules

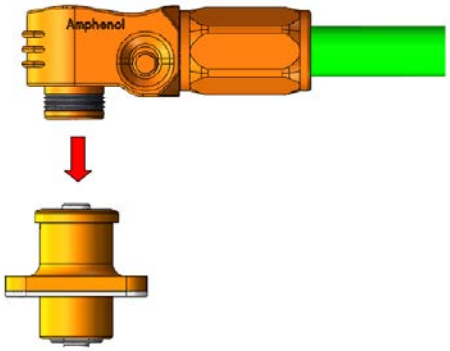
6.3.2 Connector description between modules

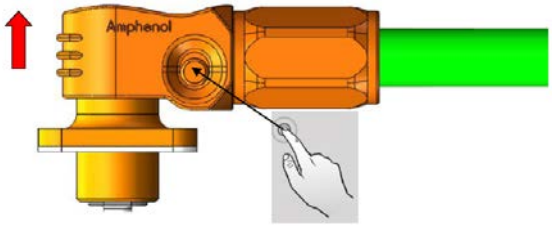
Cabinet and module connectors B + and B- use anti-reverse plug connectors, B + uses orange connector sockets and plugs, and the angle between the primary and secondary keys is 180 °. B- uses black connectors, the angle between socket, plug primary key and secondary key is 90 °. As shown below:



Primary key slot Secondary key slot



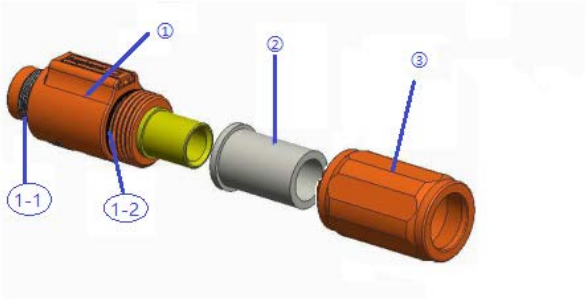




When inserting, align the plug key position with the socket key position, and then insert in alignment. If you hear a "click" sound, this means that the plug is inserted in place. When pulling out, press and hold the button shown above, and then pull out.

6.3.3 Connector description between cabinet and PCE

Part 1: Package contents

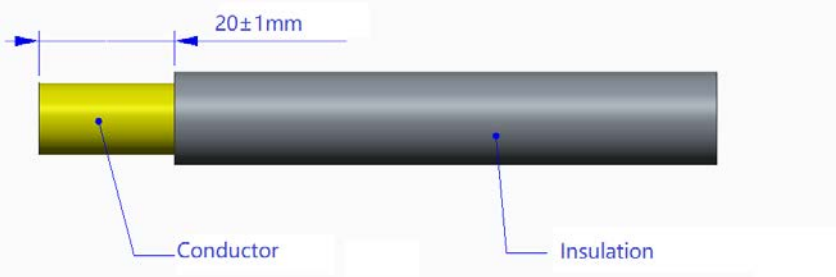


①Connector body（1-1：Barrel sealing，1-2：O-Ring） ②Grommet ③Back Shell

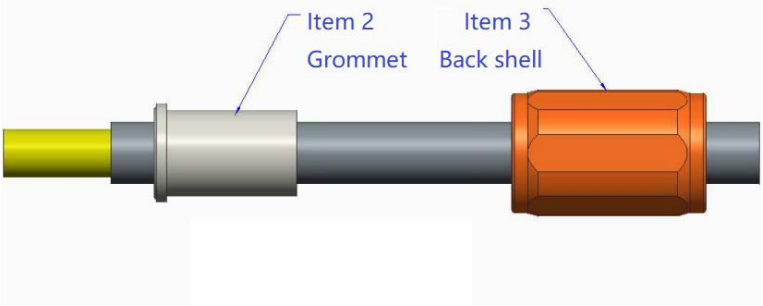
Part 2: Plug assembly

Step 1: Wire cutting and stripping （Apply for 25mm2 & 35mm2 & 50 mm2 Cable）

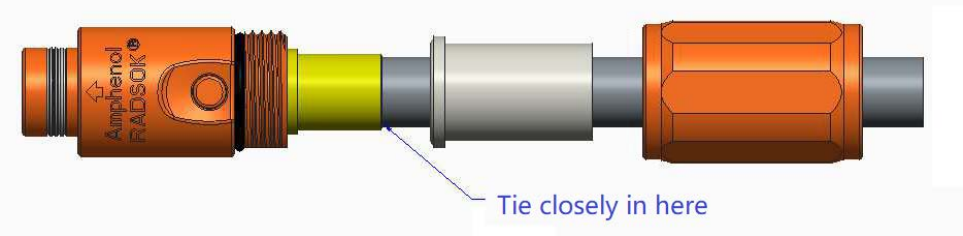
Strip conductor: 20±1mm



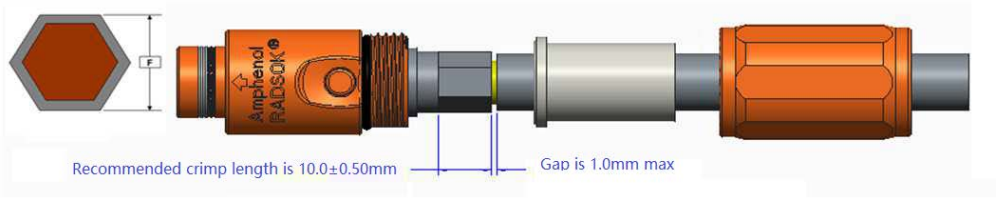
Step 2: Disassemble item 2, 3 and place over the cable as shown



Step 3: Put the cable conductor into the lug



Step 4: Crimp the lug as shown

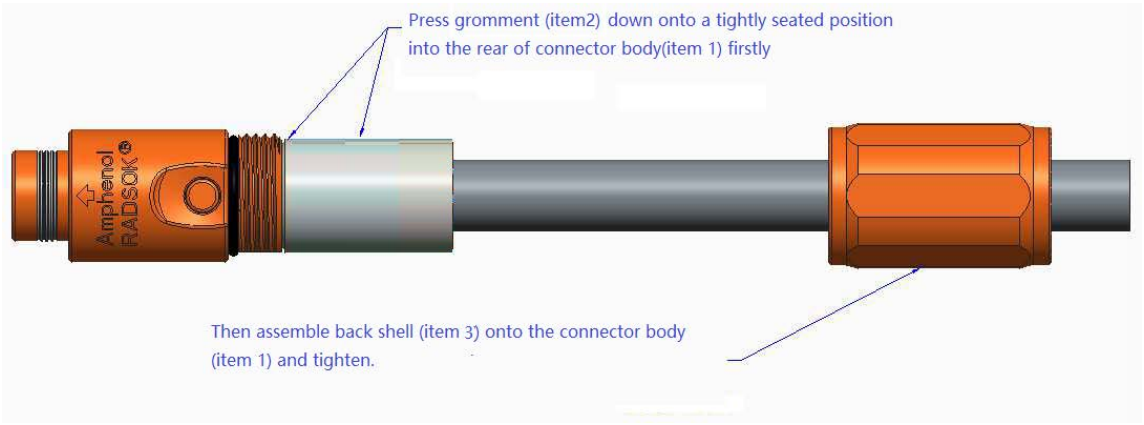


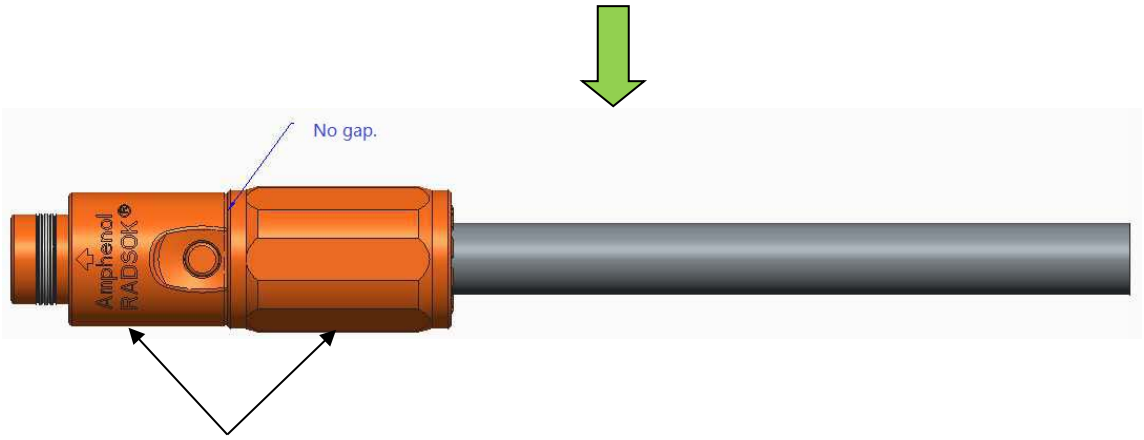
Cable size	Cable range	Recommended crimp	Cable pullout force
50 mm^2	13.6 ± 0.30 mm	7.0 mm across Sides 10.6 mm across Flats mm	1600 N Min.

Notes: The recommended crimp sizes are only for reference. The customer should adjust them according to cable specification and crimp tool and test results including temperature rise, metallographic analysis and pullout force.

