eSpire **Nano**

High-Voltage Battery

Battery Guide

Applicable to All Outdoor Rated Fortress Power eSpire Nano Battery Units
(FP-Nano-S8-O and FP-Nano-S12-O)

Important Notice

Verify the system configuration prior to installation. A properly engineered system design is required to maintain warranty coverage.

Failure to comply with proper configuration requirements may result in warranty voidance.

Fortress Power reserves the right to update this manual at any time without prior notice.

Manual Download

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Table of Contents

Introduction:

This document intends to guide the reader through outdoor rated Fortress Power eSpire Nano high-voltage battery's installation and interconnection methods and requirements, as well as some of the safety considerations.

This document is equally applicable to 40kWh and 60kWh outdoor rated eSpire Nano high voltage batteries ((FP-Nano-S8-O and FP-Nano-S12-O) but is not directly and fully applicable to 40kWh and 60kWh non-outdoor rated eSpire Nano high-voltage battery types (FP-Nano-S8-I and FP-Nano-S12-I). Furthermore, the focus of this document is on interconnecting the said battery units to Fortress Power eSpire Nano hybrid inverters and connecting the eSpire Nano batteries in parallel. Note, the said battery types may be used with compatible inverters other than eSpire Nano inverters as well.

Each section is structured to help installers, technicians, and other relevant technical parties involved to better understand the system and implement it properly and with confidence.

Before proceeding with any kind of work on the unit, we strongly recommend reading this guide in full. Proper installation and operation are essential for achieving optimal performance, ensuring long-term reliability, and maintaining compliance with safety standards.

Please note, common acronyms such as DC – direct current, AC – alternating current, SOC – state of charge, HMI – human-machine interface, etc. will be used in the text.

IMPORTANT NOTES:

- Product specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up to date. Individuals reviewing this document and installers or service personnel are cautioned, however, that Fortress Power reserves the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental or consequential damages caused by reliance on the material presented including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the material provided in this document.
- Fortress Power accepts no liability for customers' failure to comply with the instructions for correct installation and will not be held responsible for upstream or downstream systems Fortress Power equipment has supplied.

- The customer is fully liable for any modifications made to the system; therefore, any hardware or software modification, manipulation, or alteration not expressly approved by the manufacturer shall result in the immediate cancellation of the warranty.
- Given the countless possible system configurations and installation environments, it is essential to verify adherence to the following:
  - There is sufficient space suitable for housing the equipment.
  - Airborne noise produced depending on the environment.
  - Potential flammability hazards.
- Fortress Power will not be held liable for defects or malfunctions arising from:
  - Improper use of the equipment.
  - Deterioration resulting from transportation or environmental conditions.
  - Performing maintenance incorrectly or not at all.
  - Tampering or unsafe/unauthorized repairs.
  - Operation or installation by unqualified persons.
- This product contains lethal voltages and should be installed by qualified electrical or service personnel who have sufficient knowledge and experience to work safely with equipment that carries potentially lethal voltages.
- Follow all applicable electrical codes for your jurisdiction when installing the ESS.
- Follow all applicable and generally recognized norms, precautions, and techniques of working with electrical equipment.
- Only use components and accessories that are approved by Fortress Power and/or are adequate to be used in conjunction with the Fortress Power equipment.
- Follow proper grounding practices to avoid ground loops and avoid electrical shocks.

Safety and Warning

READ AND UNDERSTAND ALL SAFETY INFORMATION BEFORE INSTALLATION, OPERATION, INSPECTION, MAINTENANCE, OR SERVICE. BE AWARE OF AND ACKNOLEDGE THE DANGER, CAUTION, WARNING, AND OTHER RELATED SIGNS AT, ON, IN, WITHIN THE EQUIPMENT.
Failure to follow these instructions may result in serious injury, death, or property damage.

These inverters have connected to them, or generate, high-voltage DC and high-voltage AC electricity. Interaction with this equipment can result in serious injury or death.

Only qualified individuals are permitted to perform inspection, maintenance, service, repair, or other work on this system. Repair, modification, component replacement, modification, or advanced troubleshooting shall not be performed unless prior authorization and approval have been received from Fortress Power.

General Safety Overview

This system includes the following hazards:

- High-voltage DC electricity
- High-voltage AC electricity
- Thermal, fire, and arc-flash hazards
- Moving mechanical components within the HVAC system, ventilation/cooling system.

Non-serviceable components are contained within this unit. Any service, repair, modification, or replacement of internal components must be performed only with authorization and approval from Fortress Power.

Authorized Work Limitations

DANGER
UNAUTHORIZED ACCESS AND SERVICE HAZARD

- Inspection and routine maintenance may be performed only by individuals who are properly qualified and trained for work on high-voltage energy storage systems.
- Any service, repair, advanced troubleshooting, modification, or replacement of the unit or its internal components shall not be performed unless prior authorization and approval have been received from Fortress Power.
- All work shall be performed in accordance with applicable electrical safety standards, site safety procedures, and local regulatory requirements.

- repair, advanced troubleshooting, modification, or replacement of the unit or its internal components may result in serious injury, death, equipment damage, improper system operation, or voiding of warranty.

If the system is suspected to have developed a problem, contact Fortress Power through approved support channels and obtain authorization before performing any work.

Electrical Hazards

High Voltage – Risk of Shock or Arc Flash

DANGER
HIGH VOLTAGE PRESENT

- This system contains high-voltage DC circuits and high-voltage AC conductors capable of causing severe injury or death.
- Hazardous voltage may be present even when the system appears to be powered off.
- **An electric shock hazard exists when working around the eSpire Nano batteries and inverters, including eSpire Nano hybrid inverters.**
  Inverters, when ON, can impose hundreds of volts of potential between earth ground and the positive or negative battery ports of the inverter and everything connected to either of these ports, including the eSpire battery DC busbar pair — even when the battery/batteries connected to the eSpire Nano inverter(s) are turned off; that is when battery/batteries are not applying DC voltage to the inverter(s) and the inverter/inverters only receive AC voltage or DC voltage from a source other than batteries (PV strings, for example).
  Before performing any work on an eSpire Nano system, inverters (eSpire Nano inverters or some other inverter type), eSpire Nano batteries, the components of the two, and any other devices connected to them (electrically or otherwise), must be turned OFF and fully deenergized.
  Ensure that the inverters and the batteries are fully turned off and no AC and no DC voltage is applied to either of them for at least 5

minutes prior to starting the work on the system, it's components or other devices connected to them (electrically or otherwise).
Follow lock-out/tagout (LOTO practices).
Do not allow AC and/or DC voltage to be applied to the inverters and batteries, their components, or any other devices connected to them (electrically or otherwise) when any of the covers on the inverters, batteries, or devices connected to them are removed.
Always wear appropriate PPE.

Safety requirements:

- Electrical work shall be performed only by properly qualified personnel.
- De-energize all power sources prior to accessing internal areas of the equipment.
- Follow applicable Lockout/Tagout (LOTO) procedures when applicable.
- Use appropriate personal protective equipment (PPE) rated for electrical shock and arc-flash hazards.
- Verify absence of voltage using properly rated test equipment.

Mechanical

HVAC System, Ventilation System, and Access Doors

DANGER
MECHANICAL HAZARD

- The system contains moving mechanical components within the cooling and ventilation system and ventilation system, including fans which may present pinch, crush, or impact hazards during operation or movement.
- Mechanical components may start or move automatically during normal operation or emergency conditions.

Safety requirements:

- Inspection, maintenance, or service involving mechanical components shall be performed only by properly qualified personnel.
- Keep hands, tools, and loose clothing away from moving components.

- Use caution when opening or closing access doors.
- Ensure mechanical motion has stopped before working near HVAC or ventilation components.

Emergency Situations

IN CASE OF EMERGENCY:

- Evacuate the area immediately if fire, smoke, chemical odor, vapor release, abnormal sounds, or excessive heat are detected.
- If it is possible to do so safely given the emergency circumstances, immediately activate the Emergency Power Off (EPO) switch to shut down the system.
- Do not attempt to perform inspection, maintenance, or service activities.
- Contact emergency services and follow the site emergency response plan.
- Notify Fortress Power as soon as possible.

The following types of safety instructions and general information appear in this document as described below:

DANGER
"Danger" indicates a hazardous situation which if not avoided, will result in death or serious injury.

WARNING
"Warning" indicates a hazardous situation which if not avoided, could result in death or serious injury.

CAUTION
"Caution" indicates a hazardous situation which if not avoided, could result in minor or moderate injury.

General Overview

The outdoor-rated Fortress Power Nano batteries are available in two configurations: 60kWh and 40kWh units. Each unit contains multiple battery modules connected in series. The modules have a nominal voltage of 51.2V. Quantity of the modules per battery unit determines:

- The nominal capacity of the unit – 8 battery modules per 40kWh unit and 12 modules per 60kWh unit.
- The nominal voltage of the unit – 410V for 40kWh units and 614V for 60kWh units.
- The weight of the unit – 40kWh units weigh ~1940lbs (~880 kg), whereas the 60kWh units weigh ~2381lbs (~1080 kg).

Because the battery modules in each battery are connected in series, the maximum continuous charge/discharge current is 100A for each Nano battery type.

The 40kWh and 60kWh outdoor-rated Nano battery units are of identical dimensions – 28.93 x 87.40 x 44.29 in (0.735 x 2.220 x 1.125 m). For these and other relevant dimensions, please refer to **Figure 5**.

The battery package includes multiple accessories, cables, and wires. Please refer to the packing list in the next section (**Figure 3**).

