


Franklin Home Power Installation Guide



Please visit www.Franklinwh.com/support, for the latest documents of Franklin Home Power. To ensure the 12-year warranty period, please strictly follow the instructions on the installation or use of the product.

 **DANGER:** Please read this document carefully before any installation or use of the Franklin Home Power equipment. Failure to follow any instruction or warning in this Manual may result in equipment damage or personal electric shock, severe injury, and even death.

- Franklin Home Power (FHP) is composed of aGate, aPower and other electrical devices, and this Installation Guide applies to the following products:

aPower (10050002xxxxxxxxxxxxx)

aGate (10050001xxxxxxxxxxxxx)

- FranklinWH reserves the rights to make any improvement to the products, and the contents in this Manual is subject to modification without further notification.
- All images and pictures provided in this Manual are only for presentation purpose and may differ from the product in details, based on the product versions.
- To report any error or omission in this Guide, please contact us via E-mail at service@franklinwh.com.
- All scrapped products (including their internal chemicals and electrical materials) should not be disposed of together with household wastes. Please consult your local laws and regulations on the disposal.



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Safety Instructions














Caution: This Guide includes important information about the FHP. Please read this Guide carefully before installation, maintenance or use. Failure to follow any instructions in this Guide may lead to risks of electric shock, severe personal injury and even death, or equipment damage, which may void your warranty (www.franklinwh.com/support/Warranty).

Safety Marks














	WARNING: This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.
	DANGER: This indicates a hazardous situation, which if not avoided, will result in death or serious injury.
	DANGER: There are fire risks in the battery packs.
	Refer to instruction manual: Indicates that user should refer to operating or installation instructions before proceeding.
	Protective earthing terminal: It indicates the position of earthing connection on the equipment.
 5 Minutes	Wait time: Electric shock risk are present inside the equipment, please wait for 5 minutes before proceeding.
	Environmental Protection: Scrapped electronic products and batteries cannot be disposed of together with household wastes. Please consult your local laws and regulations for further information.

Safety Instructions for Operation

	DANGER: Please follow your local laws, regulations and standards in all installation, wiring, maintenance, transportation and handling operations. The safety instructions in this Guide supplement the laws and regulations.
	DANGER: Both aPower and aGate are electrical equipment and improper operation may lead to electric shock.
	DANGER: There are risks of electric shocks, energy hazards, and chemical hazards associated with aPower. Please do NOT open the cabinet or disassemble without express direction from the FranklinWH service team.
	DANGER: The installation, maintenance and replacement operations for aPower and aGate equipment must be done by technicians certified and registered by FranklinWH.
	DANGER: The installation, wiring, maintenance, transportation or handling of aPower and aGate should only be done by qualified personnel with personal protective equipment (PPE).
	DANGER: Working alone is prohibited. In order to prevent injury or death from electric shock, there must be other people in the vicinity to help.
	DANGER: It is strictly prohibited to install, maintain, or handle FranklinWH equipment outdoors in adverse weather conditions, such as lightning, rain, snow, or strong winds.
	DANGER: Please follow your local laws, regulations and standards during installation, wiring, maintenance, transportation and handling. The safety instructions in this Guide are supplemental to all applicable laws and regulations.
	DANGER: Please follow the FranklinWH Battery Emergency Response Guide in case the battery pack catches fire.
	DANGER: aPower units are heavy. Use of proper tools is recommended when handling and lifting the units. Special care should be taken to avoid injury.
	DANGER: Please take special care and protective measures during the transportation and handling of aPower and aGate to avoid collision, dropping, bumping, stamping, and improper stacking. Please keep aPower in its package until ready to install in order to prevent potential damage.
	DANGER: Please check and ensure that the cooling system and air vents are not blocked and flammable materials are kept clear during installation and maintenance.
	DANGER: Do NOT let aPower operate beyond the specified temperature range.
	DANGER: If any equipment failure occurs, please contact your installer or after-sales service provider for support.
	DANGER: Please complete the installation and wiring process in accordance with your local regulations and standards. Take measures to protect the equipment from lightning strike and voltage surge.

	DANGER: To install and/or maintain aPower or aGate, please keep the upstream and downstream breakers open and locked ("lock out") to prevent misoperation.
	DANGER: If aPower or aGate is found damaged (except minor defects in exterior painting) or malfunctioning after it is unboxed, please do NOT operate it and contact your after-sales service provider for support.
	DANGER: Before any debugging operation on aPower, please keep aPower powered off and prevent the ON/OFF switch from being operated by mistake.
	DANGER: Without the authorization of FranklinWH it is prohibited to take apart, open, repair and/or modify aPower and aGate. It is prohibited to open the battery pack chamber in whatever situation or otherwise it may lead to safety hazards and void your warranty.
	DANGER: If aPower is found giving off smoke, please disconnect the AC power supply on aGate, and turn off the switch mounted on the aPower unit, if possible and safe to stop the charging and discharging of aPower.
	DANGER: Gas exhausted from the battery may lead to risks of electric shock, fire and explosion. Please take appropriate protective measures.
	DANGER: Measures should be taken to prevent foreign objects from entering aPower and aGate.
	WARNING: For maintenance purposes, do NOT use any parts or fittings that are not listed in this Guide or that are purchased from any source other than FranklinWH or its recognized dealers.
	WARNING: Do NOT use paint on any part of aPower or aGate, whether internal and external, especially on the protective cover.
	WARNING: Do NOT connect aPower directly to the inverter of the solar generator.
	WARNING: The exterior paint that has been worn out or damaged in the transportation, installation or maintenance process must be repaired immediately using anti-rust paint of the same color.
	WARNING: Disconnecting input power from aPower when the temperature falls within the acceptable range (-10°C (-4°F)~ 45°C (113°F)) is acceptable, however the disconnection should last less than one month period.
	WARNING: The operation of the Franklin Home Power system requires an internet connection. Extended offline operation may result in a voided warranty. Please refer to www.franklinwh.com/Warranty for information.

Safety Instructions for Installation Site

	DANGER: The aPower and aGate installation area of should be protected against access by children and additional protective measures should be taken to protect the FWH units from being played with or tampered by children.
	DANGER: Sources of heat and fire and heating devices should be kept away from the aPower and aGate installation area.
	DANGER: The ambient temperature at the aPower and aGate installation area should be -20°C to 50°C(-4°F to 122°F) with the relative humidity between 5% and 95% and altitude lower than 3,000 meters (9,843 ft).
	DANGER: The aPower and aGate installation area of should be kept in a dry, cool and well ventilated condition, to ensure satisfactory cooling performance.
	DANGER: The aPower and aGate installation area should be protected from flooding or ponding.
	DANGER: The aPower and aGate installation area should be away from flammable and explosive gases.
	DANGER: The aPower and aGate installation area should be protected from dust or smoke.
	DANGER: APower is heavy. The installation site should be properly leveled and hardened if aPower is floor mounted.
	DANGER: APower is heavy. If the unit is wall-mounted, the wall should be able to provide sufficient bearing capacity.
	WARNING: The aPower and aGate installation area should have no inflammable and/or explosive materials stacked or piled in the near vicinity.
	WARNING: The aPower and aGate installation area should be protected from direct exposure to sunshine, rain or snow.
	WARNING: The aPower and aGate installation area should have no water source over it or in the vicinity, including water pipes, shower, faucet, and container of liquids.
	WARNING: Do NOT clean aPower and aGate with cleaning agents or expose them to flammable or corrosive chemicals or their vapors.

Please ALWAYS:

- ① Shut off the aPower AC switch on aGate, if it is safe to do so.
- ② Evacuate to a safe area.
- ③ Report the incident immediately to your fire department or other emergency response team (See *FranklinWH Battery Emergency Response Guide* for contact information.)

Fire

- ① use aerogel extinguisher, if safe.

Flood

- ① If the wiring sections of aPower or aGate are submerged, please stay away from the water. Electric leakage may result in electric shock.
- ② Drain the water to protect the system if it is safe and possible.
- ③ If water rises to the aPower's battery level, please call your installers for inspection. If water level is below the battery chamber, please allow the site to completely dry.

Abnormal noise, odor or smoke

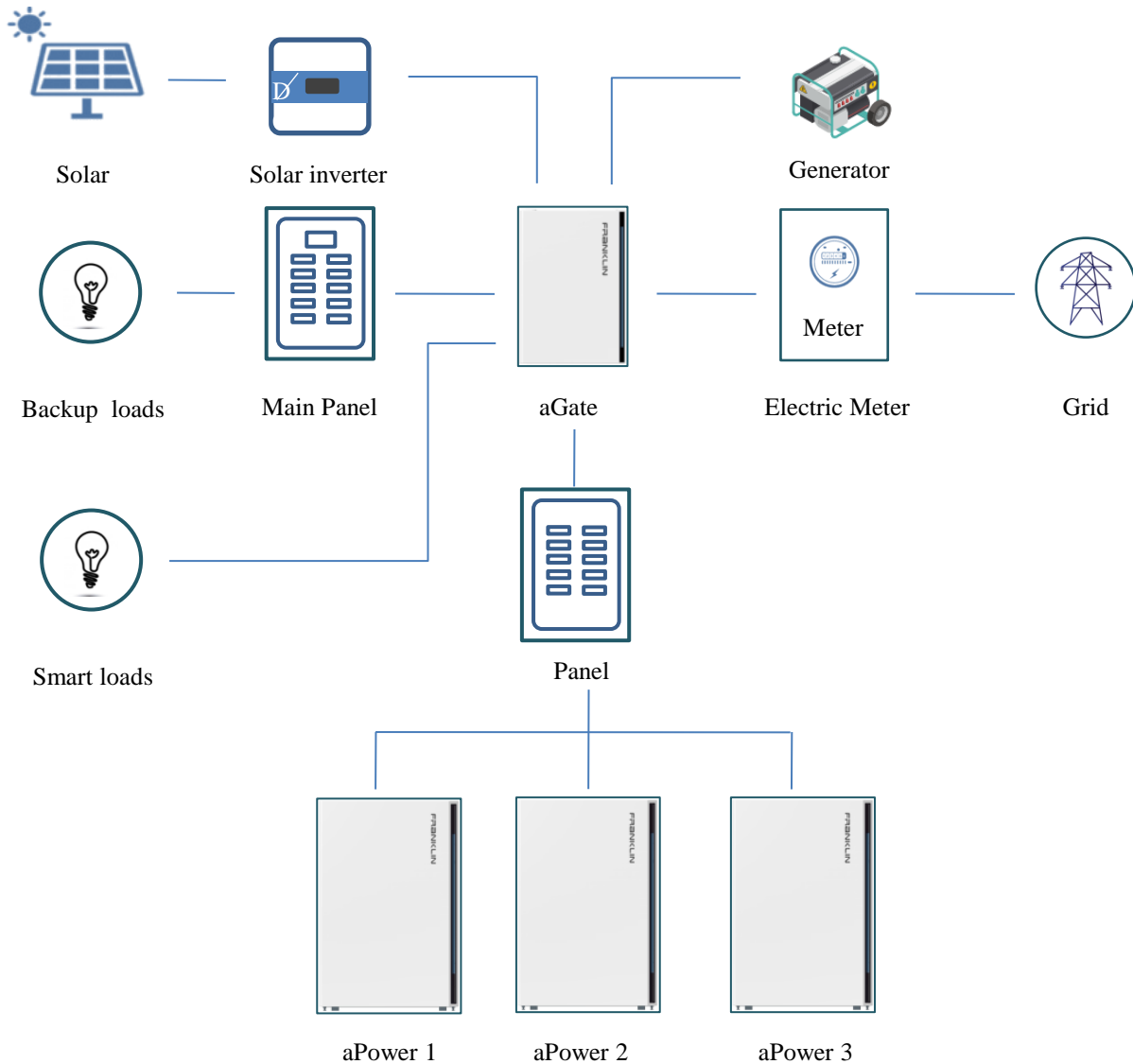
- ① Check and ensure your aPower is well ventilated and not blocked.
- ② Keep the installation site well ventilated.
- ③ Call your after-sales service for support.

Franklin Home Power Overview

Franklin Home Power (“FHP”) is a whole-house energy solution for family users. FHP is composed of aPower as the built-in accumulator for the inverter and aGate as the energy management unit. With proven AC coupling battery technologies, FHP provides a reliable household backup and load control solution for family users and supports connection to residential power generators.

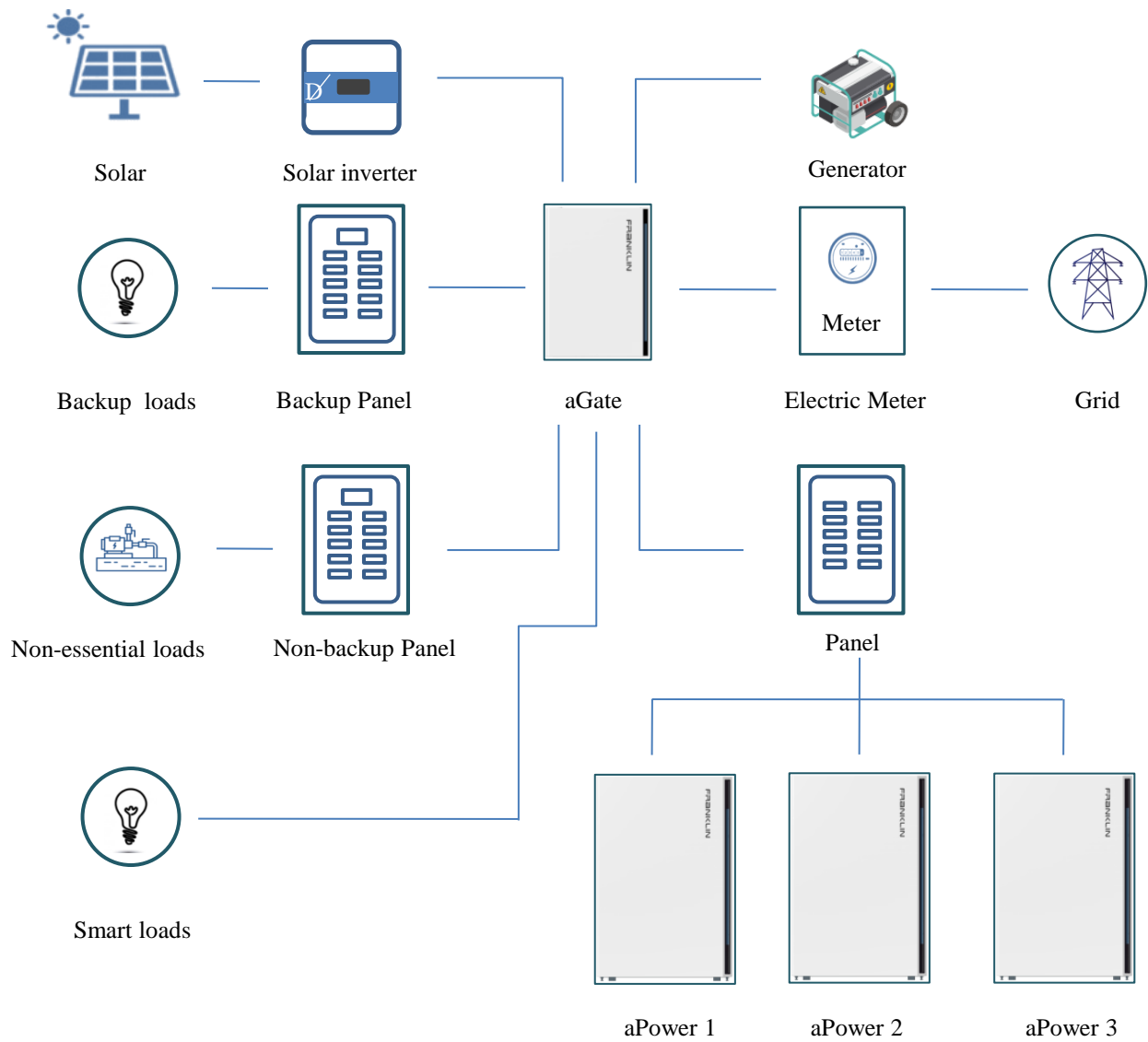
Whole-Home Power Backup System

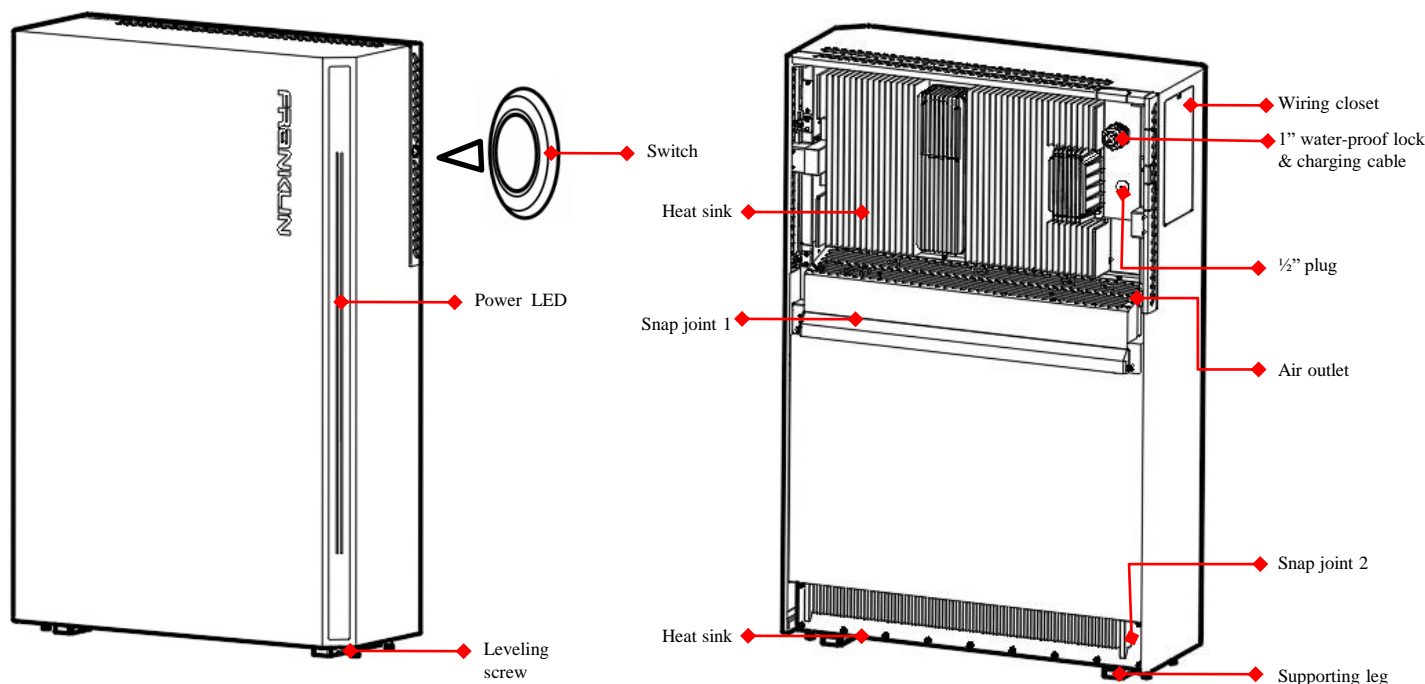
The system stores electricity supplied by the grid or generated by the solar generation system and discharges as a backup power supply for all household power loads during power failure periods or nights.



Backup Power System for Family Loads

The FHP system stores electricity supplied by the grid or generated by the solar generation system and discharges as a backup power supply during power failure periods or nights to support some of your family loads. These loads are selected in the system design process. Lower priority loads should be excluded from the backup power supply in the system configuration process.





Purposes:

DC Switch: Starts up or shuts off aPower.

Power LED: Turns on when aPower is started, to indicate the battery level.

Heat sink: Cools the components inside aPower.

Supporting leg: They support the aPower and keep it standing firmly.

Leveling screw: Helps keep the equipment well leveled where the floor is not even.

Air outlet: Outlet where heat is discharged and must NOT be blocked.

Wiring compartment: Compartment that houses all electric terminals and communication cable terminal connections.

Electrical parameters description (see Appendix 1 for details)

Coupling	AC Coupling
Rated Input/Output Voltage	120/240VAC Split
Operating Voltage Range	211.2V to 264V
Rated Input/Output Current	21A
Max.Continuous Input/Output Current	24.5A
Rated Input/Output Power	5kW
Max.Grid Output Power	5.8kVA
Rated Frequency	60Hz
Power Factor Range	-0.85 to +0.85
Max.Output Fault Current	42A/10s
Max.Supply Fault Current	20kA
Inverter Topology	Isolated
Battery Type	Lithium Iron Phosphate
Battery Max. Short Circuit Current	550A/1ms
Battery Rated Voltage/Capacity	51.2Vdc/14.3kWh
Usable Capacity	13.6kWh

Water-proof plug: Used to keep the charging cables in position. A 1" electrical conduit may be used in place of the plug.

Charging cable: Used to charge aPower when it has a low battery level.

1/2" plug: 1/2" electric conduit may be run through the hole once plug is removed.

Snap joint 1: Snaps onto the mounting bracket to support the body of aPower.

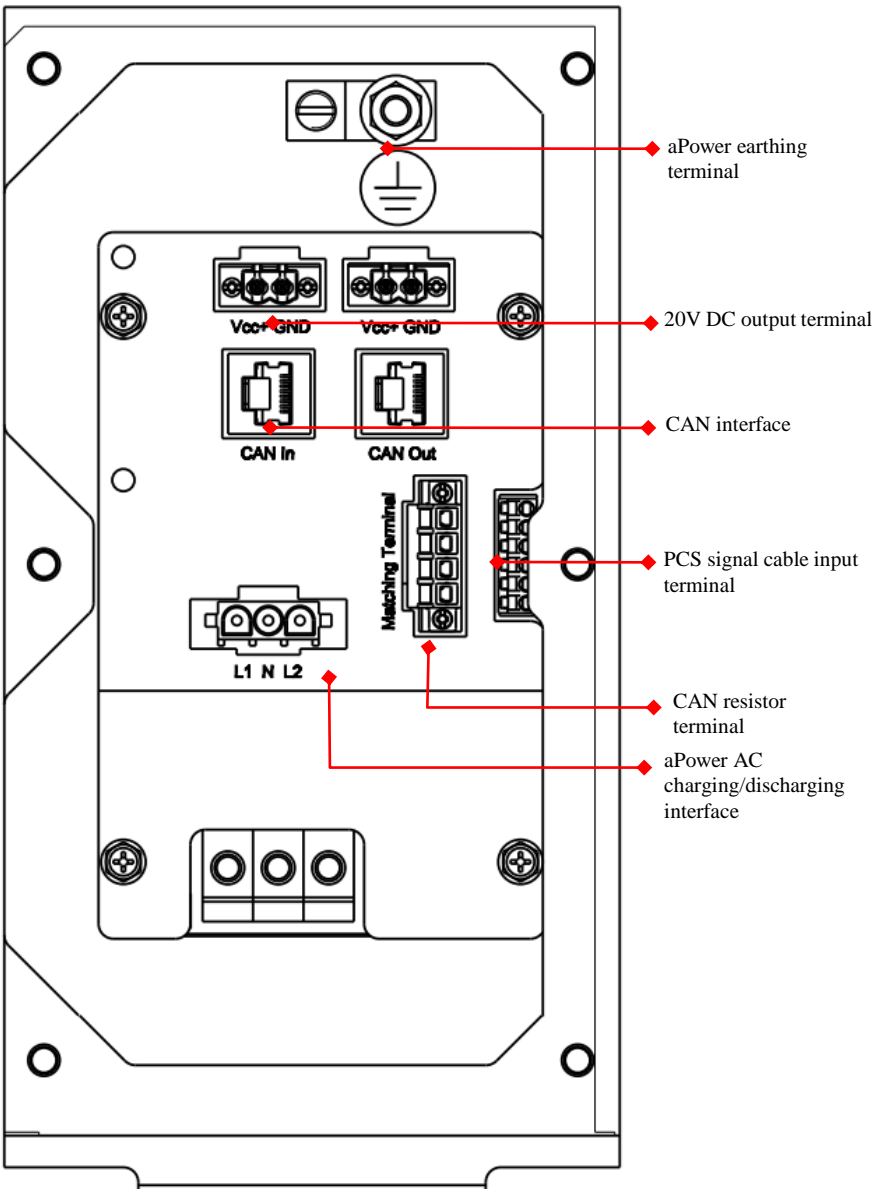
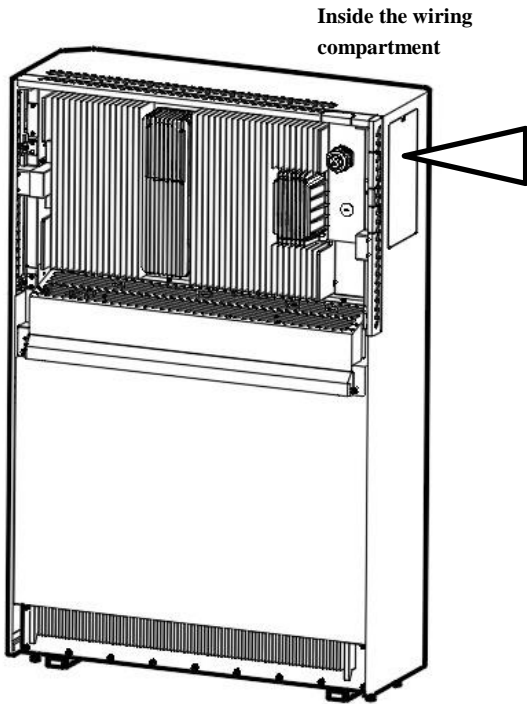
Snap joint 2: Snaps onto the mounting bracket to support the body of aPower.

Mechanical parameters

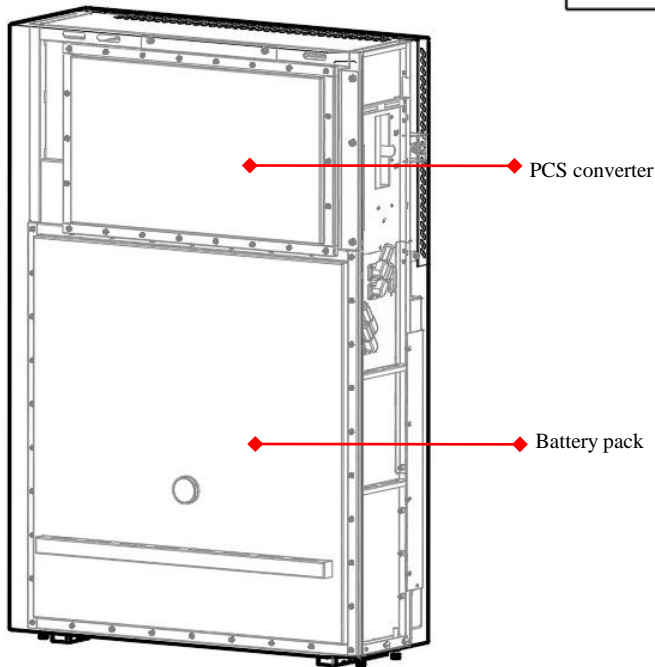
Size	750 mm×1150 mm×290 mm (29.5in×45.3in×11.6in)
Operation Temperature Range	-20°C to 50°C (-4°F to 122°F)
Enclosure Type	Type 3R
Ingress Protection	IP 67(Battery Pack&Inverter) IP 56(Wiring)
Protective Class	Class I
Environment	Indoor/Outdoor
Max.Elevation	3000m(9843ft)
Weight	185kg(408lbs)

Shipping List

No.	Item	Quantity
1	Quick release grating	1 Set
2	Mounting bracket	1PCS
3	WAGO adapting cable	1PCS



Internal modules



Purposes:

PCS converter: It converts DC power into AC power or AC power to DC power. External DC power can be converted into AC power to charge the built-in battery pack, or Internal DC power can be converted into AC power to drive external loads.

Battery pack: a module to store electrical energy.

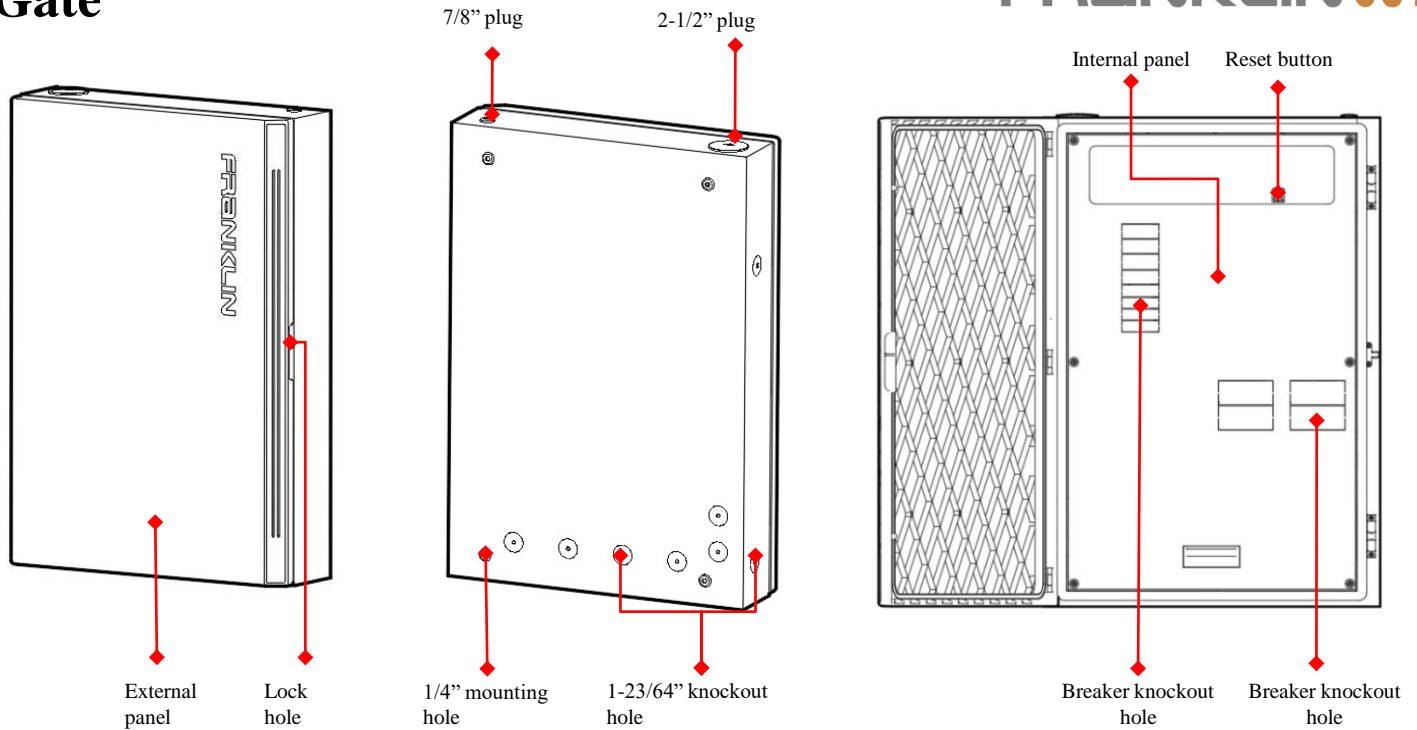
20V DC output terminal: to supply power to aGate EMS.

CAN interface: the communication interface between aPower and aGate.

PCS signal input terminal: the signal interface between user PCBA and PCS converter.

CAN resistor terminal: Controls the current balance on the CAN cable.

aPower AC charging/discharging terminal: An external AC source may be connected to this terminal to charge the aPower, or aPower may discharge AC power via this terminal.



Purposes:

External panel: The external decoration and protection panel of aGate.

Internal panel: The internal protection panel of aGate.

Lock hole: The whole where a lock may be used.

1/4" mounting hole: aGate mounting holes of aGate. Sized for 1/4" or M4 screws.

Reset button: The button to reset aGate EMS module.

Breaker knockout hole: A breaker may be mounted and operated at the hole after the steel knocked out is removed.

Breaker knockout hole: A breaker may be mounted and operated at the hole after the steel knocked out is removed.

1-23/64" knockout hole: A 1" electrical conduit may be passed through the knockout once its removed.

7/8" plug: A 1/2" electric conduit may be passed through once the knockout is removed.

2-1/2" plug: A 2" electric conduit may be passed through once the knockout is removed.

Electrical parameters description (see Appendix 1 for details)

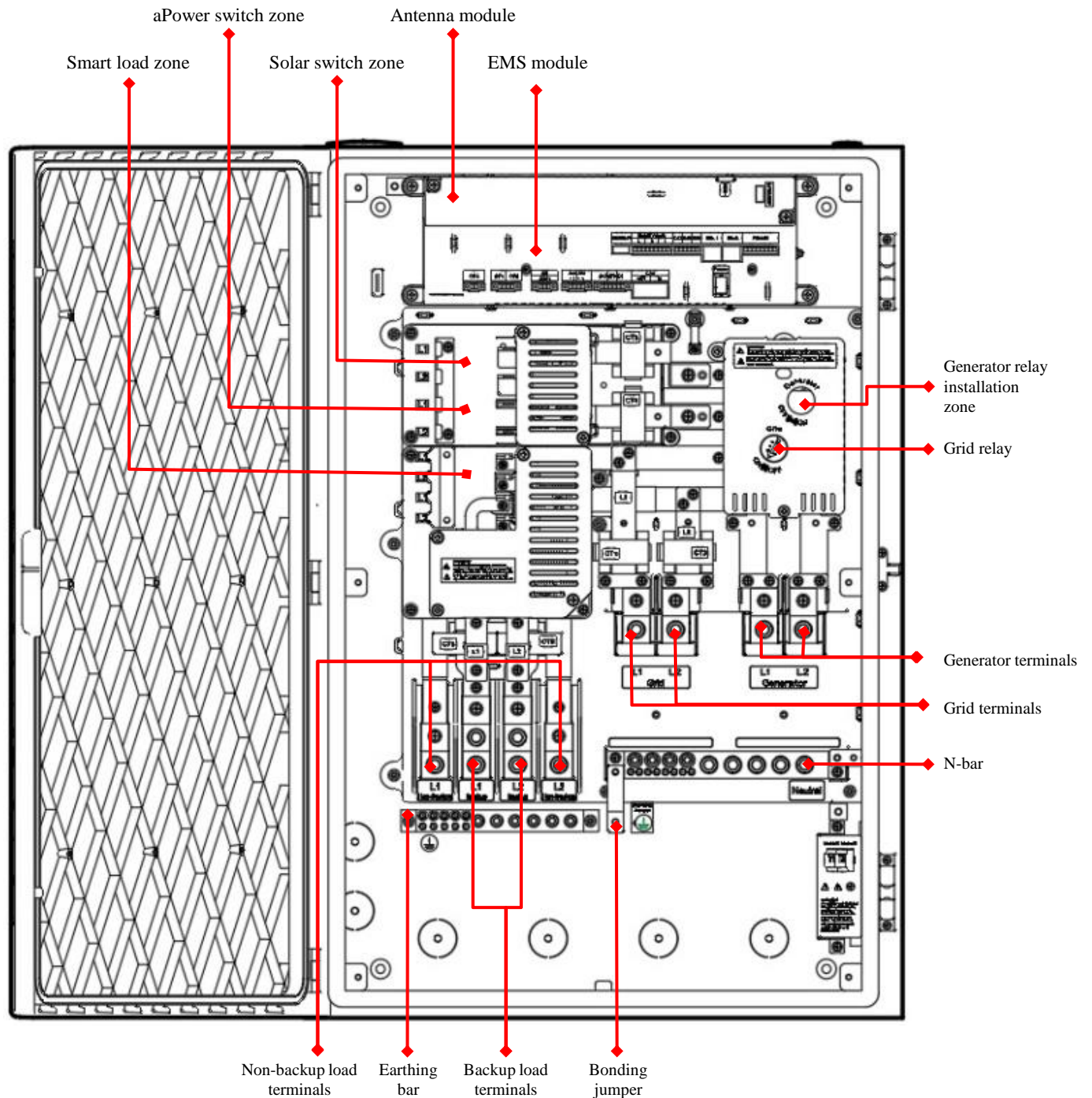
Rated Voltage	120/240VAC Split
Rated input	160A
Rated Frequency	60Hz
Protection Device Max.	200A
Short-Circuit Breaking Capacity	10kA

Mechanical parameters

Size	550 mm×800 mm×160 mm (21.7in×31.5in×6.3in)
Operation Temperature Range	-20°C to 50°C (-4°F to 122°F)
Enclosure Type	Type 3R
Ingress Protection	IP 44
Protective Class	Class I
Environment	Indoor/Outdoor
Max.Elevation	3000m(9843ft)
Weight	23kg(50lbs)

Shipping List

No.	Item	Quantity
1	1/4" water-tight washer	4 PCS
2	Switch tag	1 Set
3	Main switch mounting screw M4×10	2 PCS



Purposes:

Smart load zone: Allows installation of additional switches to remotely control and operate the relays and to control electric circuit.

aPower switch zone: Allows installation of 80A and lower rated switches to control the aPower AC circuit.