Recommended crimping tool: Manual hydraulic crimp
Die: 50mm^2 die

Step 5: Install grommet and cable gland and back shell

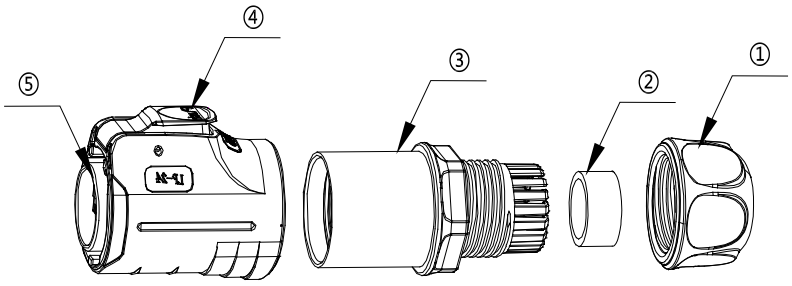




Tighten back shell to the indicated location shown in the figure above by hand or tool 50mm²: 1.2~1.5 Nm

6.3.4 Communication cable connector description

Part 1: Package contents

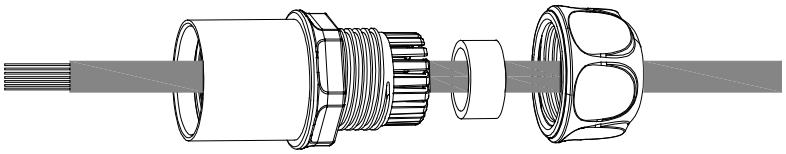


①Nut ②Waterproof rubber ring ③tail part ④shell ⑤plastic inner tooth

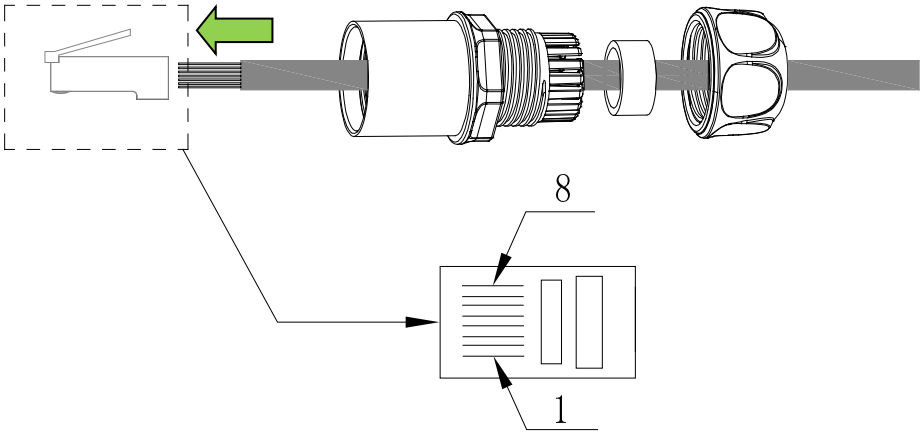
Part 2: Plug assembly

Step 1: cut and peel the cable (applicable to standard 8-core communication cable), and the stripping length is 15 ± 0.5mm.

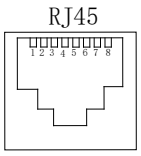
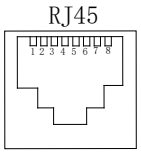
Step 2: as shown in the figure below, cover the nut, waterproof rubber ring and tail on the cable.



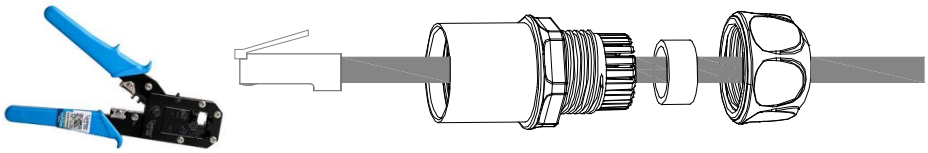
Step 3: insert the cut cable into RJ45 crystal head. The definition of RJ45 crystal head pin out is as follows.



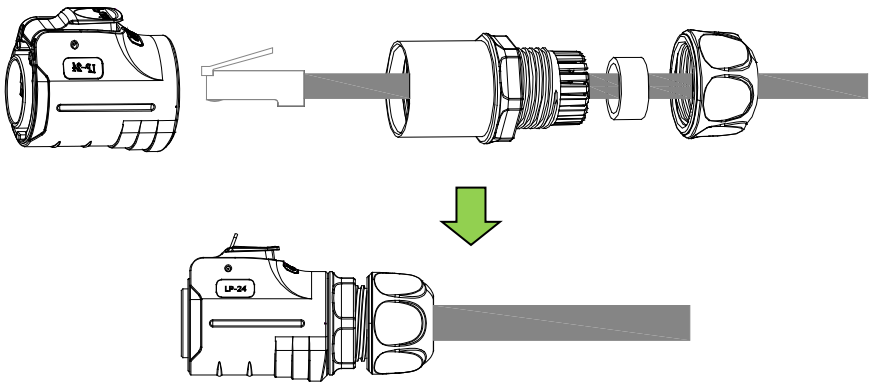
Pin definition：

Name	Port	Pin	Function	Description
RS 485 Port		1	RS485B	RS485 communication line B
		2	RS485A	RS485 communication line A
		3-8	NC	
CAN Bus Port		1	CANL	CAN communication line L
		2	CANH	CAN communication line H
		3-8	NC	

Step 4: crimp the RJ45 crystal head with wire clamp.

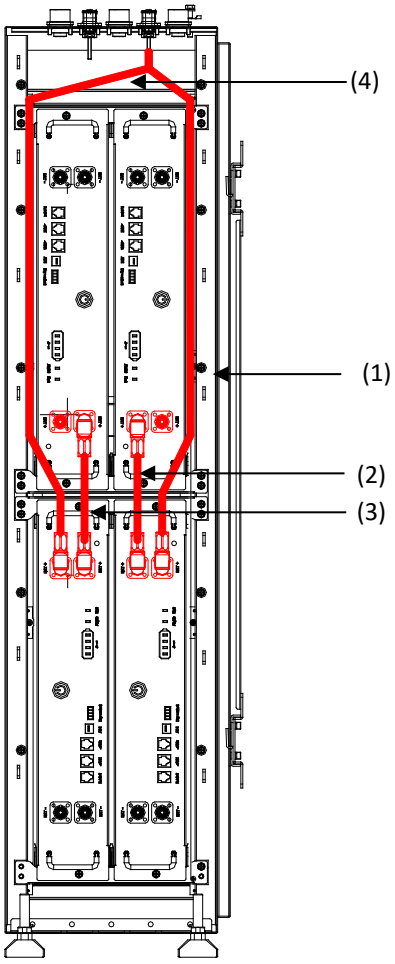


Step 5: insert the RJ45 crystal head into the plastic inner tooth, tighten the tail first, and then tighten the nut.



6.3.5 Battery modules positive connection

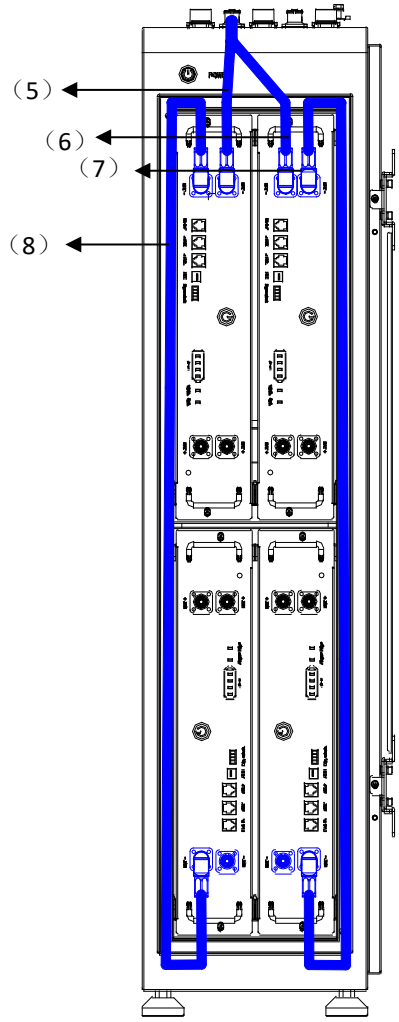
Connect the B + terminal of the battery modules as shown in the figure below, where the B + terminals of BAT3 & 4 are connected to the positive terminal on the top of the cabinet.



No.	Description	Line mark
(1) (4)	Pos Power line 820mm in orange	BAT+
(2) (3)	Pos Parallel power line 185mm in orange	5619100033951

6.3.6 Battery modules negative connection

Connect the B-terminal of the battery box as shown in the figure below, where the B-terminals of Bat1 & 2 are connected to the negative terminal on the top of the cabinet.



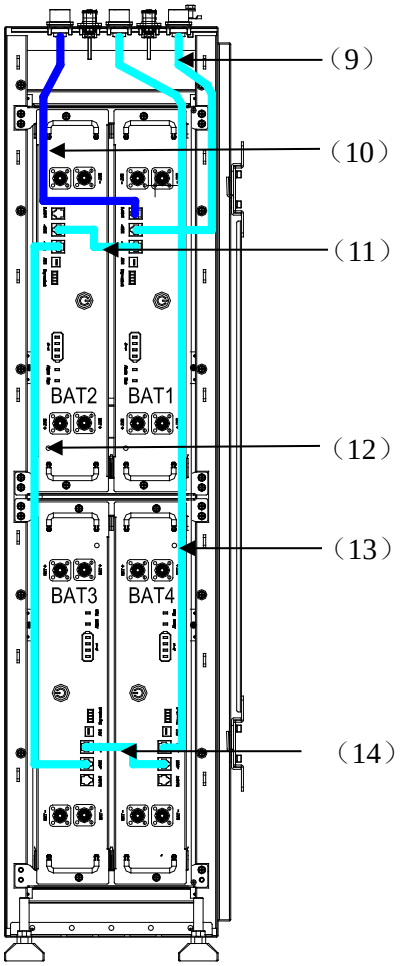
No.	Description	Line mark
（5）（6）	Neg Power line 205mm in black	BAT-
（7）（8）	Neg Parallel power line 1400mm in black	5619100023351

6.3.7 Battery modules communication line wiring

Connect the communication lines of the battery modules as shown in the figure below, where the RS485 port and CAN1 port of BAT1 are respectively connected to the RS485 port and CAN1 ports at the top of the cabinet.

