



GBLI 6532 Battery System Manual

Date: 2020/8/28

Version: V2.0



No.	Revision Contents	Drafter	Reviewer	Version	Date
1	N/A	Chen Le	Shen Zhengbin Li Bing Guo Yihao	V1.0	2020-07-24
2	Added the icon “read the manual before operating” Updated the caution about the two-pole breaker	Wang Qian	Shen Zhengbin Guo Yihao Ni Yunlong	V2.0	2020-08-30

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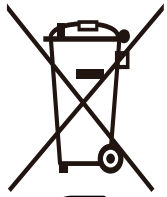
This document describes the application scenarios, installation, electrical connection, commission and troubleshooting of 6.5kWh Residential Energy Storage Battery (hereinafter simply put as battery). Before installing and operating battery, please ensure that you are familiar with product features, functions, and safety precautions as provided in this document.

Warning and caution messages are listed in the document to remind users, installers and maintainer of safe operation.

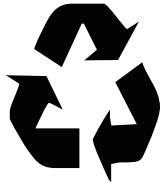
Symbol	Description
 WARNING	Indicates a potentially hazardous situation, if not avoided, could result in serious injury or death.
 CAUTION	Indicates a potentially hazardous situation, if not avoided, may result in minor or moderate injury.

1 Safety

1.1 Warning Label



Do not dispose battery in household trash.



Recyclable.



Certification in European Union area.



Risk of electric shock.



Explosive gas.



Battery may leak corrosive electrolyte.



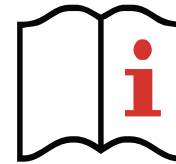
Battery is heavy enough to cause severe injury.



Do not reverse polarities.



Do not expose battery to flame.




Operate as specified by the manual.




Read this manual before operating.

Growatt Lithium Ion Battery IFpP/16/122/360/[2P16S]M/-10+50/90	
Model:	GBLI 6532
Nominal Voltage:	51.2V
Nominal/Rated Capacity:	128Ah/118Ah
Nominal/Rated Energy:	6.5kWh/6.0kWh
Ingress Protection:	IP55
Operating Ambient Temperature:	-10°C ~ 50°C
Maximum Short Current and Duration:	2200A, 4ms
Operation Voltage Range:	48~57.6Vdc
Maximum Charge/Discharge Current:	104.2A
Maximum Charge/Discharge Power:	5KW
Protection Class:	I





Made in China



Label







WARNING AVERTISSEMENT






1. Do not disassemble or alter the battery in any way.
Ne démontez ni modifiez la batterie en aucune façon.
2. Do not use the battery for purposes not described in its documentation.
N'utilisez pas la batterie à des fins non décrites dans sa documentation.
3. Do not drop, strike, puncture, or step on the battery.
Ne laissez pas tomber, ne heurtez pas, ne percez pas et ne marchez pas sur la batterie.
4. In case of electrolyte leakage, keep leaked electrolyte away from contact with eyes or skin, immediately clean with water and seek help from a doctor.
En cas de fuite d'électrolyte, gardez l'électrolyte qui fuit loin du contact avec les yeux ou la peau, nettoyez immédiatement avec de l'eau et demander de l'aide à un médecin.
5. Do not put the battery into a fire. Do not use it or leave it in a place near fire, heaters, or high temperature sources.
Ne mettez pas la batterie au feu. Ne l'utilisez pas et ne le laissez pas dans un endroit près de feu, de radiateurs ou de sources de températures élevées.
6. Do not submerge the battery in water, or expose it to moisture.
Ne plongez pas la batterie dans l'eau et ne l'exposez pas à l'humidité.
7. Do not allow the terminals to contact exposed wire or metal.
Ne laissez pas les bornes entrer en contact avec du fil ou du métal exposé.
8. The battery is heavy and can cause injury if not handled safely.
La batterie est lourde et peut provoquer des blessures si elle n'est pas manipulée en toute sécurité.
9. Keep out of reach of children or animals. Tenir hors de portée des enfants ou des animaux.

1.2 Precautions

Risks of electrolyte leakage

- * Do not subject battery to strong impact.
- * Do not crush or puncture battery.
- * Prevent battery from falling. In case of fall, turn off the battery immediately and stop using it.
- * Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes.

Risks of fire

- * Do not expose battery to direct sunlight.
- * Avoid contact with conductive objects such as wires.
- * Keep battery away from fire source, inflammable, explosive and chemical materials.
- * Do not dispose of batteries in a fire. The batteries may explode.

Risks of electric shock

- * Do not touch battery with wet hands.
- * A battery can present a risk of electric shock and burns by high short-circuited current.
- * Battery installation and wire connection must be operated by professionals.

2

Risks of damage

- * Keep a distance to water source.
- * Do not subject battery to high voltage.
- * Place battery on a flat surface. Do not place any foreign object on top of battery nor step on battery.
- * Battery-connected PCS should have reinforced insulation.

1.3 Responses to Emergencies

Event	Description and recommended actions
Leakage	<p>Inhalation: leave the contaminated area right now.</p> <p>Swallow: induce vomiting.</p> <p>Contact with eyes: flush eyes with flowing water for 15 minutes.</p> <p>Contact with skin: wash thoroughly with soap and water. Immediately seek for medical intervention after taking emergency measures.</p>
Fire	<p>Battery may catch fire when heated above 150 °C . Please implement the following actions:</p> <ol style="list-style-type: none"> 1. Extinguish fire before the battery catches fire. ABC or carbon dioxide extinguisher is recommended. 2. If the fire is too strong to put out, move battery to a safe place before it catches fire. 3. If battery is on fire, evacuate people first before seeking help from professional fire protection personnel. 4. If battery catches fire during charging, turn off the breaker between battery and PCS when safety can be guaranteed.
Wet battery	<p>If battery became wet or has been submerged in water, do not access it. Immediately contact your distributor for technical assistance.</p>
Damage	<p>Damaged battery is dangerous and must be handled with utmost care. They are not usable for use and could pose a safety threat to people or property. If battery is suspected to be damaged, stop any operation and return it to distributor.</p>

1.4 Storage safety

- * Place battery according to signs on packing case.
- * Do not put battery upside down or sidelong.
- * Store batteries in a place free from direct sunlight and rain.
- * Keep batteries at least two meters away from a heat source (such as a radiator).
- * Avoid contacting with corrosive and organic substances (including gas exposure).
- * Batteries with deficiencies should be separated from normal batteries by setting wall between or placing in difference fire protection zones.
- * Ambient temperature ranges between -30°C to 60°C during the first seven days, and ranges between -20°C to 45°C within six months. Relative humidity ranges between 0%RH-95%RH.
- * Keep the storage area dry, clean and well ventilated.
- * Do not dispose of battery into environment or sewerage.
It should be recycled and disposed based on the local legislation and regulations.
- * Do not pile up foreign objects on the top of battery. Four batteries at most can be piled up.
- * Maintain original packaging and keep labels complete and recognizable.
- * Prevent from direct sun exposure, rain, condensation and mechanical damages.
- * The battery is current qualified for land and sea transport. As respect to air transport, the battery is subject to mandatory certificates.