Solar switch zone: Allows installation of 80A and lower rated switches to control the Solar side circuit.

Antenna module: The 4G LTE and/or Wi-Fi telecommunication module.

EMS module: The signal processing and energy management module.

Generator relay installation zone: Optional generator relay can be installed after the hood is removed.

Grid relay: Controls the on/off status of the grid power supply.

Generator terminals: aGate mounted input terminals for the optional generator.

Grid terminals: aGate mounted input terminals connected to the input cables of grid power source.

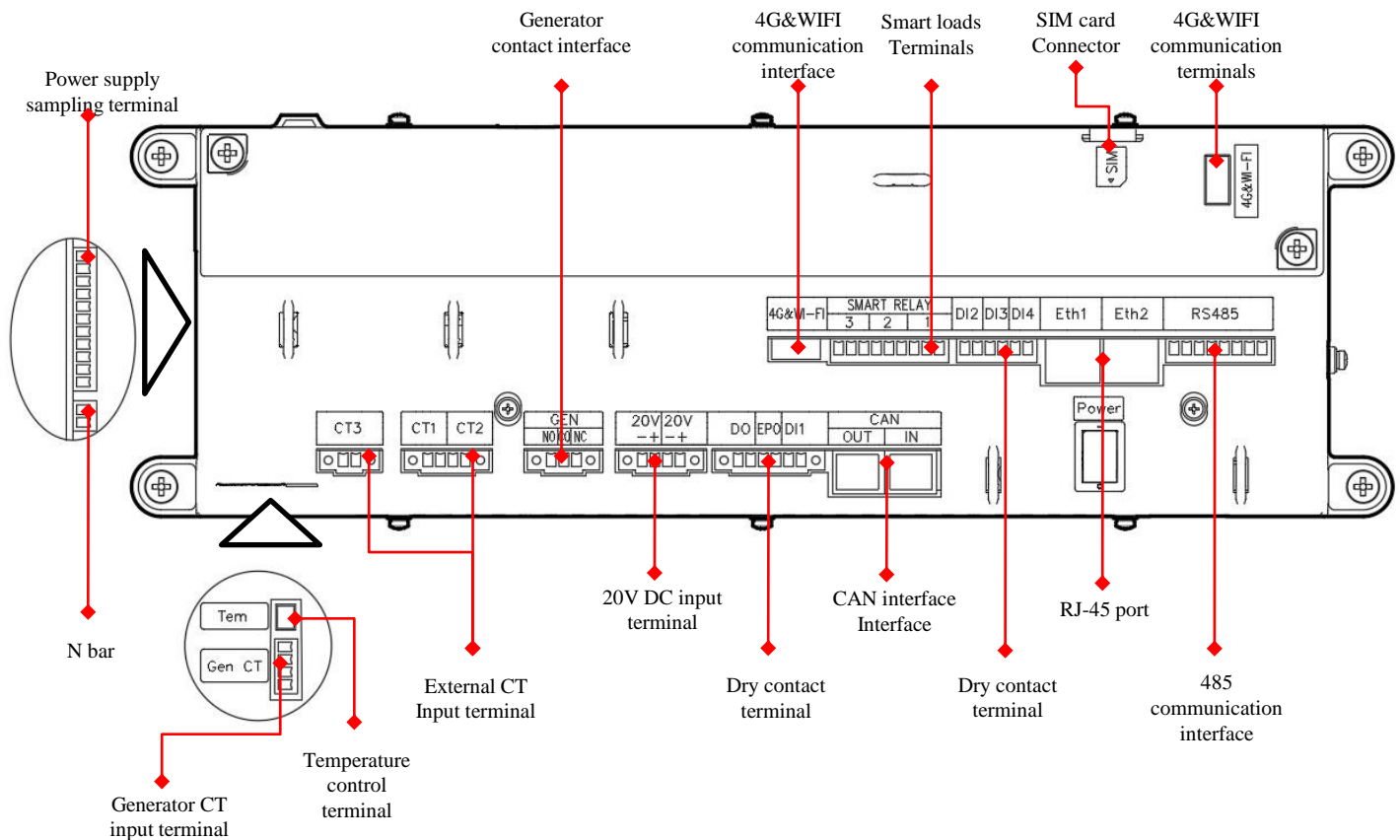
Backup power supply load terminals: The main output terminals of aGate. Typically connected to the inputs of backup loads.

Non-backup power supply load terminals : The output terminals of aGate. Connected to the inputs of non-backup loads.

N bar: The junction of all N cables.

Earthing bar: The junction of all earthing cables.

Bonding jumper: The jumper to bind N bar and earthing bar.



Purposes:

Power supply sampling terminal: Allows measurement of the aGate's current and voltage and provides AC power to PCBA of EMS module.

N bar: The Neutral bar input terminals.

Generator CT input terminal: Allows measurement of generator current data by external CT.

Temperature control sampling terminal: Signal input port for temperature control switch.

External CT input terminal: Input terminal for external CT to measure current information.

Generator contact interface: Generator data contact interface, where NO stands for constantly on, CO stands for the common ports, and NC stands for constantly off.

20V DC input terminal: 20V DC power input to power the EMS control box.

Dry contact terminals: The contact terminals for on/off status of external signals. DI1, DI2, DI3 and DI4 are the input signal terminals, DO is the output signal terminal (a current of no less than 10mA is required for DO relay to close reliably), and EPO is the emergency stop input signal contact terminal.

CAN interface: the communication interface between aPower and aGate.

Smart loads terminals: The Smart Loads relay control interface.















4G&WIFI communication terminals: The connection interface between the control box and antenna box.

RS-485 communication port: The communication interface between the control box and smart meter.

SIM Card tray: Receptacle for SIM Card used for communication between EMS and user clients.

Installation Instructions:

FHP needs to be connected and configured with all installed residential systems to optimize its function as a back-up power supply. Typical installed power sources include the power distribution system, the generator system, and the solar generation system,

-  **DANGER:** All installation must comply with the local laws, regulations, norms and standards of the installation site.
-  **DANGER:** The installation of Home Power must comply with all applicable requirements of NFPA855.
-  **DANGER:** Both electric connection and electric isolation need to comply with the local standards and National Electric Codes (NEC), ANSI/NFPA 70 or Canadian Standards Association CAS C22.1.
-  **DANGER:** The installer needs to utilize suitable conduits and cables to complete the installation process in accordance with applicable local regulations and UL514B.
-  **DANGER:** The installation site selection process must follow the installation site safety instructions.
-  **DANGER:** Fire detection and protection systems should be included in the aPower installation area in accordance with the local building and fire codes. Temperature detectors and fire detectors must be used in the vicinity of the installation zone and must be connected to the family fire control system.
-  **DANGER:** aPower may be installed on the floor or on walls. In both cases mounting brackets will be needed to stabilize the unit. aPower units are very heavy and wall mounted installation is more difficult. Floor mounted installation is recommended.
-  **DANGER:** Before the installation of Home Power starts, engineers should check and locate wall embedded electric wires and water pipes to avoid potential property damage and personal injury during the installation process.
-  **WARNING:** Selection of the aPower installation site must take into consideration the operational noise ($\leq 46\text{dB}$). Selection of an installation site might require consent of the local residents.
-  **WARNING:** A hardwired internet connection at the aGate installation area is recommended. Hardwired connection provides a more robust system so that users can remotely monitor the operation status of their Home Power system.
-  **WARNING:** Home Power is composed of aPower and aGate, which can not be used separately.
-  **WARNING:** aPower may only be used at the backup side of aGate.
-  **WARNING:** The inputs must be connected before the aGate's main relay to prevent short circuiting or bypassing the main relay.
-  **WARNING:** aGate must be connected to all applicable inputs and output at the same time and should be wired in accordance with local regulations.

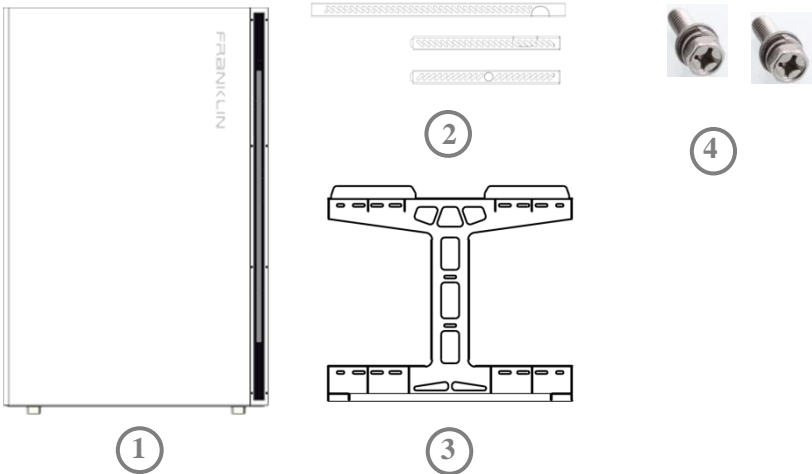
Recommended Installation Preparation Guidelines:

- Work out a specific construction plan based on the customer information and site investigation.
- Review the plan several times to identify potential errors or obscure parts.
- Notify user to clear the installation site and its access paths to ensure equipment can be quickly delivered to the installation site and that the installation process can proceed efficiently.

Installation Preparations

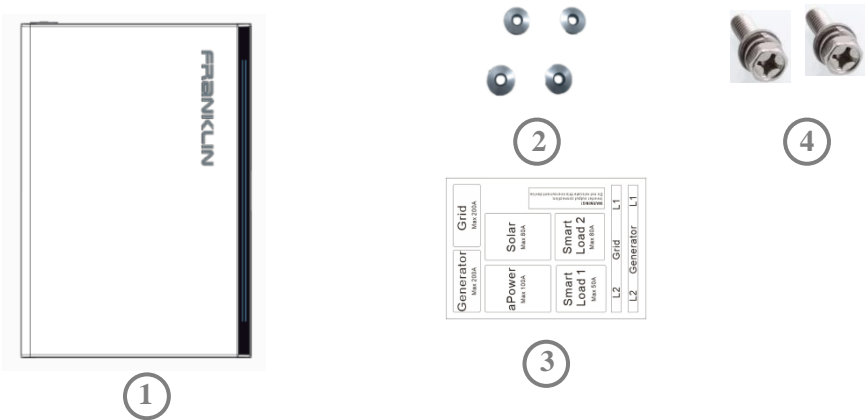
Materials

aPower and all accessories



No.	Item	Quantity
1	aPower	1 Set
2	Quick release grating	1 Set
3	Mounting bracket	1PCS
4	M5x25 screw	2PCS

aGate and accessories



No.	Item	Quantity
1	aGate	1 Set
2	1/4" water-tight washer	4 PCS
3	Connection labels	1 Set
4	Main switch mounting screw M4x10	2 PCS

Materials to be prepared by installers



No.	Item
1	Electric conduit, Hub, pull box and their fittings
2	Copper cables, see P26 for specifications.
3	Antioxidant conductive paste
4	Screws and washers for wall installation. See P22-P23.
5	See the switch and fittings section for models of switches.
6	Optional: Customer external CT
7	aPower combiner box (for parallel operation of multiple aPowers, depending on the number of aPower available)
8	Reducing Washer Conduit Fittings
9	Sealant (for use on outdoor conduits)
10	5/8 in Type X plasterboard
11	Network cable and registered jacks

Installation Preparation

Recommended Tools (unabridged list):

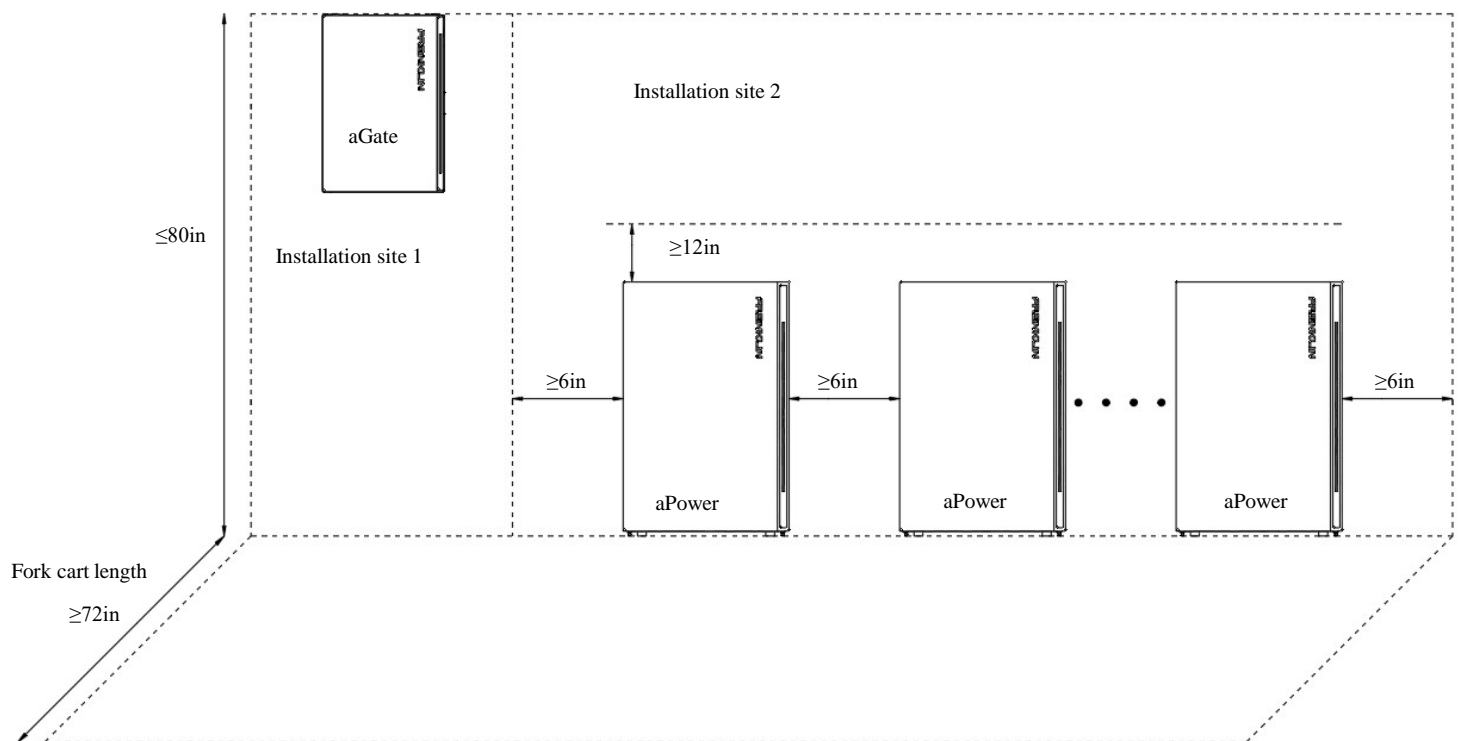
- Personal Protection Equipment (goggles, gloves, protective shoes, anti-dust respirator, etc.) to protect personal safety.
- Drill with 5/32" Brad Point bits or 5/32" Auger bits, to drill pilot holes in wooden walls for mounting the equipment.
 - 1/2", 3/4", 1", 1-1/2", 2" sized wood bits, to create holes in wooden walls for running cables.
 - 1/2", 3/4", 1", 1-1/2", 2" sized hole saw, to create holes in metal walls for running cables.
- Hammer drill with 1/2" Masonry bits, to create pilot holes on concrete or brick walls for mounting up the equipment.
 - 1/2", 3/4", 1", 1-1/2", 2" Diamond core bits, to create holes in concrete or brick walls for running cables.
- Electric screwdriver and cross screw bits, to tighten the fastening screws.
- Torque wrench and bent-handle ratchet wrench, with 11/32", 5/16", 7/16", and 3/8" hex sockets, to tighten and check the torque of outer hexagonal bolts.
 - 3/16" and 7/32" inner hexagon screwdriver bits, to fasten cables at switches and pressure connectors and to check the torque.
 - 3/16", 1/4" straight screwdriver bits, to fasten cables at switches and connectors and to check the torque.
 - PH2, PH3 cross screwdriver bits, to fasten cables at switches and to check the torque.
- Flat head screwdriver (1/8"x4", 1/4"x4"), to fasten signal terminals and take wooden boxes apart.
- Phillips cross screwdriver (#2X4", #3X4"), to tighten fasteners.
- Claw hammer, to break knockout holes and to release locks on wooden box.
- Utility knife, to cut open cartons.
- wire cutters, strippers, diagonal cutting pliers and other cable preparation tools.
- Wire crimper, cable testers, and other network cable preparation tools.
- Induction electroprobe, to detect the cables in walls to avoid short circuits when drilling.
- Multimeter, to measure voltage, current and other electric parameters.
- Loop resistance tester, to measure the wiring resistance and to detect poor connection of cables.
- Task light, to illuminate the area when power supply is off.
- Spirit level, to check whether the equipment is leveled.
- 14mm open-end wrench or 9/16" open-end wrench, to operate aPower leveling screws and to adjust the heights of aPower on a single side.
- Steel measuring tape, to measure lengths.
- Markers, to make marks.
- Camera, to record the installation process.
- Fork hand truck. aPower is heavy at a little less than 400lbs. Several well trained workers are required to maneuver the unit. Use of a fork hand truck is recommended to avoid potential injury or death of workers. The maximum length of fork hand truck should be less than 72 inches. Fork hand trucks with retractable features are preferred because they are easy to transport and to access the installation site.
- Deep Cut Band Saw, to cut thin-wall steel conduit or PVC pipes.
- Conduit Bender, if bending thin walled steel conduits with the head size depending on the types and sizes of conduits.
 - 1/2", 3/4", 1", 1-1/2", 2" diameters
- Knockout Tool Kit, to drill holes for conduits on the distribution box case.
- Wooden block, approximately 24 inch long 2x4 stud
- Adjustable wrench, size: 0-2" wide.
- 6", 10", 18" Pipe Wrench Sizes

* Battery-powered or hand tools are preferred because there may not be any power source at the construction site and power might be shut off for extended periods during the installation process.

Step 1: Site Planning

Plan installation position

- Both aPower and aGate have special installation site requirements. aPower may be floor mounted against a wall or wall mounted. For wall installation, aPower is mounted on the brackets to the wall to prevent it from falling off the wall. For floor mounted installation, the mounting brackets are used to hold the aPower unit against the wall to protect aPower from tilting. All installation configurations require aPower and aGate to be installed near or on walls.
 - The selection of unit installation locations must account for wall embedded pipes and wires. Damage to the pipes and wires during FHP installation may lead to property loss and/or personal injury.
 - According to NFPA855, the aggregate rating amount within a dwelling, garage, or accessory structure shall not exceed the following:
 - (1) 40 kWh within utility closets and storage or utility spaces
 - (2) 80 kWh in attached or detached garages and detached accessory structures
 - (3) 80 kWh on exterior walls
 - (4) 80 kWh in outdoor installations.
- Therefore, if more than 6 aPowers are to be installed, the installation must follow the requirements of NFPA 855 Chapters 4-9 and may proceed after approvals have been granted.
- The installation area for aPower and aGate must consider not only the space to be taken by the equipment, but also the necessary space for wiring connections and the mandatory minimum clearances required for equipment to operate properly.



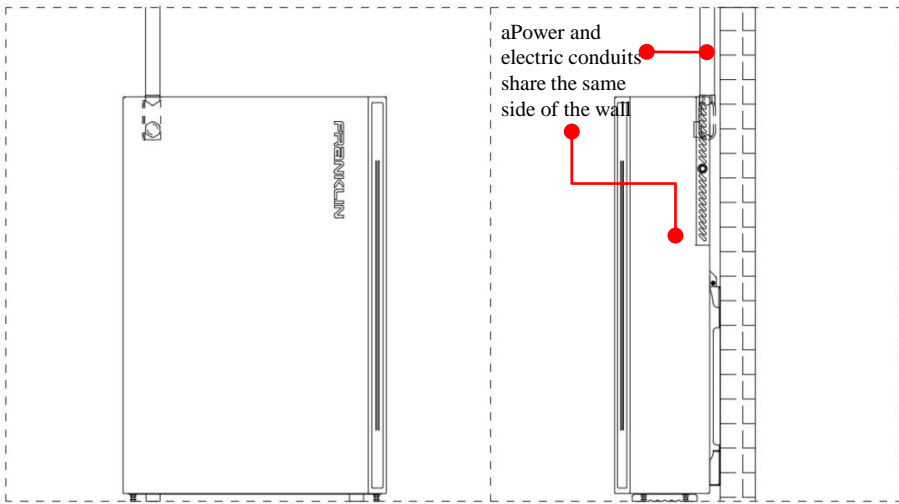
- FranklinWH system requires an internet connection. All signal transfers between aPower and aGate, the generator, and the router are realized by CAN bus, network cables or other signal transmission cables. Long distances will likely adversely affect the quality and speed of communication negatively impacting equipment operation. The installer or system designer will need to factor in the recommended maximum cable lengths below when laying out the FWH installation.

Data interchange equipment	Maximum cable length
aPower and aGate	100 ft
aGate to Generator	100 ft
aGate to Router	300 ft
External CT	15 ft

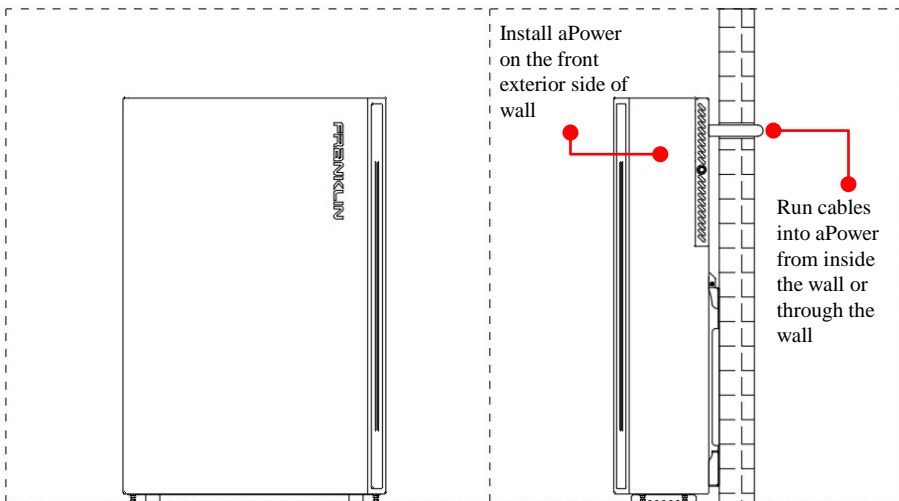
Step 1: Site Planning

Plan the positions of inputs and outputs of the equipment

- The main cable connection for aPower is located at the rear of the unit case. The following scenarios offer variations on the cable inlets and outlets of aPower to accommodate variations in the existing residential wiring layout.



Scenario 1: The cables pass through the electric conduits and enter aPower from the same side as the conduits. Gasketed pull boxes and sealing rings must be used to ensure the tightness of the wiring closet. The cable inlets on the wiring closet of aPower are 35mm and 22mm in diameter respectively, and the pull boxes that work with them have thread size of NPT 1" and NPT 1/2". Reducing washers should be purchased as necessary if diameters don't match.



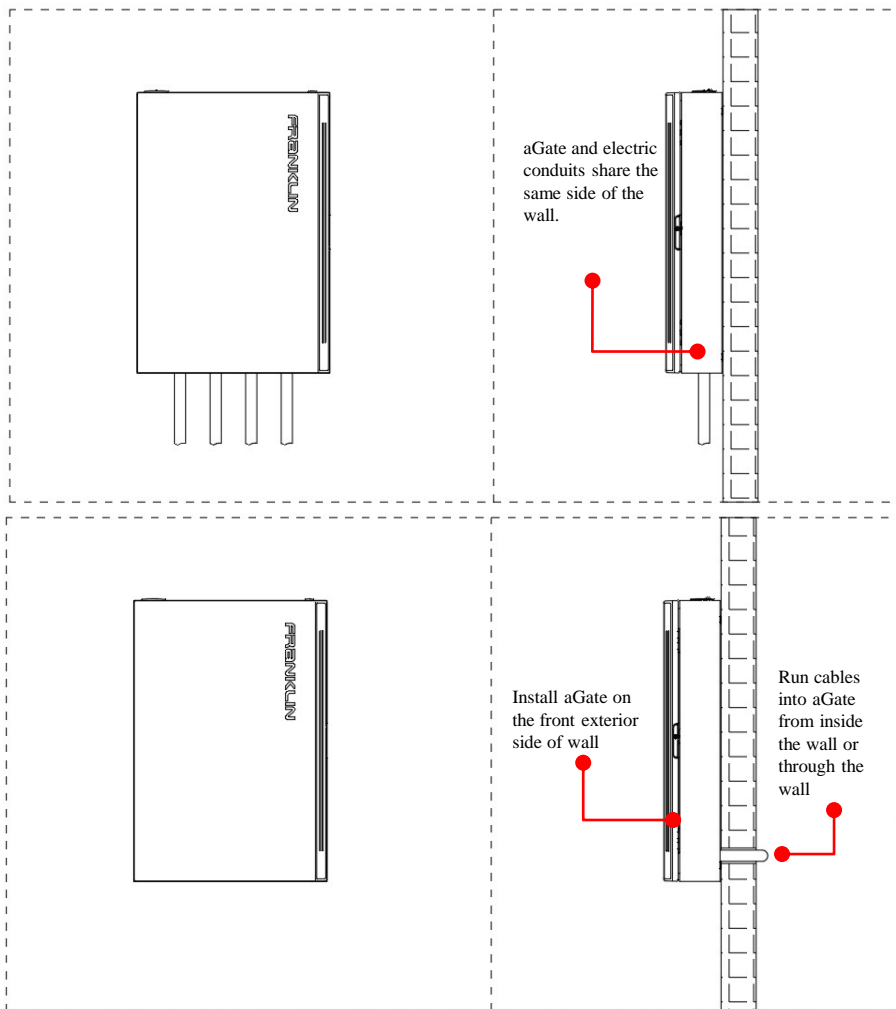
Scenario 2: The cables will connect to aPower from inside the wall or through the wall through the electric conduits. Sealing rings must be used. The cable inlets on wiring closet of aPower are 35mm and 22mm in diameter. A good sealing must be guaranteed between the electric conduits and the wiring closet, which may be realized by Hub or sealing rings, or caulk.

Planning the Fire Control and Extinguishing System

- The selection and installation of fire control and extinguishing systems for residential power storage systems must comply with the requirements of NFPA855 and local fire authorities.

Step 1: Site Planning

- The cable inlets and outlets are located on the four side panels of aGate: upper, lower, left and rear. The following scenarios illustrate different configurations accounting for variations in the existing residential wiring layout.



Scenario 1: Cables pass through the electric conduits and enter aGate from the same side of the wall. Gasketed junction boxes and conduit connections will be needed to ensure the IP grade (water resistance) of aGate. The electric conduit diameter varies by the types of conduits: the knockout holes on the left and lower panel of aGate are 35mm in diameter, while the knockout holes on the upper panel are 63mm and 22mm in diameter. If the knockout holes do not match the electric conduits in size, additional reducing fittings will be needed to achieve the required IP grade. If aGate is installed outdoors, the electric conduits attach to aGate through the cable inlet on the upper panel, and water-proof sealant or caulk should be used at each connection of the reducing fitting, junction box, electric conduit, and aGate, in order to enhance the watertightness.

Scenario 2: Cables are run in electric conduits and enter aGate from inside the wall or through the wall: in this case, gaskets will be needed to ensure the IP grade (water tightness) of aGate. The electric conduit diameter varies by the types of conduits: the knockout holes on the left and lower panel of aGate are 35mm in diameter, while the knockout holes on the upper panel are 63mm and 22mm in diameter. If the knockout holes do not match the electric conduits in Hub diameter, additional reducing fittings will be needed to achieve the required IP grade. If aGate is installed outdoors, the electric conduits connect to aGate through the cable inlet on the upper panel. Water-proof sealant or caulk should be used between the reducing fitting, junction box, electric conduit, and aGate, in order to enhance the watertightness.

Planning protection for aGate's input connections

- aGate serves as the entrance to the Franklin Home Power system. Installation of proper lightning protection systems are required before the input end of aGate. Over current protection measures are required to be installed before the aGate inputs or inside the aGate. A breaker of 100A to 200A may be installed at the grid input connection and the fuel generator input connection. Please refer to Step 6 of this Guide for the recommended models of breakers inside aGate.

Planning the types, sizes and routes of cable and electric conduits

- Please refer to Step 8 of this Guide for recommended cable types and wire diameters electric connections and communication connections between aGate and aGate and between aGate and the residence's power distribution system.
- The current carrying capacity of cables needs to be reduced as wires travel longer distances through electric conduits. Please refer to the applicable information if Appendix B to NFPA 70.
- The relationship between wire diameters, cable numbers, and inner diameters of conduits should be taken into general consideration as cables run through the electrical conduits. Please refer to Appendix C to NFPA 70 for the list of maximum numbers of cables of the same size in the electric conduits and pipelines.
- The type of electric conduits depend on the installation type: indoor or outdoor. IMC, EMT and other thin-wall metal conduits are recommended in case of indoor installation. These two types of conduits are cost effective and provides excellent anti-electromagnetic interference and are easy to shape and to joint. In outdoor installation, GRC and RMC thick-wall conduits are recommended, because they can provide effective mechanical protection and good tightness at the conduit joints. Thick-wall conduits have a reduced flexibility disadvantage which makes bending and jointing very difficult.

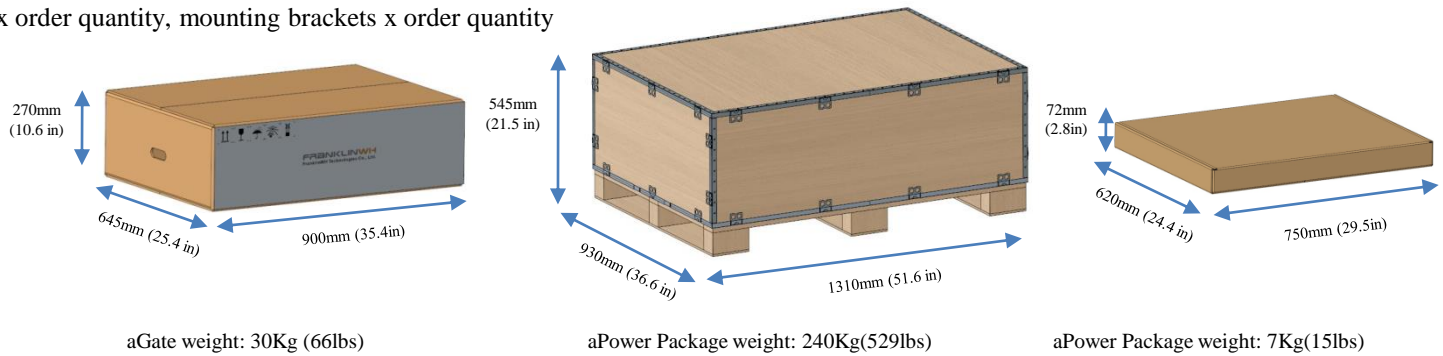
FCC Requirements

- See Appendix 1 for the applicable FCC Requirements. Installer informs user of the contents in Appendix 1.

Step 2: Mobilization and Unboxing

Unloading

- Compare and confirm the equipment delivered against the order information. The basic configuration includes aGate x 1, aPower x order quantity, mounting brackets x order quantity



- Since aPower is heavy and large, fork cart hand truck will be needed to unload aPower from the truck.



- Lower the fork. Transport aPower and aGate to an open area for unloading and unboxing

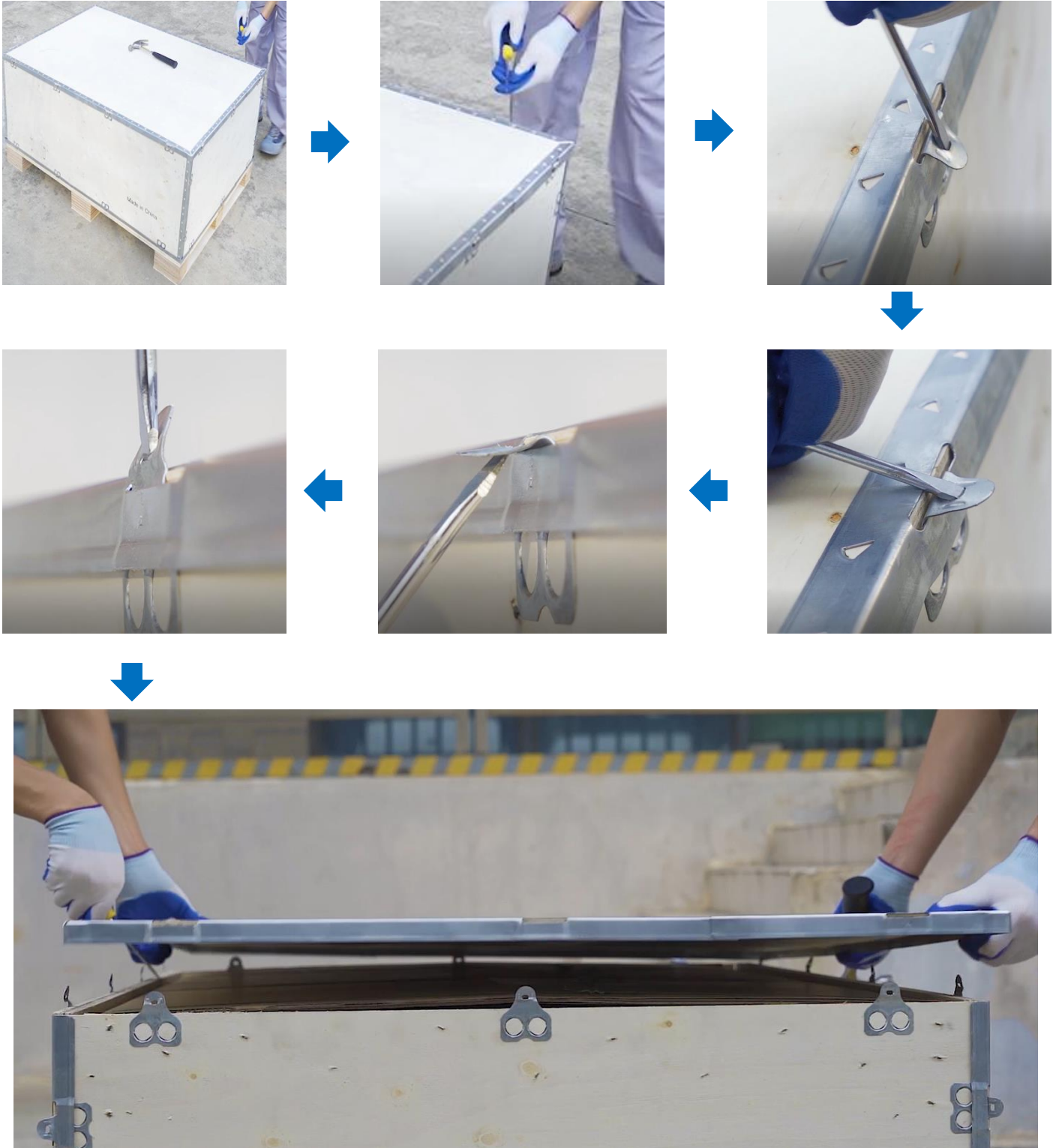


Special care must be taken to protect personal safety. Reinforced toe shoes must be used to protect the installers in case equipment tilts and fall.