(1) In case of a single cabinet, remove the CAN2 communication line number (13) and replace with the Termination Resistance plug that is inserted into the Bat4 CAN 2 port

(2) When multiple cabinets are connected in parallel, in the last parallel cabinet,the cable number (13) CAN2 communication line is not required, it must be replaced with the Termination Resistance plug which is inserted into the Bat4 CAN 2 port of the last parallel connected cabinet.

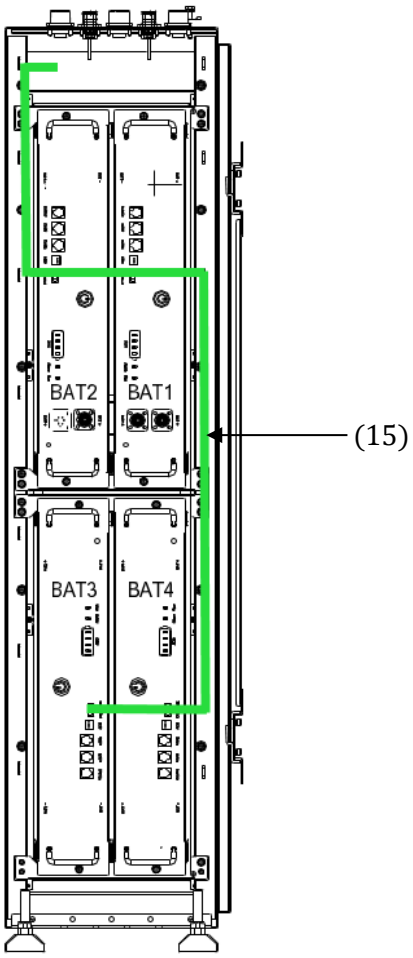


No.	Description	Line mark
（9）	CAN1 communication cable 500mm	CAN1
（10）	RS485 communication cable 500mm	RS485
（11）（14）	CAN communication cable 150mm	CAN1, CAN2
（12）	CAN2 communication cable 800mm	CAN1, CAN2
（13）	CAN communication cable 1010mm	CAN2

6.3.8 Power on button connection

Connect the power button power on line of the battery module as shown in the figure below, and plug the line terminals into the dry contact interface of BAT1 / 2 / 3 / 4 according to the direction of the gap.

No.	**Description**	Cable marking
(15)	Power on button cable	DRY1/ DRY2/ DRY3/ DRY4



The cabinet incorporates loops for cable management.
Use the supplied cable ties to secure all internal cabling.

6.3.9 DIP Switch Setting

(1) For a single cabinet set the DIP switch address for each battery module in the cabinet according to Diagram 6-8.

Battery module #1 is the battery module corresponding to the cabinet 1 display window. Cabinet 1 is also battery cabinet that communicates with the inverter (PCE). The address of battery module #1 in cabinet 1 must be set to 0000. Module addresses must not be repeated on other modules.

(2) When using parallel cabinets, remove the 6 screws on the side door of Cabinet-2/3/4 with a screwdriver, and set the DIP switch address of the battery module according to Figure 6-9. After address setting, reattach the side door.

Note: For multiple cabinets Battery module #1 is the battery module corresponding to the power display window of Cabinet-1 and is the energy storage battery cabinet that communicates with the inverter. The #1 battery module of cabinet-1 must be set to 0000, and the address must not be repeated on other modules.

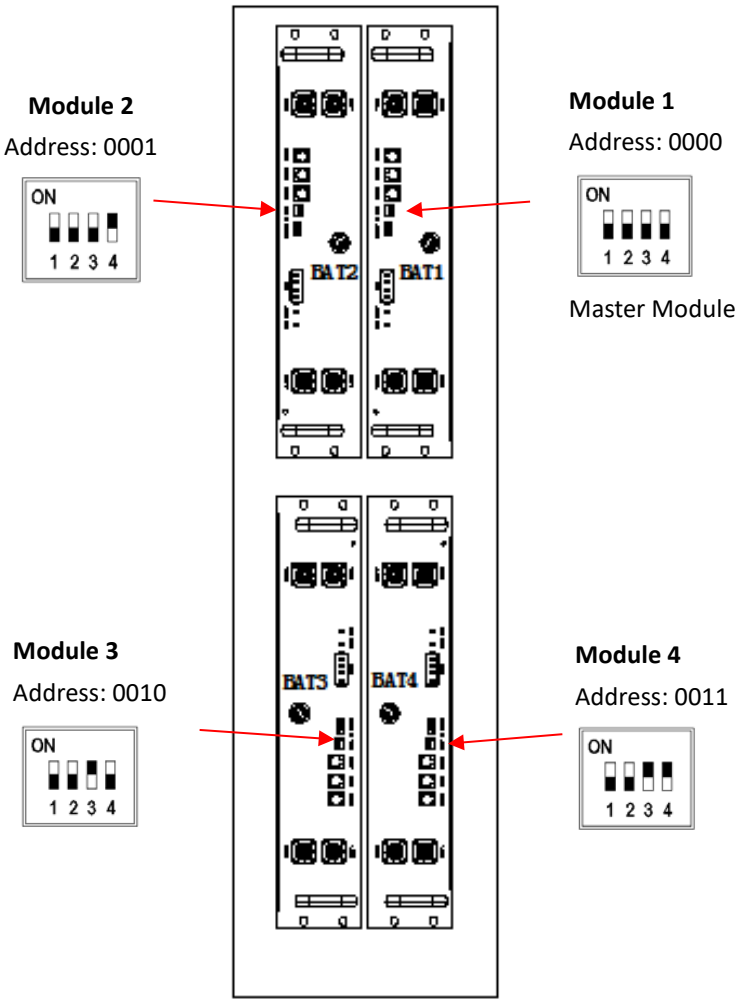


Figure 6-8 Single Cabinet Address Setting Diagram

Multi Cabinet DIP Switch Settings：

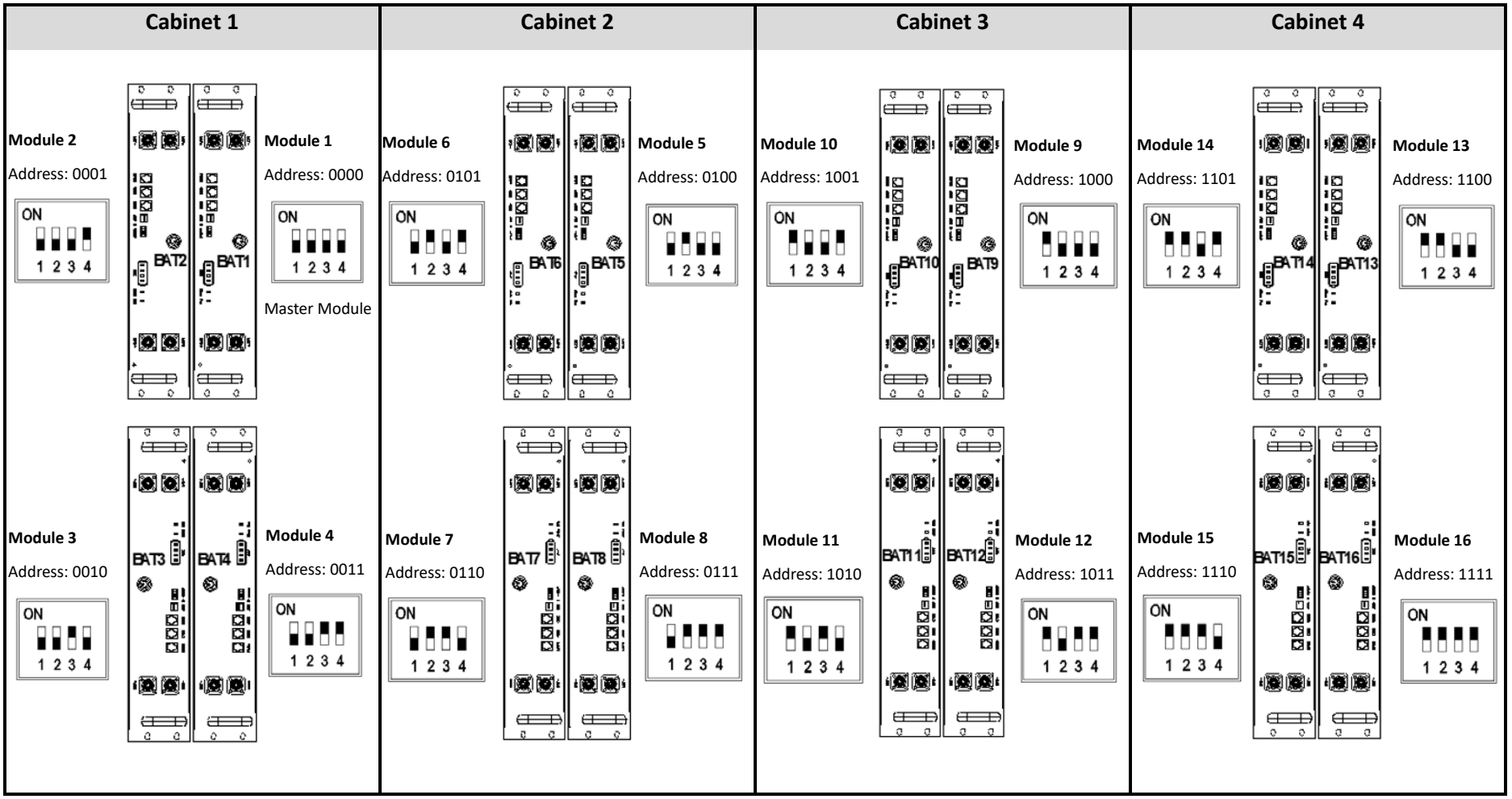


Figure 6-9 Parallel Cabinet Address Setting Diagram

6.3.10 Termination Resistor Installation

When a single cabinet is used, the termination resistance must be connected to the CAN2 communication port of BAT4. When there are two, three or four cabinets in parallel, the termination resistance must be connected to the CAN2 communication port of BAT4 in the last parallel cabinet.

