Shenzhen Growatt New Energy CO.,LTD

powering tomorrow

Growatt

ML33RTA Lithium Ion Standalone Battery

Residential Energy Storage System

Product Manual

Version: V1.0

Date: 2020-10-12

Contents

About This Document

Purpose

This document describes the application scenarios, installation, electrical connection, commission and troubleshooting of ML33RTA, a 3.3 kWh 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.

Target Audience

Installer, operator, commissioning personnel, maintenance personnel of the RESS product

Change History

Version	Date	Changes	Prepared By	Reviewed By
1.0	2020-10-08	Initial draft	WQ	Guo YH Wang XP Ni YL

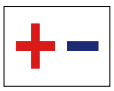
Symbols and Conventions

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 Important Safety Information

1.1 Warning Label

	Do not dispose battery in household trash.		Battery is heavy enough to cause severe injury.
	Recyclable.		Keep battery away from children.
	Certification in European Union area.		Do not reverse polarities.
	Risk of electric shock.		Do not expose battery to flame.
	Explosive gas.		Operate as specified by the manual.
	Battery may leak corrosive electrolyte.		Read the manual before operating.

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.
* Keep battery away from children and animals.
* 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.

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.

Table 1-1 Responses to Emergencies

Event	Description and recommended actions
Leakage	Inhalation: leave the contaminated area right now. ⁎ Swallow: induce vomiting. ⁎ Contact with eyes: flush eyes with flowing water for 15 minutes. ⁎ Contact with skin: wash thoroughly with soap and water. ⁎ Immediately seek for medical intervention after taking emergency measures.
Fire	Battery may catch fire when heated above 150℃. Please implement the following actions: ⁎ Extinguish fire before the battery catches fire. ABC or carbon dioxide extinguisher is recommended. ⁎ If the fire is too strong to put out, move battery to a safe place before it catches fire. ⁎ If battery is on fire, evacuate people first before seeking help from professional fire protection personnel. ⁎ If battery catches fire during charging, turn off the breaker between battery and PCS when safety can be guaranteed.
Wet battery	If battery became wet or has been submerged in water, do not access it. Immediately contact your distributor for technical assistance.
Damage	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.

Nameplate

POWERAMP

Lithium Ion Battery

IFpP/16/122/360/[16S]M/-10+50/90

Model:	**ML33RTA**
Nominal Voltage:	**51.2V**
Total/Rated Capacity:	**64Ah/58.6Ah**
Total/Rated Energy:	**3276Wh/3000Wh**
Ingress Protection:	**IP20**
Operating Ambient Temperature:	**-10°C ~ 50°C**
Maximum Short Current and Duration:	**1700A, 2ms**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Made In China

Warning 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.

2 Overview

ML33RTA is a 3.3kWh LiFePO4 battery pack. It has a 48V battery module as the main power supply unit which composed of 64Ah cells in one parallel and 16 serial connect (1P16S).

2.1 Appearance and Terminals

The battery is an energy storage unit composed of cells, mechanical parts, battery management system (BMS) as well as power and signal terminals.

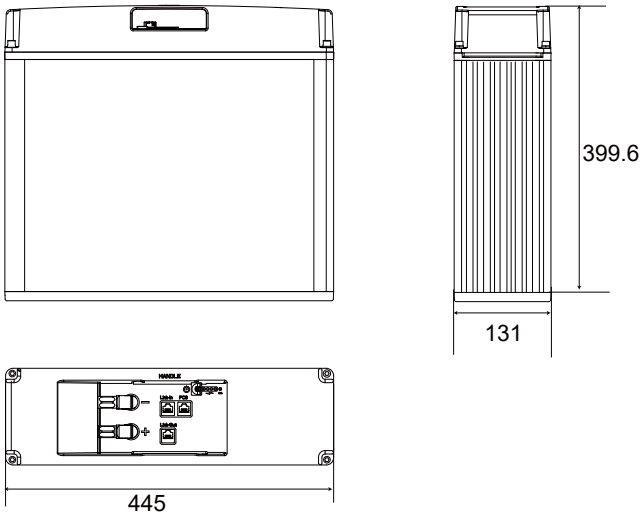
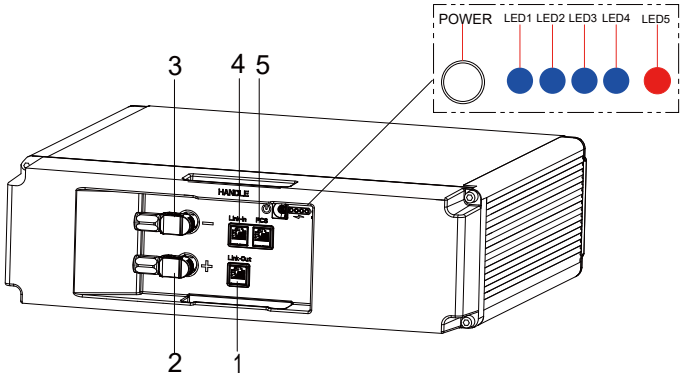