Step 2: Mobilization and Unboxing

Mobilize equipment to the installation site

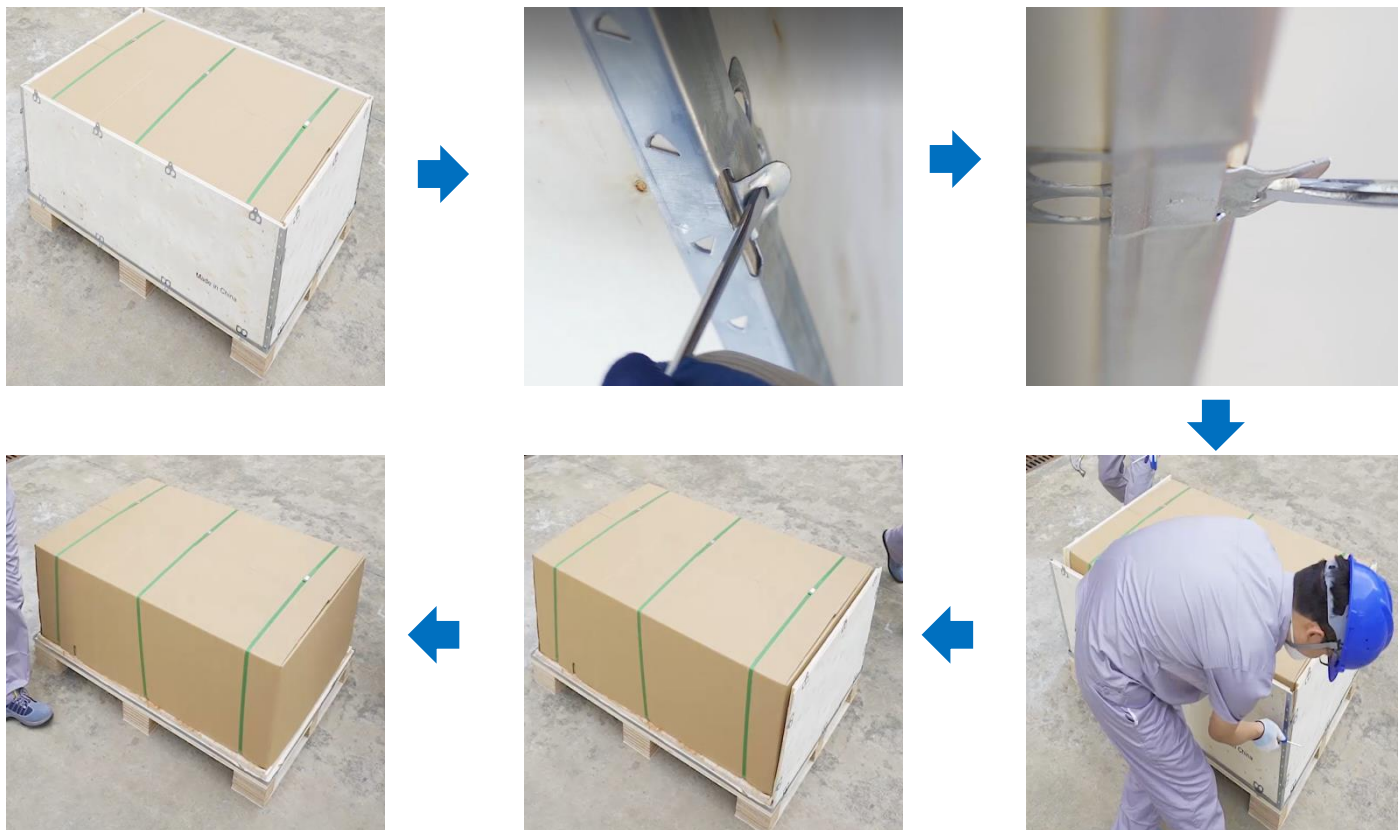
● The aGate unit and its mounting brackets are light in weight and small in size allowing them be carried to the installation site. The aPower unit's packaging is large and bulky making it very hard to move it into a confined space. Installers will need to disassemble the external wooden box. A 1/4"X4" straight screwdriver and a claw hammer can be used to follow the procedures below.



Step 2: Mobilization and Unboxing

Unboxing

- Remove the sides of the wooden box from aPower.



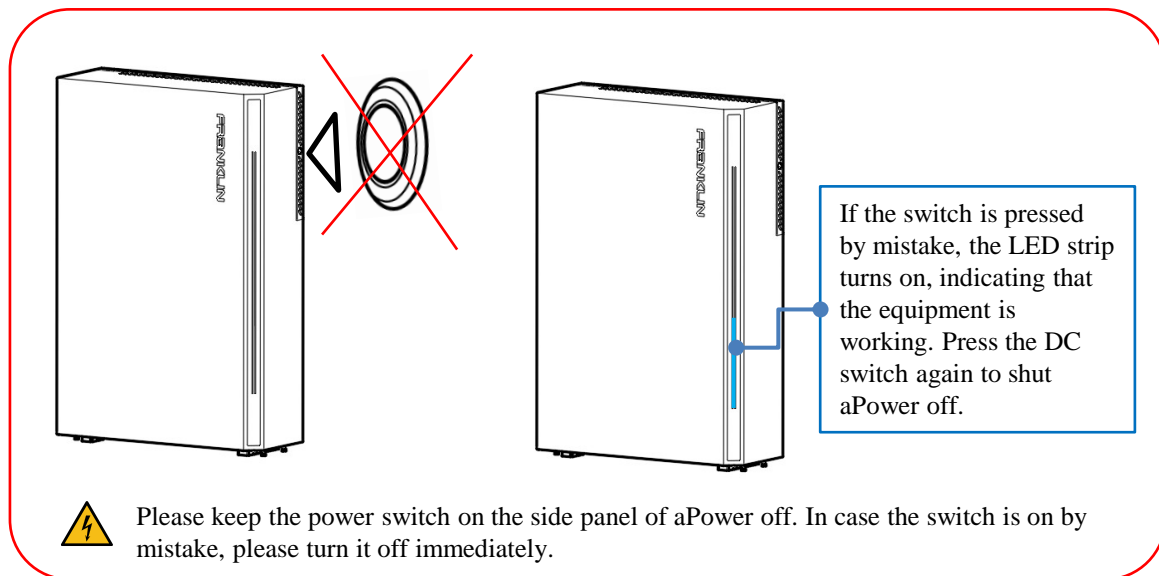
- Remove the protective carton and upper foam. Do NOT touch or operate the switch on the right side of the aPower case.



Step 2: Mobilization and Unboxing

Stand up aPower

● Two installers will be needed. Push aPower along the wooden pallet horizontally until the feet of aPower slide off the pallets area and the upper case of aPower tilts upward. The two installers can work together to fully stand up the aPower.



Mobilize aPower to installation site

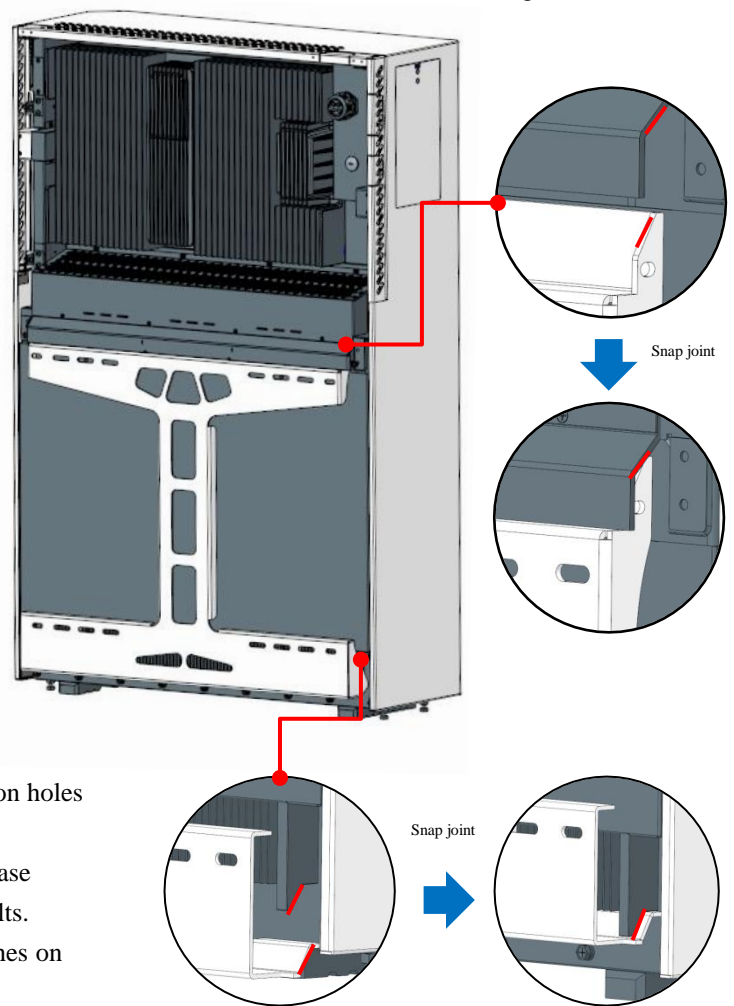
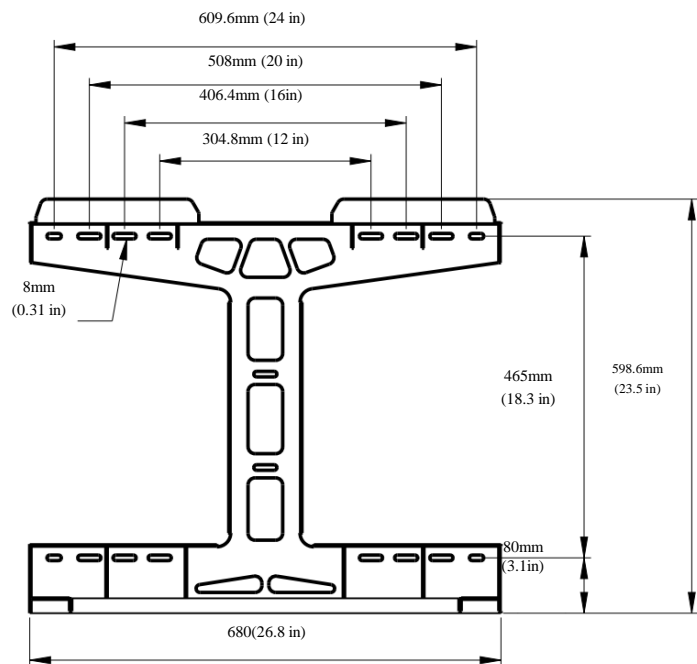
● A small-sized hand truck (with stair climbing features) may be used to carry aPower to the installation site.



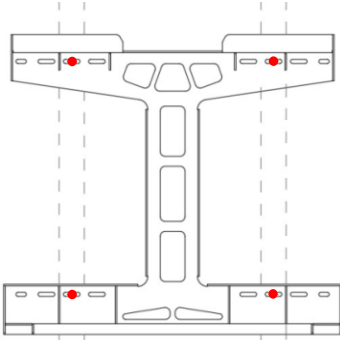
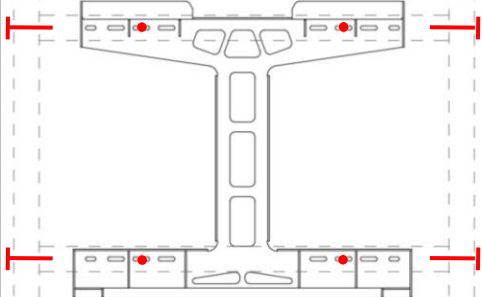
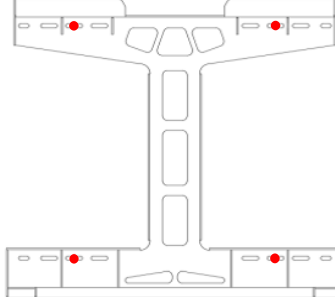
Step 3: aPower

aPower Mounting brackets

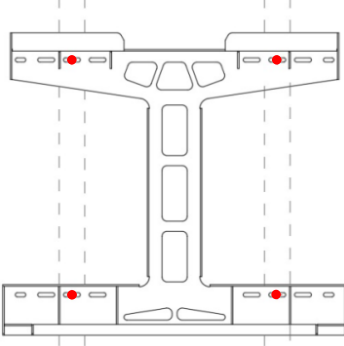
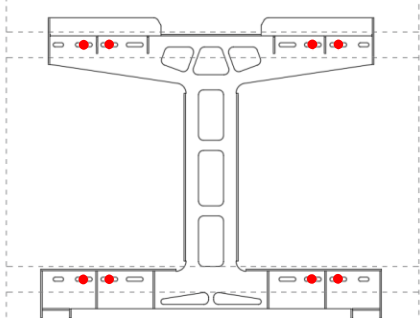
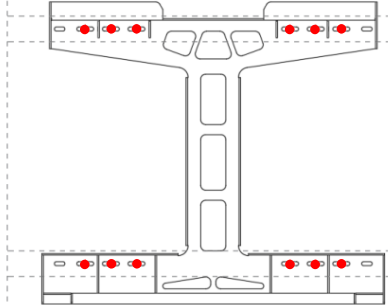
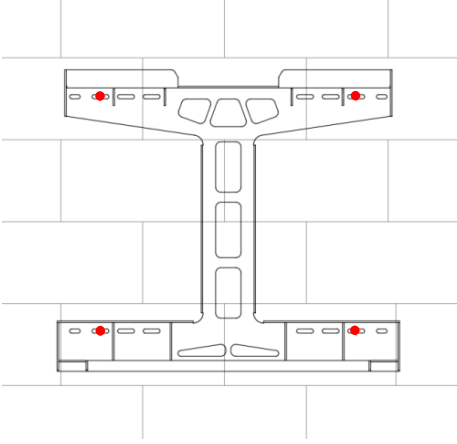
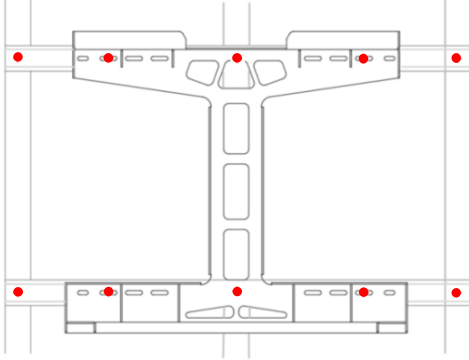
● The mounting bracket couples mates with the installation hangers on the back of aPower through a wedged structure to keep aPower tightly in position. Mounting brackets are required for both floor mount and wall mount installation. Mounting brackets should be fastened to the wall at a minimum of 4 points.



● The installer needs to choose the fasteners and required installation holes depending on the type of wall. The following details are general recommendations and should cover most installation conditions. Please refer to local applicable regulations for selection of fasteners and bolts. Mounting bracket has the mounting holes spaced at 12/16/20/24 inches on center in the horizontal direction.

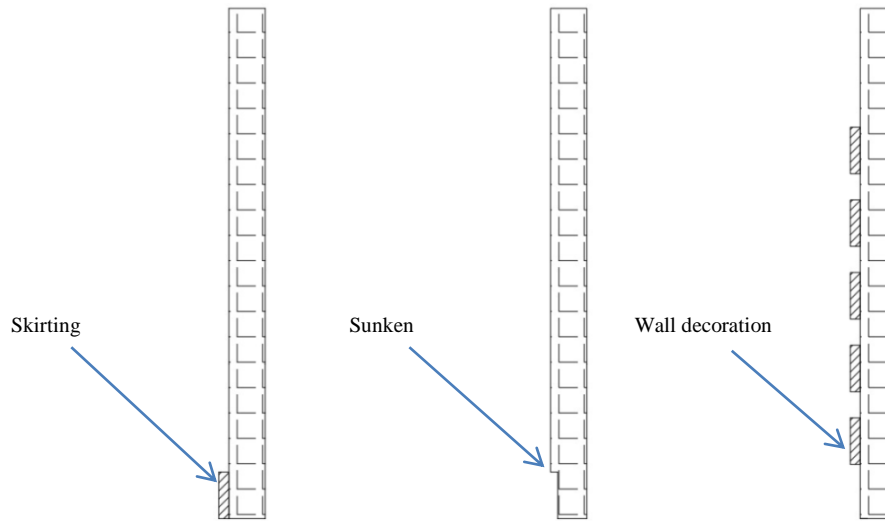
Wood Studs (spaced at 12, 16, 20 or 24 inches)	Wood Studs (spaced at 12, 16, 20 or 24 inches)	Plywood
If anchoring directly into wood studs, use at least four (one in each corner) 1/4-inch wood screws with washers, of sufficient length for at least 2-1/2 in. embedment into the studs.	If anchoring to blocking between wood studs, use minimum 2 x 4 in blocks, end-nailed into studs with two 16d nails or toe-nailed into studs with four 8d nails. Use at least four (one in each corner) 1/4-inch wood screws with washers, of sufficient length for at least 2-1/2 in. embedment into the blocking.	If anchoring to plywood wall material, the plywood must be minimum 1/2-inch thick. Use at least four (one in each corner) 1/4-inch diameter wood screws with washers, of sufficient length to penetrate at least 1/4 inch beyond the backside of the plywood.
		

Step 3: aPower

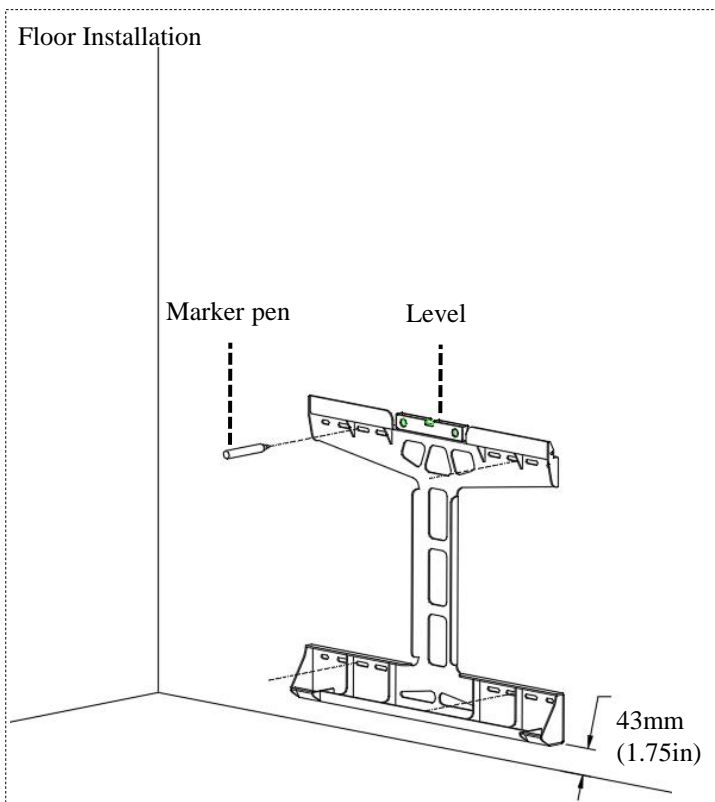
<p>Metal Studs (spaced at 12, 16, 20 or 24 inches)</p> <p>If anchoring directly to metal studs, studs must be minimum 18 gauge. Use at least four (one in each corner) #14 sheet metal screws with washers, of sufficient length to penetrate at least 3 threads beyond the stud.</p>	<p>Metal Studs (spaced at 12, 16, 20 or 24 inches)</p> <p>If anchoring to backing between metal studs, studs must be minimum 25 gauge, and backing must be minimum 22 gauge. Use at least eight (two in each corner) #14 sheet metal screws with washers, of sufficient length to penetrate at least 3 threads beyond the backing.</p>	<p>Metal Studs (spaced at 12, 16, 20 or 24 inches)</p> <p>If anchoring to backing between metal studs in an outdoor high wind area, studs must be minimum 25 gauge, and backing must be minimum 22 gauge. Use at least twelve (three in each corner) #14 sheet metal screws with washers, of sufficient length to penetrate at least 3 threads beyond the backing.</p>
		
<p>Concrete or Masonry Minimum strength must be 2500 PSI (concrete) or 1500 PSI (masonry). Use at least four (one in each corner, in any available anchor slot) 1/4-inch fasteners with washers, of sufficient length for at least 1-1/2 in (38 mm) embedment into the material. Ensure that all fasteners are at least 1-1/2 in (38 mm) away from the edges of masonry blocks or bricks.</p>	<p>Channel Strut (Unistrut) Struts must be minimum 1-5/8 in x 1-5/8 in, 12 gauge. If mounting on wood studs, attach the strut to at least three studs, using at least one 1/4-inch wood screw with washer per stud, of sufficient length for at least 2-1/2 in embedment into the studs. If mounting on metal studs, attach the strut to at least three studs, using at least two #14 sheet metal screws with washers per stud, of sufficient length to penetrate at least 3 threads beyond the studs. To attach the bracket to the struts, use at least four (one in each corner) 1/4-inch hex head screws with washers and strut nuts.</p>	
		

Step 3: aPower

● Examine the smoothness of wall. If the wall is not smooth enough, the mounting brackets may not completely fit with the wall because of the gaps. Plasterboards will be needed to fill the gaps to ensure all parts of the mounting bracket are well supported by the wall and the installation inclination is less than $\pm 2^\circ$.

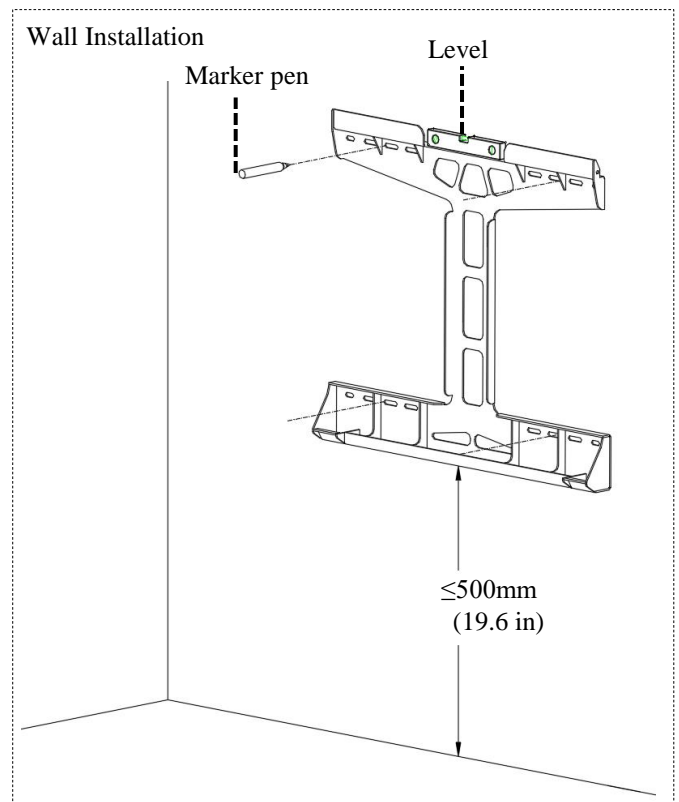


● The height of mounting brackets depend on the installation type of aPower: floor mounted or wall mounted installation. Two scenarios below illustrate differences in the height of mounting bracket over the floor.



Scenario 1: Floor installation (recommended)

- ① Place the mounting bracket at the planned installation position. Support the mounting bracket at the bottom using a 1.75 inch-thick wood block.
- ② Use a spirit level to adjust the installation angle.
- ③ Make marks at the mounting holes where the fasteners will be used.

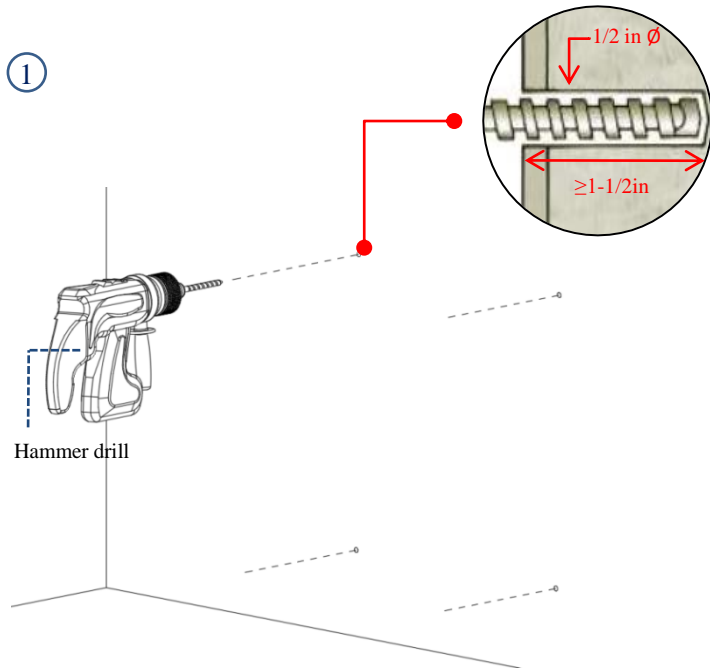


Scenario 2: Wall installation

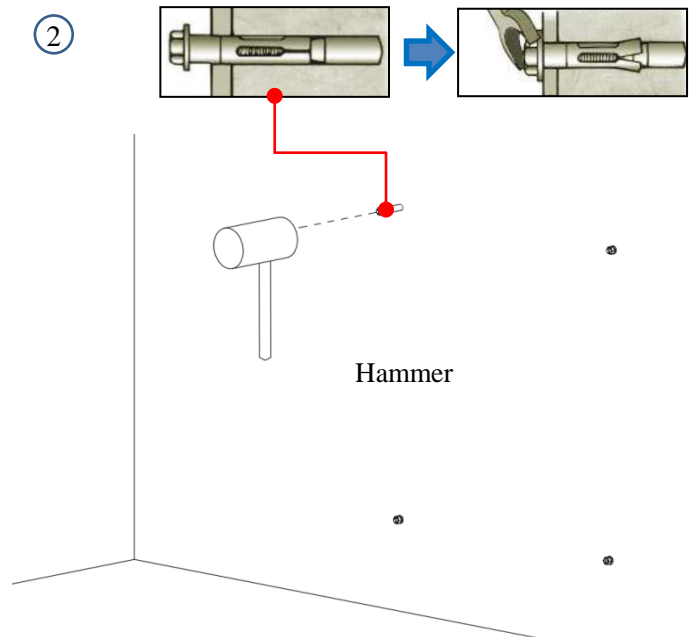
- ① Two installers will be needed to complete the installation. One installer supports the mounting bracket, keeping the bracket at the desired position on the wall. Adjust the bracket height so that there is 19.6 inch clearance between the bracket bottom and the floor. Adjust the bracket angle using a spirit level.
- ② The other installer marks the mounting holes where the fasteners will be used.

Step 3: aPower

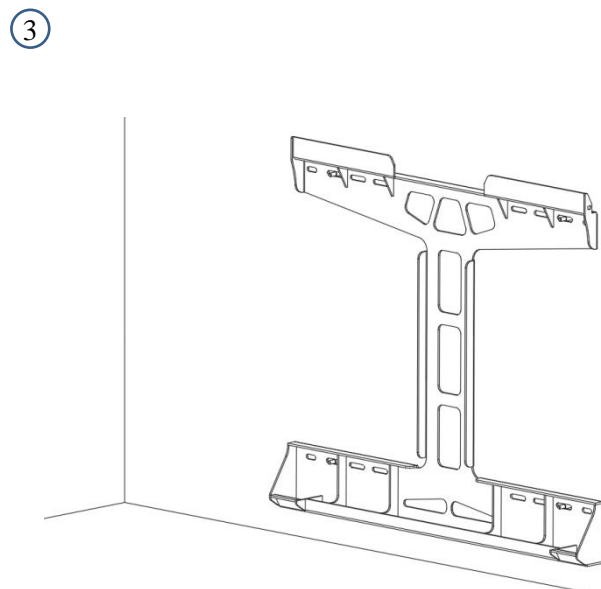
- The following are basic steps to use the mounting bracket on concrete or brick structures:



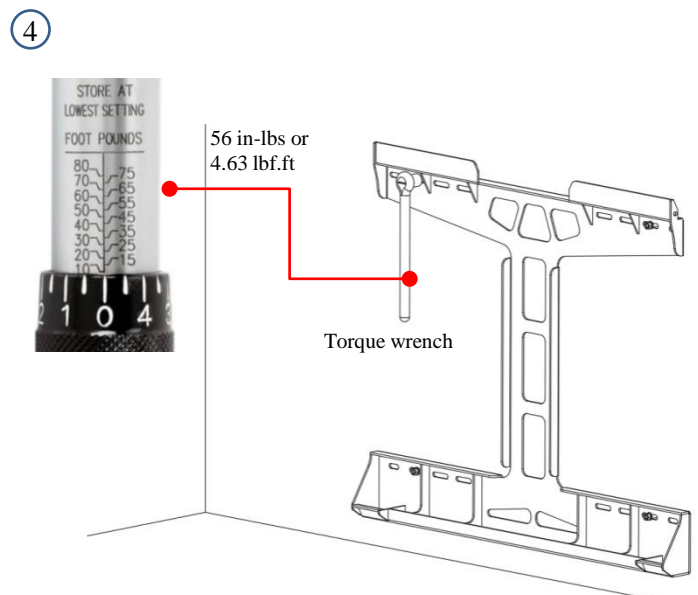
1. Using a hammer drill and carbide tipped drill bit, drill a hole the same diameter as the anchor diameter, and at least 1-1/2" deeper than the expected embedment. Ensure that all fasteners are at least 1-1/2" (38 mm) away from the edges of masonry blocks or bricks. Clean out the hole of all debris.



2. Set the nut flush with the top of the sleeve anchor. Use a hammer to drive the sleeve anchor into the hole in the base material until the washer and nut are tight against the fixture. Turn the nut until finger tight. Use a 7/16" wrench to set the anchor by turning the nut three to four full turns.



3. Use a 7/16" wrench to turn the nut in the opposite direction. Remove the nut, spring washer, and flat washer from the sleeve anchor. Set the Mounting bracket to the sleeve anchor.

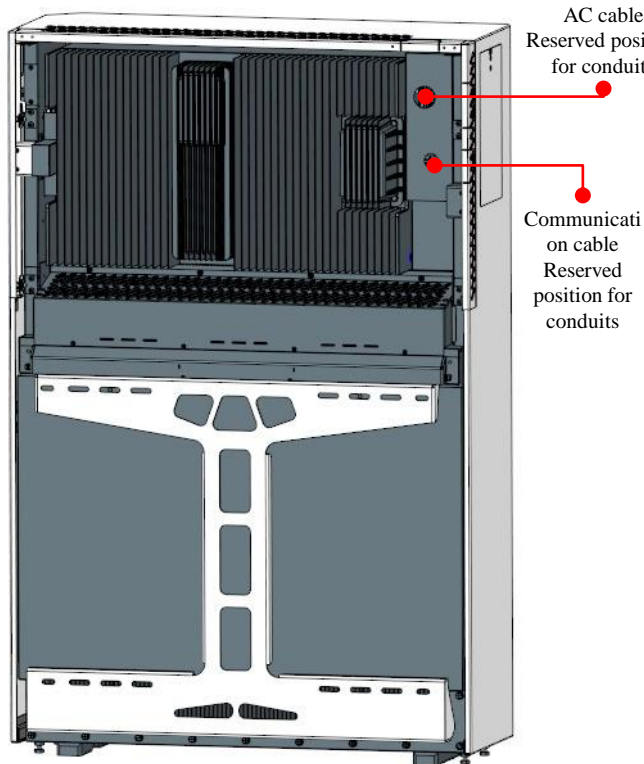


4. Use a 7/16" wrench to fix the Mounting bracket by turning the nut until the torque is 56 in-lbs.

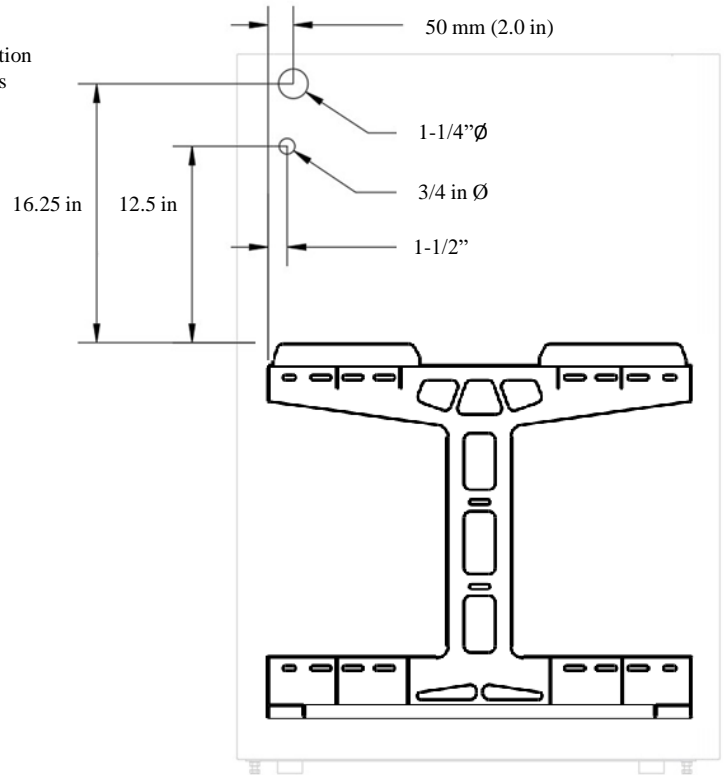
Step 3: aPower

Drill cable inlet holes on the wall (applies only when connecting cables run in wall, not exterior conduit)

● Drill holes at the cable inlet on the back of aPower (this step is not necessary if cables do not enter aPower from inside the wall or through the wall). Coordinate the holes with the any present external metal or wooden support brackets..



Back view: Mounting brackets, positions of holes for electric conduits



Front view: Mounting brackets, positions of holes for electric conduits

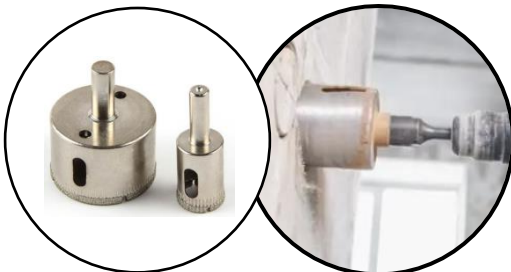


In case of wooden wall:

Electric drill and 1", 1-1/2" wood bits are recommended to create holes for running cables on wooden walls. It is important that the drill bit should be kept 90° perpendicular to the wall when drilling.



EPQ must be used in the above-mentioned operation.



In case of concrete or brick walls:

Hammer drill and 1", 1-1/2" Diamond tipped core bits are recommended to create holes for running cables on concrete walls or brick walls. Wet the wall and HEPA vacuum the dust, to protect the drill bits from overheating. Keep the drill bit 90° perpendicular to the wall surface.



EPQ must be used in the above-mentioned operation.



In case of metal wall or metallic studs:

Electric drill and 1", 1-1/2" hole saw are recommended to create holes for running cables on metal plate and hardware. Wet the wall and use a HEPA vacuum to manage dust to protect the drill bits from overheating. Keep the drill bit 90° perpendicular to the wall surface.

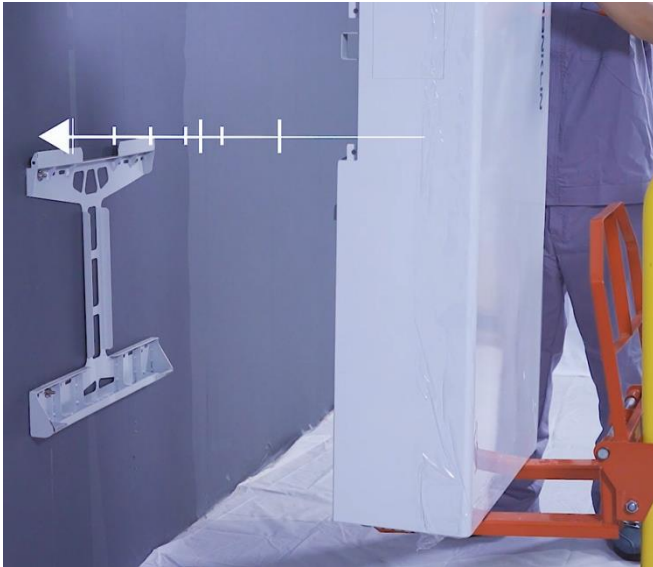


EPQ must be used in the above-mentioned operation.