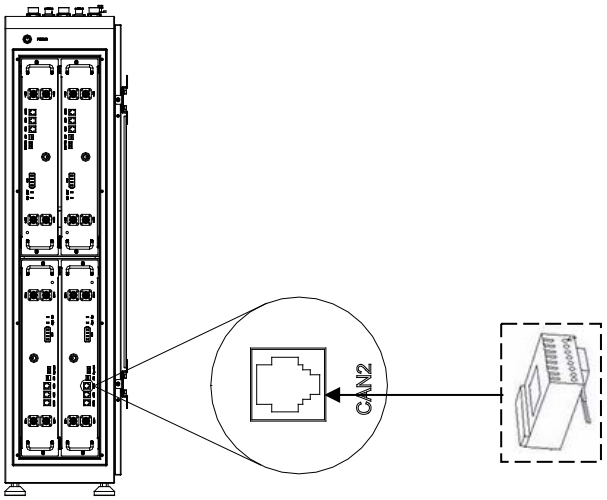


Figure 6-10Termination resistance installation

6.3.11 Cabinet door grounding

The ground wire has been pre-installed on the ground point of the left and right side doors.

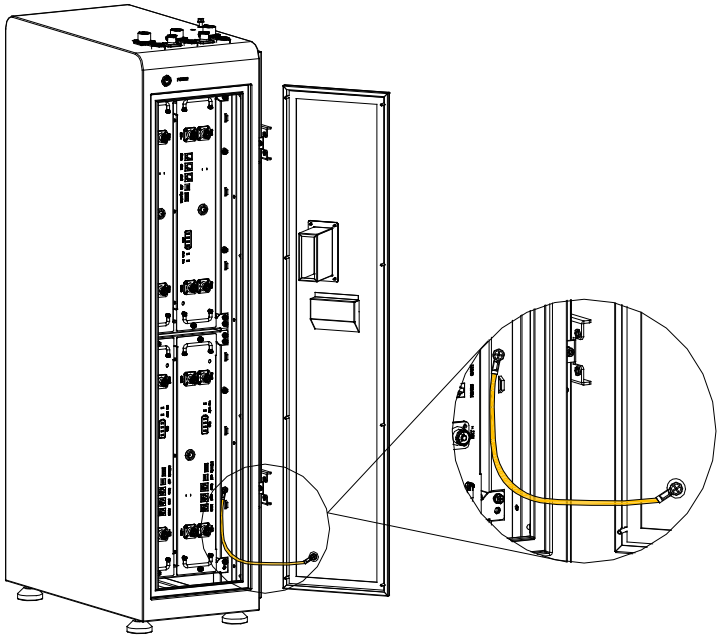


Figure 6-11 Grounding diagram of cabinet door

7 External Cable Connection

Note: Before wiring, make sure the battery pack is turned OFF. In order to ensure that the lithium battery system can be safely and reliably disconnected from the PCE, isolation devices are required at external points for each battery cabinet. Isolation devices are to operate on all live conductors (D.C. positive and negative) install according to local electrical code requirements,(for Australia and New Zealand refer to AS/NZS 5139 Electrical Installations – Safety of battery systems for use with power conversion equipment).
D.C cable length (positive and negative) from the battery cabinets to isolation devices and isolation devices to PCE must be the equal for all battery cabinets.

7.1 Equipment Grounding

The recommended cabinet grounding cable specifications are as follows. Please comply with any local regulatory requirements.

Cable requirements	6AWG（13mm^2） Yellow-green cable
Wire stripping length	8mm
Terminals	Ring terminal M6

Connect one side of the grounding ring terminal to the grounding point on the top of the cabinet, and the other side to the common grounding point.

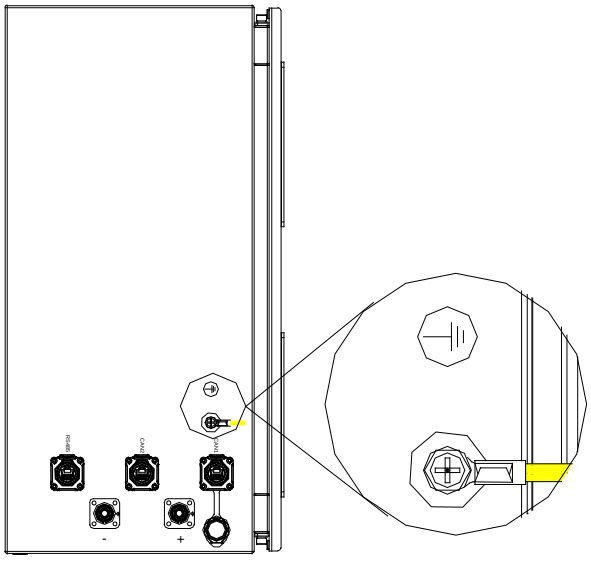


Figure 7-1 Equipment grounding diagram

7.2.2 Single cabinet wiring

The wiring of the battery cabinet is shown in the figure below. For the PCE side wiring, refer to the PCE user manual. Positive and negative cable lengths must be equal; external isolation devices are to operate on all live conductors (D.C. positive and negative) install according to local electrical code requirements and inverter manufacturer recommendations.

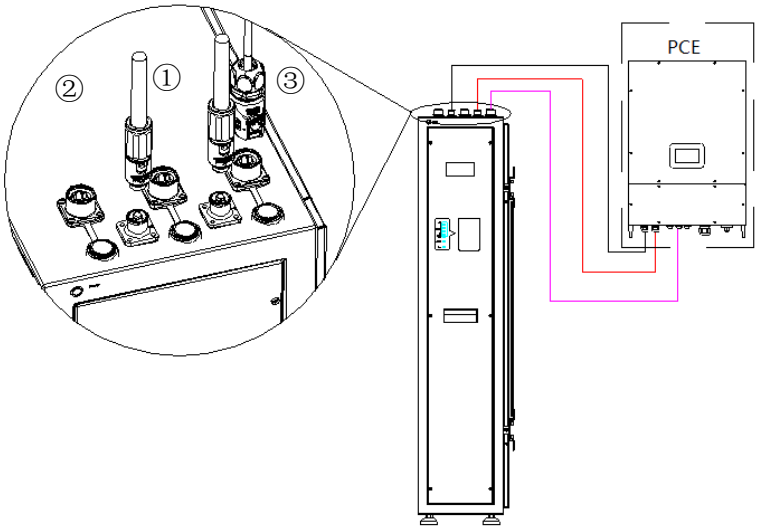


Figure 7-2 Single cabinet connection

Table 4-1 Cables for a single cabinet

No.	Cable	Cable Label
①	Positive Power Cable	BAT+PCE/BAT+ (connector only supplied)
②	Negative Power Cable	BAT-PCE/BAT- (connector only supplied)
③	PCE-CAN Cable	BAT / PCE

7.2.3 Parallel cabinet wiring

(1) When paralleled cabinets are connected to the PCE, the DC power cables of each battery cabinet are connected to a combiner box supplied by the installer. The output from the combiner box connects to the PCE. Positive and negative cable lengths for each battery cabinet must be equal; external isolation devices are to operate on all live conductors (DC. positive and negative) install according to local electrical code requirements and inverter manufacturer recommendations.

(2) The CAN communication ports of the cabinets are connected by the CAN line. Part Number 5619100037631, this cable must be ordered separately.

(3) Cabinet 1 must be connected to the inverter, and BAT 1 module of cabinet 1 must be set to address 0000, refer to section 6.3.9 DIP Switch Setting.