Table 2-1 Mechanical features

Parameter	Value
Dimension	W445*D131*H399.6 mm
Weight	Around 29 kg
Installation	Rack-mounted installation

Table 2-2 Ports and terminals

No.	Label	Name
1	Link-Out	Network port 3
2	P+	Positive terminal 1
3	P-	Negative terminal 1
4	Link-In	Network port 2
5	PCS	Network port 1
6	POWER	POWER button



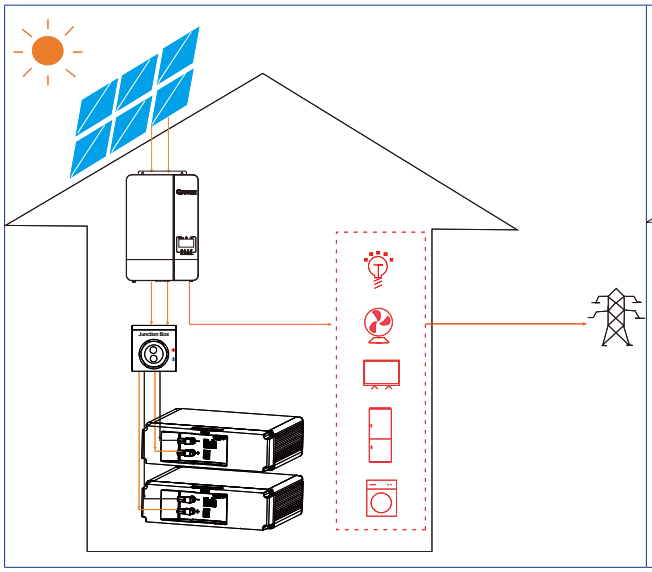
LED indicators

Status	SOC Indication	LED1	LED2	LED3	LED4	LED5
Charging	0%-25.0%	■				●
	25.1%-50.0%	■	■			●
	50.1%-75.0%	■	■	■		●
	75.1%-99.9%	■	■	■	■	●
	100%	●	●	●	●	●
Discharging & Standby	100%-75.1%	●	●	●	●	●
	75.0%-50.1%	●	●	●		●
	50.0%-25.1%	●	●			●
	25.0%-0%	●				●

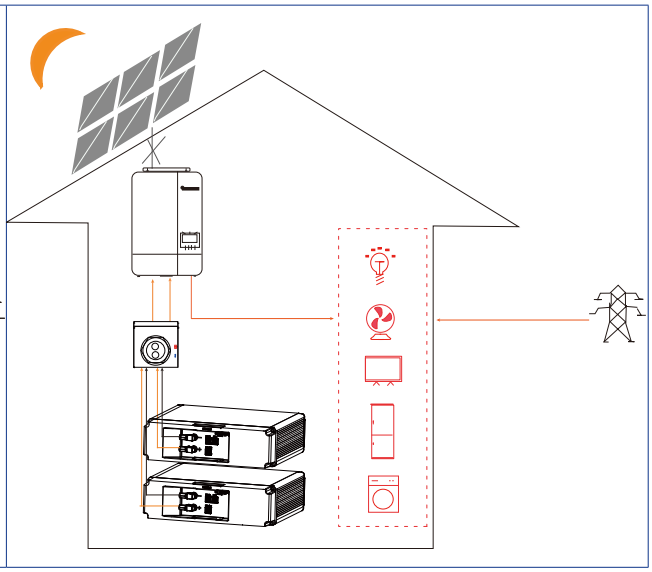
★ : Blue LED Blink ● : Blue LED On ■ : Blue LED flash display