1.5 Transportation Safety

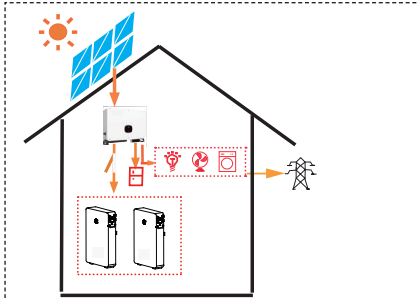
Battery has cleared UN38.3 (Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and SN/T 0370.2-2009 (Part 2: Performance Test of the Rules for the Inspection of packaging for Exporting Dangerous Goods). The battery is classified as class 9 dangerous goods, and is subject to land and water transportation. It is mandatory to report to the airline company and obtain approval before air transport.

- * Before transportation, press POWER button for two seconds and five LED lights flicker for three times to power off battery.
- * During transportation, put battery flat, do not have battery stand on or lean against the floor to avoid possible crash.
- * Maintain temperature between -20°C to 45°C during the transportation.
- * Prohibit mixing up with explosive, inflammable or toxic objects.
- * Use van-type vehicle including container and metallic van-type vehicle. Platform vehicle and convertible are prohibited.

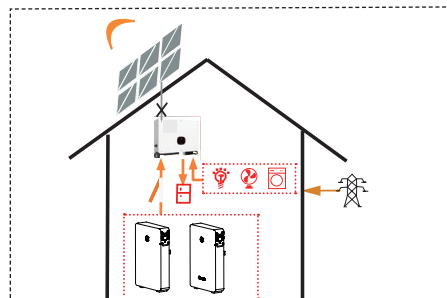
2. Introduction to Product

2.1 Intended Purpose

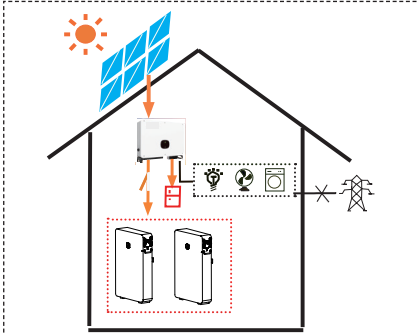
The battery is a 6.5kWh LiFePO4 pack. It has a 48V battery module as the main power supply unit which composed of 32 pieces of 64Ah cells in two parallel and sixteen serial connect (2P16S). Battery coordinates with PV, PCS, Grid, DC Breaker and loads in the residential energy storage system. The four typical application scenarios are as shown



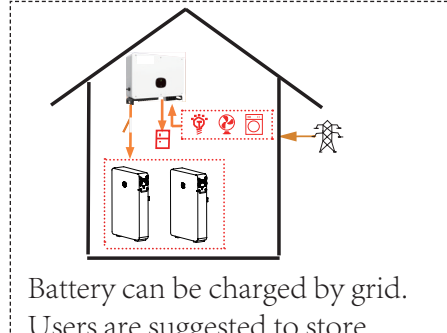
The energy produced by PV is optimized to supply loads. The excess energy is used to charge battery, then export to grid.



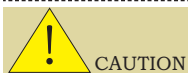
Battery powers loads at nighttime when there is no PV. If battery energy is insufficient, it can supply loads together with grid.



When grid falls, battery and PV can power loads.



Battery can be charged by grid. Users are suggested to store energy from grid to battery when electricity price is relatively lower.



CAUTION

Each battery shall be equipped with an two-pole DC breaker as:
Rated Voltage \geq 120Vdc Rated Current \geq 150A
Cut-off current: 2200A

Breakers are provided by your system supplier.
The quantity of breakers must be consistent with that of the batteries.

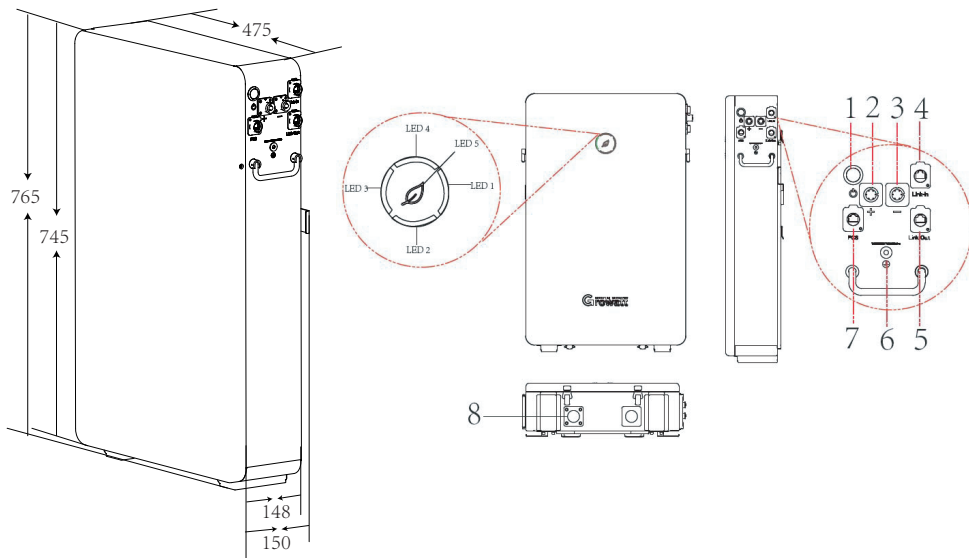
2.2 Function

Compared with normal batteries, the battery is characterized with better charging and discharging performance, longer cycle life and less self-discharging loss. The build-in BMS can monitor battery operation status and alarm timely to avoid operation out of limit. A maximum of 8 batteries can be parallel-connected to expand energy and power of energy storage system. Battery realizes communication with PCS via CAN or RS485 network port.

- * Monitoring: detect the voltage and temperature of cell, the voltage and current of battery.
- * SOC estimate: indicate the precise volume of remaining electricity.
- * Alarm: alarm when overvoltage, under voltage, overcurrent, over temperature or under temperature occurs.
- * Protection: protect against over voltage, under voltage, over current, over temperature, under temperature, cell fault and hardware failure.
- * Report: report alarm messages and operation data to PCS via CAN or RS485 network ports.
- * Parallel connection: support a maximum of 8 batteries in parallel connection.
- * Power-off triggered by fault: battery powers off if level three under voltage, 0V cell or parallel connection failure happens.
- * Forced power-off: when battery does not connect to mains supply, press POWER button for two seconds and battery powers off.
- * Activation: input 48V-57.6V/2S-5S via P+/P- terminals, battery will be activated from off mode to standby status.

2.3 Appearance

The battery is an energy storage unit composed of cells, mechanical parts, battery management system (BMS) as well as power and signal terminals. Product dimension (unit: mm) and appearance are as shown below:



No.	label	Name	No.	label	Name
1	POWER	Power button	5	Link-out	Parallel Network Output
2	+	Positive terminal	6		Grounding terminal
3	-	Negative terminal	7	PCS	Network port to PCS
4	Link-In	Parallel Network Input	8	Safety vent	A vent to release pressure inside.

