

FranklinWH aPower S Installation and Wiring Guide

aPower S SKU: APRS-10K15V1-US; APRS-10K15V1.1-US; APRS-10K15V1.1DCP-US
FranklinWH RSD Duo SKU: ACCY-RSDV1-US

November 12, 2026

Experience Whole Home Energy Freedom

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All brands and trademarks mentioned in this document are the property of their respective owners, and their use in this document does not imply the sponsorship or recognition of their products or services.

Please read this document carefully to ensure the best reliability of the product and your warranty eligibility. For further information about the warranty, please refer to the ***FranklinWH Limited Warranty***.

This document is intended for use by professional installation and maintenance service providers only and no statements, information or recommendations in this document constitute any express or implied warranty.

Product Information

The FranklinWH System is composed of aGate, aPower, the FranklinWH App, and other electrical and software components.

FranklinWH Energy Storage Inc. (FranklinWH) reserves the right to make any improvements to the product, and the contents in this document shall be subject to updates without further notification.

All images and pictures provided in this Manual are only for demonstration purposes and may differ in detail from the product, based on the product version.

FCC Compliance

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.

MPE caution (if an FCC certified RF module is inserted in and the separation distance is indicated in the FCC grant of RF module).

To satisfy FCC / IC RF exposure requirements, a separation distance of 8 in. (20 cm) or more should be maintained between the antenna of this device and persons during device operation.

To ensure compliance, operations at closer than this distance is not recommended.

Feedback

If you have any questions or comments, please send us an email at: *service@franklinwh.com*

Disposal of Scrapped Products

Scrapped products (including their internal chemicals and electrical materials) should not be disposed of with household waste. Please refer to your local laws and regulations regarding disposal.

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Safety Statements

This Guide includes important information about the FranklinWH System. Please read this Guide carefully before installation, maintenance, or use. Failure to follow any instruction in this Guide may lead to risks of equipment damage, electric shock, severe personal injury and even death, and may also void the warranty (*FranklinWH Support*).

Only FranklinWH certified and qualified technicians may install, maintain, or replace equipment or wiring.

The safety messages labeled DANGER, WARNING, CAUTION, and NOTE are supplemental to the safety instructions in this guide and do not address all possible hazards or conditions.

Safety Symbols

Type	Symbol	Definition
Safety Alert Symbols		
DANGER		Indicates a hazardous situation that, if not avoided, will result in serious injury or death.
WARNING		Indicates a hazardous situation that, if not avoided, could result in serious injury or death.
CAUTION		Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTE		Indicates information considered important, but not related to personal injury.
IEC Standard Graphical Symbols		
PROTECTIVE GROUNDING TERMINAL		This indicates the position of grounding connection on the equipment.
WAIT TIME		It means there are electric shock risks inside the equipment. Please wait 5 minutes before proceeding.
ELECTRONIC DEVICE: DO NOT THROW AWAY		Scrapped electronic products and batteries cannot be disposed of together with household waste. Please consult your local laws and regulations for further information.

Safety Instructions

All installation, wiring, maintenance, transportation, and handling of equipment must comply with applicable local laws, regulations, and standards. The safety instructions in this guide supplements those requirements.

Electrical Hazards	**DANGER** Electrical shock and chemical exposure hazards. Will result in electric shock, burns, serious injury, or death. Do not open the cabinet or disassemble the product without specific direction from the FranklinWH service team.
	DANGER Unexpected equipment energization hazard. Will result in electric shock, arc flash, serious injury, or death. Disconnect and padlock all upstream and downstream switches before installation or maintenance.
	WARNING Unexpected equipment energization hazard. Accidental operation of the ON/OFF switch could result in death, serious injury, or equipment damage. Keep the switch button on the right side of aPower in the OFF position to prevent accidental operation during installation and commissioning.
	WARNING Improper electrical connection. Incorrect wiring could result in fire, equipment damage, or serious injury. Do not connect aPower directly to a PV inverter.

Risk of fire and explosion hazard	**WARNING** Fire hazard. Excessive temperatures, flammable materials, or blocked ventilation could result in fire, serious injury, or equipment damage. Keep the ambient temperature below 122° F (50° C), keep the FranklinWH product away from flammable materials, and do not block the cooling system or ventilation openings.
Risk of battery hazard	**DANGER** Battery thermal runaway, leakage, smoke, or fire. Will result in fire, explosion, toxic fume exposure, serious injury, or death. If the aPower battery is leaking electrolyte, smoking, or catching fire, and if it is safe to do so, disconnect the AC power from the FranklinWH System and turn off the aPower switch to stop charging and discharging the battery.
	DANGER Battery fire occurs. Will result in severe burns, serious injury, or death. In case of a battery fire, take action as instructed in the ***Safety Data Sheet***.
Risks of installation and handling hazards	**CAUTION** Presence of concealed electrical wiring and water pipes during installation. Property damage, electric shock, water leakage, or personal injury. Before the installation starts, engineers should check and locate the embedded electric wires and water pipes to avoid potential property damage and personal injury during the installation process.
	CAUTION Improper handling and installation of aPower without lifting equipment. Personal injury and equipment damage could result. The aPower must be carefully handled and installed using lifting equipment to avoid injury to installers or the aPower.

<table>
<tr><td></td><td>NOTE

During the transport and handling of the FranklinWH devices, extreme care is required to avoid dropping, bumping, stomping, or inverting the equipment. To prevent potential damage, please keep all units in their packaging until ready to install.</td></tr>
<tr><td rowspan="3">Risks associated with environmental and site hazards</td><td>WARNING

Proximity to heat sources or ignition sources during installation.

Fire or equipment damage may result.

The installation site should be away from heating devices, or any source of heat and/or fire.</td></tr>
<tr><td>WARNING

Presence of flammable or explosive materials near the installation area.

Fire or equipment damage may result.

The installation area should be away from flammable and explosive materials.</td></tr>
<tr><td>WARNING

Fire and hazardous gas exposure

Installing the energy storage system in a prohibited location can expose occupants to fire, heat, smoke, and hazardous gases.

Do not install the system in a sleeping room or in a closet or other space that opens directly into a sleeping room. For outdoor or exterior-wall installations, maintain at least 3 ft (914 mm) from doors and windows that directly enter the dwelling. Install the system only in locations permitted by applicable codes, the equipment listing, and these instructions.

Failure to follow these instructions could result in death or serious injury.</td></tr>
</table>

	WARNING Outdoor installation, maintenance, or handling during severe weather conditions. Electric shock, fire, equipment damage, or serious injury may result. It is strictly forbidden to install, maintain, or handle the system outdoors during bad weather conditions, such as lightning, thunder, rain, snow, or strong winds.
	WARNING Foreign objects entering aPower, aGate, or other FranklinWH devices. Equipment damage, short circuit, or malfunction may result. Prevent foreign objects from entering any aPower, or aGate, or other FranklinWH device.
	WARNING Use of cleaning agents or exposure to flammable or irritant chemicals or vapors on the FranklinWH devices. Equipment damage, fire, or chemical exposure hazards may result. Do not clean the FranklinWH devices with cleaning agents or expose them to flammable or irritant chemicals or their vapors.
	WARNING Presence of overhead or nearby water sources at the installation site. Water ingress may result in equipment damage, electric shock, or fire. The installation site should have no water source above it or in the vicinity, including water pipes, shower, faucet, and containers of liquids.
	NOTE Before installation, do not store an aPower on site for more than one month. After installation, do not turn on the aPower before connecting the PV and grid, otherwise the battery will be depleted due to a long period of time without charging.

	NOTE Either Ethernet or Wifi connectivity should be provided at the aGate installation site. Ethernet and Wifi connections are more reliable, but 4G connections are also possible, though not suggested as the primary method.
Regulatory and Compliance Requirements	**NOTE** The installation of the FranklinWH System must comply with all applicable codes and requirements set by the local AHJ, utility companies and/or the state.
	NOTE 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 CSA C22.1.
	NOTE The installer needs to provide suitable conduits and cables, and complete the installation process in accordance with the local regulations.

Critical Safety Practices	**DANGER** Energized electrical circuits during installation, service, or maintenance. Electric shock, arc flash, serious injury, or death. Before any electrical operation starts, please turn off the grid power supply switch, generator input switch, the PV input switch, the load switch, and lock the switches. If the switches cannot be locked, please lock the distribution box where the switches are installed. A warning sign, **Out of Operation**, or **Do NOT Turn On,** should be hung.
	WARNING Exposure to electrical, mechanical, or environmental hazards. Failure to wear appropriate PPE may result in electric shock, burns, or serious injury. Use appropriate personal protective equipment (PPE) at all times during installation and service.
	WARNING Working on or operating the system alone. Potential safety risks with no on-site assistance in case of emergencies. Always ensure another person is present to provide assistance during system operation or servicing.
	WARNING Unauthorized disassembly, repair, modification of the FranklinWH device, or opening of the battery pack chamber. Serious safety hazards and voidance of product warranty. Do not disassemble, repair or modify the FranklinWH device without FranklinWH authorization. It is prohibited to open the battery pack chamber in any situation.

	WARNING Operating damaged or malfunctioning devices. Personal injury and equipment failure may occur. If a FranklinWH device is found damaged (except for minor defects in exterior painting) after it is unboxed or malfunctioning on installation, please do NOT operate it and contact service support at +1 888-851-3188 or email *service@franklinwh.com* for assistance.
	NOTE Do NOT use paint on any part of a FranklinWH product, whether internal or external, especially on the protective cover except for exterior paint that has been worn out or damaged in the transportation, installation, or maintenance process. The damaged part can be repaired using a water-based paint or topcoat of the same color.
	NOTE 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.

Fire and Other Emergency Situations

Fire: • Shut off the aPower breaker on the aGate, if it is safe to do so. • Evacuate to a safe area. • Contact 911 as soon as it is safe to do so. • Use approved fire extinguishing devices, if it is safe to do so.
Flood: • Shut off the aPower breaker on the aGate if it is safe to do so. • If the wiring sections of an aPower or aGate are submerged, please stay away from the water. Electric leakage may result in electric shock. • Drain the water to protect the system if it is safe and possible. • If water rises to the battery level, please call your installer for inspection. If the water level is below the battery chamber, please allow the site to completely dry.
Abnormal noise, odor, or smoke: • Shut off the aPower breaker on the aGate, if it is safe to do so. • Check and ensure your aPower is well ventilated and the vents are not blocked. • Keep the installation site well ventilated. • Call your after-sales service for support.

Warranty Statement

The operation of the FranklinWH System requires an Internet connection. Extended offline operation may result in a voided warranty. Please refer to *FranklinWH Support* for information.

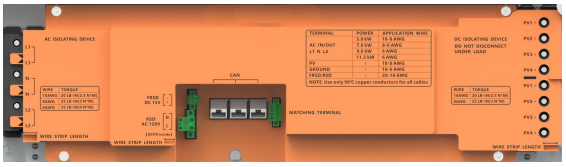
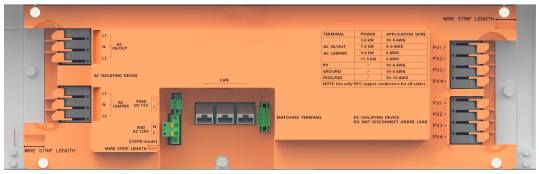
aPower S Overview

Product Introduction

The FranklinWH aPower S is an integrated solar-input energy storage unit equipped with a built-in battery management system (BMS) and inverter. It supports DC-coupled solar configurations for efficient photovoltaic energy storage. Designed to operate with the aGate or MAC, the FranklinWH aPower S enables seamless whole-home energy management by coordinating energy flow across DC-coupled solar input, battery storage, and AC-coupled parallel expansion.

Wiring Compartment Identification

The aPower S is available with two control board configurations. The AC and DC terminal block types differ between the two configurations. Both configurations share the same terminal layout, with the L1, L2, neutral, ground, and PV+/- terminals located in the same sequence. Refer to the following images for a visual comparison of the two configurations.

	Screw Terminal Block	Lever-nut Terminal Block
SKU	APRS-10K15V1.1DCP-US APRS-10K15V1.1-US	APRS-10K15V1-US
SN Prefix	10050022xxxx... 10050029xxxx...	10050019xxxx...
Product Images		
SN Locations	  	

***NOTE**: Images are for reference only. Please refer to the actual product.*

Compatibility

Unit	Compatible Controllers	Compatible Expansions	Max Batteries
aPower S	aGate X 1.3/1.3.1	aHub	15
	MAC 1		4

Related Documents

For more information about the FranklinWH aGate and MAC, visit
https://www.franklinwh.com/support/documentation-center

Related Information

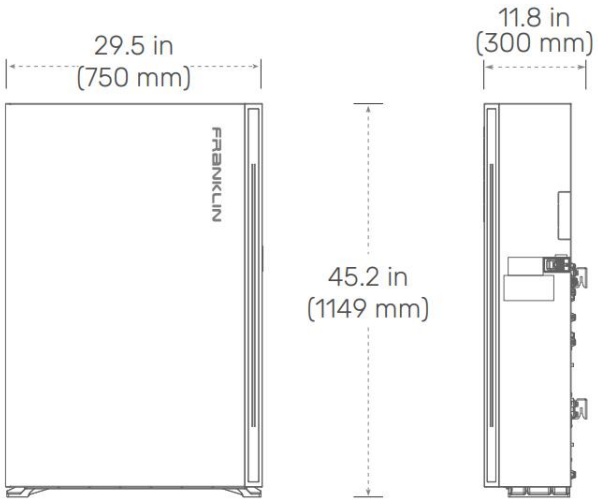
For more information about the FranklinWH battery and compatible devices, refer to the ***FranklinWH Backwards Compatibility Statement***.

Installation Preparations

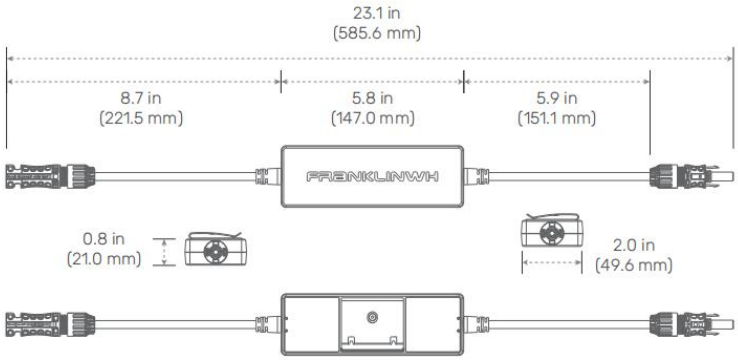
Site Planning

Dimensions and Weight

aPower S	
Dimensions (H × W × D)	45.2 in. × 29.5 in. × 11.8 in. (1149 mm × 750 mm × 300 mm)
Weight, aPower S Complete	388 lb. (176 kg)
Weight, without Cover	365 lb. (166 kg)



RSD Duo	
Dimensions (H × W × D)	5.8 in × 2.0 in × 0.8 in (147.0 mm × 49.6 mm × 21.0 mm)
Weight	0.6 lb. (273 g)



1. Plan installation position

NOTE

The installation location must be away from heat sources, open flames, and flammable or explosive materials. Do not install the system in areas prone to flooding or standing water.

The aPower installation area should be well-ventilated to maintain the ambient temperature within -4° F to 122° F (-20° C to 50° C). In regions that experience prolonged periods of extreme cold, indoor installation is recommended to further enhance performance and longevity.

It is best practice to install the FranklinWH System in an area protected from direct sunlight, rain, and snow, and to avoid a direct south-facing orientation when installing outdoors for optimal performance. Extreme heat from direct sunlight may derate the output or affect equipment longevity beyond the warranty period for FranklinWH equipment.

Refer to all applicable local codes and standards.

a) Choose a mounting location that can bear the weight of the aPower.

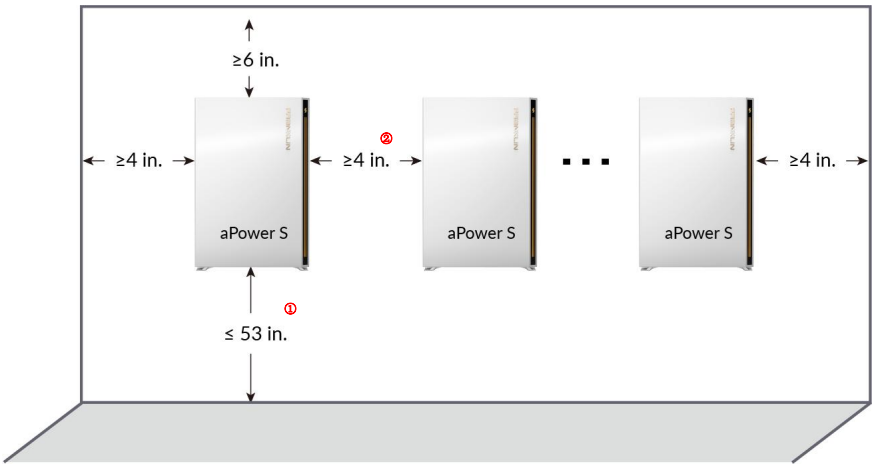
NOTE: The clearance details below are general guidelines for spacing in accordance with NEC requirements. For countries or regions where NEC requirements are not applicable, please consult with your AHJ or Utility before finalizing the spacing.

aPower

There should be a minimum clearance of 6 in. (0.15 m) from the top of aPower to the ceiling.

For an aPower mounted on a wall, the maximum distance between the bottom of the aPower and the ground shall be ≤ 53 in. (1.35 m) i.e., **the maximum distance between the aPower switch button and the ground shall not exceed 79 in. (2 m) per NEC 404.8(A) requirements.**

The minimum clearance between adjacent aPower units and from side wall is 4 in. (0.1 m). Ensure adequate spacing for connection access.

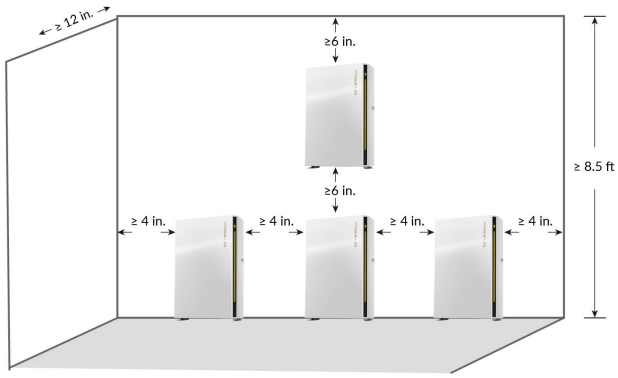


① NEC 408.4(A) requires the aPower switch to be no more than 79 in. (2 m) from the ground.

② 4 in. (0.1 m) between adjacent aPower units is UL9540A required clearance. FranklinWH recommends a clearance of 14 inches for optimal operation of the electric drills and screwdrivers during installation.

The aPower S may also be installed in vertical orientations. For indoor deployment, refer to the clearance diagram below for minimum clearances. Outdoor installation is considered the best practice for vertical setups to ensure adequate access and ventilation. All configurations and clearances have been tested and approved in accordance with UL 9540A: 2026 (Sixth Edition). Ensure that all battery installations, regardless of configuration, comply with applicable national and local codes and regulations. For more information, contact engineering@franklinwh.com.

Description	Space
Vertical stacking clearance	≥ 6 inch (150 mm)
Wall height for vertical stacking	≥ 8.5 ft (2.6 m)
Space to room ceiling	≥ 6 inch (150 mm)
Vertical stacking depth	≥ 12 inch (305 mm)



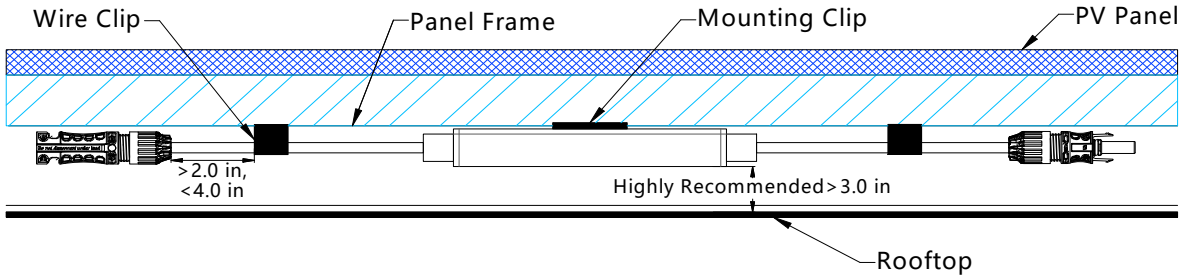
b) The system requires an internet connection. All signal transfers between aPower, aGate/MAC, the generator, and the router are provided by a CAN bus, network cables or other signal transmission cables. Long distances will likely adversely affect the quality and speed of communications, negatively impacting equipment operations. Recommended maximum cable lengths listed below.

Connection	Maximum cable length
aPower to aGate/MAC	164 ft (50 m)
Split CT to aGate	49 ft (15 m)

c) Plan the aPower installation location to ensure the total DC circuit length for each PV string (from the MPPT PV+ terminal to the PV- terminal, including module leads, jumper cables, and **all wiring within the string array boundary) does not exceed 984 ft (300 meters)**.

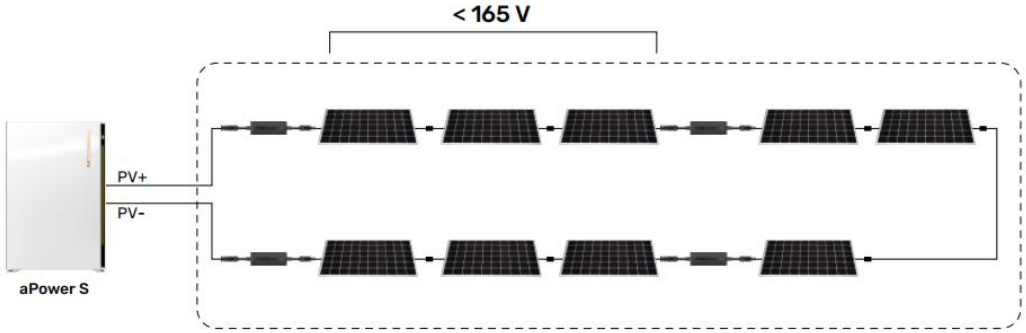
	NOTE: The RSD Duo is not required for all installations. For ground-mounted systems where local code does not require RSD, the aPower S can be installed without the RSD Duo by selecting the "No RSD" option during commissioning. In these cases, distance is not a factor since the RSD Duo is not used.
	NOTE: The total DC circuit length refers to the complete round-trip distance from the aPower inverter to the rooftop and back. The PV+ and PV- cables for each PV string must be routed through the same conduit and kept as close together as possible.
	NOTE: It is recommended to install the RSD Duos in a location that is not exposed to direct sunlight and does not accumulate rain or snow. The preferred method is to secure the RSD Duos to the support structure beneath the bottom edge of the PV panel using mounting clips. Ensure the RSD Duos do not contact the roof surface. Alternatively, the mounting clips can be removed and the RSD Duos can be installed using rail-slot mounting. For installations with bifacial modules where the RSD Duo is module-mounted, a portion of the RSD Duo may protrude from the module and receive sunlight. This operating condition will not impact the performance/reliability of RSD Duo.

d) Select an installation location for the RSD Duos as close to the PV panels as possible. If mounting the RSD Duos to the PV panel frame using the mounting clips, ensure the RSD Duos do not extend beyond the panel frame and a minimum clearance of 3 inches (7.62 cm) from the roof surface is highly recommended.



e) Plan the quantity and placement of RSD Duos. The RSD Duo is used within PV strings and arrays to meet the Rapid Shutdown requirements of NEC Article 690.12. The quantity and placement of RSD Duos necessary to meet Rapid Shutdown requirements in NEC Article 690.12 (B) and Canadian Electrical Code (CE Code), C22.1, is governed by the UL 3741 (PV Hazard Control System or PVHCS) listing applicable to various array types. For detailed FranklinWH PVHCS specifications and PV module list, please refer to the FranklinWH RSD Duo & PV UL 3741 Compliance.

- It is recommended that RSD Duos be used for UL3741 PVHCS system compliance with the 165 V array certification (also known as the rule of thumb: 1 RSD Duo per 3 modules).
- RSD Duos should be installed between series-connected photovoltaic modules to ensure that under all circumstances, the maximum circuit voltage of the photovoltaic system does not exceed 165 V after activation. In accordance with NEC 690.7 standards, the maximum photovoltaic system voltage should be calculated using the expected minimum operating ambient temperature at the installation site.
- Typically, based on standard photovoltaic panel voltage values, one RSD Duo should be installed in series for every 3 photovoltaic panels. Please refer to the panel open circuit voltages (Voc) and specifically Voc at low design temperature before installation. The actual installation configuration must be determined based on the actual voltage specifications of the photovoltaic panels being used.
- In all configurations, an RSD Duo must be installed on each end of the PV string, i.e., one RSD Duo is required for each of the PV+ and PV- connections of the PV array to the aPower S.