2.2 Application Scenarios

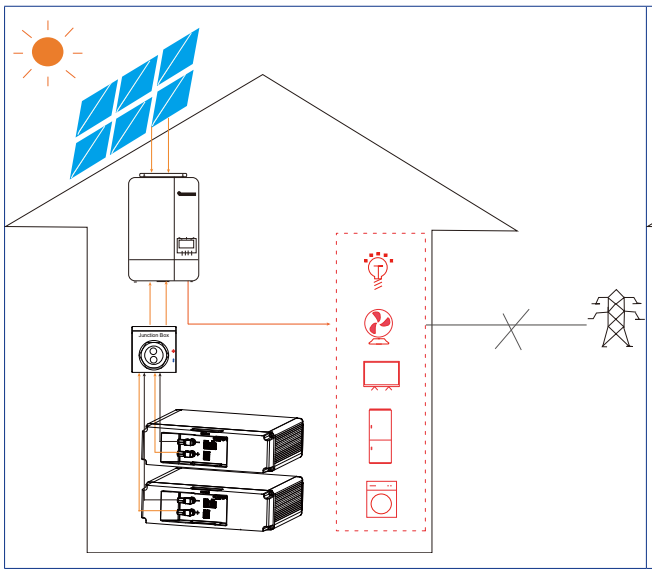
Battery coordinates with PCS in the residential energy storage system. The typical application scenarios are as shown below.



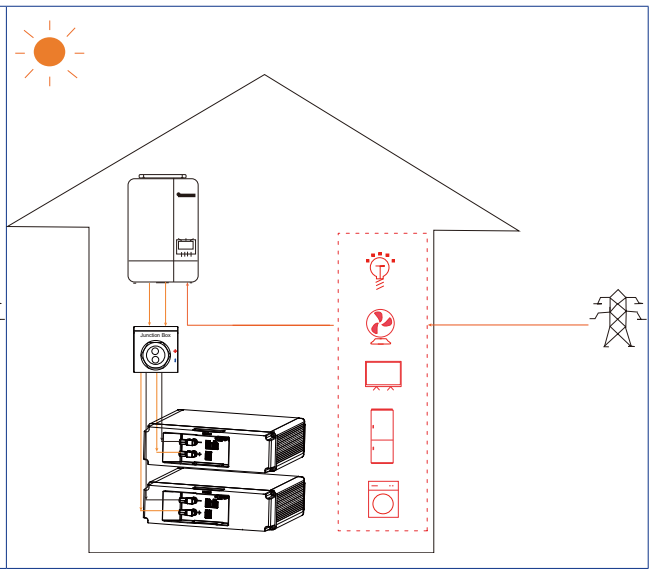
The energy produced by PV is optimized to supply loads. The excess energy is used to charge battery, then export to grid.



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.

2.3 Technical Parameters

No.	Items	Specifications
1	Nominal Voltage (V)	51.2V
2	Normal Capacity/Energy	64Ah/3.3kWh
3	Usable Capacity/Energy	58.6Ah/3.0kWh

4	Operating Voltage	48 ~ 57.6V
5	Rated Charging Current	32A
5	Rated Discharging Current	42.5A
6	Max. Discharging Power	3kW
7	Peak Discharging Power	4.3kW/5s
8	Max Charging Power	1.5kW
9	IP Protection	IP20
10	Working Temperature	-10°C~+55°C
11	Storage Temperature	-20°C~+45°C
12	DOD	94.5%
13	Cycle Life	>3500 (25°C, 60% SOH)
14	Parallel Connection	Max .6 packs
15	Communication Port	CAN2.0 / RS485
16	Warranty	10 years
17	Certification	IEC62619, CE, UN38.3

3 Storage and Transport

3.1 Storage Requirements

Battery storage life

Life	Temperature	Humidity
7 days	-30℃ to -20℃ or 45℃ to 60℃	5%RH-95%RH
180 days	-20℃ to 45℃	5%RH-95%RH

If the battery is not used for more than 1 week, you need to store it in accordance with the requirement for storage conditions.

- Place battery according to signs on packing box and 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.
- Keep the storage area dry, clean and well ventilated.
- Recharge the battery that has been stored for over 12 months.

  Set "CV=55V, CC=16A" and charge the battery till LED2 flickers.

3.2 Transport Requirements

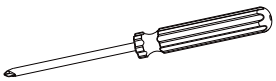
Battery has cleared UN38.3 (Section 38.3 of the Seventh Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and SN/T 0370.2-2009 (Part 2: Performance Test of the Rules for the Inspection of packaging for Exporting Dangerous Goods). The battery is 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℃ to 45℃ 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.
- 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.