Step 3: aPower

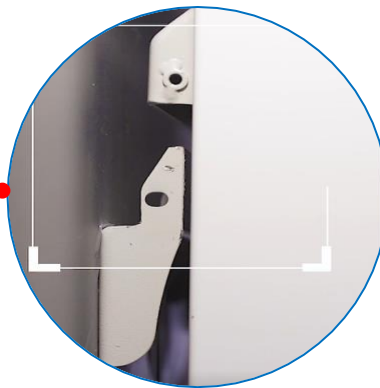
aPower lifting

- For both floor mounting or wall mounting, a fork hand truck will be needed to lift aPower so that the installation clips on the unit back are higher than the top of the mounting bracket.



Special care must be taken to protect personal safety. Reinforced toe footwear must be used to protect the installers in case the equipment tilts or falls.

- Adjust the angle and position of the fork hand truck, move the lift towards the mounting bracket until the mounting bracket is completely aligned to the back clips on aPower and the wedge structures on the mounting bracket are within locking position of the back joint on the rear of aPower.

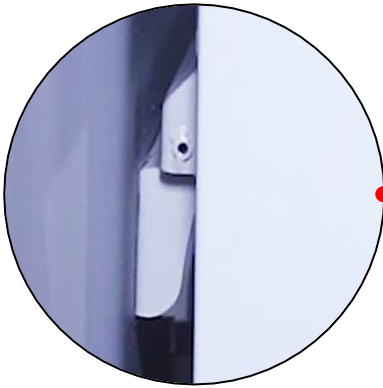


- Lock the wheels of the fork hand truck, to prevent it from tilting or displacement.



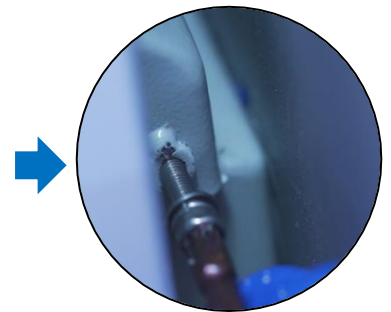
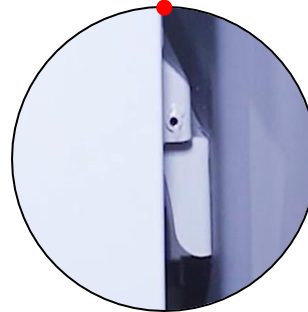
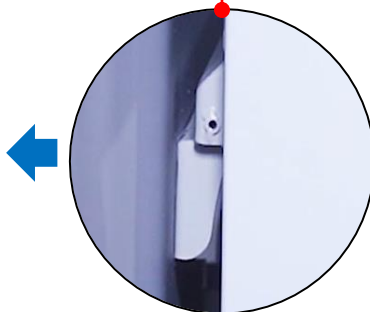
Step 3: aPower

- Lower the fork until the upper and lower snap joints are locked by the mounting brackets firmly. In this process, the installer must push the front side of aPower, to ensure the back is firmly locked into the mounting brackets.



Special care must be taken to protect personal safety. Reinforced toe footwear must be used to protect the installers in case the equipment tilts and fall.

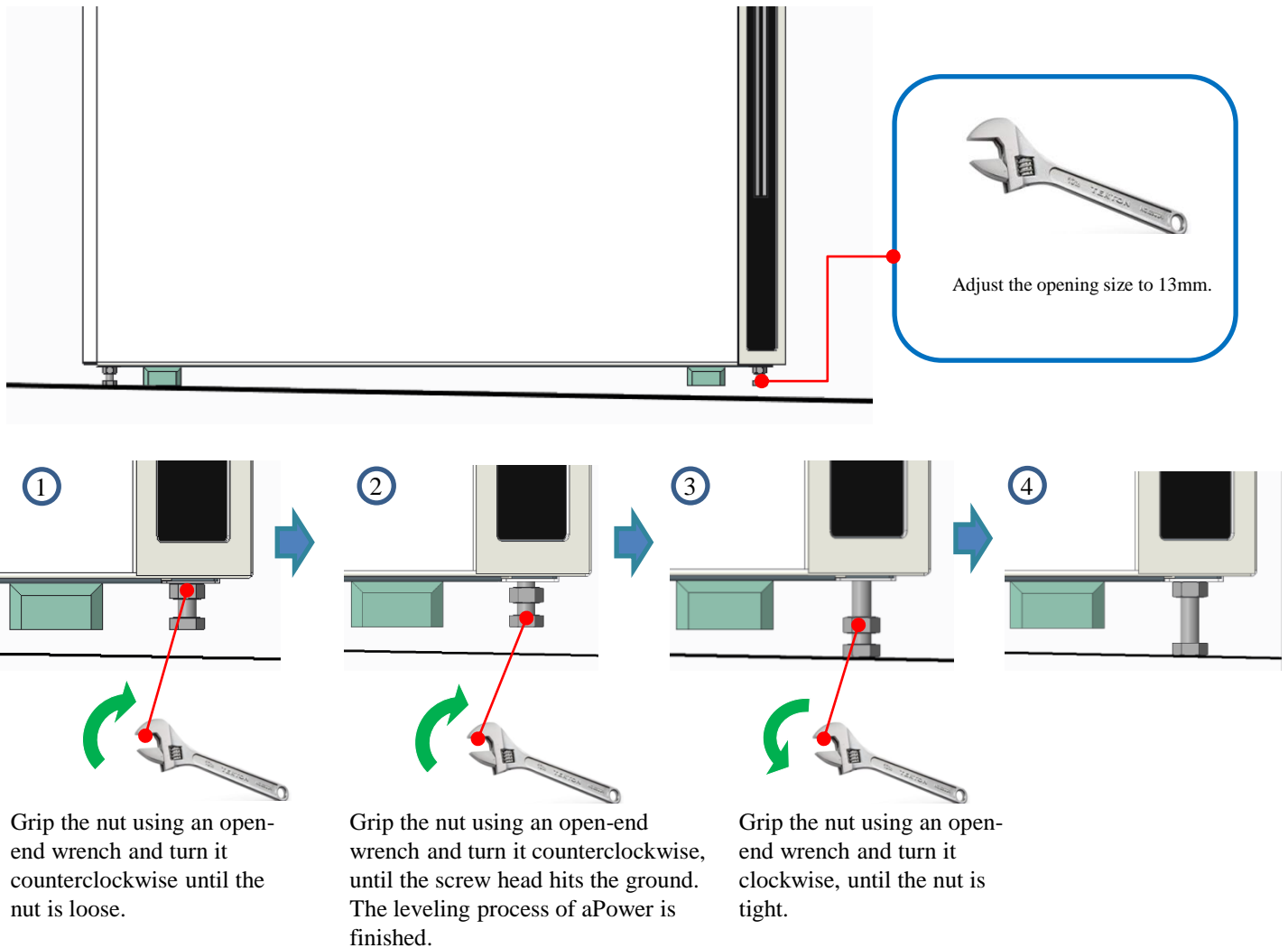
- Install M5X25 fasteners at 3N*m to the stopper position of the upper joint of aPower.



Step 3: aPower

aPower floor mounted leveling adjustment

● If aPower is installed on over an uneven floor, the leveling screws on the bottom of aPower cabinet can be adjusted until the screw directly contacts the floor. Both the floor and the wall mounted bracket will provide sufficient support for aPower.



Install parallel distribution panel (this step is required when more than (1) aPower is installed)

● Install the parallel distribution panel for aPower. Eaton load centers are recommended. Each aPower has a 2-pole input terminal, and the total number of available circuits should be larger than the quantity of parallel aPowers. Please refer to the aPower overview section for additional information on the charging and discharging of aPower.

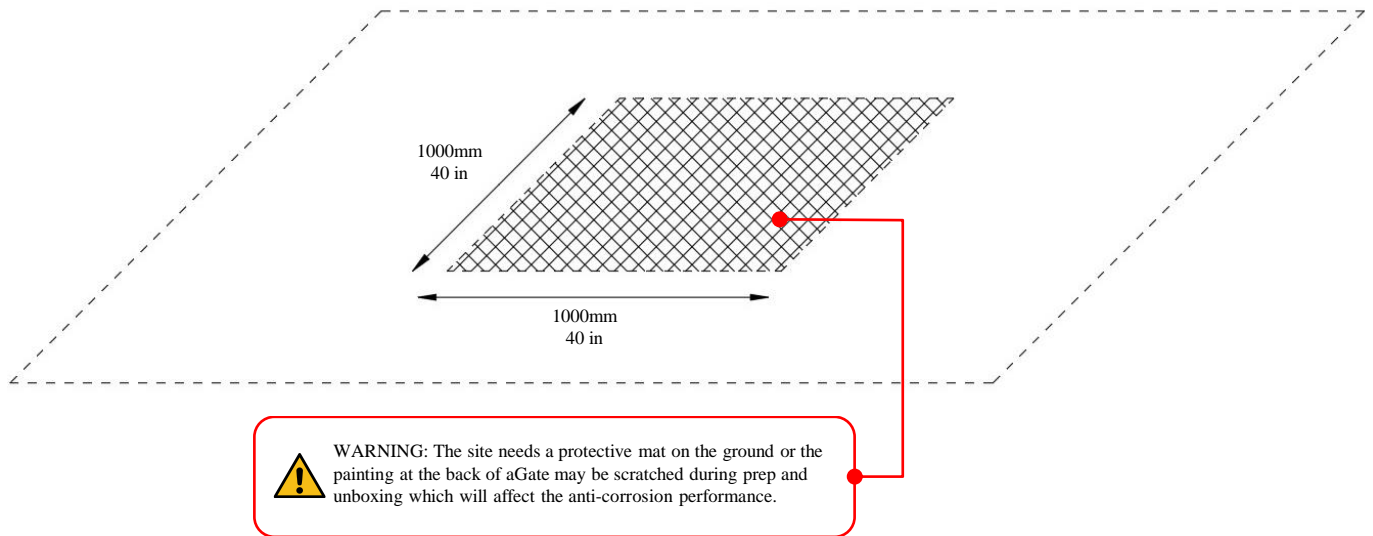


Please refer to the installation instructions provided by the product manufacturer for the specific installation steps of the load centers.

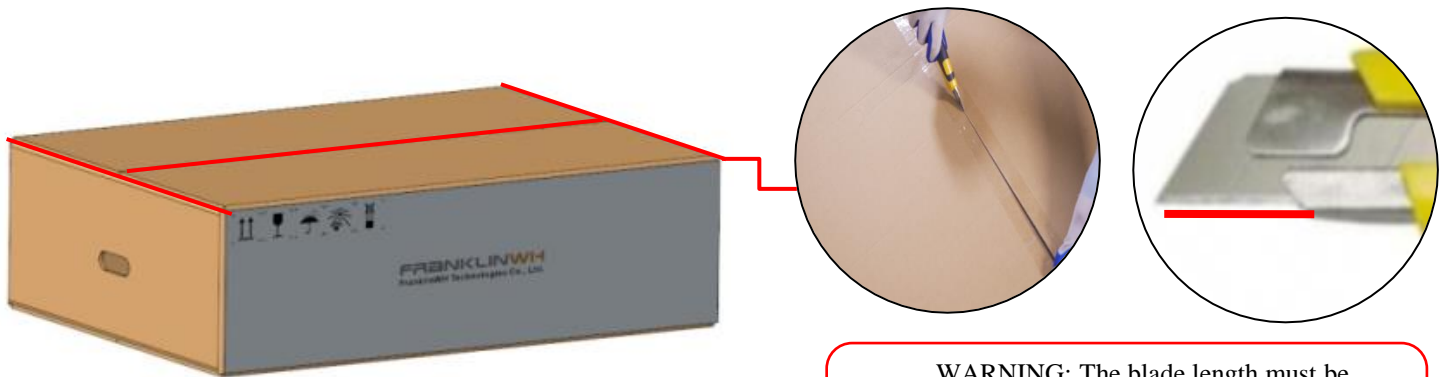
Step 4: aGate

Unboxing

- Find a clear, level site of at least 40" x 40" to remove the external and internal panels of aGate.



- Adjust the utility knife until the blade is less than 1 inch long (it may damage aGate if too long). Cut open the adhesive tape on the upper surface of the aGate carton.



WARNING: The blade length must be less than 1 inch long, or it may damage the exterior surface of the equipment stored inside.

- Open the aGate carton, take out the drill template guide board, accessories, and take aGate out of the box.

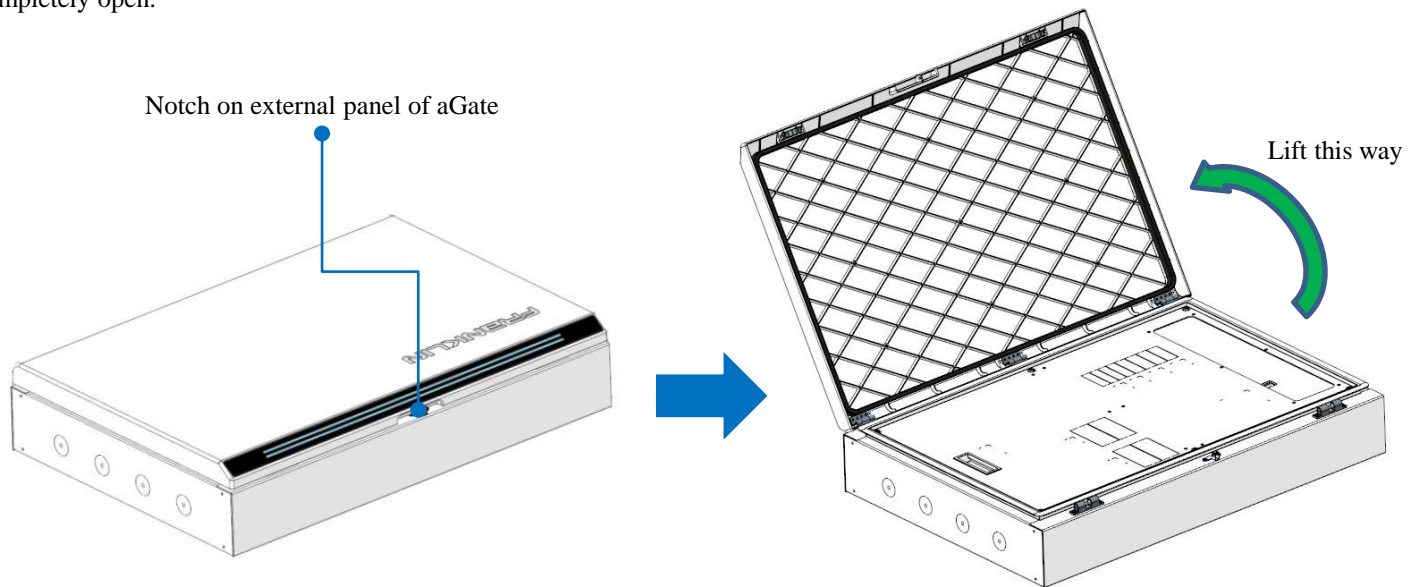
WARNING: The drill template guide board will be used for hole drilling during. Keep it in good condition before the installation completes.

- Remove the butter foam from both sides of aGate and remove the PE bag.

Step 4: aGate

Remove the internal and external panels from aGate

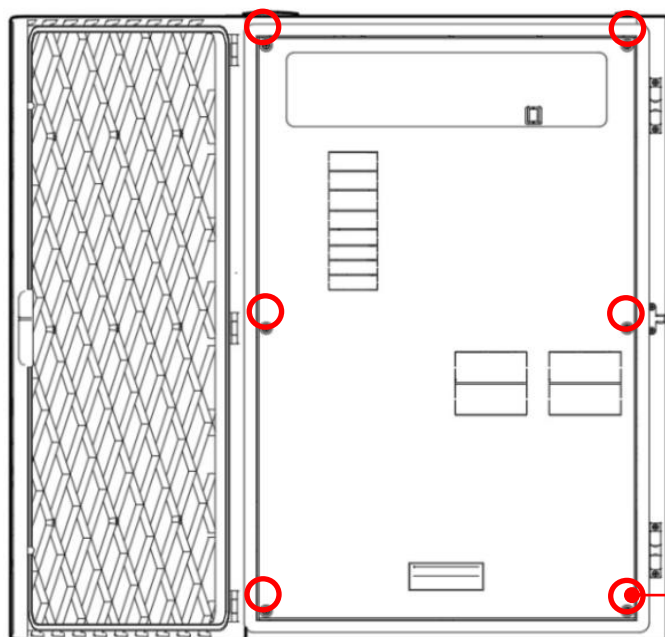
- Put your hand at the small notch on the right panel of aGate and pull it outward. Lift it slowly until the external panel of aGate is completely open.



WARNING: The external panel of aGate is made from plastic and may only be opened a maximum of 115°. Violent operation may lead to cracking of the plastic panel.

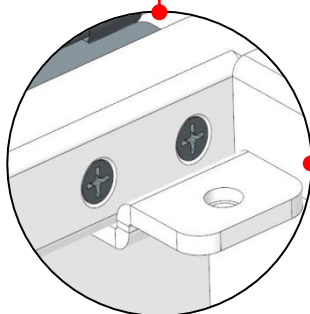
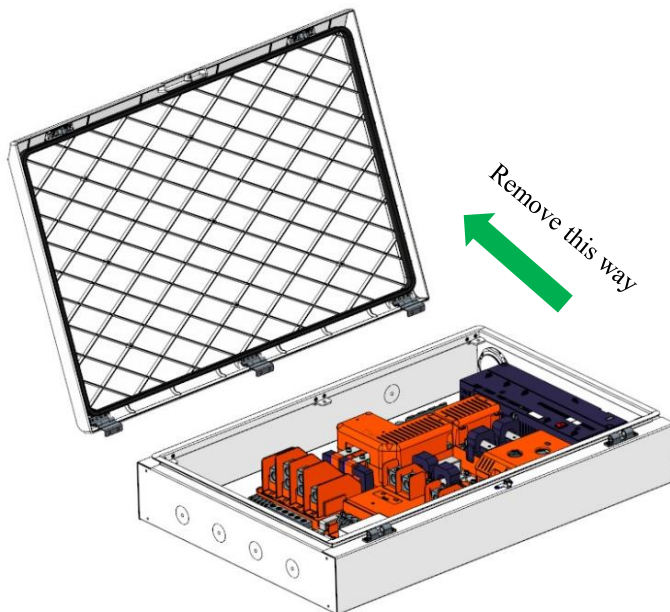
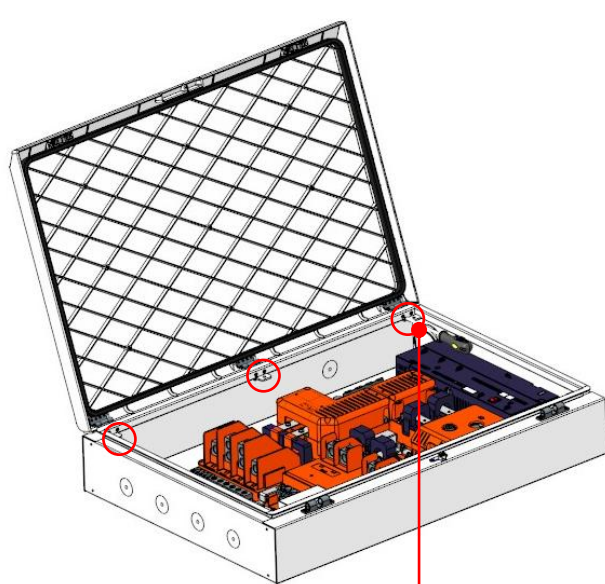
Step 4: aGate

● Use a #3X4" Phillips head cross screwdriver or an electric screwdriver with a Phillips head cross screw bit. Turn the 6 combination screws fastening the internal panel counterclockwise to remove the screws. Please keep the internal panel of aGate out of the way.



WARNING: Misconduct may lead to thread galling, which will damage aGate as the screws can not be loosened.

● Use a #2X4" Phillips head cross screwdriver. Turn the (6) recessed screws fastening the hinge on the external panel of aGate, to remove the screws. Please don't lose the recessed screws and set aside the external panel.



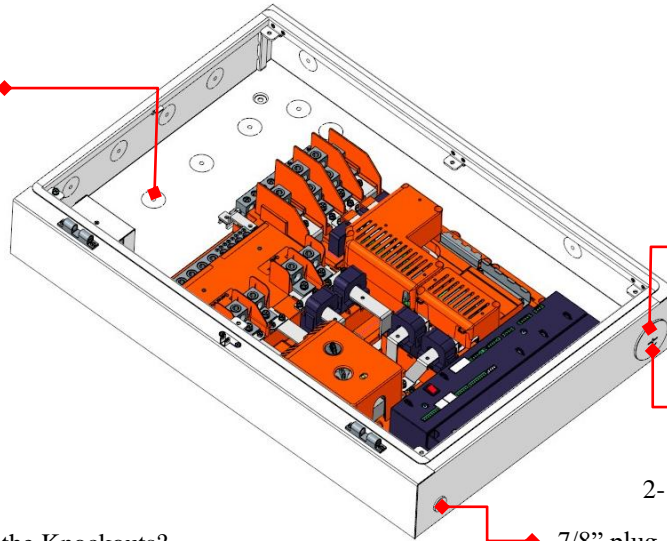
WARNING: Carefully loosen the screws to avoid stripping the threads or the heads.

Step 4: aGate

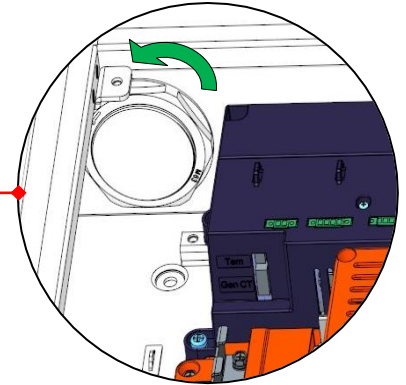
Prepare aGate cable inlets

● Based on the preplanned installation position and electric conduit arrangement, the installer may choose to remove the knockouts or plug in aGate, where all knockout holes are 1-23/64" in diameter while the plugged holes are 7/8" and 2-15/32" in diameter respectively.

1-23/64"
knockout hole

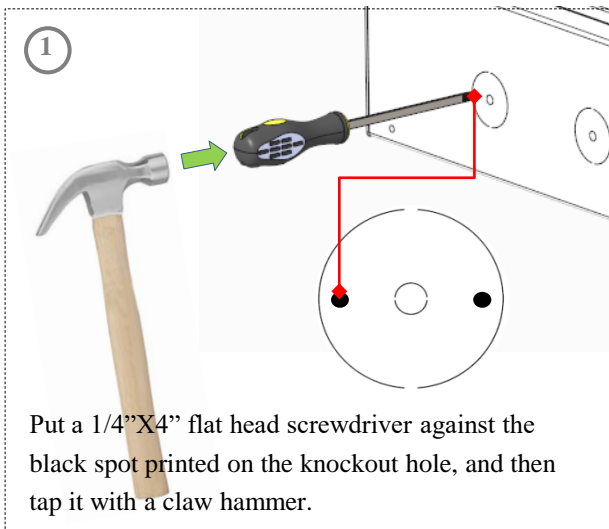


How to Removing the plugs?

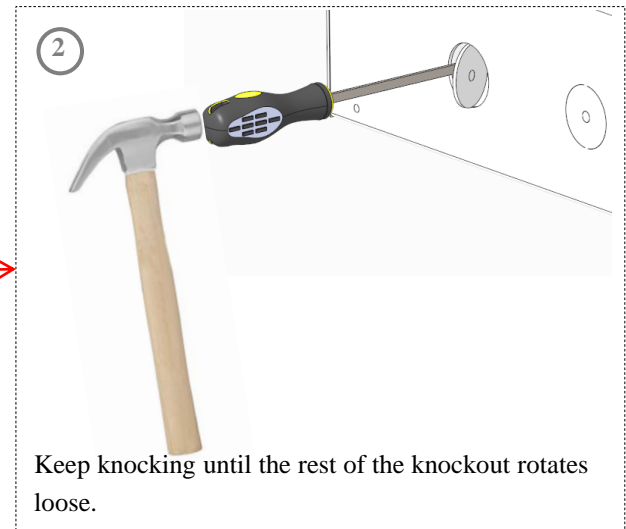


Hand turn the plug nut counterclockwise until the nut is removed. Then remove the plug.

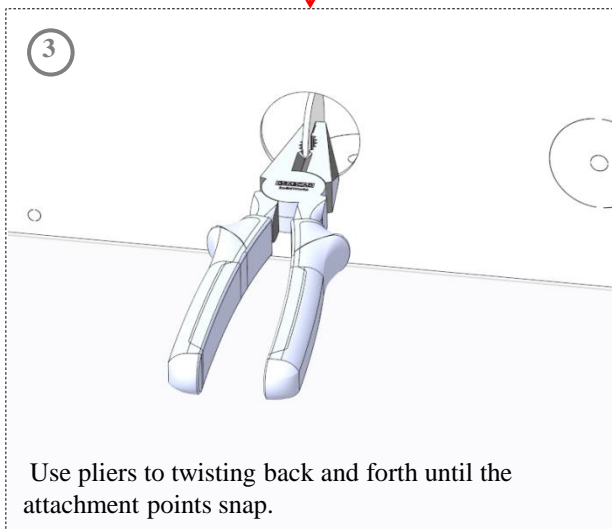
How to Removing the Knockouts?



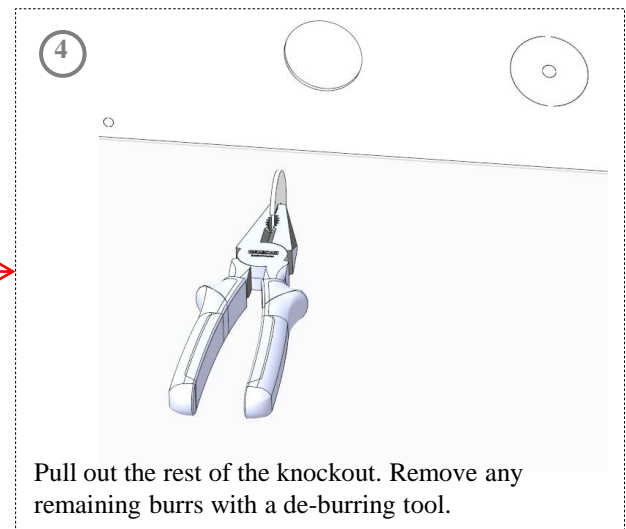
Put a 1/4"X4" flat head screwdriver against the black spot printed on the knockout hole, and then tap it with a claw hammer.



Keep knocking until the rest of the knockout rotates loose.



Use pliers to twisting back and forth until the attachment points snap.

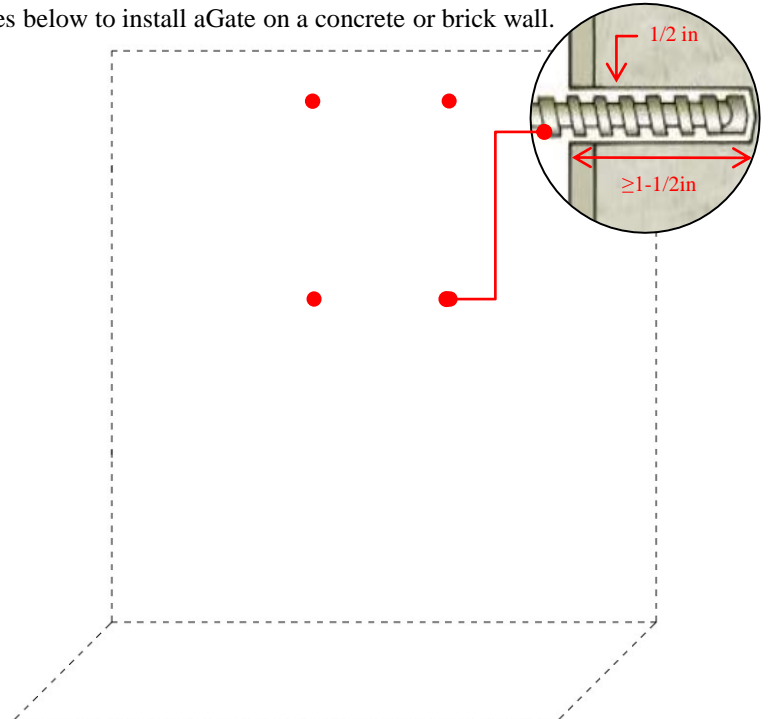
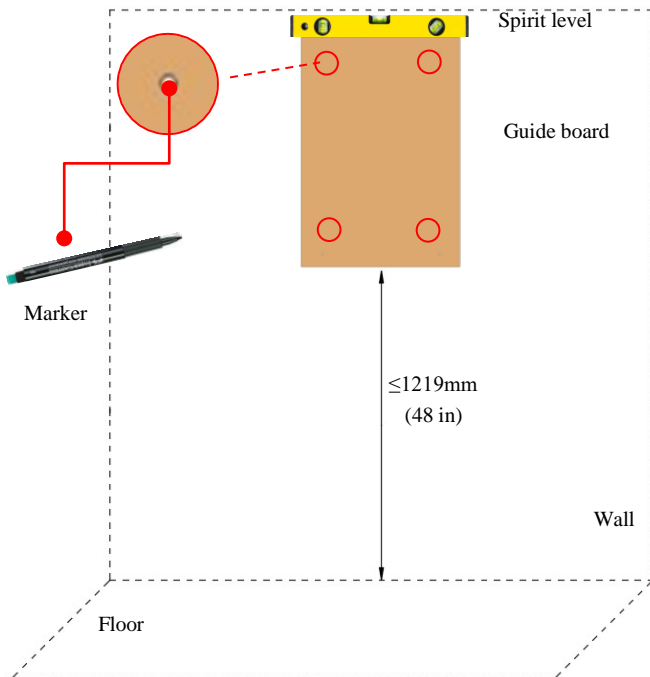


Pull out the rest of the knockout. Remove any remaining burrs with a de-burring tool.

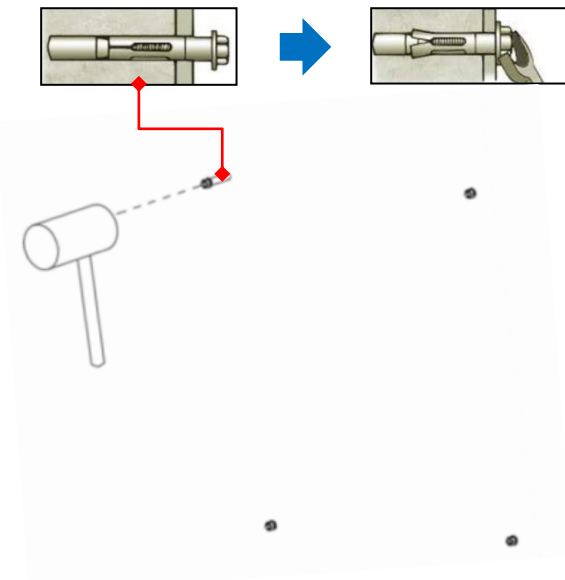
Step 4: aGate

Wall installation of aGate

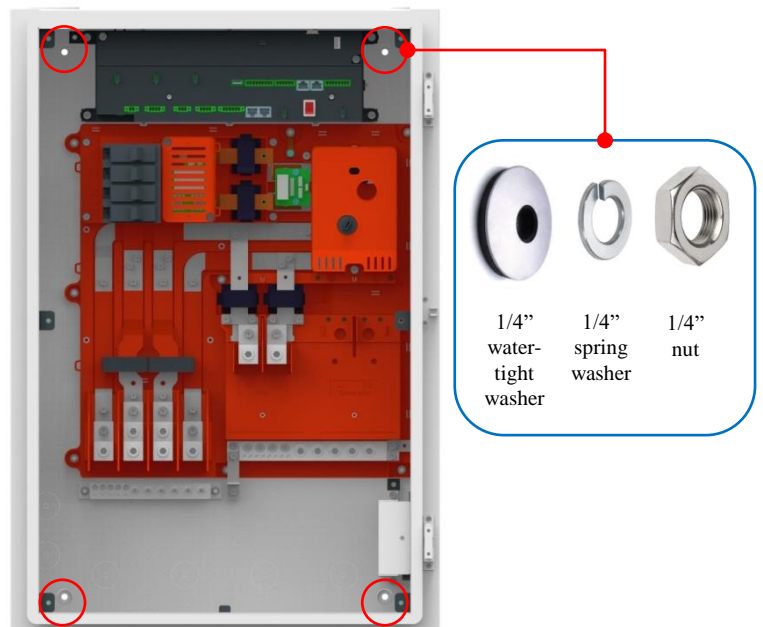
- To install aGate on the wall, please follow the basic procedures below to install aGate on a concrete or brick wall.



1. Put the aGate guide board drill template at the planned installation position. The recommended installation height of aGate is $\leq 48''$ AFF (the installer shall consult your local laws and building regulations for details). Use a spirit level to adjust the levelness of the guide board and make marks at the four holes on the guide board.



2. Using a hammer drill and carbide tipped drill bit, drill a hole the same diameter as the anchor diameter, and at least $1\frac{1}{2}''$ deeper than the expected embedment. Ensure that all fasteners are at least $1\frac{1}{2}\text{ in}$ (38 mm) away from the edges of masonry blocks or bricks. Clean out all debris from the hole.

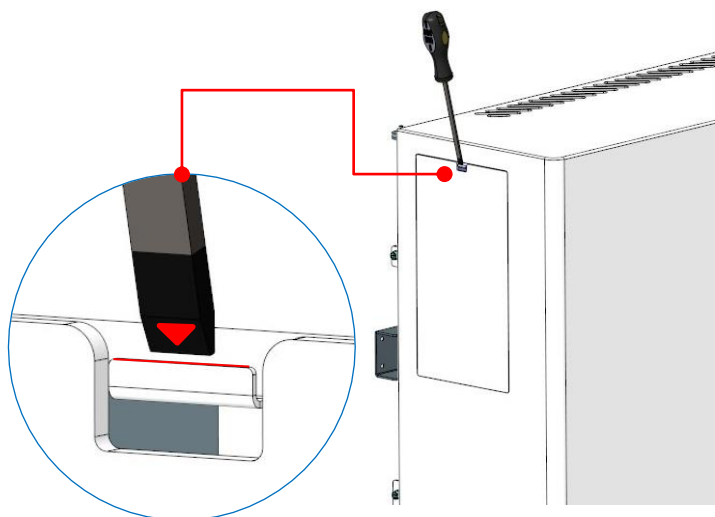


3. Use a $\frac{7}{16}''$ wrench to turn the nut in the opposite direction, and remove the nut, spring washer, and flat washer from the sleeve anchor.

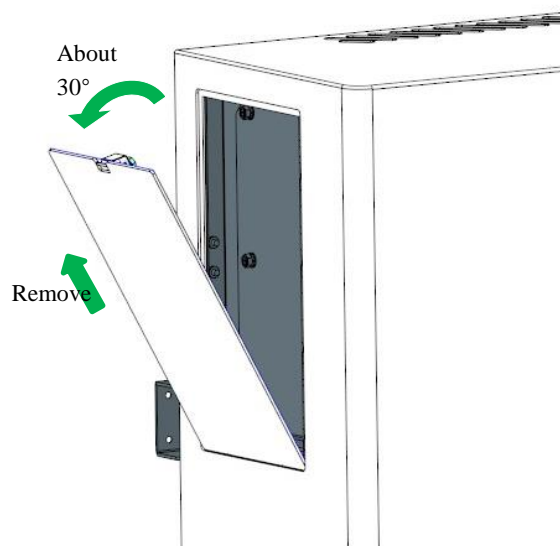
4. Fasten aGate to the wall using the fittings of aGate: $\frac{1}{4}''$ water-tight washer, spring washer and nuts, and check that the tightening torque is 4.63 lbf.ft or 56 in.-lbs.