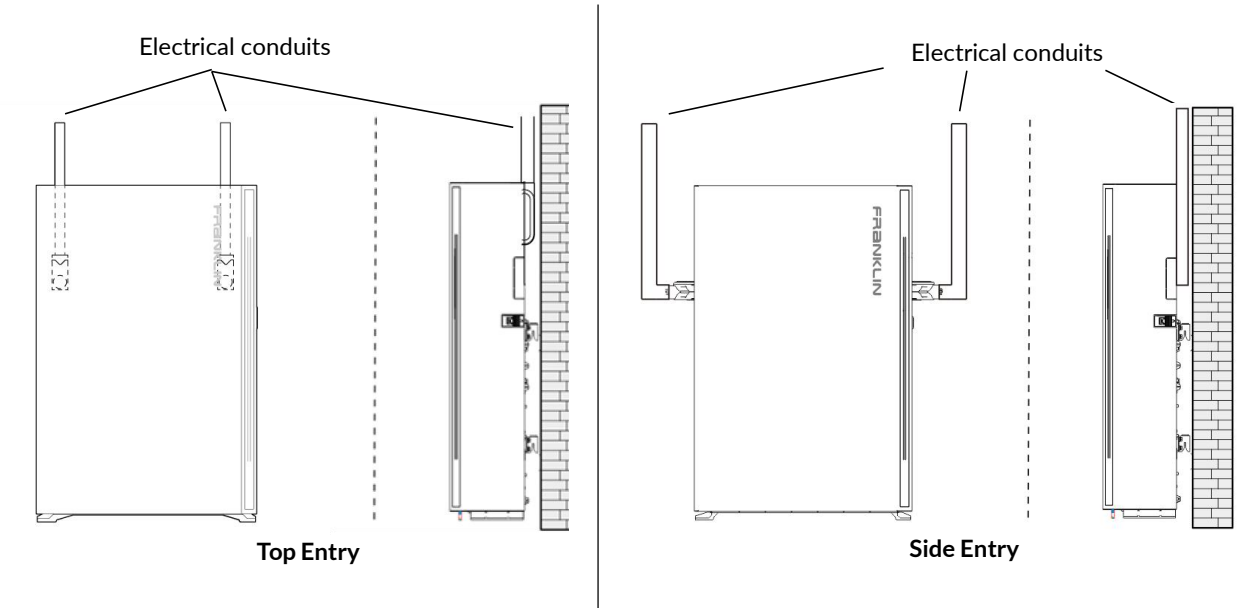
NOTE: Other UL3741-compliant installation scenarios require specific third-party components. See FranklinWH RSD Duo & PV UL 3741 Compliance for details.

2. Plan the positions of aPower knockout entries

The positions of the knockout entries on an aPower are shown below. The following scenarios offer variations on the cable entry points of an aPower to accommodate variations in the existing residential wiring layout.

The cable entry points on the wiring compartment of the aPower are 1.38 in. (35 mm) in diameter. The pull boxes have a 1″ trade size.

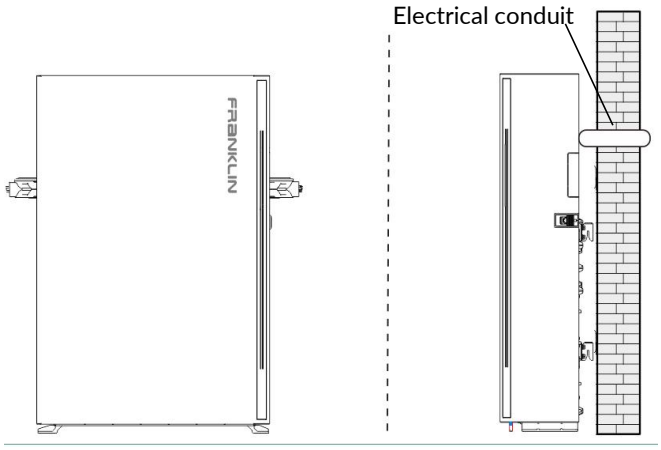
Scenario 1: The electrical conduits and aPower share the same side of the wall.



Determine the electrical conduit routing (top entry or dual-side entry) based on specific side conditions.

Gasketed pull boxes and sealing rings must be used to ensure the tightness of the wiring compartment.

Scenario 2: The cables will connect to the aPower from inside or through the electrical conduits through the wall.



Sealing rings must be used.

A good seal must be guaranteed between the electrical conduits and the wiring compartment which can be achieved by using a conduit hub, sealing rings, or caulk.

3. Plan the types, sizes and routes of cable and electrical conduits

a) Please refer to **Wiring Requirements** for recommended cable types and wire diameters.

b) As cables run through the electrical conduits:

- The current-carrying capacity of the cables needs to be reduced. Please refer to the applicable information in Appendix B of NFPA 70.
- The relationship between wire diameters, cable numbers, and inner diameters of conduits should be taken into consideration. Please refer to Appendix C of NFPA 70 for the list of maximum numbers of cables of the same size in the electrical conduits and pipelines.

c) The type of electrical conduits depends on the installation type, indoor or outdoor:

- IMC, EMT and other thin-wall metal conduits are recommended for indoor installations. These two types of conduits are cost effective, provide excellent anti-electromagnetic interference, and are easy to shape and to joint.
- In outdoor installations, 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.

4. Fire Code Compliance

The installation must comply with all applicable local codes, relevant regulations, and the requirements of local fire authorities.

5. FCC Requirements

See preface for the applicable FCC Requirements. The installer should inform customers of the contents in Appendix 3.

Tools Needed

- Personal Protection Equipment (PPE) (goggles, gloves, protective shoes, anti-dust respirator, etc.) for personal safety.
- Drill
  - ✓ Use 5/32″ Brad Point bits or 5/32″ Auger bits to drill pilot holes in wooden walls.
  - ✓ Use 1/2″, 3/4″, 1″, 1-1/2″, 2″ sized wood bits to create holes in wooden walls.
  - ✓ Use 1/2″, 3/4″, 1″, 1-1/2″, 2″ sized hole saw bits to create holes in metal walls.
- Hammer drill
  - ✓ Use 1/2″, 3/8″ Masonry bits to create pilot holes on concrete or brick walls.
  - ✓ Use 1/2″, 3/4″, 1″, 1-1/2″, 2″ Diamond core bits to create holes in concrete or brick walls.
- Electric screwdriver, cross screw bits, and 3 mm Allen wrench screw bit to tighten the fastening screws.
- Torque wrench and bent-handle ratchet wrench.
  - ✓ 11/32″, 5/16″, 7/16″, and 3/8″ hex sockets, to tighten and check the torque of outer hex bolts.
  - ✓ 3/16″ and 7/32″ inner hex screwdriver bits to fasten cables at circuit breakers and pressure connectors and to check the torque.
  - ✓ 3/16″, 1/4″ straight screwdriver bits to fasten cables at circuit breakers and connectors and to check the torque.
  - ✓ PH2, PH3 cross screwdriver bits to fasten cables at circuit breakers and to check the torque.
  - ✓ 6″ ratchet extension.
  - ✓ 1/4″ open end interchangeable torque wrench to fasten relays and to check the torque.
- Flat head screwdriver (1/8″ x 4″, 1/4″ x 4″) to fasten signal terminals.
- Phillips head screwdrivers (PH#2 x 4″, PH #3 x 4″) to tighten fasteners.
- Crimping tool (PV-CZM-61100 or PV-CZM-60100) to crimp PV MC4 connector terminals and cables. (Refer to the Stäubli MC4/MC4 Evo2 Connector Installation Instructions for information on other compatible models.)
- Assembly and unlocking tool (PV-MS-PLS or PV-MS) to disconnect mated male and female connectors. (Refer to the Stäubli MC4/MC4 Evo2 Connector Installation Instructions for information on other compatible models.)

NOTE:

- It is required to use Stäubli-brand PV MC4/MC4 Evo2 connectors when connecting directly to the RSD Duo terminal. The use of incompatible connectors may result in system malfunctions or failures and will void the warranty for any connector-related issues, as well as any damage or other problems resulting from the use of incompatible connectors.
- To ensure reliable assembly of PV connectors, strictly follow the requirements outlined in the official Stäubli assembly instructions. Failure to do so may result in PV connector failure.

- Claw hammer to break knockout holes.
- Utility knife to cut open boxes.
- Needle nose, vise grip, wire stripper, wire cutter, utility wire shear, and other cable preparation tools.
- Wire crimper, network cable testers, wire tracker, and other network cable preparation tools.
- Induction electro probe 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.
- Level to check whether the equipment is level and plumb.
- Measuring tape.
- Markers for drilling marks.
- Camera to record the installation process.
- Deep cut band saw to cut thin-wall steel conduit or PVC pipes.
- FranklinWH lifting dolly.
- Conduit bender to bend thin-wall steel conduits, with the head size depending on the types and sizes of conduits, with Φ1/2″, 3/4″, 1″, 1-1/2″, 1-1/4″, 2″ benders.
- Knockout tool kit to drill holes for conduits on the distribution box case.
- Adjustable wrench, size: 0-1.97 in. (0-50 mm).
- 6″, 10″, 18″ pipe wrenches.

Torque Requirements

Screw type	Cross head screwdriver	Tightening torque
M4	PH2	1.03 lb·ft (1.4 N·m)
M5	PH2	2.21 lb·ft (3.0 N·m)
M6	PH3	4.42 lb·ft (6.0 N·m)
M8	PH3	8.85 lb·ft (12.0 N·m)

Items Provided by Installers

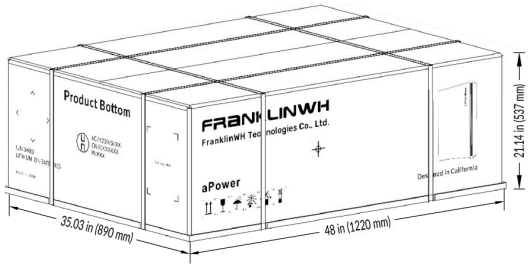


1	Electrical conduit, conduit hub, pull box and fittings
2	Screws and M6/M8 spacers for wall installation
3	aPower combiner box (for parallel operation of multiple aPower units)
4	5/8 in. Type X plasterboard
5	Copper or aluminum cables
6	Circuit breakers. For details, refer to the circuit breaker and optional parts section for circuit breaker models
7	Reducing washer conduit fittings
8	Network cable and registered jacks
9	Antioxidant conductive paste
10	Sealant (for use on outdoor conduits)
11	Stäubli MC4/MC4 Evo2 connectors
12	Wire clip (for use on RSD Duo cable fastened)

Unboxing

Unbox the aPower

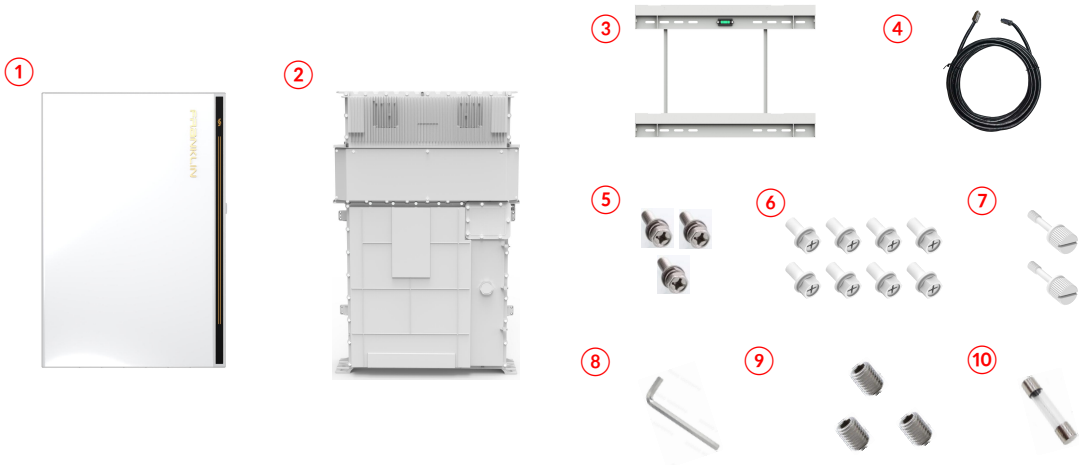
1) Inspect the package for damage such as dents or scratches.



2) Cut the sealing tape and lift the cardboard cover.

3) Remove the protective box and top foam.

4) Check that you have the following:



1	2	3	4
Cover	aPower chassis	Mounting bracket	6.5 ft (2 m) communications cable
5	6	7	8
M 6 x 16 screws	M 5 x 12 screws	Captive screws	Hex wrench*
9	10		
Hex socket screws*	Fuse*		

** These accessories are included only with aPower S (APRS-10K15V1.1-US/APRS-10K15V1.1DCP-US) that have screw terminal blocks.*

5) Stand the aPower upright. Several installers should work together to prevent the equipment from falling.

6) Using FranklinWH lifting dolly, move the aPower to the installation site.

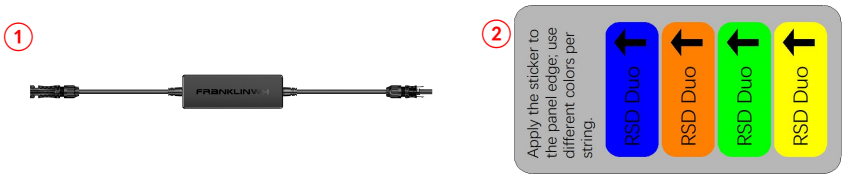
NOTE: Wrap the aPower in a protective blanket and keep the aPower well fastened to the dolly during transportation and handling to avoid scratches or damage.

Unbox the RSD Duo

1) Inspect the package for damage such as dents or scratches.

2) Adjust the utility knife blade to less than 0.3 in. (7.62 mm) as it may damage the RSD Duo if too long. Cut the adhesive tape on the upper surface of the RSD Duo box.

3) Open the RSD Duo box, check that you have the following:



1	2
RSD Duo	Location indicator stickers

NOTE:

- Only Remove the dust caps from the RSD Duo PV terminals only immediately prior to installation. Do not remove the dust caps during unpacking.



- The stickers has a weatherproof design.

Installation Procedures

WARNING: Care must be taken to protect personal safety. Reinforced toe shoes must be used to protect the installers in case equipment tilts or falls.

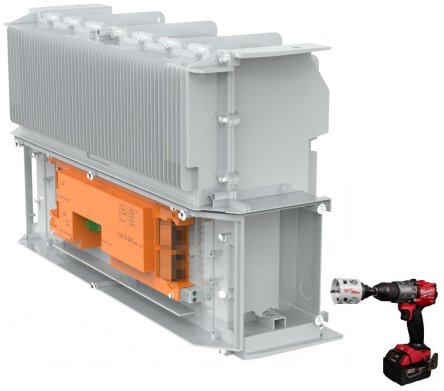


The aPower S may be mounted either on the wall or on the floor. Choose a location that can structurally support the weight of the aPower.

The installation site should be properly leveled and hardened if the aPower is floor mounted. If there is grass nearby, a layer of cement or slab stone must be placed on the projection area around the equipment to prevent grass growth and protect the equipment.

Prepare aPower Cable Entries

Based on site conditions and wire gauge, select the appropriate knockouts on the left and right sides of the aPower S for cable entry. Use a 1-inch hole saw and standard electrical tools to drill additional cable access holes where needed, particularly on the PV side.

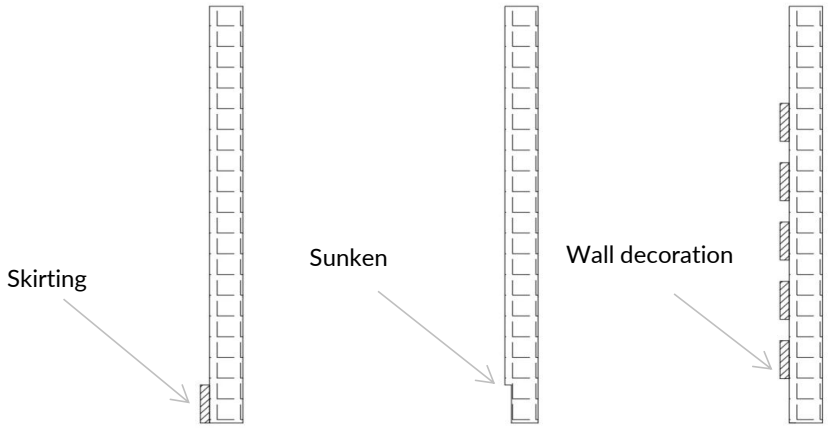


Wall-Mounted Installation

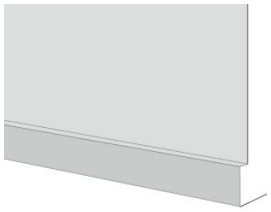
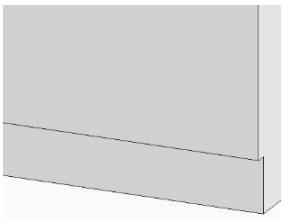
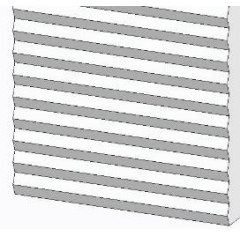
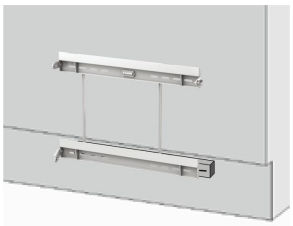
Install the mounting bracket

1) Before installing, examine the smoothness of the wall.

   If the wall is not smooth and straight to the floor, Type X plasterboards will be needed to fill the gaps to ensure all parts of the mounting bracket are well supported by the wall.



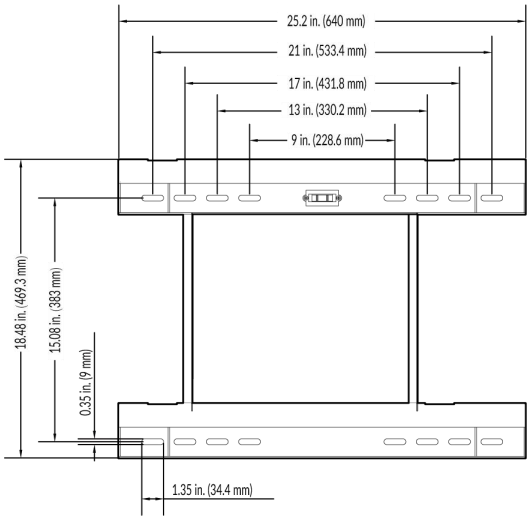
Special Wall/Baseboard Installation

Case 1: Protruding Baseboard Height > 6 in. or the thickness of the bulge > 1 in.	**Case 2:** Concave Baseboard Height > 6 in.	**Case 3:** Uneven Wall
		
Solution Use wooden or steel spacers on the upper part of the bracket (to keep it flush with the baseboard).	**Solution** Use wooden or steel spacers on the indented part of the baseboard (to make it flush with the wall).	**Solution** Use plywood or gypsum board to level the wall. The recommended thickness is 0.5 in.
		

NOTE: The wooden or steel materials are prepared by the installer.

2) Determine bracket attachment points

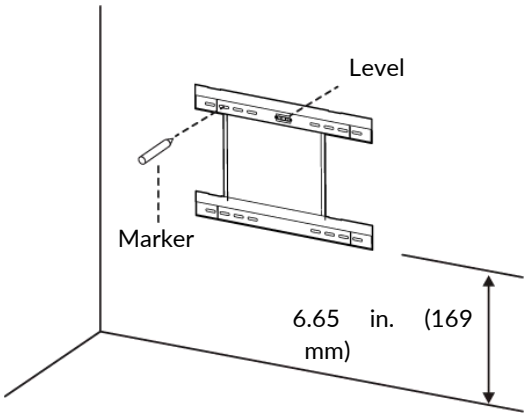
The mounting bracket should be fastened to the wall at a minimum of 4 points, one on each arm. If the mounting bracket is used to fully wall mount the aPower without ground support, be sure to use adequate fasteners to support the full weight of the aPower and mounting bracket. If necessary, consult a local licensed structural engineer for attachment guidance. Confirm compliance with all applicable local building codes.



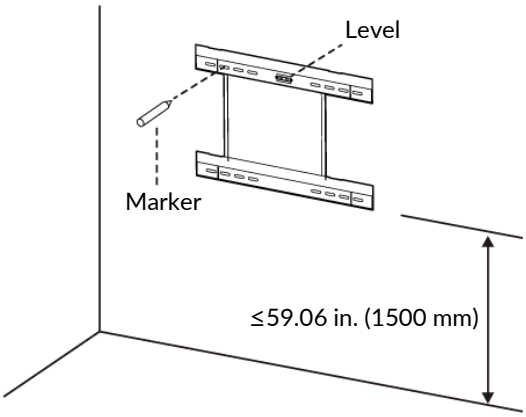
Determine bracket attachment points following the methods described below.

a) Method 1: Use the bracket to mark the points.

Wall mount with floor support



Wall mount above the floor

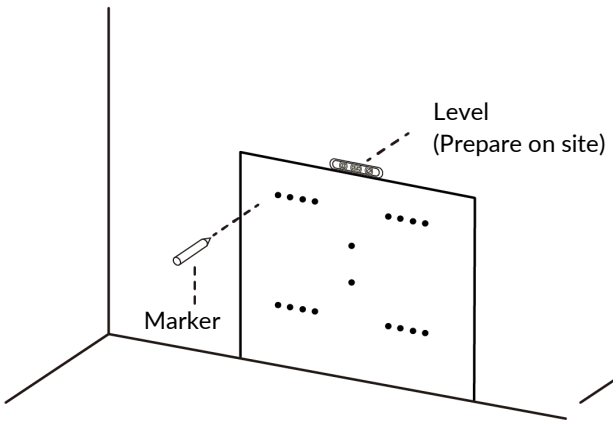


① Place the mounting bracket at the planned installation position.

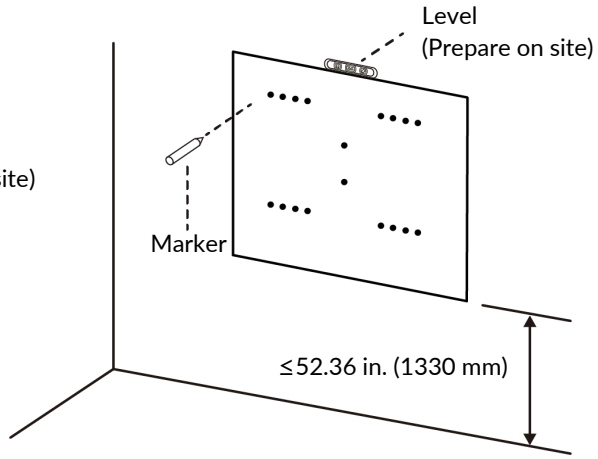
② Mark the wall through the mounting holes where the fasteners will be used.

b) Method 2: Use the cardboard mounting template to mark the points.

Wall mount with floor support



Wall mount above the floor

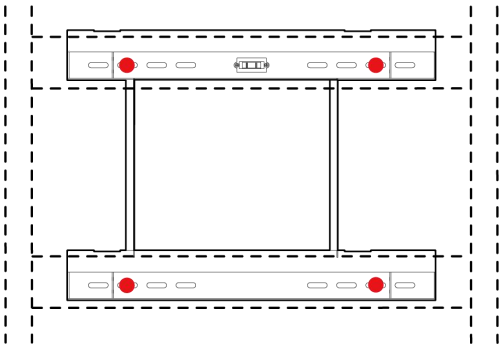
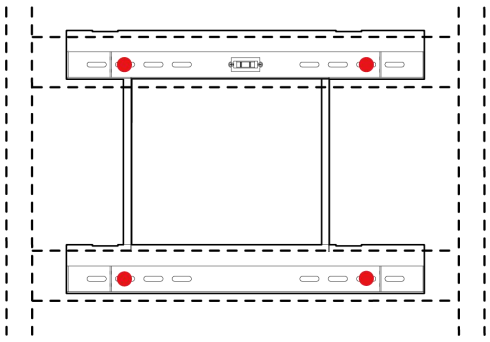


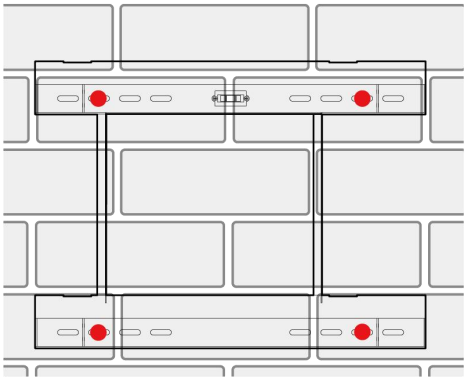
① Place it against the wall in the planned installation position according to the orientation of the cardboard text (the bottom of the cardboard is on the ground when it is installed on the ground).