2.4 Technical Parameters

Unless otherwise specified, all tests stated above are conducted as:

Temperature: $25 \pm 2^\circ\text{C}$ Humidity: 5%RH-95%RH

1	Usable Capacity	118Ah Step 1: rest the battery for 5 minutes; Step 2: charge (CC=23.6A) until $V_{\text{cell-max}}=3.48\text{V}$; Step 3: charge (CC=11.8A) until $V_{\text{cell-max}}=3.5\text{V}$; Step 4: charge (CC=2A) until $V_{\text{cell-max}}=3.5\text{V}$; Step 5: stop charging and rest the battery for 60 minutes; Step 6: discharge (CC=0.2C) until $V_{\text{cell-min}}=3.0\text{V}$; Step 7: stop discharging and rest the battery for 5 minutes; repeat step 2-step 7 for 3 cycles.
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2	Normal Battery Capacity / Energy	128Ah/ 6.5kWh
3	Rated Battery Capacity / Energy	118Ah/ 6.0kWh
4	Usable Energy	6.0kWh
5	Nominal Voltage	51.2Vdc
6	Operating Voltage	48Vdc~57.6Vdc
7	Max. Charging Current (temperature refer to the cell surface temperature)	$-10^\circ\text{C} - 0^\circ\text{C} : 21.3\text{A}$ $0^\circ\text{C} - 5^\circ\text{C} : 32\text{A}$ $5^\circ\text{C} - 15^\circ\text{C} : 64\text{A}$ $15^\circ\text{C} - 45^\circ\text{C} : 104.2\text{A}$ $45^\circ\text{C} - 50^\circ\text{C} : 64\text{A}$ $50^\circ\text{C} - 55^\circ\text{C} : 32\text{A}$
8	Max. Discharging Current (temperature refer to the cell surface temperature)	$-10^\circ\text{C} - 0^\circ\text{C} : 21.3\text{A}$ $0^\circ\text{C} - 45^\circ\text{C} : 104.2\text{A}$ $45^\circ\text{C} - 50^\circ\text{C} : 85.3\text{A}$ $50^\circ\text{C} - 55^\circ\text{C} : 32\text{A}$
9	Normal Charging and Discharging power	3.3KW
10	Short Circuit Current	2200A/4ms
11	Max. Charging and Discharging power	5kW
12	Peak Charging and Discharging power	6.9kW/3s
13	Operating Temperature	$-10^\circ\text{C} \sim 50^\circ\text{C}$
14	Cycle Life (25°C)	6000 cycles
15	RTE	>95%, 0.2C charge/discharge 25°C
16	DOD/EOL	94.5% \geq 6000cycle/60%EOL
17	Cooling	Natural cooling
18	Dimension/Weight	W475*D148*H745 mm/58kg
21	Installation	Wall mounting installation or floor standing installation
20	Protection class / Ingress protection	Class I / IP55
21	Cell safety certification	IEC62619/UL1973
22	PACK safety certification	IEC62619/CE/RCM/CEC
23	UN transportation test standard	UN38.3
24	Communication	CAN; RS485
25	Parallel Connection	Eight batteries
26	Storage conditions	Store for seven days during $-30^\circ\text{C} \sim +60^\circ\text{C}$; store for six month under $-20^\circ\text{C} \sim +45^\circ\text{C}$, 0%-95%RH.

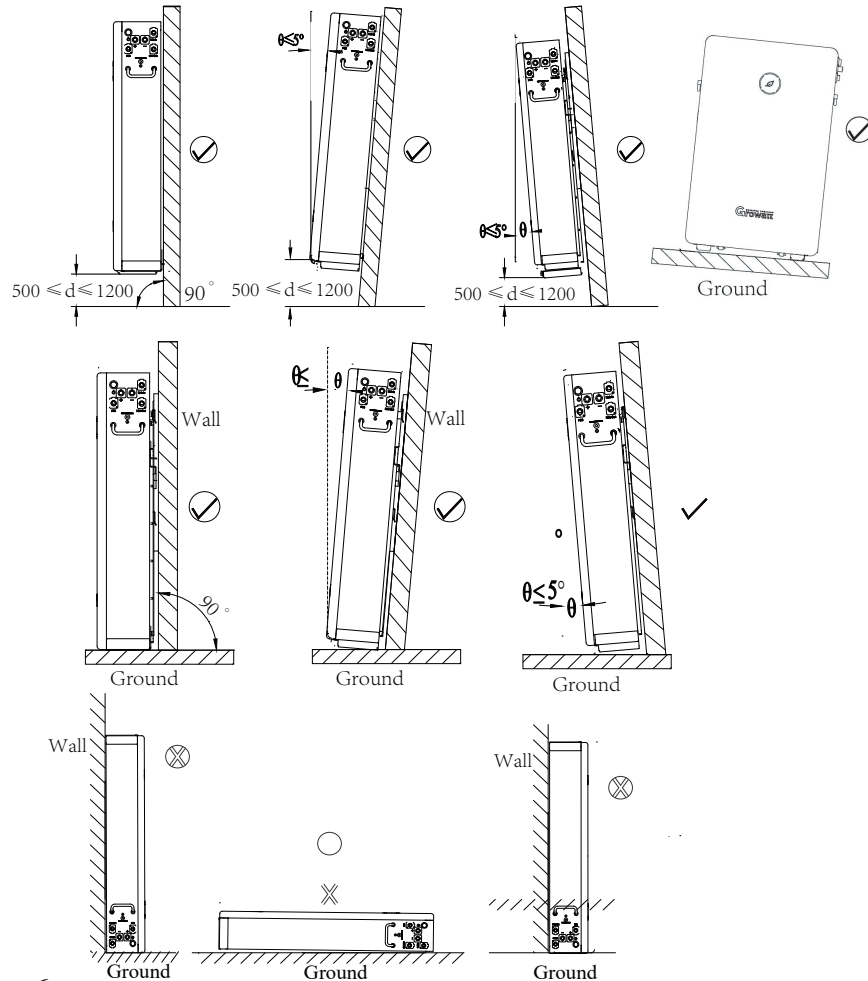
3 Installation

Please follow the AS/NZS 5139 standard during the battery installation.

3.1 Basic Installation Requirements

Battery can be installed indoors or outdoors. Ensure the following conditions are satisfied:

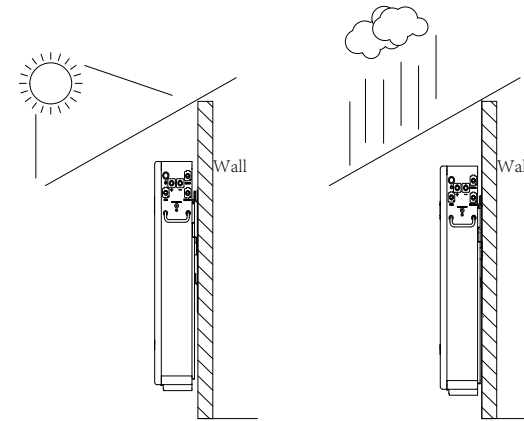
- * A deviation of $-5^\circ \leq \theta \leq 5^\circ$ is allowed for both installation against wall and floor. Additionally, the distance between the bottom part of battery and floor should range between 500mm to 1200mm. Please refer to figures below (✓ means acceptable installation and X unacceptable).