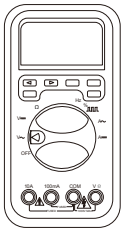
4 What You Need

Before installing, operating, and maintaining the battery, you need to prepare tools and protection equipment to ensure safety.

4.1 Tools

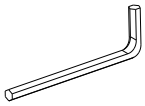


Screwdriver



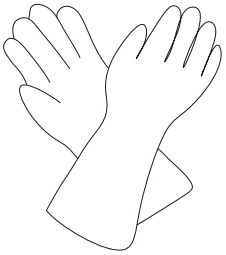
Multi-meter

Tape

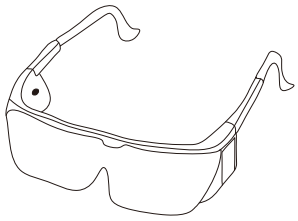


HEX key

4.2 Protective equipment



Insulated gloves



Safety goggle

Safety shoes

To prevent injury, always wear acid-resistant clothing, PVC gloves, goggles and rubber boots during installation, operation, and maintenance.

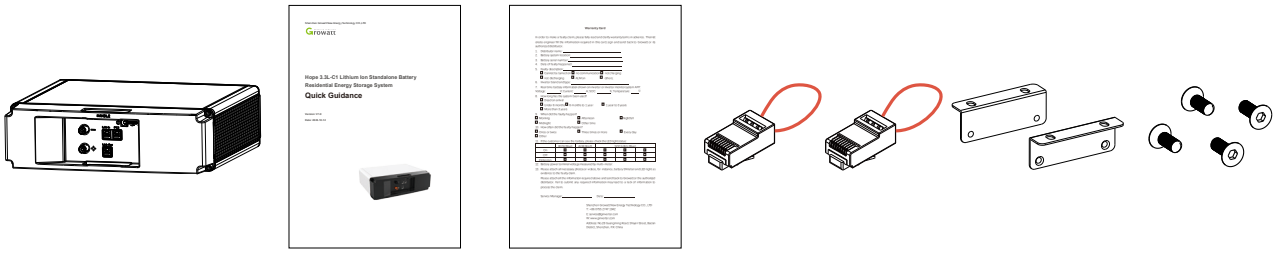
5 Installation

It is recommended to install the battery into a cabinet and place it indoor. If you install it outdoor, select a cabinet with a sufficient IP rating. Build sunshade & rain shelter to avoid direct exposure to sunlight and rain for outdoor application.

5.1 Inspection before Installation

Before installation, check carefully for any damages on the package and the products and inspect if all accessories in the list are included. If any part is missing or damaged, please contact your distributor.

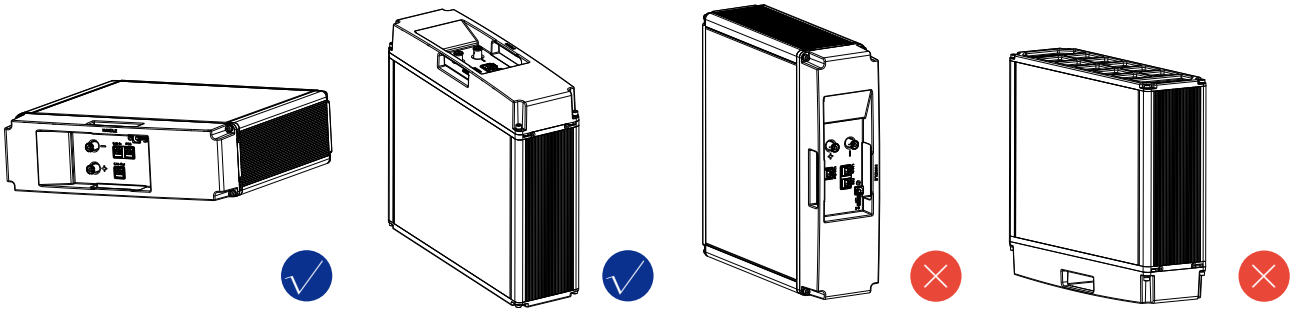
Battery Package		
Item NO.	**Part Name**	**Quantity**
1	Battery Pack	1
2	Quick Guidance	1
3	Warranty Card	1
4	Master plug	1
5	Slave plug	1
6	Tap	2
7	Screw	4



1 2 3 4 5 6 7

5.2 Battery Orientation

The battery can be installed in any direction except upside down and can be connected in parallel (up to 6p).