Step 5: Electrical Conduits

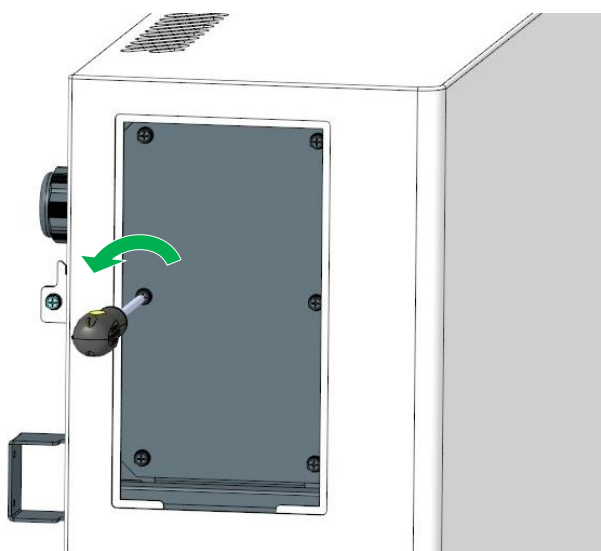
Open the wiring panel's cover on aPower unit casing



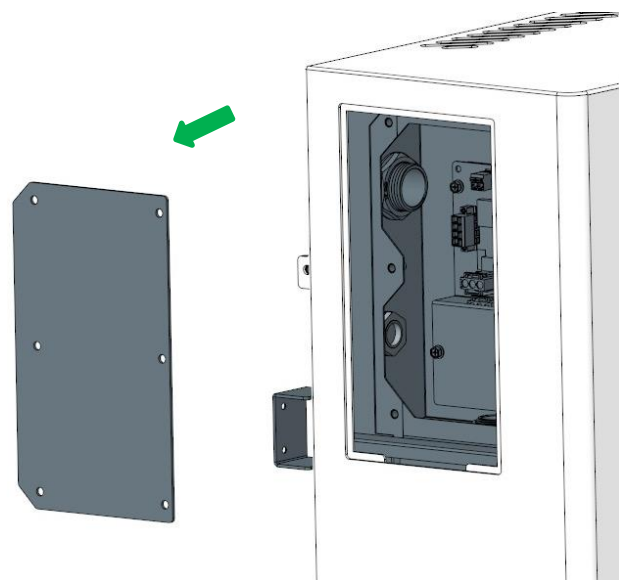
1. Use a 1/4"X4" flat head screwdriver and insert it into the snap joints.



2. Turn its counterclockwise by about 30°, and then lift the exterior cover board on the wiring closet.



3. Turn the 6 screws on the internal panel on the wiring closet counterclockwise, using a #3X4" Phillips head cross screwdriver.



4. Remove the internal panel cover and label the board to the equipment. This is very important because the nameplate of aPower must correspond to the aPower. If there are multiple aPowers installed mixed up covers may affect the product warranty.



WARNING: Be careful not to strip the heads or threads of the screws.

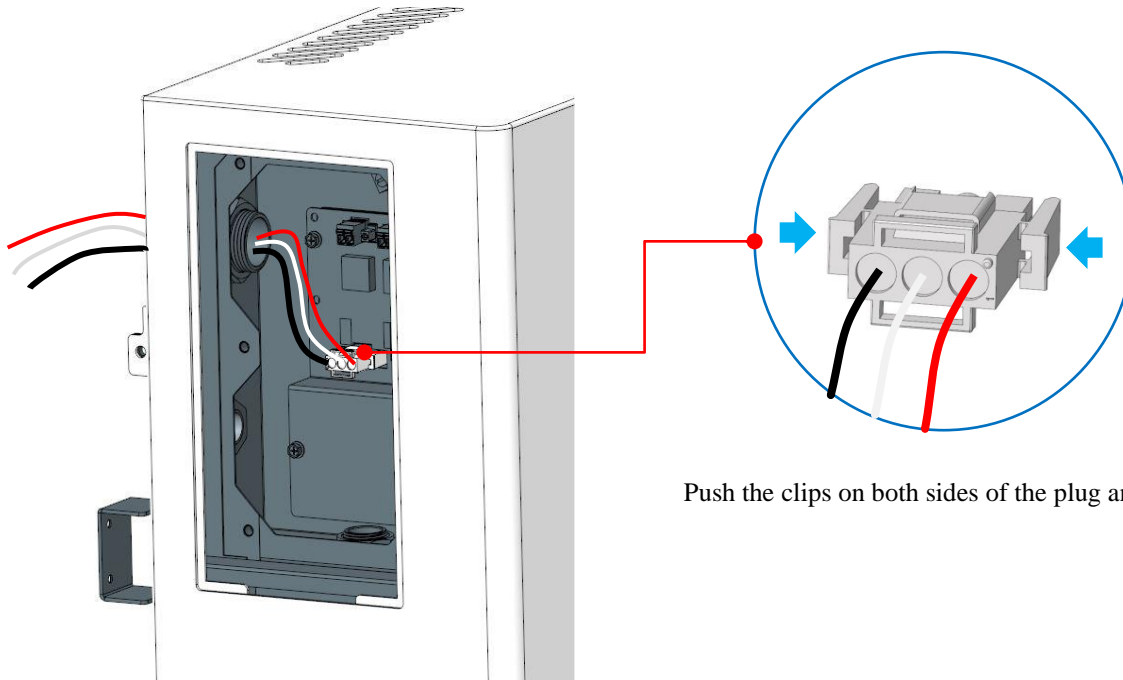


WARNING: There is a unique SN on the nameplate on the internal cover board, and the SN must correspond with the aPower equipment. Any mistake will lead to void warranty.

Step 5: Electrical Conduits

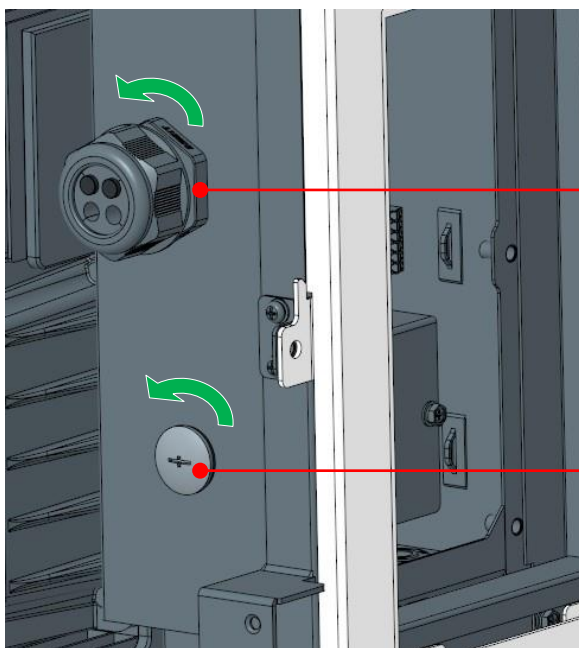
Remove aPower charging cable

- Unplug the charging cable



Push the clips on both sides of the plug and pull it out.

- Open the adjustable wrench to 41mm. Turn the nut at the end of the water-tight lock counterclockwise with one hand, while hold the nut inside the wiring closet in position with the other hand, to prevent it from turning until the water-tight lock is completely removed from the cable hole (the lock and the charging cables are not to be used and may be recycled once they are removed). Turn the plug with one hand using a flex-head ratchet wrench and a Phillips head cross screw bit and hold the nut on the plug inside the wiring closet with the other hand until the plug is completely removed.。



Adjust the opening size to 41mm.

Run power cable through here



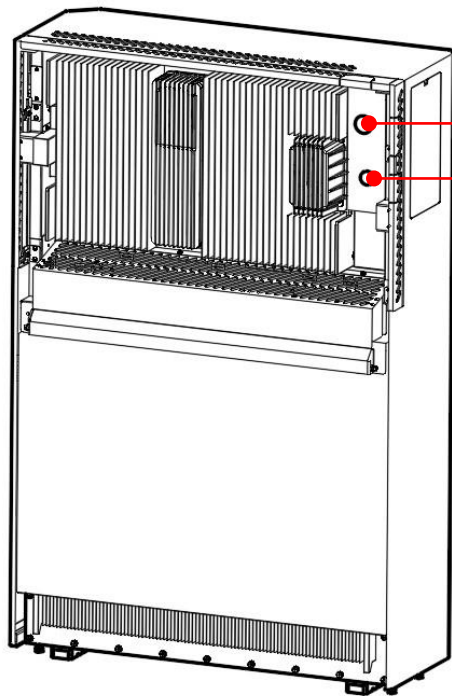
Flex head ratchet wrench



Run signal cable through here

Step 5: Electrical Conduits

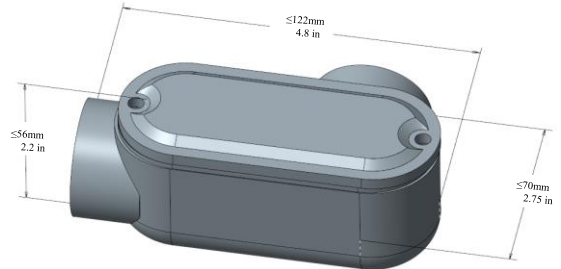
Install pull box after aPower cable hole



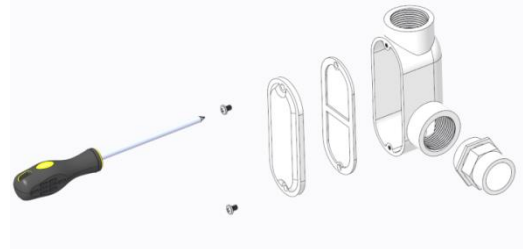
Diameter: 35mm

Diameter: 22.5mm

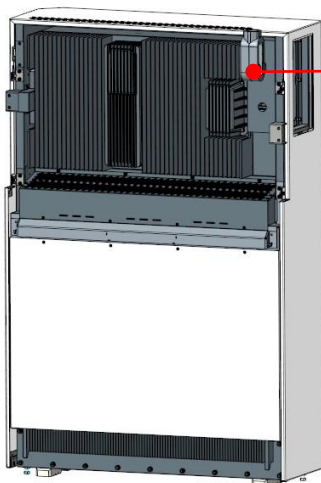
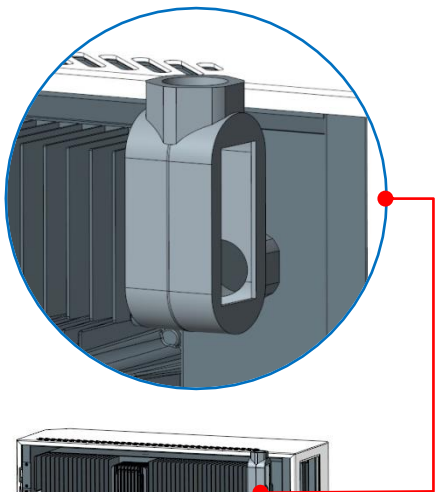
1. Select appropriate pull box according to the cable distribution direction. Max. size: 4.8inx2.75inx2.2in (L*W*H)



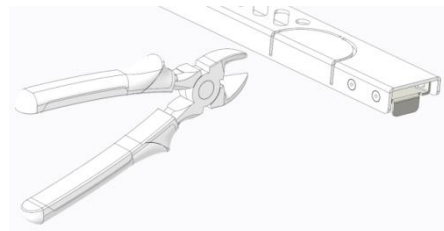
2. Use a #3X4" Phillips head cross screwdriver to take the junction box apart.



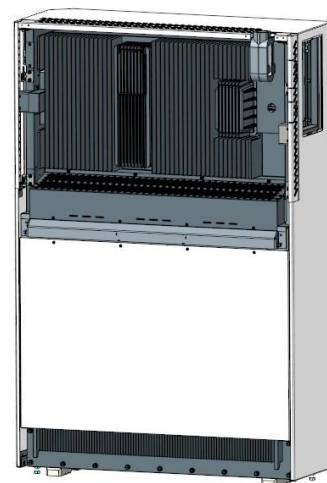
3. Use a wrench to install the pull box behind the user port compartment.



4. Use a diagonal cutting plier to remove the knockout holes on the side gratings.

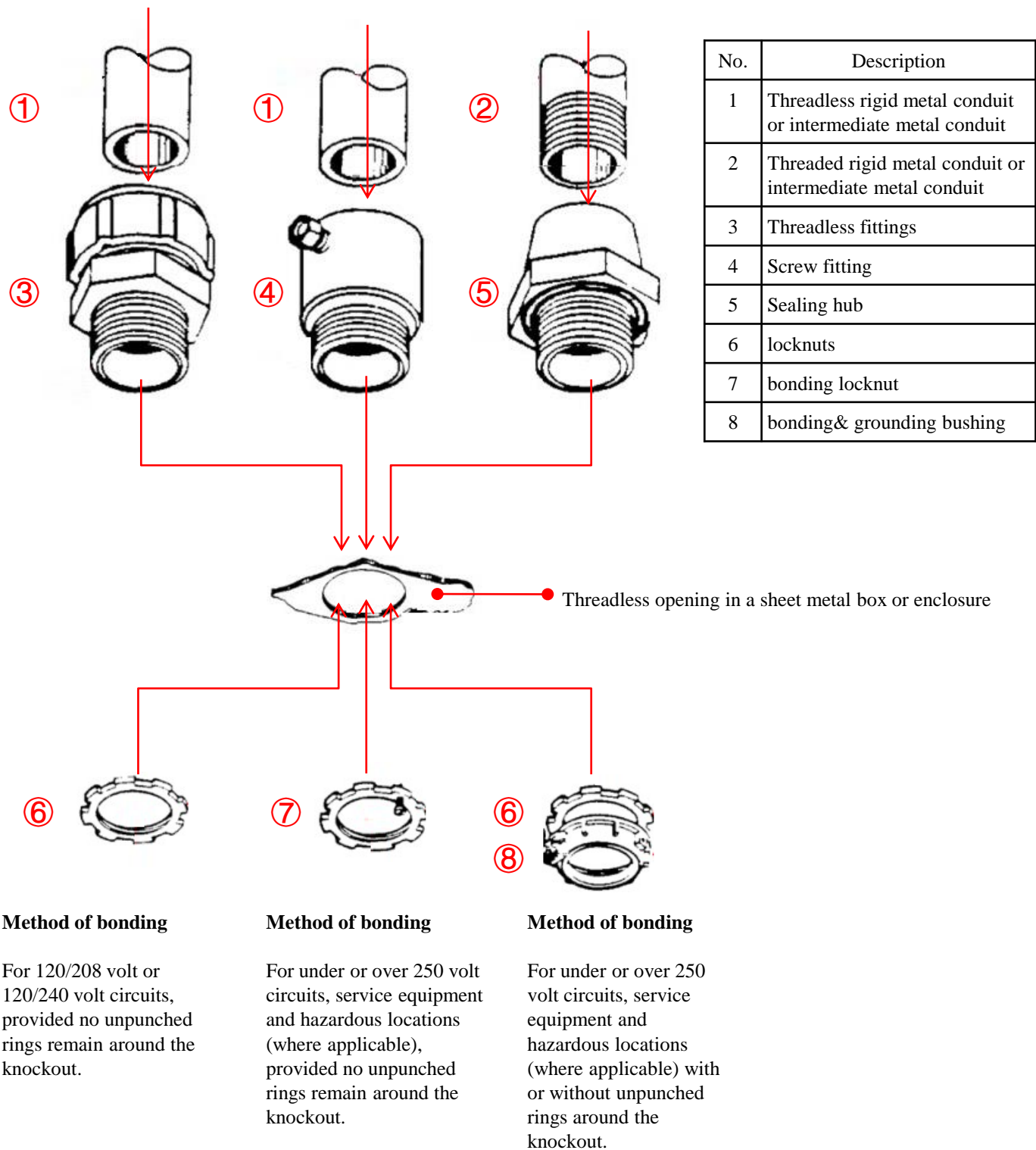


5. Install the three side trim gratings.



Step 5: Electrical Conduits

Conduit Connection and Installation

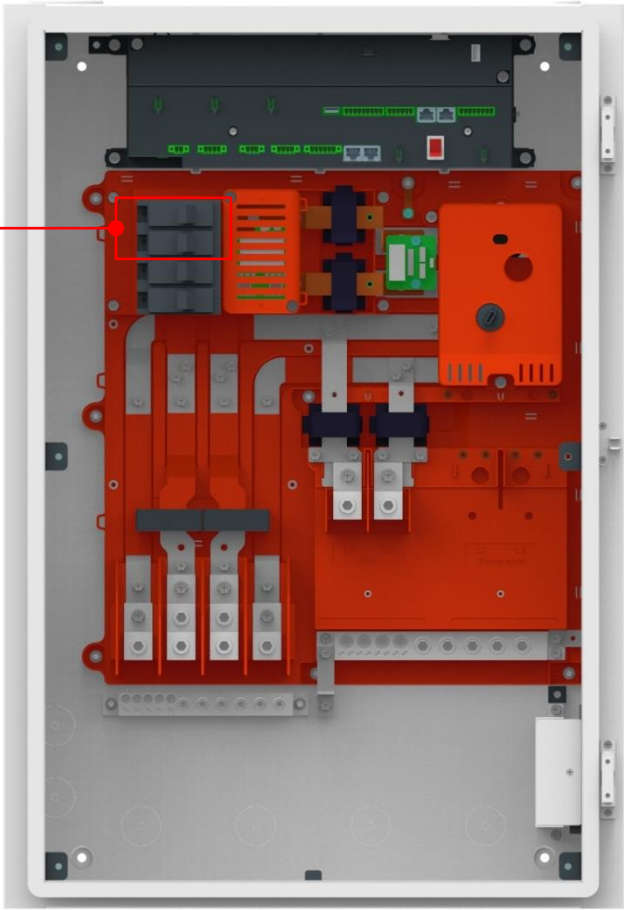


The conduits and related materials must comply with requirements in UL746B and the installation of electric conduits should comply with the local laws and regulations.

Step 6: Switches and Optional Parts

Install solar switch in aGate

Solar breaker location, solar generation system available at the residence.



Installation process of BR series switches:

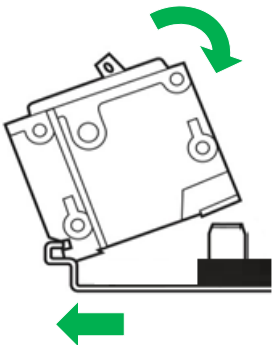
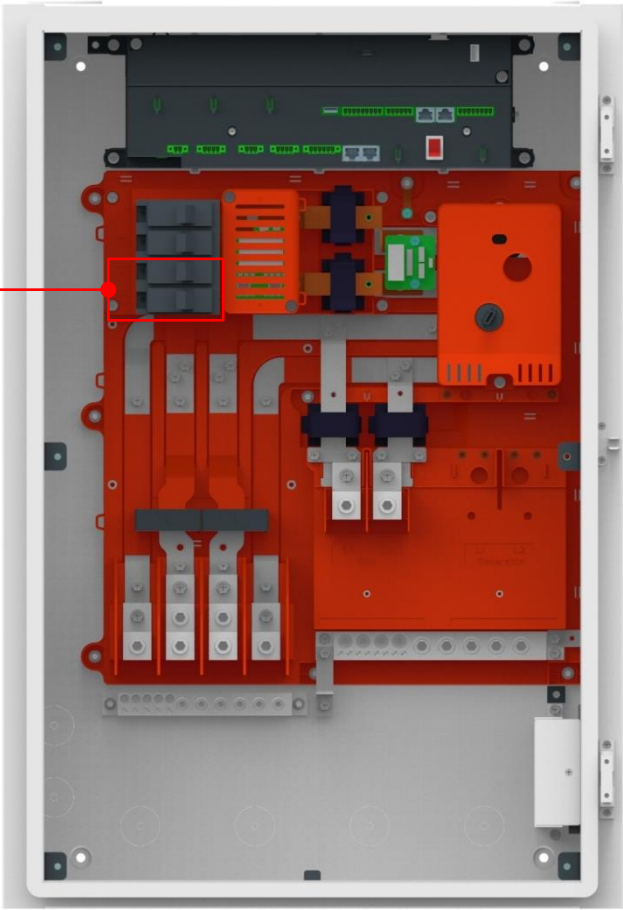


Table Optional circuit breakers for PV			
S/N	Model	Current	Description
1	BR230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
2	BR240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
3	BR250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V
4	BR260	60A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 60A/240V
5	BR270	70A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 70A/240V
6	BR280	80A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 80A/240V
7	BRH230	30A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 30A/240V
8	BRH240	40A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 40A/240V
9	BRH250	50A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 50A/240V
10	BRH260	60A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 60A/240V
11	BRH270	70A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 70A/240V
12	BRH280	80A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 80A/240V

Step 6: Switches and Optional Parts

Install aPower AC switch in aGate

The AC switch of aPower. The switch is locally installed in the aGate only when there are 1 to 3 aPowers installed.



Installation process of BR series switches:

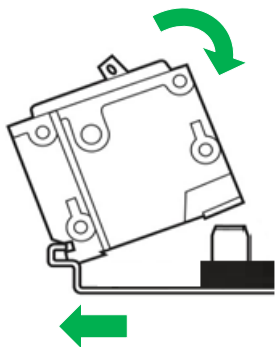
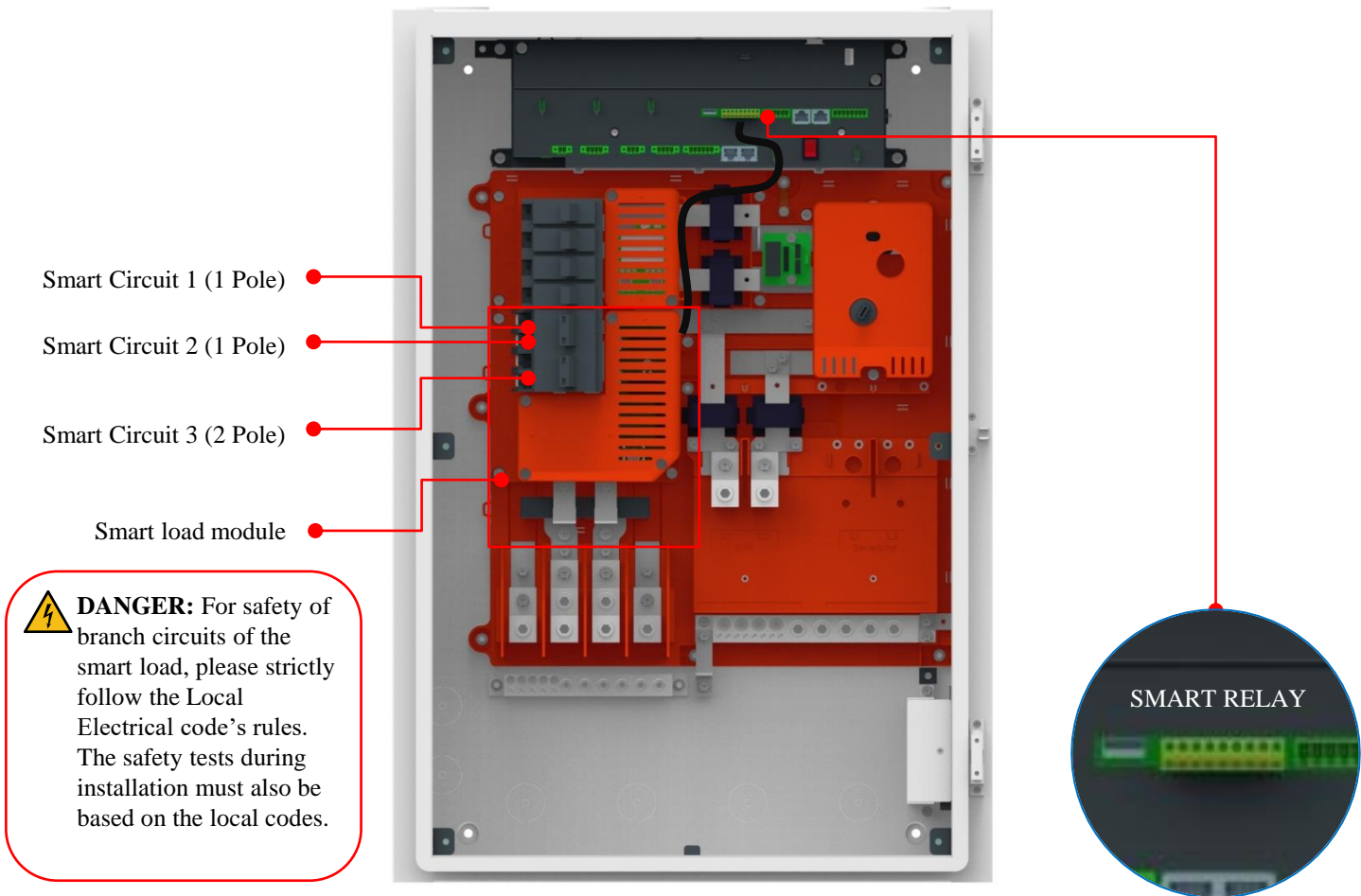


Table Optional circuit breakers for aPower			
S/N	Model	Current	Description
1	BR230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
2	BR240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
3	BR250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V
4	BR260	60A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 60A/240V
5	BR270	70A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 70A/240V
6	BR280	80A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 80A/240V
7	BR290	90A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 90A/240V
8	BR2100	100A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 100A/240V
8	BRH230	30A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 30A/240V
9	BRH240	40A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 40A/240V
10	BRH250	50A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 50A/240V
11	BRH260	60A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 60A/240V
12	BRH270	70A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 70A/240V
13	BRH280	80A	Eaton#Circuit Breaker ; 2-Pole, 22kAIC, 80A/240V

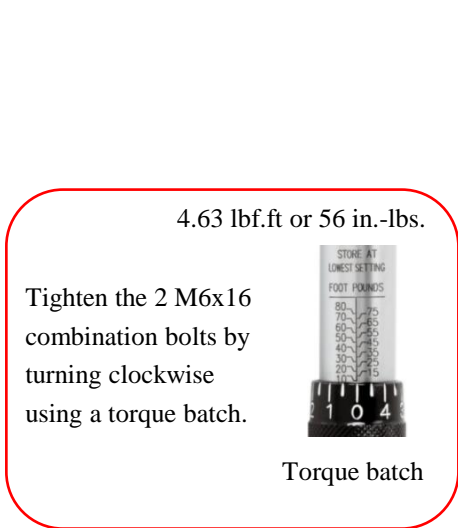
Step 6: Switches and Optional Parts

Install optional smart load module in aGate

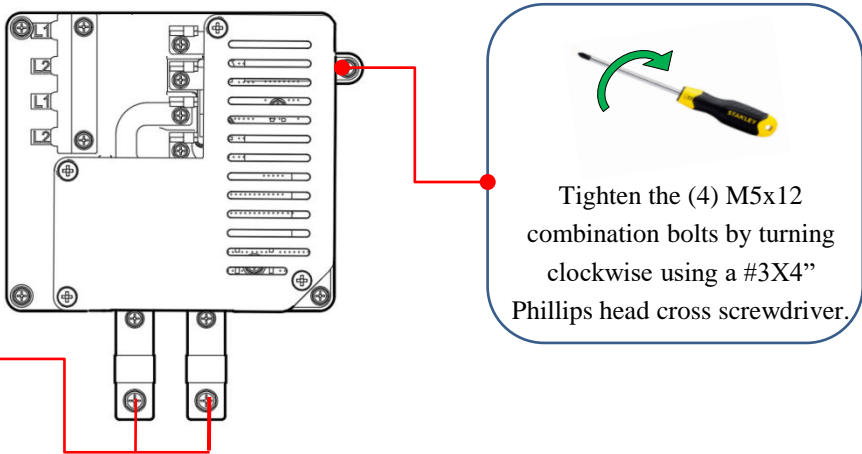
The smart load modules and switches are optional parts. If the user did not purchase them, please skip this step. The smart load module enable remote control of the on/off status for three branch circuits. Both branch circuit 1 and circuit 2 are 1-pole circuits, while circuit 3 is a 2-pole circuit. However, circuit 1 and circuit 2 may be bonded to form a 2-pole circuit.



Step 1: Install the smart load module.



Step 2: Insert the module terminals and mount the wires.



Step 6: Switches and Optional Parts

Install optional smart load module in aGate

Installation process for CH series switches:

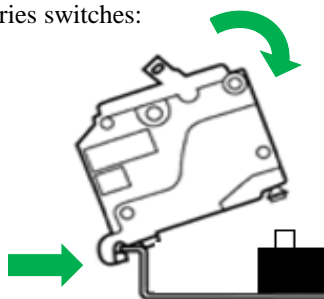


Table Optional circuit breakers for Smart Circuit 1 (1Pole)

S/N	Model	Current	Description
1	CH120	30A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 20A/240V
2	CH130	35A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 30A/240V
3	CH135	40A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 35A/240V
4	CH140	45A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 40A/240V
5	CH145	50A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 45A/240V
6	CH150	60A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 50A/240V
7	CH160	70A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 60A/240V
8	CH170	80A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 70A/240V
8	CHF130	30A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 30A/240V
9	CHF135	35A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 35A/240V
10	CHF140	40A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 40A/240V
11	CHF145	45A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 45A/240V
12	CHF150	50A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 50A/240V

Table Optional circuit breakers for Smart Circuit 2 (1Pole)

S/N	Model	Current	Description
1	CH120	30A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 20A/240V
2	CH130	35A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 30A/240V
3	CH135	40A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 35A/240V
4	CH140	45A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 40A/240V
5	CH145	50A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 45A/240V
6	CH150	60A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 50A/240V
8	CHF130	30A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 30A/240V
9	CHF135	35A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 35A/240V
10	CHF140	40A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 40A/240V
11	CHF145	45A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 45A/240V
12	CHF150	50A	Eaton#Circuit Breaker ; 1-Pole, 10kAIC, 50A/240V

Step 6: Switches and Optional Parts

Install optional smart load module in aGate

Installation process for CH series switches:

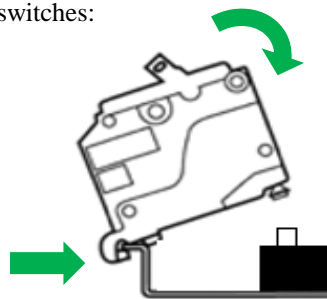


Table Optional circuit breakers for Smart Circuit 1+Circuit2 (2Pole)			
S/N	Model	Current	Description
1	CH230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
2	CH235	35A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 35A/240V
3	CH240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
4	CH245	45A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 45A/240V
5	CH250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V
6	CHF230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
7	CHF235	35A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 35A/240V
8	CHF240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
8	CHF245	45A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 45A/240V
9	CHF250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V

Step 6: Switches and Optional Parts

Install optional smart load module in aGate

Installation process for CH series switches:

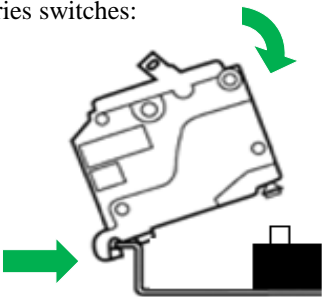
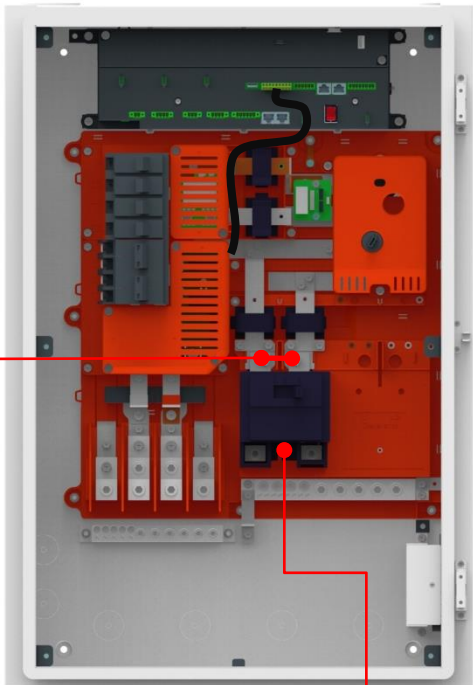
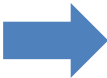
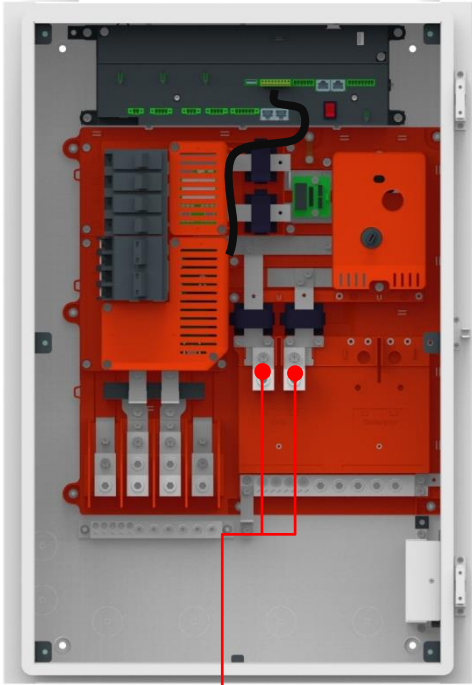



Table Optional circuit breakers for Smart Circuit 3			
S/N	Model	Current	Description
1	CH230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
2	CH235	35A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 35A/240V
3	CH240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
4	CH245	45A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 45A/240V
5	CH250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V
6	CH260	60A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 60A/240V
7	CH270	70A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 70A/240V
8	CH280	80A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 80A/240V
8	CHF230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
9	CHF235	35A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 35A/240V
10	CHF240	40A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 40A/240V
11	CHF245	45A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 45A/240V
12	CHF250	50A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 50A/240V
13	CH230	30A	Eaton#Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V

Step 6: Switches and Optional Parts


Install grid power supply switch in aGate






Loosen the (2) M6x16 combination bolts by turning counterclockwise using a #3X4"Phillips head cross screwdriver until the screw is completely removed.

Tighten the 2 4.63 lbf.ft or 56 in.-lbs. M6x16 combination bolts by turning clockwise using a torque batch.



Torque batch



Tighten the (1) M4x12 combination bolt by turning clockwise using a #3X4" Phillips head cross screwdriver.

Table Optional circuit breakers for inputs of grid			
S/N	Model	Current	Description
1	CSR2100	100A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 100A/240V
2	CSR2125N	125A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 125A/240V
3	CSR2150N	150A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 150A/240V
4	CSR2175N	175A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 175A/240V
5	CSR2200N	200A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 200A/240V
6	BW2100	100A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 100A/240V
7	BW2125	125A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 125A/240V
8	BW2150	150A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 150A/240V
9	BW2175	175A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 175A/240V
10	BW2200	200A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 200A/240V
11	BWH2100N	100A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 100A/240V
12	BWH2125N	125A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 125A/240V
13	BWH2150N	150A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 150A/240V
14	BWH2175N	175A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 175A/240V
15	BWH2200N	200A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 200A/240V

Step 6: Switches and Optional Parts

Install optional fuel generator switch in aGate

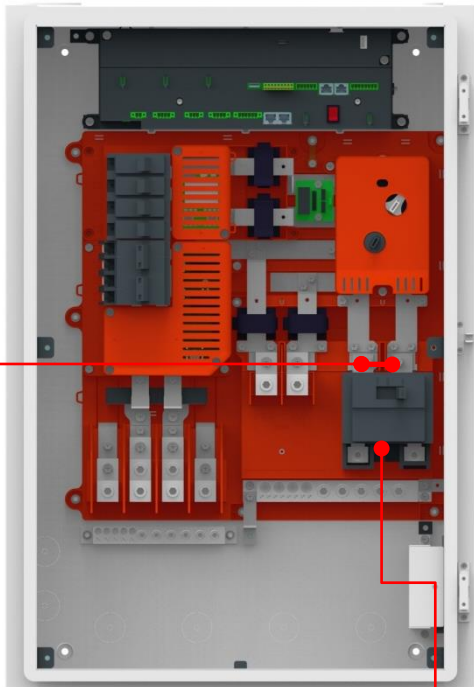
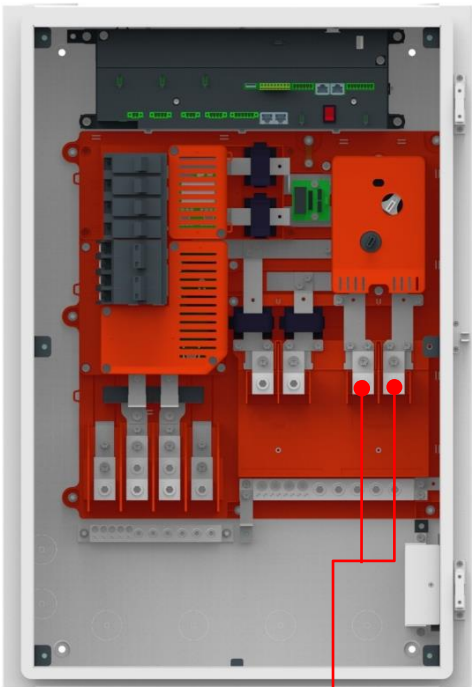


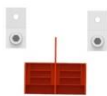

Please refer to the installation instructions included with the optional parts.