② Use a level to adjust the installation angle.

③ Mark the wall through the mounting holes where the fasteners will be used.

3) Install the bracket on a wall

Wooden beams At least 4 5/16" stainless steel wood screws with large flat washers (1 at each corner), at least 2.5" (64 mm) of each screw inserted into the wooden beam.	
Steel beams Use at least 4 5/16" stainless steel hex screws (1 at each corner) with spring washers, large flat washers and nuts to secure the bracket to the steel beam.	

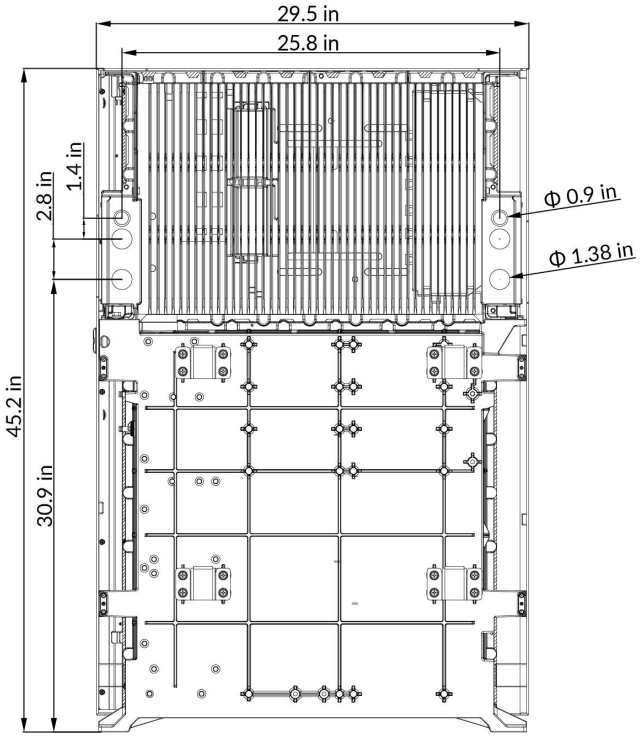
Concrete or brick walls Use at least 4 5/16" stainless steel expansion screws (1 at each corner) with spring washers and large flat washers and at least 1.5" (38 mm) length embedded in the wall. Place screws at least 1.5" (38 mm) away from brick edge.	

Drill conduit entry holes on the wall (if needed)

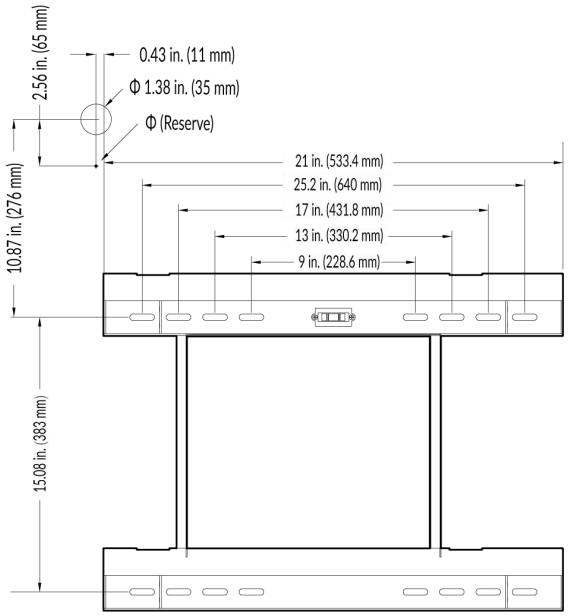
If needed, drill conduit entry holes on the wall. If there are any metal or wooden supporting structures in the drilling area, adjust the position to avoid them.

CAUTION: Avoid drilling holes in water pipes and cables in the wall.

NOTE: Cover the aPower top heat dissipation hole to protect from gravel dust during drilling.



Rear View



Front View: Bracket and conduit entry holes on the wall

	**Wooden wall** Electric drill and 1″, 1-1/2″ wood bits are recommended to create holes for running cable through wooden walls. It is important that the drill bit be kept perpendicular to the wall when drilling.
	**Concrete or brick wall** Hammer drill and 1″, 1-1/2″ diamond tipped core bits are recommended to create holes for running cables through concrete or brick walls. Wet the wall and HEPA vacuum the dust, to protect the drill bits from overheating. It is important that the drill bit should be kept perpendicular to the wall when drilling.
	**Metal wall or metallic studs** Electric drill and 1″, 1-1/2″ hole saw are recommended to create holes for running cables through metal plate and metallic studs. It is important that the drill bit should be kept perpendicular to the installation surface when drilling.

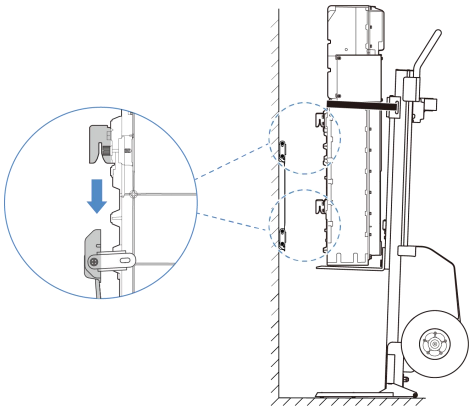
Mount the aPower to the wall mounting bracket

WARNING: Special care must be taken to protect personal safety. Reinforced toe shoes must be used to protect the installers from tilting and falling equipment.

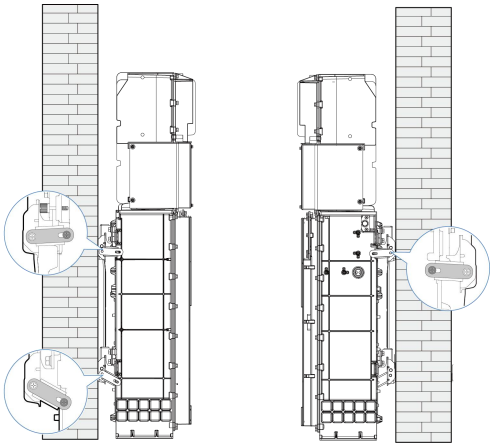


NOTE: Use proper protective measures on the lift, such as foam or protective cloth, and take effective protection measures to avoid scratching or damaging the aPower during the installation process.

1) For transportation, secure the aPower to the dolly using straps. Raise the aPower to position the rear mounting cleats slightly higher than the mounting bracket. Move the dolly so that the aPower is in mounting position. Slowly lower the aPower so that the four mounting cleats snap securely onto the mounting bracket.



2) After the aPower is firmly seated on the mounting bracket, fasten the three retainer plates to the aPower using three M6 x 16 screws. Tighten to a torque of 4.3 lb·ft (5.8 N·m).



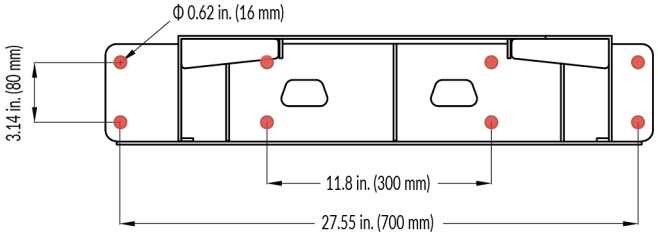
Floor-Mounted Installation

If wall mounting is not feasible, for example in an open area, or where the wall is not suitable for support, the optional floor mounting bracket (ACCY-FMBV2-US) can be used to install the aPower S on a concrete pad or a reinforced surface.

Installation site requirement

Perform a site assessment before installation. The poured concrete pads must have a minimum compressive strength of 3,000 PSI. And the concrete reinforcement must meet the temperature and shrinkage control requirements of ASTM A615 Grade 60, with a yield strength of 60,000 PSI.

Mount the aPower on a solid surface, such as a concrete floor, with an area exceeding 10.76 ft^2 (1 m^2) and a minimum depth of 5.9 in. (150 mm). The aPower should be attached to a floor mounting bracket and maintain a minimum distance of 1.18 in. (30 mm) from the ground to the bottom of the aPower.



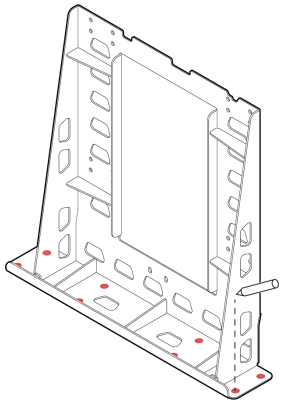
NOTE

The floor mounting bracket meets the strength requirements specified by IEC60721-3-3 recommended grade 3M4 sinusoidal vibration test conditions.

Install the floor mounting bracket

Choose a smooth, level concrete area with sufficient structural strength to support the weight of the aPower.

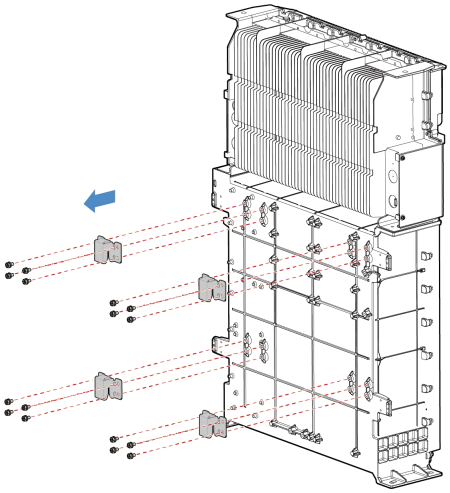
1. Mark eight mounting holes for drilling on the floor using the floor mounting bracket or cardboard mounting template as a guide.



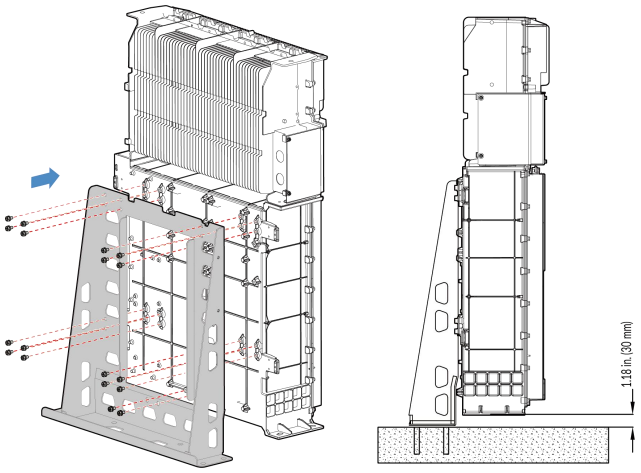
2. Drill holes at the marked spots.
   The drilling depth should be at least 4.72 in. (120 mm), and diameter should be Φ 0.62 in. (16 mm).
3. Secure the floor mounting bracket to the floor with eight 1/2" expanding anchor bolts. Tighten the nuts to a torque of 73.8 lb·ft (100 N·m).

Mount the aPower to the floor mounting bracket

1. Remove the sixteen combination screws (M 8 x 16) and the four mounting cleats. Properly store the combination screws for later use.



2. Hang the aPower on the floor mounting bracket and secure with the sixteen combination screws (M 8 x 16) that were previously removed and the two supplied M8 x 16 screws. Maintain a minimum distance of 1.18 in. (30 mm) from the ground to the bottom of the aPower.



Notes on other common installations

When the aPower is ground mounted and the weight of the aPower unit is bearing on the surface below, installation partners often erect a structure to provide lateral support. Common materials for the structure include Unistrut, and the included aPower wall bracket. On-site conditions vary, so it is dependent on the installation partner to provide a structure that provides adequate lateral support. Often for space efficiency, the aGate or other project equipment may be mounted to the same structure. This is an alternative to the FranklinWH floor mounting bracket and is outside of the scope of FranklinWH liability.

Install a Combiner Box (if needed)

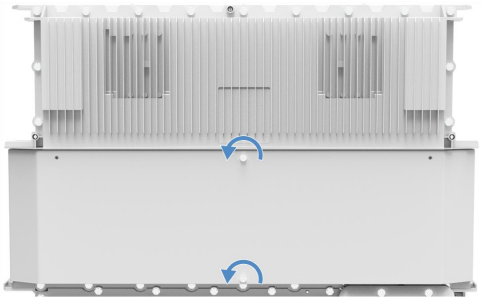
The installation of more than two aPower units requires a combiner box. Each aPower should be connected to a 2-pole breaker. Select a suitable external combiner box and provide breakers for each aPower unit. For details, refer to Table 2 Breakers in a Combiner Box.

NOTE: Refer to the manufacturer's instructions before installation.

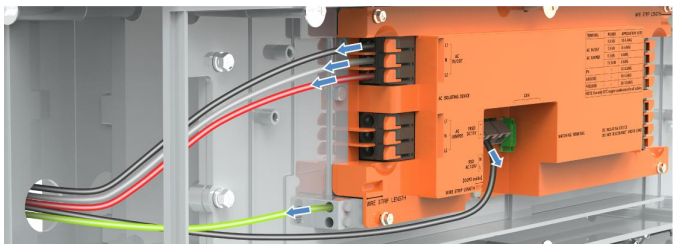
System Wiring

Install Electrical Conduit

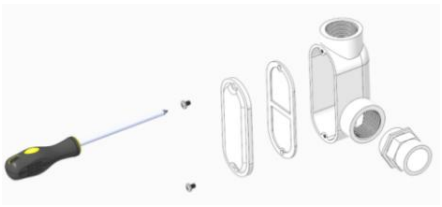
1) Remove the two M5 x 12 screws and the wiring compartment cover. Store the M5 x 12 screws and the wiring compartment cover properly.



2) Filp the terminal lever to unplug the factory-installed power cables, if present. Remove the communications cable. Use a 3 mm hex wrench to loosen the terminal screw and disconnect the ground wire.

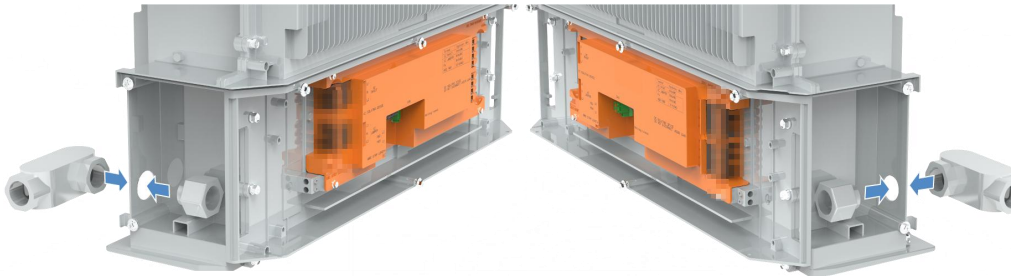


3) As needed, install pull boxes at the cable entry points.
   a) Select appropriate waterproof pull boxes according to the cable distribution direction.
   b) Use a Philips head screwdriver to disassemble the pull boxes.



NOTE: Ensure that the waterproof pull boxes are selected.

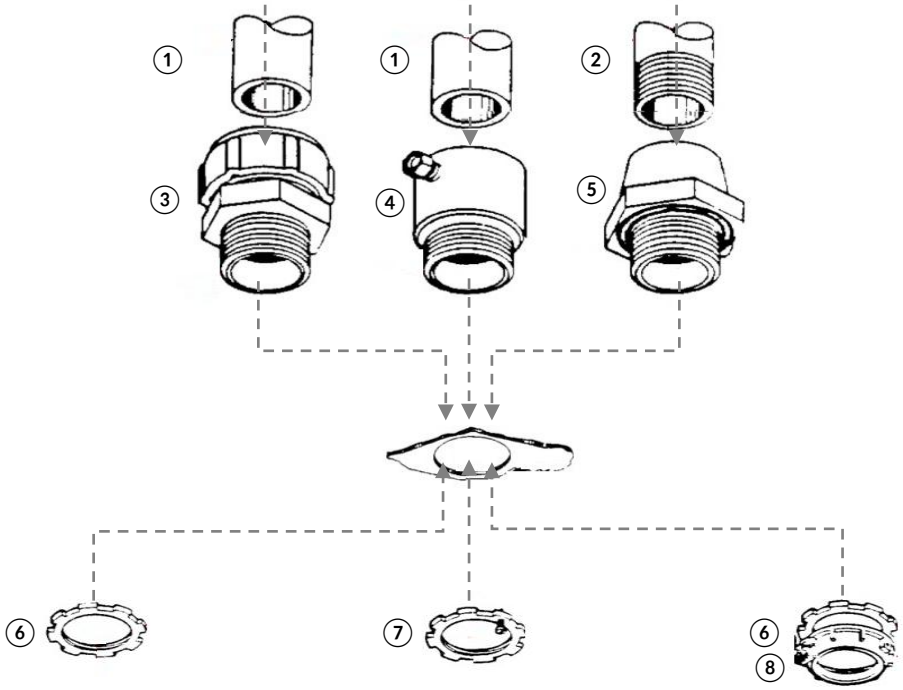
c) Install the pull boxes on both sides.



4) Conduit Connection and Installation

Install conduit as needed and attach the conduit fitting to the cable entry of aPower wiring compartment.

The image below shows an example of conduit and fitting for different applications.



For 120/208 V or 120/240 V circuits, if there is no unpunched ring around the knockout section.

Service equipment and hazardous locations, if there is no unpunched ring around the knockout section.

Service equipment and hazardous locations with or without unpunched rings around the knockout.

No.	Description
1	Threadless rigid metal conduit or intermediate metal conduit.
2	Threaded rigid metal conduit or intermediate metal conduit
3	Threadless fitting
4	Screw fitting
5	Sealing hub
6	Locknut
7	Bonding knockout
8	Bonding & grounding bushing

NOTE: The conduits and related materials must comply with UL746B requirements as well as all local laws and regulations.

Metallic conduits and fittings are recommended to minimize electromagnetic interference.

Prepare the Communications Wiring

NOTE: It is recommended to install the communications cable in the conduit to avoid accidental damage and equipment failure. If the network cable and the power cable share the same conduit, use a shielded network cable (RJ45 cable end with metal connector).

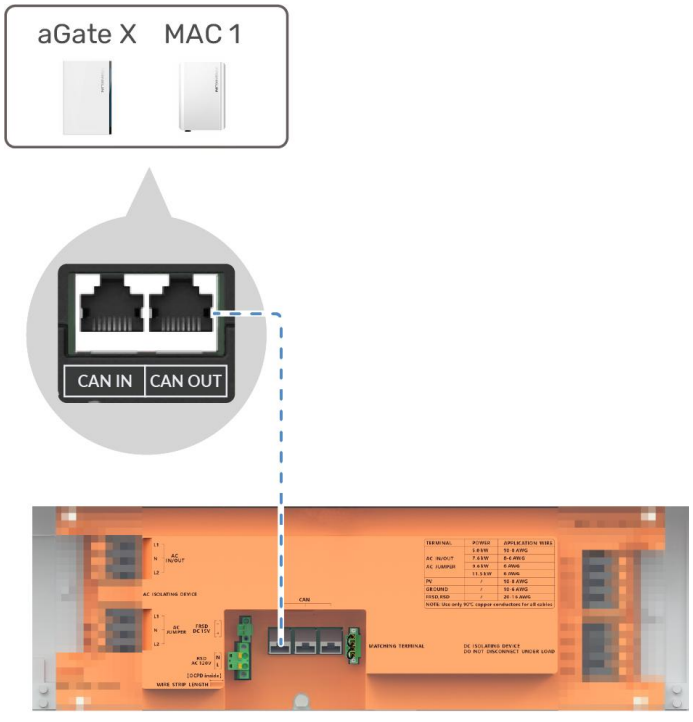
Before connecting the communications cable, use a network cable tester to ensure that the cable contact is error-free.

The distance between the aGate/MAC and the first/single aPower must be ≤ 164 ft (50 m).

a) Communications connection between the aGate/MAC and a single aPower

Remove the dust plug from the aPower CAN port.

Use a minimum CAT5 cable to connect the aGate/MAC **CAN OUT** port to one of the aPower **CAN** ports.



aPower S

NOTE

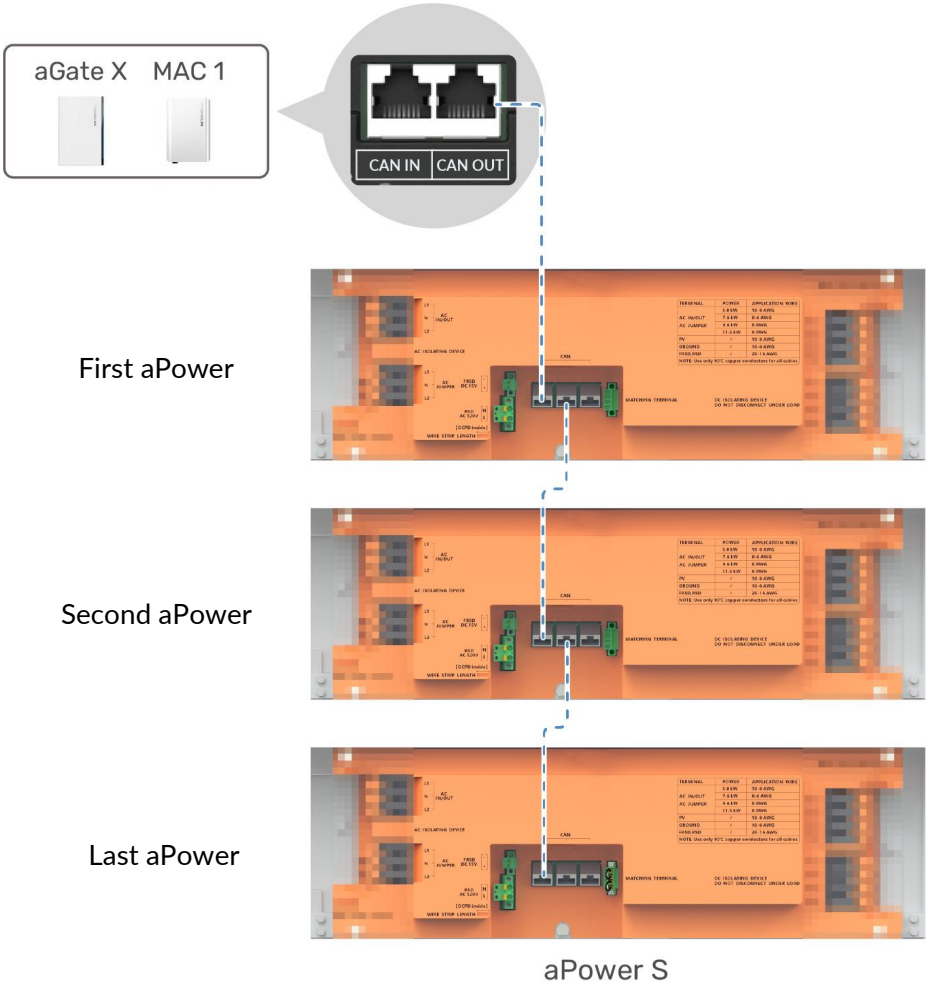
The three CAN ports in the aPower S are interchangeable. Use any port as needed.

b) Communications connection between the aGate/MAC and multiple aPowers

Remove the dust plugs from the aPower CAN ports.

Use a minimum CAT5 network cable to connect the aGate/MAC **CAN OUT** port to one of the **CAN** ports of the first aPower. Connect the **CAN** ports on the remaining aPower units in sequence.

Remove the matching terminals from all aPower units except for the one in the **last** aPower. In the image below, only aPower S units are used; but the same cabling and matching terminals should be set if linking an aPower S with aPower 2 batteries.



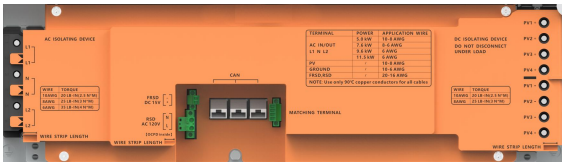
NOTE

The three CAN ports in the aPower S are interchangeable. Use any port as needed.

If the distance between the aGate/MAC and the first/single aPower exceeds 164 ft (50 m), please contact engineering@franklinwh.com for guidance.