5.3 Installation

It is recommended to install the battery into a cabinet and place it indoor. If you install it outdoor, select a cabinet with a sufficient IP rating. Build sunshade & rain shelter to avoid direct exposure to sunlight and rain for outdoor application.

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 and do NOT cover or shield battery.

CAUTION

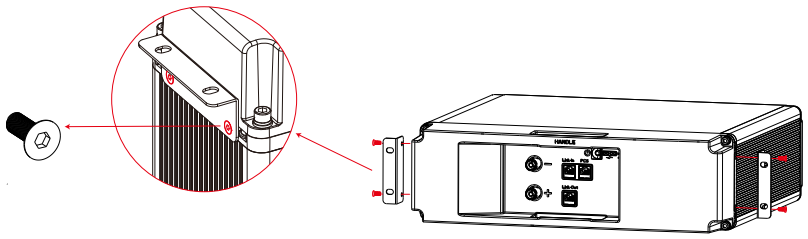
Before installing the battery, wear safety goggle, insulating gloves, and safety shoes for protection and remove conductive ornaments such as watch, bracelet, and rings.

The battery supports installation with bracket. At most 4 batteries can be athwart stacked.

Check and confirm the battery is powered off and battery breakers are turned off before any process.

Step 1. Take the battery out of its package.

Step 2. Fix two brackets to the battery with screws in the pack list.



Step 3. Install the battery pack into a cabinet.

6 Electrical Connection

ML33RTA can work in single mode and parallel mode. To make the battery work properly, follow the instructions below to correctly connect it.

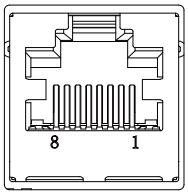
This chapter describes how to connect one battery and multiple batteries.

6.1 Power Terminals and Network Ports

The battery provides the following three network ports and two power terminals for electrical connection.

Table 6-1 Pin definition of network ports

Pin No.	PCS	Link-In	Link-Out
1	RS485_B	CAN2_H	CAN2_H
2	RS485_A	CAN2_L	CAN2_L
3	NA	Ecode_IN+	Ecode_OUT+
4	CAN0_H	ISO_GND	ISO_GND
5	CAN0_L	Master IN	Slave IN
6	NA	Dry1-	Dry1-
7	PCS_WAKE-	Dry1+	Dry1+
8	PCS_WAKE+	Syn_Wake In/Out	Syn_Wake In/Out



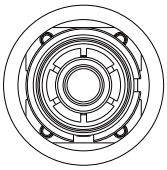


Table 6-2 Power terminals

Terminal	Description	Manufacturer	Connector Model	Specifications	Cable Cross-section
+	Positive terminal	Amphenol	C10-761489-0001	Max. 120A	3 AWG or 25 mm^2
-	Negative terminal	Amphenol	C10-761489-1000	Max. 120A	3 AWG or 25 mm^2