Identifying Components

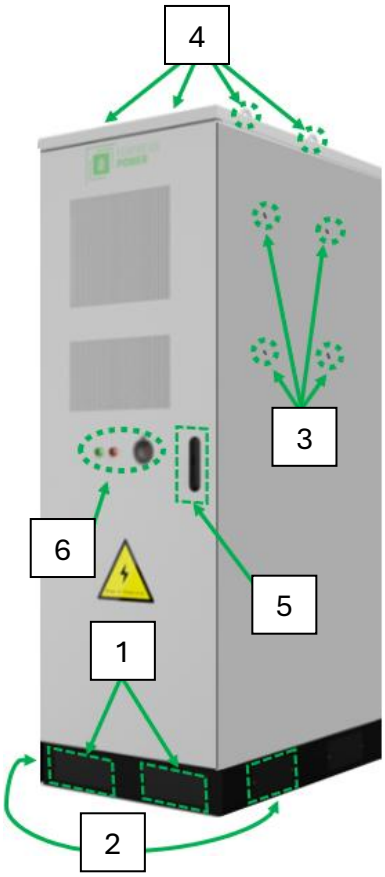
Nano inverters are equipped with four forklift pockets, two below the front door of the battery, and two on the opposite side of them. Each of these pockets are covered with a removable plate held in place by two screws.

Additionally, on each side (left and right) of the battery unit, there is one removeable plate with conduit knockouts. These plates are also held in place by two screws.

On the right side of the battery, there are four premade threaded holes which are used to install the Nano inverter wall bracket onto the exterior of the battery cabinet.

On the top of the battery there are four female threads to install lifting eyes allowing to move the unit using a crane. The four lifting eyes are included with the package.

Additionally, on the front door of the battery unit, there are two LED indicators, an eStop button (NC configured), as well as the lockable door handle with the key included with the package.



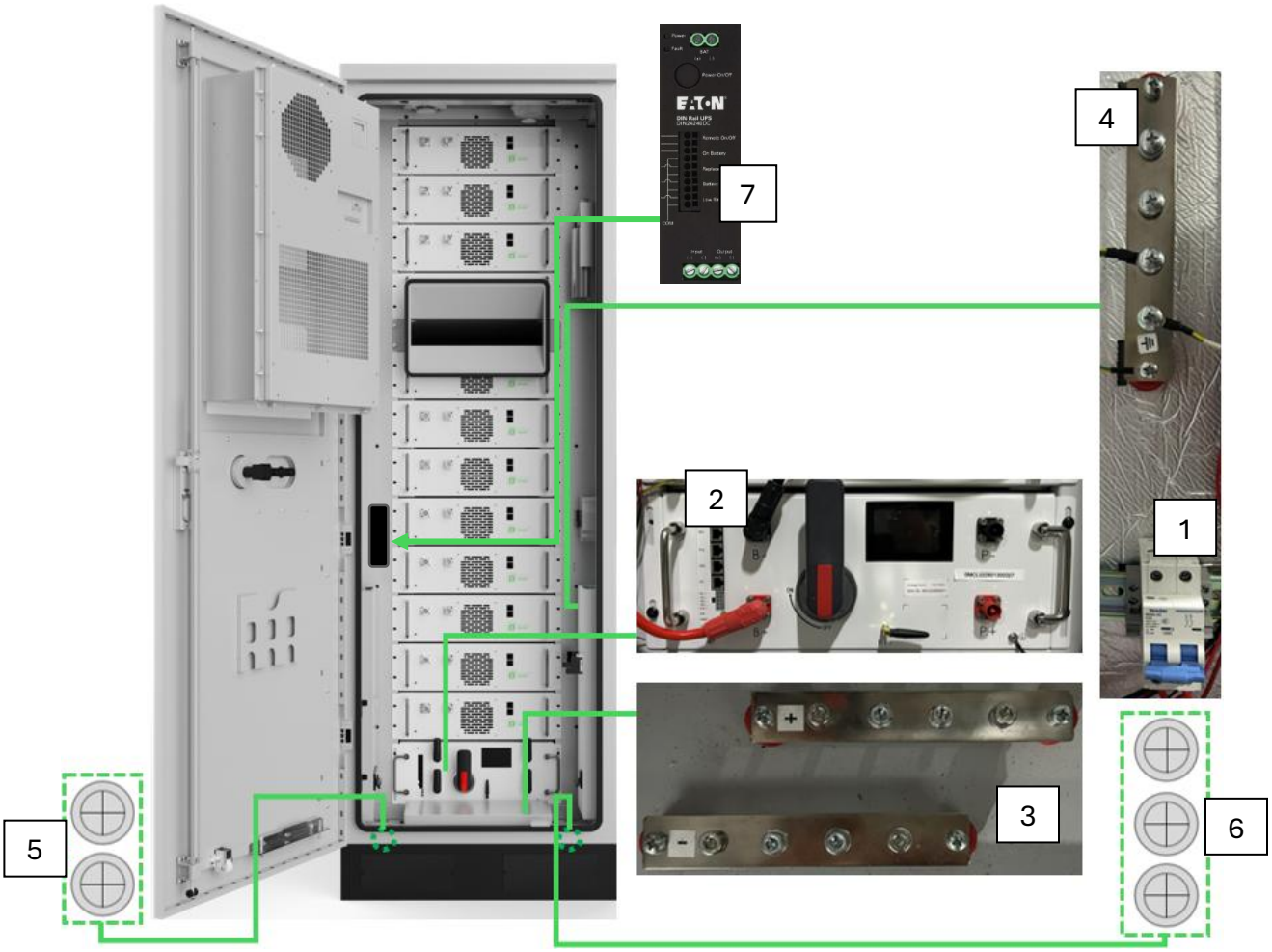
1	Fork Pockets
2	Plates with Conduit Knockouts
3	Inverter Bracket Mounting Holes
4	Lifting Eye Female Threads
5	Door Handle
6	EPO button and LED Indicators

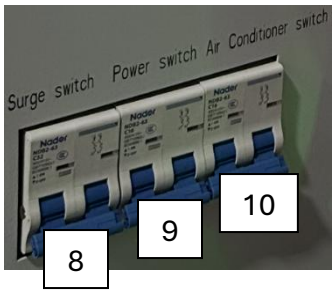
Figure 1: Notable Items (exterior)

Inside the battery unit there are multiple important items to which an installer or a technician will connect cables and wires directly. These are:

- **Battery unit 480V AC supply breaker ("AC access")** – used only for delivering 480V AC power to the battery cabinet so that the items such as the built in fire safety systems, HVAC, UPS, fans, and lights receive power.
- **Surge Protection Device Breaker ("Surge switch")** – in addition to enabling surge protection device, used for delivering 208V AC power (never 480V) to the battery cabinet so that the items such as the built in fire safety systems, HVAC, UPS, fans, and lights receive power.
- **Battery control module** – enabling high voltage output from the battery which it is in, enabling battery to battery and battery to inverter communication, allowing to configure the battery role (primary, secondary, parallel ID), and more.
- **DC busbar pair**, to which the battery control module, and inverters or other batteries in parallel connect. Each busbar has four vacant terminals.
- **Ground busbar,** which is to be connected to ground/PE and to which the internal ground wires are connected.

The battery unit 480V AC supply breaker (“AC Access”) and the ground bar are located on the right side of the battery unit interior. To access these items and to terminate wires on them, the cover must be removed via removing the four screws holding it in place. The battery control module is always the bottommost modu——le in the vertical stack. Immediately in front of it, a cover which is held in place by four screws conceals the DC busbar pair. To access the DC busbars, remove the four screws and the cover itself.





1	Battery Unit 480V AC Supply Breaker (“AC Access”)
2	Battery Control Module
3	DC Busbar Pair
4	Ground Busbar
5	Rubberized Cable Inlets (1.2” diameter)
6	Rubberized Cable Inlets (1.2” diameter)
7	UPS (pre-wired, accessible through air duct)
8	Surge Protection Device Breaker (“Surge switch”)
9	Auxiliary Power Breaker (“Power switch”)
10	HVAC Breaker (“Air Conditioner switch”)

Figure 2: Notable Items (interior)

Item			QTY
1	eSpire Nano Battery Unit		1
2	Cabinet Door Key	For opening/closing cabinet door / Universal	2
3	Lifting Eye Bolt	For cabinet lifting, M20X35, Stainless Steel 304 / with rubber gasket	4
4	Expansion Bolt	For cabinet fixing, M8*100mm, Stainless Steel 304	4
5	Battery Positive Cable	UL3640/4AWG/Red/1100V/L=3000mm	2
6	Battery Negative Cable	UL3640/4AWG/Black/1100V/L=3000mm	2
7	Battery Control Module to Battery busbar positive cable	UL3640/4AWG Red Wire/L=400mm	1
8	Battery Control Module to Battery busbar negative cable	UL3640/4AWG Black Wire/L=500mm	1
9	Nano Inverter Bracket Fixing Screw	M8*20 Cross Hexagon Combination / Stainless Steel	5
10	Zip tie	For fixing/arranging wire harnesses	20
11	Ethernet Communication Splitter	For battery cabinet parallel communication	1
12	Battery to Battery/Inverter Communication Cable	Orange / Length 5000mm	1
13	Battery Module to Battery Control Module Communication Cable	Blue / Length 1000mm	1
14	Grounding Wire	Yellow-Green Wire / L=1000mm	1
15	Communication Terminal Resistor	Short circuit pins 6 and 7 of the harness	1
16	Signal Cable	22AWG UL1332 Black / L=4000mm	2
17	FAT Document (Hard Copy)		1
18	Fork Pocket Plate	1.5mm Galvanized Sheet with Coating	4
19	Conduit Knockout Plate	1.5mm Galvanized Sheet with Coating	4
20	Cover Plate Fixing Screw	M4X8 Dacromet Countersunk Screw	20
21	Metal Flexible Conduit	Black PVC-Coated Metal Flexible Conduit, Inner Diameter 1-1/2"	3
22	Metal Flexible Conduit Connector	DN38-M50X1.5 (304 Stainless Steel)	6

Figure 3: Packing List

Installation Overview

eSpire Nano battery units must be installed on a horizontal surface that can adequately support the weight of the equipment and reliably endure the stress imposed by it. Please note that a Nano battery unit with a Nano inverter mounted onto it may weigh ~2600lbs (~1180kg).

