APX 5.0~30.0P-S0-US High Voltage Battery System

User Manual

About this Document

This document introduces the APX 5.0~30.0P-S0-US Battery System (short for APX) in terms of installation, electrical connection, operation, commission, maintenance, and troubleshooting. Before installing and operating the APX system, ensure that you are familiar with product features, functions, and safety precautions provided in this document.

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

Table of Contents

1 Product Overview 1

1.1 Intended Use 1

1.2 Appearance 1

1.2.1 APX 55042-P0-US (Power Module) 1

1.2.2 APX 5.0P-B1-US (Battery Module) 5

1.3 Working Principle and Function 7

2 Safety 8

2.1 General Safety 8

2.2 Safety Precautions 8

2.2.1 Environment requirements 8

2.2.2 Operation Precautions 9

2.3 Label Description 9

2.4 Emergency Responses 12

3 Storage and Transportation 13

3.1 Storage Requirements 13

3.2 Transportation Requirements 14

4 Installation 15

4.1 Basic Installation Requirements 15

4.2 Installation Tools 18

4.3 Installation Procedures 18

4.3.1 Pre-installation Check 18

4.3.2 Floor-mounted Installation 21

4.3.3 Wall-mounted Installation 24

4.4 Electrical Connection 26

4.4.1 Connecting to the inverter 27

4.4.2 System connection 28

5 Power on/off the APX Battery System 36

5.1 Power on the APX Battery System 36

5.2 Power off the APX Battery System 38

6 Maintenance Guide 39
6.1 Preparation 39
6.2 Replace a fuse 39
6.3 Battery Module or Power Module replacement 39
6.4 LED indicators 40
6.5 Troubleshooting 41
6.6 System fault information list and troubleshooting suggestions 42
6.7 Cleaning 55
6.8 Expansion 55
7 Technical Specifications 56
7.1 APX 55042-P0-US (Power Module) 56
7.2 APX 5.0P-B1-US (Battery Module) 56

1 Product Overview

1.1 Intended Use

The entire APX 5.0~30.0P-S0-US high-voltage battery system is composed of a APX 55042-P0-US (hereinafter referred to as Power Module) and multiple APX 5.0P-B1-US battery modules (hereinafter referred to as Battery Module, the maximum number of Battery Module connected in parallel is 6).

Each Battery Module consists of 100Ah LFP battery cells and a DC-DC converter, which boosts a power source of 51.2V up to 380V. One to six Battery Modules can be connected in parallel to increase the capacity and power of the energy storage system.

The APX battery system powers the loads through the single-phase hybrid inverter MIN 3-11.4K TL-XH-US whenever demanded; when solar becomes available during daytime, solar energy powers the loads as a priority and the surplus solar power is stored in the APX battery system.

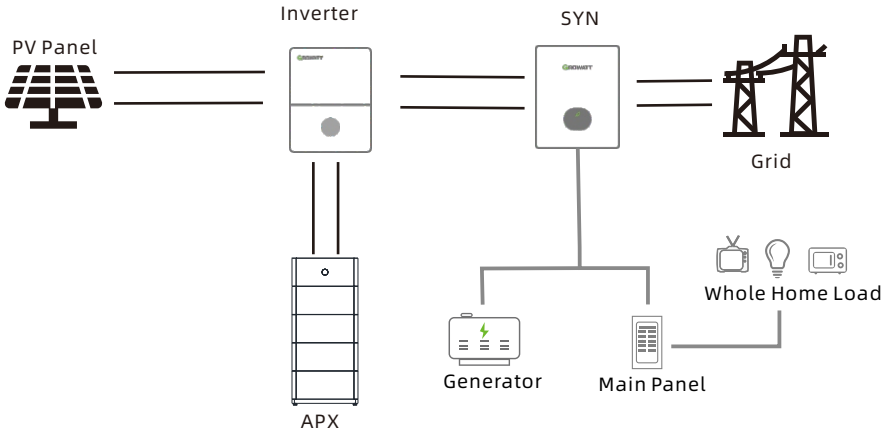


Figure 1-1: System diagram of the APX 5.0~30.0P-S0-US High Voltage Battery System

1.2 Appearance

1.2.1 APX 55042-P0-US (Power Module)

Power Module is composed of power control units, relay, fuse, DC switch, power supply and communication terminals. The appearance of the product is shown below.

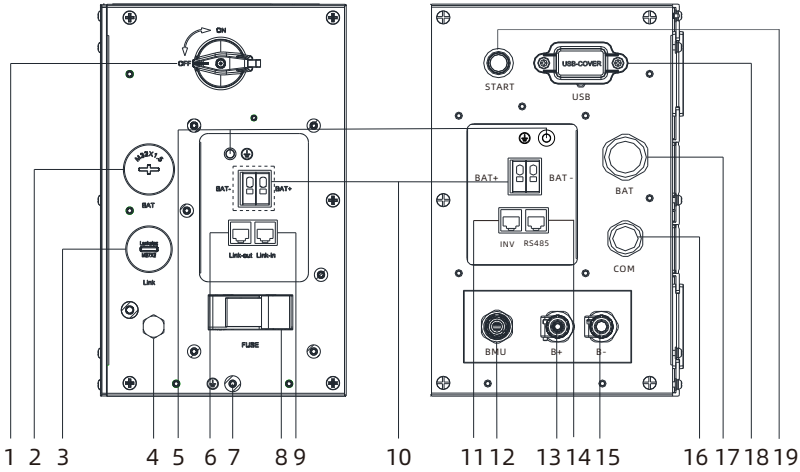


Figure 1-2: Side views of the Power Module

No.	Port	Function
1	DC switch	Turn on/off the power connection from Power Module to hybrid Inverter
2	BAT	Reserve
3	LINK	Reserve
4	Pressure relief valve	Provide protection against excessive pressure
5	⏚	Ground terminal, connect to the hybrid inverter
6	Link-out	Reserve
7	⏚	Ground terminal, connect to the Battery Module
8	FUSE	Provide overcurrent protection for a circuit
9	Link-in	Reserve
10	BAT+	The positive output from APX system to the hybrid inverter
	BAT-	The negative output from APX system to the hybrid inverter

No.	Port	Function
11	INV	Port for communication with the hybrid inverter
12	BMU	Communication with the Battery Module
13	B+	Connect to the positive power terminal of the Battery Module
14	RS485	Port for communication with the next module when the system is paralleled
15	B-	Connect to the negative power terminal of the Battery Module
16	COM	Opening for routing inverter communication cable to inverter.
17	BAT	Opening for routing cables connected to BAT+ and BAT- to inverter.
18	USB	USB port, connect to a USB flash drive to upgrade firmware
19	Start	Darkstart wakeup button, wake up the Battery Module (Press and hold forover 5 seconds)

LED display

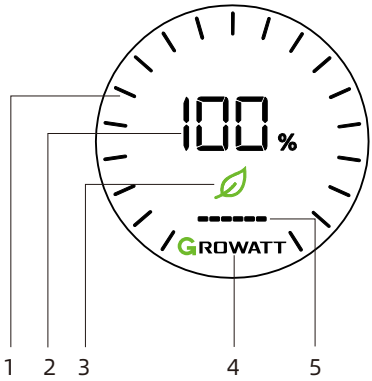


Figure1- 3: LED display

No.	Function	Function description
1	Display SOC	Display current SOC in a progress circle.
	Display upgrade status	Eight bars rotate clockwise when the program is updating.
	Charging	When charging, bars light up one by one clockwise.
	Discharging	When discharging, bars go off one by one anticlockwise.
2	Display SOC	Display SOC in percentage.
	Display upgrade status	When upgrading the firmware, "UP" is displayed.
3	Power Module status indicator	Steady green during normal operations; Blinking green indicates an protection or standby mode; Blinking red indicates a fault.
4	Logo	The light is steady on when the APX is on.
5	Battery Module status indicator (corresponding in sequence to each battery module)	Steady green during normal operations;Blinking green indicates an protection; Steady red indicates a fault.

Dimensions

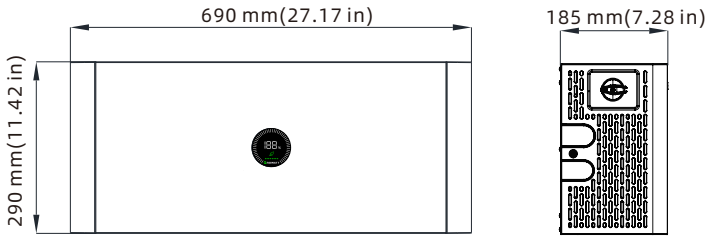


Figure 1-4: Dimensions of APX 55042-P0-US

1.2.2 APX 5.0P-B1-US (Battery Module)

Battery Module consists of LFP battery cells, a DC-DC converter, mechanical parts, the battery management unit (BMU) as well as power and communication terminals. Product appearance is shown below.

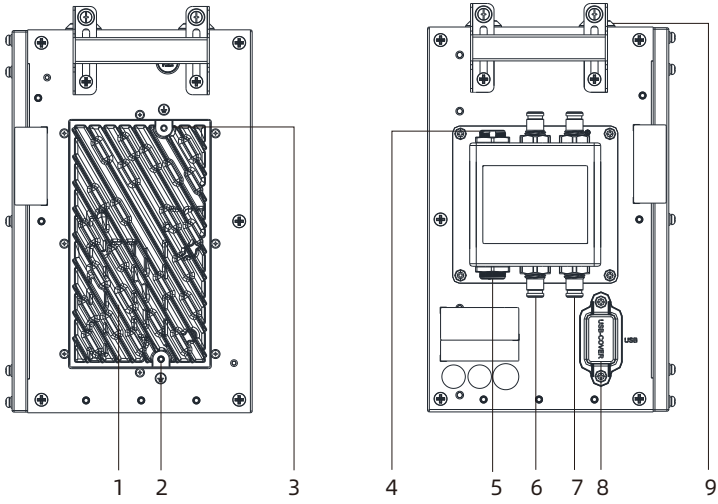


Figure 1-5: Side views of the Battery Module

Location	Port	Function
1	Heat sink	DC-DC converter heat sink
2		Ground terminal, connect to the next module
3		Ground terminal, connect to the previous module

Location	Port	Function
4	Link in	Communicate with the previous module
5	Link out	Communicate with the next module
6	B+	Parallel battery module terminal B+
7	B-	Parallel battery module terminal B-
8	USB	USB port, connect to a USB flash drive to upgrade firmware
9	Stacking guide component	Module alignment

Dimensions

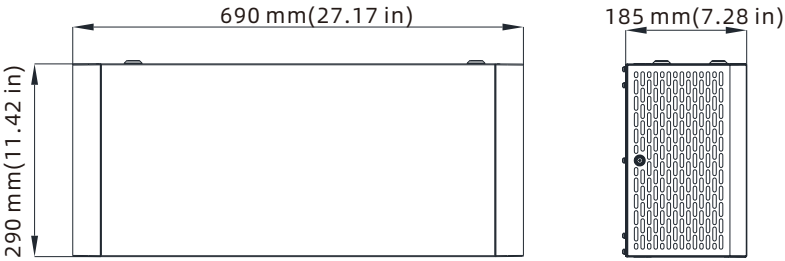


Figure 1-6: Dimensions of APX 5.0P-B1-US

1.3 Working Principle and Function

The APX 5.0~30.0P-S0-US high voltage battery system is composed of a Power Module APX 55042-P0-US and multiple Battery Modules APX 5.0P-B1-US connected in parallel. It contains electrochemical batteries, battery control units, power control units, battery management units, power and signal terminals, and mechanical parts.