6.2 Connect One Battery

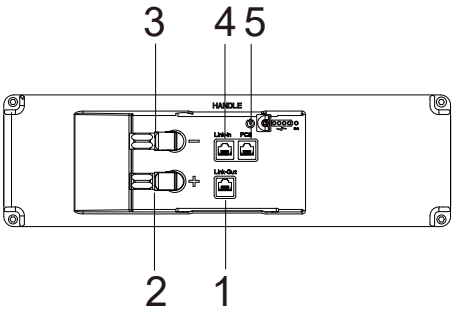
WARNING

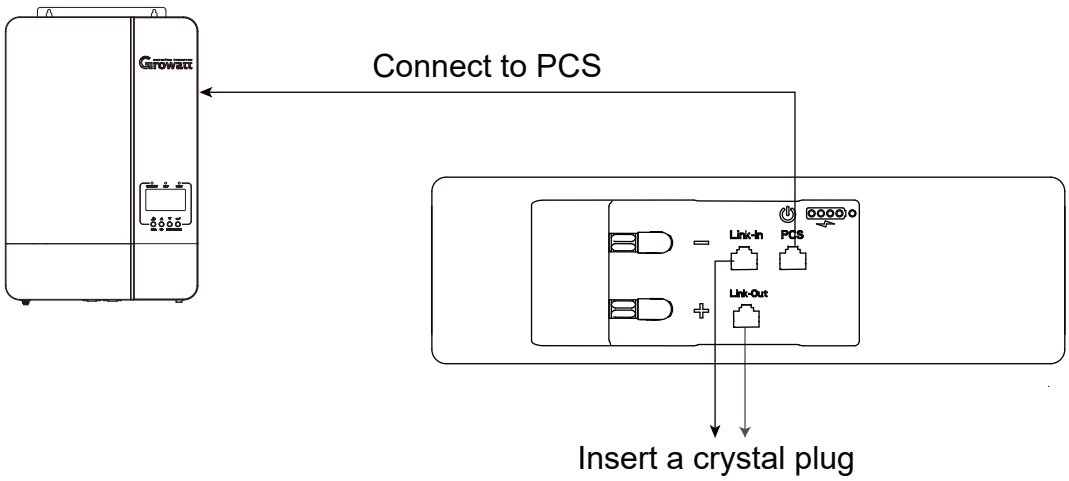
- Before connecting the cables, ensure that the battery is off.
- Wear protection equipment when wiring batteries.
- Ensure all cables are smooth and not twisted.

Keep the battery in off mode and connect it in the following way:

Step 1. Connect network cable.

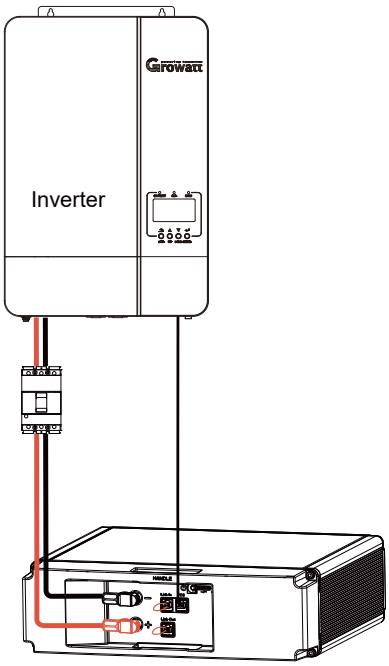
1. Insert the master plug into port 4 of the battery.
2. Plug one end of Network Cable A into port 5 and the other end into PCS.
3. Insert the slave plug into port 1 of the battery.





Step 2. Connect power cables.

1. Plug the positive power cable into port 2 and breaker.
2. Plug the negative power cable into port 3 and breaker.



6.3 Connect Batteries in Parallel

To increase the available amount of current and capacity, connect batteries in parallel. At most 6 pcs of batteries can be connected in parallel.

WARNING

Batteries in parallel should not have a cycle difference more than 300.

Step 1. Before installing and connecting the batteries, ensure that the voltage difference is not greater than 1V between batteries to be paralleled.

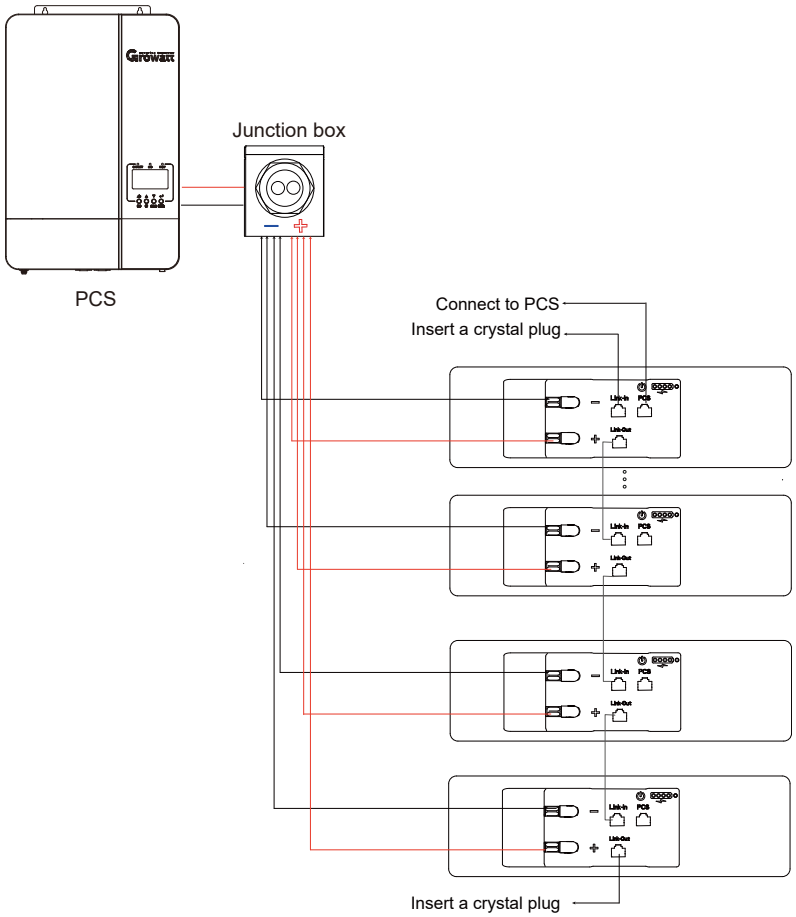
1. Power the batteries on and use a multi-meter to measure their voltages.
2. Charge the battery with lower voltage or discharge the battery with higher voltage if voltage difference is greater than 1V.
3. Power off all batteries and keep them in off mode.