Nano battery must be secured onto the surface on which it is installed using the included expansion bolts, or other appropriate hardware which will be usable with the four mounting holes (0.55”x0.98”) on the base of the battery unit (**Figure 5**). Furthermore, once the battery unit is installed and secured in place, it is required to use sealant, cement, or similar solution, around the perimeter of the battery base to eliminate any external gaps between the battery base and the installation surface. This is an important step, because the cables that are terminated within the battery interior are channeled through the hollow base without a conduit.

The Nano battery must be installed such that the minimum clearance requirements (**Figure 4**) are followed.

Please note, included in the battery package there are three metal flexible conduits to channel the AC, DC, ground, and communication cables from the battery to the Nano inverter installed on its side. All other cables and conduits must be brought to the inverter directly, without them being channeled through the battery unit.

Additionally, the following items are not included in the battery package:

- ground and AC supply wires that are not internal to the battery
- battery to battery DC power wires used to parallel multiple batteries

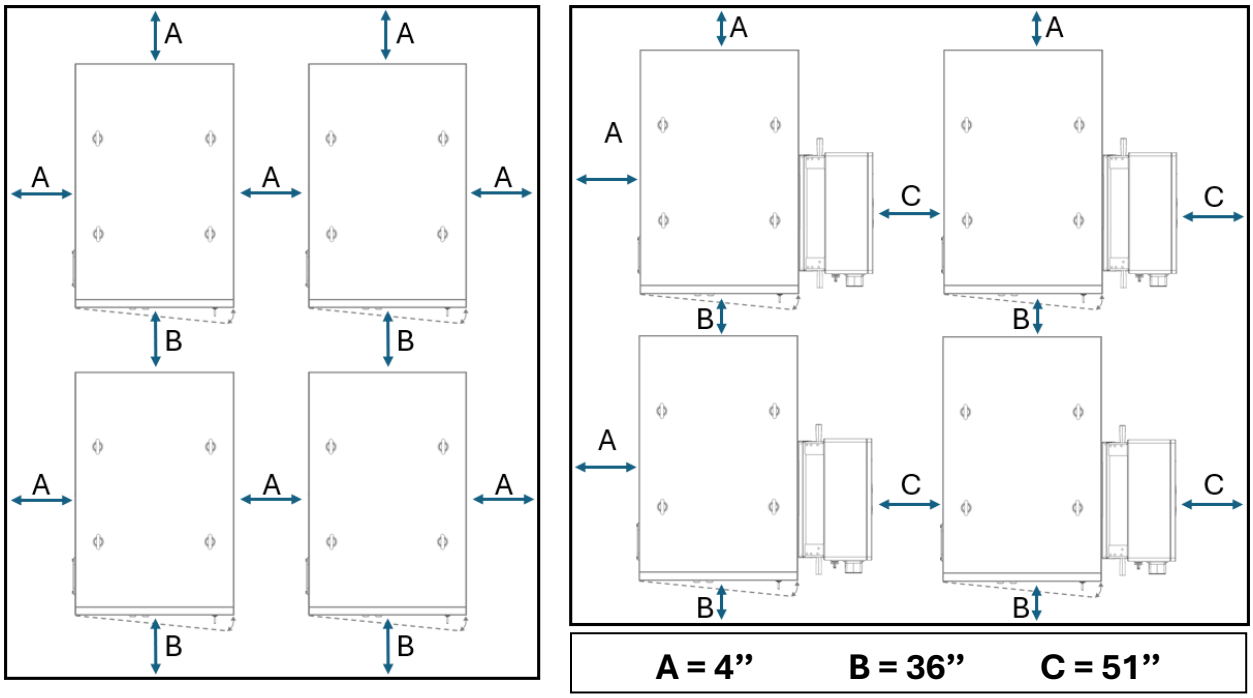
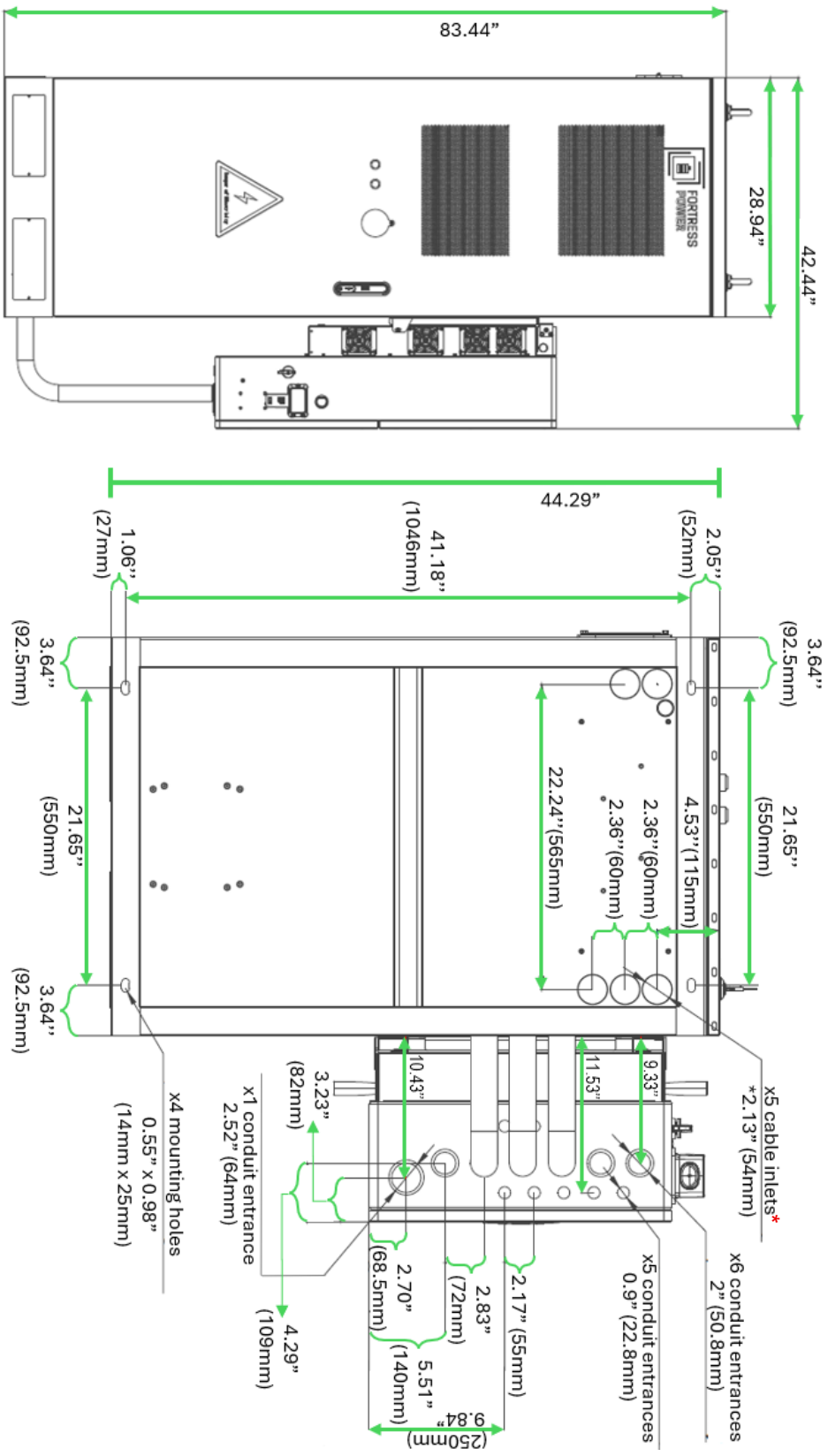


Figure 4: Minimum Clearance Requirements

DANGER: Risk of fire – Despite careful construction, electrical devices can cause fires. Do not install the inverter in an area containing flammable materials or gases. Do not install the inverter in a potentially explosive atmosphere.

CAUTION: Hot Surface – The temperature of some battery components may reach over 167°F.



*The five cable inlets are equipped with rubber gaskets, which themselves have an inner diameter of 1.2”

Figure 5: Important Distances, Dimensions, and Diameters

Interconnection Overview

The Nano batteries include two pairs of DC wires, as one may see on the packing list provided in this text. The wire lengths are sufficient for connecting the battery busbars to the Nano inverter installed on its side. These cables are suitable for battery to inverter (or vice-versa) current flow, regardless of which Nano inverter model these cables connect to. Note, that there must be two positive and two negative wires connecting from a Nano battery busbar pair to the four battery ports of a Nano inverter.

For connecting Nano batteries in parallel, customer-supplied cables are to be used (between the battery units). These cables must be able to conduct 100A of continuous DC current while being sized per NEC code and must have insulation rating of no less than 1000V.