Wiring Compartment Configuration

The aPower S is available with two control board configurations. The AC and DC terminal block types differ between the two configurations. Both configurations share the same terminal layout, with the L1, L2, neutral, ground, and PV+/- terminals located in the same sequence. The terminal wiring sequence remains identical across both configurations; however, the connection methods slightly differ. Refer to the table below for specifications regarding the terminal specifications and required tool for each configuration.

aPower S		Type A	Type B
SKU		APRS-10K15V1.1DCP-US/APRS-10K15V1.1-US	APRS-10K15V1-US
SN		10050022xxxx.../10050029xxxx...	10050019xxxx...
Product image			
AC/DC terminal	Spec	Screw terminal block	Lever-nut terminal block
	Tool	1/8 inch hex wrench	/
Ground terminal	Spec	M6 screw x 3 pcs	Hex socket screw x 4 pcs
	Tool	Flat-head screwdriver	3 mm hex wrench
Built-in transmitter		Yes (Compatible with FranklinWH RSD Duo and third-party RSD)	No (Compatible with third-party RSD only)
Conductor spec: copper conductors only, 194° F / 90° C minimum			

Select the appropriate wire gauge in accordance with the local codes and regulations.

Establish the PV Power Connection

⚠	**WARNING:** Do not connect an aPower S to PV strings that require positive or negative grounding. During installation and operation, ensure that neither the positive nor the negative PV string pole is shorted to ground. A short circuit may cause an AC/DC short circuit in the inverter and damage the equipment. Damage caused by this will not be covered by the warranty.
🔍	**NOTE: The maximum cable length for the PV+ and PV− connections of aPower S must not exceed 984 ft (300 m).**

Rapid Shutdown Solutions for aPower S

To comply with NEC Article 690.12 and ensure rapid disconnection from photovoltaic panels in emergency situations, it is required to install a rapid shutdown system (PVRSE) that complies with the applicable codes and standards for the Authority Having Jurisdiction (AHJ).

FranklinWH System offers two paths for rapid shutdown compliance: the **FranklinWH RSD Duo** and officially certified third-party solutions. Both are designed to meet NEC requirements and ensure fire safety. Select either of them based on product specifications and installer preference.

FranklinWH RSD Duo (ACCY-RSDV1-US)



The FranklinWH RSD Duo is a high-reliability rapid shutdown device designed to quickly disconnect the PV array circuit in the event of an emergency. The RSD Duo is connected in series within the main PV power circuit, and its installation location must comply with applicable regulatory requirements.

***Note**: The FranklinWH RSD Duo is not compatible with aPower S Type B (APRS-10K15V1-US).*

Third-Party Rapid Shutdown System



The aPower S inverter is certified and listed as a Photovoltaic Rapid Shutdown System (PVRSS) when accompanied by the products shown below. When installed according to the manufacturer's instructions, the rapid shutdown device ensures the FranklinWH System will comply with the NEC requirements.

Products and models compatible and listed with FranklinWH

Product	Rooftop Receiver	Transmitter	Outdoor Kit
APsmart	RSD-S-PLC RSD-D-20	Transmitter-PLC-1P	Transmitter-PLC-Outdoor Kit APS-408006/APS-408012
Tigo	TS4-A-F TS4-A-2F	RSS Transmitter	Tigo 492-00000-51

***Note**: Depending on array location and other factors, the rapid shutdown requirement may not be required for the installation. For systems not subject to NEC Section 690.12 (for example, ground-mounted and carport PV arrays), module-level shutdown devices (PVRSE) are not required on the PV strings, and any subsequent instructions related to the installation of shutdown devices and their transmitters may be disregarded. It is the installer's responsibility to comply with all enforced codes and standards for projects.*

As of publication, the aPower S is not compatible with the Tigo TS-A-O/S optimizers installed with the TAP and CCA for Rapid Shutdown.

FranklinWH RSD Duos Installation (If using a 3rd-party shutdown device, skip this section)

WARNING

Do not remove the protective dust caps from the PV cable connectors on either side of the RSD Duo before this installation step. Removing them may allow dust or moisture to enter the connectors, which could cause the RSD Duo to malfunction.

NOTES

- When installing the RSD Duo, ensure that no third-party module level devices, rapid shutdown devices or related equipment is present on the roof.
- Always power off the aPower S before installing or removing Staubli MC4/MC4 Evo2 connectors terminals. It is highly recommended to use Stäubli professional tools to remove the terminals. Using other tools that result in damage to the RSD Duo connector will void the RSD Duo warranty.
- Inspect the RSD Duo for any external damage, including the main body, external cables, and PV connectors. Check that the strain relief (SR) structures at the cable entry points are intact and that the protective dust caps on the PV terminals are undamaged. If any issues are found, contact FranklinWH.

  Do not install or use the RSD Duo if it has been dropped and shows any damage to the housing, cables, terminals, or other components. Replace with a new RSD Duo.
- It is recommended to install the RSD Duos in a location that is not exposed to direct sunlight and does not accumulate rain or snow. The preferred method is to secure the RSD Duos to the support structure beneath the bottom edge of the PV panel using mounting clips. Ensure the RSD Duos do not contact the roof surface. Alternatively, the mounting clips can be removed and the RSD Duos can be installed using rail-slot mounting.

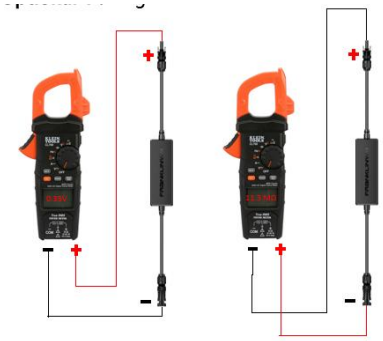
Check the RSD Duo (Pre-Installation)

NOTE
It is strongly recommended that spare RSD Duo units be unpacked only upon arrival at the installation site to prevent damage during transit.

Remove the dust caps from the two terminals on the RSD Duo. It is strongly recommended to perform a basic health check on each RSD Duo before installation.



Using a standard digital multimeter's Resistance setting, measure across the positive and negative terminals.



A functional RSD Duo will show a high resistance/OL reading in both directions.

If the meter indicates a dead short (≈0 Ω) or an open circuit in both directions, the unit is faulty.

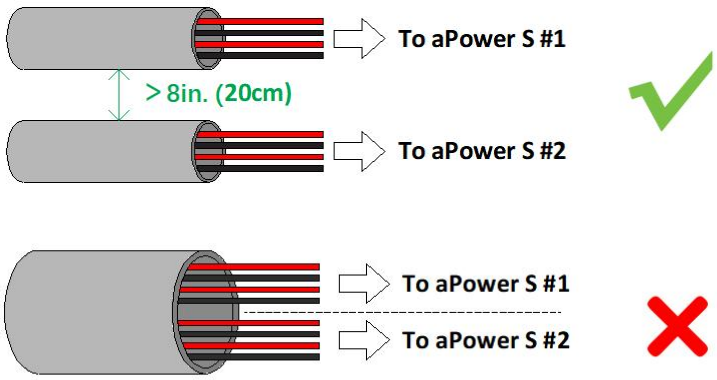
NOTE: Do not replace the unit based on slight variations in Ohm readings, as different meter models will produce different results. Only replace if the unit shows a hard short or complete failure.

Install RSD Duos in the PV series

DANGER: RSD Duos must not be installed beneath the light-transmitting zones of double-glass modules to prevent direct sunlight from causing RSD Duo overheating or performance abnormalities.

WARNING

- Ensure that each photovoltaic string circuit has a minimum of 2 RSD Duos and a maximum of 5 RSD Duos. It is strictly prohibited to use only 1 RSD Duo. Failure to install the required number of RSD Duos may result in equipment damage and will void the FranklinWH warranty.
- Ensure that the voltage and current specifications of the PV arrays are compatible with the RSD Duo specifications.
- Before installing the RSD Duo, ensure that the PV cables are disconnected from the aPower S.
- PV cables connected to different aPower S units must not be routed through the same cable tray or conduit. Sharing a conduit between different aPower S units may cause crosstalk, resulting in different aPower S RSD Duos to be interfered with and turned on accidentally. If separate plastic conduits are used, maintain a minimum distance of 8 in. (20 cm) between conduits connected to different aPower S units and conductors of different systems.



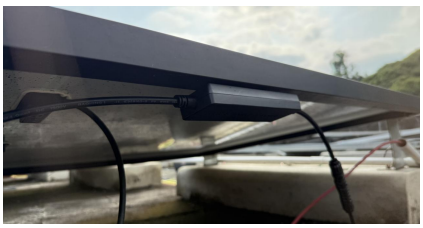
NOTE: RSD Duos may be installed either on the bottom frame of the PV panel or in the mounting rail channel.

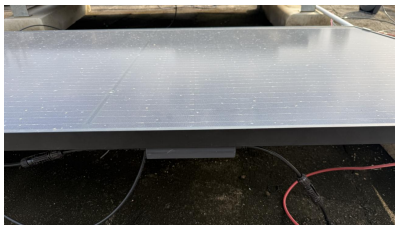
Two mounting options are available when installing the RSD Duo near the PV modules:

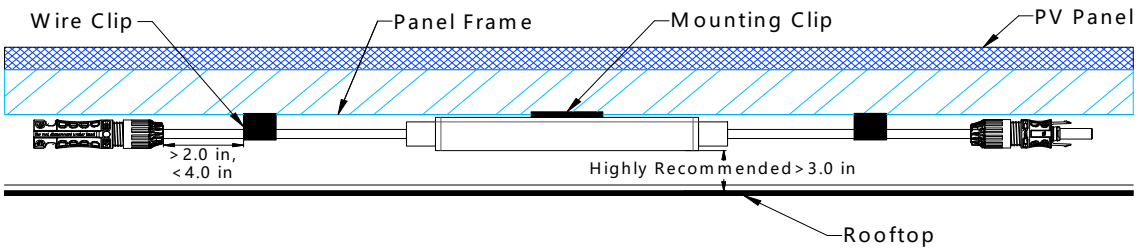
1) **Option 1: Using mounting clips**

- Secure the RSD Duo to the photovoltaic module frame using mounting clips. A "click" sound indicates that the mounting clips are properly installed.
- Then use wire clips to fasten the cables at both ends to the frame.









WARNING: Ensure the area around the PV connector terminals is free of standing water and debris.

NOTES

- Install the wire clips at least two inches (approximately 5 cm) from the end of the MC4 connector, but no more than four inches (approximately 10 cm).
- After installing the wire clips or completing the PV cable routing, check the RSD Duo mounting clip installation to make sure the clips are fully seated, and that the RSD Duo is secure with no looseness or misalignment.
- Ensure the RSD Duos do not directly contact the roof. It is strongly recommended that a ventilation space of at least 3.0 inches be maintained between the RSD Duo and the roof, and that this space remain unobstructed.
- The thickness of the frame where the clips are installed is recommended to be 1.2mm to 1.7mm.

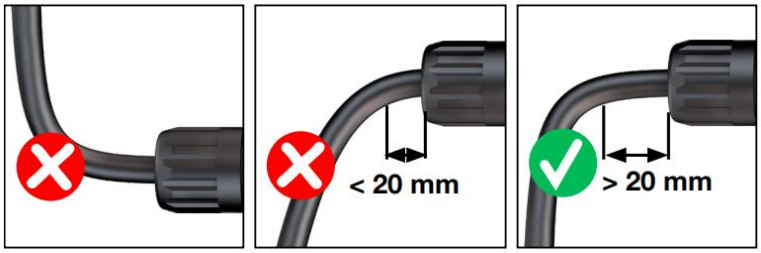
- Connect the RSD Duo connector terminals to the corresponding terminals on the photovoltaic module. If the photovoltaic panel's built-in terminals are not Stäubli MC4 or MC4 Evo2 connectors, jumper cables must be added. For more information on Stäubli connectors, see Stäubli MC4 or MC4 Evo2 Connectors Instructions.

WARNING: Do not twist the cable gland of the RSD Duo connector terminals. Twisting the connector terminals will compromise the IP protection rating and may cause the RSD Duo to malfunction.



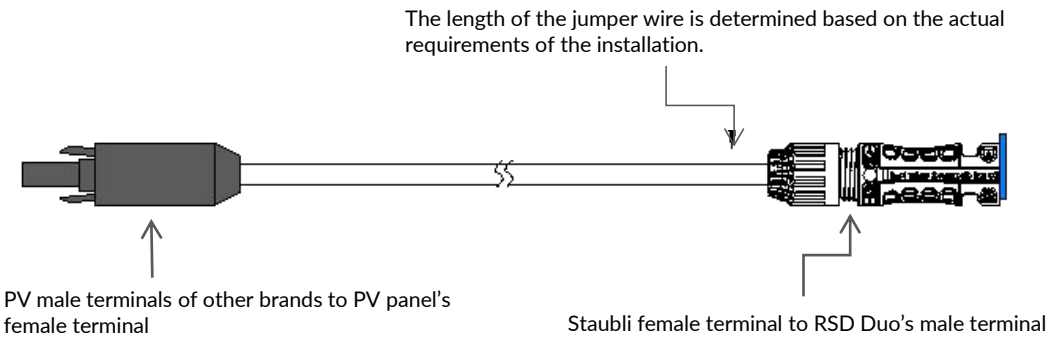
NOTES

- **When installing the RSD Duo with PV modules, it is required to use standard Stäubli MC4 or MC4 Evo 2 connectors to ensure reliable terminal connections.**
- If the PV connectors used to connect to the RSD Duo are not manufactured by Stäubli, they shall be evaluated and certified by an NRTL to ensure compatibility and proper intermateability with the corresponding Stäubli MC4 or MC4 Evo 2 connectors.
- The use of incompatible connectors may result in system malfunctions or failures and will void the warranty, as well as damage or other problems resulting from the use of incompatible connectors.
- In the event of any deviation from applicable local regulations or requirements, the relevant local regulations and requirements shall take precedence.
- When installing the RSD Duo, the cables at the terminal exit points must be bent downward, and the bending radius of the cables near the housing must be greater than 20 mm. Refer to the Stäubli MC4 connector installation instructions for details.



- If on-site cables need to be extended, ensure that the PV connectors on both ends of the extension cable are compatible with both the RSD Duo and the PV modules.

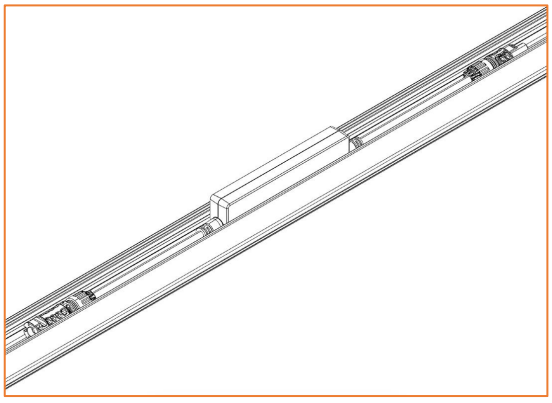
- If a jumper cable needs to be fabricated, refer to the diagram below. The procedure for fabricating a male terminal jumper is the same as shown.



- Cables connected to the connector shall be suitable for use in photovoltaic systems and shall comply with the requirements of IEC 62390.
- For an end use of the product in systems > DC 1000 V, the following points must be considered when selecting the PV cable:
  - The PV cable has to meet conductor class 5 according to IEC 60228:2005
  - The sheath material of the PV cable has to meet insulation class 1 according to IEC 60664-1.

2) Option 2: Rail-slot mounting

- Use Phillips screwdriver to remove the mounting clips from the back of the RSD Duo.
- Connect the RSD Duo connector terminals to the corresponding connector terminals on the PV module.
- Insert the RSD Duo into the third-party mounting rail slot, as shown in the figure below.



⚠	**WARNING:** This installation method requires a compatible third-party mounting system and must comply with UL3741 standards and local regulations.

	NOTE: Ensure the area around the mounting rail slot where the RSD Duo will be installed is free of standing water and debris **NOTE**: Removing the clip from the RSD Duo will not affect its normal function or IP protection performance.

Check Connection of RSD Duo and PV series

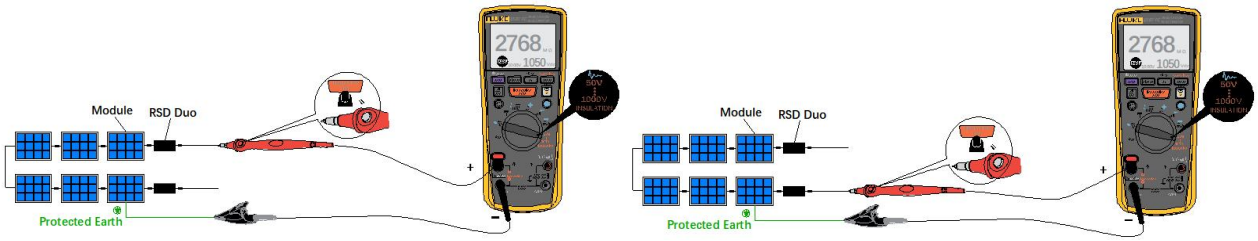
1) Apply the location indicator sticker to the side edge of the solar panel where the RSD Duo is installed. Use different colored stickers for different PV circuits to facilitate subsequent inspection and maintenance.

2) Record and retain a complete PV string connection diagram indicating the array layout and the position of each RSD Duo. Refer to Appendix 4: Installation Map Template.

3) After installation is complete, ensure the surrounding area is free of accumulated leaves and that the RSD Duo will not be submerged in standing water for extended periods.

Troubleshooting Insulation Error

1) Use an insulation resistance tester to confirm the resistance value is greater than 1 MΩ. If the value is less than 1 MΩ, there is likely a damaged wire and/or ground fault in the system. Look for nicked or pinched wires, improper field-made connectors or improper crimps, or evidence of damaged modules that need to be replaced:



2)

- The system will report the error code 0x5#43 when the insulation impedance is too low. The system may also report error code 0x5#45 (AFCI self-check fault), error code 0x5#44 (arc lock fault).
- It is recommended to test insulation resistance after wires have been pulled through but before they have been landed at the aPower S.
- To find the failure, perform a close inspection of all the components in the faulty string:
  - Inspect where the wires exit conduit, and where wires pass through conduit bodies, as nicked wires may occur here.
  - Check for wires pinched by mounting hardware or damaged by fasteners.
  - Check for improper field-made connectors or improper crimps.
  - Look for evidence of damaged modules: Microcracks, signs of water intrusion, module leads are bent at sharp angles.

- For the faulty string, try testing the string with the DC grounding conductor (EGC) removed from the inverter's ground terminal; if the string passes self-test with the grounding conductor removed, it is likely the string is faulting to ground somewhere.
- If any of the above issues are found, fully replace the damaged wire and/or perform the necessary repairs to ensure the system's lifespan is not compromised.

WARNING: Do not connect or disconnect PV terminal connections while under load current.

NOTE

If the RSD Duo requires maintenance or replacement, the service technician must reapply the corresponding location indicator sticker to the replaced RSD Duo.

Test RSD Duo Functions after Installation

Verify Normal Operation of RSD Duo

Step 1. Ensure aPower breakers are all in the OFF position.

Step 2. Turn on the aGate power switch.

Step 3. Press the switch on the right side of the aPower S units to confirm that they are turned ON .

Step 4. Login to the FranklinWH App and open the aPower S MPPT page. Before MPPT start-up is complete, the PV voltage and current read approximately zero. This indicates the PV power line is in an open-circuit state.

PV1~PV4 Voltage	1.2V, 1.8V, 6.3V, 3.5V
PV1~PV4 Current	0.0A, 0.0A, 0.0A, 0.0A
PV1~PV4 Arc	0.0, 0.0, 0.0, 0.0,
PV1~PV4 AFCI Current	0.0A, 0.0A, 0.0A, 0.0A

Step 5. Wait several minutes for the aPower S MPPT start-up to complete. Check the PV voltage and current in the app again. Both should be within normal operating range.

PV1~PV4 Voltage	381.2V, 511.8V, 456.3V, 493.5V
PV1~PV4 Current	6.5A, 5.7A, 6.3A, 6.1A
PV1~PV4 Arc	0.0, 0.0, 0.0, 0.0,
PV1~PV4 AFCI Current	6.5A, 4.8A, 5.5A, 5.0A

Verify RSD Duo's Rapid Shutdown Activation

Step 1. Confirm that the MPPT function of the aPower S is operating normally.

Step 2. Activate the RSD switch, using either of these:

- the external RSD switch on the aGate (if installed as an option), or
- the RSD switch on the side of the aPower S (the power switch).

Step 3. Check the MPPT page in the app. Within 30 seconds, the PV voltage and current should drop to near zero (voltage below 30 V).

PV1~PV4 Voltage	1.2V, 1.8V, 6.3V, 3.5V
PV1~PV4 Current	0.0A, 0.0A, 0.0A, 0.0A
PV1~PV4 Arc	0.0, 0.0, 0.0, 0.0,
PV1~PV4 AFCI Current	0.0A, 0.0A, 0.0A, 0.0A

Step 4. After the RSD condition is cleared, wait a few minutes for the aPower S MPPT to resume normal operations. The PV voltage and current in the app should return to their normal operating values.

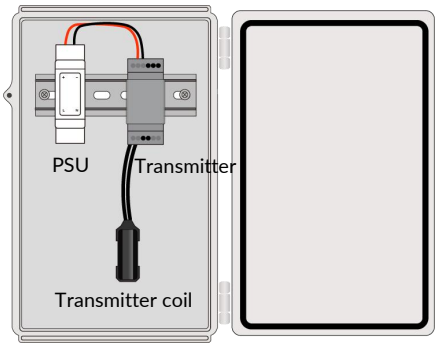
PV1~PV4 Voltage	381.2V, 511.8V, 456.3V, 493.5V
PV1~PV4 Current	6.5A, 5.7A, 6.3A, 6.1A
PV1~PV4 Arc	0.0, 0.0, 0.0, 0.0,
PV1~PV4 AFCI Current	6.5A, 4.8A, 5.5A, 5.0A

3rd party RSD module Installation (If using a 3rd party shutdown device)

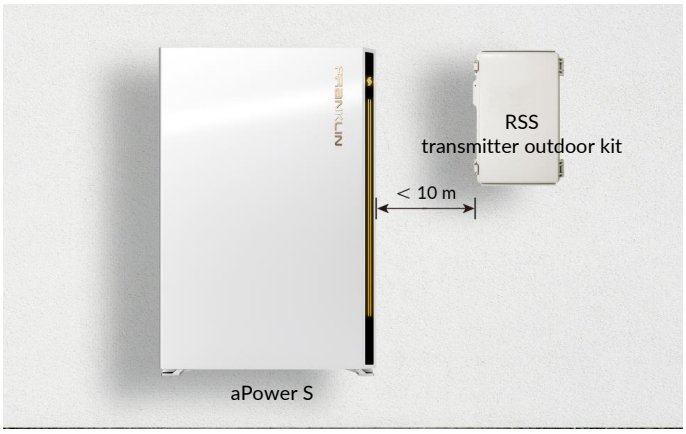
The number of RSS transmitter outdoor kits purchased by the installer must match the number of aPower units installed. Each RSS transmitter outdoor kit must be paired with its own aPower.

WARNING: The installer shall confirm: (1) the RSS power supply is prepared on site, (2) it accepts 120 Vac input, and (3) it outputs 12 Vdc that matches the transmitter's requirement.

1) Prepare and waterproof the junction box as per manufacturer's requirements.

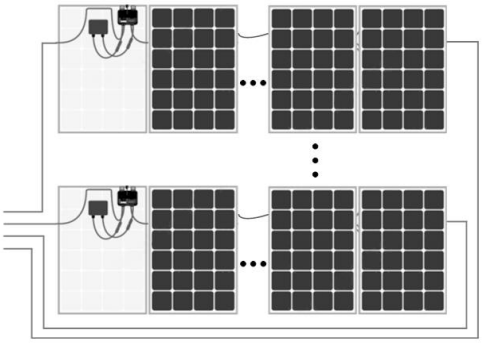


2) Securely mount the whole RSS transmitter outdoor kit near the aPower S. Ensure the installation distance from the RSD modules complies with the RSD manufacturer's instructions.



3) Install RSD modules on PV panels referring to the relevant manufacturer's instructions.

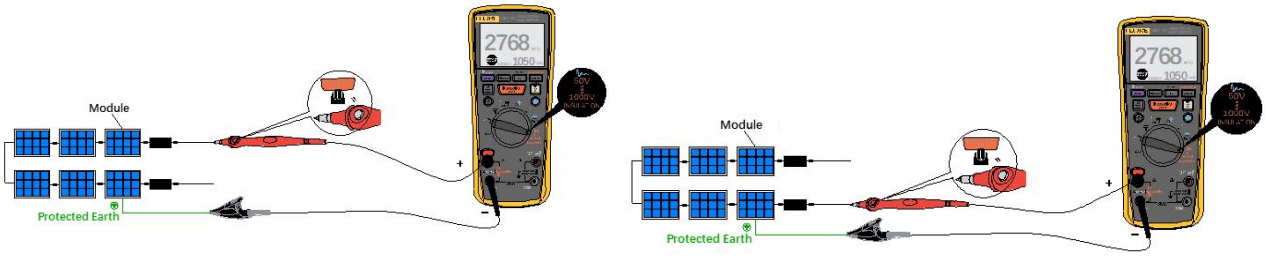
Based on the electrical characteristics of the homeowner's PV array, connect the RSD modules in series as per the detailed solar terminal specifications outlined in Appendix 3.