Step 2. Connect network cables.

1. Insert the master plug into port 4 of the first battery.
2. Plug one end of Network Cable A into port 5 of the first battery and the other end into PCS.
3. Plug one end of Network Cable B into port 1 of the first battery, and the other end into port 4 of the second battery. The process goes on until the last battery is connected.
4. Insert the slave plug into port 1 of the last battery.

Step 3. Connect power cables.

1. Plug the positive power cable into port 2 of battery and junction box
2. Plug the negative power cable into port 3 of battery and junction box.



7 Operation

After the battery is installed, you can power on/off it.

WARNING

When operating or maintain the battery module, please strictly follow the safety instruction below:

- ✧ You must be a technician who goes through technical training and obtains 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.
- ✧ Use insulating tools and wear protective devices.
- ✧ Do not contact with two charged positions with a potential difference.
- ✧ Hang a prohibition sign that stop people approaching the equipment.
- ✧ Measure battery voltage with a multi-meter and ensure voltage output under off mode is 0V.
- ✧ If any abnormality is detected, immediately power off the battery. Proceed again only after causes are confirmed.

7.1 Power on Battery

The battery can be powered on by either charging voltage or the POWER button.

- ✶ Supply a charging voltage ranging from 33V to 60V, and the battery turns on.
- ✶ Hold the POWER button for three seconds.

If the SOC indicators turn on and the RUN indicator flickers for five times, the batteries are powered on successfully and the communication between batteries works.

If the ALM light of one battery turns red, there is a parallel connection failure and should be fixed before powering on again.

7.2 Power off Battery

- ✶ Hold the POWER button of any battery for three seconds.

  Five LED lights will flicker for three times, and battery turns off.
- ✶ Turn off the inverter, and the battery is powered off too.

8 Maintenance

Prepare tools like safety gloves, cross head driver and socket wrench.

CAUTION

Only professionals can conduct the battery maintenance.

8.1 Replace Battery

CAUTION

- Ensure undamaged appearance and complete accessories of new battery.
- Do not change battery in rainy or stormy days.
- Turn on the breaker and power off old battery;
- Confirm wire connection of new battery, close breaker and power on new battery

When a battery is faulty or reaches its EOL, you might need to replace it with another one.

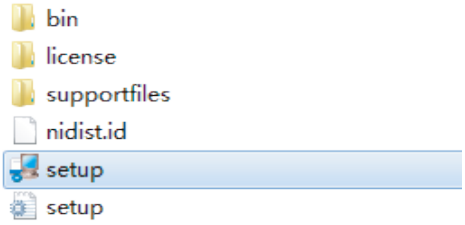
1. Wear safety gloves.
2. Turn on the breaker, and hold the POWER button for three seconds to power off battery.
3. Unplug power cables and network cables from battery terminals.
4. Remove battery from the cabinet.

8.2 Upgrade Firmware

Growatt will provide firmware updates accordingly. Ensure that your battery runs the latest version of firmware.

Step 1. Install the BMS PC software.

1. Choose file **BMS Installation package.zip** and decompress it.
2. Enter BMS Installation package\Volume and double-click **setup.exe**.



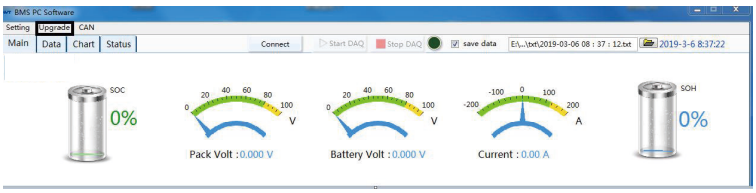
3. Keep the default configurations until completing the installation.