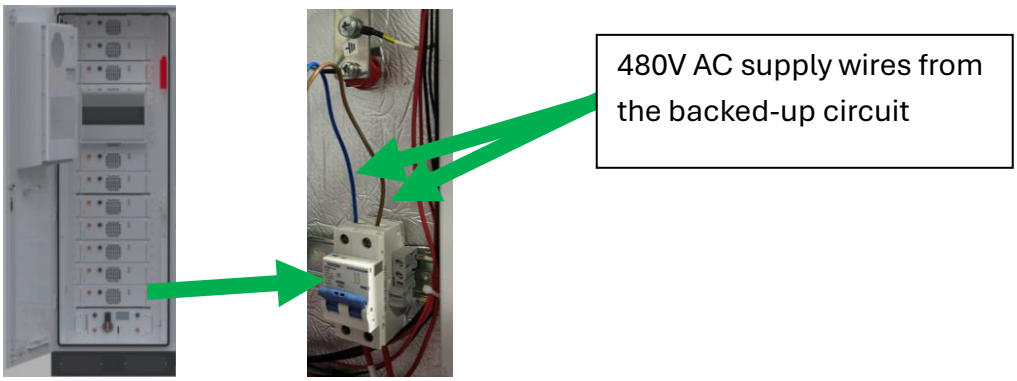
The Nano batteries are required to be commissioned and used in close-loop communication mode. Thus, it is required to have communication cables between all batteries and their corresponding inverter.

Nano inverters are equipped with multiple AC circuits that feed power to various loads, such as the HVAC system and the power converter for safety and auxiliary systems. Thus, AC power must be delivered to the battery unit. The cables that are selected for the task must be sized as per the NEC code with the breaker current rating of 32A. The AC to the battery (or batteries) must be delivered from the inverters that provide backup output:

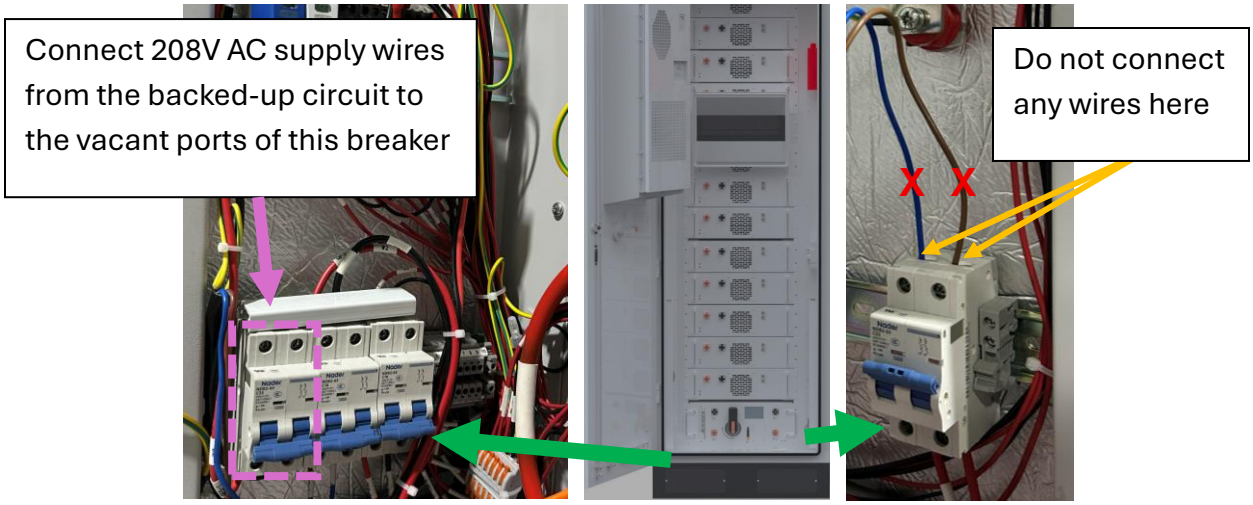
- Inverter backup ports, if the backup ports are not used to back up a load panel
- Inverter smart ports, if these are not used to connect a generator/load/AC-coupled PV to the inverter
- Using appropriately sized Polaris-style connectors (or similar), the backup output from the inverter is split between the backed-up load panel and the battery unit.

When multiple batteries are used, a pair of Polaris-style connectors must be used to split the AC supply to all batteries in the group. In such case, the cables that deliver power from the inverter to these Polaris-style connectors must be sized as per NEC code and with the combined ratings of the battery AC supply breakers in mind (64A for two batteries, 96A for three batteries).

In 480V applications, deliver the 480V AC supply (one phase of the 480V three-phase AC) from the backed-up circuit to the 480V AC supply breaker (“AC Access”) (or breakers, if multiple batteries), **see item 1 in Figure 2** and the next illustration.



In 208V applications, deliver the 208V AC supply (one phase of the 208V three-phase AC) from the backed-up circuit to the surge protection device breaker ("Surge switch") (or breakers, if multiple batteries), **see item 8 in Figure 2** and the next illustration.



Refer to the Figures in this section for illustration of battery interconnection methods for various configurations.

WARNING: Electrical installations must be done in accordance with the local and the national electrical safety and other standards. Any work on the equipment must be performed by appropriately qualified individuals

WARNING: Do not touch any internal parts of the unit until 5 minutes after the unit and other systems/panels/components connected to it have been fully deenergized

WARNING: Always follow proper grounding practices. Ensure that the battery control module ground terminal is grounded to the ground bar of the battery.