Step 6: Switches and Optional Parts


Install fuel generator switch in aGate (optional)






Loosen the (2) M6x16 combination bolts by turning counterclockwise using a #3X4" Phillips head cross screwdriver until the screw is completely removed.

Tighten the (2) 4.63 lbf.ft or 56 in.lbs. M6x16 combination bolts by turning clockwise using a torque batch.



Torque batch



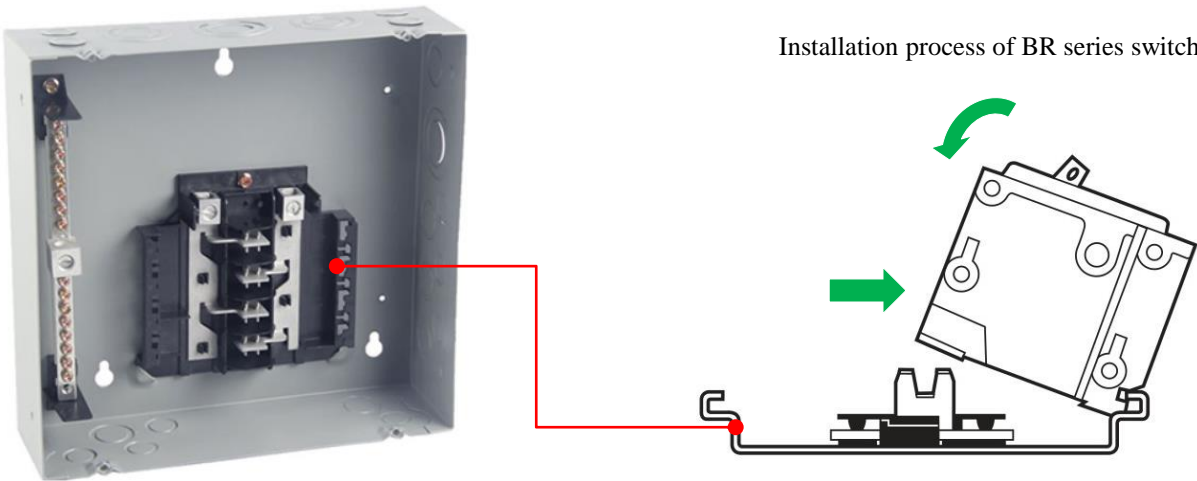
Tighten the (1) M4x12 combination bolt by turning clockwise using a #3X4" Phillips head cross screwdriver.

Table Optional circuit breakers for inputs of Generator			
S/N	Model	Current	Description
1	CSR2100	100A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 100A/240V
2	CSR2125N	125A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 125A/240V
3	CSR2150N	150A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 150A/240V
4	CSR2175N	175A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 175A/240V
5	CSR2200N	200A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 200A/240V
6	BW2100	100A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 100A/240V
7	BW2125	125A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 125A/240V
8	BW2150	150A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 150A/240V
9	BW2175	175A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 175A/240V
10	BW2200	200A	Eaton#Circuit Breaker; 2-Pole, 10kAIC, 200A/240V
11	BWH2100N	100A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 100A/240V
12	BWH2125N	125A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 125A/240V
13	BWH2150N	150A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 150A/240V
14	BWH2175N	175A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 175A/240V
15	BWH2200N	200A	Eaton#Circuit Breaker; 2-Pole, 25kAIC, 200A/240V

Step 6: Switches and Optional Parts

Install the optional load centers switch

Install BR series switches in the distribution box



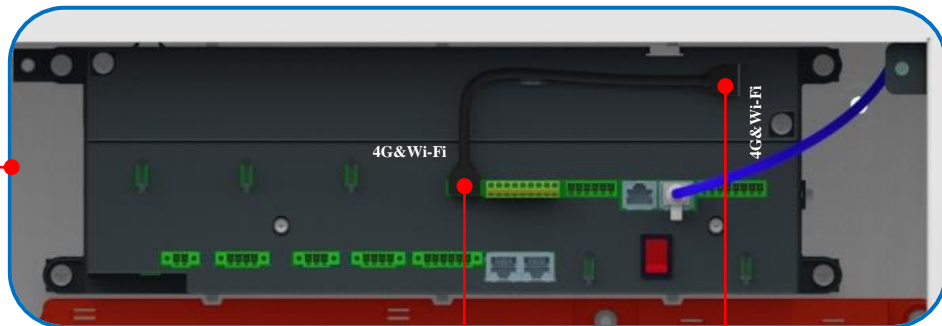
Installation process of BR series switches:

S/N	Breaker Model	Current	Description
1	BR230	30A	Eaton # Circuit Breaker ; 2-Pole, 10kAIC, 30A/240V
2	BRH230	30A	Eaton # Circuit Breaker ; 2-Pole, 22kAIC, 30A/240V
3	BRH240	40A	Eaton # Circuit Breaker ; 2-Pole, 22kAIC, 40A/240V

Step 7: Communication Wiring

Wire the 4G&Wi-Fi communication module in aGate

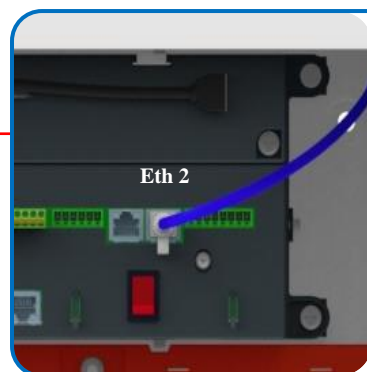
Insert the USB connector from the antenna module into the 4G&Wi-Fi ports on the EMS module and the antenna module to enable wireless connection optionality.



The aGate cannot be activated if this step is not finished.

Connect aGate to a residence's network

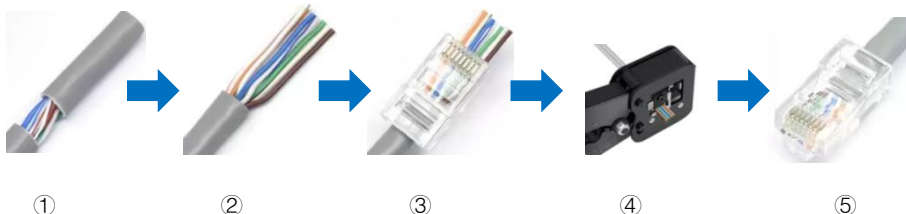
To ensure the reliability of remote communication, it is recommended to insert the residence's network cable with Internet connection to the "Eth 2" port of EMS module to enable the remote communication function.



The network cable should be made on site using RJ45 connectors and cables, while the ready-made network cable should not be used, or otherwise the bending of cables inside aGate may take too much space that the internal panel cannot be closed.



RJ-45 Connector:



- ① Remove the insulation jacket from the cable.
- ② Fan out the wires in the order of 568B (white/orange, solid orange, white/green, solid blue, white/blue, solid green, white/brown, solid brown).
- ③ Insert the wires into the connector.
- ④ Crimp the connector using a crimping tool.
- ⑤ The cable is ready.

Step 7: Communication Wiring

Network cable connection between aGate and aPower (if distance between aPower and aGate is less than 100 ft)

When the communication cable length between aPower and aGate is less than 100ft, connecting via network cabling is acceptable. The network cable should form a loop between aPower and aGate. If multiple aPowers are installed, the network cables should be connected in tandem or “daisy chained.” Insert the network cable between aGate and aPower 1 into the “CAN OUT” port of aGate and the “CAN IN” port of aPower 1; insert the network cable between aPower 1 and aPower 2 into the “CAN OUT” port of aPower 1 and the “CAN IN” port of aPower 2; insert the network cable between aPower 2 and aPower3 into the “CAN OUT” port of aPower 2 and the “CAN IN” port of aPower 3, so on and so forth until the connection between aPower N and aGate, where the network cable should be inserted into the “CAN OUT” port of aPower N and the “CAN IN” port of aGate.

RJ-45 Connector:



- ① Run the network cable through the electric conduit, remove the insulation jacket from both ends. The color of network cable should comply with the local regulations.
- ② Fan out the wires in the order of 568B (white/orange, solid orange, white/green, solid blue, white/blue, solid green, white/brown, solid brown).
- ③ Insert the wires into the connector.
- ④ Crimp the connector using a crimping tool.
- ⑤ The cable is ready.



aGate EMS



aPower 1 wiring closet

aPower 2 wiring closet

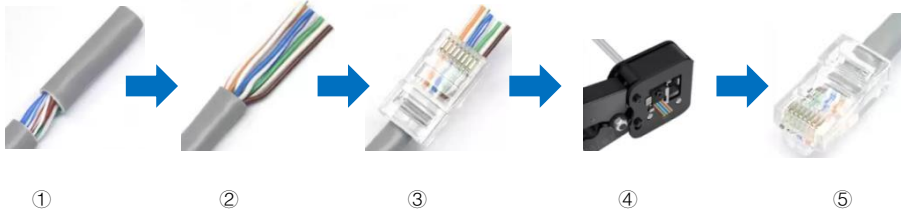
aPower N wiring closet

Step 7: Communication Wiring

Communication cable connections between aPower and aGate (if distance between aPower and aGate is longer than 100ft)

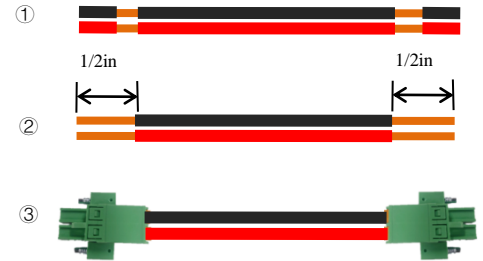
Both network cable connection and 20V power supply must be used in conjunction when the communication cable length between aPower and aGate is longer than 100ft. The network cable should form a loop between aPower and aGate similar to installations with distances less than 100ft. Insert the network cable between aGate and aPower 1 into the “CAN OUT” port of aGate and the “CAN IN” port of aPower 1; insert the network cable between aPower 1 and aPower 2 into the “CAN OUT” port of aPower 1 and the “CAN IN” port of aPower 2; insert the network cable between aPower 2 and aPower 3 into the “CAN OUT” port of aPower 2 and the “CAN IN” port of aPower 3, so on and so forth until the connection between aPower N and aGate, where the network cable should be inserted into the “CAN OUT” port of aPower N and the “CAN IN” port of aGate. The 20V power supply should be wired in series.

RJ-45 Connector:

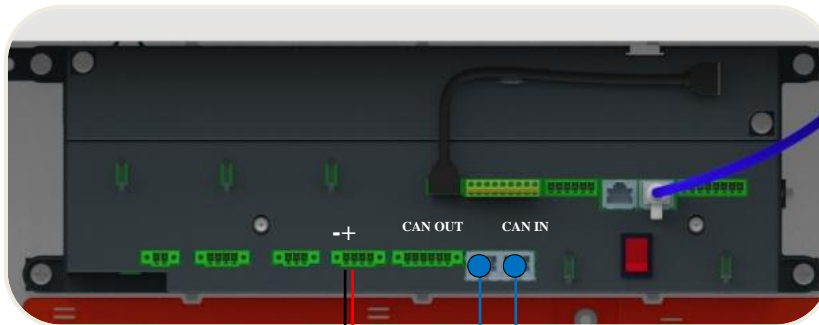


- ① Run the network cable through the electric conduit, remove the insulation jacket from both ends. The color of network cable should comply with the local regulations.
- ② Fan out the wires in the order of 568B (white/orange, solid orange, white/green, solid blue, white/blue, solid green, white/brown, solid brown).
- ③ Insert the wires into the connector.
- ④ Crimp the connector using a crimping tool.
- ⑤ The cable is ready.

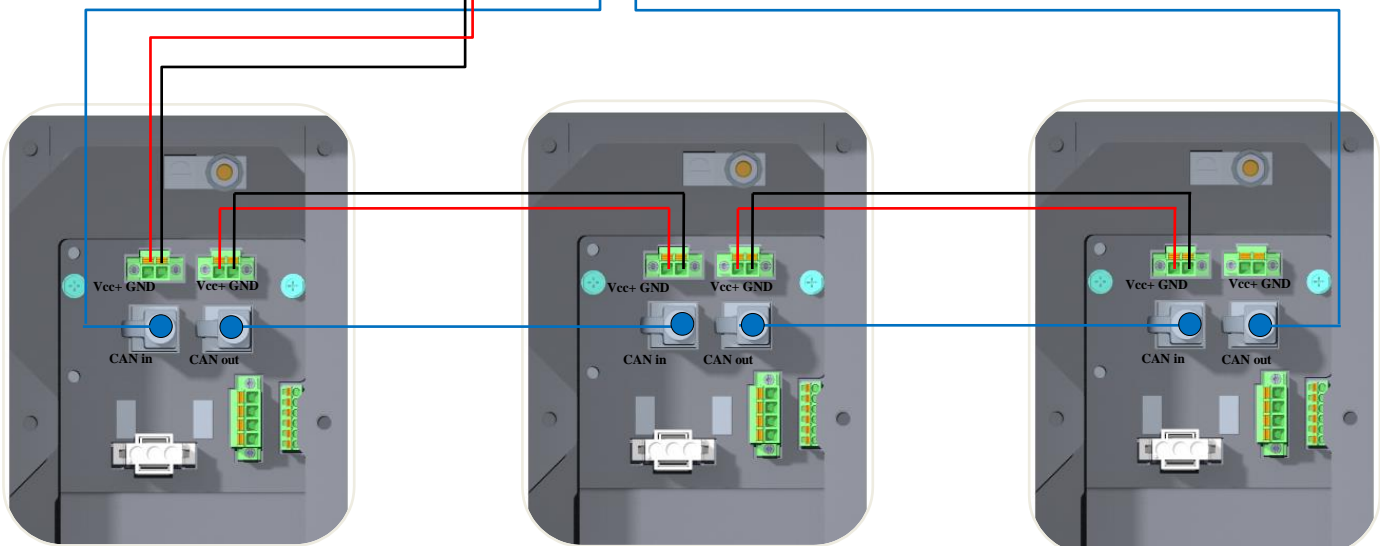
20V power cable preparation:



- ① Run the 20V power cable of 18AWG~16AWG through the electric conduit. Refer to the local regulations for the cable colors.
- ② Remove the insulation jacket on both ends by 1/2 in.
- ③ Connect the wires to the corresponding terminals.



aGate EMS



aPower 1 wiring closet

aPower 2 wiring closet

aPower N wiring closet

Step 8: Electrical Wiring

aGate terminal information and wiring requirements

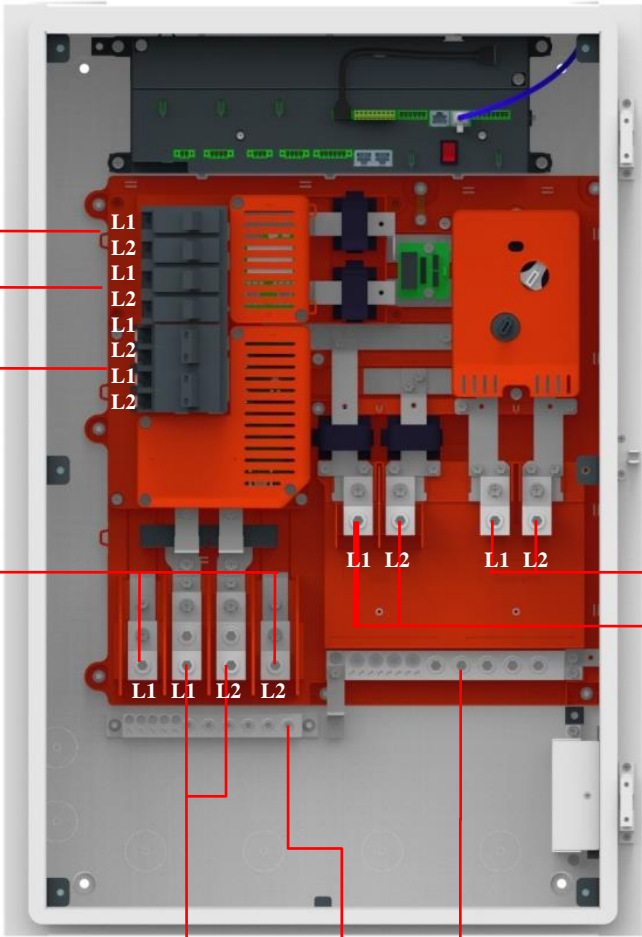
The wiring of breakers should follow the instructions provided by the breaker.

Breakers to be installed on the grid power supply or fuel generators should be wired following the breaker manufacturer’s instructions



Interrupting Capacity		
RMS Sym. Ampere		
Volt	kA	
120/240 ~	25	
Terminal Wire	Wire Size	Torque Lb. in.
CU/AL	2 - 300	250

- Solar AC breaker
- aPower AC breaker
- Smart Load breaker

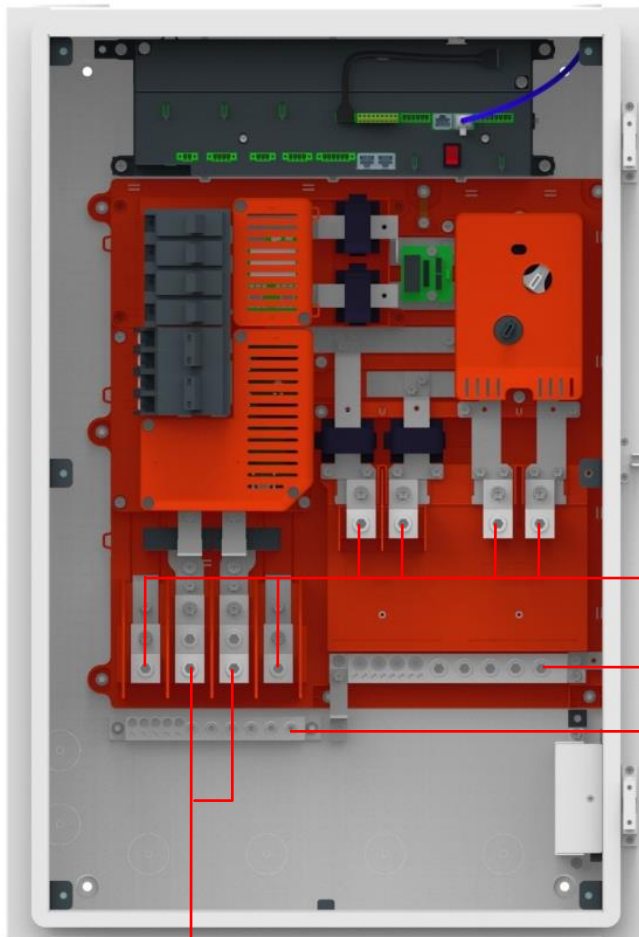


- Non –Backup lugs
- Backup lugs
- Ground
- Neutral lugs

- Generator lugs
- Grid lugs

Step 8: Electrical Wiring

aGate terminal information and wiring requirements



DANGER: The wiring should comply with NFPA 70 and local laws and regulations.

Terminals: Copper alloy
Surface Finish: Tinning
Hex head screw: 5/8-18 UNF
Stripping Length : 1in (upper layer)
2in (lower layer)
Applicable Cable: 4AWG~250 MCM CU
Wiring Torque: 3/0AWG~250 MCM 275LB-IN
4AWG~2/0AWG 110LB-IN



DANGER: The wiring should comply with NFPA 70 and local laws and regulations.

Terminals: Copper alloy
Surface Finish: Tinning
Hex head screw: 5/8-18 UNF
Stripping Length: 1in
Applicable Cable: 4AWG~250 MCM CU
Wiring Torque: 3/0AWG~250 MCM 275LB-IN
4AWG~2/0AWG 110LB-IN



DANGER: The wiring should comply with NFPA 70 and local laws and regulations.

Terminals: Aluminum alloy
Surface Finish: Tinning
Hex head screw: 5/8-18 UNF
Stripping Length : 1in
Applicable Cable: 4AWG~250 MCM CU
Wiring Torque: 3/0AWG~250 MCM 275LB-IN
4AWG~2/0AWG 110LB-IN

Hex head screw: 7/16-20 UNF
Stripping Length : 1in
Applicable Cable: 14AWG~2/0AWG CU
Wiring Torque: 3AWG~2/0AWG 110LB-IN
14AWG~4AWG 35LB-IN

Hex head screw: 1/4-28 UNF
Stripping Length: 0.6in
Applicable Cable: 14AWG~4AWG CU
Wiring Torque: 14AWG~4AWG 26LB-IN



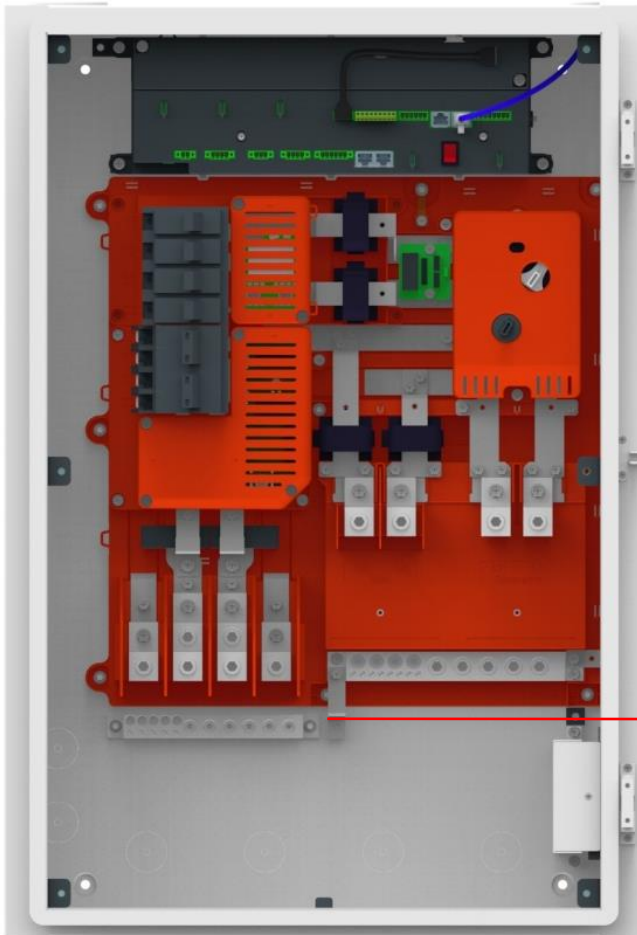
DANGER: The wiring should comply with NFPA 70 and local laws and regulations.

Terminals: Aluminum alloy
Surface Finish: Tinning
Hex head screw: 7/16-20 UNF
Stripping Length : 0.8in
Applicable Cable: 14AWG~2/0AWG CU
Wiring Torque: 3AWG~2/0AWG 110LB-IN
14AWG~4AWG 35LB-IN

Hex head screw: 1/4-28 UNF
Stripping Length : 0.4in/0.8in
Applicable Cable: 14AWG~4AWG CU
Wiring Torque: 14AWG~4AWG 26LB-IN

Step 8: Electrical Wiring

Bonding jumper in aGate



DANGER: The bonding of neutral and grounding wires should comply with NFPA 70 and local laws and regulations.

According to NFPA 70 -250 Grounding and Bonding Part V, when installed as service equipment, the neutral and ground should be bonded together, as shown in the figure to the left. The Neutral-Ground Bonding Jumper must only be removed if not installed as Service Equipment, or for test purposes.

A torque wrench with 11/32" hex sockets will be needed to remove or install the bonding jumpers, in order to remove the fasteners and to check the torque. For installation, the required torque is 3N*m (27 Lb-in).













WARNING: To ensure safe operation in Backup Mode, Device must have a local ground connection, such as through a ground rod or ground electrode. The connection of the ground rod must comply with local regulations

Step 8: Electrical Wiring

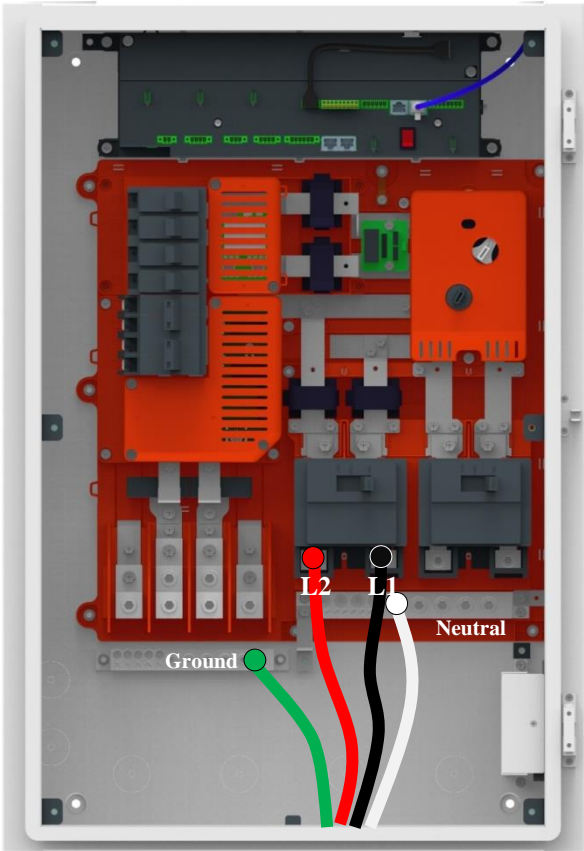
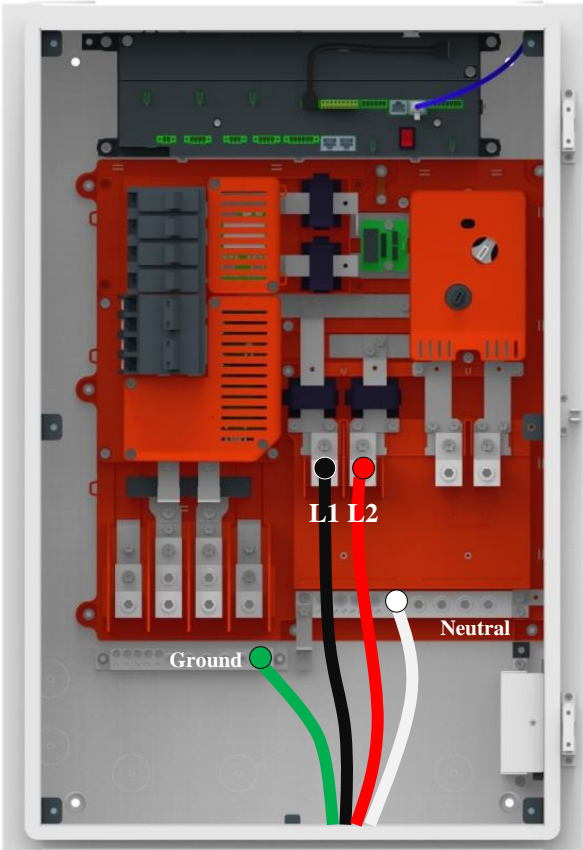
General

- The cables conductor size and current capacity rated are listed in the standard NFPA70, Article 310 for connection L1, L2, N, and Ground.
- Conductors, relied upon for the protective grounding and bonding system, must be sized to handle potential fault currents. If insulated, the insulation must be green or green with yellow striped in color.
- Grounding conductors are sized following Article 250.122 of NFPA 70 or Rule 10-810 of C22.1.d. A field wiring terminal or lead shall be rated for the connection of a conductor or conductors having a minimum carrying capacity rating of 125% of the rating of the unit.
- The distance between the end of the connection point of a field-installed wire and the wall of the enclosure toward which the wire is to be directed shall follow Table 312.6 (A) or (B) of NFPA 70.
- Cables selections are listed in the last table. Please be sure to coat stripped surfaces of aluminum cable with antioxidants.
- Cables selection must consider metal compatibility. Please refer to Figure F.1 of Appendix F in the UL9540 standard.

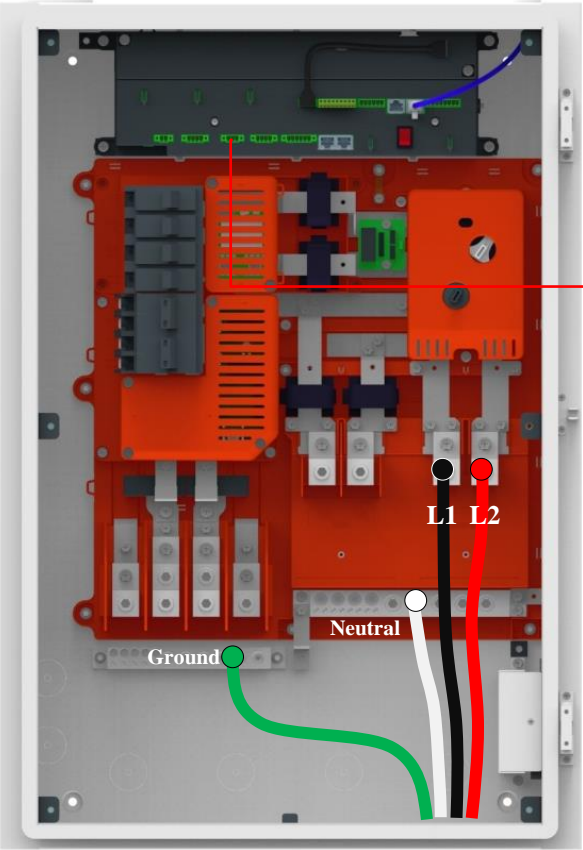
	DANGER: The installation, service and replacement operations on aPower and aGate equipment must be done by installers certified and recognized by FranklinWH.
	DANGER: Before starting any electrical work, please ensure that aPower is powered OFF to reduce the risks of electric shock.
	DANGER: The Installation, wiring, maintenance, transportation or handling of aPower and aGate should only be done by qualified personnel with personal protective equipment (PPE).
	DANGER: Before starting any electrical work, please open the grid power supply breaker, generator input breaker, the solar input breaker, the load breaker, and lock (“lock out”) the switches. If the switches can not be locked, please lock the distribution box where the switches are installed. A warning sign “Equipment Servicing, Keep OFF” should be hung.
	DANGER: It is strictly prohibited to install, maintain, and handle FranklinWH equipment outdoors when adverse weather conditions, such as lightning, rain, snow, or strong winds are present.
	DANGER: Please follow your local laws, regulations and standards when performing installation, wiring, maintenance, transportation and handling operations. The safety instructions in this Guide are supplemental to the laws and regulations.
	DANGER: The power cables should be wired following the sequence: the load side, the backup power supply side, and then the non-backup power supply side. If the other end of the cable can not be wired at the same time, a warning sign “In operation. Keep OFF” should be hung.
	DANGER: aPower and aGate do not have any lightning protection features. Installers must configure lightning protection equipment as the grid power supply runs into the house.
	DANGER: Please follow the “Local Precedence” rule. Remote control shut off does not mean that the local circuits are safe. Please decide whether your circuit is safe only by testing for voltage.
	DANGER: The electrical wires must be connected to the correct service legs: L1 and L2 cannot be misconnected. Misconnection may result in quipment damage or even personal injury or death.

Step 8: Electrical Wiring

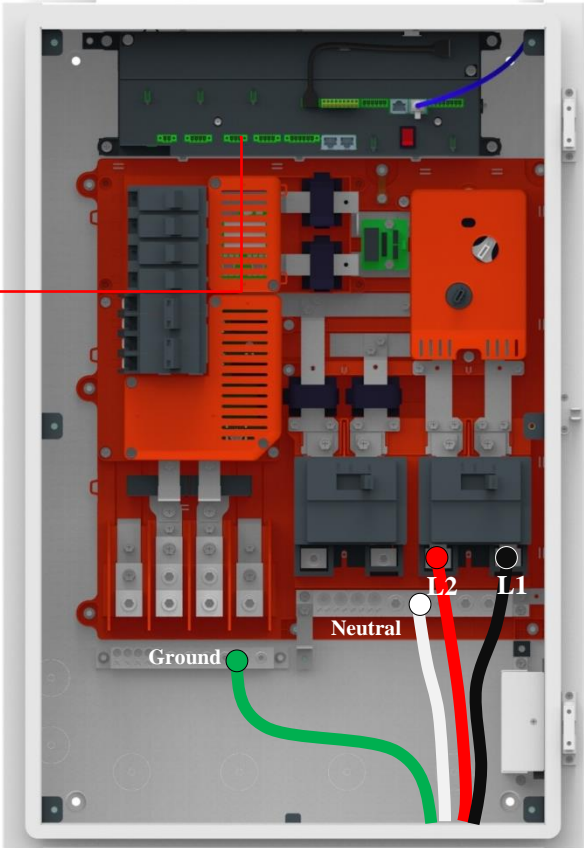
Make AC Power Connections to aGate



Optional Generator Power Connections to aGate (Parts for fuel generator are configured in Step 8)

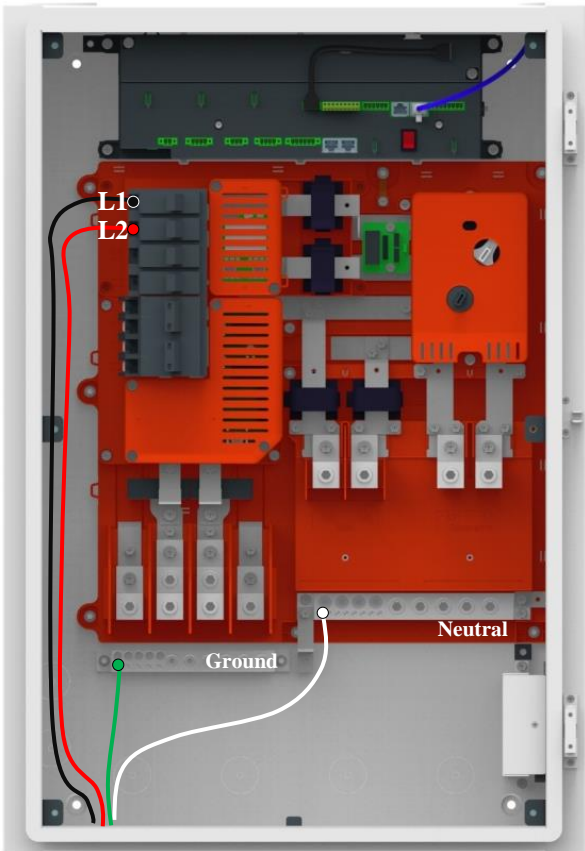


CAUTION: The fuel generator requires a signal interchange connection with aGate. Please connect it to the terminals as shown in the figure, where NO indicates Normally ON, CO indicates Common, and NC indicates Normally Closed. Please refer to the installation instructions of the optional parts for wiring details.