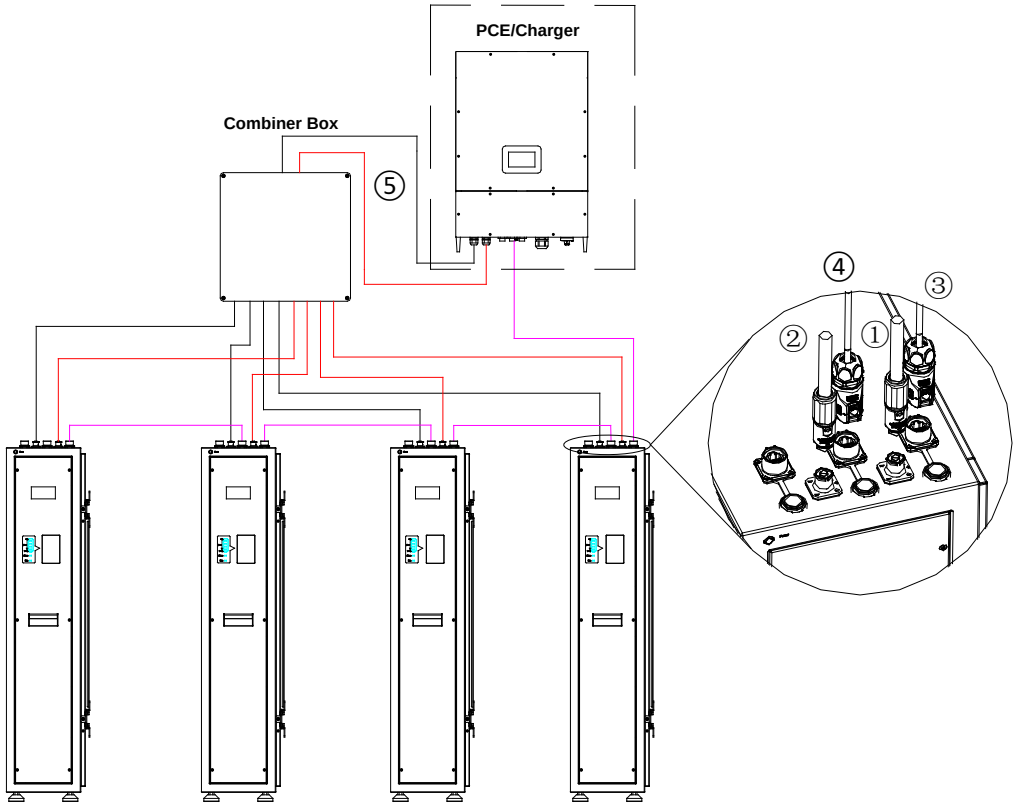


Figure 7-3 Parallel cabinet connection

Table 4-2 Cables for a single cabinet

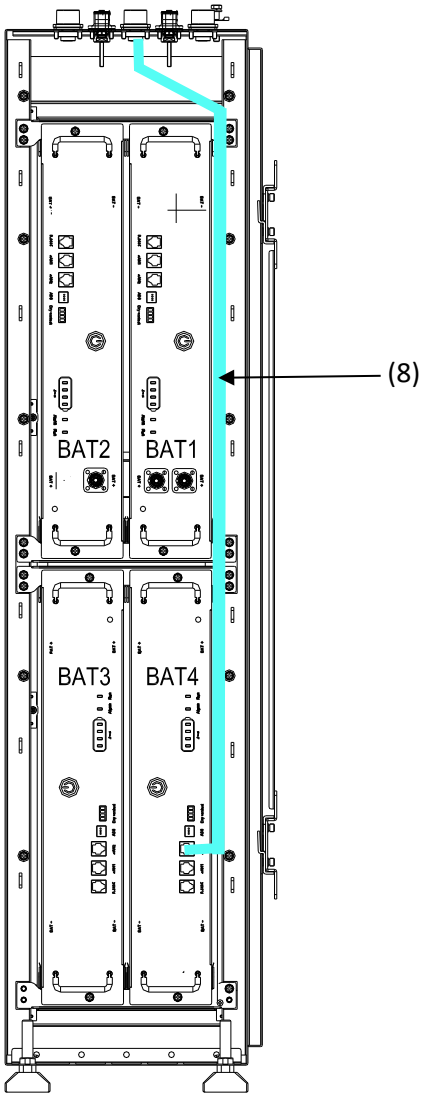
NO.	Cable	Label
1	Positive Power Cable	BAT+PCE/BAT+
2	Negative Power Cable	BAT-PCE/BAT-
3	PCE-CAN Cable	PCE/CAN-BAT (see section 9.2)
4	Cabinet to Cabinet CAN	CAN1- CAN2 Part Number 5619100037631
5	Combined positive and negative power cables to PCE	

(4) When battery cabinets are connected in parallel, set the address of each battery module DIP switch according to Section 6.3.9 Dip Switch Setting.

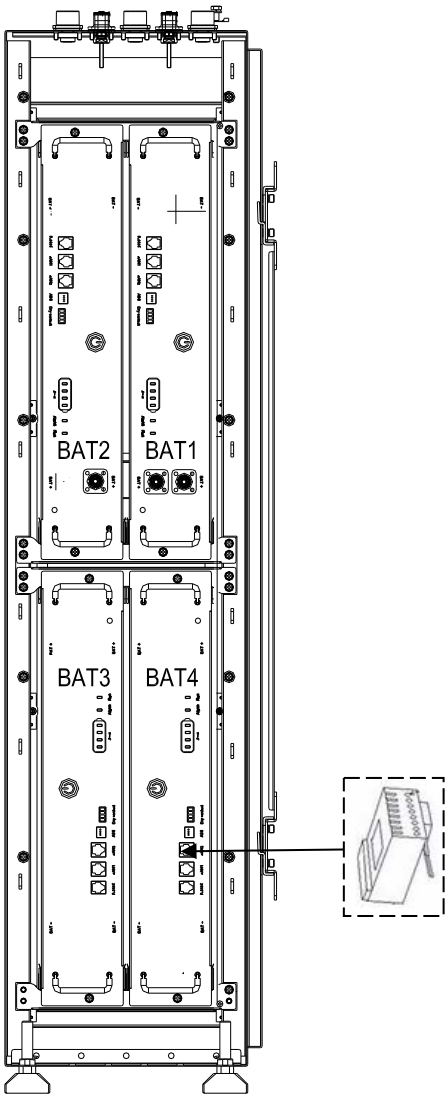
(5) When there are two, three or four cabinets in parallel, remove the termination resistance plug from the BAT4 CAN2 port, of each cabinet except the last parallel connected cabinet. Connect the CAN2 port of BAT4 in these cabinets to the CAN2 port under the top of the cabinet (13).

(6) The termination resistance plug must be connected to the CAN2 communication port of BAT4 in the last parallel cabinet.

NO.	**Description**	Mark
8	CAN2 communication wire 1010mm 5619100025851	CAN



Cabinet 1,2,3



Cabinet 4

8 Operation Guide

8.1 Operating Instructions

8.1.1 Power On

Before Powering ON please take care to re-check that all connections have been properly made strictly in accordance with these instructions and that all connections are tight and that no additional connections have been made.
Any deliberate or accidental contact not in accordance with these instructions may cause electric shock

Press the Power button, observe the status indicator of the 1# Battery Module through the SOC display window. When the status LEDs will cycle then illuminate to show the system is active. The RUN LED will flash for approximately 10 seconds to indicate the Inverter pre-charge function is in progress.

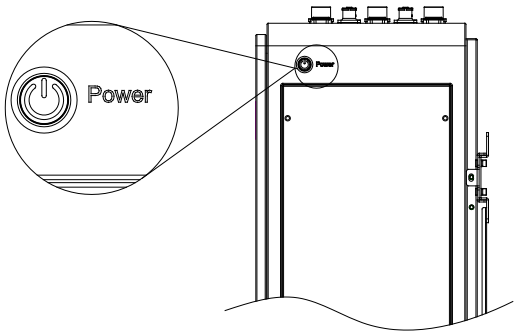


Figure 8-1 Power Button Diagram

8.1.2 Power Off

Press the Power button again to turn OFF, the button pops up, the 1# Battery Module indicator LED's go out, and the system is shut down.

8.2 LED Status Light Display

The status indicator of the 1# Battery Module is viewed through the SOC display window. The LED indicators are arranged from top to bottom as LED1-LED6.
LED1 to LED4 indicate the state of charge (SOC) of the 1# Battery Module. LED5 indicates the fault status of any battery module, and LED6 status is the operating state of the system.

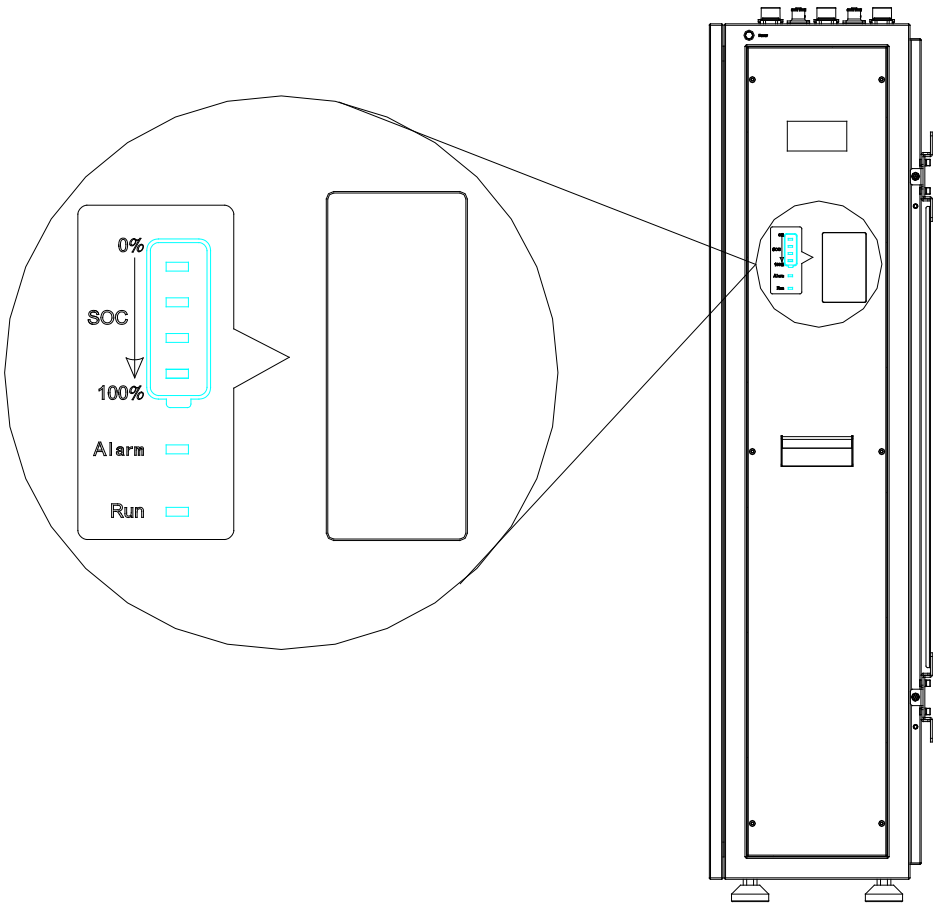
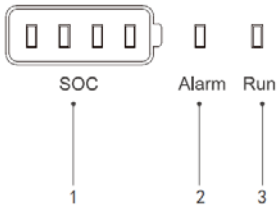