CAUTION

Do not place the battery upside down nor keep it flat as above.

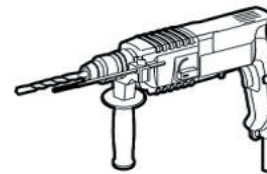
- * It is recommended to build sunshade & rain shelter to avoid direct exposure to sunlight and rain.



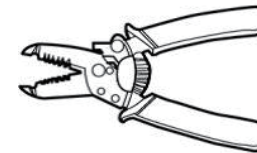
CAUTION

Keep the dirt or dust at a minimal level;
 Do not install battery in a place where flood frequently occurs;
 Do not install battery in highly humid area such as bathroom;
 Ensure direct contact between battery shell and ambient air.
 Do not cover or shield battery to avoid poor cooling.

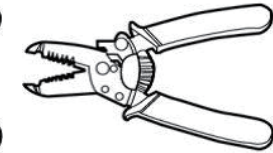
3.2 Installation Required Tools



Drill



Crimper



Wire stripper



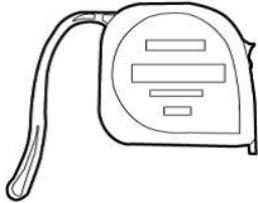
Screw driver



Cable wrench



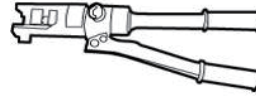
Pencil



Tape measure



Multi-meter



Hydraulic plier



Insulated gloves



Safety goggle



Safety shoes

3.3 installation Procedures

Pre-installation Check

Check exterior package: before opening package, check for damages like holes, cracks or other traces on exterior packing case. If any abnormality is detected, do not open the package and contact your distributor.

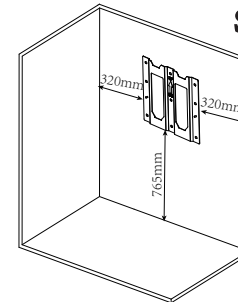
Check deliverables: after opening package, check if deliverables are complete. If there is any part missing or damaged, please contact your distributor.

Check and confirm the battery is powered off and breaker is open before any further step.

Accessory list:

RJ45 connector	2 PCS
Grounding Cable	1 PCS
M6 Nut	
Warranty Card	1 PCS
Gradienter	1 PCS
Fastenings	
M8 expansion screw	2 PCS
M8*H60 anchor	2 PCS

3.3.1 Wall Mounted Installation



Step 1 Confirm installation spot.

At least two persons participate the installation. One person places the bracket on wall and ensures the gradienter horizontal; the other person marks spots of screw driving. After confirming the spots to drive screws, put down the bracket.

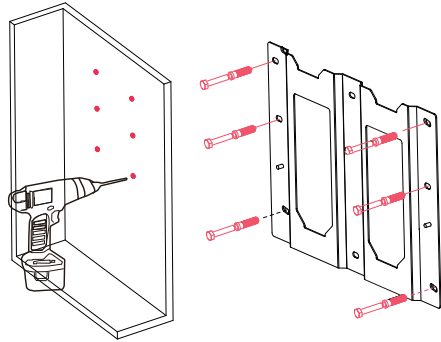


The weight capacity of wall should exceed 4 times weight of battery. Keep the distance between bracket, wall and floor as is shown (320mm, 320mm, 765mm). Installer should consider the specific wall shape before choosing four drilling spots.

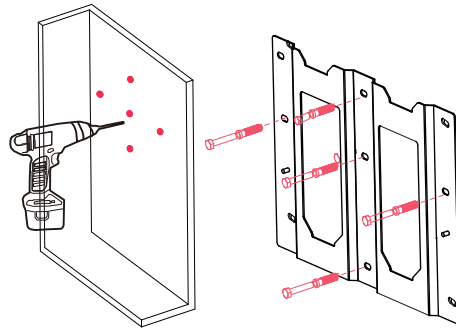
Step 2 Fix bracket to wall.

Choose alloy drill bit with a diameter of 12mm and install it to a drill. Drill in the spots that have been located in step 1 and have at least 60mm drilling depth. Clean the soil and drive expansion tube into the hole. One person puts the bracket on wall and minds to keep gradienter horizontal. The other person drives M8 screw through the bracket into hole.

Proposal 1



Proposal 2

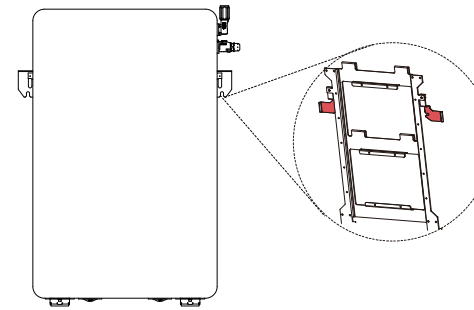
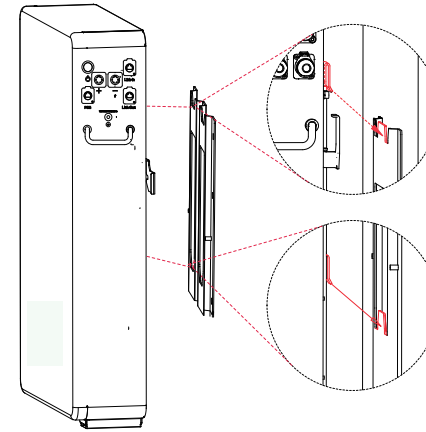


WARNING

There are two spot drilling proposals available. For installation on a wall with its main supporting beams at a distance of 16 inches, it is recommended to adopt the first drilling spots. For wall with its main supporting beam at a distance of 24 inches, it is recommended to adopt the second drilling spots.

Step 3 Fix battery on bracket.

Rotate the left latch leftward and the right latch rightward until they keep perpendicular to the battery. Install battery from the top down and lock the connection part of battery with the support plate of bracket.



Rotate the left latch rightward until the notch locks limiting pin, rotate the right latch leftward until the notch locks limiting pin too.