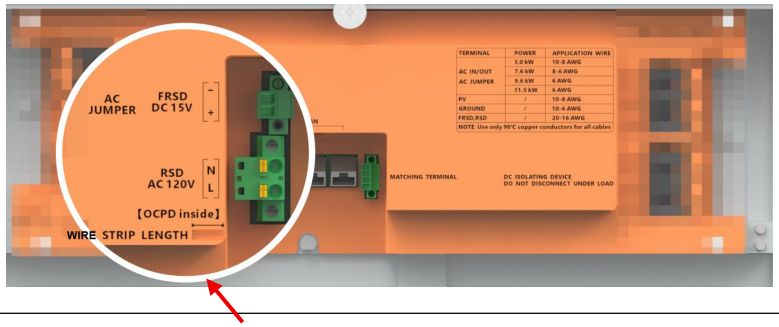
NOTE

To ensure the stability of the power supply, install the junction box near the aPower.

4) Use an insulation resistance tester to confirm the resistance value is greater than 1 MΩ. If the value is less than 1 MΩ, there is likely a damaged wire and/or ground fault in the system. Look for nicked or pinched wires, improper field-made connectors or improper crimps, or evidence of damaged modules that need to be replaced:



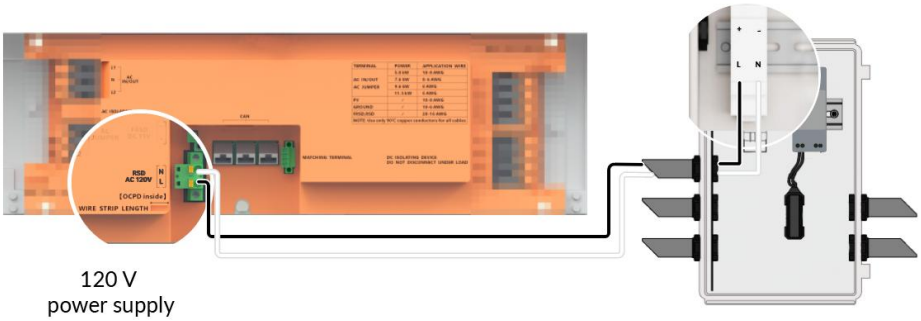
5) Use the small groove next to the RSD PWR terminal to measure the correct strip length of the RSD power cables. Strip the wire insulation to 0.39-0.43 in. (10-11 mm).



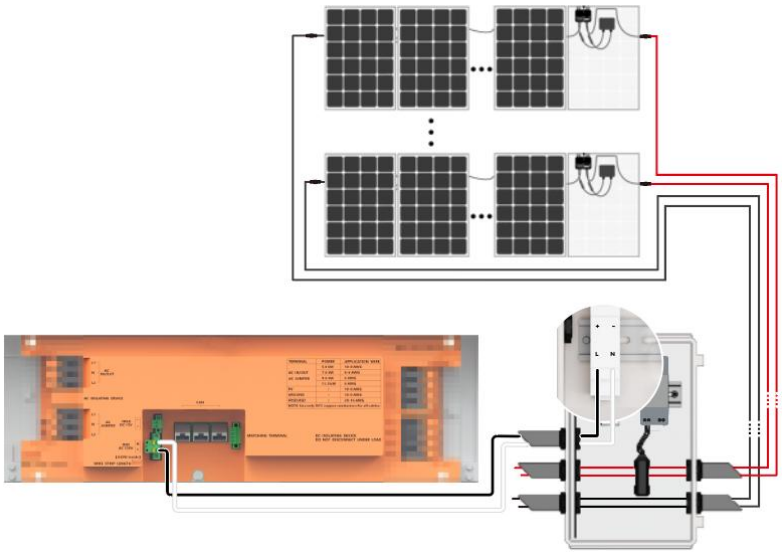
NOTE

Improper cabling can lead to equipment damage or fire risks.

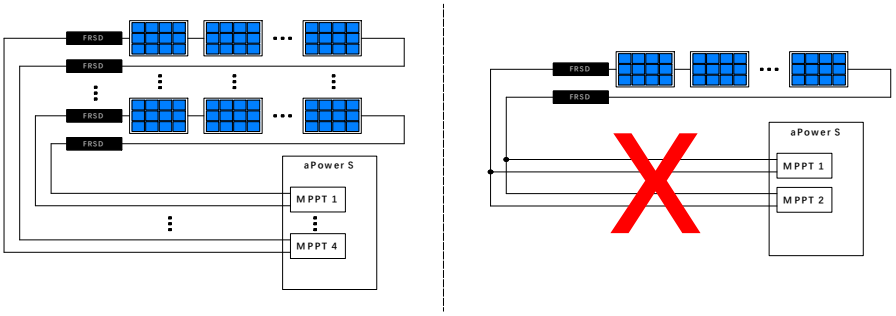
6) Connect the RSD power cables to the aPower RSD terminals (L&N or L1&L2) and the AC conductors (L&N) of the power supply in the RSS transmitter-outdoor kit.



7) Route all the PV power cables through the RSS transmitter-outdoor kit. Pass the four positive PV power cables through transmitter core per manufacturer's instructions.



Wiring Steps on PV side

⚠	**DANGER:** It is strictly forbidden to connect only one RSD Duo to a string of PV circuits. At least two RSD Duos should shall be connected to a string of PV circuits.
⚠	**WARNING:** ● Do not connect multiple MPPT PV ports on the aPower S in parallel to a single PV string, as this may prevent the system from operating properly. 
	● After wiring, ensure that the total length of each PV DC circuit (from the aPower S PV+ terminal to the PV− terminal, including module leads, jumper cables, and all wiring within the single-string array boundary) **does not exceed 984 ft (300 meters)**. Exceeding this limit may prevent the RSD Duo from working properly.

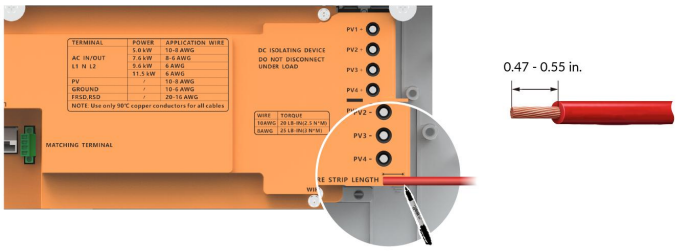
Select an appropriate wire gauge, strip length, torque, and tool according to the Wiring Requirements table.

	NOTE The transmitter required for the RSD Duo is integrated into the latest aPower S units (APRS-10K15V1.1-US; APRS-10K15V1.1DCP-US), eliminating the need to route PV cables through a transmitter magnetic ring, as is typically required with third-party rapid shutdown (RSD) products.

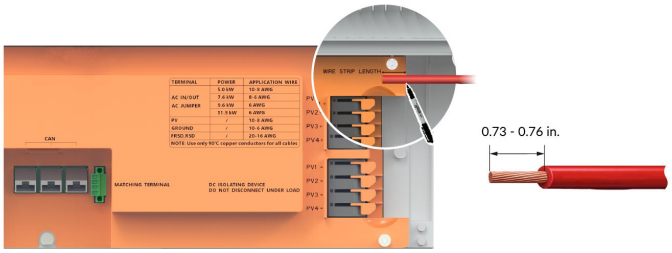
1) Measure the wire strip length using either the groove next to the PV terminals or a wire stripping tool. Strip the wire insulation to:

   - Type A: 0.47-0.55 inches (12 to 14 mm)
   - Type B: 0.73-0.76 inches (18.5 to 19 mm)

aPower S Type A



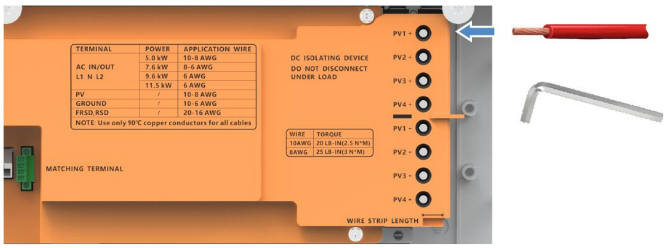
aPower S Type B



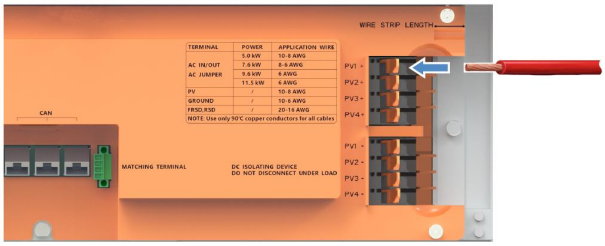
2) Pass the PV power cables through the pull box and connect the cable.

   - Type A: Loosen the screw with the supplied 1/8 inch hex wrench. Insert the power cable and tighten the screws to the torque specified on the table beside the terminal.
   - Type B: Lift the terminal levers to the fully open position and insert the wire until it reaches the bottom of the terminal. Firmly press down the terminal levers.

aPower S
Type A

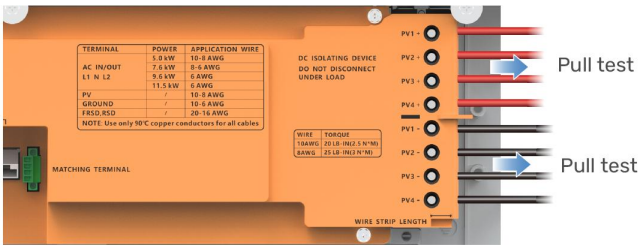


aPower S
Type B

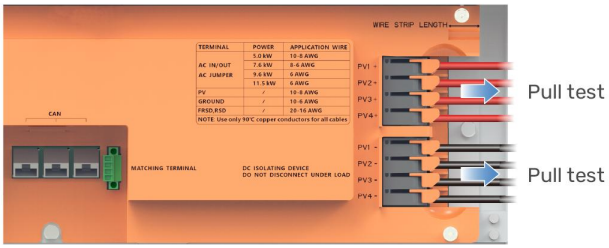


3) Perform a pull test to confirm the secure connections.

aPower S Type A



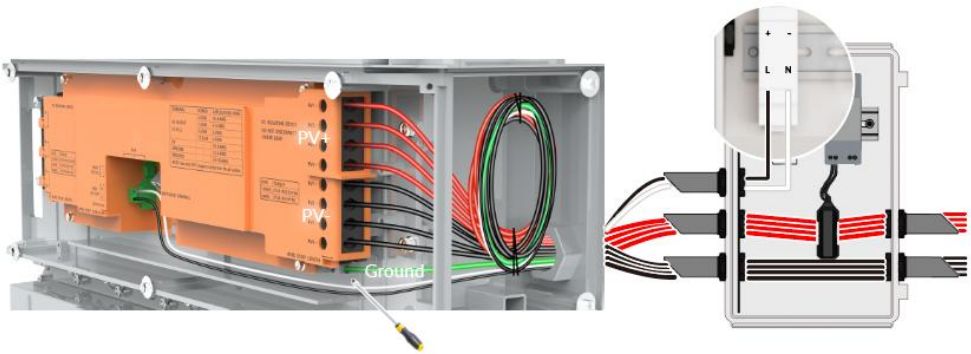
aPower S Type B



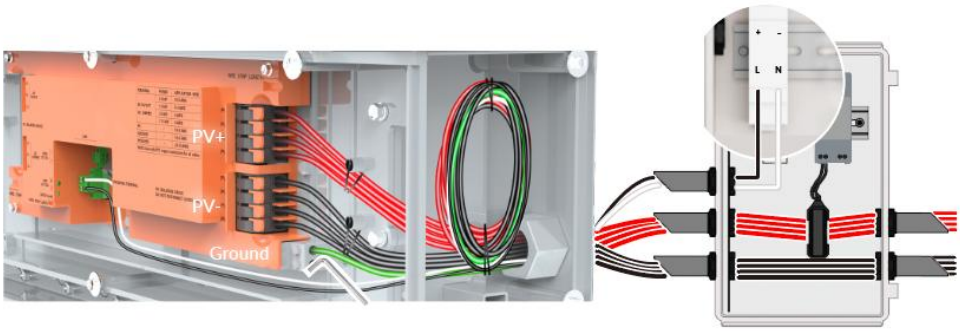
4) Route the PV ground cable through the pull box. Coil and neatly arrange the excess cables inside the wiring compartment to prevent condensation from reaching the PV/Ground terminals. Then connect the ground cable to the PV ground terminal.

- Type A: Tighten the ground screw using a flat-head screwdriver.
- Type B: Tighten the ground screw using a 3 mm hex wrench.

aPower S Type A



aPower S Type B



For multiple aPower S units installed, the installer shall prepare a corresponding number of RSS transmitter outdoor kits. Each aPower S must be paired with its own RSS transmitter-outdoor kit.

WARNING

Correct polarity must be followed.

Refer to the embossed symbols (PV+/PV-) next to the PV terminals, connect the positive PV power cables to the upper (+) terminals and connect the negative PV power cables to the lower (-) terminals.

NOTE

Retain a service loop in the conductors for maintenance or adjustment.

Coil and neatly arrange the excess cables inside the wiring compartment to prevent condensation from reaching the DC/PV ground terminals. Use the provided cable ties to secure all cables.

Establish the AC Power Connection

Connect the aPower(s) to the Main Panel When Using a MAC 1

NOTE

- Use ONLY copper conductors with a temperature rating of 194° F (90° C) for aPower connections.
- The hold down kit is used to secure aPower breakers onto the main panel. The breaker hold-down kit may be required by the local authority having jurisdiction.

aPower Breakers Options

Select the appropriate aPower breaker and wire gauge based on the desired power output.

Nominal Output Power (AC)	Maximum Continuous Current	Recommended minimum wire gauge
5.0 kW	21 A	10-8 AWG
7.6 kW	32 A	8-6 AWG
9.6 kW	40 A	6 AWG
10 kW/11.5 kW	48 A	6 AWG

NOTE: *In both on-grid and off-grid modes, aPower S output is set to the PCS permanent derate value set during system commissioning. The PCS derate feature applies to both charging and discharging rates.*

If the homeowner plans to add backup loads later, it is recommended to use 6 AWG wire gauge to avoid the need for upgrades. A smaller wire gauge may overheat, posing safety risks.

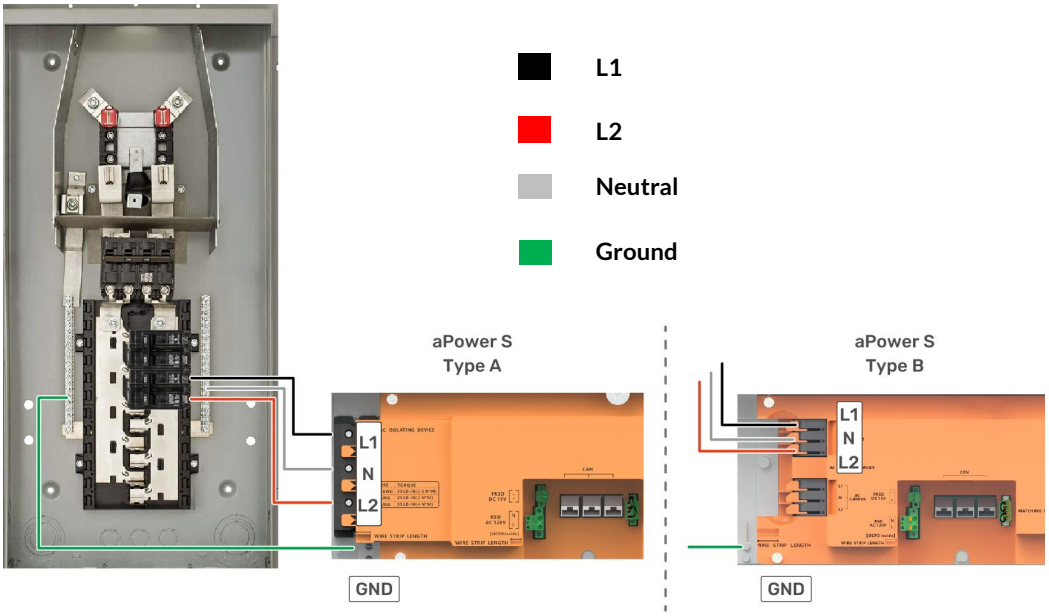
The nominal output power of aPower S shall be as specified on the product nameplate.

Refer to Table 1 aPower Breaker for compatible breaker.

Single aPower Wiring

Follow these guidelines when wiring one aPower to the main panel:

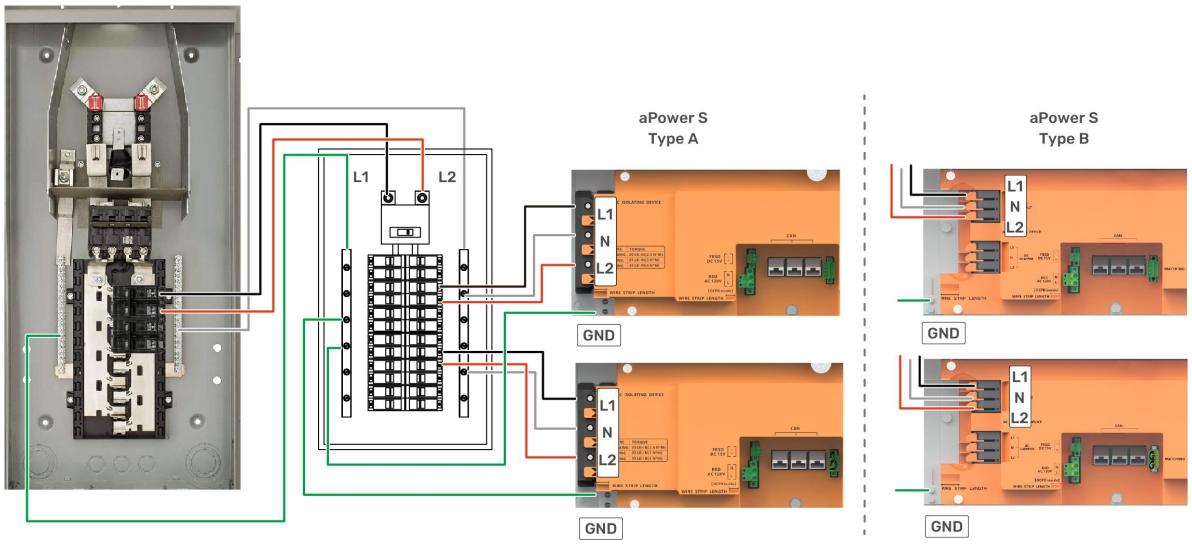
- Use one (1) pair of wires for a single aPower connection to the aPower 2-pole breaker on the main panel.
- Select an appropriate wire gauge, strip length, torque, and tool according to the Wiring Requirements table.
- To connect the other end of the cable to the main panel breaker, determine the cable stripping length based on the breaker configured.



Wiring for Two or More aPower S Units

WARNING

A combiner box must be installed when connecting two or more aPower S units to the main distribution panel to ensure system stability and electrical safety.



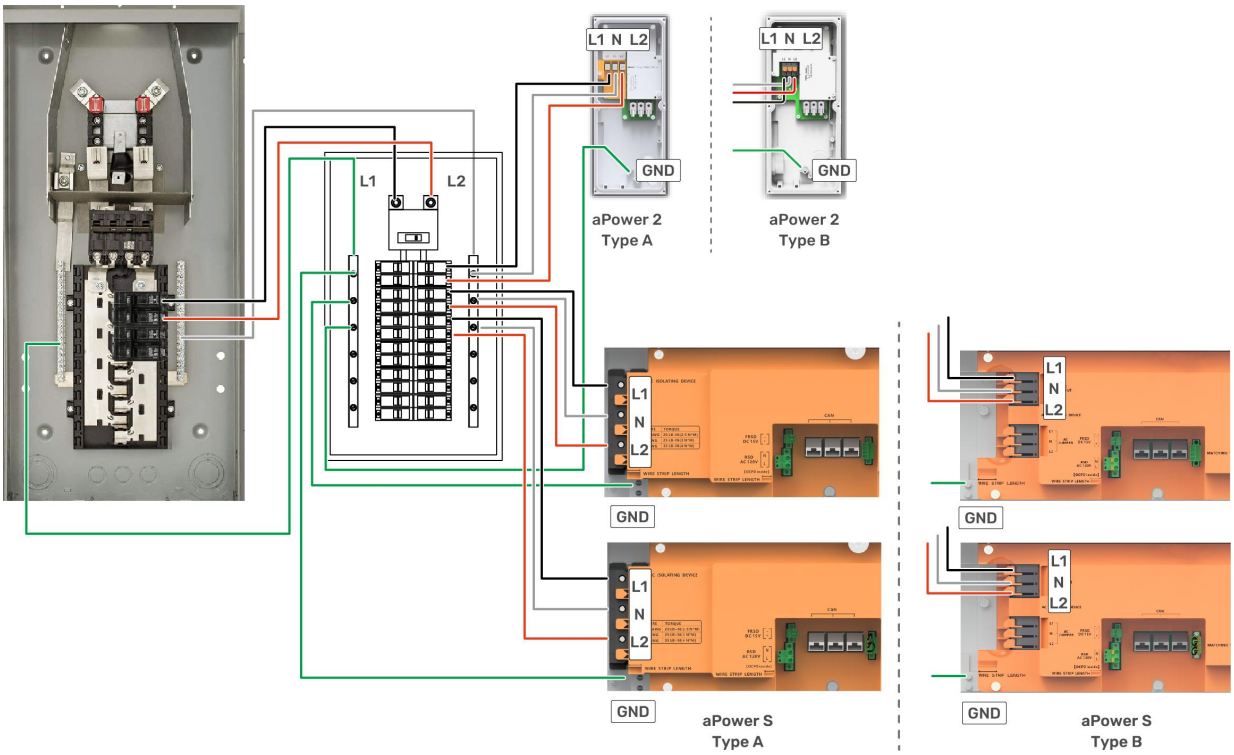
Mixed Configuration: aPower S + aPower 2 Wired in Parallel

The FranklinWH aPower S maintains backward compatibility with aPower 2, enabling seamless integration into existing installations and supporting future expansion of power and energy capacity.

WARNING

A combiner box must be installed when connecting both aPower S and aPower 2 units to the main distribution panel to ensure system stability and electrical safety.

The combiner box is for aPower connection only. Do not connect the combiner box to any other loads or PV AC. Use a combiner box with a minimum busbar rating of 100 A. If your system requires a higher busbar rating, contact FranklinWH service team.



NOTE

The aPower 2 now offers two AC terminal block types. Both AC terminal block types share the same L1, L2, NEU, and GND positions, so the wiring method is identical. Note the different strip length and torque specifications applicable to each type when wiring. Install and wire aPower 2 units in accordance with the FranklinWH aPower 2 Installation Guide.

For configurations involving more than four aPower units that are equipped with MAC 1, consult FranklinWH for technical support.

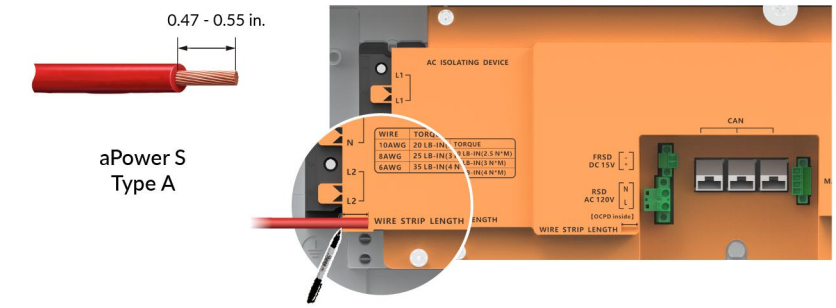
Connect the aPower(s) to the aGate

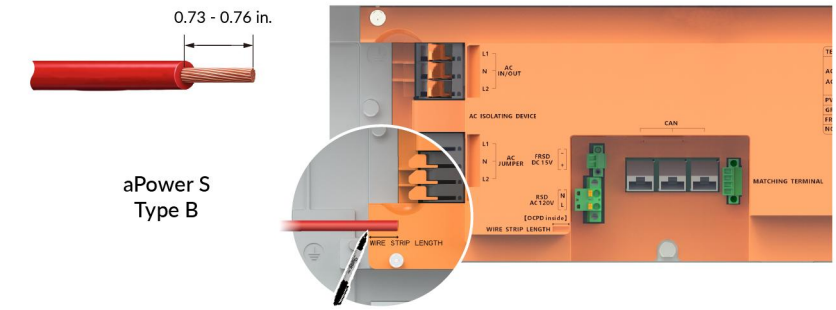
Cable Requirements

For all aPower connections, use only copper conductors rated for 194° F (90° C). Choose power cables in the 10 AWG to 6 AWG range based on the aPower's rated power specified in the utility contract. Select an appropriate wire gauge, strip length, torque, and tool according to the Wiring Requirements table.