Figure 8-2LED status light Display Diagram



NO.	Description	Function
①	SOC	Battery remaining capacity
②	Alarm	Fault indicator
③	Run	Run light

The function description corresponding to the indicator status is shown in the following table:

Legend: ● means LED ON, ★ means LED flashing, the flashing frequency of the LED indicators is 1Hz.

Battery status		SOC LED (low to high)				ALM	RUN
Power Off		LED1	LED2	LED3	LED4	LED5	LED6
Charge	0%-25% SOC	★	★	★	★		●
	26%-50% SOC	●	★	★	★		●
	51%-75% SOC	●	●	★	★		●
	76%-99% SOC	●	●	●	★		●
	100% SOC	●	●	●	●		●
Discharge	Inverter Pre-Charge Function Active						★
	1%--25% SOC	●					●
	26%--50% SOC	●	●				●
	51%--75% SOC	●	●	●			●
	76%--100% SOC	●	●	●	●		●
	3% SOC	★					●
Protection	Under voltage protection	●				●	●
	Overvoltage protection				●	●	●
	Charging overcurrent protection		●			●	●
	Discharge overcurrent protection			●		●	●
	Charging low temperature protection	●	●			●	●
	Charging high temperature protection	●		●		●	●
	Low temperature protection	●			●	●	●
	High temperature protection		●	●		●	●
	MOS tube high temperature protection		●		●	●	●
	Charging short circuit protection	●	●	●		●	●
	Short circuit protection	●	●		●	●	●
Errors	Charging MOS failure	●				●	
	Discharge MOS failure		●			●	
	Voltage front end sampling failure			●		●	
	Voltage front end disconnection failure				●	●	
	Temperature front end sampling failure	●	●			●	
	The battery is seriously out of balance		●	●		●	
	Parameter configuration error		●		●	●	
	Equipment parallel failure			●	●	●	
	Short circuit protection lock	●		●		●	
	Front-end chip initialization failed	●			●	●	
	Front-end chip failure	●	●	●		●	
	Pre-Charge failure	●		●	●	●	

9 Setup and Monitoring Software

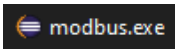
9.1 Energy Storage Device Monitoring

End users have the ability to monitor the status and state of charge of the battery via the inverter.

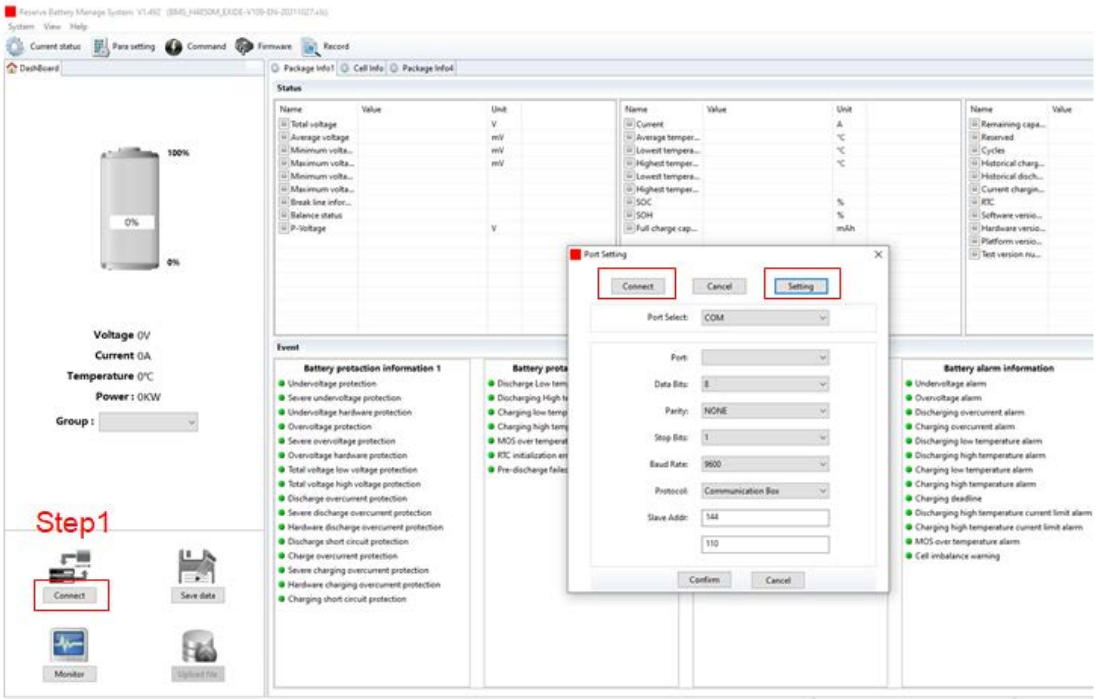
9.2 Battery parameter settings

The Inverter manufacturer and the real time clock (RTC) may be set through the battery configuration and monitoring software, which is available to registered installers.
WARNING: Installation of unauthorised, modified or third part firmware or unauthorised modification of the system parameters will void warranty and may result in serious physical harm to persons, permanent damage to the battery and damage to property.

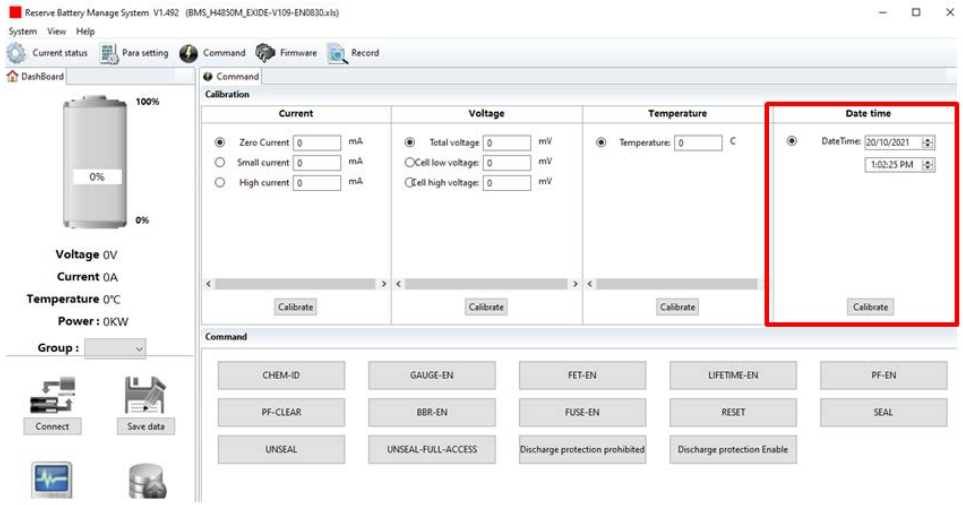
Remove the green terminal (Dry contact) and CAN cables from the battery modules.
Insert the USB to RS485 communication cable into the RS485 position of the battery module and connect the USB port to the laptop. Turn on the battery module

Open the battery monitoring application: 

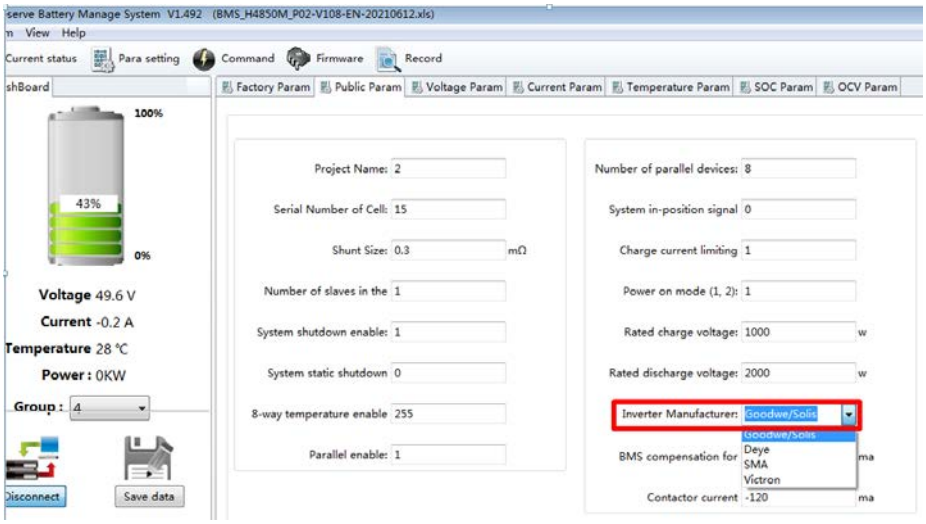
Select the “Current Status” tab, and click on connect.
From the pop up Port Setting dialogue click on “Setting” and select the correct port number from the drop down menu. (the port number can be viewed using “Device Manager”). Click on “Confirm” then Click “Connect”



• Select the “Command” tab→ Adjust the date and time then click on “Calibrate” to set the RTC



• Select the “Para setting” tab→ “Public Param” tab→ “Inverter manufacture” and select the appropriate inverter protocol from the drop down menu.