The APX distinguishes itself with better charging and discharging performance, higher charging and discharging efficiency, higher flexibility in capacity expansion, more accurate status monitoring, longer service life, and less self-discharge loss.

A single APX system can connect 1 to 6 Battery Modules in parallel to increase the capacity and power of the battery system. The APX system communicates with the hybrid inverter through RS485 communications.

- Monitoring: Monitor the voltage, current and temperature of each battery module and the battery system.
- Protection and Alarm: Generate alarms and provide protection in cases of overvoltage, undervoltage, overcurrent, over-temperature or under-temperature.
- Report: Report alarms and status data to the hybrid inverter.
- Parallel connection: Support the parallel connection of one to six battery modules.
- Battery cell balancing: Passive battery balancing.
- Battery Module balancing: Intelligent power distribution, active balancing.
- System power-off: 12 minutes after the communication between the battery system and the hybrid inverter is lost.

Safety 2

When installing or using the battery system, observe the safety precautions provided in this section. For personal safety, the operation personnel must read through this manual and follow the safety instructions.

2.1 General safety

The battery system has been designed and tested in accordance with strict rules to meet international safety certification requirements. Before installing or using the battery system, please read all safety instructions carefully and follow the rules. Growatt will not be liable for any consequence of the following circumstances:

- Damage during the transportation by the customer.
- Damage caused by improper operations when transporting, storing, installing or operating the product; or the third party fails to convey the correct information to end users about transporting, storing, installing or operating the equipment.
- Improper installation by unprofessional and unreliable personnel.
- Failure to follow the operation instructions and safety precautions specified in this document.
- Unauthorized modifications or removal of the software package.
- The product's tamper evident label is removed or any item is missing due to customer's negligence or intentional damage.
- Operation in environments that cannot meet the requirements specified in this document.
- Damage caused by repairing, disassembling, and modifying Modules without authorization.
- Damage to labels on the chassis or modification on the date of production.
- Battery Modules have been left uncharged for more than six months.
- Damage due to force majeure, such as lightning, earthquakes, fire, and storms.
- Warranty expiration.

2.2 Safety Precautions

2.2.1 Environment requirements

- Do not expose the battery to temperature above 50°C(122°F) or heat sources.
- Do not install or use the battery in wet environment with moisture, corrosive gases or liquids, such as in the bathroom.
- Do not expose the battery to direct sunlight for extended periods of time.
- Place the battery in a safe place and ensure that the battery is not accessible to children and animals.
- Battery power terminals shall not come in contact with conductive objects such as wires.
- Do not throw battery into fire, which may cause an explosion.
- The battery system must be protected from liquids.

2.2.2 Operation Precautions

- Do not touch the battery system with wet hands.
- Do not disassemble the battery system without authorization from a Growatt representative.
- Do not crush, drop or pierce the battery pack and the high voltage controller.
- Dispose of the batteries according to local safety regulations.
- Store and recharge the battery in accordance with this manual.
- Ensure that the protective earth cable is securely connected.
- Remove all metal objects such as watches and rings that could cause a short circuit before installation, replacement and maintenance.
- The Pack shall be repaired, replaced or maintained by qualified and well-trained personnel.
- When storing or handling the batteries, do not stack batteries without package.
- Handle the battery with caution to avoid leakage. The leaked electrolyte is toxic and hazardous to skin and eyes.
- Stack battery packing cases in compliance with the stacking requirements on the external package.
- Do not use damaged, faulty or deformed batteries, which may release flammable gases that may cause a fire or other safety hazards.

2.3 Label Description

Symbols	Description
	Do not dispose of the system with the household waste but in accordance with the local regulations
	Lithium-Ion batteries can be recycled
	Be aware of the electric shock
	Be aware of the explosive gas
	Be aware of the battery leak
	Heavy objects. Lift with care
	Keep the Pack away from children
	Ensure that the positive and negative terminals are correctly connected
	Keep away from open flame or ignition sources
	Observe the manual

GROWATT

Manual APX High Voltage Battery System

System Model/ Nominal Voltage/ Nominal Power/ Nominal Energy/ Rated Energy/	☐ APX 5.0P-S0-US/ 400V.D.C/2.5kW/ 5kWh/4.5kWh ☐ APX 10.0P-S0-US/ 400V.D.C/5kW/ 10kWh/9kWh ☐ APX 15.0P-S0-US/ 400V.D.C/7.5kW/ 15kWh/13.5kWh ☐ APX 20.0P-S0-US/ 400V.D.C/10kW/ 20kWh/18kWh ☐ APX 25.0P-S0-US/ 400V.D.C/12kW/ 25kWh/22.5kWh ☐ APX 30.0P-S0-US/ 400V.D.C/12kW/ 30kWh/27kWh
High Voltage Controller Model	APX 55042-P0-US
Chemical Composition Of Electric Core	LFP
Protective Class	I
Max. Current	33A
Peak Current	42A
Ingress Protection	IP66
Operating Ambient Temperature	-20°C ~ +50°C (-4°F~+122°F)
Maximum Short Circuit Current	2450A,500us

Conforms to ANSI/CAN/UL STD 1973

X

GROWATT

Lithium-ion Battery Module

Part of Battery System of APX 5.0~30.0P-S0-US

Model	APX 5.0P-B1-US
Nominal Energy	5kWh
Rated Energy	4.5kWh
Input/Output	330-450V;2.5kW
Protective Class	I
Ingress Protection	IP66
Weight	50kg(110lbs)
Operation Ambient Temperature	-20°C-+50°C(-4°F-+122°F)
Maximum Short Current and Duration	2450A, 500us

X

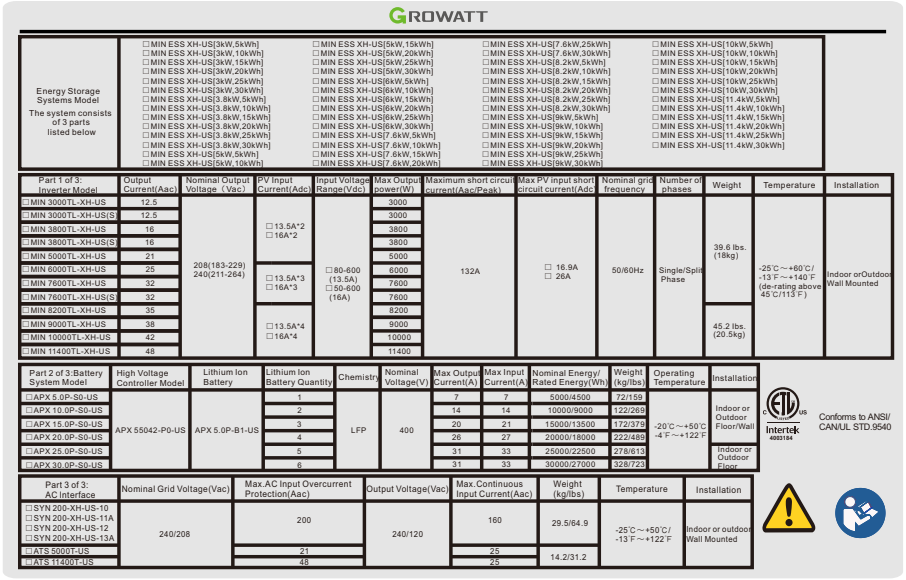


Figure 2-1: Nameplate

Figure 2-2: Label

WARNING	Performance de-rate may be initiated when the temperature is below 10°C(50°F) or above 45°C(113°F).

2.4 Emergency Responses

Manufacturer has taken foreseeable risk scenarios into consideration and designed the battery system to mitigate the hazards. In case of an emergency, do as below:

Emergency	Description and measures
Leakage emergency	➢ Avoid contact with leaked liquids or gases. Should you come into direct contact with the battery electrolyte, do as follows: Inhalation: Evacuate from the contaminated area, and seek immediate medical attention. Eye contact: Flush your eyes with flowing water for 15 minutes, and seek immediate medical attention. Skin contact: Wash the affected area with soap and water, and seek immediate medical attention. Ingestion: seek immediate medical attention.
Fire emergency	Normally, the battery system won't ignite spontaneously. If a fire occurs, do not try to extinguish the fire but evacuate people immediately.
Flood emergency	If the battery system is soaked or submerged in water, do not touch the batteries to avoid electric shock. Contact Growatt or your distributor immediately for technical assistance.
Shell damage	The shell damage requires extra attention as it is of high risk. Do not use batteries with a damaged shell, which may cause safety hazards. Contact Growatt or a distributer to dispose of them.

3 Storage and Transportation

3.1 Storage Requirements

- Place the batteries according to the signs on the packing case.
- Do not put batteries upside down or on their side.
- Do not store damaged batteries near undamaged ones.
- The storage environment requirements are as follows:
  - Install the batteries in a dry, clean and well-ventilated place.
  - The battery module is recommended to be stored in an environment within the t emperature range of -20℃~30℃ (-4℉~+86℉) and charged regularly.

Storage temperature	Storage RH	Storage period	Recharge period
< -20℃(< +50℉)	/	Not permitted	/
-20℃~+10℃(-4℉~+50℉)	5%~95%	≤12 months	≤12 months
+10℃~+30℃(+50℉~ +86℉)	5%~95%	≤12 months	≤12 months
+30℃~+50℃(+86℉~+122℉)	5%~95%	≤6 months	≤6 months
> 50℃(> +122℉)	/	Not permitted	/

Note:
If the battery is not charged when the permitted storage period illustrated above is exceeded, it might result in battery damage. Currently, the battery can only be charged via the inverter.

- Do not expose batteries to corrosive environments.
- Avoid direct exposure to sunlight and rain.
- Keep the batteries at least 2 m (78.74 in) away from heat sources (such as a radiator).
- Avoid exposure to intense infrared radiation.

- If the battery is over-discharged, recharge it to 40% SOC within 7 days.

NOTICE	If not follow the above instructions for long-term storage, the battery cycle life will be reduced or even damaged.

3.2 Transportation Requirements

The battery pack passes the certifications of the 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 pack belongs to Class 9 dangerous goods.

- The battery pack shall not be transported with other flammable, explosive or toxic materials.
- Ensure that the original package and label are intact and identifiable.
- Avoid direct exposure to sunlight, rain, condensing water caused by temperature difference and mechanical damages.
- Do not pile up more than four Battery Modules.
- There might be a drop in capacity during transportation and storage.
- Transportation temperature is between -20°C to 40°C(-4°F to 104°F), relative humidity: 5%~95%RH.

4 Installation

WARNING

- Read through the Guidance before installation to understand product information and safety precautions.
- Ensure installation meets all local codes and requirements. All US and Canada electrical installations are required to follow local codes and the National Electrical Code (NEC) NFPA 70 or the Canadian Electrical Code (CSA C22.1).
- Only qualified and well-trained technicians who fully understand the whole photovoltaic system, grid network, battery system, working principle and national/local standards are allowed to perform operations on the battery.
- Installers must use insulating tools and wear safety equipment.
- Device damages caused by failure to comply with storage, transportation, installation and use requirements specified in Guidance are not covered under any Warranty.
- Do not install or use the battery near explosive or inflammable materials.
- Use the battery in a well-ventilated environment with temperature ranging from -20°C to 50°C(-4°F to 122°F) . For outdoor installation, build a sun & rain shade to avoid direct exposure to sunlight and rain.
- The batteries should be protected from dust and dirt.