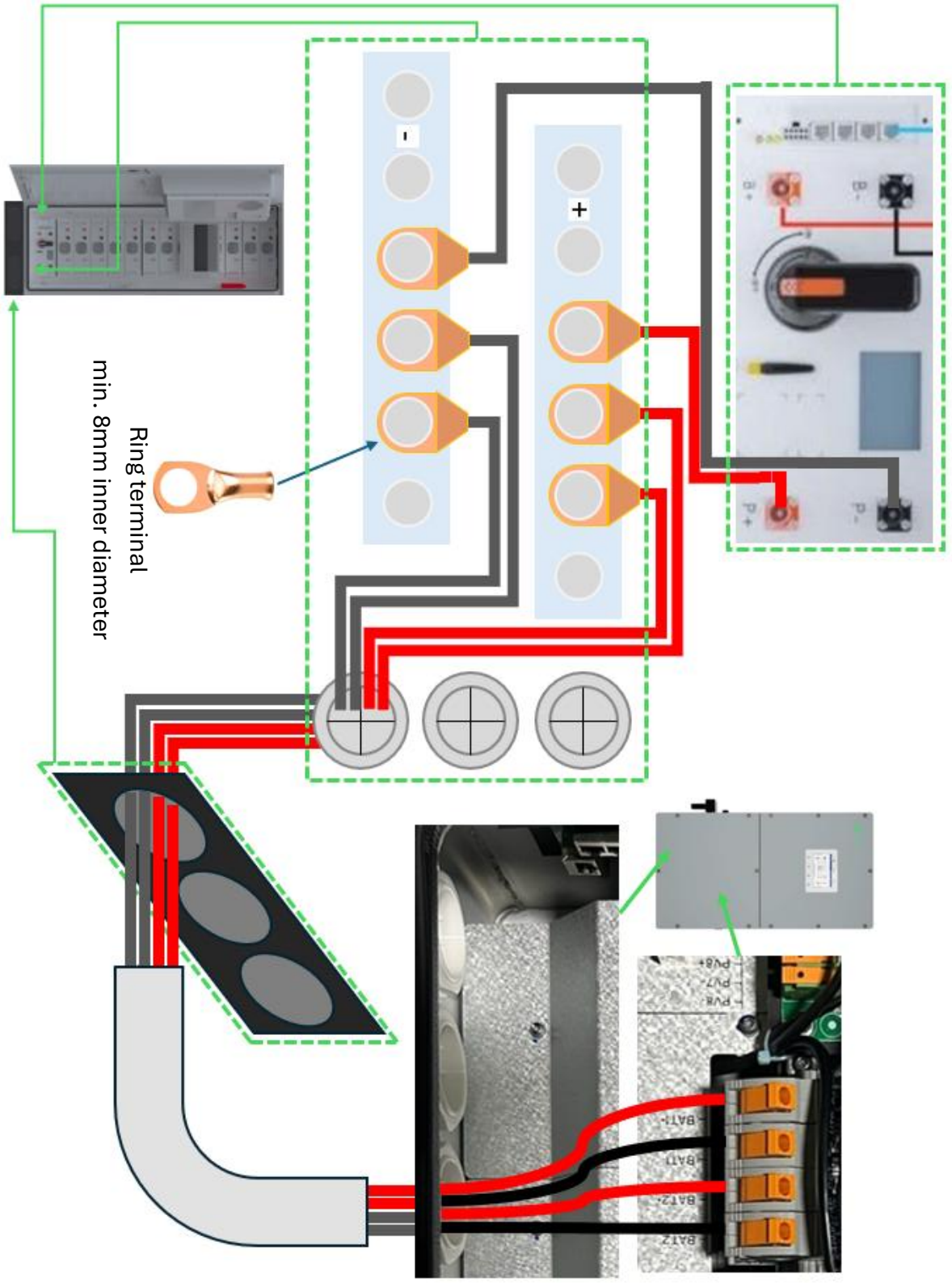


Figure 6: Battery to Inverter DC Power Cables

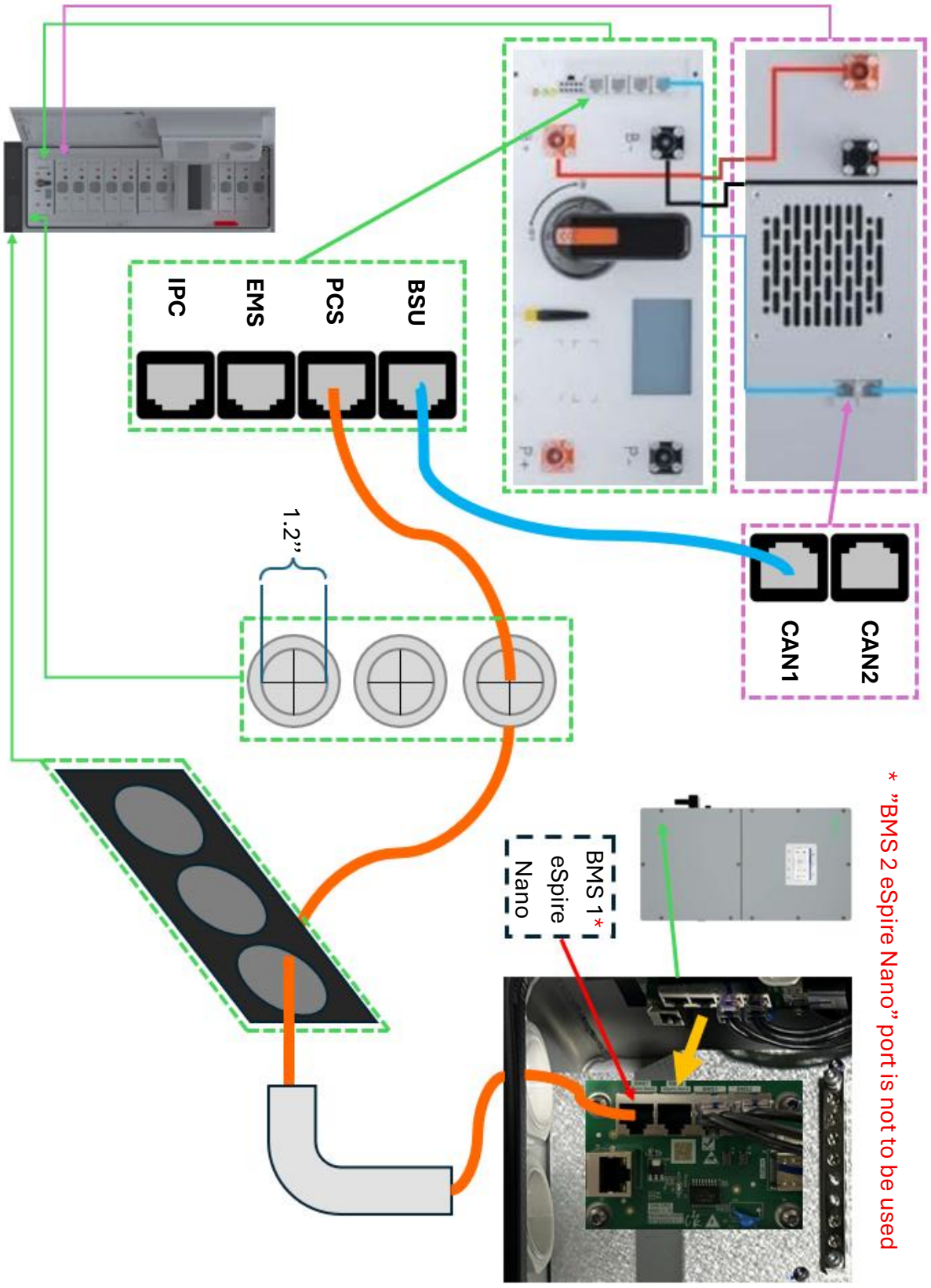


Figure 7: Battery to Inverter Communication Cables

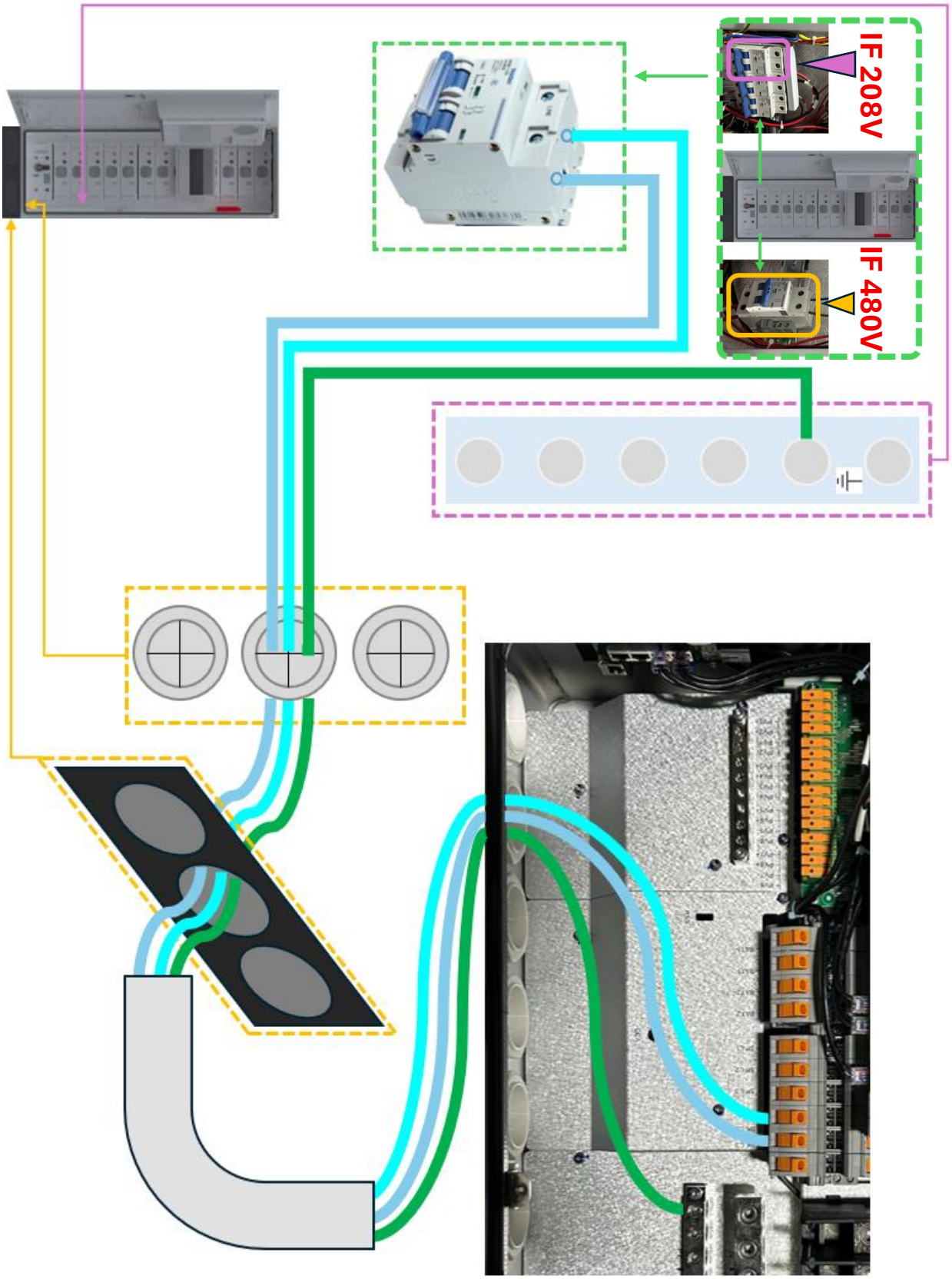


Figure 8: Inverter to Battery AC Power Supply (option 1, backup ports)