Select Disconnect.

Turn off the battery module and reconnect the CAN cables.

These steps must be repeated for each module in the cabinet.

Figure 9-1 battery monitoring software

Please refer to the table below to set inverter manufacturer parameter.

Inverter manufacture	Parameter setting	Inverter Type
GoodWe	Goodwe/Solis	GW3648D-ES，GW5048D-ES
Deye	Deye	SUN-5K/6K/7.6/8K-SG01LP1
SMA	SMA	Sunny island 6.0H/8.0H
Victron	Victron	Victron Multiplus
Solis	Goodwe/Solis	RHI-（3-6）K-48ES-5G
Selectronic	TBA	SP Pro Series

9.3 Inverter Parameter Settings

Before setting the inverter parameters, please make sure that the Battery to Inverter CAN cable is connected correctly. The Battery to inverter CAN cable must be ordered separately (see part numbers in the table below).

In some cases it might be necessary to make the CAN cable at the location. Pin designations are also shown below.

Please test the cable very carefully after crimping it. Self-made cables are very often the cause of very hard to diagnose problems.

Function	Battery	Solis/Goodwe/Deye/SMA[1]	Selectronic	Victron CCGX
CAN-L	Pin 1	Pin 5	Pin 2	Pin 8
CAN-H	Pin 2	Pin 4	Pin 1	Pin 7
GND[2]	Pin 6	Pin 2	Pin 3	Pin 3
Part Number		5619100036671	5619100043391	5619100025301

1. Please refer to SMA documentation regarding termination requirements for the SYNC-bus.
   The battery to inverter cable supplied does not include a SYNC-bus termination resistor.
2. Only CAN-H and CAN-L pins are populated in the supplied cables.

9.3.1 SMA Sunny Island Inverter Setting

The cable end labelled "BAT" is inserted into the CAN1 port of the battery cabinet, and the other end labelled "PCE" is inserted into the ComSyncln port of the SMA Sunny island device.

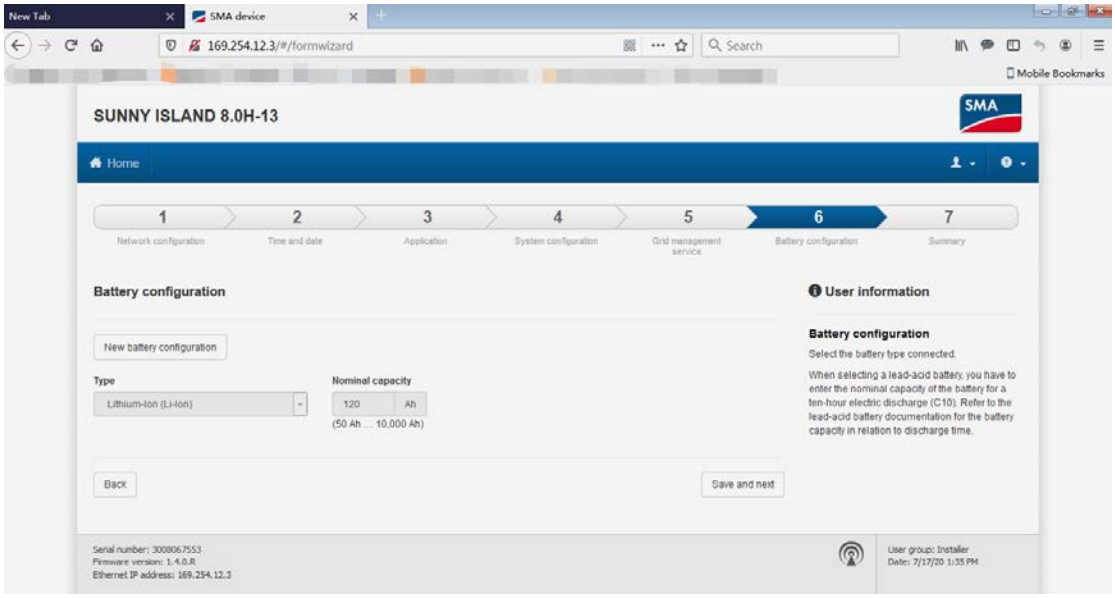
Procedure:

1. Commission the inverter.
2. Establish a connection to the user interface of the inverter.
3. Open the user interface
4. Log in as Installer.
5. Select the menu User Settings on the start page of the user interface.
6. In the context menu, select [Starting the installation assistant].

On the page of user interface:

• Select the battery configuration type: Li-ion.

• Set battery nominal capacity.



•Click [save and next], Complete the installation assistant settings.

Please refer to the inverter manufacturer's instructions for more detail.

9.3.2 Victron CCGX Inverter Setting

The cable end labelled "BAT" is inserted into the CAN1 port of the battery cabinet, and the other end labelled "PCE" is inserted into the VE CAN port of the Victron CCGX device.

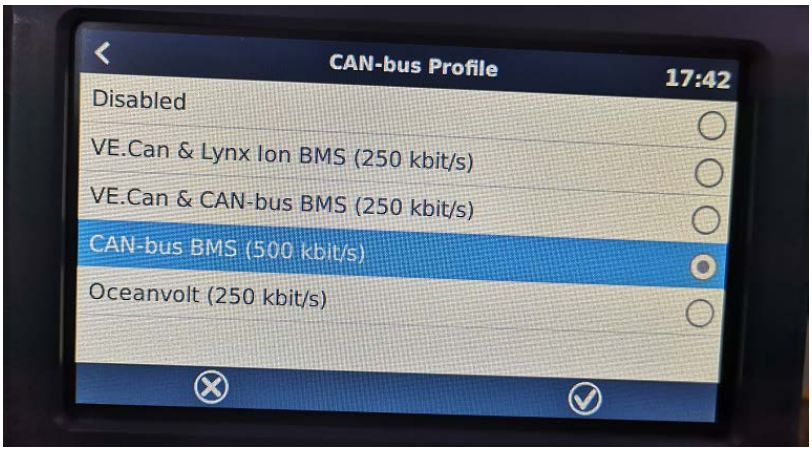
Procedure:

1. Establish a communication between Victron CCGX device and the Victron inverter.
2. Power on the Victron CCGX device, battery and the inverter.

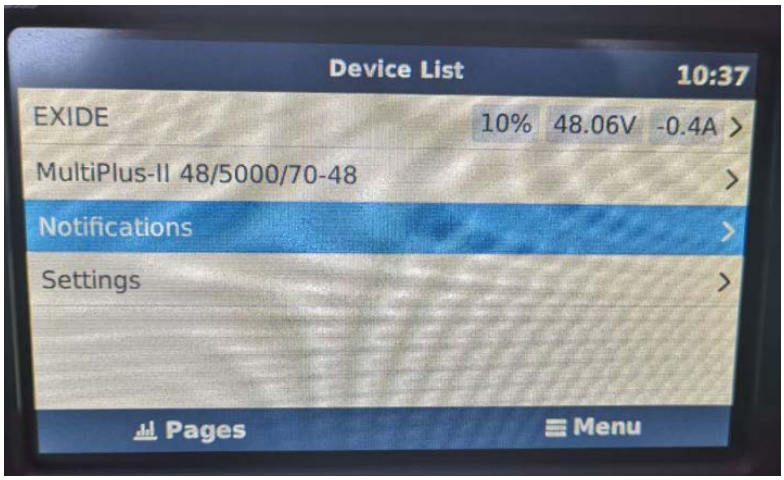
On the Victron CCGX device:

• Select the CAN-bus BMS (500 kbit/s) CAN-profile in the CCGX.

Menu path: Settings → Services → CAN-profile.



After properly wiring and setting the correct CAN-bus speed, the battery will be visible as a battery in the device list. If you have multiple batteries a single entry will show up, which represents all batteries:



Please refer to the inverter manufacturer's instructions for more detail.

9.3.3 Goodwe Inverter Setting

The cable end labelled "BAT" is inserted into the CAN1 port of the battery cabinet, and the other end labelled "PCE" is inserted into the BMS port of the GOODWE inverter.

Step:

1. Power up the battery and inverter.

2. Connect to “Solar-Wi-Fi” and open the “PV Master” APP.

In the inverter PV Master APP interface:

• Choose battery model: Default 100Ah

Setting path: Settings → Basic Setting → battery model.

Please refer to the inverter manufacturer’s instructions for more detail.

9.3.4 Deye inverter setting

The end labelled "BAT" is inserted into the CAN1 port of the battery cabinet, and the other end labelled "PCE" is inserted into the CAN port of the Deye inverter.

Step:

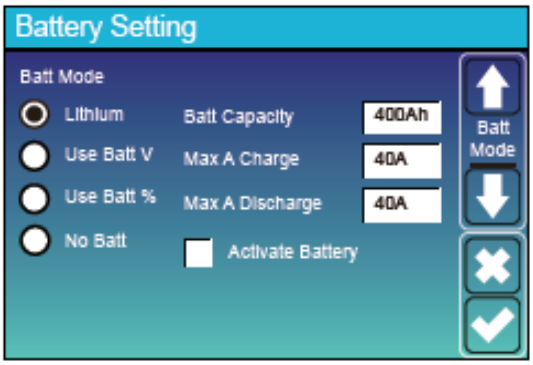
1.Power up the battery and inverter.