4.1 Basic Installation Requirements

- The ambient temperature for the installation of the battery system shall be above-20℃(-4℉), below 50°C(+122°F), recommended operating temperature 10°C~30°C(+50°F to +86°F), and the humidity shall between 5% and 95%.
- The battery system can be installed indoors or outdoors. The angle and space requirements are as follows:

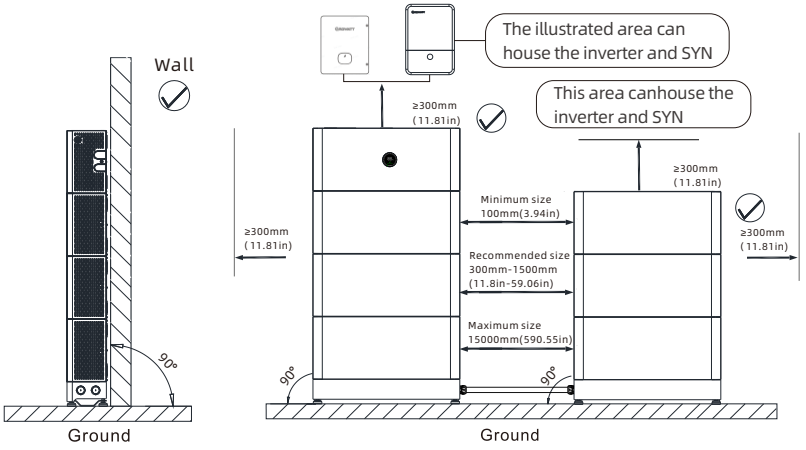


Figure 4-1: Floor-mounted installation

Note:1. For the floor-mounted installation with the base, a maximum of six battery modules can be configured. Up to five battery modules can be stacked in one column. If the number of the battery modules to be installed is greater than four, you are advised to install them in 2 columns.
2. You can install the inverter or SYN in areas where the clearance requirements illustrated above are met.
3. When two stacks are installed, the distance between the two stacks is at least 100mm (based on 9540A certification safety considerations), the recommended distance is 300mm-1500mm (11.8in-59.06in)(based on the length of the matching wire of the heat sink),and the maximum distance is not more than 15000mm (590.55in)(based on the quality of communication considerations).

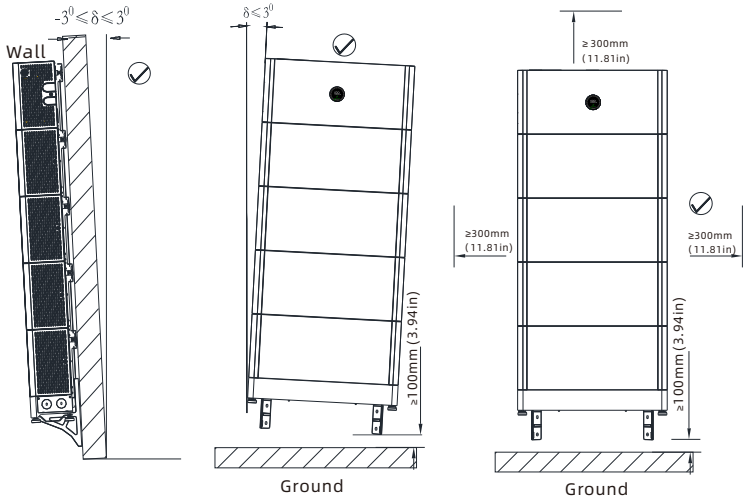


Figure 4-2: Wall-mounted installation

Note:1. When mounted on the wall, a maximum of four battery modules can be stacked.Please ensure that the load-bearing capacity of the wall exceeds 280 kg(617.29lbs).
2. You can install the inverter or SYN in areas where the clearance requirements illustrated above are met.

WARNING	Do not place the battery pack upside down.

- When installed outdoors, build a sun/rain shelter to protect the battery system from direct sunlight and rain.

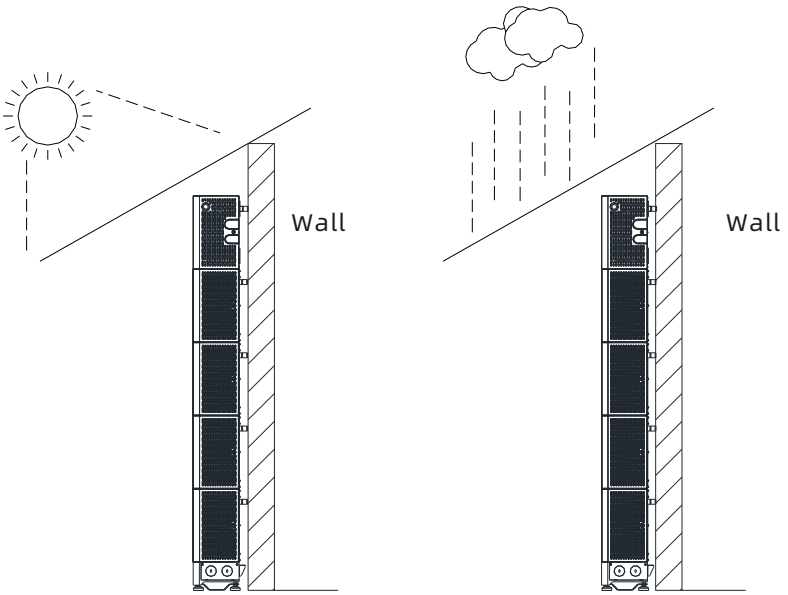
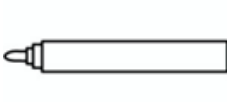
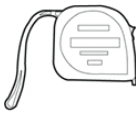


Figure 4-3: Build a sun/rain shelter

4.2 Installation Tools

Prepare the following tools to install the battery system:

 M8 Hammer Drill	 M6 2Nm(17.6inlbs) M4 2Nm(17.6inlbs) M3 1Nm(8.8inlbs) Screwdriver	 M8 2Nm(17.6inlbs) Socket Wrench
 Marker	 Measuring Tape	 Multimeter

It is recommended to wear the personal protective equipment when operating the battery system.

 Insulated Gloves	 Safety Goggles	 Safety Shoes

4.3 Installation Procedures

4.3.1 Pre-installation Check

- Check the package before unpack it. If any damage is found, do not unpack the package and contact your distributor.
- Check the quantity of all components according to the package list. If any damage is found or any component is missing, please contact your distributor.

4.3.1.1 Check the APX Battery System of different capacities

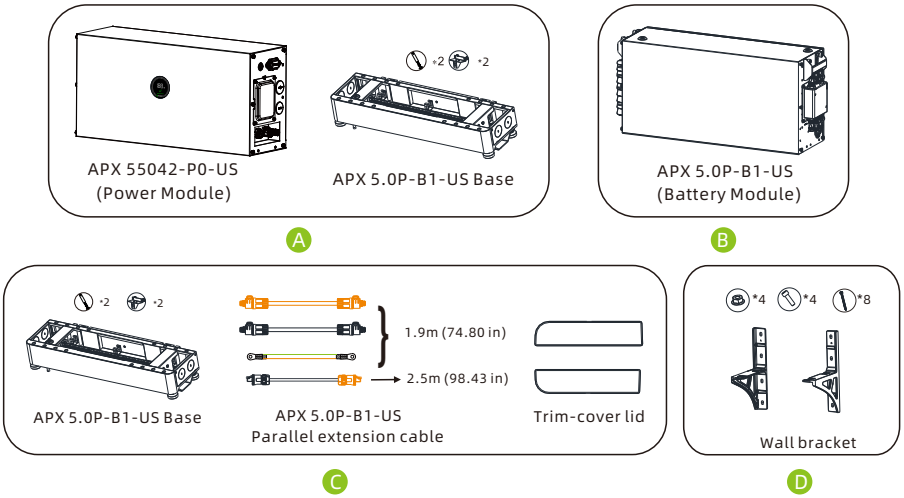


Figure 4-4: Packing list of the APX Battery System of different capacities

Battery System Capacity	System Configurations (floor-mounted installation)	System Configurations (wall-mounted installation)
5kWh	A+B	A+B+D
10kWh	A+B*2	A+B*2+D
15kWh	A+B*3	A+B*3+D
20kWh	A+B*4	A+B*4+D
25kWh	A+B*5+C	/
30kWh	A+B*6+C	/

Note: For wall-mounted installation, up to 4 battery modules can be configured in the battery system.