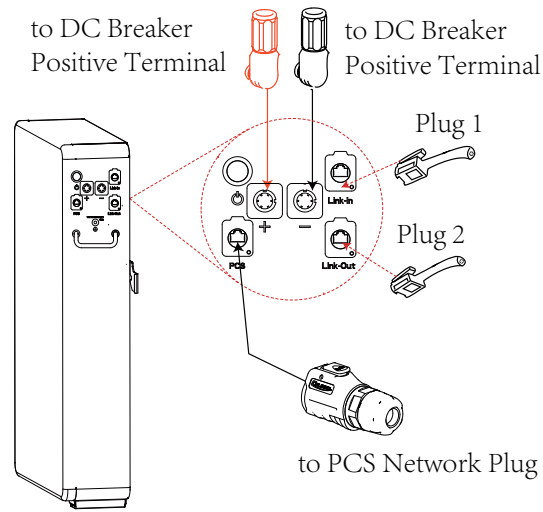


CAUTION

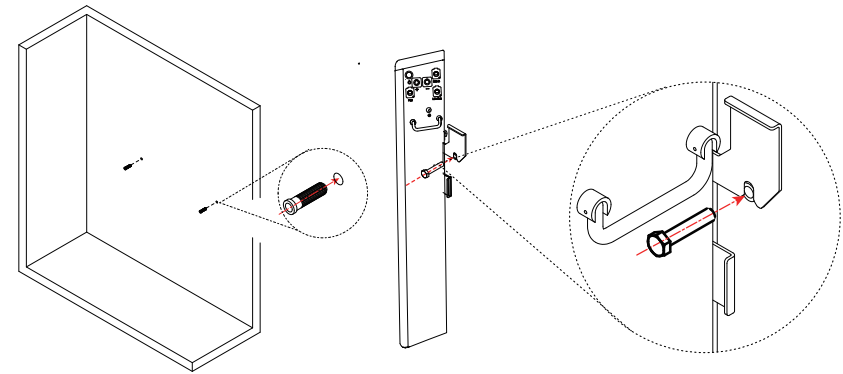
Leave a minimum clearance of 133mm before the front surface of battery. In order to guarantee a stable connection between battery and bracket, please visually check if the two upper joints are fixed. Try to move the lower part of battery away from wall. The connection is proved qualified if the battery cannot be moved at all. Otherwise, please connect the battery and bracket again until confirming a fixed connection.

Step 4 Insert power cable and network cable into battery terminals.

Check and confirm battery is well fixed to wall. Plug the power cables into battery terminals and DC Breaker. Plug network cable A into network ports of battery and PCS. Please refer to Section 4.2 for cable making details.



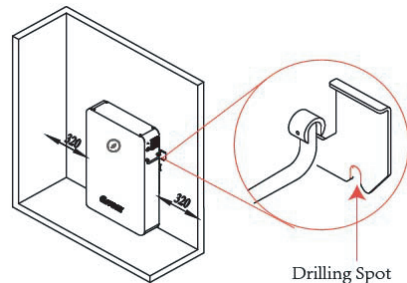
Move battery back to the place confirmed in step 1. Drive M8 screw through notch of latch into wall.



3.3.2 Floor Standing Installation

Step 1 Confirm installation spot.

Place battery in the to-be installed area. Rotate the left latch leftward and the right latch rightward until they are perpendicular to the battery. Keep the distance between wall and battery as shown (320mm, 320mm). Leave a minimum clearance of 133mm before the front surface of battery. Use pencil to mark where the notches of two latches are and confirm the two drilling spots. Move battery away.

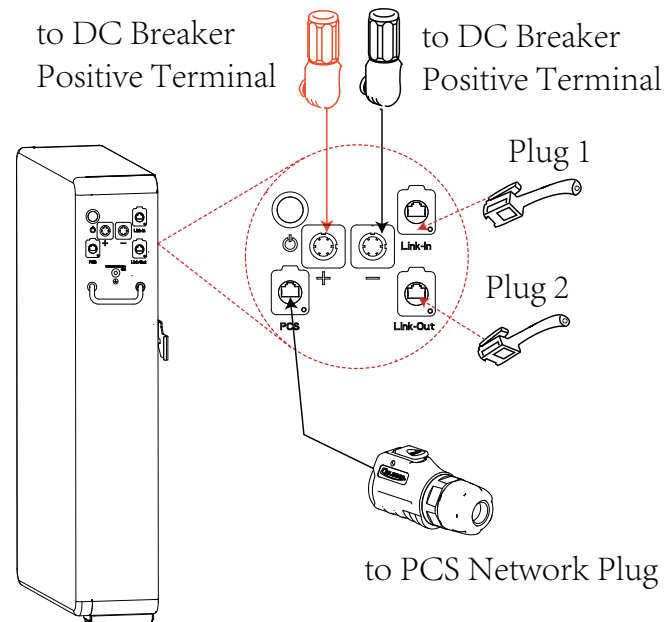


Step 2 Install battery.

Choose an alloy drill bit with a diameter of 12mm and install it in the drill. Drill two holes in the spots that have been confirmed in step 1. Keep the drilling depth as least 60mm. Clean the soil and drive expansion tube into hole.

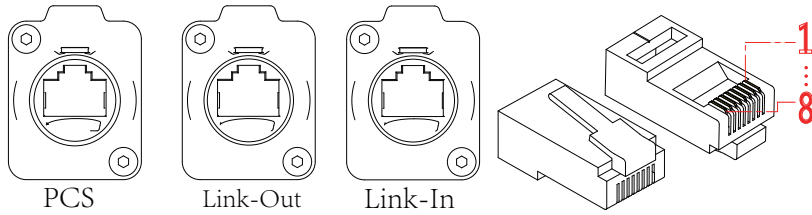
Step 3 Insert power cables and network cable into battery terminals.

Check and confirm battery is well fixed to wall. Plug the power cables into battery terminals and DC Breaker. Plug network cable A into network ports of battery and PCS. Please refer to Section 4.2 for cable making details.



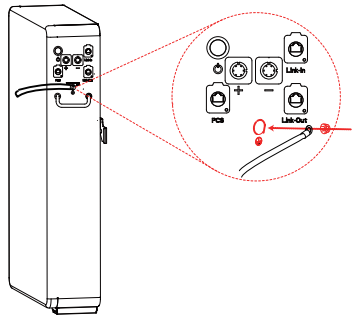
4 Electrical Connection

4.1 Preparation



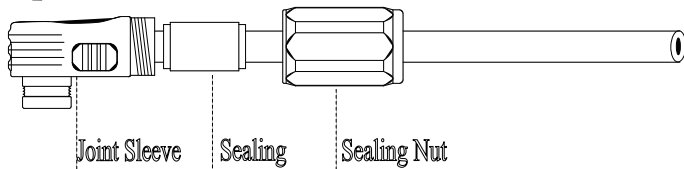
Item	No.	Definition	Item	No.	Definition	Item	No.	Definition
PCS	1	PCS-RS485-B	Link-Out	1	COM-CANH	Link-In	1	COM-CANH
	2	PCS-RS485-A		2	COM-CANL		2	COM-CANL
	3	GND-ISO		3	Encode-OUT+		3	Encode-IN+
	4	PCS=CANH		4	GND-ISO		4	GND-ISO
	5	PCS=CANL		5	Slave-Last		5	Master-Select
	6	GND-ISO		6	GND-ISO		6	GND-ISO
	7	PCS-WAKE-		7	GND-ISO		7	GND-ISO
	8	PCS-WAKE+		8	WKP-OUT+		8	WKP-OUT+

4.2 Electrical Connection Procedures



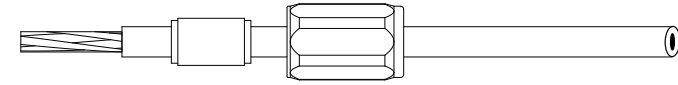
Step 1 Connect grounding cable.
It is recommended to fasten grounding terminal and grounding cable with M6 screw.

Step 2 Make power cables.