Wiring Connection on AC side

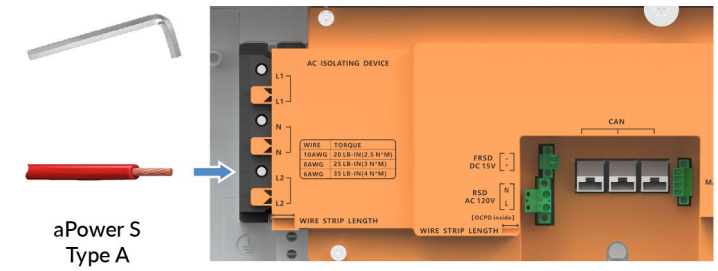
1. Measure the wire strip length using either the groove next to the AC terminals or a wire stripping tool. Strip the insulation to:
   - Type A: 0.47-0.55 inches (12 to 14 mm)
   - Type B: 0.73-0.76 inches (18.5 to 19 mm)

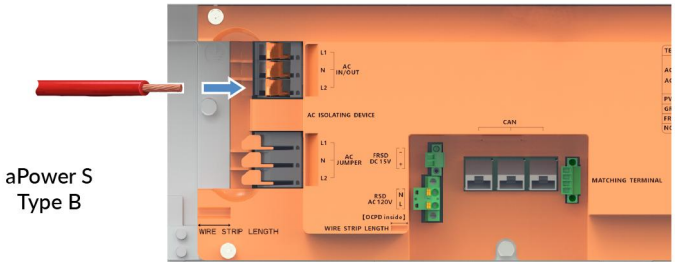




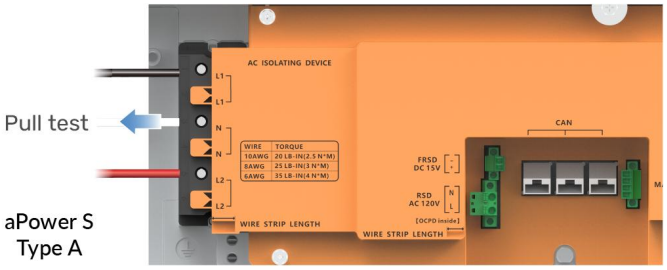
2. Pass the AC power cable through the pull box and connect the cable.

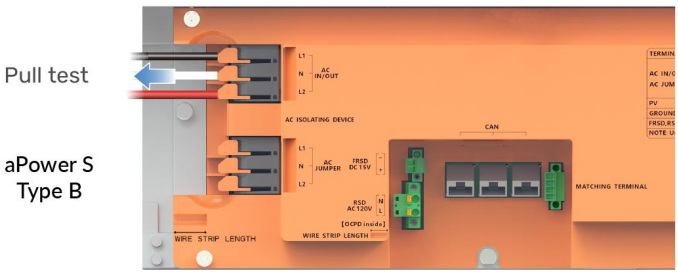
   - Type A: Loosen the screw with the supplied 1/8 inch hex wrench. Insert the power cable and tighten the screws to the torque specified on the table beside the terminal.
   - Type B: Lift the terminal levers to the fully open position and insert the wire until it reaches the bottom of the terminal. Firmly press down the terminal levers.





3. Perform a pull test to confirm the secure connections.

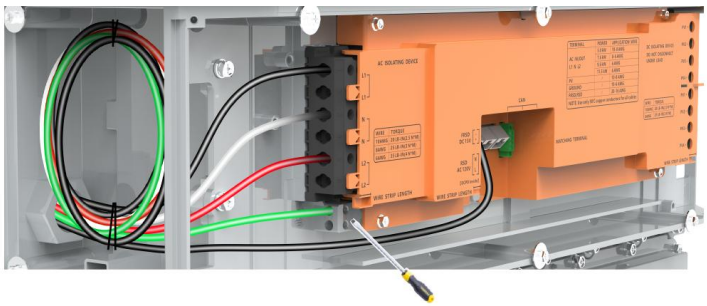




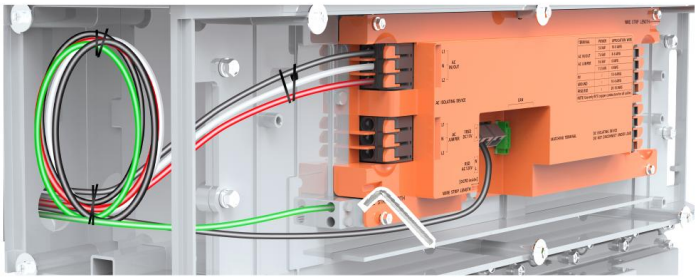
4. Route the AC ground cable through the pull box. Coil and neatly arrange the excess cables inside the wiring compartment to prevent condensation from reaching the AC/Ground terminals. Then connect the ground cable to the AC ground terminal.

   - Type A: Tighten the ground screw using a flat-head screwdriver.
   - Type B: Tighten the ground screw using a 3 mm hex wrench.

aPower S Type A



aPower S Type B



WARNING: Ensure proper cabling, stripping, and secure connections to prevent equipment damage or fire hazards.

NOTE: Retain a service loop in the conductors for maintenance or adjustment.

The **AC IN/OUT** and **AC JUMPER** terminals are functionally interchangeable. In case of a terminal failure, the alternate terminal may be used as a backup.

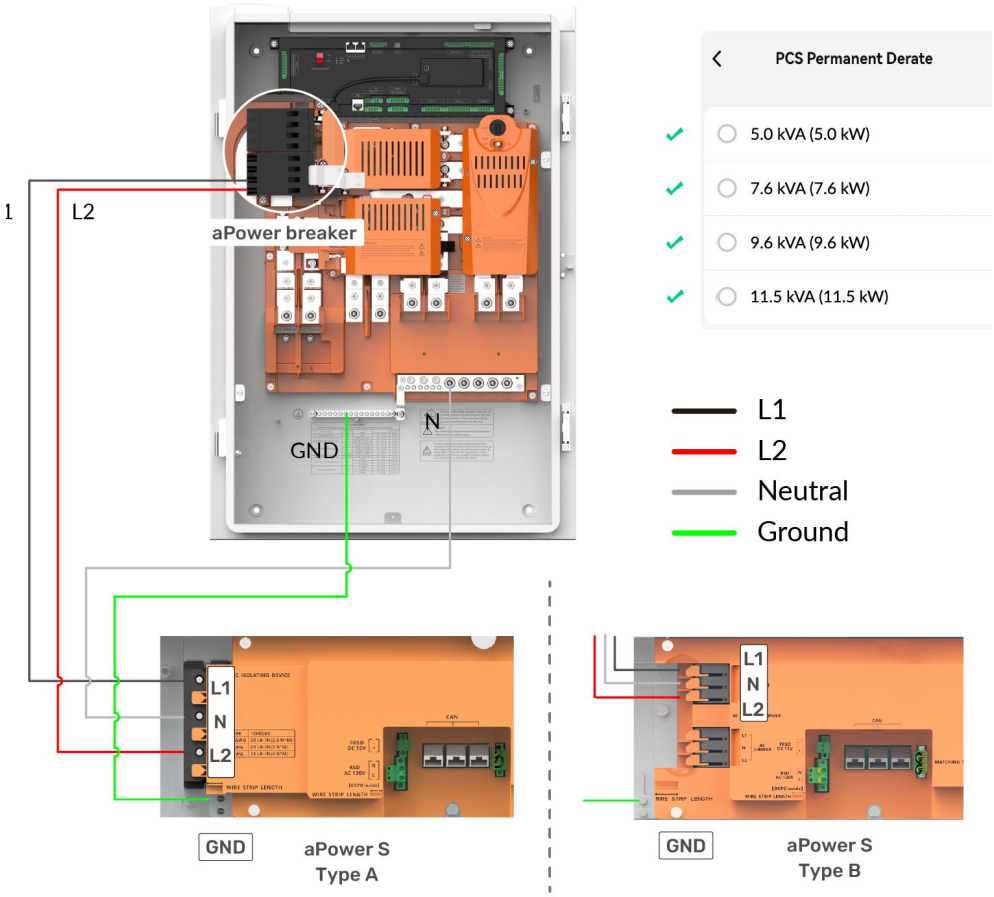
aGate Terminal Selection

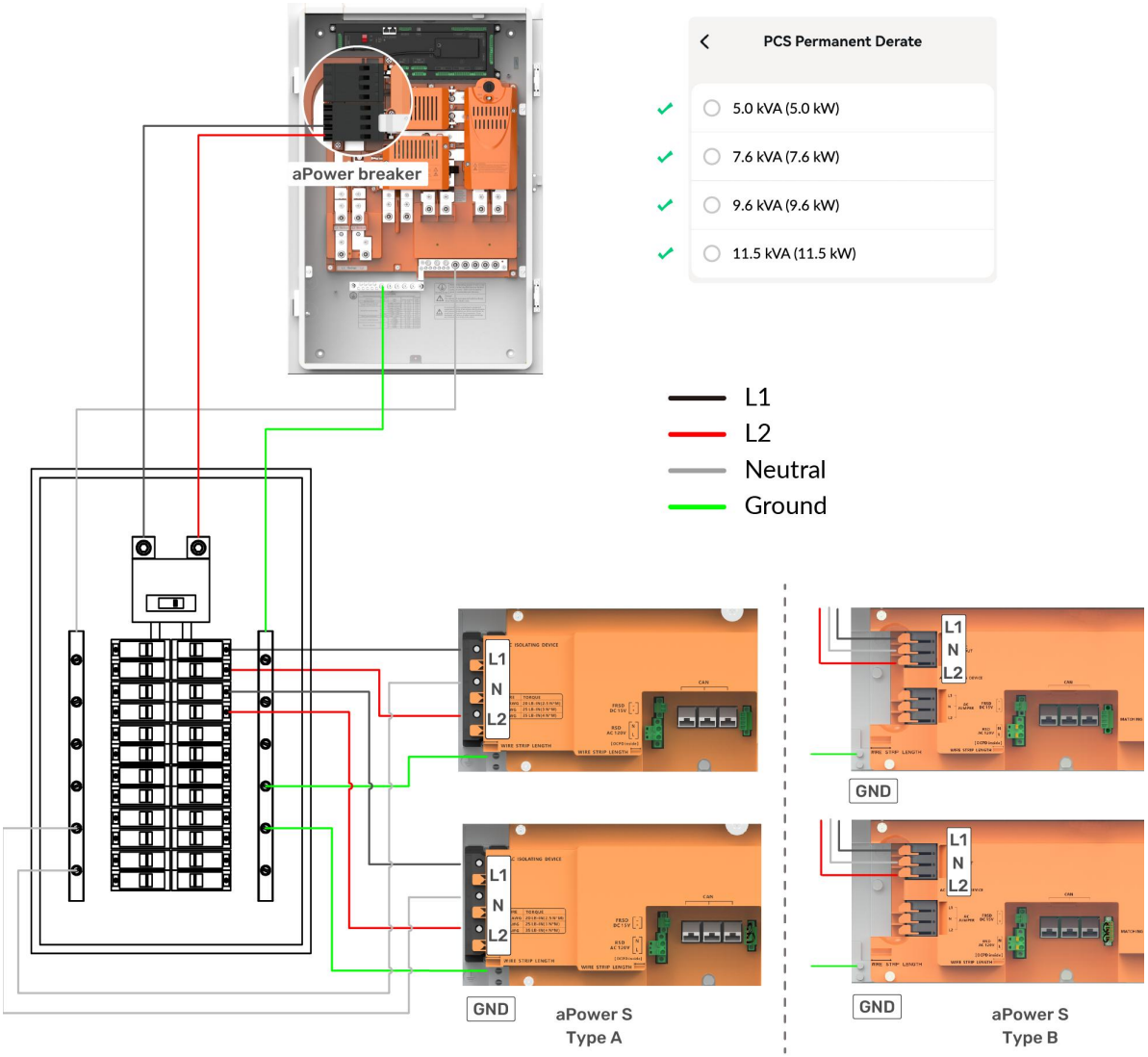
When connecting aPower(s) to the aGate, it is necessary to select the appropriate terminals based on the number of installed aPower units: aPower terminals or backup loads terminals. Select appropriate circuit breakers or combiner box to ensure safe and compliant installation.

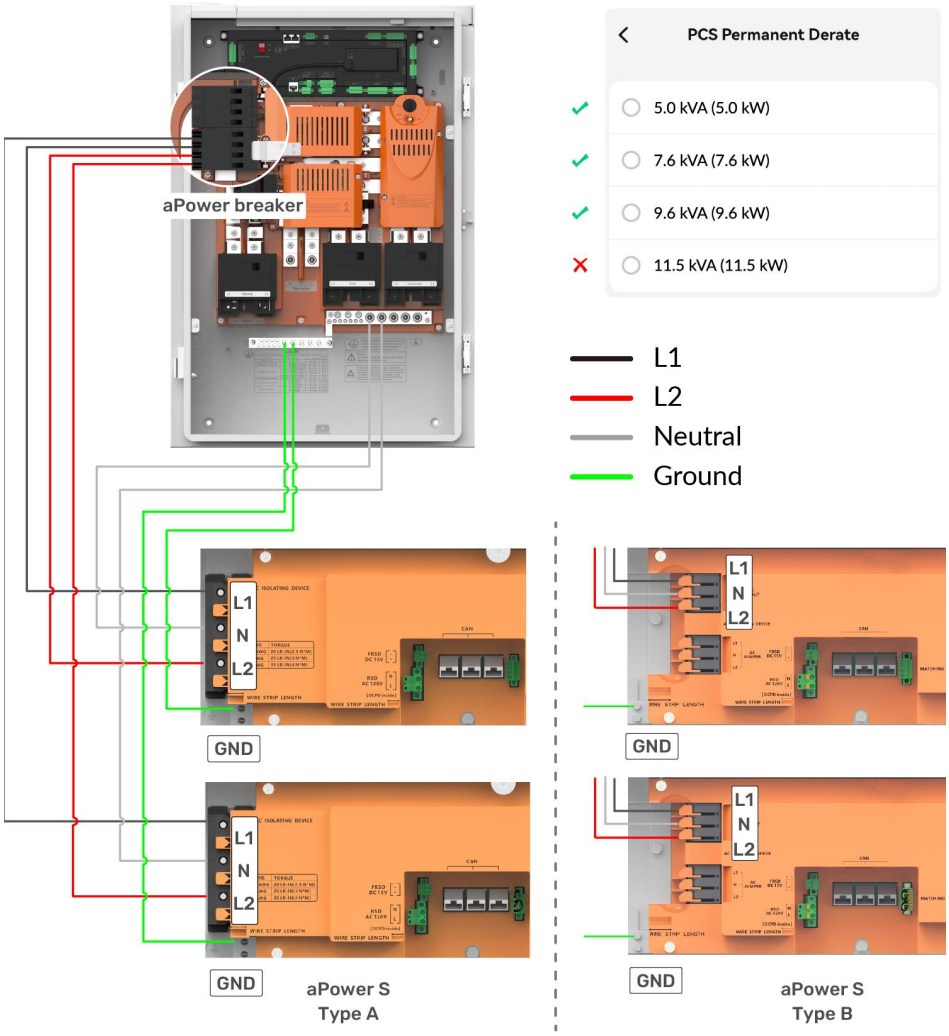
When using aGate backup load terminals for wiring, install the Backup Expansion Lugs on the aGate backup loads terminals. There are two sets of lugs: one set is designated for aPower input, and another set is intended for the backup main panel output.

Refer to Table 1 aPower Breaker for compatible breaker.

For configurations involving four or more aPowers units, consult FranklinWH for technical support.

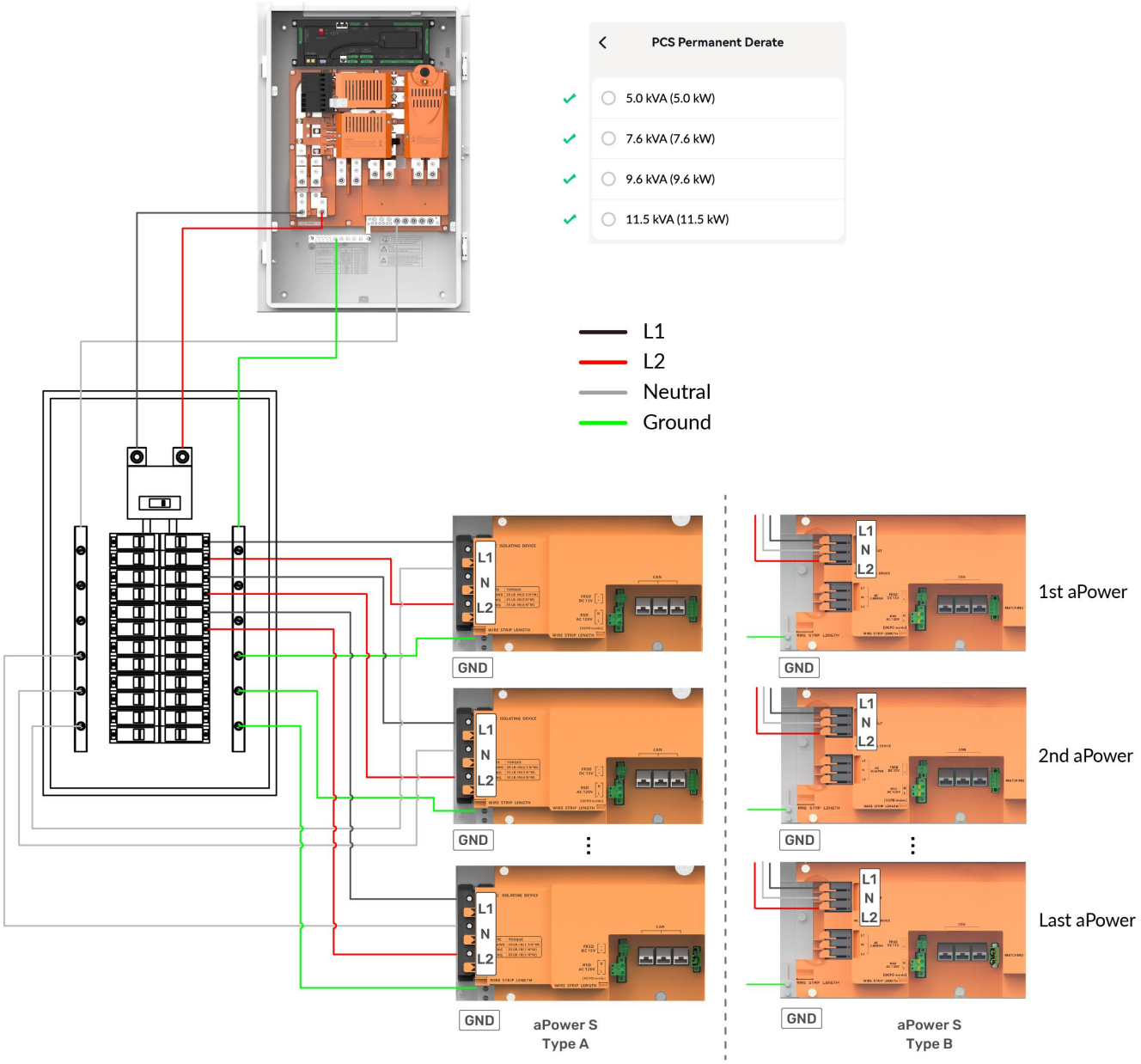



aPower breaker
PCS Permanent Derate
5.0 kVA (5.0 kW)
7.6 kVA (7.6 kW)
9.6 kVA (9.6 kW)
11.5 kVA (11.5 kW)
L1
L2
Neutral
Ground
L1
N
L2
GND
aPower S
Type A
aPower S
Type B



NOTE

If a quad breaker is installed, limit the aPower output to ≤9.6 kW. The 11.5 kW setting requires a 60 A breaker.


PCS Permanent Derate
5.0 kVA (5.0 kW)
7.6 kVA (7.6 kW)
9.6 kVA (9.6 kW)
11.5 kVA (11.5 kW)
L1
L2
Neutral
Ground
L1
N
L2
GND
aPower S
Type A
1st aPower
2nd aPower
Last aPower
aPower S
Type B

Mixed Configuration: aPower S, aPower 2, and aPower X 1.3 Wired in Parallel

The FranklinWH aPower S maintains backward compatibility with aPower 2 and aPower X 1.3, enabling seamless integration into existing installations to expand power and energy capacity.

The aPower S is compatible with aGate X 1.3 and above.

For mixed configurations involving four or more aPower S units, consult engineering@franklinwh.com for technical support.

Installation Requirements

- Calculate the cable gauge and circuit breaker ratings based on the total system capacity. All electrical installations must comply with applicable local codes and regulations.
- Use a combiner box or a compatible quadplex breaker to safely accommodate multiple hybrid unit connections.

	**DANGER** Before installation, ensure that all breakers are turned **OFF** and the system is fully de-energized. Use a multimeter to verify 0 V at all terminals before proceeding. Wear appropriate PPE for personal safety.

aGate Electrical Specifications (AGT-R1V2-US/AGT-R1V3-US)

- **aPower Terminals:** Maximum current 100 A, compatible with a 125 A circuit breaker.
- **Backup Loads Terminals:** Maximum current 160 A, compatible with a 200 A circuit breaker.

Determining Connection Terminal on the aGate for Hybrid Configuration

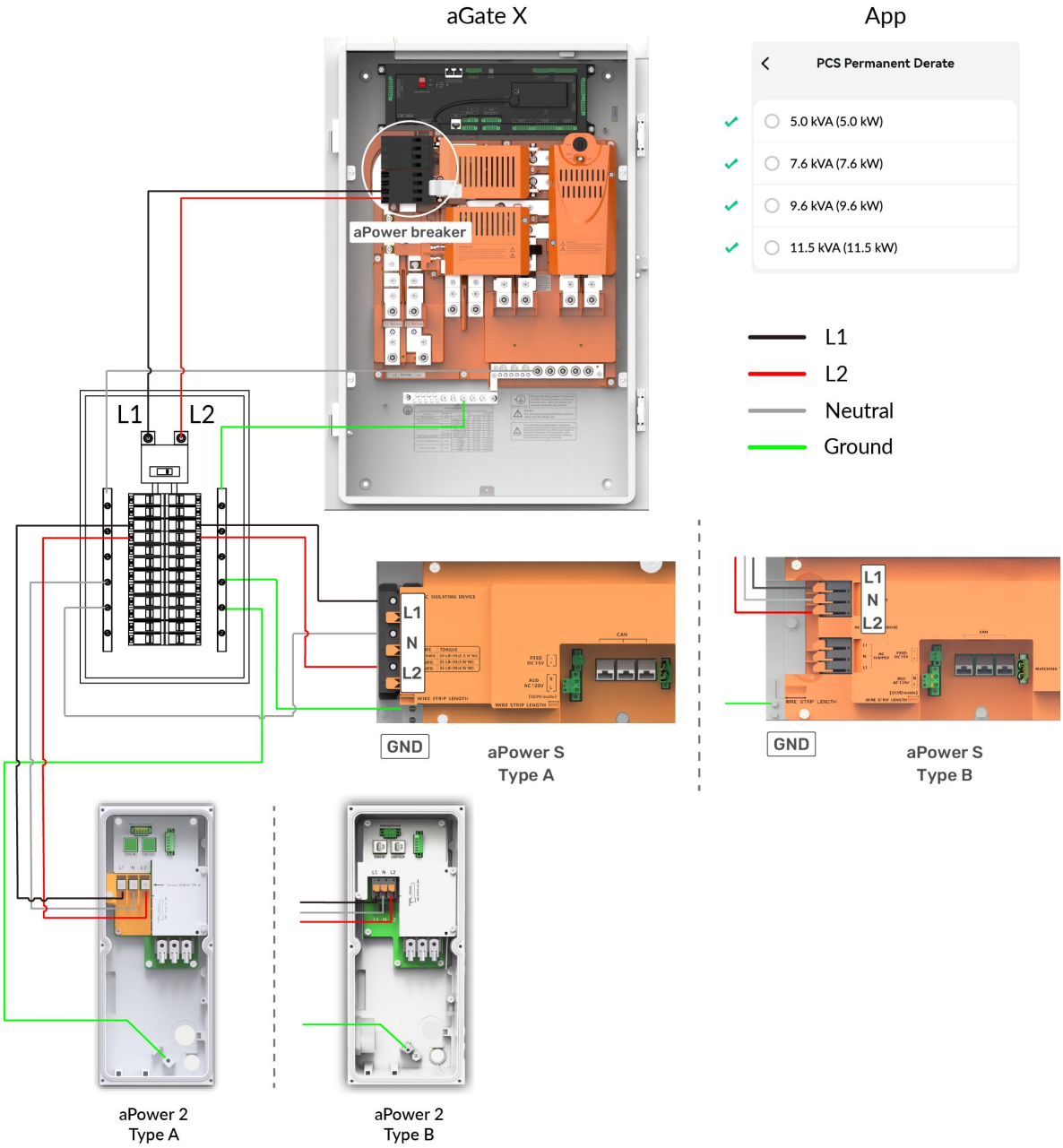
The four levels of aPower S output options are 10 kW/11.5 kW, 9.6 kW, 7.6 kW, and 5.0 kW. Configure the battery rated power according to the specific household load requirements. Then, calculate the total system output and select appropriate terminals on the aGate for hybrid system connection.