4.3.1.2 Check the package of the APX 55042-P0-US

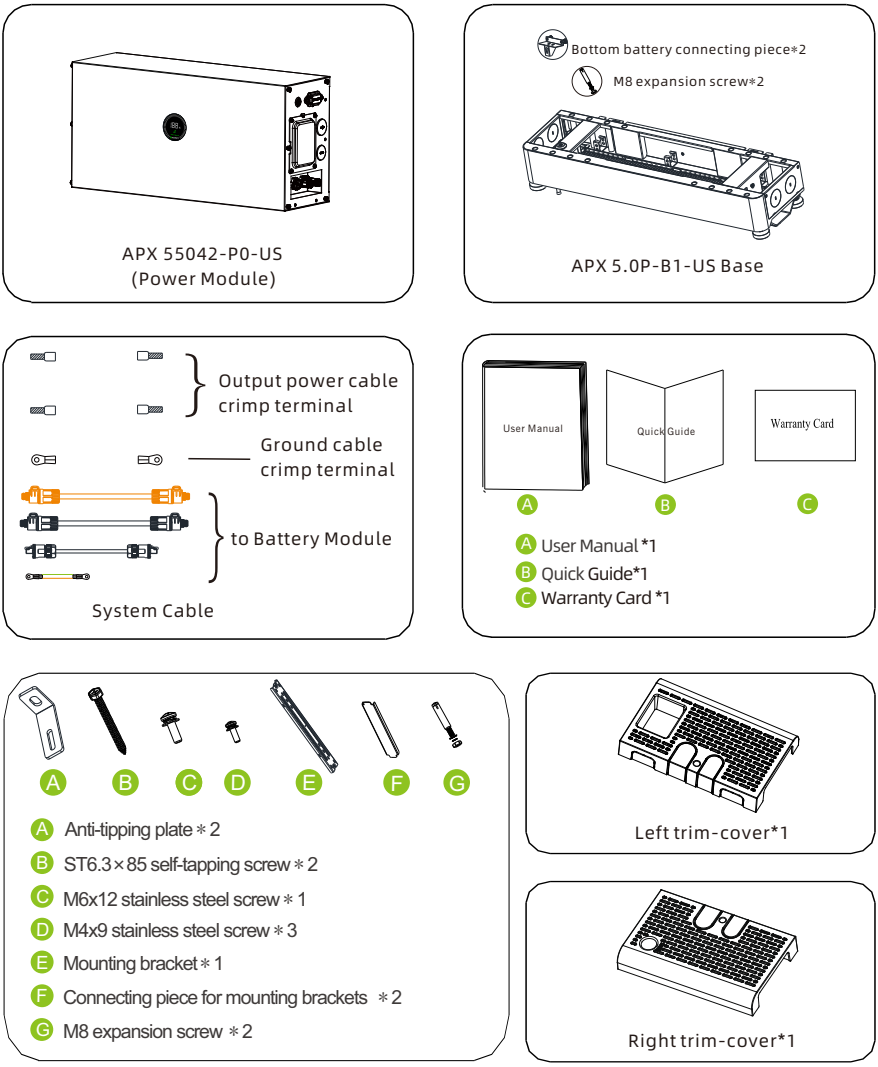


Figure 4-5: Packing list of the APX 55042-P0-US

4.3.1.3 Check the package of the APX 5.0P-B1-US

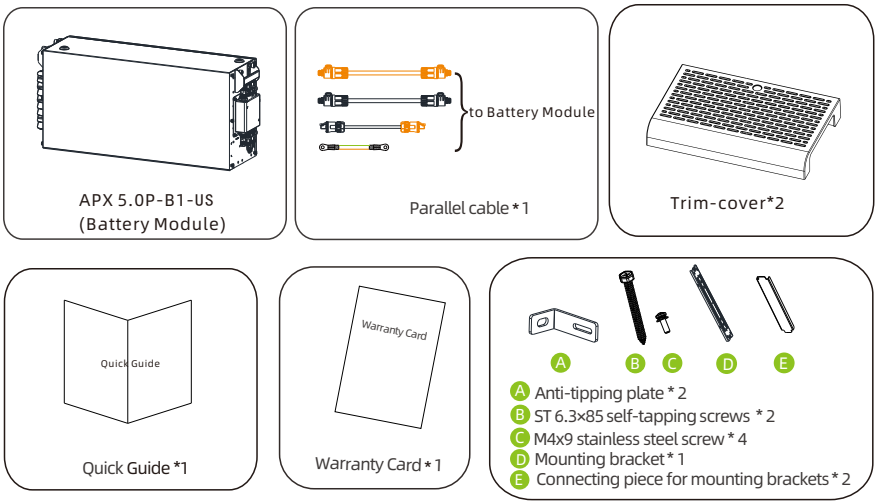


Figure 4-6: Packing list of the APX 5.0P-B1-US

NOTICE	➢ Ensure that you have the standard accessories - the Power Module (APX 55042-P0-US) and the Battery Module (APX 5.0P-B1-US) . The APX battery system consists of a Power Module (APX 55042-P0-US) and 1 to 6 Battery Modules (APX 5.0P-B1-US). ➢ If you want to install one APX battery system in two columns, you need to purchase the APX-US parallel extension package.

4.3.2 Floor-mounted Installation

Mounting Hole Dimensions

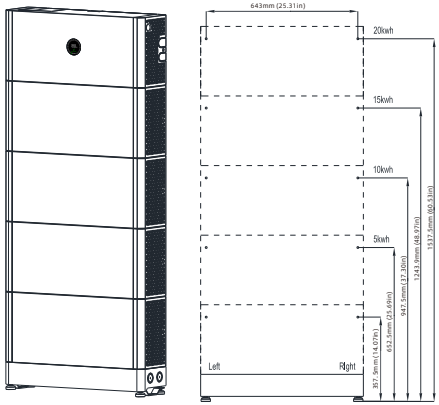
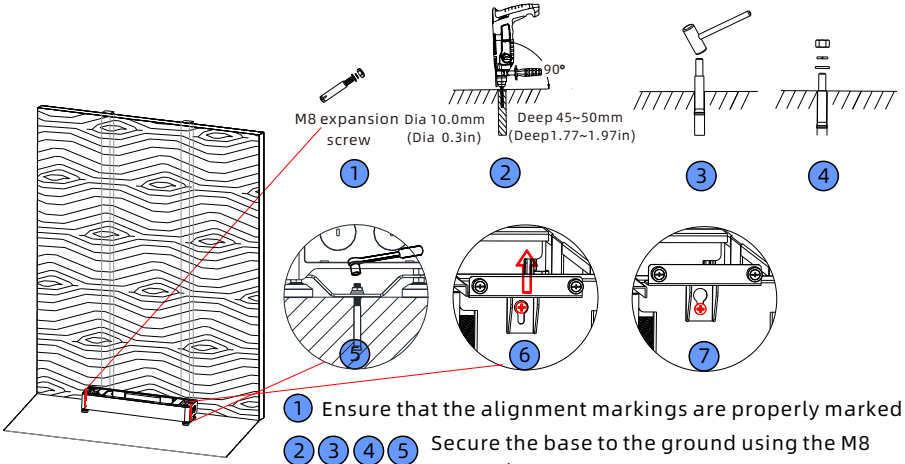


Figure 4-7: Mounting hole dimensions



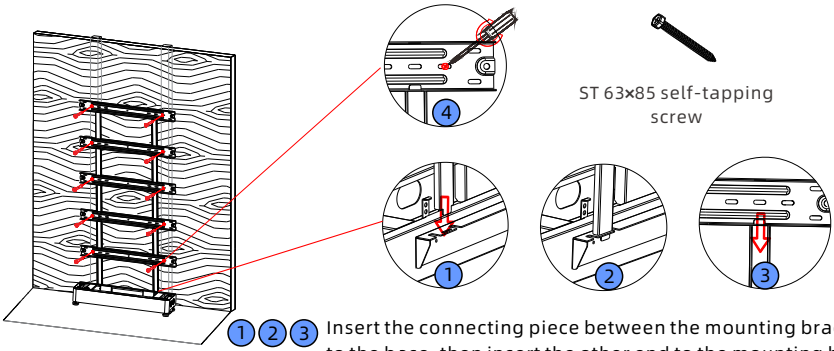
1 Ensure that the alignment markings are properly marked.

2 3 4 5 Secure the base to the ground using the M8 expansion screws

6 7 Move up the bottom battery connecting piece.

Figure 4-8: Secure the base

Step 1: Place the base on the predetermined installation position to mark the hole positions, then drill holes with the appropriate drill bit. Tighten the expansion screws to secure the base to the ground. Install the bottom battery connecting pieces on both sides of the base and then move them up.



1 2 3 Insert the connecting piece between the mounting brackets to the base, then insert the other end to the mounting bracket.

4 Secure the mounting bracket to the wooden wall using the self-tapping screw.

Figure 4-9: Install the mounting brackets

Step 2: Insert the connecting pieces between the mounting brackets into the holes on the base, then insert the other end of the connector into the bracket. After determining the installation position, tighten the self-tapping screws into the wooden wall. Repeat these steps to install your desired layers.

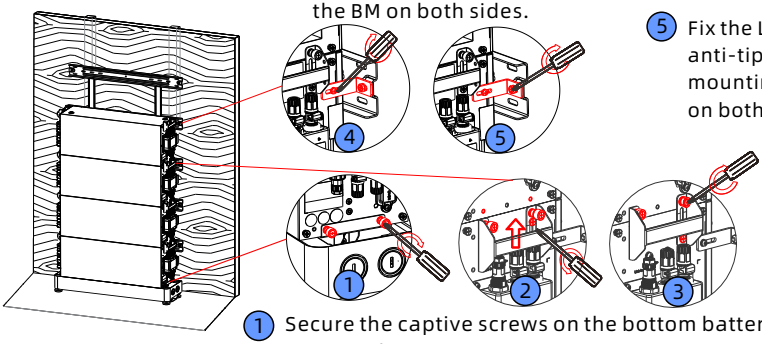


Figure 4-10: Install the battery module

Step 3: Place the BM onto the base. Install the two captive screws on the bottom battery connecting piece to the frame of the BM, then secure the L-shaped anti-tip plate to the frame and the mounting bracket. Finally, move up the handle and secure the captive screws. Repeat these steps to install your desired layers.

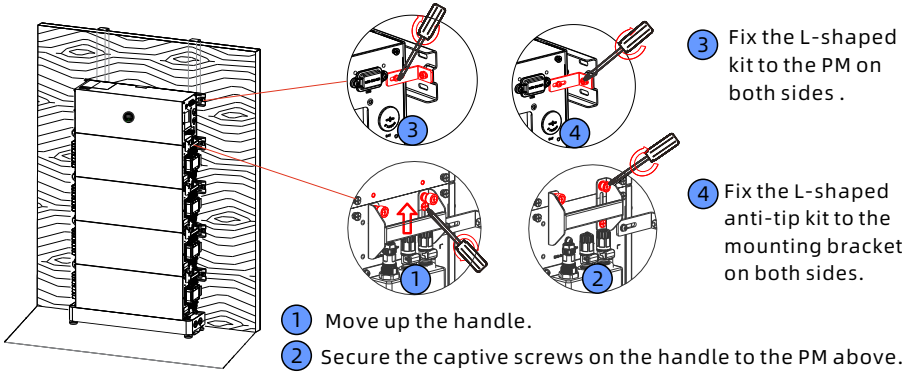
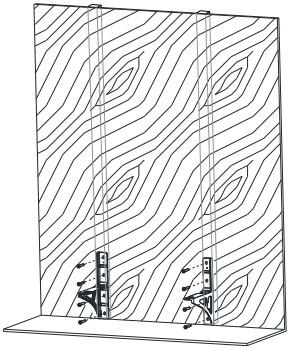


Figure 4-11: Install the power module

Step 4: Place the PM on the top. Move up the handle and then secure the captive screws. Finally, secure the L-shaped anti-tip plate to the frame and the mounting bracket.

NOTICE	➢ A maximum of four battery modules can be installed in a single column (excluding the power module) whether it is wall-mounted or floor-mounted. ➢ If there are more than four battery modules, please install them in two columns, and the spacing should be greater than or equal to 325 mm (12.80 in).

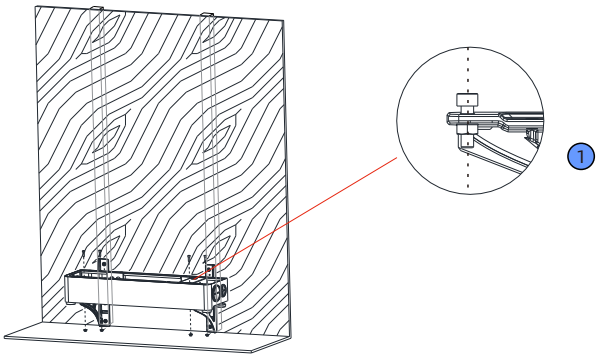
4.3.3 Wall-mounted Installation



1. Stick the paper template for drilling holes onto the wall and keep it level. Please select the appropriate installation dimensions (12 in, 16 in, 20 in or 24 in), and mark the hole positions using a marker
2. Fix the mounting bracket to the wall using the M8*95 screws

Figure 4-12: Installing the wall brackets

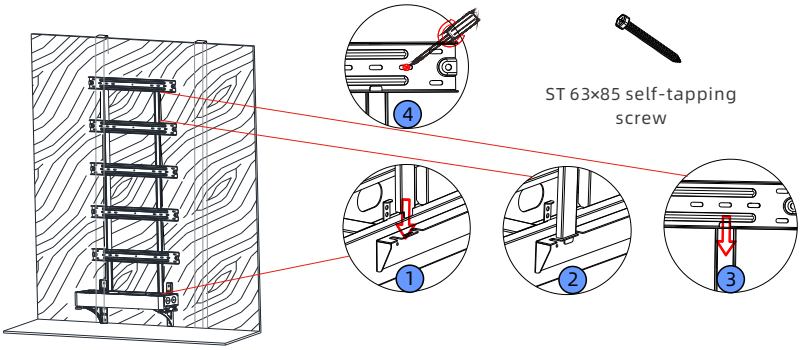
Step 1: Select a suitable position to stick the paper template for drilling holes horizontally to the wall. Choose the appropriate installation dimension (12 in, 16 in, 20 in, or 24 in) according to the actual situation and mark the hole positions with a marker. Align the wall brackets with the marked positions and secure them to the wall using the M8*95 self-tapping screws.



1. Place the base onto the mounting bracket
2. Insert the four M6*20 screws into the holes on the base, then tighten them with the M6*20 bolts from the bottom

Figure 4-13: Installing the base

Step 2: Place the base onto the wall bracket, then insert four M6*20 screws into the holes on the base and then tighten them from the bottom with M6 nuts. Install the bottom battery connecting pieces on both sides of the base and then move them up.