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

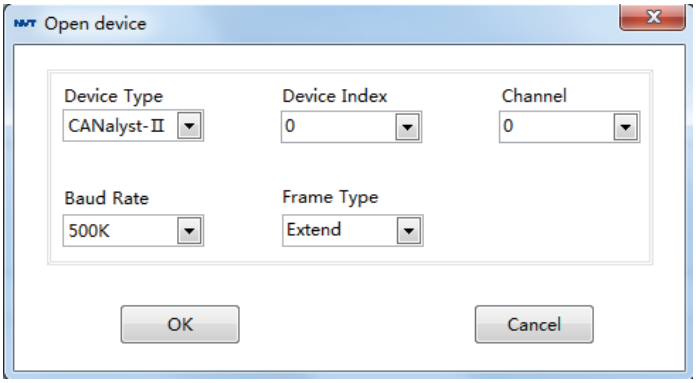
Step 3. Connect computer and the PCS network port on battery with CANalyst-II.

Step 4. Perform upgrade.

1. Click Upgrade in the main menu of the BMS PC software.

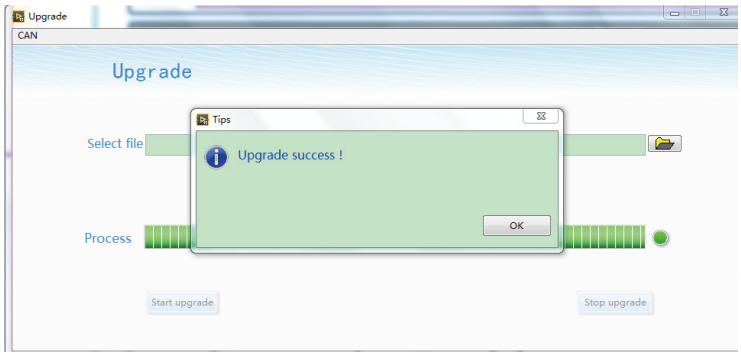


2. In the **Open device** dialog box, choose **CANalyst-II** from the **Device Type** dropdown list and **Extend** from the **Frame Type** dropdown list, and set **Baud Rate** to **500K**. Keep other default parameters. Click **OK**.



3. Choose target upgrade file and click **Start Upgrade**.

Upgrade succeeds when progress bar reaches 100%.



8.3 Troubleshooting

PACK Status	PACK Information	Display Logic					Remark	Duration
		LED1	LED2	LED3	LED4	LED5		
Remote		/	/	/	/	/	LED5 depending same as the normal status	
Bootload		★	★	★	★	★	2Hz	1S-2S
Starting	Master/Slave	★	★	★	★	●	Master	3S~30S
		/	/	/	★	●	Slave 1	
		/	/	★	/	●	Slave 2	
		/	/	★	★	●	Slave 3	
		/	★	/	/	●	Slave 4	
		/	★	/	★	●	Slave 5	
		/	★	★	/	●	Slave 6	
Application Mode checking	Parallel or single application mode checking success	SOC Display				★	Blink 5 times	2S
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 parallel connect	●	/	/	●	●		
	Reserved	●	/	●	/	●		
	Reserved	●	/	●	●			
	Reserved	●	●	/	/			
	Reserved	●	●	/	●			
	Reserved	●	●	●	/			
	BMS fault	●	●	●	●	●		
Shutdown	/	★	★	★	★	★ or ★	LED5 depending on the previous status, blink 2 times, then shutdown	
Click	Display PACK ID	Display PACK ID				off	Return after 10s	

★: Blue LED Blink ●: Blue LED On ■: Blue LED flash display

★: Red LED Blink ●: Red LED On

9 Product Liability

Growatt is not responsible for the incident caused by not obeying the Manual. Before using the battery, you should read the specifications, safety information and operation instructions carefully to learn its application method and scenarios. If the product or accessories are damaged by incorrect using method, wrong circuit connection, incorrect data settings, or working beyond limit defined in the Manual, Growatt does not provide any warranty or assume any accountability for the injuries or loss.

10 Recycle

Lithium ion batteries are recyclable, valuable resources and should be recycled according to the local laws or regulations. Do NOT throw your battery into household waste.

For information on used batteries, contact the place of purchase or your battery distributor.