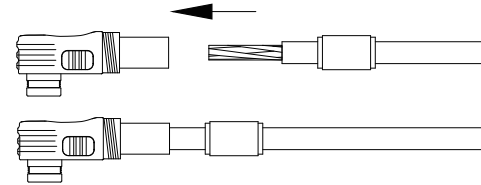


10

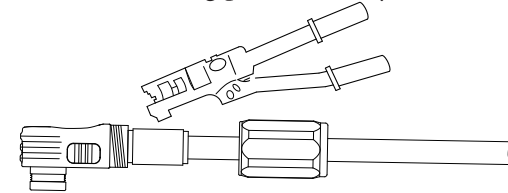
1. Strip cable sheaths for 20 ± 0.5 mm, with orange positive cable and black negative cable. Insert sealing and sealing nut along the cable as shown.



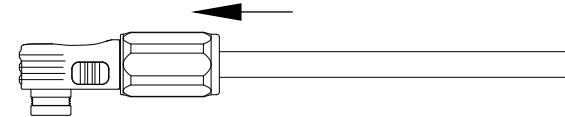
2. Insert the copper wires all into the joint sleeve.



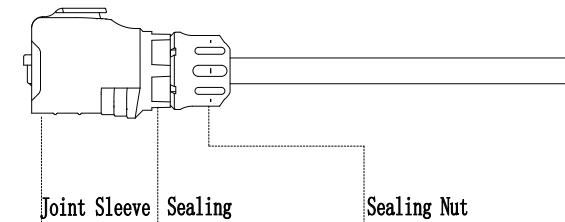
3. Press connecting part with a hydraulic clamp.



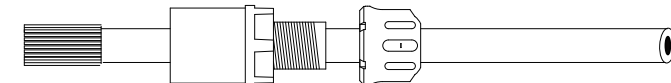
4. Tighten up sealing, sealing nut and joint sleeve.



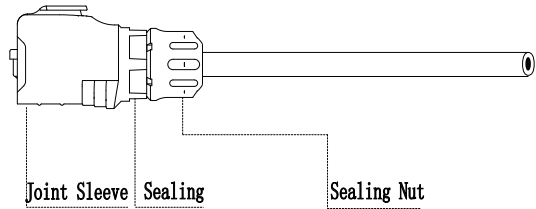
Step 3 Make network cables



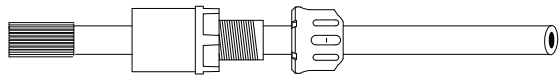
1. Strip cable sheaths for 15 ± 0.5 mm first. Insert sealing and sealing nut along the cable.



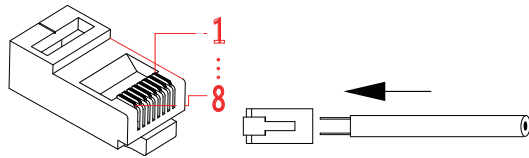
Step 3 Make Network Cable A



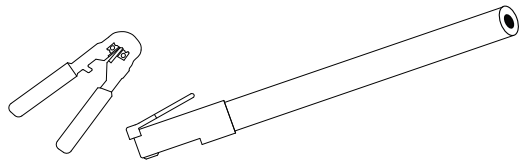
1. Strip cable sheaths for 15 ± 0.5 mm first. Insert sealing and sealing nut along the cable.



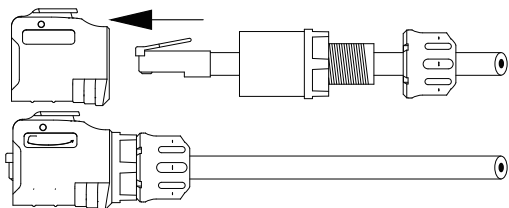
2. Network cable adopts standard 8-core cable. Insert eight wires into RJ45 plug of one end of network cable A. Ensure all wires stay well aligned.



3. Crimp the RJ45 plug with a wire crimper.

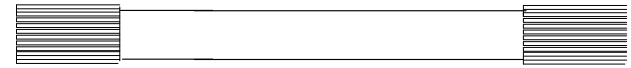


4. Connect RJ45 plug with joint sleeve, and tighten up sealing, sealing nut and joint sleeve.

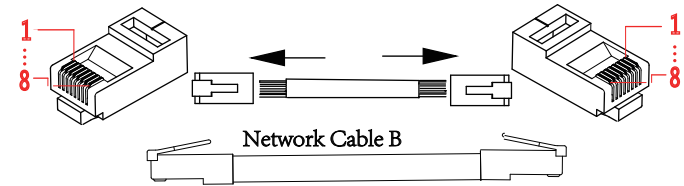


Make Network Cable B:

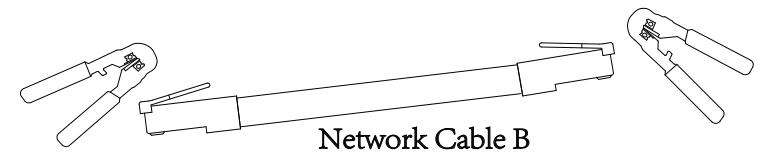
1. Strip cable sheaths for 15 ± 0.5 mm first. Insert sealing and sealing nut along the cable.



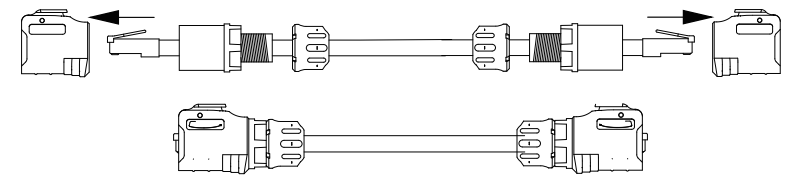
2. Network cable adopts standard 8-core cable. Insert eight wires into RJ45 plug. Ensure the color of wires in to RJ45 stay consistent and have pin-to-pin RJ45 plugs in two ends of network cable B.



3. Crimp the RJ45 plug with a wire crimper.



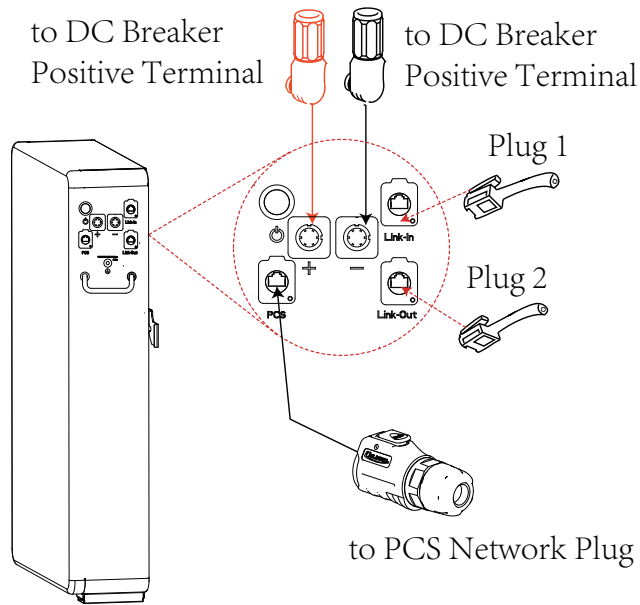
4. Connect RJ45 plug with joint sleeve, and tighten up sealing, sealing nut and joint sleeve.