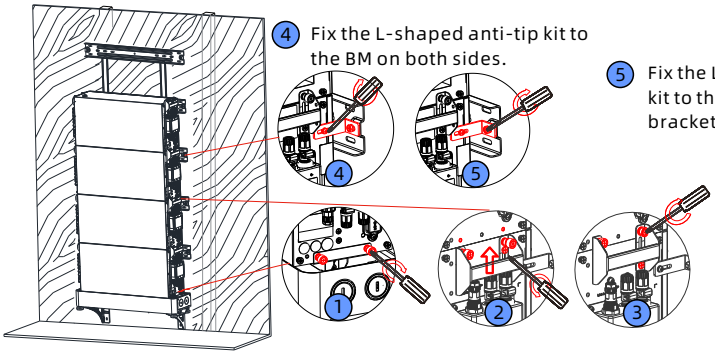


1 2 3 Insert the connecting piece between the mounting brackets to the base, then insert the other end to the mounting bracket.

4 Secure the mounting bracket to the wooden wall using the self-tapping screw.

Figure 4-14： Installing the mounting brackets

Step 3: Insert the connecting pieces between the mounting brackets into the holes on the base, then insert the other end of the connector into the bracket. After determining the installation position, tighten the self-tapping screws into the wooden wall. Repeat these steps to install your desired layers.



1 Secure the captive screws on the bottom battery connecting piece to the BM.

2 Move up the handle.

3 Secure the captive screws on the handle to the BM above.

Figure 4-15： Installing the battery module

Step 4: Place the BM onto the base.Install the two captive screws on the bottom battery connecting piece to the frame of the BM, then secure the L-shaped anti-tip plate to the frame and the mounting bracket. Finally, move up the handle and secure the captive screws. Repeat these steps to install your desired layers.

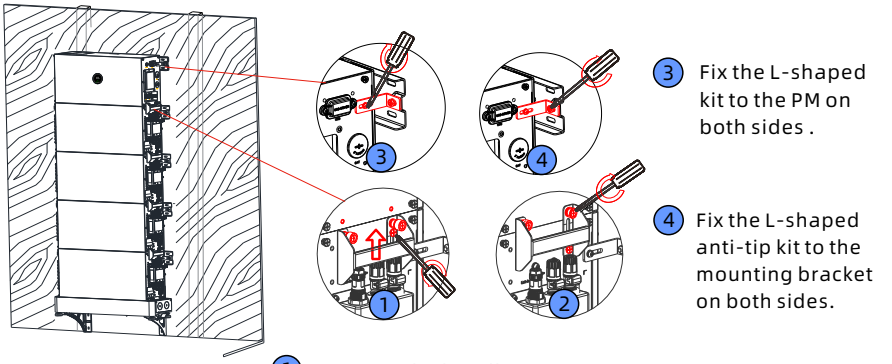


Figure 4-16： Installing the power module

Step 5: Place the PM on the top. Move up the handle and then secure the captive screws. Finally, secure the L-shaped anti-tip plate to the frame and the mounting bracket.

NOTICE	➢ For wall-mounted installation, up to 4 battery modules can be configured in the battery system.

4.4 Electrical Connection

WARNING	Do not forget to wear ESD wrist strap and gloves, safety shoes and goggles.

4.4.1 Connecting to the inverter

Note: Please be careful with the components inside the inverter during drilling.

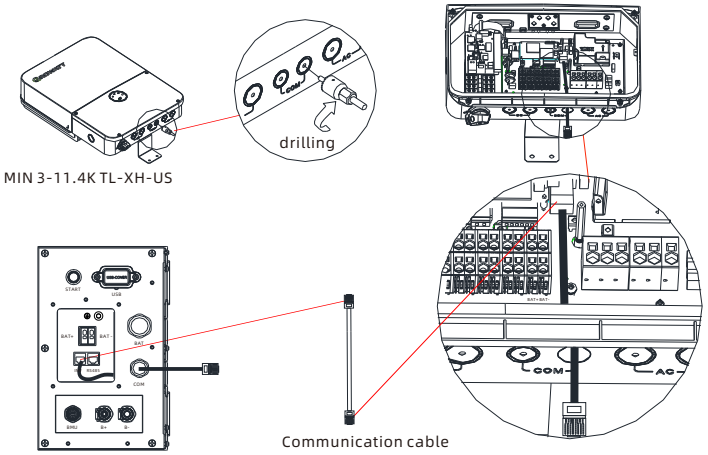


Figure4-17: Communication port connection

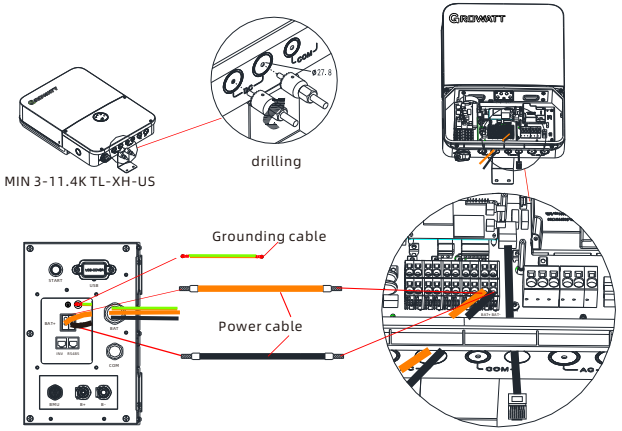


Figure4-18: Power cable connection

Please prepare the cables listed below before electrical connections
(The cable length should not exceed 5 m/196.85 in)

No.	Cable name	Type	Recommended specification
1	Grounding cable	One yellow and green multi-core copper cable	AWG10≤Wire diameter≤AWG8
2	Power cable	Red and black multi-core copper cables	AWG10≤Wire diameter≤AWG8
3	Communication cable	CAT5E suggested	/

4.4.2 System connection

NOTICE	➢ A DC switch (switch-disconnector) has been installed in the Power Module. Therefore, a DC circuit breaker is not recommended to be installed between the battery system and the hybrid inverter system. If you have installed a DC circuit breaker, do not perform operations on the DC circuit breaker with power-on, otherwise the machine may be damaged. Please note that the breaker should be purchased separately and should be greater than or equal to the following specifications: a. Voltage: 600Vdc b. Current: 50A

4.4.2.1 Battery Capacity Description

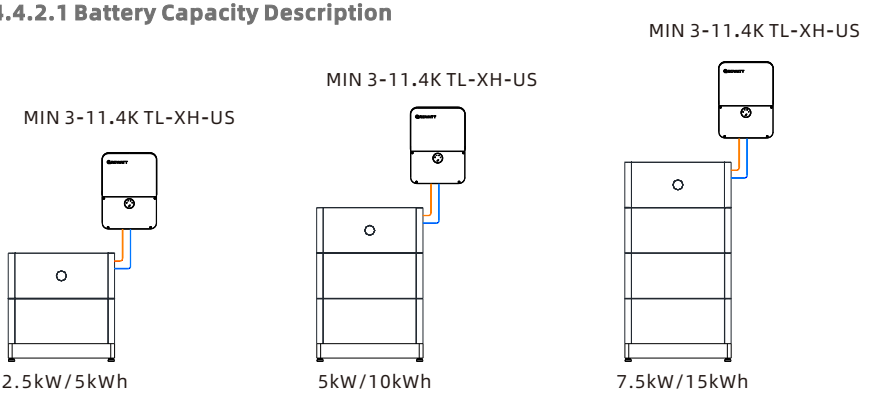


Figure 4-19: Installation diagram of the battery system with a battery capacity of 5kWh to 15kWh

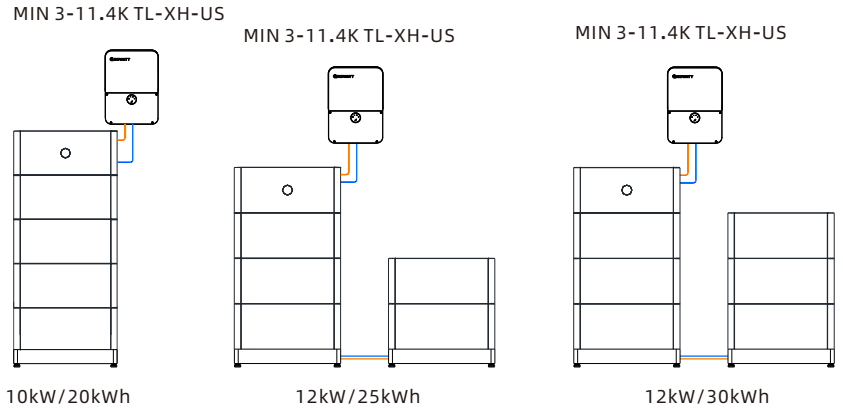


Figure 4-20: Installation diagram of the battery system with a battery capacity of 20kWh to 30kWh

Fig 4-13 Note:
When installing in two columns, please purchase the APX-US parallel extension package, which includes power cables, communication cables, ground cables and a base.

4.4.2.2 System connection diagram

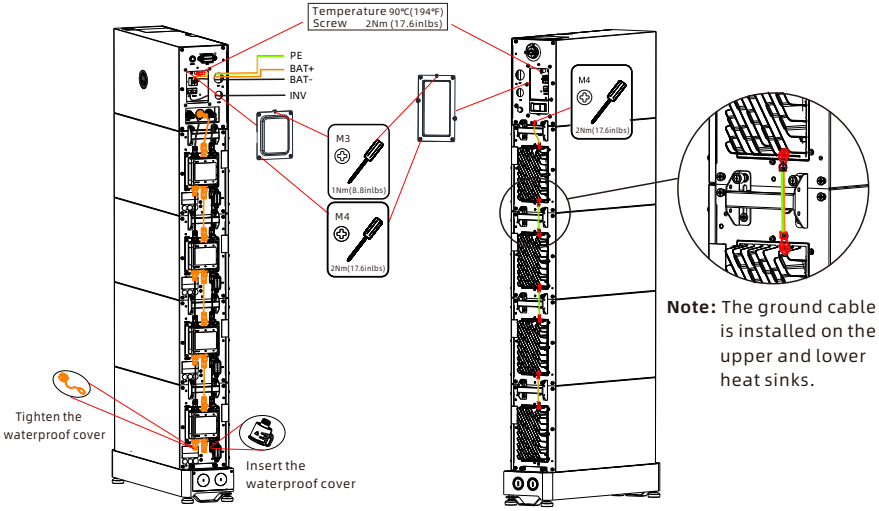
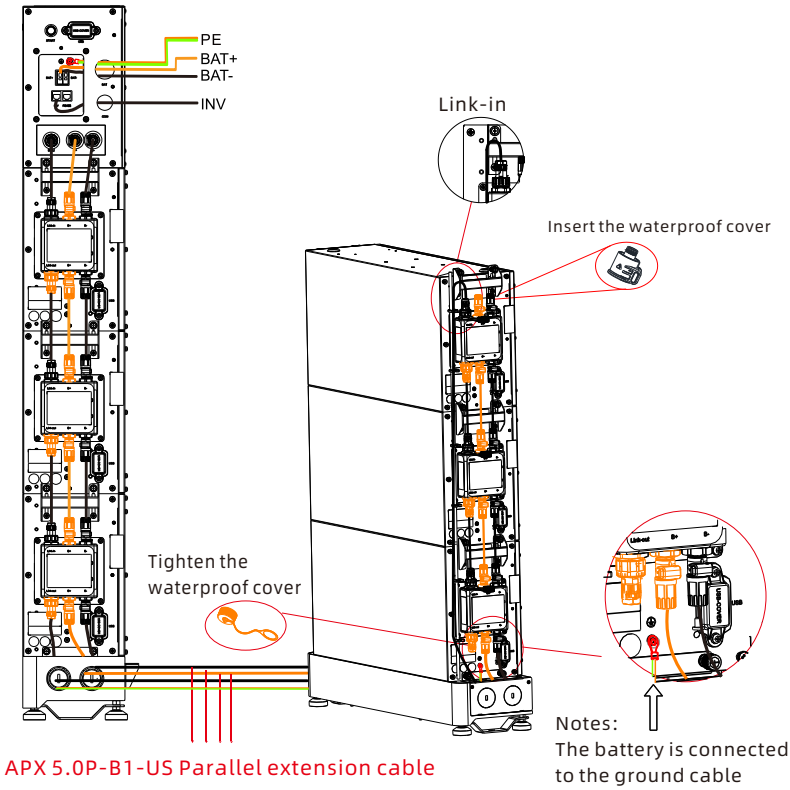


Figure 4-21: Single-column installation

Note: Battery modules must be paralleled with B+ to B+, B- to B-.