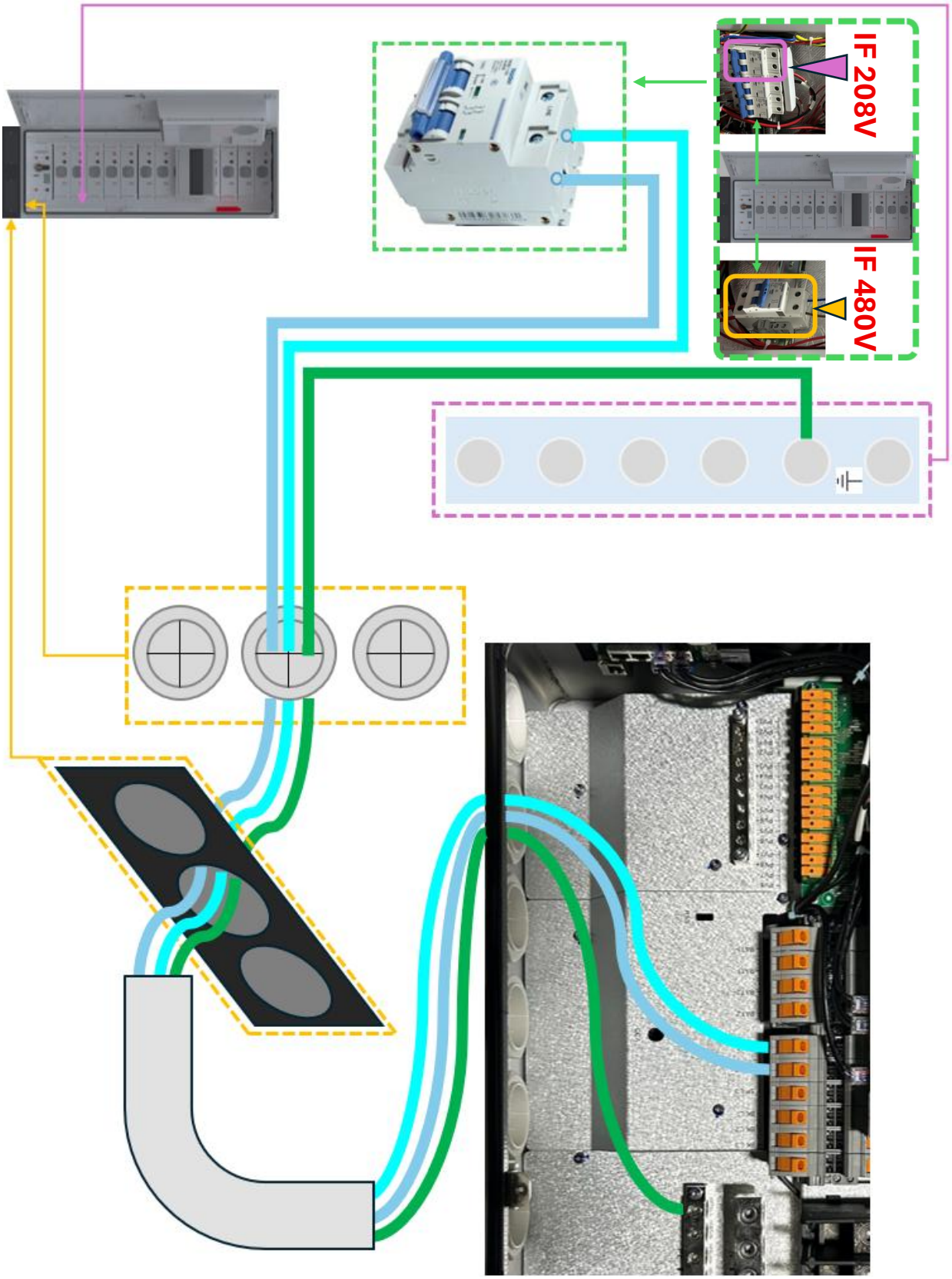


Figure 9: Inverter to Battery AC Power Supply (option 2, smart ports)

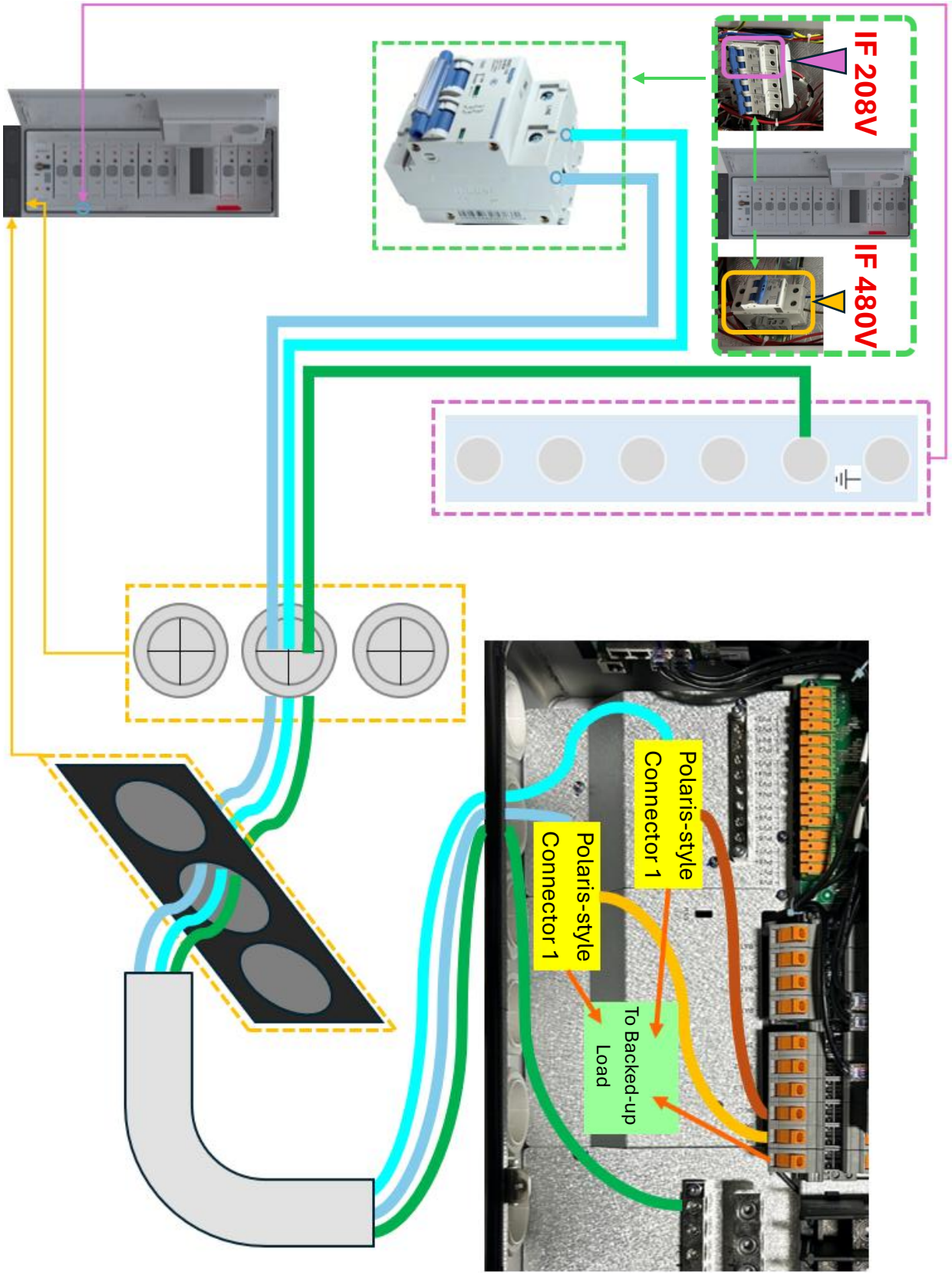


Figure 10: Inverter to Battery AC Power Supply (option 3, “split” backup ports)