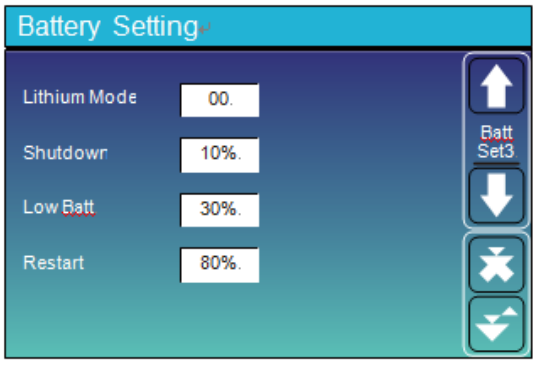
2.In the LCD screen of the inverter：

•Set batt mode: Lithium.

• Set Lithium mode: 00.

Setting path:: Settings → Battery Setting





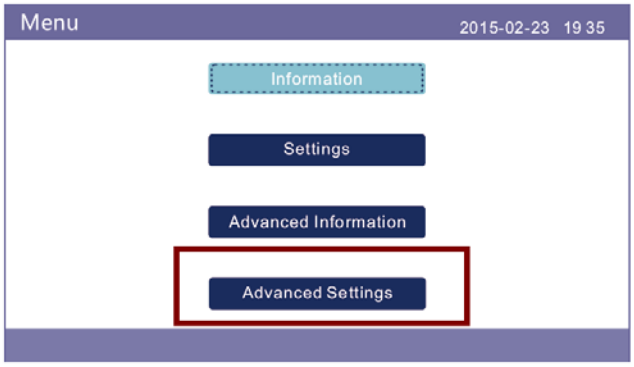
Please refer to the inverter manufacturer’s instructions for more detail.

9.3.5 Solis Inverter Setting

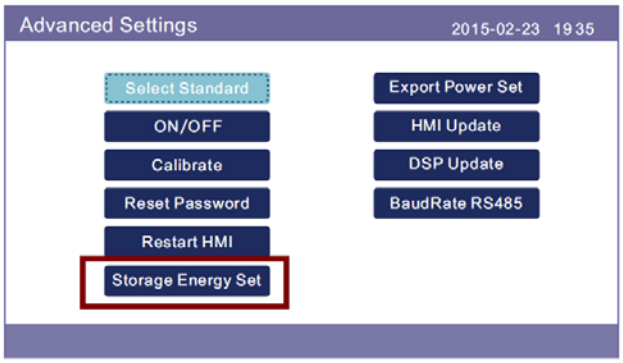
The cable end labelled "BAT" is inserted into the CAN1 port of the battery cabinet, and the other end labelled "PCE" is inserted into the Solis inverter. Solis HMI version must be V35 or higher.

Procedure:

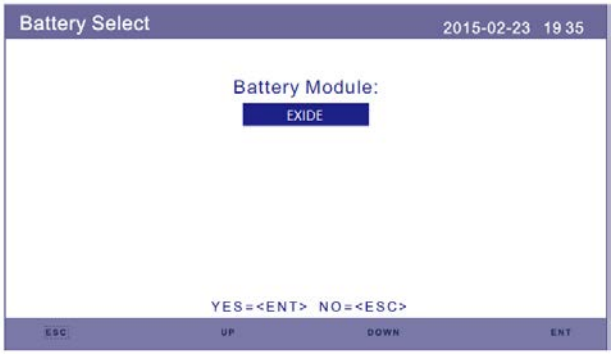
1. Commission the inverter.
2. Establish a connection to the user interface of the inverter.
3. Operate in the LCD screen of the inverter.
4. Select the advance settings.



5. Press “Storage Energy Set” ,click the “Battery Select” to select the battery brand.



6. Select the “EXIDE”, then press enter, finish the battery brand setting.



Please refer to the inverter manufacturer’s instructions for more detail.

9.3.6 Selectronic Inverter Setting

10 Maintenance and Trouble Shooting

10.1 Maintenance

- The system needs to be charged at least every 6 months while in storage. Time between charging will be influenced by storage conditions
- When the device is not going to be used for an extended period, discharge the battery to between 40% and 60% of the battery capacity, and disconnect the battery output and shutdown the battery to avoid the battery being discharged.
- During system storage, the system should be checked regularly by qualified personnel.

10.2 Trouble Shooting

Failures	Reasons	Solution
No response when pressing the start button	One-button start cable is damaged or poorly installed	Open the side door and check one-button start cable. Re-seat connectors.
		Press the POWER button on each battery module. Check the LED status.
		Contact the installer / supplier
Short discharge time	Low battery SOC	Keep the battery on charge for more than 4 hours until the battery indicates it is fully charged.
	Product overload	Check load status and remove non-critical loads
	Capacity decline due to battery aging.	To replace the battery, please contact the supplier.
Unable to charge and discharge	Internal failure	Please note status LEDs and contact the supplier
	Battery over temperature	Allow to stand at room temperature for more than 3 hours
Battery Communication is abnormal	Communication disconnection	Check the battery cabinet and battery module communication connections

Alarm	Others	According to the prompted fault information, check the indicator function status table to find the corresponding fault cause If the 1# Battery Module fails to boot normally, open the side door and move the BAT-RS485 communication line from the 1# Battery Module to the 2# Battery Module's RS485 Connector. The DIP switch of the 1# Battery Module should be set to 0001, and the DIP switch of the 2# Battery Module should be set to 0000.

If the problem still cannot be solved, please contact the installer, supplier or manufacturer as soon as possible. Note: Do not disassemble the product yourself!

When you need to report the fault to the installer's customer service staff, please record and inform the following information:

① Product model (Model)

② Product batch number (Serial No.)

③ Fault occurrence date, complete problem description (including fault code, grid condition, load capacity, etc.).

④ Invoice number

Appendix A

Technical Data Tables

No.	Description	Specification			Notes
Battery Cabinet		LIBM048050-G01	LIBS048150-G03	LIBS048200-G04	
1	Nominal Energy	2.4kWh	7.2kWh	9.6kWh	100%DOD
2	Usable Energy	1.92kWh	5.76kWh	7.68kWh	80%DOD
3	System Capacity	50Ah	150Ah	200Ah	25℃, 0.2C
4	Modules in single cabinet	N/A	3	4	48V50Ah modules in parallel
5	Nominal Voltage	48V			
6	Voltage Range	42～51.5V			
7	Maximum continuous charging current	40A	76.5A	100A	25℃
8	Maximum sustained discharge current	50A	90A	120A	25℃
9	Peak discharge power	3.84kW/3 seconds 2.8kW/30 seconds	9.21kW/3 seconds 7.64kW/30 seconds	12.28kW/3 sec 10.19kW/30 sec	25℃
10	Short Circuit Current	2300A/1ms	2400A/1ms		
11	Cycle Life	≥6000 cycles/60%EOL			25℃
12	Working temperature	Charge:-10℃～45℃; Discharge:-10℃～45℃			Recommended 25℃
13	Storage ambient temperature	-20℃～20℃	12months		The SOC before storage to be in the range of 40% to 60%.
		-20℃～45℃	3months		
		-20℃～50℃	1month		
14	Size	482.6mmx91mmx433mm	550mmx1150mmx286mm [1]		W*H*D
15	Weight	24kg	115kg	140kg	
16	Protection level	IP20	IP55		
17	Cabinet color	White			
18	Installation method	Floor-mounted/Wall-mounted			Two methods
19	Environment humidity	≤90%RH			No condensation
20	Cooling	Natural convection			
21	Maximum parallel connected cabinets	4 Cabinets / (16 Modules)			
22	Altitude	≤2000m			
23	Pollution level	2 Class			
24	Communication	RS485/CAN 2.0B			
25	Certifications	UL1642 UL1973 UN38.3 IEC62619			

Product specifications are subject to change without prior notice.

No.	Description	Specification			Notes
Battery Cabinet		2 x LIBS048200-G04	3 xLIBS048200-G04	4 x LIBS048200-G04	
1	Nominal Energy	19.2kWh	28.8kWh	38.4kWh	100%DOD
2	Usable Energy	15.36kWh	23.04kWh	30.72kWh	80%DOD
3	System Capacity	400Ah	600Ah	800Ah	25℃ 0.2C
4	Modules in Total	8	12	16	LIBM048050-G01in parallel
5	Nominal Voltage	48V			
6	Voltage Range	42～51.5V			
7	Maximum continuous charging current	153.1A	153.1A	153.1A	25℃
8	Maximum sustained discharge current	240A	240A	240A	25℃
9	Peak discharge power	21.5kW/3 seconds 18.1kW/30 seconds	29.9kW/3 seconds 25.4kW/30 seconds	43.2kW/3 seconds 37.4kW/30 seconds	25℃
10	Short Circuit Current	2400A/1ms			

Product specifications are subject to change without prior notice.

1. Dimensions exclude wall mounting bracket, adjustable feet and connection sockets.

Compatible Inverters - Managed Operation

Manufacturer	Communications	Notes
Deye	CAN	
GoodWe	CAN	
Selectronic	CAN	
SMA	CAN	
Solis	CAN	
Victron	CAN	https://www.victronenergy.com/live/battery_compatibility:exide

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