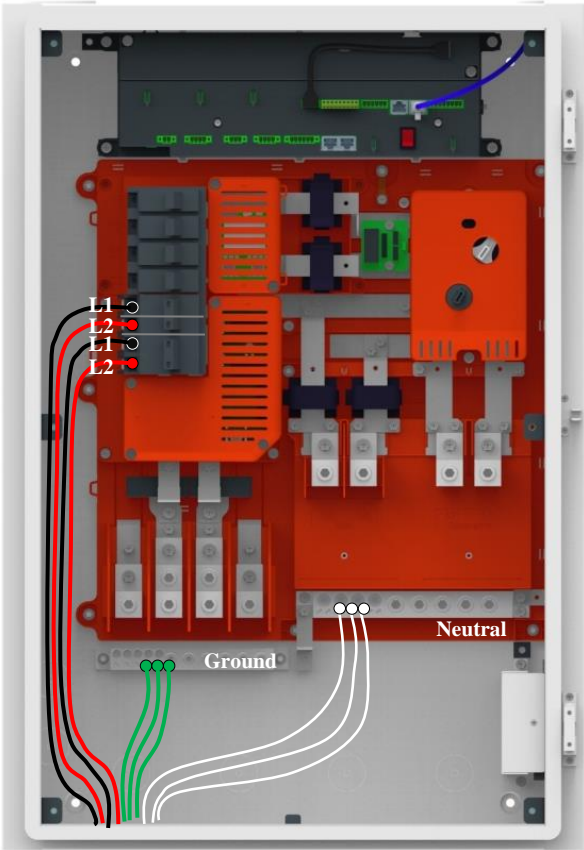
Step 8: Electrical Wiring

Make PV inverter Connections to aGate (If solar AC switch is configured in Step 8)

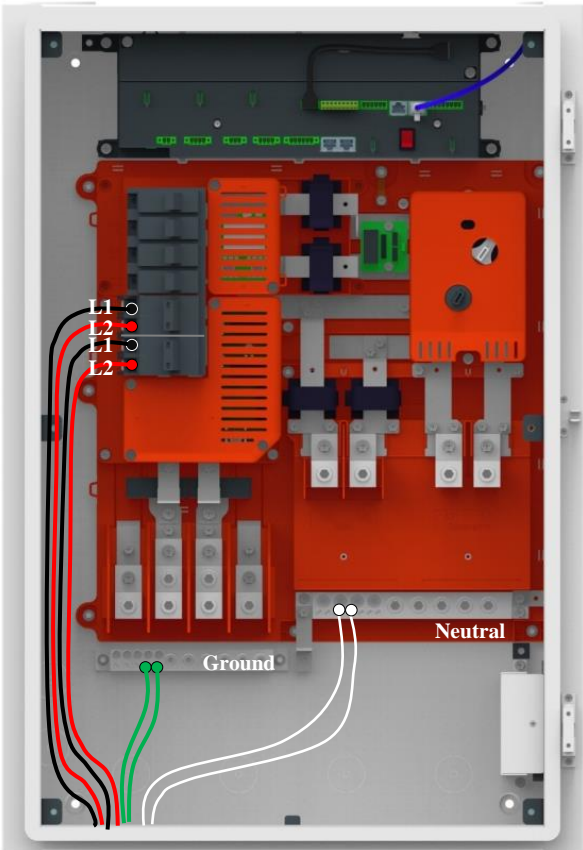


Make Smart load Connections to aGate (If Smart load module is configured in Step 8)

1 pole
1 pole
2 pole

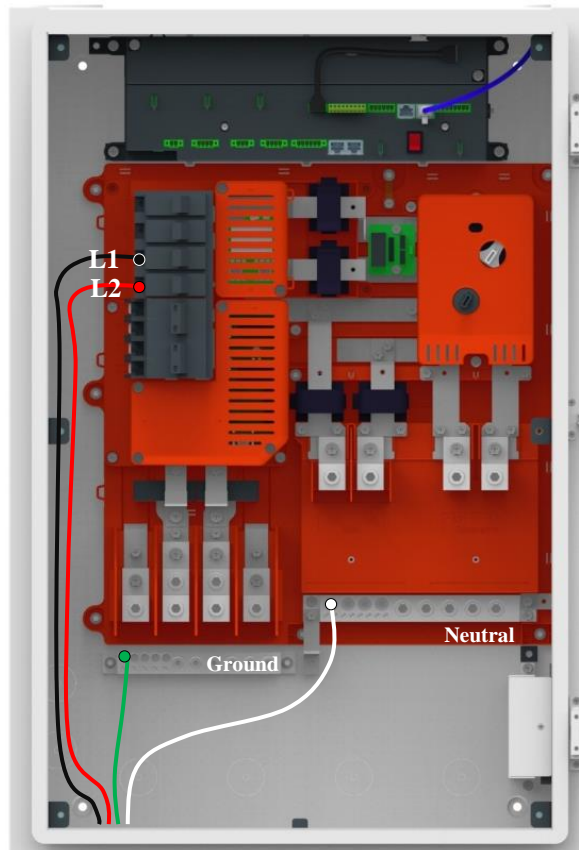


2 pole
2 pole



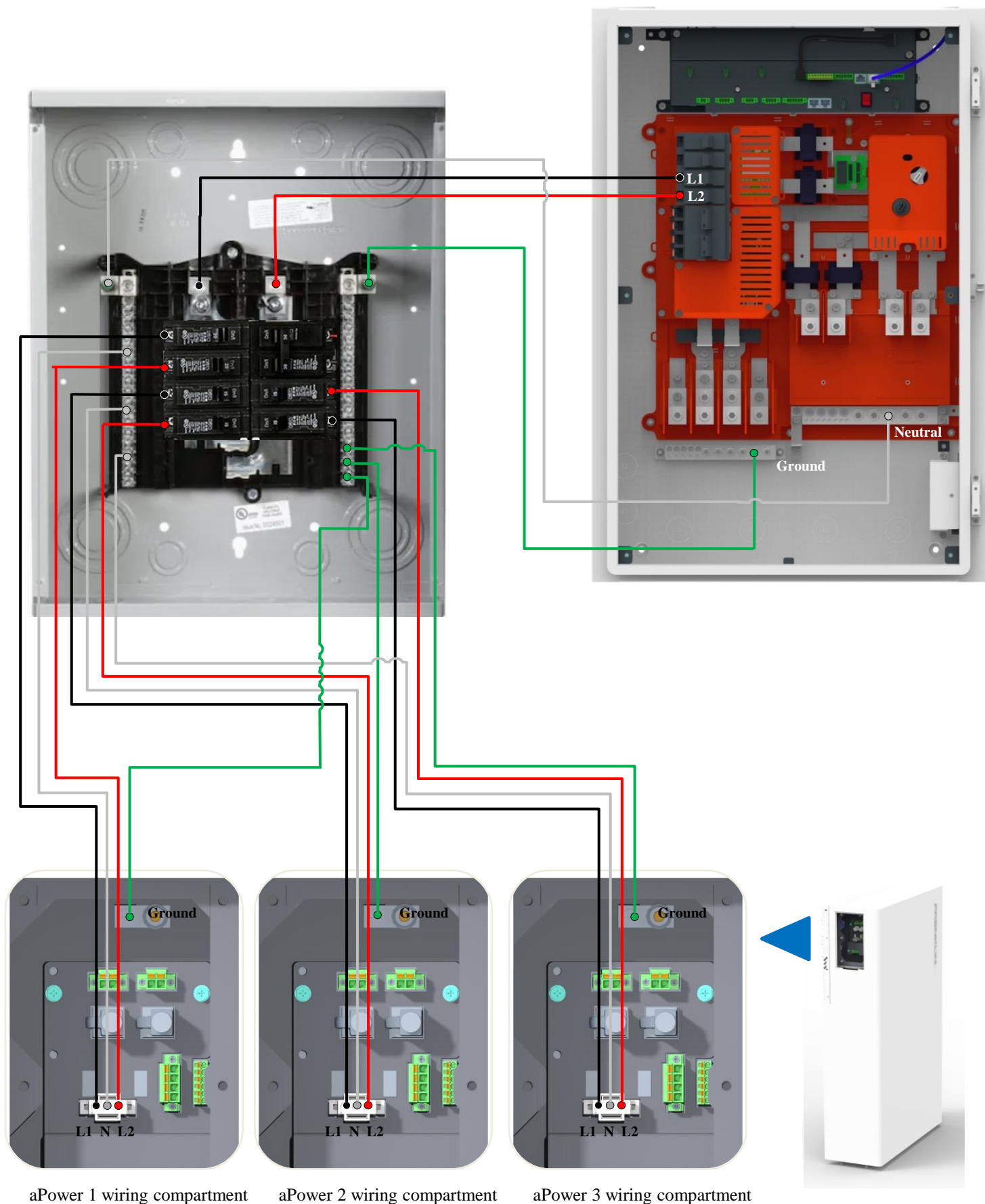
Step 8: Electrical Wiring

Make aPower Connections to aGate (In case of (1) aPower)



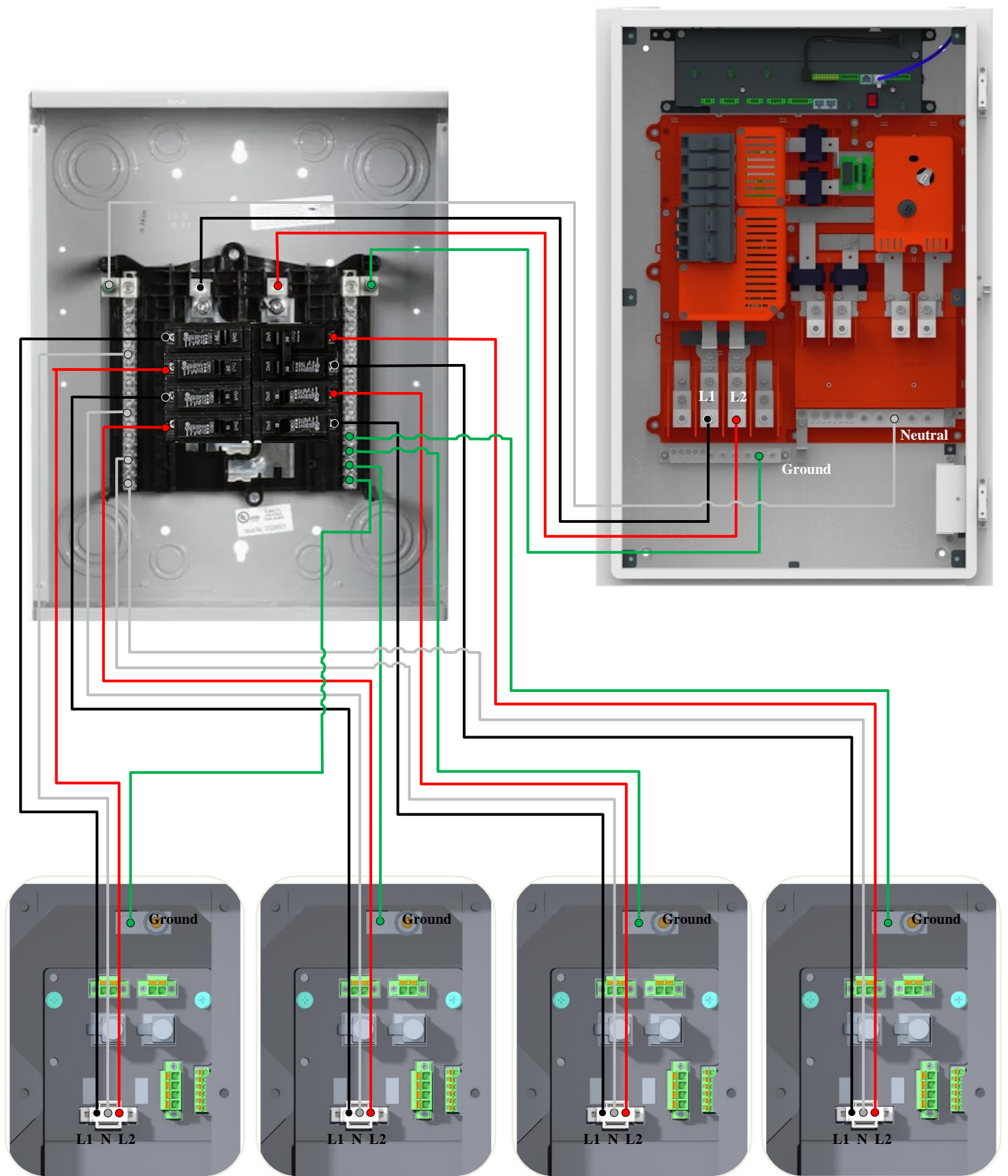
Step 8: Electrical Wiring

Make aPower Connections to aGate (In case of (2) to (3) aPowers)



Step 8: Electrical Wiring

Make aPower Connections to aGate (In case of more than (3) aPowers)



aPower 1 wiring compartment

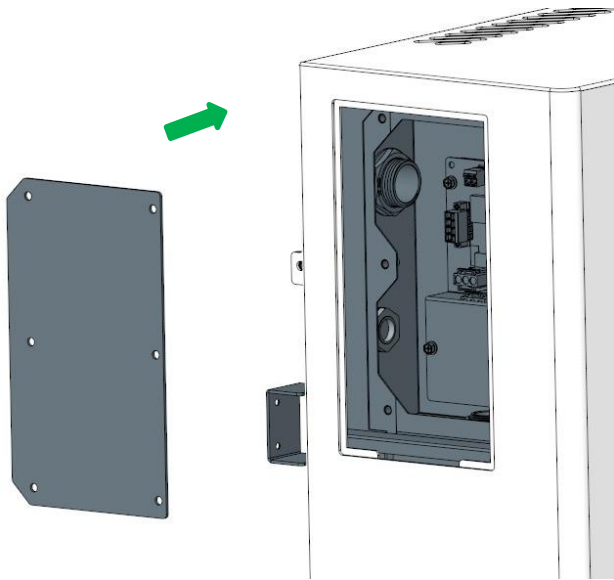
aPower 2 wiring compartment

aPower 3 wiring compartment

aPower 4 wiring compartment

Step 9: Re-Install aPower's cover board

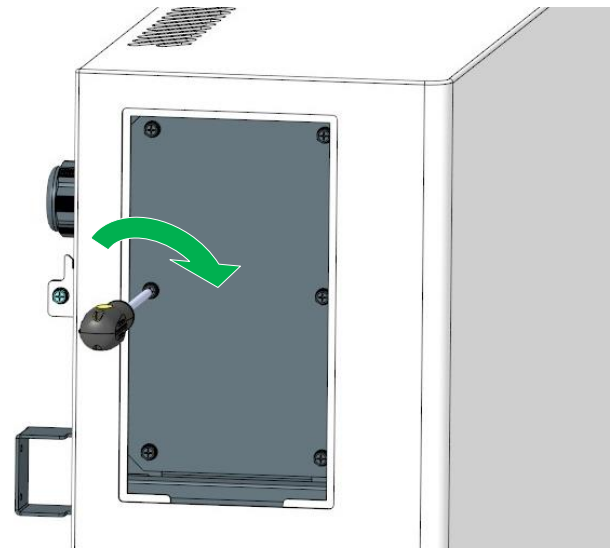
- Close the wiring panel on aPower



1. Remove the internal cover board of the wiring closet. Please check to make sure the cover label's S/N corresponds with the equipment S/N, otherwise the nameplates of aPower will be incorrectly swapped, which may adversely affect the warranty.



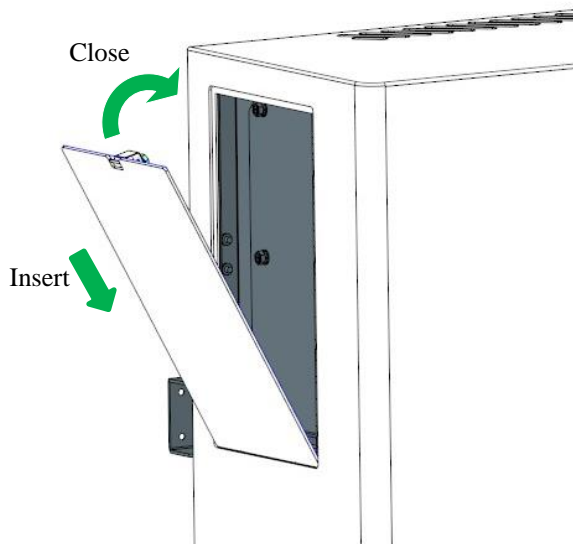
There is the unique S/N on the nameplate on the internal cover board, do NOT confuse them, otherwise it may affect the warranty.



2. Tighten the (6) screws by turning clockwise using a #3X4" Phillips head cross screwdriver.



Tighten the (1) M4x12 combination bolt by turning clockwise using a #3X4" Phillips head cross screwdriver.



3. Insert the external cover board on the wiring compartment into the proper position and secure it clockwise.

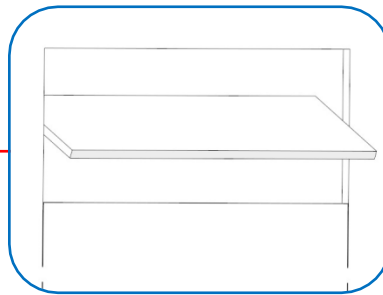
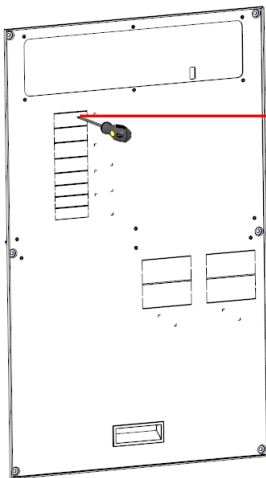
Step 10: aGate Panel re-installation

- Two installers will be needed to re-install the aGate external panel. One installer lifts the aGate external panel up and adjusts it to the correct position. The other installer fastens the (6) screws M4X8 sunk screws.

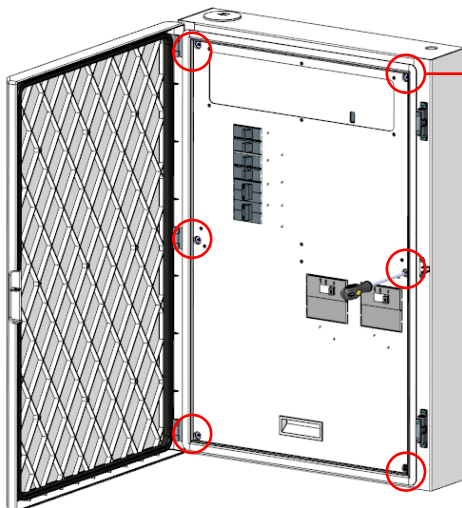


Tighten it clockwise using a #3X4 Phillips head cross screwdriver.

- Remove the knockouts at the desired positions where the breaker switches will be installed.



- Install the internal panel and fasten it by tightening the (6) M5X12 combination bolts.

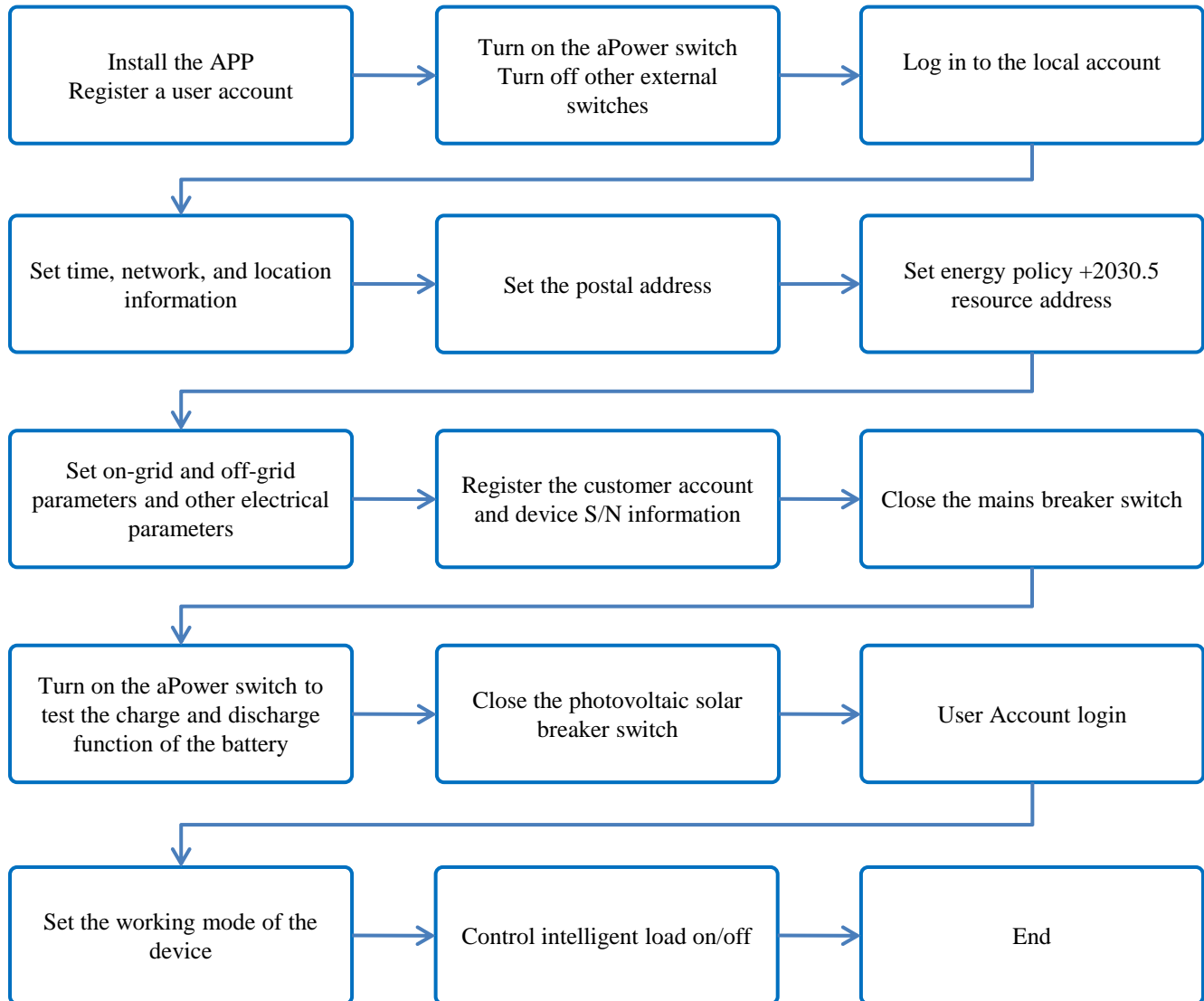


Tighten it clockwise using a #3X4 Phillips head cross screwdriver.

Step 11: Commissioning

Energy Storage System Commissioning

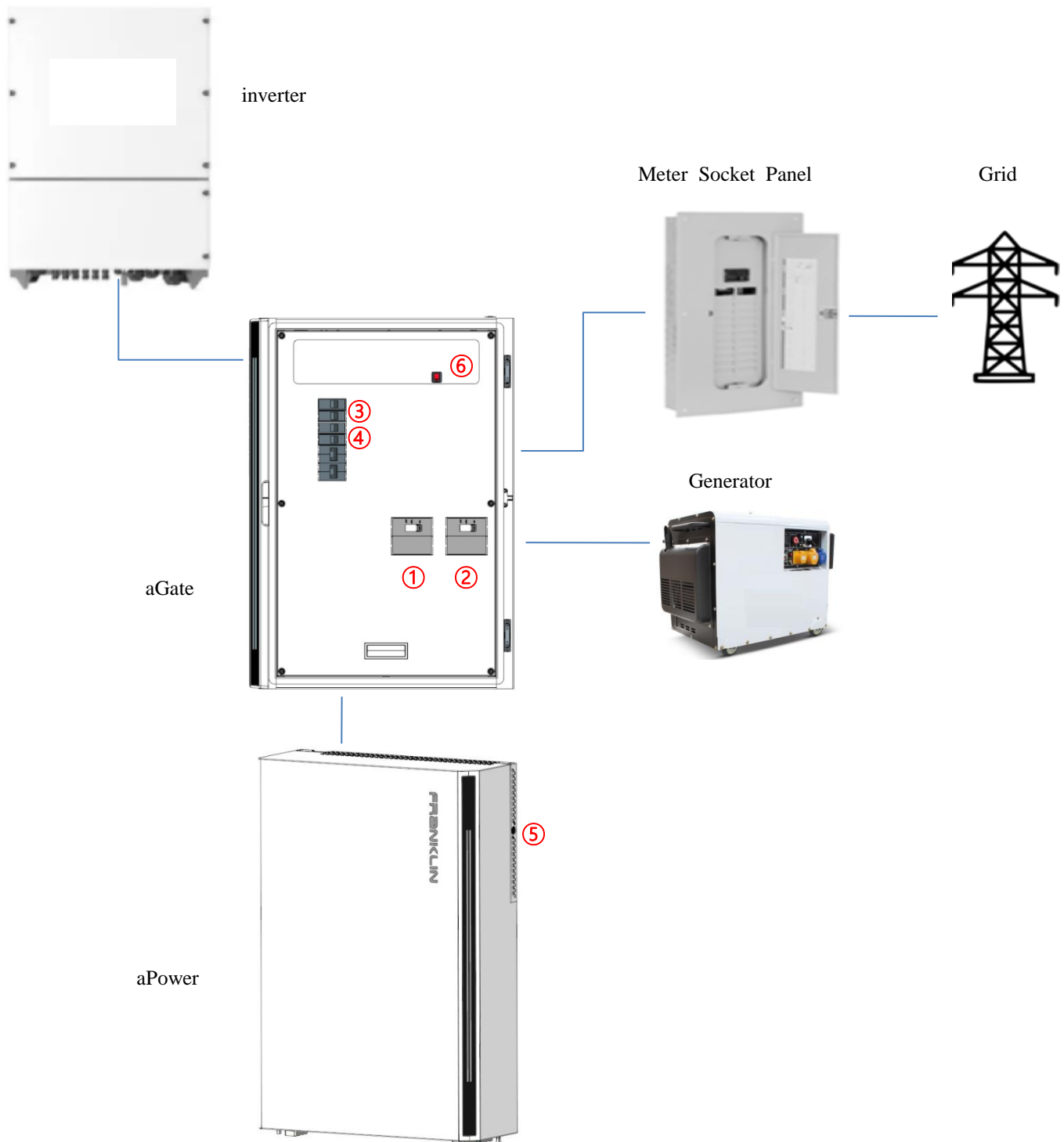
Franklin Home Power Commissioning Flowchart



Commissioning

Startup

- ① Disconnect the grid power supply switch in aGate
- ② Disconnect the generator input switch in aGate
- ③ Disconnect the solar switch in aGate
- ④ Close the aPower AC input breaker switch on aGate.
- ⑤ Press the side cabinet switch on aPower, and wait for about half a minute until the power LED of aPower turns on and flashes at a frequency of 1 cycle/sec. aPower has been started up normally.
- ⑥ Turn on the EMS switch on aGate. EMS powered on when the switch LED turns red.



Commissioning

Installer to assist user in completing the registration process

Check the option “I have read and agree to the User Agreement”.

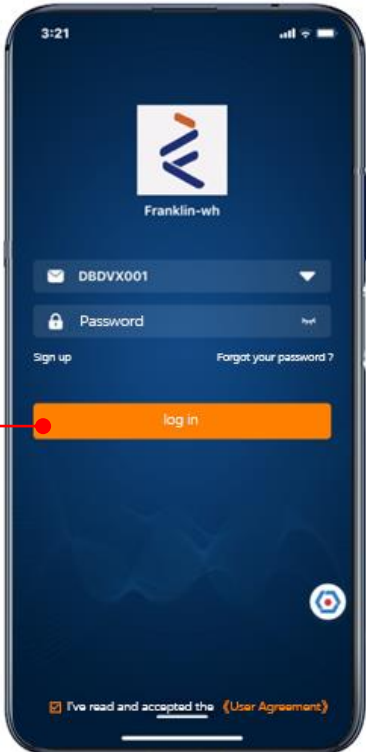


Enter the verification code

Sign up for a new user account with which the user will be able to operate the equipment.

Log in to the installer account

Log in using the installer account info assigned by FranklinWH for installers in order to activate and set up the equipment.



Commissioning

Connect mobile phone to Wi-Fi of aGate



After the installer logs in using the installer account, a window will pop out prompting you to select your Wi-Fi. Click on “Yes” to turn to the mobile phone Wi-Fi setting page, where please choose the Wi-Fi SSID “AP_XXXXXX”.

After Wi-fi connection has been established, you can access the settings page.

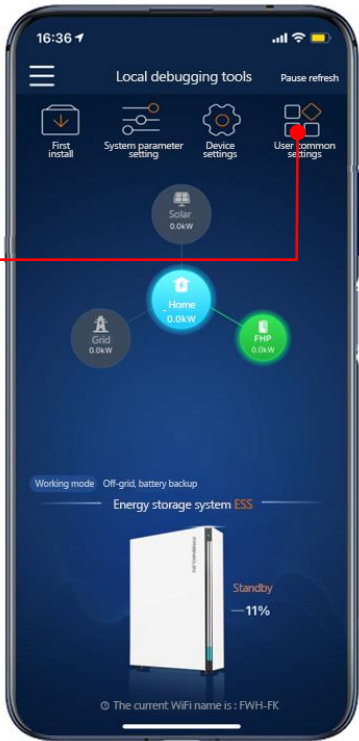


Settings page

Commissioning

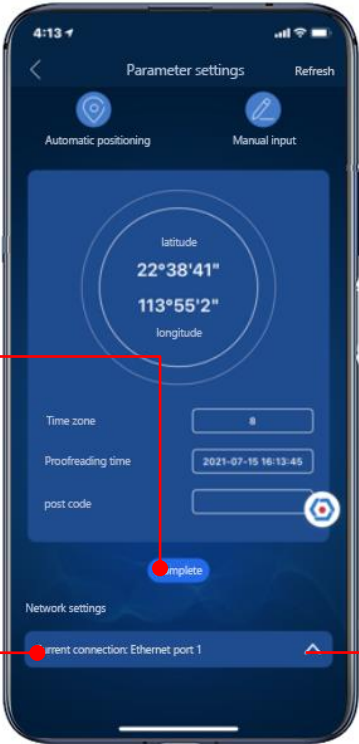
Click on “User Common Settings” to set up the installation site.

Click on “User Common Settings” to enter the setting page.

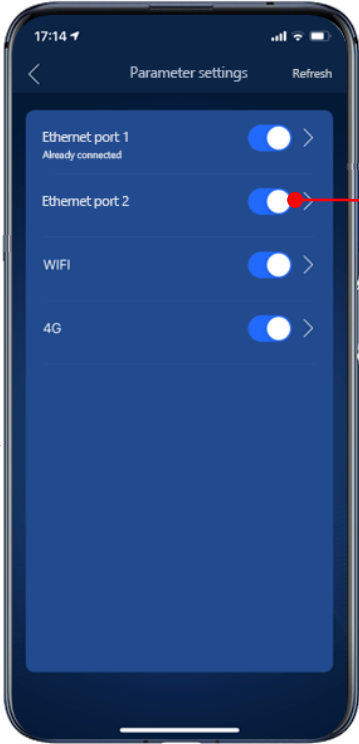


Set the “longitude and latitude” of the installation site.

Click on the drop menu “Network settings” to set up your network.



Choose Home Power network connection setting.

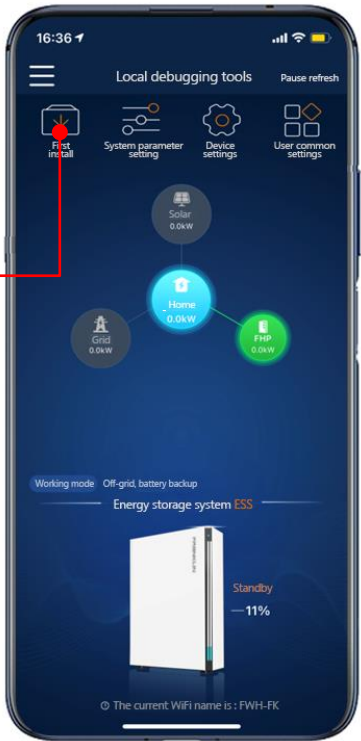


Click on the arrow to redirect automatically

Commissioning

Click on “First Install” to enter the system initialization settings.

Click on “First Install” to enter the system initialization settings..



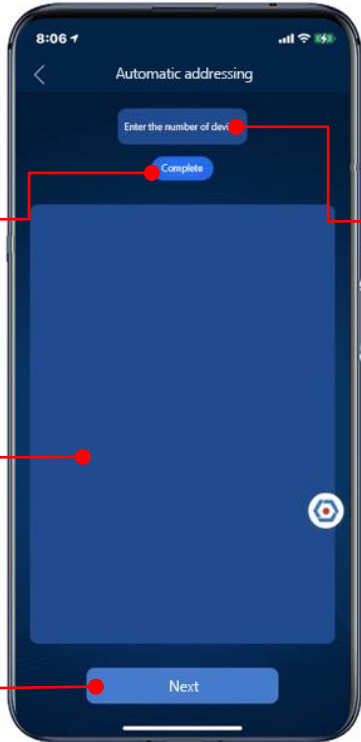
Click on “First Install” to redirect.

Input the complete numbers and click on “Complete”.

Input the number of aPowers installed, such as “1”, “2” ...

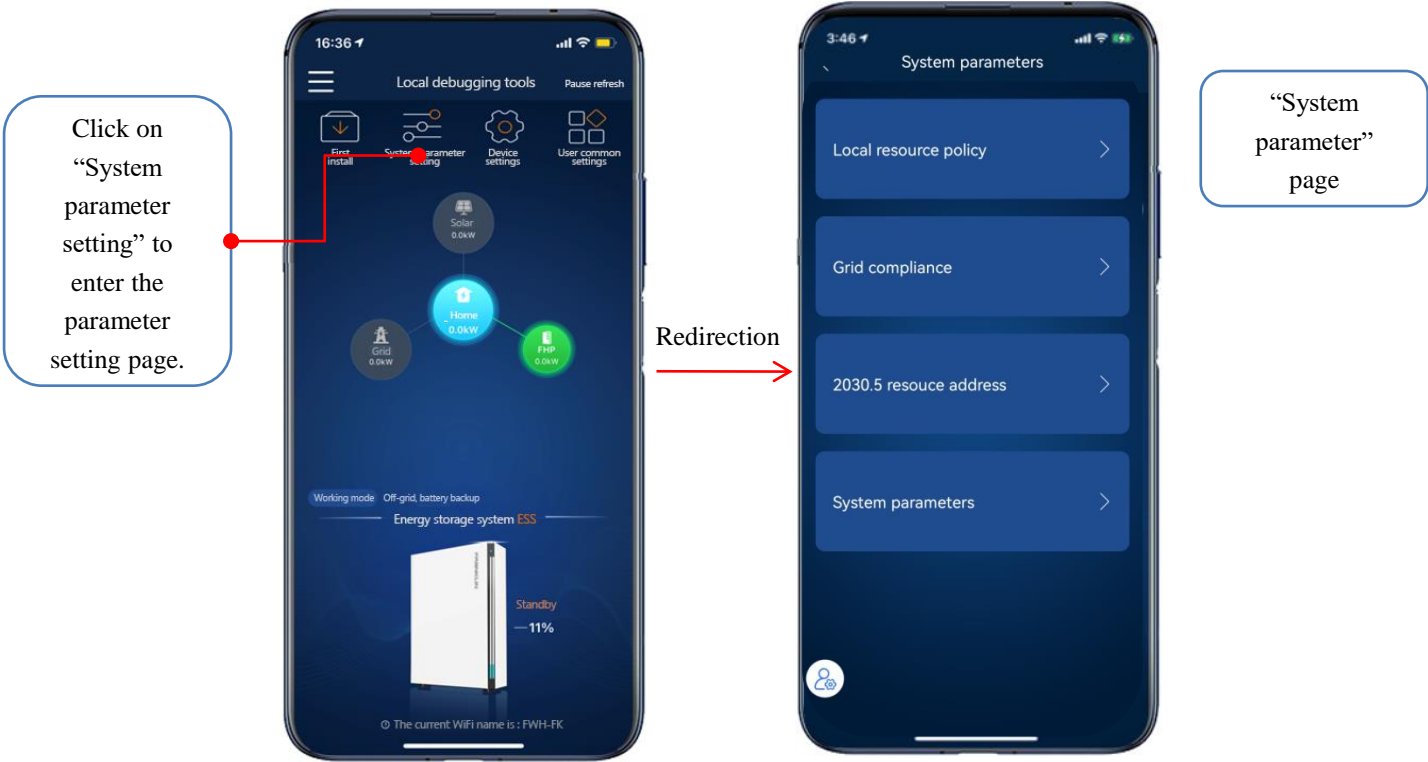
aPower will automatically generate window icons for them.