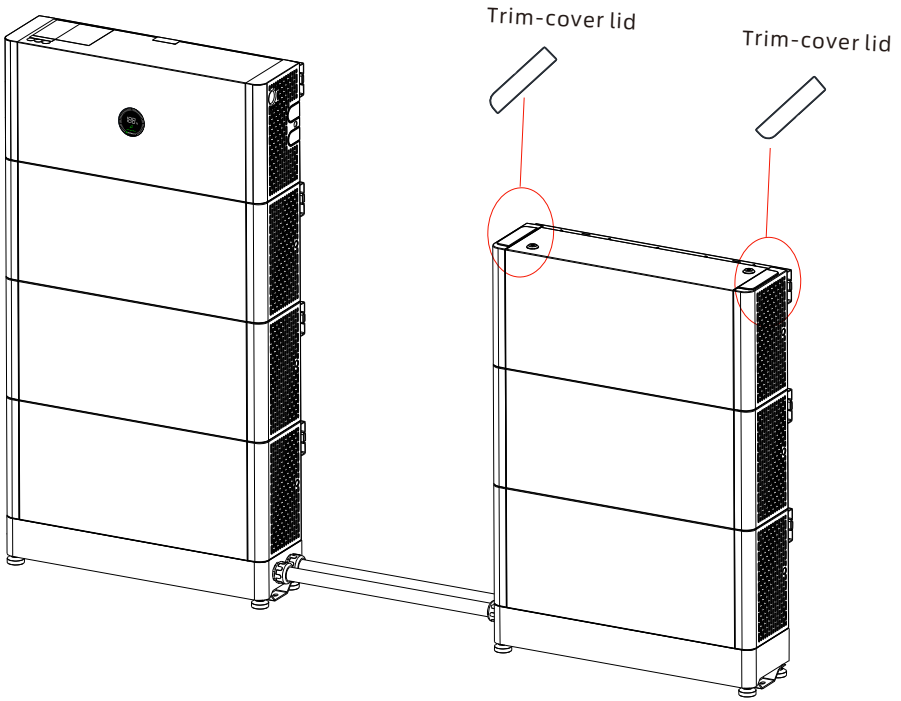


Figure 4-22: Two-column installation

Note:
The battery module is not allowed to be installed when inverter/power module/battery module is running. Ensure that all the lights indicating "RUN" of battery modules are off before installation.
Ensure that the protective earth cable is securely connected.

4.4.2.3 Electrical wiring connection

A. APX 55042-P0-US (Power Module) wiring

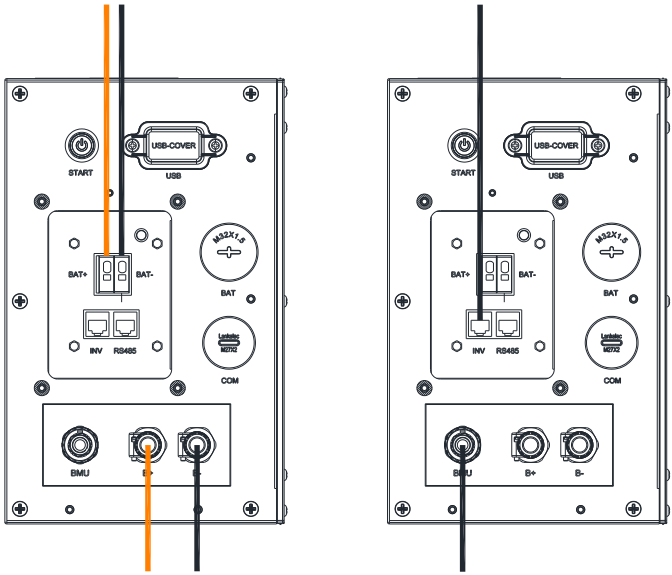


Figure 4-23: APX 55042-P0-US wiring diagram

Step 1: Insert the power cable into the corresponding port. The click sound indicates a robust connection. The power cables are delivered with the Power Module.
Step 2: Insert the communication cable into the "INV " port and "BMU" port, and then tighten the communication terminal clockwise. The INV communication port is used for communication connection with the hybrid inverter, and the BMU communication port is used for communication connection with the Battery Module by connecting to the "Link-in" port of the Battery Module. The communication cables are delivered with the Power Module.

NOTICE	➢ For a single APX battery system, the “Link-in” and “Link out” port of the Power Module don't need to be connected as they are only used for cascading the APX battery systems. Please pay attention to the connector color when connecting the power cables. Stick to the color conventions - orange to orange, black to black. ➢ Ensure that the PE cable is securely connected. ➢ This area is a restricted access area, which is explained below: • Area accessible only to electrically skilled persons and electrically instructed persons with the proper authorization. • Note 1 to entry: An electrically skilled person is a person who has received special education and adequate training in safety rules for the operation of the electrical installations. • Note 2 to entry: An electrically instructed person is a person who are informed of the safety rules for operating electrical equipment and can perform some operations under the supervision of skilled persons. ➢ When wiring the communication cable, remember to tighten the protective cover of the communication cable; otherwise it might undermine the waterproof performance. （Water penetration caused by failure to do so is beyond the scope of warranty.）

B. APX 5.0P-B1-US (Battery module) wiring

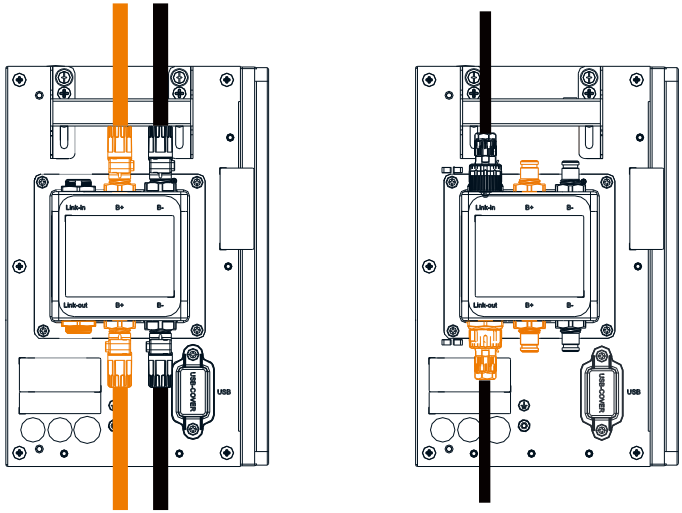


Figure 4-24: APX 5.0P-B1-US wiring diagram

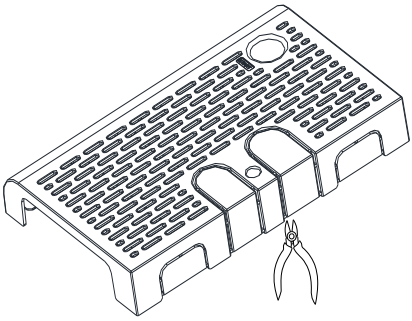
Step 1: Insert the power cable into the corresponding port. The click sound indicates a robust connection.

Step 2: Insert the communication cables into the “Link-in” and “Link out” port, and then tighten the communication terminals clockwise.
Step 3: The "Link out" port of the last battery module does not need to be connected. Tighten the dust cover.

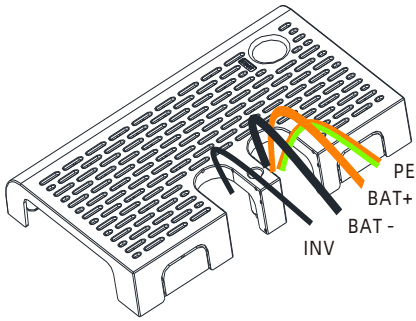
NOTICE	➢ The last battery module refers to the battery module that is the most distant from the power module. ➢ Please pay attention to the connector color when connecting the power line. Stick to the color conventions - orange to orange, black to black. ➢ The RJ45 connector (in orange) of the communication cable is to be connected to the Link-out port (in orange) on the battery module. ➢ When wiring the communication cable, remember to tighten the protective cover of the communication cable; otherwise it might undermine the waterproof performance. (Water penetration caused by failure to do so is beyond the scope of warranty.)

4.4.2.4 External Electrical Connections of the APX

Step 1: Cut the cable hole according to the wiring mode.
Step 2: Cover it with a protective rubber ring, and route external cables through the cable hole.



APX55042-P0-US Right trim-cover



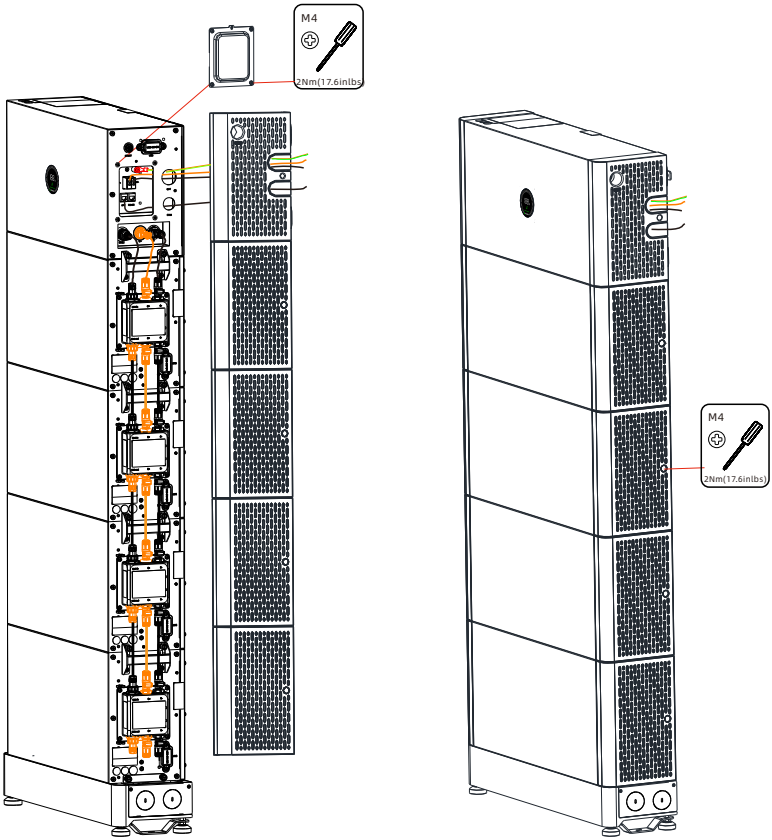


Figure 4-25: Installing external cables

Power on/off the APX Battery 5 System

NOTICE	➢ Personnel who install and operate the Battery System must receive thorough training and possess the local and national required qualifications before operation. Only qualified professionals and trained personnel are allowed to install, operate and maintain the equipment. ➢ Please stand on dry insulating objects and do not wear conductive material such as watches and necklace during operation. Insulated tools should be used. ➢ Avoid contact with any parts with electric potential difference. ➢ Hang the warning sign: Do not touch. Authorized personnel only. ➢ If abnormality is found when the equipment is energized, turn off the DC switch of the power module immediately. After the fault is rectified, turn on the switches again. ➢ Make sure the inverter is off before checking the APX battery system. ➢ When connected to an inverter, the APX 5.0~30.0P-S0-US high-voltage battery system can be monitored. If the datalogger is configured and connected to the internet, you can remotely monitor the battery modules via the web portal and APP.