Network Cable B

Step 4 Insert power cables and network cable into battery terminals

1. Measure battery voltage with a multi-meter and ensure the voltage output is 0V under power-off mode.
2. Plug one end of the power cables that have been made in Section 4.2 step 2 into DC breaker, and plug the other end into the battery terminals.
3. Plug network cable A that has been made in Section 4.2 step 3 into a network terminal of battery (labelled as PCS), and plug the other end of network cable A into network port of PCS.



WARNING

A manually operating breaker should be installed between battery and PCS to control the main circuit during installation, wire connection and maintenance. The breaker can be operated manually without using any tool and should be located near the battery. The distance between battery and the breaker should comply with local regulations. Each battery shall be equipped with a two-pole DC breaker.

5 Installation Steps under Parallel Connection

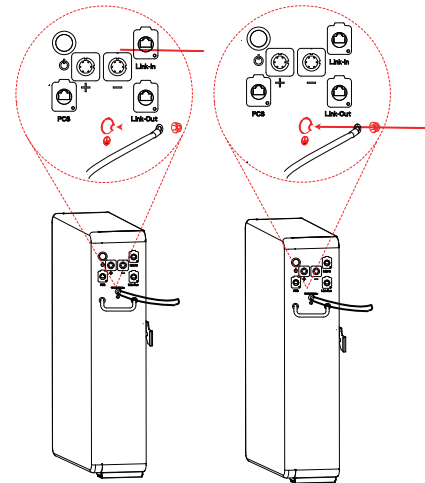
Step 1 Install battery.

Power on batteries in condition of no load, measure their voltages with a multi-meter and confirm the voltage difference not more than 0.5V. After that, power off batteries and install them according to the procedures specified in Section 3.3.



WARNING

If voltage difference is measured more than 1V, the difference shall be adjusted to be less than 1V either by charging the battery with lower voltage or discharging the battery with higher voltage before conducting the parallel-connected installation. If two or more batteries are connected in parallel, the same quantity of two-pole DC breakers are required between batteries and the inverter.

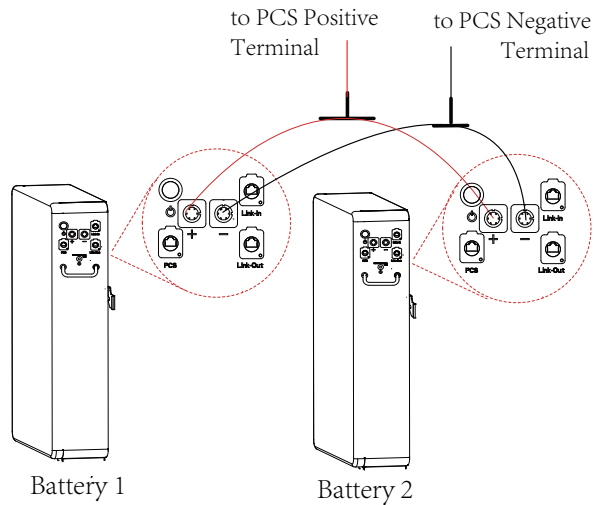


Step 2:

Fasten ground terminal and grounding cable with M6 screw for two batteries.

Step 3 Insert power cables into battery terminals.

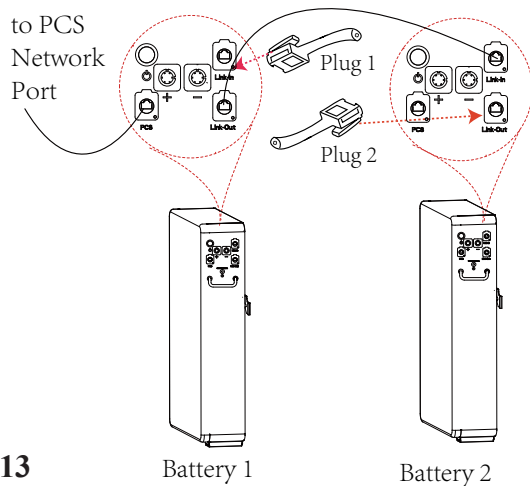
Make the power cables of batteries based on Section 4.2 Step 2. Plug one end of positive and negative terminals into DC breaker. Respectively measure the positive and negative terminal blocks of each battery with a multi-meter, and ensure the voltage outputs under off mode are all 0V. After that, plug the other end of power cables into battery terminals. Connect DC Breakers with PCS.



Step 4 Insert network cables into battery terminals.

Make network cables based on Section 4.2 step 3. Connect two batteries with Network Cable B, and connect battery and PCS with Network Cable A.

Specifically, Plug one end of Network Cable A into network port of battery 1 (labelled as PCS), plug the other end into the network port of PCS. Plug one end of Network Cable B into Link-Out of the Battery 1 and the other end into Link-In of Battery 2. Insert one plug into Link-In of the Battery 1 and the other plug into the Link-Out of Battery 2.



WARNING

Ensure batteries in parallel connection are from the same batch, same model and same manufacturer. Do not mix an old battery with a new battery. Batteries undergone less than 300 cycles are defined as new batteries.

6 Power on/off Battery



WARNING

There are many technical contents involved in the electrification process, and technicians must go through technical training and obtain certificates in compliance with local laws and regulations.

Please stand on dry insulating objects and do not wear metal objects such as watches, rings and necklaces during operation. Insulating tools should be used.

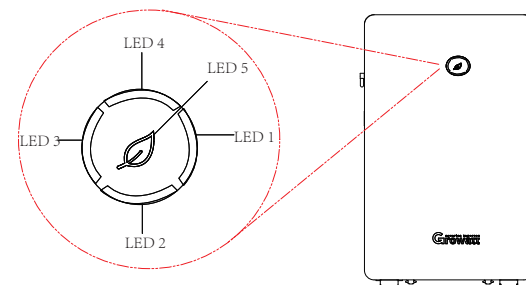
Do not contact with two charged positions with a potential difference. If other people are not allowed to operate, the prohibition sign should be hung on the distribution equipment: "No closing, someone operating."

Make sure to turn off breaker before checking battery.

Measure battery voltage with a multi-meter and ensure voltage output under off mode is 0V.

If any abnormality is detected when powering on, immediately power off the battery. Proceed again only after causes are confirmed.

6.1 LED Indication



LED Indicator light Status Description		Dispaly Logics				
Battery Status	Description	Light Indication				
		LED1	LED2	LED3	LED4	Bi-colour LED5 (blue/red)
Bootload		★	★	★	★	★
Starting	Master/ Slave Battery	★	★	★	★	●
					★	●
		/	/	★	/	●
		/		★	★	●
		/	★	/	/	●
		/	★	/	★	●
		/	★	★	/	●
		/	★	★	★	●

Application Mode checking	Parallel or single application mode checking success	SOC Indication				
		LED1	LED2	LED3	LED4	LED5
Charge	0%-25.0% SOC	■				●
	25.1%-50.0% SOC	■	■			●
	50.1%-75.0% SOC	■	■	■		●
	75.1%-99.9% SOC	■	■	■	■	●
	100% SOC	●	●	●	●	●
Discharge & Standby	100%-75.1%	●	●	●	●	●
	75.0%-50.1%	●	●	●		●
	50.0%-25.1%	●	●			●
	25.0%-0%	●				●