Click on “Next”. aPower will automatically show the numbers of each aPower.

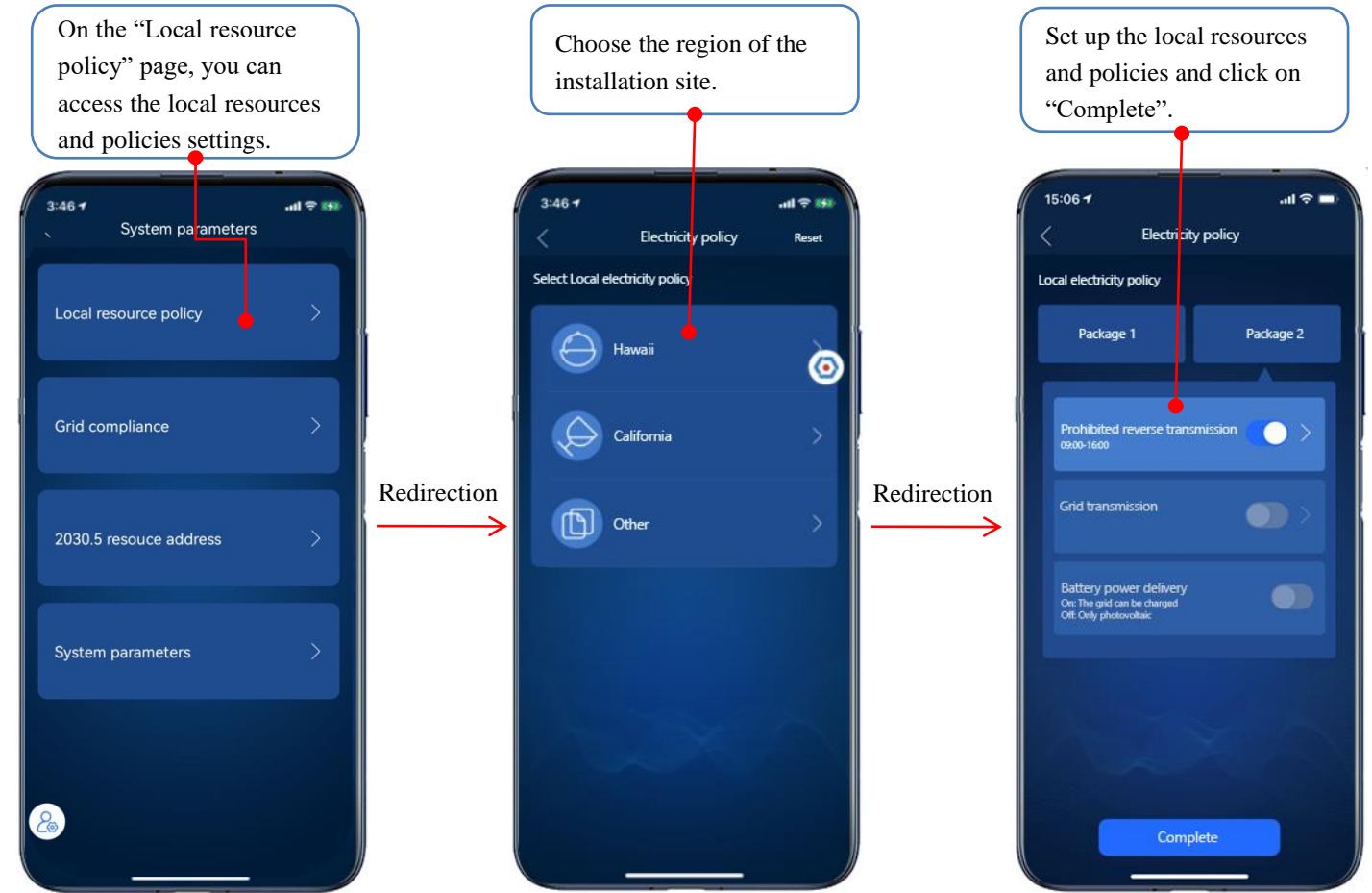


Commissioning

Click on “System parameter setting” to enter the parameter setting page.

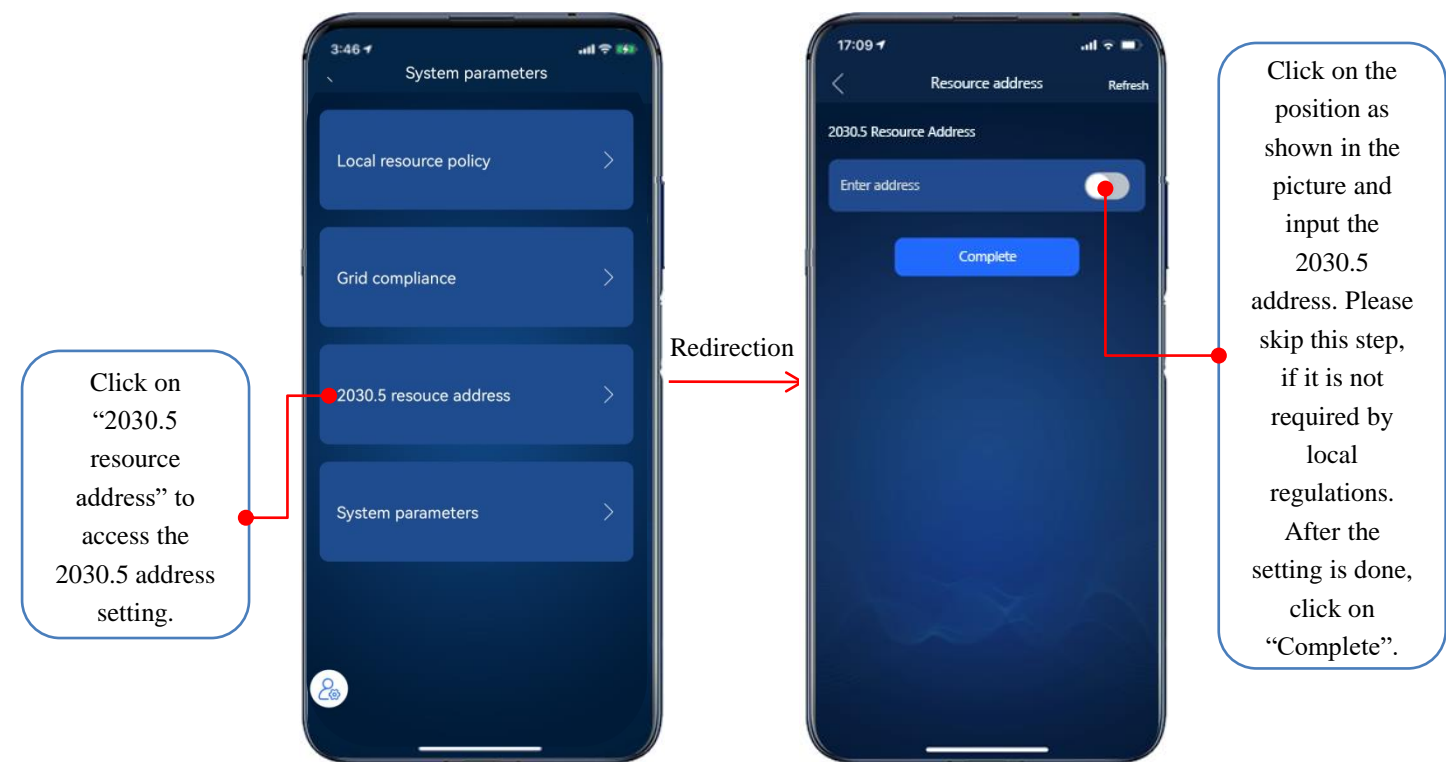


On the “System parameter” setting page, set up the local resources and policies.

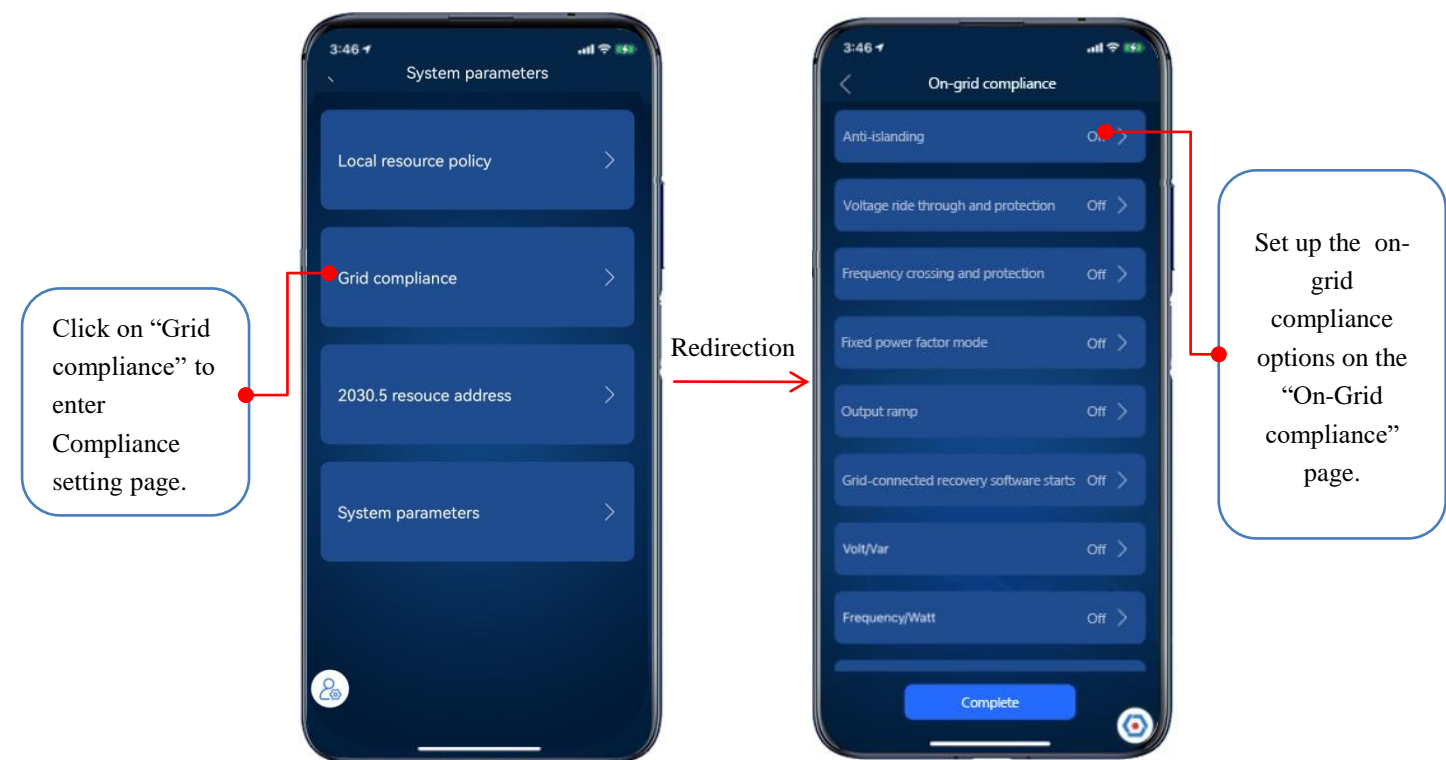


Commissioning

On the “System parameter” setting page, set up the 2030.5 address.

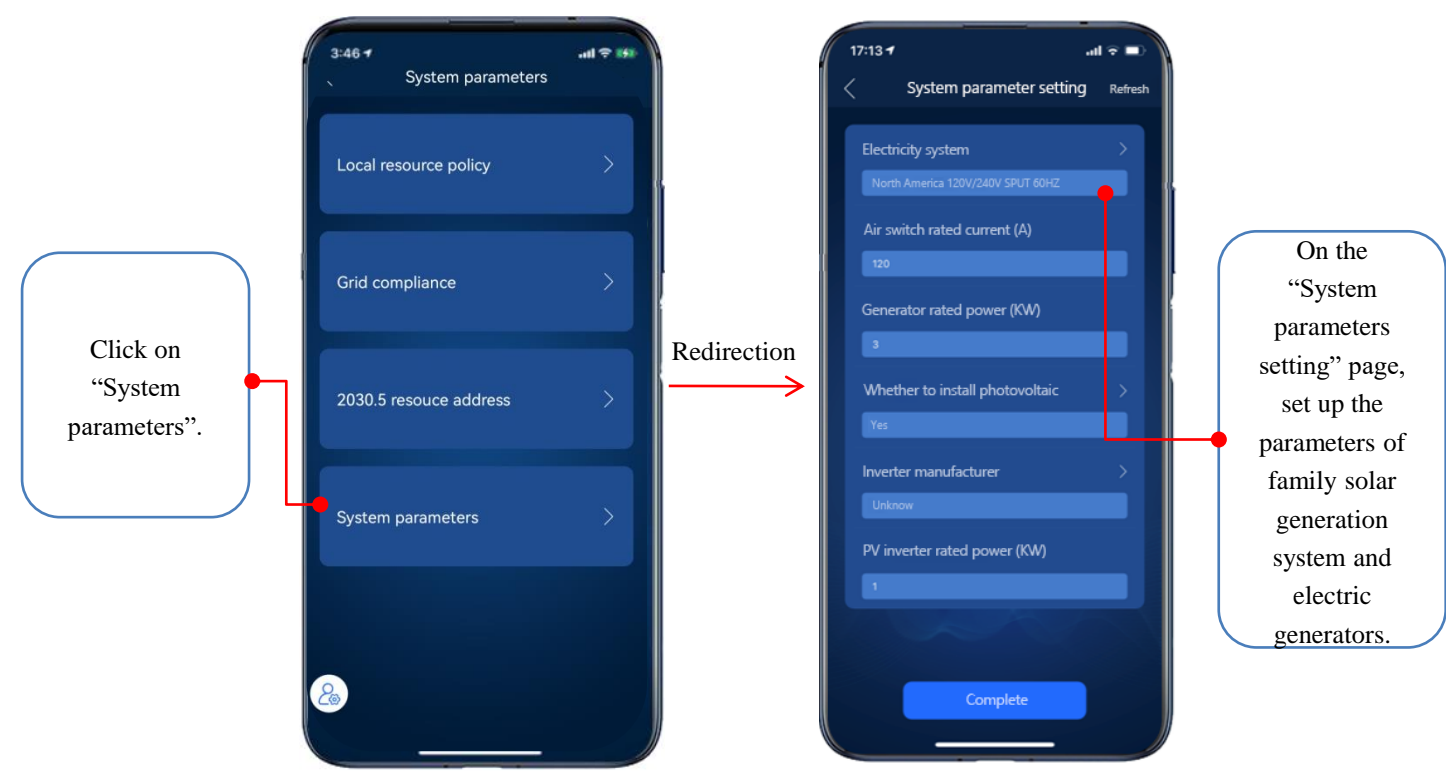


On the “System parameter” setting page, there are settings in relation to the compliance in case of parallel operation. Please refer to Appendix 3 and Appendix 4 for FHP BESS and related settings.

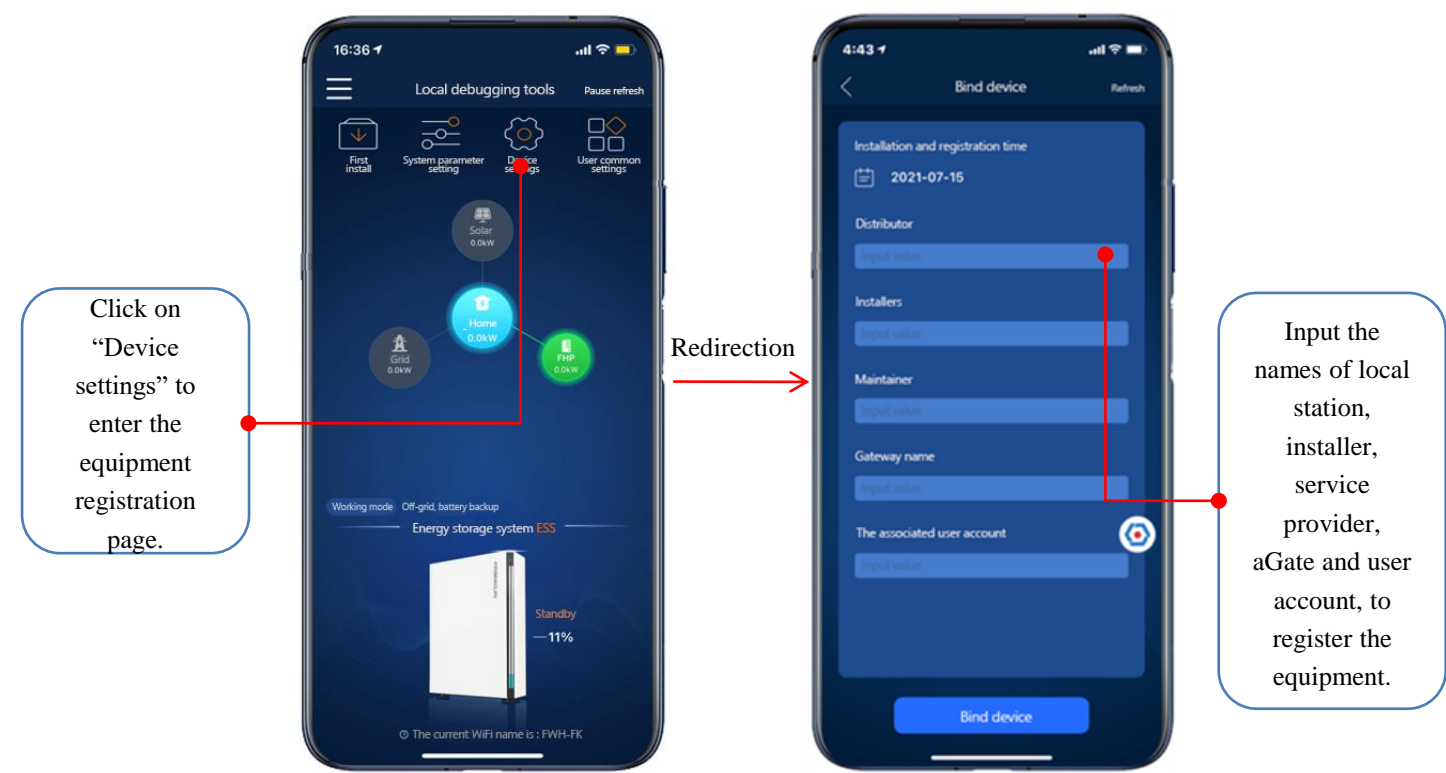


Commissioning

On the “System parameter” setting page, set up the 2030.5 address.

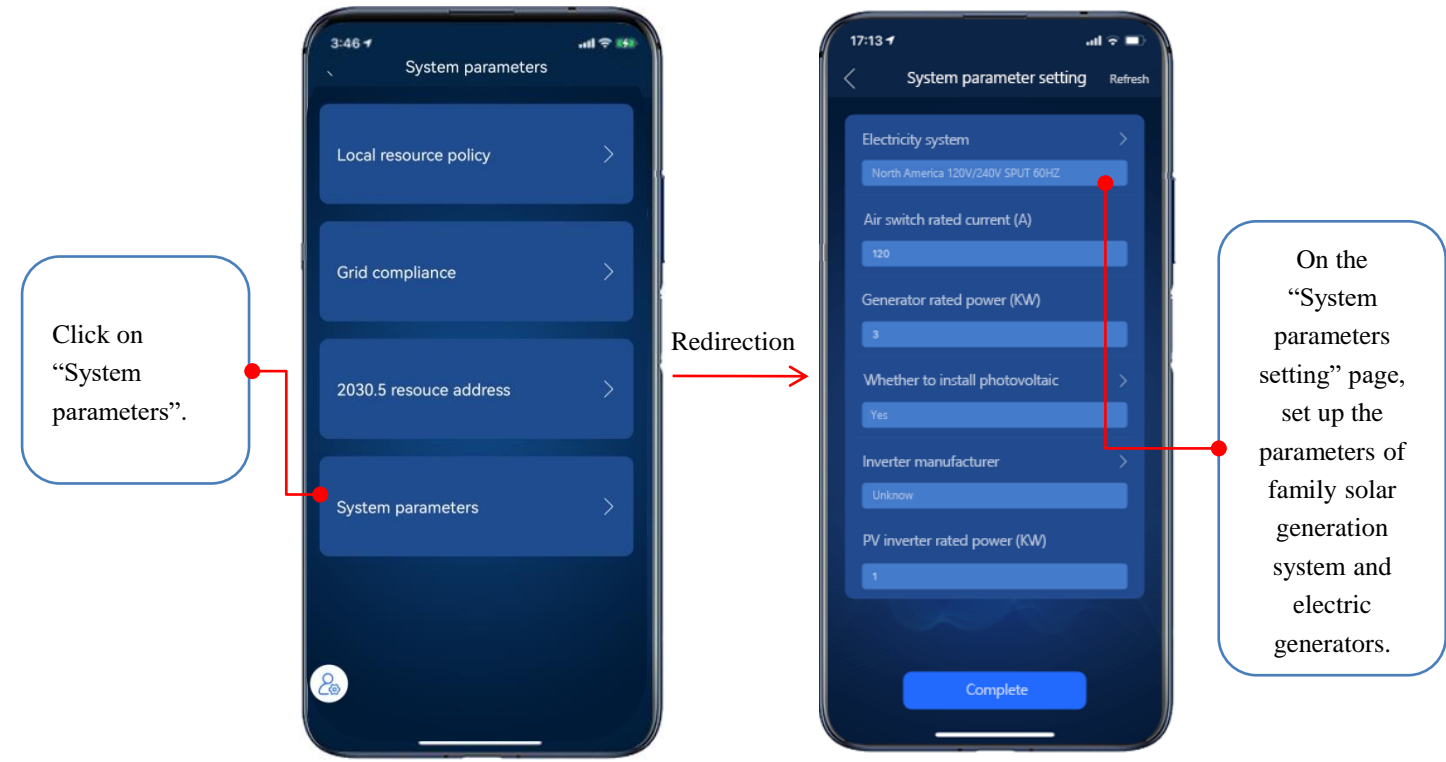


Return to the home page, and click on “Device settings” to register the user E-mail account with the equipment.



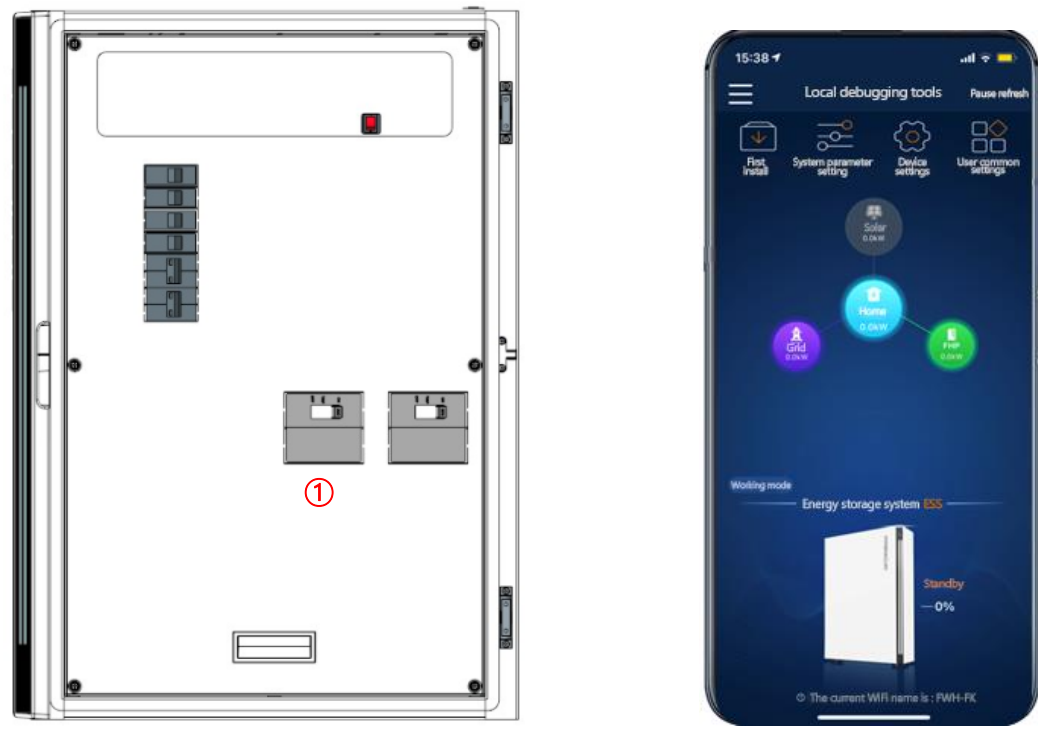
Commissioning

Return to the home page, and click on “Device settings” to register the user E-mail account with the equipment.



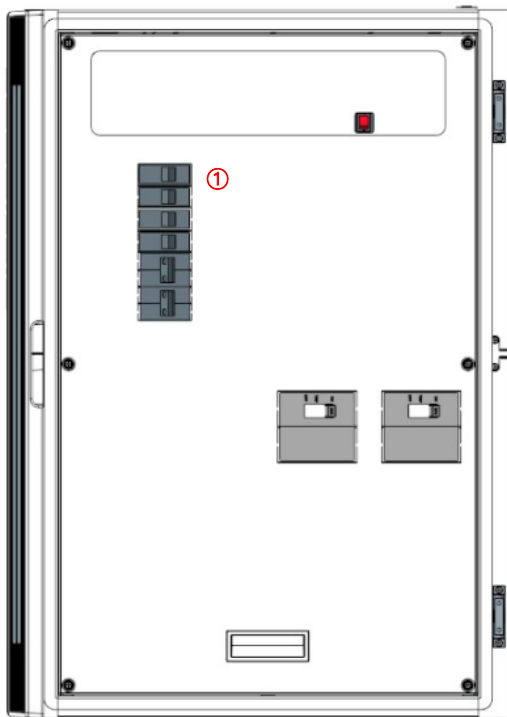
Operate aGate and close the grid power supply

Close the grid power input switch on aGate. The grid icon will turn on at the energy flow page on the application.



Commissioning

Operate aGate and close the solar input switch. Return to the Home page of the application and check the commissioning mode. Set up the charging power and discharging power to test the charging and discharging functions of the system.



Choose the “debugging mode” to test the charging and discharging functions. You can determine whether the charging and discharging functions are working properly by the energy flow direction shown on the energy flow page.

Commissioning process has been completed.

Appendix 1: Data sheet

aPower	
Model:	aPower X
BAT DC terminal, Bi-directional:	
Nominal voltage (Vdc)	51.2 Vdc
Range of DC charging voltage (Vdc)	32 - 58 Vdc
Range of DC discharging voltage (Vdc)	32 - 58 Vdc
Max. charging/output current (Adc)	100A
Max. charging/output power (W)	5000W
Max. discharging/input current (Adc)	118A
Max. discharging/input power (W)	5300W
AC terminal, Bi-directional:	
Nominal AC voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC frequency (Hz)	60Hz
Nominal AC output/inject current (Aac)	21A
Nominal AC output/inject power (W), (L-N)	2500W
Nominal AC output/inject power (W), (L-L)	5000W
Max. Continuous AC output/inject current (Aac)	24.5A
Max. Continuous AC output/inject power (VA), (L-N)	2900 VA
Max. Continuous AC output/inject power (VA)	5800 VA
Nominal AC input/absorb current (Aac)	21A
Max. Continuous AC input/absorb current (Aac)	24.5A
Nominal AC input/absorb power (W), (L-L)	5000W
Max. Continuous AC input/absorb power (VA), (L-L)	5800 VA
Output/inject power factor rating	±0.85, adjustable
Max. overcurrent protection (amps), circuit breaker ratings (QF4 2P)	30A
Operation temperature range	-20 °C to +50 °C
Ingress protection	IP67

Appendix 1: Data sheet

aGate	
Model:	aGate X
(1) Grid terminal (QF1 2P), Bi-directional:	
Nominal AC Grid voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC Grid frequency (Hz)	60Hz
Nominal AC input/absorb current (Aac)	160A
Nominal AC input/absorb power (W)	38400W
Max. Continuous AC input/absorb power (VA)	38400 VA
Nominal AC output/inject to Grid current (Aac)	21A
Nominal AC output/inject to Grid power (W)	5000W
Max. Continuous AC output/inject to Grid current (Aac)	24.5A
Max. Continuous AC output/inject to Grid power (VA)	5800 VA
Output/inject power factor rating	±0.85, adjustable
Max. overcurrent protection (amps), circuit breaker ratings (QF1 2P)	200A
(2) AC input terminal, Diesel generator (QF2 2P):	
Nominal AC input voltage (Vac)	240 V
Nominal AC input frequency (Hz)	60Hz
Nominal AC input current (Aac)	160A
Nominal AC input power (W)	38400W
Max. Continuous AC input current (Aac)	160A
Max. Continuous AC input power (VA)	38400 VA
Max. overcurrent protection (amps), circuit breaker ratings (QF2 2P)	200A
(3) AC output terminal, Non-Backup / L1, L2:	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC output current (Aac)	160A
Nominal AC output power (W)	38400W
Max. Continuous AC output current (Aac)	160A
Max. Continuous AC output power (VA)	38400 VA
(4) AC output terminal, Backup / L1, L2:	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC output current (Aac)	160A
Nominal AC output power (W)	38400W
Max. Continuous AC output current (Aac)	160A
Max. Continuous AC output power (VA)	38400 VA
(5) AC input terminal, PV converter's output (QF3, 2P):	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC input current (Aac)	64A
Nominal AC input power (W)	15360W
Max. overcurrent protection (amps), circuit breaker ratings (QF3 2P)	80A

Appendix 1: Data sheet

aGate	
(6) AC terminal (QF4 2P), Bi-directional:	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC output/inject current (Aac)	21A
Nominal AC output/inject power (W), (L-N)	2500W
Nominal AC output/inject power (W), (L-L)	5000W
Max. Continuous AC output/inject current (Aac)	24.5A
Max. Continuous AC output/inject power (VA), (L-N)	2900 VA
Max. Continuous AC output/inject power (VA), (L-L)	5800 VA
Output/inject power factor rating	±0.85, adjustable
Max. overcurrent protection (amps), circuit breaker ratings (QF4 2P)	30A
(7) AC output terminal, Smart load 1, (QF5, 2P):	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC output current (Aac)	40A
Nominal AC output power (W) (L-L)	9600W
Max. Continuous AC output current (Aac) (L-L)	40A
Max. Continuous AC output power (VA) (L-L)	9600W
Nominal AC output power (W) (L-N)	4800W
Max. Continuous AC output current (Aac) (L-N)	40A
Max. Continuous AC output power (VA) (L-N)	4800W
Max. output overcurrent protection (amps), circuit breaker ratings (QF5 2P)	50A
(8) AC output terminal, Smart load 2, (QF6, 2P)	
Nominal AC output voltage (Vac)	120/240 V, (L1, L2, N)
Nominal AC output frequency (Hz)	60Hz
Nominal AC output current (Aac)	64A
Nominal AC output power (W) (L-L)	15360W
Max. Continuous AC output current (Aac) (L-L)	64A
Max. Continuous AC output power (VA) (L-L)	15360 VA
Nominal AC output power (W) (L-N)	7680W
Max. Continuous AC output current (Aac) (L-N)	64A
Max. Continuous AC output power (VA) (L-N)	7680 VA
Max. output overcurrent protection (amps), circuit breaker ratings (QF6 2P)	80A
Others:	
Operation temperature range	-20 °C to +50 °C
Enclosure Type	Type 3R
Ingress protection	IP44

Notes:

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:—Reorient or relocate the receiving antenna.—Increase the separation between the equipment and receiver.—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.—Consult the dealer or an experienced radio/TV technician for help.

Appendix 2: About FHP energy metering

Energy visibility data on power and energy usage is needed for the FHP system, including metering for site energy, solar energy, and BESS advanced inverter by measuring voltage (by voltage tap) and current (by current transformer, CT) building-in the units of aGate and aPower.

FHP metering have complied with the standard IEEE 1547, section 4.4 Measurement accuracy, table 3-Minimum measurement and calculation accuracy requirements for manufacturers. The actual measurement and calculation accuracy of FHP are stated here as shown following.

Table Statement of FHP energy measurement accuracy

Time frame	Steady-state measurements			Transient measurements		
Parameter	Minimum measurement accuracy	Measurement window	Range	Minimum measurement accuracy	Measurement window	Range
Voltage, RMS	$\pm 1\%$ Vnom	10 cycles	0.5 p.u. to 1.2 p.u.	$\pm 2\%$ Vnom	5 cycles	0.5 p.u. to 1.2 p.u.
Frequency	10mHz	60 cycles	50 Hz to 66 Hz	100mHz	5 cycles	50 Hz to 66 Hz
Active Power	$\pm 2\%$ Srated	10 cycles	0.2 p.u. <P < 1.0p.u.	N/A	N/A	N/A
Reactive Power	$\pm 2\%$ Srated	10 cycles	0.2 p.u. <Q < 1.0p.u.	N/A	N/A	N/A
Time	1% of measured duration	NA	5 s to 600 s	2 cycles	N/A	100 ms < 5 s

Appendix 3: FHP Non-Export compliance mode for solar and BESS utility programs.

Generally, The commissions in USA request the suppliers of solar and BESS equipment listed and comply with the rules of the interconnection of distributed generating facilities.

Non-export compliance is built in the BESS work mode setting, such as HECO CSS, NEM+ program, and California States Commission's NEM non-export program.

FHP aPower equipment has an advanced inverter to control the non-export to zero while the non-export function is enabled. And the solar non-export will be enabled also.

Franklin APP provides the work mode to installer setting up.

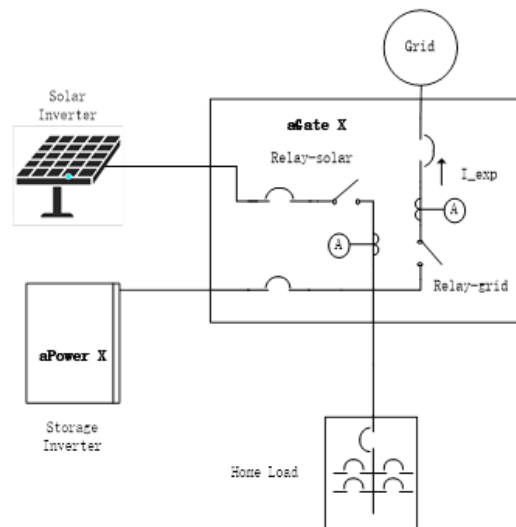
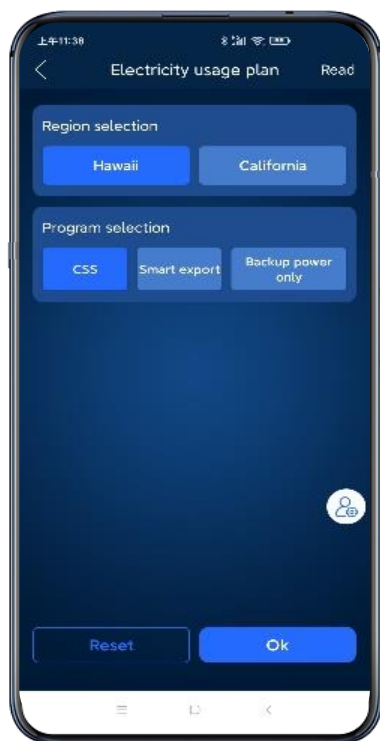
Once the program with non-export is activated in the “FranklinWH” APP, the FHP system will automatically run the pre-setting “non-export” built-in function according to the compliance and management there is no power export to the grid.

1), When the FHP system detects that the export current is over zero, the aPower unit will dynamically absorb the excess power generated from solar to balance the current export is zero.

2), The relay for solar input will be automatically disconnected within 2 seconds, if

- The aPower unit can't balance the export current value to zero within 30 seconds.
- The aPower unit is fully charged and the export current could not be balanced to zero within 30 seconds.

Figure Example of a work mode for a program HECO CSS with non-export built-in.



Appendix 4: FHP BESS interconnection compliance activation and reset.