5.1 Power on the APX Battery System

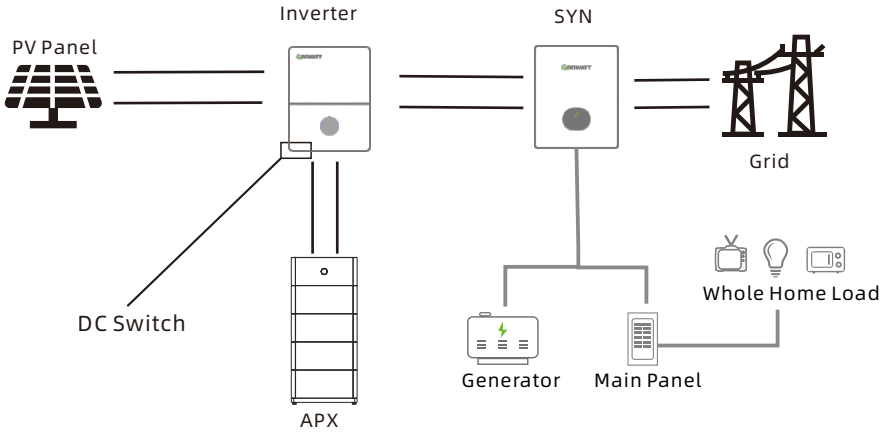


Figure 5-1

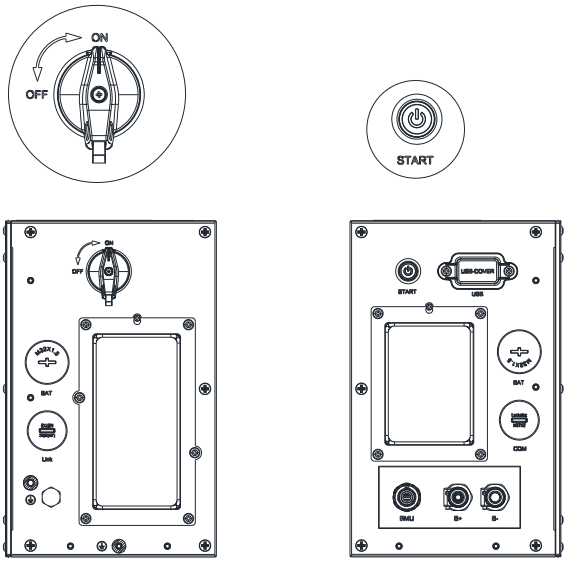


Figure 5-2

- Before turning on the battery, please check if the cables are properly connected.

Step 1: Turn on the DC switch of the Power Module(Figure 5-2).
Step 2: Turn on the DC switch of the inverter(Figure 5-1).
Step 3: Turn on the circuit breaker on the inverter's AC side.
Step 4: Press the START key and hold for five to eight seconds(Figure 5-2).
Step 5: Observe the LED on the Power Module and inverter.

NOTICE	- In case that the switch is OFF when energizing the equipment, do not turn it on immediately; otherwise, the fuse may be damaged. The APX battery system will automatically shut down in a few minutes after the LED indicator and the logo "Growatt" go off. Do not turn on the switch until it is completely powered off.

5.2 Power off the APX Battery system

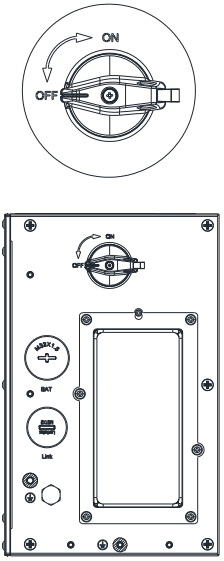


Figure 5-3

Step 1: Turn off the circuit breaker on the inverter's AC side.
Step 2: Turn off the DC switch of the inverter(Figure 5-1).
Step 3: Turn off the DC switch of the Power Module(Figure 5-2).
Step 4: Wait for 15 minutes until the LOGO indicator (GROWATT) on the APX turns off, indicating that the system is completely powered off.

NOTICE	➢ The APX battery system cannot be restarted until it is powered off completely.

6 Maintenance Guide

6.1 Preparation

After the system is powered off, the remaining electricity and heat still exist in the chassis, which may cause electric shocks or burns. Therefore, you need to wear protective gloves and perform operations 10 minutes after the system is powered off.

6.2 Replace a fuse

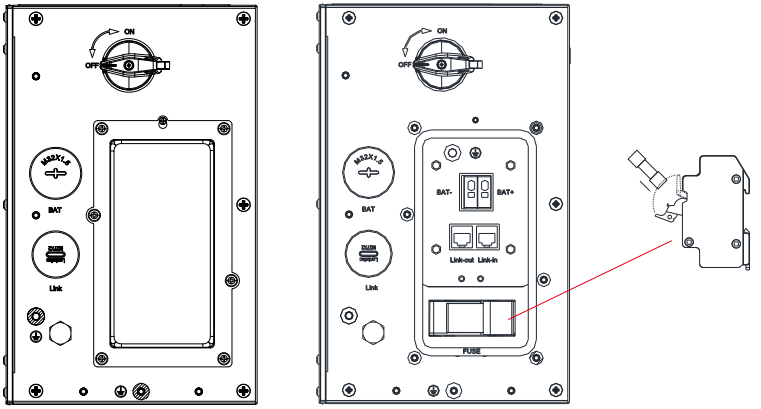


Figure 6-1: Replace a fuse(PN:021.0012400)

Step 1: Power off the APX system.
Step 2: Loosen the screws on the junction box cover and remove the cover.
Step 3: Lift the fuse box opening, remove the fuse, insert a new fuse into the slot, and close the fuse box.
Step 4: Place the junction box cover and tighten the screws to secure the cover.

6.3 Battery Module or Power Module replacement

- **NOTE:** Replace the Battery Module if the following conditions occur: The internal circuit of the Battery Module is faulty, the battery health reaches the end point, the Battery Module appearance is deformed, damaged, or leaks.
- Wear safety gloves.
- Turn off the DC switch of the APX battery system and wait for 15 minutes until the system is completely powered off.
- Remove the trim covers on both sides.
- Disconnect power cables and CAN communication cables from the battery system.
- Wall-mounted battery system: unscrew the safety screws on both sides of the battery module or the power module. Lift up the battery module or the power module.
- Floor-mounted battery system: unscrew the safety screws on both sides of the battery module or the power module. Lift up the Battery Module or the Power Module.

- Put the battery pack or the high voltage controller back into the packing case according to the repair procedures and transport the Battery Module or the Power Module to the designated site.
- Install new Battery Module or Power Module following the procedures specified in Section 4.

NOTICE	➢ The Battery Module contains batteries. Dispose of them in compliance with local laws and regulations. ➢ After the system is powered off, beware the residual heat of the heat sink to avoid burns.

6.4 LED indicators

			Meaning
Steady white	Blinking green at long intervals	Steady green	Standby mode
Blink in clockwise direction	Steady green	N/A	Charge mode
Blink in anti-clockwise direction	Steady green	N/A	Discharge mode
N/A	Blinking green at short intervals	N/A	Protect
N/A	Steady red	N/A	System failure
N/A	Blinking red at long intervals	Steady red	Battery module failure
8 LED indicators blink clockwise and “UP” is displayed	N/A	N/A	Upgrade
Off	Off	Off	Hibernation mode
Blinking green at short intervals (on for 0.5s and then off for 0.5s,on for 0.5s and then off for 2s)			
Blinking green at long intervals (on for 0.5s and then off for 2s)			
Blinking red at long intervals (on for 1s and then off for 1s)			

Figure 6-2: LED indicators

- If the LED indicators are not displayed, you can tap the enclosure below the display to activate the screen.

6.5 Troubleshooting

Indicator ALM	Description	Suggested measures
 (Steady red) Power Module	System failure	Please refer to Section 6.6 Power Module Fault Code List
 (Blinking green at short intervals) Power Module	Protection	Please refer to Section 6.6 Power Module Protect Code List

Indicator ALM	Description	Suggested measures
 (Steady red) Batter Module	System failure	Please refer to Section 6.6 Battery Module Fault Code List
 (Blinking green at short intervals) Batter Module	Protection	Please refer to Section 6.6 Battery Module Protect Code List

6.6 System fault information list and troubleshooting suggestions

PM (Power Module) Error Code List

Error Code	Fault Description	Troubleshooting suggestions
Error 407(0)	BM output power cable connection is abnormal	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then check if the power cables between BM and PM are connected properly. After confirming they are securely connected, turn on the breaker and long press the START button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Error 411(0)	Communication between the PM and Inverter is abnormal	1. Check if the communication cable between PM and INV is properly connected after shutdown; 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Error 411(1)	Communication between the PM's monitoring and main control chip is abnormal	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine. 2. If the fault message persists, contact the manufacturer.
Error 411(5)	Communication between the PM and BM is abnormal	1. Observe if the PM and BM are powered on normally; 2. Check if the communication cable between PM and BM is properly connected after shutdown; 3. Turn on the breaker and long press the START button to power on the machine;4. If the fault message persists, contact the manufacturer.

Error Code	Fault Description	Troubleshooting suggestions
Error 411(6)	PM parallel operation failed	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine. 2. If the fault message persists, contact the manufacturer.
Error 411(7)	PM detects that the parallel operation with multi-master failed	1. Check if the communication cable between BM and BM is properly connected after shutdown; 2. Turn on the breaker and long press the START button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Error 417(1)	When a mismatch between software and hardware MODEL is detected, it is set immediately.	Turn off the air circuit breaker of the PM and disconnect the communication cable between the PM and BM. Wait 12 minutes. Confirm that the whole system has been completely powered off, and contact the manufacturer.
Error 419(5)	PM's software and hardware versions are inconsistent	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine. 2. If the fault message persists, contact the manufacturer.
Error 506(2)	PM fuse blown	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the STARTto power on the machine and check if it is in normal operation; 2. If the fault message persists, contact the manufacturer.

Error Code	Fault Description	Troubleshooting suggestions
Erro506(3)	PM output short-circuited	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the STARTto power on the machine and check if it is in normal operation; 2. If the fault message persists, contact the manufacturer.
Error 510(0)	PM is in production aging mode	Contact the manufacturer to replace the PM.
Error 700(0)	Internal temperature sampling resistor is open-circuited	If the device temperature is higher than -20 ℃ and the fault message persists after restart, please contact the manufacturer to replace the PM.