6.2 Troubleshooting

LED Indicator light Status Description		Dispaly Logics				
Battery Status	Description	Light Indication				
		LED1	LED2	LED3	LED4	Bi-colour LED5 (blue/red)
Fault	Level 3 cell over voltage	/	/	/	●	●
	Level 3 cell under voltage	/	/	●	/	●
	/Level 3 cell over temperature	/	/	●	●	●
	Level 3 cell under temperature	/	●	/	/	●
	Level 3 over current (charge or discharge)	/	●	/	●	●
	Level 3 under SOH	/	●	●	/	●
	Internal communication	/	●	●	●	●
	External communication	●	/	/	/	●
ID addressing failure during parallelconnect	●	/	/	●	●	
Fuse failure	●	/	●	/	●	
BMS fault	●	●	●	●	●	

6.3 Power on Battery

Power on single battery by pressing POWER button		
No.	Procedures	Acceptation criteria
1	Close the breaker that is connected with positive and negative power cables.	Breaker in ON position.
2	Press POWER button for two seconds and observe the LED indication on panel.	1. If both RUN and SOC lights turn on normal, battery powers on successfully; 2. If ALM light turns red, there is a failure and should be fixed before powering on again.
Power on single battery by PCS activation		
1	Close the breaker that is connected with positive and negative power cables.	Breaker in ON position.
2	PV or mains supply powers PCS.	1.PCS in ON position; 2, PCS HMI screen indicates normal PV or mains supply input.
3	PCS voltage/wakeup signal activates battery.	1. If RUN light and SOC lights on battery indicate normal, battery powers on successfully; 2. If the ALM light turns red, the indication shows a failure. The failure shall be fixed before powering on again.
Power on parallel-connected batteries by pressing POWER button		
1	Close the breaker that is connected with positive and negative power cables.	Breaker in ON position.

2	Press POWER button of any battery for two seconds and observe the LED indication on two panels.	1. If RUN and SOC lights on both batteries turn on normal, and the RUN lights on both batteries flicker for five times, two batteries power on successfully and communication between batteries works; 2. If ALM light of one or both batteries turn red, there is a parallel failure and should be fixed before powering on again.
Power on parallel-connected batteries by PCS activation		
1	Close the breaker that is connected with positive and negative power cables.	Breaker in ON position.
2	PV or mains supply powers PCS.	1. PCS in ON position; 2. PCS HMI screen indicates normal PV or mains supply input.
3	PCS voltage/wakeup signal activates battery.	1. If RUN lights and SOC lights on both batteries indicate normal, and RUN lights on both batteries flicker for five times, two batteries power on successfully and communication between batteries works; 2. If the ALM light of one battery or both batteries turn red, there is a parallel connection failure and should be fixed before powering on again.

6.4 Power off Battery

- * Press the POWER button of any battery for two seconds. Five LED lights will flicker for three times, and battery turns off.
- * Battery will turn off 25 minutes after Network Cable A connection between PCS and battery fails.

7 Maintenance

7.1 Preparation

- * Battery replacement should be conducted by professionals.
- * Prepare tools like safety gloves, cross head driver and socket wrench.
- * Ensure undamaged appearance and complete accessories of new battery.
- * Do not change battery in rainy or stormy days.
- * Open breaker and power off old battery;
- * Confirm wire connection of new battery, close breaker and power on new battery.

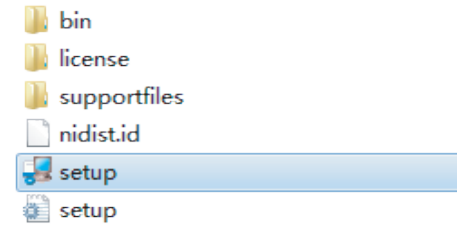
7.2 Battery Replacement

- * Wear safety gloves.
- * Open breaker, press POWER button for two seconds to power off battery.
- * Unplug power cables and network cable from battery terminals.
- * For wall-mounted battery: rotate both latches upward. Two persons lift up battery off bracket.
For floor-standing battery: unscrew expansion screws with a cross screwdriver, rotate latches upward and move battery.
- * Two persons move battery via handlers into packing case and transport battery to a designated repair site.
- * Install new battery based on procedures specified in Section 3.

7.3 Firmware Upgrade

Step 1: Install software

1. Choose file "BMS Installation package.zip" and decompress it.
2. Enter "BMS Installation package \Volume", double click "setup.exe" and run it.



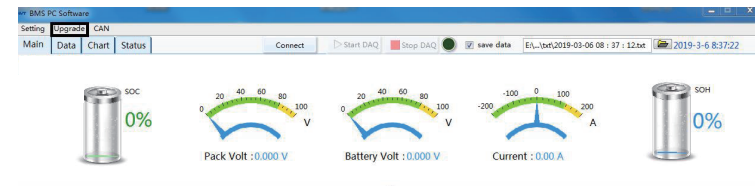
3 Execute the default configuration until completing the installation.

Step 2: Make sure the battery stay in IDLE mode or battery relays cut off.

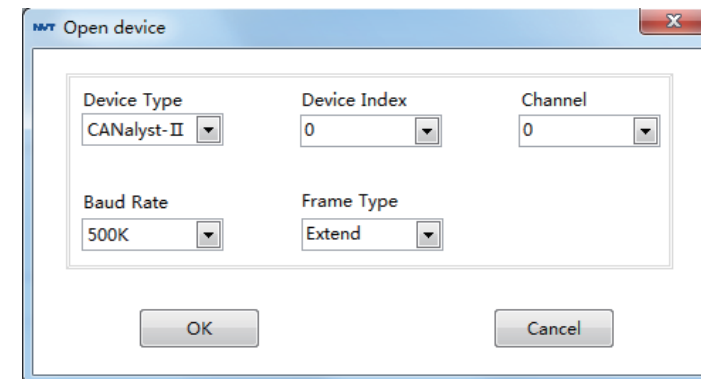
Step 3: Connect computer and the PCS network port on battery with "CANalyst-II" .

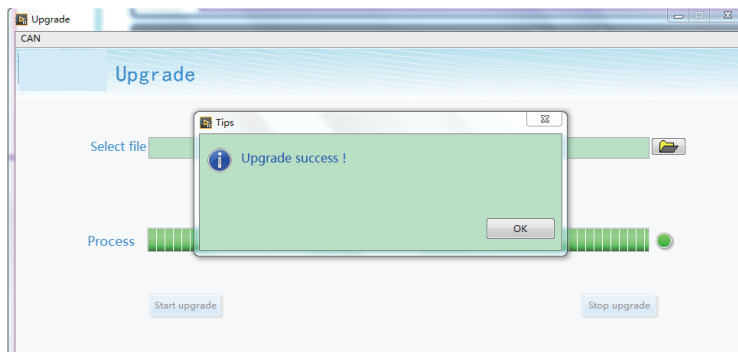
Step 4: Upgrade

1. Choose "Upgrade" as shown in the below figure.



2. Choose "CANalyst-II" for device type and "Extend" for Frame Type, set "500Kbps" baud rate. Keep other default parameters. Click "OK" .





3. Choose target upgrade file.
4. Click “Start to Upgrade” .
5. Upgrade succeeds when progress bar reaches 100%.

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