Total Battery Power Output	Connection Terminals
≤ 20 kW	aPower terminals
> 20 kW	Backup loads terminals

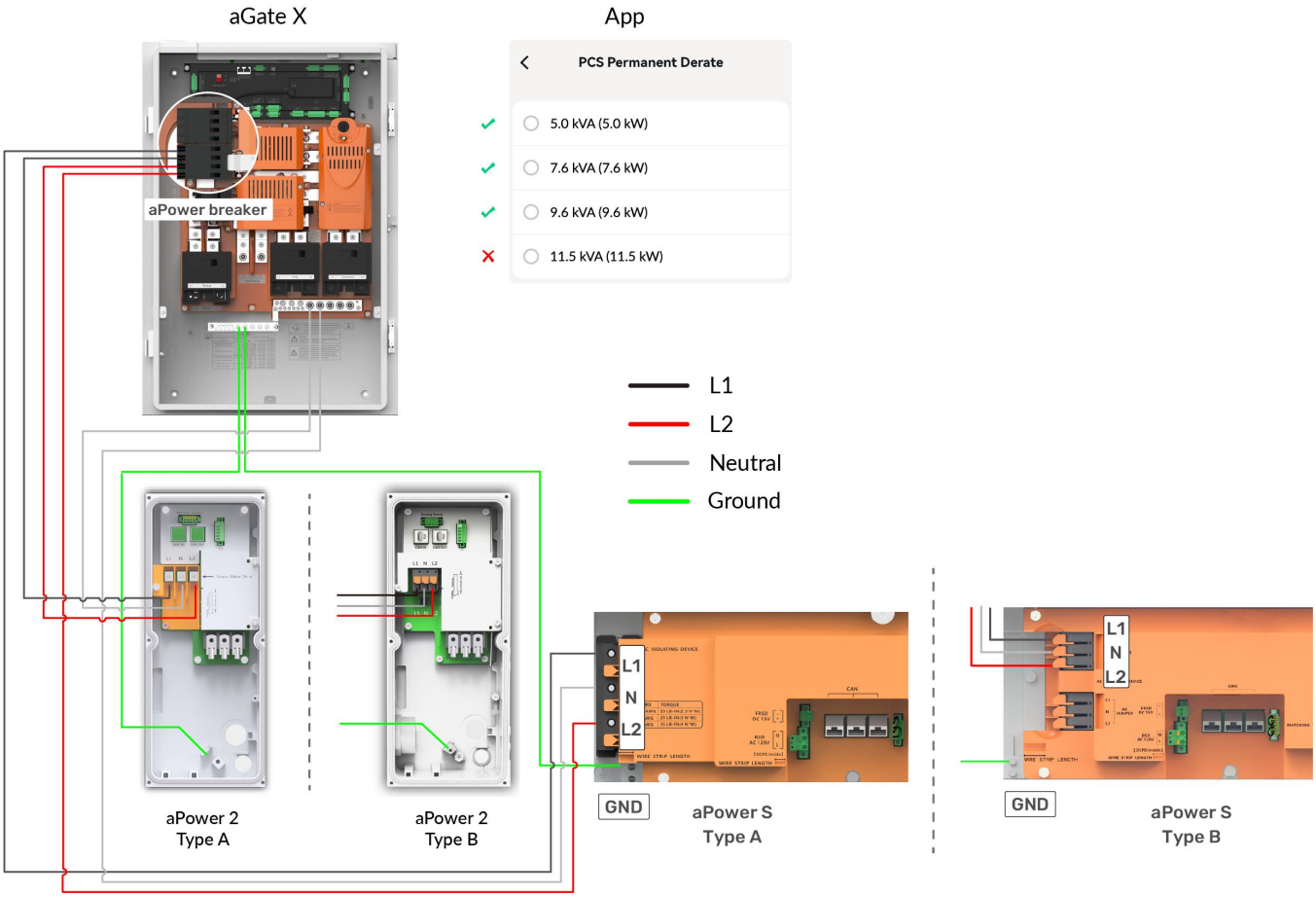
An additional combiner box or quadplex breaker may be required depending on site-specific conditions. Refer to Table 1 aPower Breakers for compatible circuit breakers.

All aPower S units must be installed and wired in accordance with the instructions outlined in previous chapters. The following diagram illustrates the parallel connection for hybrid units.

1*aPower 2 + 1*aPower S + Combiner box solution



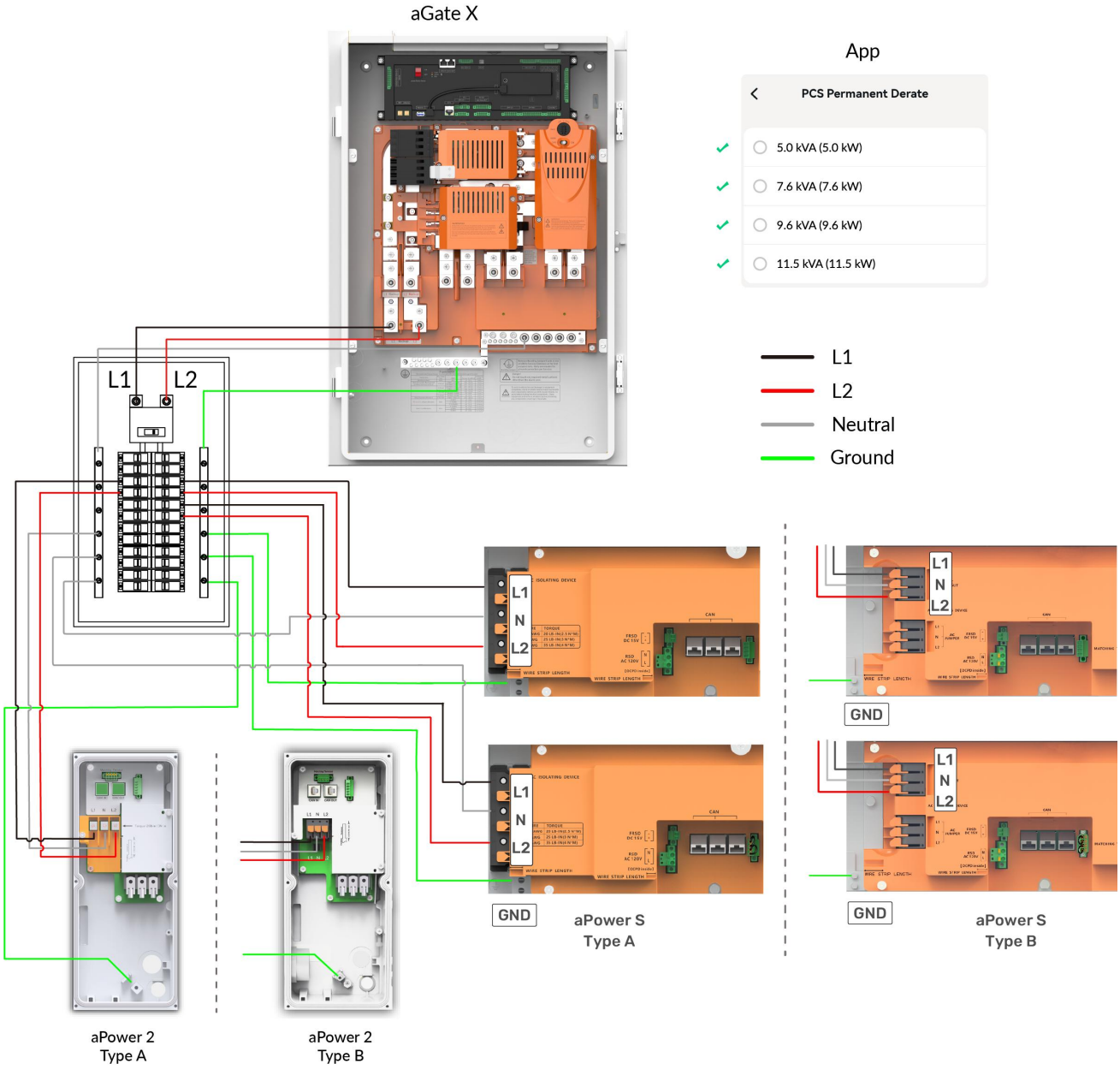
1*aPower 2 + 1*aPower S + Quad breaker solution



NOTE

If a quad 50 A breaker is installed, limit the aPower output to 9.6 kW or less. The 11.5 kW setting requires a 60 A breaker.

More than 2 aPower units mixed



NOTE

Backup circuit breaker installation is not supported when the backup load terminals are in use for main power distribution wiring.

Wiring Requirements

Select the appropriate wire gauge to meet local codes.

aPower Terminal	Rated Power	Wire Gauge	Torque		Strip Length		Tool	
			Type A	Type B	Type A	Type B	Type A	Type B
AC Terminal	5 kW	10 AWG	20 lb·in (2.5 N·m)	/	0.47-0.55 in. (12-14 mm)	0.73-0.76 in. (18.5-19 mm)	1/8 inch hex wrench	/
		8 AWG	25 lb·in (3 N·m)					
	7.6 kW	8 AWG	25 lb·in (3 N·m)					
		6 AWG	35 lb·in (4 N·m)					
	≥ 9.6 kW	6 AWG	35 lb·in (4 N·m)					
PV Terminal	/	10 AWG	20 lb·in (2.5 N·m)					
		8 AWG	25 lb·in (3 N·m)					
Ground	/	10 AWG	35 lb·in (4.0 N·m)		0.73-0.76 in. (18.5-19 mm)		Flat-head screwdriver	3 mm hex wrench
		8 AWG	40 lb·in (4.5 N·m)					
		6 AWG	45 lb·in (5.1 N·m)					
RSD	/	20 – 16 AWG			0.39-0.43 in. (10-11 mm)		Flat-head screwdriver	

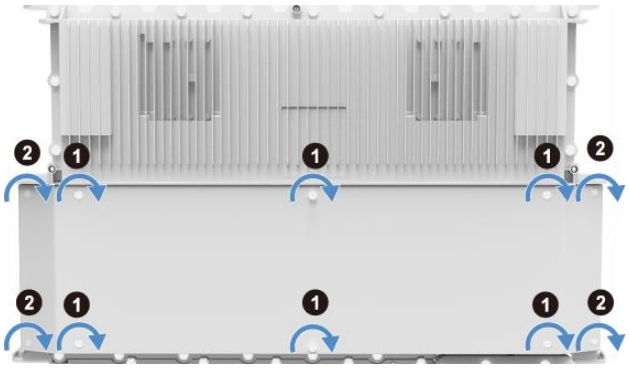
NOTE

For aPower connection, use ONLY copper conductors, rated to a minimum of 194° F (90° C).

Complete Installation

Install the aPower Exterior Cover

1. Install the six front panel screws first, followed by the four screws on both sides of the aPower, tightening all the screws to a torque of 2.21 lb·ft (3 N·m).



NOTE

Ensure all the ten screws are fully secured. Loose fasteners may lead to water intrusion and device failure.

2. Use diagonal pliers to remove the top or side knockout holes in accordance with the pull box position, wiring, and conduit layout.



3. Place the exterior cover close to the chassis for LED light strip's power cable connection.

   a) Cut the cable tie that secures the LED light strip's power cable.

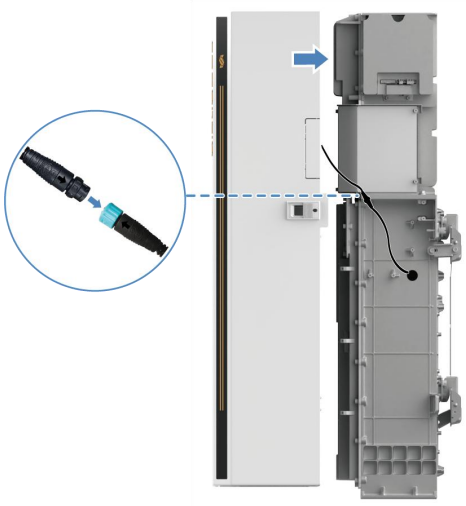


   b) Align the arrows on the male and female waterproof connectors, then insert the male head into the female one until a click sound.

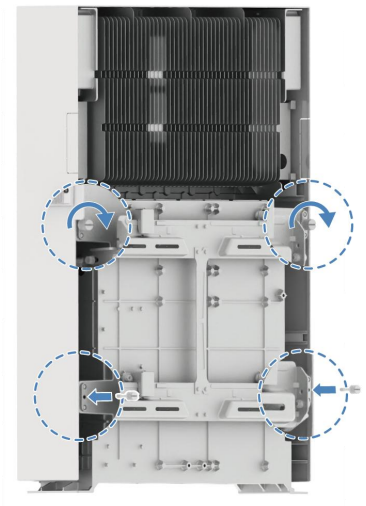
NOTE

Two installers will be needed to complete the LED light strip power cables connection.

Make sure this connection achieves a NEMA 6P protection rating.



4. Insert eight locating pins on the exterior cover into the corresponding holes on the rear left and right side of the chassis. Securely fasten the four captive screws.



WARNING

To prevent potential safety hazards, do not place any item on top of the aPower S. Otherwise, item may fall through the heat dissipation holes onto the heating sink inside, possibly causing damage or creating safety risks.

5. The installer shall provide a padlock to secure the aPower's On/Off switch after commissioning.



NOTE

Remove the cover film after the installation.

Commissioning and Acceptance

The FranklinWH System installation is complete. For the commissioning and acceptance process, please refer to the ***FranklinWH Commissioning Guide (aGate & aPower)*** or ***FranklinWH Commissioning Guide (MAC 1 & aPower 2 & aPower S)***.

Appendix 1: Allowed Breakers

Table 1 aPower Breakers

aPower Breaker				
S/N	**Description**	**Manufacturer Model 1**	**Manufacturer Model 2**	**Manufacturer Model 3**
1	2-Pole, 10 kAIC, 30 A/240 V	Eaton #BR230	Siemens #Q230	Schneider #HOM230
2	2-Pole, 10 kAIC, 40 A/240 V	Eaton #BR240	Siemens #Q240	Schneider #HOM240
3	2-Pole, 10 kAIC, 50 A/240 V	Eaton #BR250	Siemens #Q250	Schneider #HOM250
4	2-Pole, 10 kAIC, 60 A/240 V	Eaton #BR260	Siemens #Q260	Schneider #HOM260
5	2-Pole, 10 kAIC, 70 A/240 V	Eaton #BR270	Siemens #Q270	Schneider #HOM270
6	2-Pole, 10 kAIC, 80 A/240 V	Eaton #BR280	Siemens #Q280	Schneider #HOM280
7	2-Pole, 10 kAIC, 90 A/240 V	Eaton #BR290	Siemens #Q290	Schneider #HOM290
8	2-Pole, 10 kAIC, 100 A/240 V	Eaton #BR2100	Siemens #Q2100	Schneider #HOM2100
9	2-Pole, 10 kAIC, 125 A/240 V	Eaton# BR2125	Siemen# Q2125	Schneider# HOM2125
10	2-Pole, 22 kAIC, 30 A/240 V	Eaton #BRH230	Siemens #Q230H	N/A
11	2-Pole, 22 kAIC, 40 A/240 V	Eaton #BRH240	Siemens #Q240H	N/A
12	2-Pole, 22 kAIC, 50 A/240 V	Eaton #BRH250	Siemens #Q250H	N/A
13	2-Pole, 22 kAIC, 60 A/240 V	Eaton #BRH260	Siemens #Q260H	N/A
14	2-Pole, 22 kAIC, 70 A/240 V	Eaton #BRH270	Siemens #Q270H	N/A
15	2-Pole, 22 kAIC, 80 A/240 V	Eaton #BRH280	Siemens #Q280H	N/A
16	2-Pole, 22 kAIC, 90 A/240 V	Eaton #BRH290	Siemens #Q290H	N/A
17	2-Pole, 22 kAIC, 100 A/240 V	Eaton #BRH2100	Siemens #Q2100H	N/A
18	2-Pole, 22 kAIC, 125 A/240 V	Eaton# BRH2125	Siemen# Q2125H	N/A
19	2-Pole, 10 kAIC, 2X30A/240 V	Eaton #BQC230230	Siemens #Q23030CT2	Schneider #HOMT230230
20	2-Pole, 10 kAIC, 2X40A/240 V	Eaton #BQC240240	Siemens #Q24040CT2	N/A
21	2-Pole, 10 kAIC, 2X50A/240 V	Eaton #BQC250250	N/A	N/A
22	2-Pole, 10 kAIC, 2X30A/240 V	Eaton #BQ230230	N/A	N/A
23	2-Pole, 10 kAIC, 2X40A/240 V	Eaton #BQ240240	N/A	N/A
24	2-Pole, 10 kAIC, 2X50A/240 V	Eaton #BQ250250	N/A	N/A

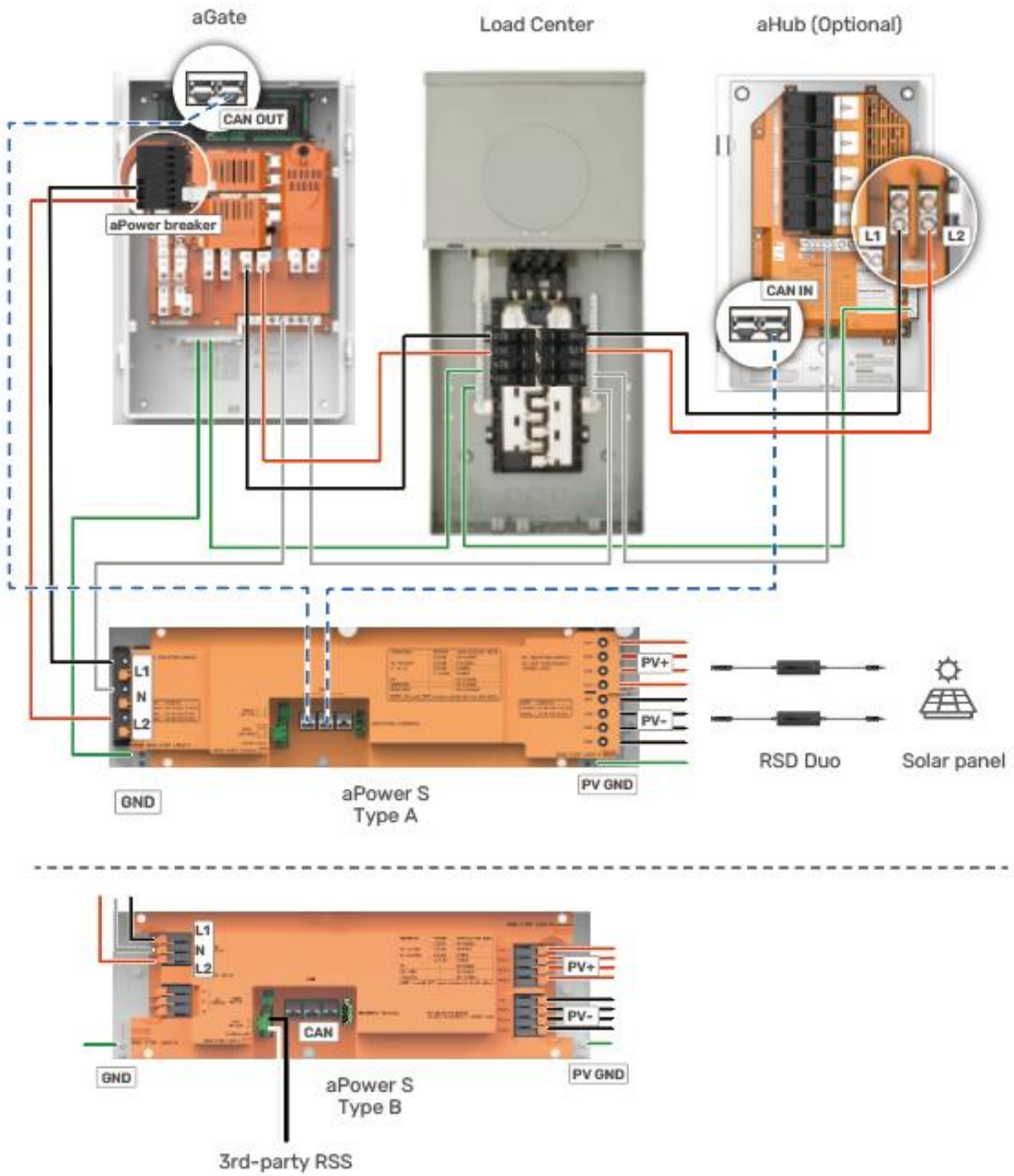
Table 2 Breakers in a Combiner Box

S/N	aPower Rated Power	Recommended Breaker
1	5 kW	30 A
2	7.6 kW	40 A
3	9.6 kW	50 A
4	10 kW/11.5 kW	60 A

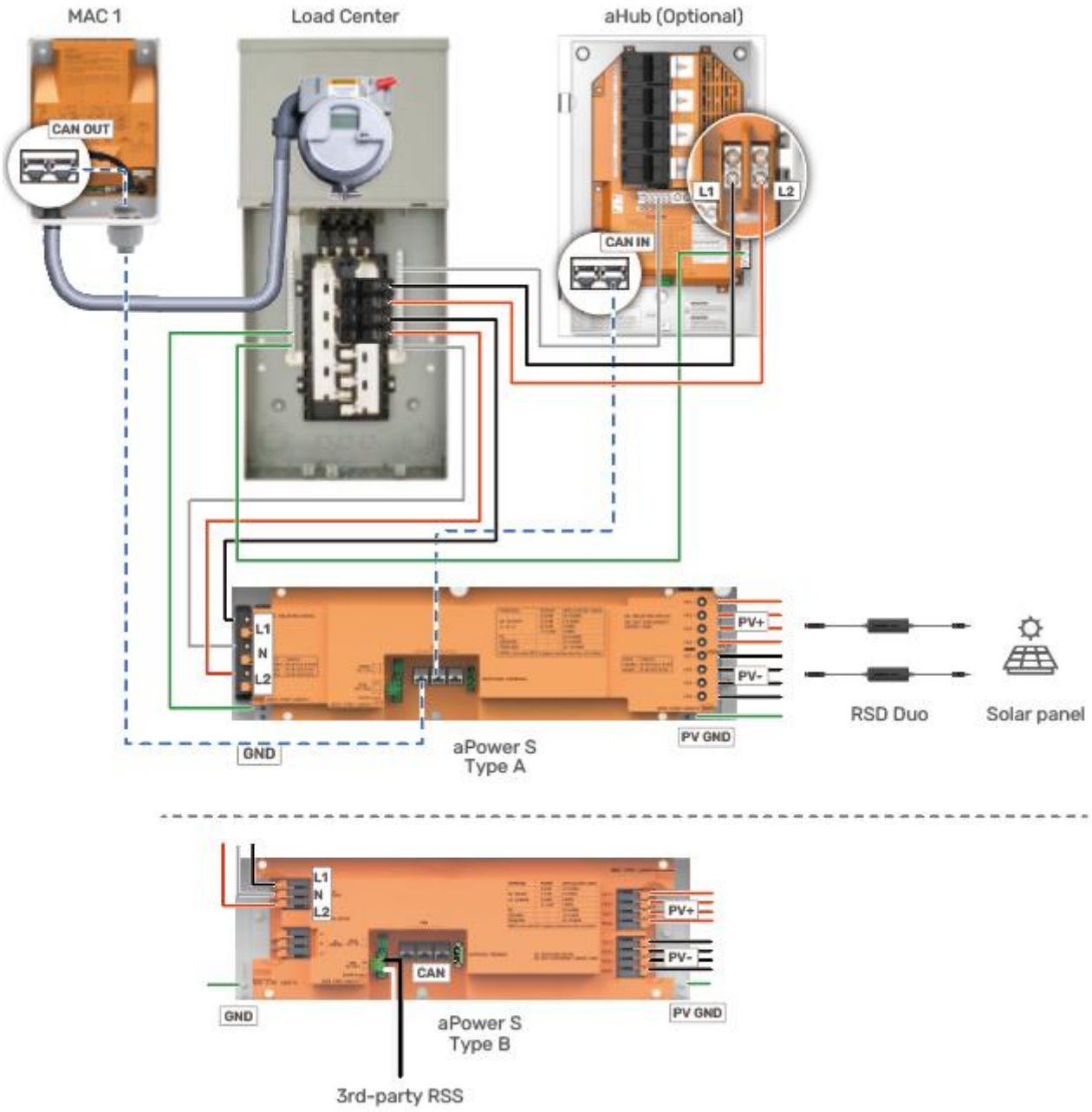
**NOTE:* *If homeowners need capacity expansion, configure the circuit breaker and cables based on the maximum output of 11.5 kW.*