PM (Power Module) Protect Code List

ProtectCode	Fault description	Troubleshooting suggestions
Protect 408(0)	Temperature of heat sink in BM or PM is too high	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press theSTART button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 410(2)	Battery USB communication is abnormal	1. Re-insert the USB flash drive; 2. Replace the USB flash drive; 3. If the fault message persists, contact the manufacturer.
Protect 416(1)	Hardware malfunction	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then check if the PV configuration is oversized and if the PV open-circuit voltage is excessively high (1100V for 15k, 12k and 7.5k models; and 560V for the 6.2k model); 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press theSTART button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Protect 500(7)	PM detects that a BM comes offline	1. Check if any BM is shut down; if so, long press theSTART button to power it on, then check if the fault is cleared; 2. If the fault message persists, turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then check if the communication cable between the BM and BM is properly connected. After that, turn on the breaker and long press theSTART button to power on the machine; 3. If the fault message persists, contact the manufacturer.

ProtectCode	Fault description	Troubleshooting suggestions
Protect 500(9)	Communication between PMs in the system with multiple clusters in parallel is abnormal	1. Power off the system, then check if the communication cable between PM and PM is properly connected; 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Protect 603(1)	PM output soft start failed	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Disconnect the power cables between PM and INV. Then turn on the breaker and long press theSTART button to check if PM soft start is successful. 2. If the fault message persists, contact the manufacturer.
Protect 707(0)	Overload protection	1. Check the output load and reduce the load power; 2. Wait for 10 minutes and it will recover automatically.

BM (Battery Module) Error Code List

Error Code	Fault Description	Troubleshooting suggestions
Error 411(1)	Communication between the PM's monitoring and main control chip is abnormal	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 411(5)	BM communication is abnormal	1. Observe whether both PM and BM are normally powered on; 2. Shut down the machine. Check whether the communication cable between PM and BM is normal; 3. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 4. If the fault message persists, contact the manufacturer.
Error 411(6)	BM parallel operation failed	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 411(7)	BM parallel operation with multi-master failed	1. Shut down the machine. Check if the communication cable between BM and BM is normal; 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 3. If the fault message persists, contact the manufacturer.
Error 416(6)	LLC resonant inductor is abnormal	Contact the manufacturer to replace the BM.

Error Code	Fault Description	Troubleshooting suggestions
Error 419(5)	BM's software and hardware versions are inconsistent	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 502(0)	Battery voltage is low	Check if the battery-side voltage is within normal range (single pack > 32V or so) through web monitoring data. If the battery voltage is lower than 32V, please contact the manufacturer to replace BM.
Error 700(0)	Internal temperature sampling resistor is open-circuited	If the temperature of the device is higher than -20 ℃ and the fault persists after reboot, please contact the manufacturer to replace the BM.
Error 1030	Single cell failure	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 1035	Front-end chip failure	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 1062	Single cell overvoltage protection failure	1. The battery has been fully charged and it will recover automatically. 2. If the fault message persists, contact the manufacturer.

Error Code	Fault Description	Troubleshooting suggestions
Error 1074	FUSE failure	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 1075	UART communication failure	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Error 1105	High temperature failure	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.

BM (Battery Module) Protect Code List

ProtectCode	Fault description	Troubleshooting suggestions
Protect 408(0)	BM heat sink temperature is too high	1. The system will automatically recover after the battery cools down; 2. If the fault message persists, contact the manufacturer.
Protect 410(2)	Battery USB communicatio n is abnormal	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 416(1)	Hardware malfunction	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to turn on the machine. If the fault message persists, please check the alarm message via the monitoring data on the web, and take corrective measures according to the BMS fault info. 2. If the BMS does not report an alarm, but report the hardware failure for a couple of days in a row, contact the manufacturer to replace the device.
Protect 502(1)	BM output voltage is low	1. It will automatically recover after one hour, or turn off the air circuit breaker of the PM, confirm that the whole system has been completely powered off, then restart it; 2. If the fault message persists, contact the manufacturer.
Protect 507(0)	Received the battery operating status “Fault” from the BMS	1. Check the BMS battery fault info and take corrective measures according to the BMS battery fault info table.

ProtectCode	Fault description	Troubleshooting suggestions
Protect 603(2)	BUS soft start failed	1. It will automatically recover after 1 hour, or turn off the air circuit breaker of the PM, confirm that the whole system has been completely powered off, then restart it; 2. If it still reports protection after restarting and continues to report Protection 603-2 for several days in a row, please contact the after-sales personnel.
Protect 707(0)	Overload fault	1. If it is running in off-grid mode, reduce the load at home, and it will automatically recover after 10 minutes. If an error is reported in grid-connected mode, please contact the manufacturer.
Protect 1001	Cell charging overvoltage protection (level 1)	1. The battery is fully charged and charging is limited. It will recover automatically.
Protect 1003	Discharge undervoltage protection	1. The battery has been discharged completely and discharging is limited. It will recover automatically.
Protect 1005	Large single cell voltage difference protection	1. The battery voltage difference is large, charging and discharging are limited, and it can automatically recover; 2. If the fault message persists, contact the manufacturer.
Protect 1007	Charging total voltage overvoltage protection	1. The battery is fully charged and charging is limited. It will recover automatically.
Protect 1009	Discharge total voltage undervoltage protection	1. The battery has been discharged completely and discharging is limited. It will recover automatically.
Protect 1013	Discharge high temperature protection	1. The battery temperature is too high, charging and discharging are limited, and it can automatically recover.

ProtectCode	Fault description	Troubleshooting suggestions
Protect 1015	Discharge low temperature protection	1. The battery temperature is too low, charging and discharging are limited, and it can automatically recover.
Protect 1017	Large PACK temperature difference protection	1. The battery temperature difference is too large, charging and discharging are limited, and it can automatically recover; 2. If the fault message persists, contact the manufacturer.
Protect 1021	Discharge overcurrent protection	1. The battery current is too large, and discharging is limited. It can automatically recover.
Protect 1023	Charging overcurrent protection	1. The battery current is too large, and charging is limited. It can automatically recover.
Protect 1025	External CAN communicatio n protection	1. Observe whether PM and BM are powered on normally; 2. After shutdown, check if the communication cable between PM and BM is properly connected; 3. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine;4. If the fault message persists, contact the manufacturer.
Protect 1029	Precharge timeout	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 1031	Current sampling fault protection	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.

ProtectCode	Fault description	Troubleshooting suggestions
Protect 1034	Charging high temperature protection	1. The battery temperature is too high, and charging is limited. It can automatically recover.
Protect 1038	EEPROM fault protection	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 1039	Low temperature charging and current limiting no response protection	1. The temperature is too low. Charging current exists, while charging is limited. It can automatically recover when the temperature rises; 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Protect 1041	Charging low temperature protection	1. The temperature is too low, and charging is limited. It can automatically recover.
Protect 1042	Module voltage (sampling) abnormality protection	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 1044	EEPROM calibration parameter fault protection	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.

ProtectCode	Fault description	Troubleshooting suggestions
Protect 1047	Internal ambient temperature over-high protection	1. The internal ambient temperature is too high. Charging and discharging are limited. 2. It can automatically recover.
Protect 1087	SOH too low protection	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.
Protect 1088	Low temperature charging overcurrent protection	1. The temperature is too low, charging current exists, charging is limited, and it can automatically recover.
Protect 1099	Low temperature overvoltage protection	1. The temperature is too low and the voltage has reached full charge. It can automatically recover; 2. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the START button to power on the machine; 3. If the fault message persists, contact the manufacturer.
Protect 1128	BOOT area flash is damaged	1. Turn off the air circuit breaker of the PM. Confirm that the whole system has been completely powered off. Then turn on the breaker and long press the “START button to power on the machine; 2. If the fault message persists, contact the manufacturer.

6.7 Cleaning

➢ Checking the heat dissipation

In case that output reduction of the APX battery system occurs regularly due to high temperature, please improve the heat dissipation conditions, such as cleaning the heat sink.

➢ Cleaning the APX battery system

If the enclosure of the battery system gets dirty, shut down the system and wait until it is completely powered off. Clean the enclosure and the display with a moistened cloth. Do not use any cleaning agents, e.g. solvents or abrasives.

➢ Checking the DC switch and cables

Check for any externally visible damage and discoloration of the DC switch and cables regularly. If any visible damage of the DC switch is found, or the cable is damaged or discolored, please contact the installer.

Turn the knob switch from On to Off 5 times in a row every year, which cleans the touch area of the knob switch and extends its electrical endurance.

6.8 Expansion

➢ New battery module selection:

The model number of the battery modules must be consistent.

➢ Steps to add a new battery module:

Step 1: Power off the APX battery system (see Chapter 5).

Step 2: Connect the new battery module to the system (see Chapter 4).

Step 3: Power on the APX battery system (see Chapter 5).

Step 4: Set the Battery First mode and charge the battery system to 100% SOC.

Step 5: Complete the installation of the new battery module.

NOTICE	➢ Failure to follow the instructions specified in this manual might affect the performance of the battery system and the system may even fail to operate normally.

Technical Specifications 7

7.1 APX 55042-P0-US (Power Module)

No.	Items	Specifications
1	Model	APX 55042-P0-US
2	B+/B- voltage range	330V-450V
3	BAT+/BAT- voltage range	380V-550V
4	Maximum current	33A
5	Peak current	42A
6	Operating temperature range	-20℃~+50℃(-4°F~+122°F)
7	IP rating	IP66
8	Communication method	CAN2.0
9	Dimensions (W/D/H)	690*185*295 mm ±2mm (27.17*7.28*11.61 in±0.08 in)
10	Weight	16±1kg(35.27±2.20 lbs)
11	Certification & Licensing	UL9540A/UL1973/FCC/UN38.3
12	Environment requirements	RoHS

7.2 APX 5.0P-B1-US (Battery Module)

No.	Items	Specifications
1	Module	APX 5.0P-B1-US
2	Nominal Capacity/Energy	100Ah/5kWh
3	Rated Usable Capacity/Energy	100Ah/4.5kWh
4	Rated Voltage	385V
5	Operating Voltage	330-450V
6	Rated current (25℃)	7.6A
7	Maximum current (25℃)	12.5A
8	Battery Type	Cobalt Free Lithium Iron Phosphate (LFP)
9	Operating temperature range	-20℃~+50℃(-4°F~+122°F)

No.	Items	Specifications
10	Storage conditions	-20℃~+10℃(-4°F~+50°F)/12 months; +10℃~+30℃(+50°F~ +86°F)/12 months; +30℃~+50℃(+86°F~+122°F)/6months; 5%-95%RH
11	Cooling	Natural cooling
12	Dimensions (W/D/H)	690*185*295mm±2mm (27.17*7.28*11.61 in±0.08 in)
13	Weight	50±1kg(110.23±2.20 lbs)
14	Installation	Floor-mounted installation /Wall-mounted installation
15	IP rating	IP66
16	Certification & Licensing	UL9540A/UL1973/FCC/UN38.3
17	Environment requirements	RoHS

IFpP/51/161/119/[1P16S]M/-10+50/90
Formula for calculating the rated capacity:
Rated capacity of the measured module: 100 Ah
N (Number of modules connected in Parallel): 1~6
Rated capacity (Ah) = 100 Ah *N

Growatt USA, Inc.
9227 Reseda Blvd, #435 Northridge, CA 91324, USA.

T +1-866-686-0298
E usaservice@ginverter.com
W us.growatt.com

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Growatt USA, Inc.
9227 Reseda Blvd, #435 Northridge, CA 91324, USA.

T +1-866-686-0298
E usaservice@ginverter.com
W us.growatt.com

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