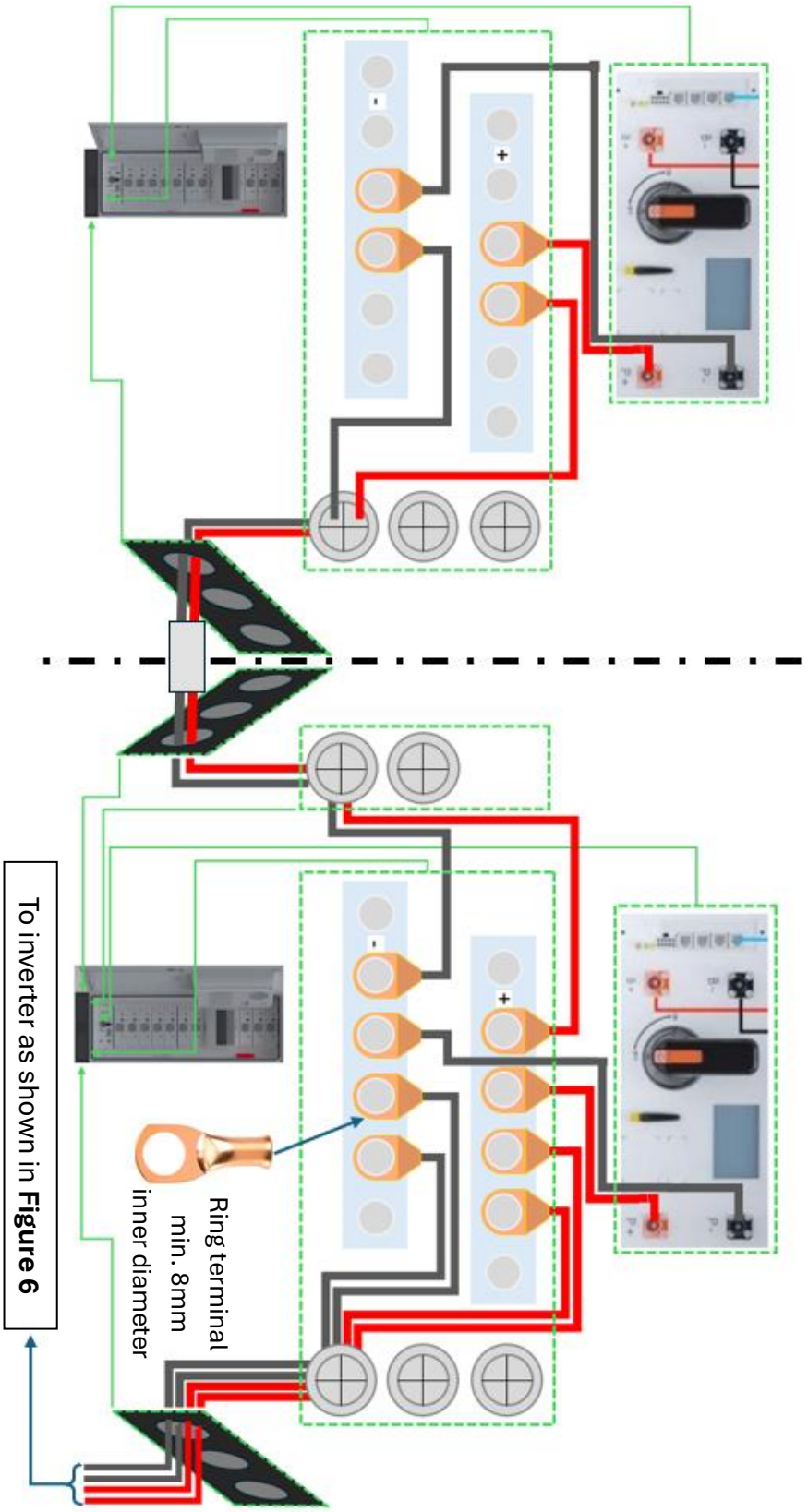


Figure 11: Battery to Battery DC Power Cables

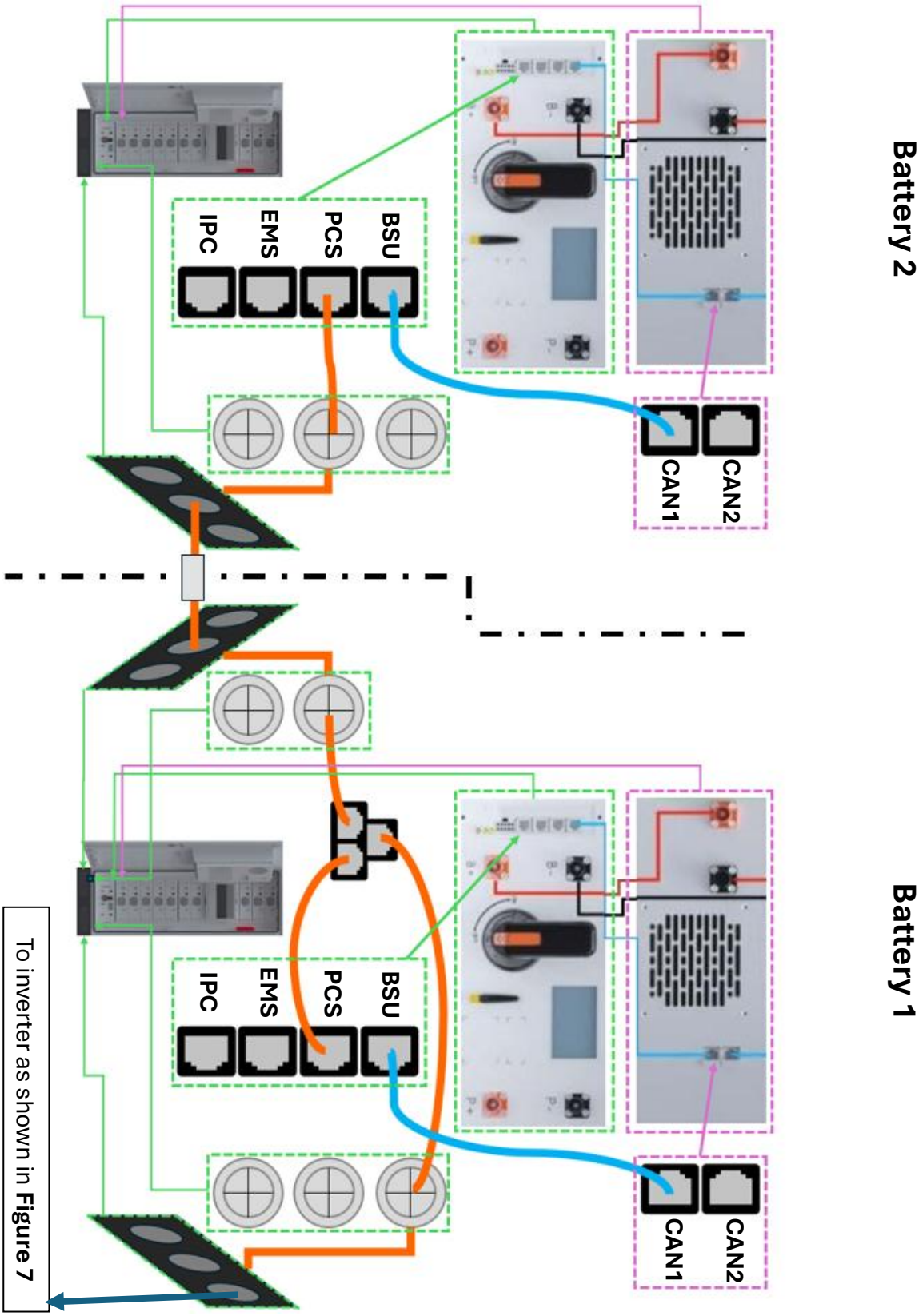


Figure 12: Battery to Battery Communication Cables

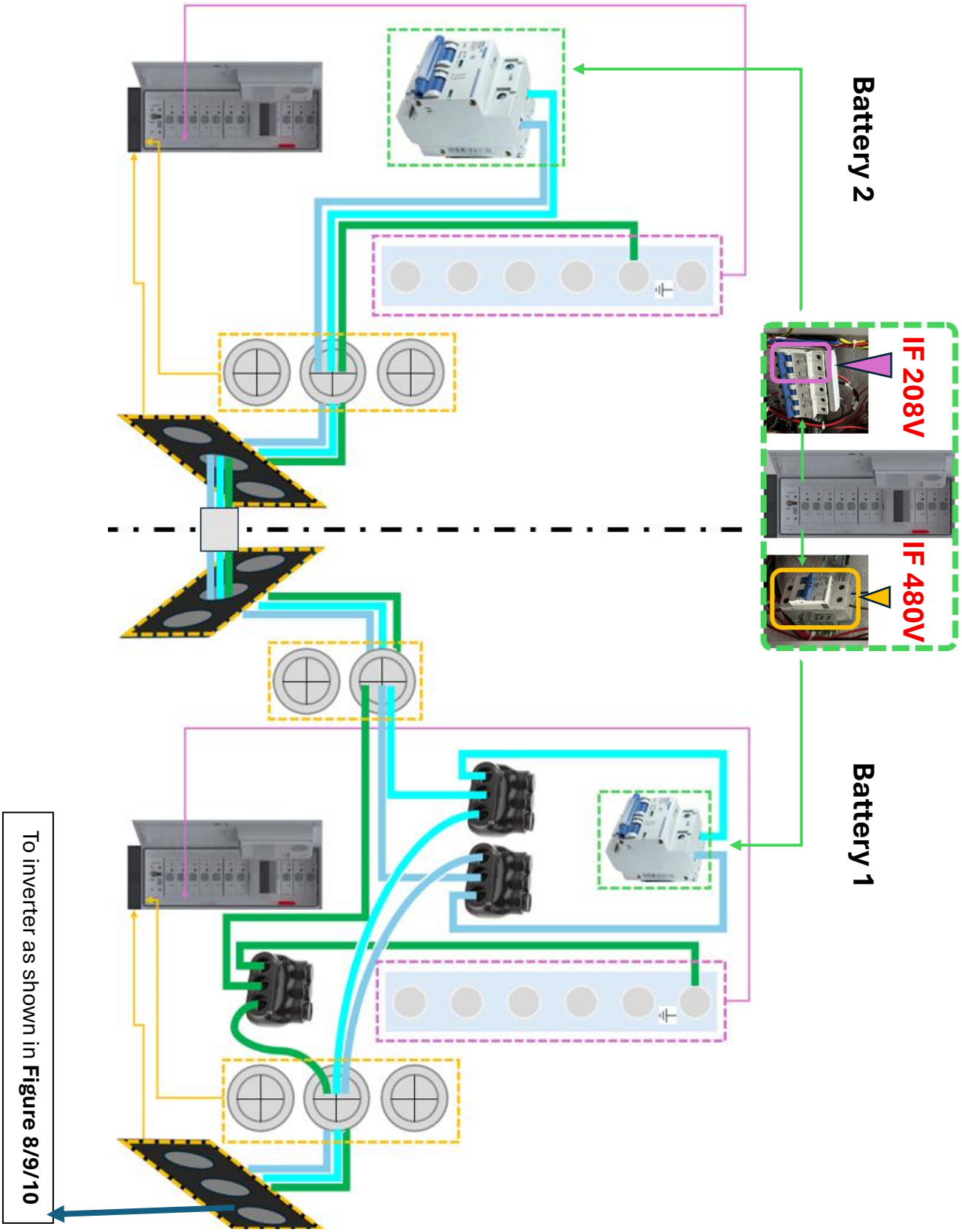


Figure 13: Battery to Battery AC Power Supply

Although the figures above for battery to battery interconnection in this section show methods for two batteries, the interconnection method for batteries one and two (counting after the inverter, downstream the communication chain) are identical to interconnection methods to be used when interconnecting batteries two and three.

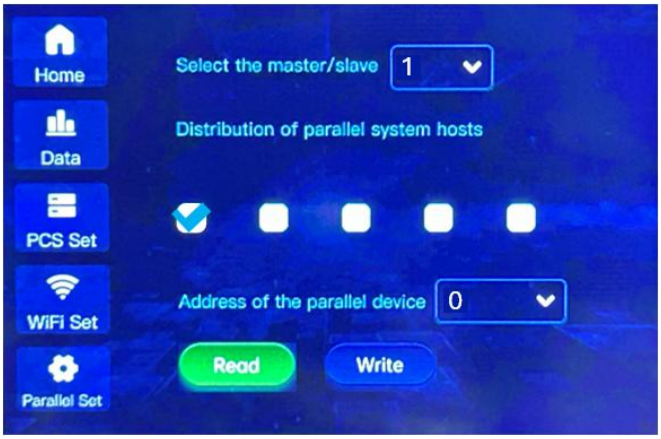
Programing and Commissioning

Once the battery (batteries) and inverter are interconnected, and all covers are reinstalled, one may commission the system.

1. Ensure that the eStop button is not pressed in (battery and inverter).
2. Turn on the batteries by putting the DC disconnect in ON (horizontal) position. The HMI screens and power LEDs turning ON indicates the batteries being ON. Until commissioning, this disconnect must remain off at all times!