Appendix 2: System Wiring Diagrams

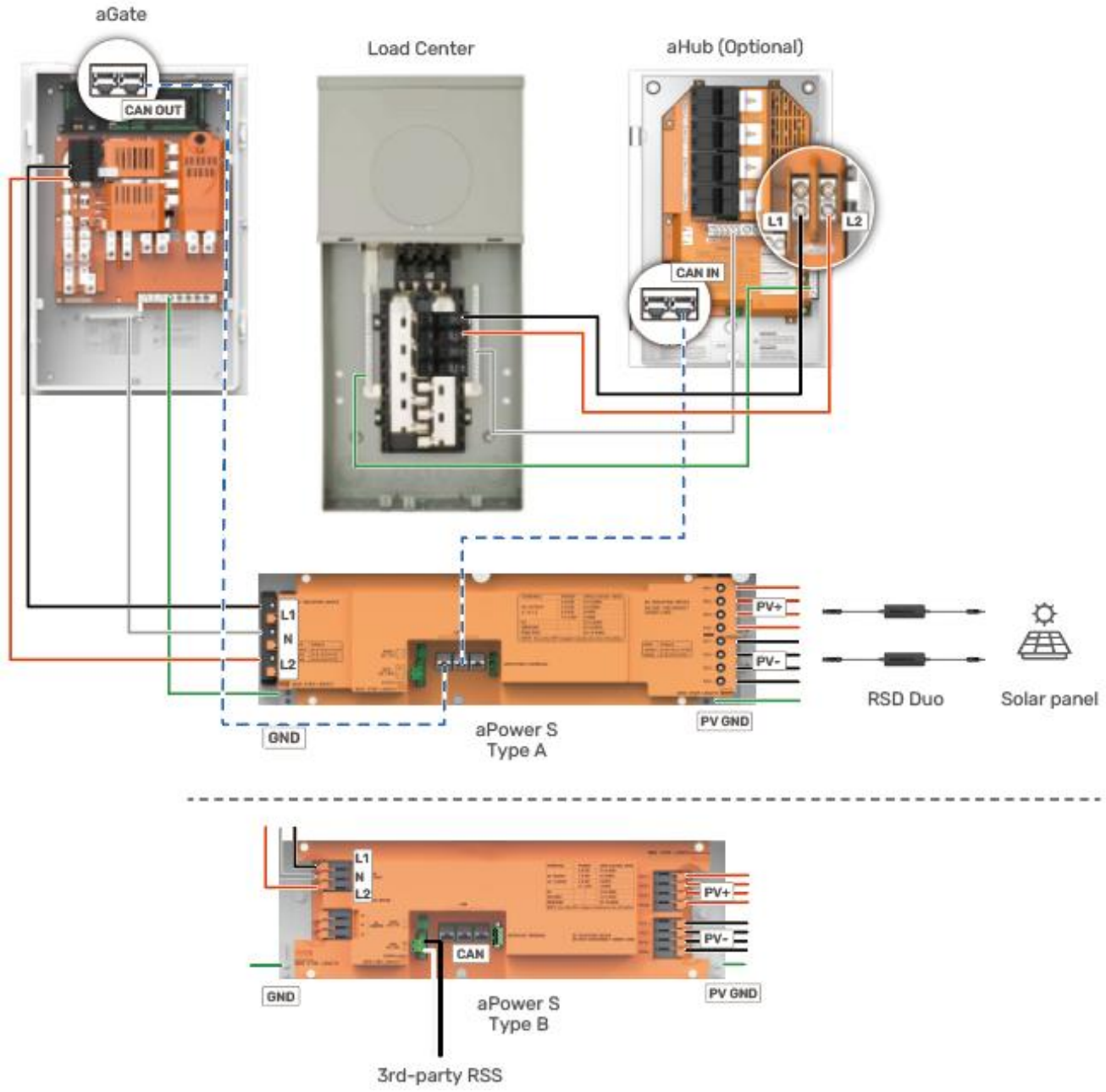
Scenario 1: aGate X + aPower S + aHub (Optional)



Scenario 2: MAC 1 + aPower S + aHub (Optional) + ConnectDER MSA



Scenario 3: MAC 1 + aPower S + aHub (Optional) + EQB MSA



Appendix 3: Datasheet

For detailed performance specification, compliance information, mechanical specification, and environmental specification, please refer to ***aPower S Datasheet*** *or* ***RSD Duo Datasheet*****.**

Appendix 4: Installation Map Reference Table

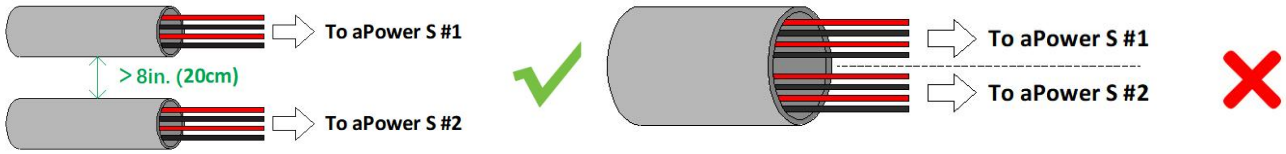
***For reference only. Please refer to the table provided by the installer for official documentation.**

Panel group: Azimuth: Tilt: Sheet _____ of _____			Customer:		Installer:		
	1	2	3	4	5	6	7
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
L							
M							

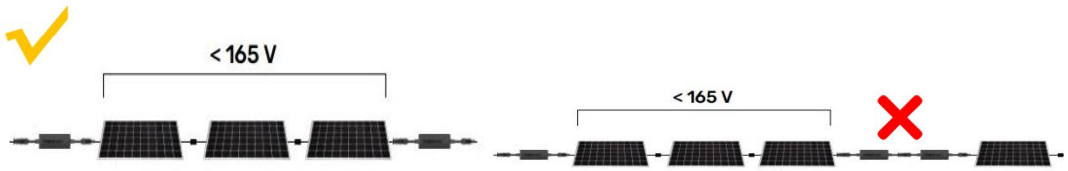
Appendix 5: Best Practices for Installing PV System with RSD Duo

Danger:

- Always power off the aPower S before installing or removing RSD Duos, otherwise, there is a risk of electric shock or arcing.
- Due to the Voc, as a precaution, connect the aPower DC cable first, then plug in the last MC4 terminal.
- PV cables connected to different aPower S units must not be routed through the same cable tray or conduit. Sharing a conduit between different aPower S units may cause crosstalk, resulting in aPower S RSD Duo communications interference. If separate plastic conduits are used, maintain a minimum distance of 8 in. (20 cm) between conduits connected to different aPower S units and conductors of different systems.

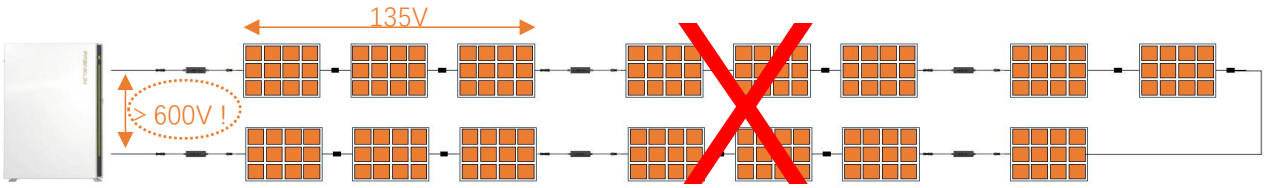


- Two RSD Duos must not be directly connected to each other.

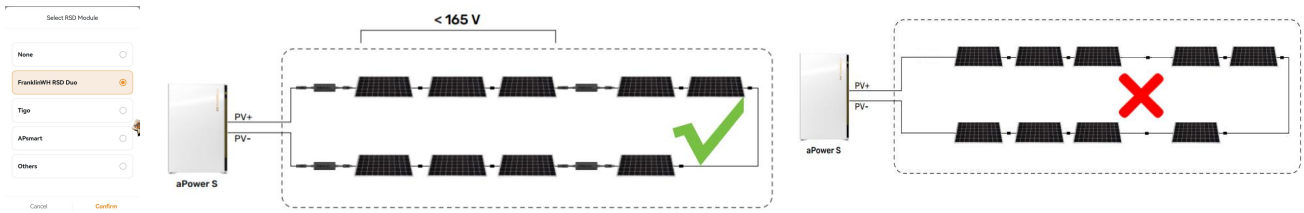


Warning:

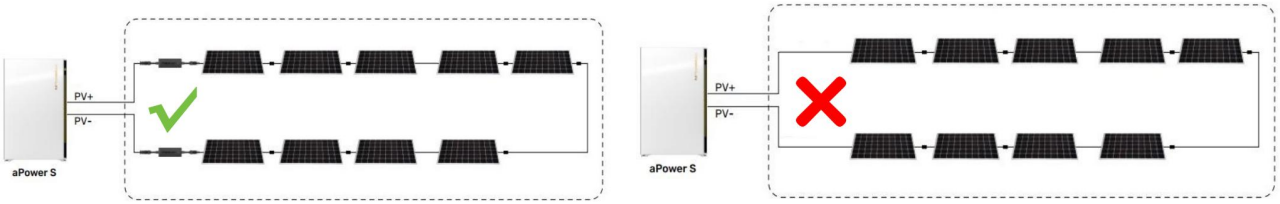
- Each PV string system voltage should be less than 600 V.



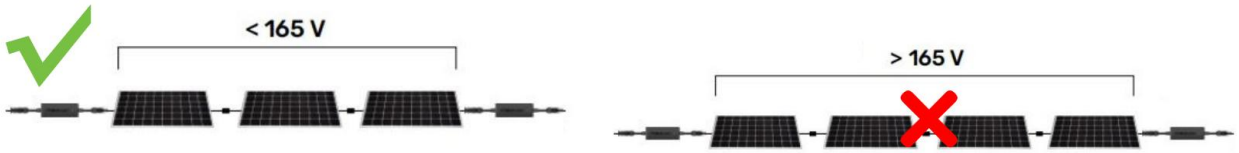
- For PV installations where the shutdown device type is configured as **FranklinWH RSD Duo** in the app, confirm that RSD Duos have been installed in the circuit per requirements and that the quantity installed meets applicable code.



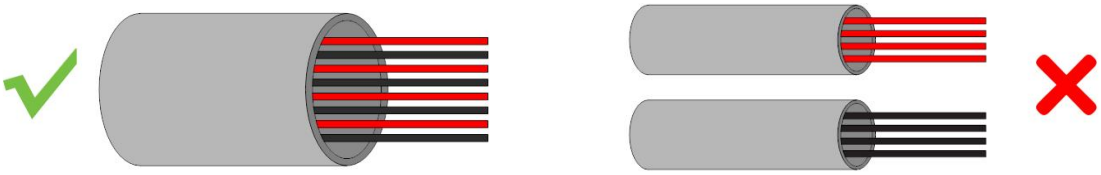
- For installations requiring only 2 RSD Duos (see FranklinWH RSD Duo & PV UL 3741 Compliance for details), ensure that one RSD Duo is installed at each end of the string.



- The open-circuit voltage (Voc) of the sub-array between any two adjacent RSD Duos must be less than 165 V at the minimum design temperature (typically no more than 3 modules per sub-array).



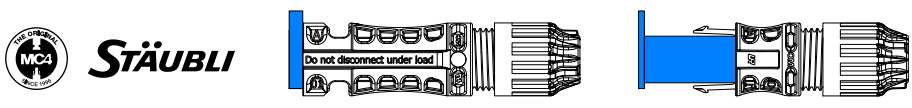
- Run all conductors that use the same transmitter together in one conduit. Never separate the + and – of the same string.



- Do not twist the cable gland of the RSD Duo connector terminals. Twisting the connector terminals will compromise the IP protection rating.
- It is highly recommended to use Stäubli professional tools to remove the terminals. Using other tools may result in damage to the RSD Duo connector and will void the RSD Duo warranty.

Note:

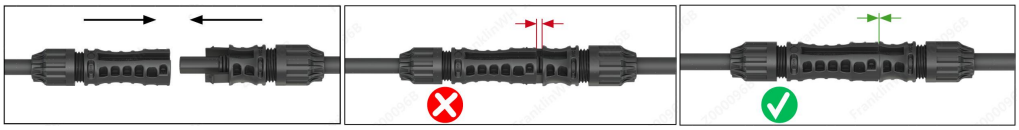
- PV string length ≤ 984 ft (300 m).
- To ensure reliable terminal connections, it is required to use Stäubli-brand PV MC4/MC4 Evo2 connectors when connecting directly to the RSD Duo terminal.
- When field-fabricating PV connectors to be mated with an RSD Duo, read the Stäubli official assembly guide MA273 (en) Assembly Instructions in full before proceeding. Ensure that cables comply with applicable codes and the connector manufacturer's requirements, and that crimping tools meet the connector manufacturer's specifications.
- Cables connected to the connector shall be suitable for use in photovoltaic systems and shall comply with the requirements of IEC 62930.
  Consider the following when selecting the PV cable:
  - ➢ The sheath material of the PV cable has to meet insulation class 1, according to IEC 60664-1.
  - ➢ Cables specified by EN 50618 are allowed as an alternative to cable types IEC 131, according to IEC 62930.
- Install RSD Duos in line with PV modules using standard Stäubli MC4 Evo2 certified compatible connectors.



- Cable management must allow a minimum of 0.79 in. (20 mm) of cable that exits straight from the cable seal without bending or stress. Refer to cable manufacturer specification for minimum bending radius.



- Mate the connectors until an audible click is heard. When fully seated, the mating face of the connector must be flush with no visible gap.



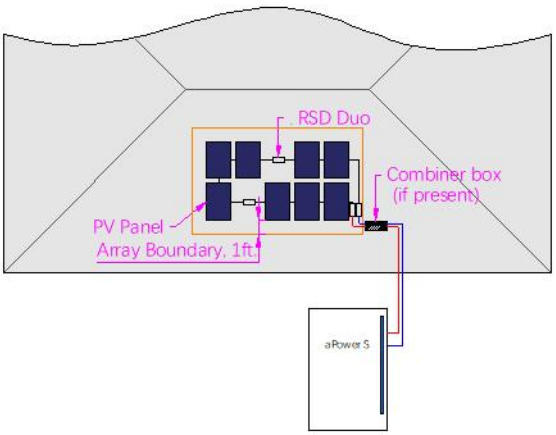
- Hold the RSD Duo cable with wire clips.
- RSD Duo positions in different PV strings should be marked with stickers of different colors.
- Failure to follow the instructions in the following Warning and Danger sections will void the warranty.

Appendix 6: How to Measure the 30 V Voltage Outside the PV Array

Before you measure, confirm the following:

- The PV wiring of the energy storage system is fully connected.
- If there are circuit breakers in the PV circuit, all of them are closed (in ON status).
- The energy storage system is powered off.

Measurement Methods



Method 1:

Once the system connections are fully established (**ensure any circuit breakers in the PV circuit are closed**), measure the voltages at the combiner box between PV+ and PV-, PV+ and EARTH, and PV- and EARTH. Each reading should be less than 30 Vdc.

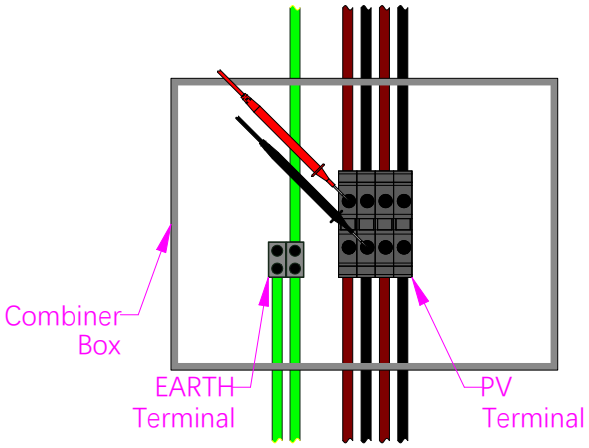


Diagram: PV+ to PV- measurement

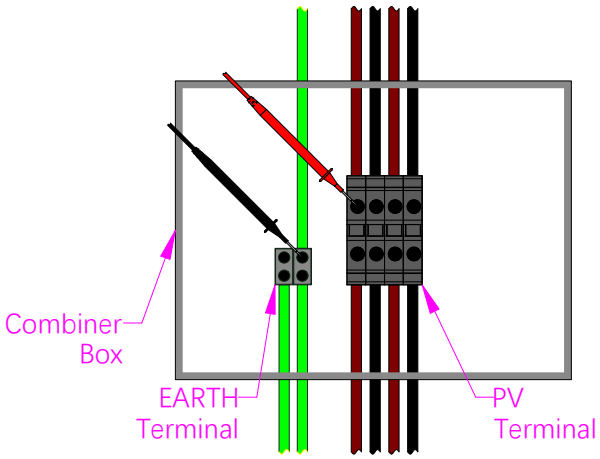


Diagram: PV+ to EARTH measurement

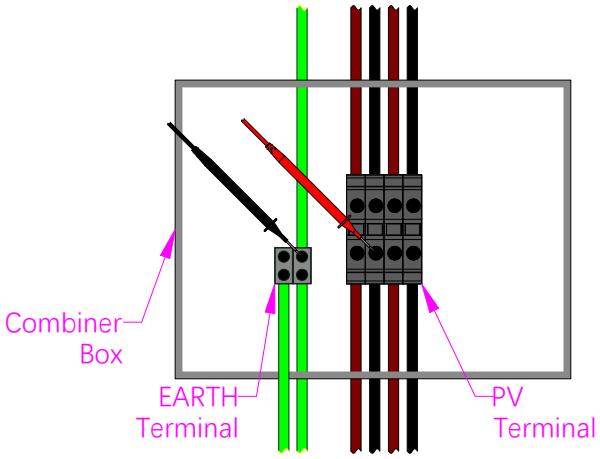


Diagram: PV- to EARTH measurement

Method 2:

Once the system connections are complete (ensure any circuit breakers in the PV circuit are closed), measure the voltages at the aPower S MPPT connection terminals: the voltage between PV+ to PV-, between PV+ to EARTH, and between PV- to EARTH should each be less than 30 Vdc.

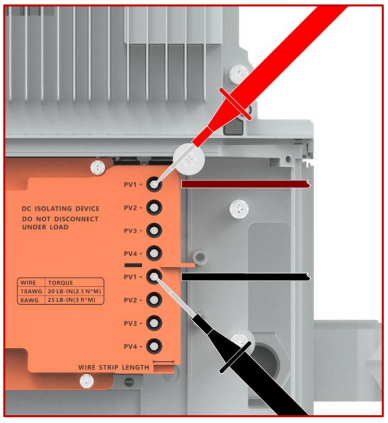


Diagram: PV+ to PV- measurement

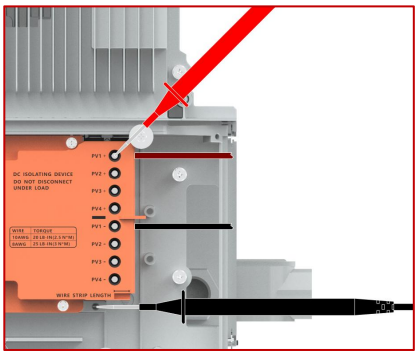


Diagram: PV+ to EARTH measurement

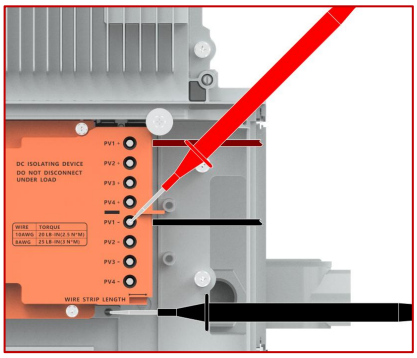


Diagram: PV- to EARTH measurement

NOTEs:

- The number of PV panels and rapid shutdown devices shown in the diagrams is for illustration only. Use the actual quantities at your installation; this does not affect the 30 V measurement method.
- Method 1 applies only if the PV circuit includes a combiner box or junction box. If there is no such device, Method 1 cannot be used.
- It is strongly recommended to use a good-quality digital multimeter, the Fluke 117C is suggested, and to utilize its LoZ (low-impedance) setting when measuring voltage.

Appendix 7 Troubleshooting table for RSD Duo

No.	Alerts	Code	Possible Cause	Solution
1	The App prompts **Undervoltage of PV branch X**	5#(x-1)2	a. No irradiance b. RSD Duo not functioning properly c. PV cable not connected to the aPower	a. Check that all solar panel connections are complete and that the PV terminals are properly mated and secured. b. If all connections are intact, the PV X under-voltage may be caused by the RSD Duo failing to power on. Contact the FranklinWH team for troubleshooting; the RSD Duo may need to be replaced.
2	The App prompts **RSD shutdown failed on PV branch X**	5#(x-1)9	a. RSD Duo damaged b. PV system not equipped with RSD Duo	a. Check that the correct number of RSD Duo units are connected in series in the PV circuit. b. Check whether multiple aPower S units are installed and their PV cables are routed within the same conduit or cable tray. If so, please route the PV cables of the different aPower S units through separate conduits or cable trays. c. If the number of RSD Duo units connected in series is correct, contact the FranklinWH team for troubleshooting; the RSD Duo may need to be replaced.
3	Obvious RSD Duo Faults	/	a. The installation environment is extremely harsh, with the RSD Duo directly exposed to sunlight, rain, or snow b. The RSD Duo was accidentally damaged during installation c. Other unknown external stresses	a. Inspect the RSD Duo housing, cables, and connectors for cracking, bulging, or severe corrosion. b. If any of the aforementioned conditions are observed, please contact the FranklinWH team for troubleshooting; the RSD Duo may need to be replaced.

Appendix 8: Revision History

REVISION	DATE	DESCRIPTION
V2.0.0	November 12, 2026	Added FranklinWH RSD Duo content. Restructured the installation guide and created aPower S Installation and Wiring Guide.
V1.2.6	October 20, 2026	Added newer aPower S (APRS-10K15V1.1-US and APRS-10K15V1.1DCP-US) content. Updated space clearance requirements and image for vertical orientation of 4 × aPower units.
V1.2.5	October 15, 2026	Revised the prohibited-connection instruction to "*Do not connect aPower directly to a PV inverter.*"
V1.2.4	October 8, 2026	Updated diagram: knockout location with dimensions referenced to the unit.
V1.2.3	September 24, 2026	Added field-erected lateral support description in the **Floor-mounted Installation** section.
V1.2.2	September 4, 2026	Revised the lightning protection statement in **Plan protection for aGate's input connections** section.
V1.2.1	August 7, 2026	Updated the Note in the "Plan installation position" section.
V1.2.0	July 24, 2026	• Refined guidance on coiling cables inside the wiring compartment and updated the relevant images. • Clarified indoor residential installation location restrictions (garages/basements/utility spaces allowed; habitable/living spaces not allowed). • Added an outdoor recommendation when installing the aPowers vertically or in a front-to-back configuration. • Updated safety instructions to align with ANSI Z535.6 by reclassifying safety messages using appropriate signal words and restructuring them using the Hazard-Consequence-Avoidance format.

V1.1.3	May 27, 2026	• Added compatible dual-channel RSD receiver type • Updated DI1 port for RSD switch connection • Added “EPO Switch vs. RSD Switch Comparison” table • Updated installation clearance between the aPower S and RSS transmitter outdoor kit • Added compatible Eaton CH breakers on a Smart Circuits module
V1.1.2	April 29, 2026	Deleted the following three warnings: • “The FranklinWH System is composed of one or more aGate controllers, one or more aPower battery units, and other electrical components which may be used separately.” • “An aPower may only be connected to the aPower breaker on the aGate or to the backup load terminals on aGate.” • “The inputs from grid and generators may only be connected to the respective reserved terminals on the aGate.”
V1.1.1	March 10, 2026	• Updated the side wall clearance per revised spec in Certification of UL9540A. • Updated an installation site warning for FranklinWH System. • Added a warning to remove the cover film. • Added mixed configuration for aPower S, aPower 2, and aPower X.
V1.1	February 13, 2026	• Updated direct sunshine instructions • Updated the mounting bracket anchor points requirement • Updated clearance to 4 inches between adjacent aPowers
V1.0	January 23, 2026	Initial release