3. Take note of the battery voltages indicated on the screens.
4. Program the batteries using the HMI screens by entering the “Parallel Set” screen in the menu tab on the left of the screen:

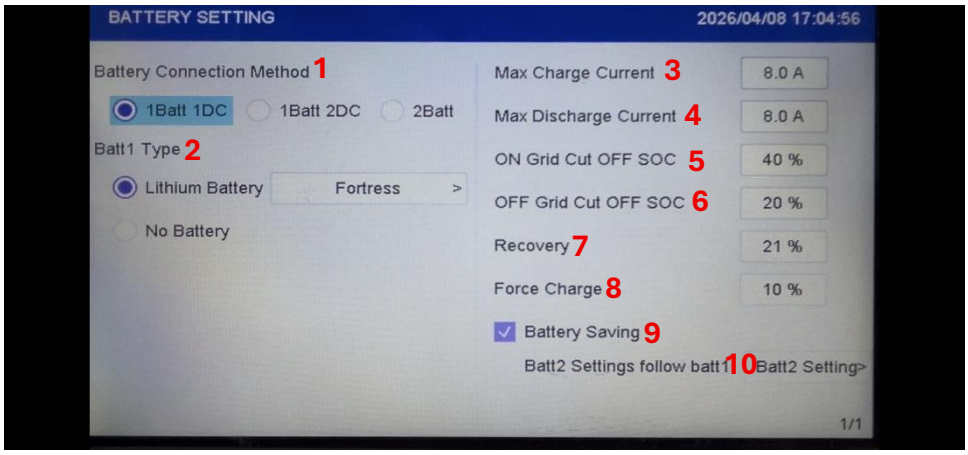
Single-battery bank configuration



two-battery bank configuration

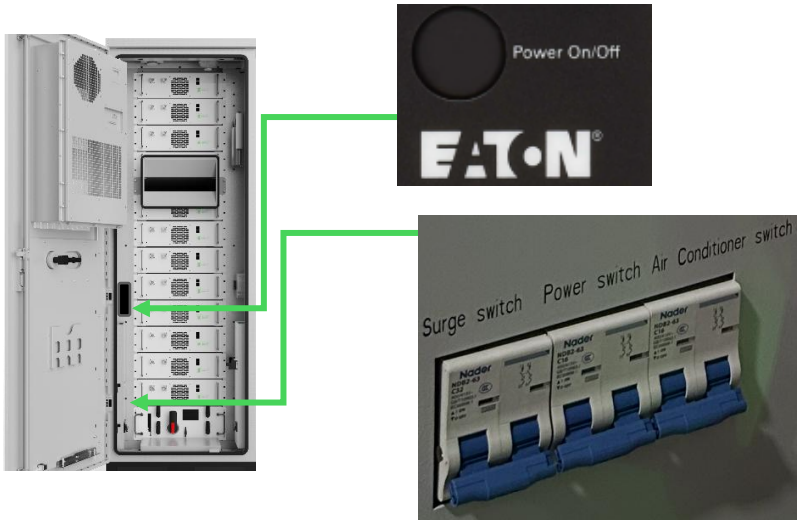
three-battery bank configuration

5. Program the settings on the Nano inverter. The following figure shows the battery settings only. For detailed information on commissioning the system and programing the Nano inverter(s) beyond the battery, refer to the Nano inverter manual)



1	"1Batt 2DC" is to be selected
2	Select "Fortress" for the battery-inverter communication to exist
3	100A is to be entered
4	100A is to be entered
5	SOC at or below which the battery will not be discharged when the grid is available
6	SOC at or below which the battery will not be discharged when the grid is unavailable. Must be set no lower than 20%
7	SOC at which battery becomes available again after it has reached SOC described a cutoff SOC (on-grid or off-grid). Must be set higher than the largest of the two cutoff SOC values.
8	SOC at which the inverter starts using grid power (if charging from the grid is enabled) to charge the battery bank regardless of mode of operation
9	Checked by default
10	Checkmarked since there are two pairs of battery conductors connected to the battery ports

6. Once the inverter is fully configured and the battery unit can receive AC power from the backed-up circuit.
   For 480V applications, put the battery unit 480V AC supply breaker ("AC Access") in the ON position.
   For 208V applications, put the surge protection device breaker ("Surge switch")in the ON position. In 208V applications, 480V AC supply breaker ("AC Access") must remain in the off position at all times.
7. Put in the ON position the remaining three breakers on the left side of the battery interior.
   For 480V applications turn on the breakers in the following order: surge switch, power switch, air conditioner switch.
   For 208V applications turn on the breakers in the following order: power switch, air conditioner switch.
8. Turn ON the UPS by pressing the UPS power button (see figure below).


Power On/Off
EATON
Surge switch
Power switch
Air Conditioner switch

Appendix A: Troubleshooting

No.	Fault Symptom	Possible Cause		Potential Resolution
1	(No PCS / PCS Fault) **NoPcs/u8PcsFault**	PCS communication cable not connected		Check that the physical communication cable to the PCS is secure and that pin assignments match.
		Incorrect PCS communication protocol parameter selected		Refer to the protocol comparison table provided by our company. Select the correct protocol via the PC software or display screen so that it matches the inverter in use.
2	(Main Contactor Fault) **MRelayErr**	Relay contact welding/sticking		With the system powered off, use a multimeter to check continuity across both the main contacts and auxiliary contacts of the relay.
3	(Slave Contactor Fault) **SRelayErr**	Relay contact welding/sticking		With the system powered off, use a multimeter to check continuity across both the main contacts and auxiliary contacts of the relay.
4	(Insulation Resistance Fault) **InsuLow**	System insulation resistance low; impedance test ≤1 MΩ		Use insulation/dielectric withstand test equipment to measure whether low insulation resistance exists between the DC bus and ground or between the DC bus and the enclosure.
		False positive triggered by shared detection with inverter		After ruling out an actual insulation fault, or by disconnecting the inverter power cables and then powering on, if no fault appears, suppress the insulation fault alarm via PC software or the display screen.
5	(Slave Fault) **SlaveFault**	Voltage sampling fault	Incorrect voltage quantity setting	A CAN tool and the slave-controller PC software are required. Connect to the faulty slave controller and set the voltage data count to match the actual number of sampling bits.
			Abnormal voltage sampling	A. Use the abnormal voltage index shown in the PC software to identify the slave controller, then measure the corresponding pins of the slave controller's sampling harness with a multimeter and verify that the multimeter reading matches the PC software value. B. Re-seat the sampling connector.
		Temperature sampling fault	Incorrect temperature quantity setting	A CAN tool and the slave-controller PC software are required. Connect to the faulty slave controller and set the temperature data count to match the actual number of sampling bits.
			Abnormal temperature sampling	A. Use the abnormal temperature index shown in the PC software to identify the slave controller, then measure the resistance at the corresponding pins of the slave controller's sampling harness with a multimeter and compare it with adjacent normal pins to see if there is a large difference. B. Re-seat the sampling connector.
6	Output Current Too High **PcsCurHigh**	Current exceeds the limit defined in the current-limit table		Check that the current-limit table is configured correctly; check that the inverter is executing the current-limit command.
7	(Parallel Communication Fault) **ParallelComErr**	Incorrect parallel configuration parameters		Configure the master/slave role selection and master/slave address settings via PC software or the display screen.
		Incorrect parallel communication cable wiring		Check the pin correspondence and continuity of the parallel communication cable.
8	(Cell Voltage Too High) **CellVoltHighest**	Individual cell voltage exceeds the protection threshold		A. Check that the overvoltage protection parameter is set correctly. B. Contact the manufacturer to handle the abnormal cell.

9	(Cell Voltage Too Low) **CellVoltLowest**	Individual cell voltage below the protection threshold	A. Check that the undervoltage protection parameter is set correctly. B. Contact the manufacturer to handle the abnormal cell.
10	(Voltage Differential Too Large) **BatMaxMinErrHigh**	Abnormal voltage sampling on slave controller	Check the highest and lowest individual cell voltages shown on the display terminal. If they are within the normal lithium battery range, the sampling may be at fault.
		Insufficient cell consistency in the system	Contact the manufacturer to handle the abnormal cells.
11	(Temperature Differential Fault) **TemErrHigh**	Abnormal measured sampling temperature	A. Use the abnormal temperature index in the PC software to identify the slave controller. Measure the resistance at the corresponding pins of the slave controller's sampling harness with a multimeter and compare with adjacent normal pins to confirm correct temperature sampling. B. Contact the manufacturer to handle the abnormal sampling harness.
		Master controller temperature count setting inconsistent with slave controller	Set the master controller temperature sampling count via PC software to ensure it matches the slave controller.
12	(Series Battery Fault) **SeriMachine**	Number of slave controllers online does not match the actual count	Power down the system and re-seat the slave-to-slave and slave-to-master communication harnesses.
13	(SD Card Fault) **SD_Err**	Memory card damaged	Replace the memory card.
14	(Cluster Voltage Differential Too Large) **MasterVoltMaxMinErrHigh**	Voltage differential between clusters in a parallel system is too large (typically total voltage difference ≥5 V)	Charge the low-voltage cluster or replace it with a cluster having a similar voltage level.

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If you encounter any problems with the Fortress Power eSpire Nano energy system, or any of its components, contact us via phone – +1(877)497-6937 ext. 2, or create a support ticket using the following link: https://www.fortresspower.com/support/support-ticket/.

Compliant with:

Certified to UL Standards 1973, 9540, and 9540A