Fortress Power Avalon

Installation and Startup Guide

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Introduction and Safety Information

A. Introduction

An Avalon system consists of an inverter, a battery (with no fewer than three battery modules) and a smart energy panel (SEP). In the remainder of the text, **the battery, the inverter, and the SEP** may be referred to as the **"system elements".**

The purpose of this guide is to assist the installers with interconnecting the Avalon system elements and connecting the power sources, and the loads to the system. Additionally, this guide provides the startup sequence for the system so that, after following the steps outlined in this document, the system is ready for commissioning via the user interface.

The guide is created under the assumption that its reader has completed the **Avalon Technical Training course (at www.training.fortresspower.com)**, is reasonably familiar with the system, and has a solid conceptual understanding of it.

Only qualified professionals that have completed the training course are authorized to install and commission the Avalon system.

B. General Safety

- Only qualified professionals who have successfully completed the **Avalon Technical Training course (available at www.training.fortresspower.com)** are permitted to install the system. **Unauthorized installation is strictly prohibited**.
- **Mandatory personal protective equipment (PPE)**, **including gloves, safety glasses, rubber-soled shoes**, must be worn all the time during installation or servicing of Avalon ESS. Failure to comply may result in **serious injury**.
- **Do not expose** the Avalon system or any of its components to **extreme temperatures, fire, or water**. Exposure to these conditions may result in system **failure, fire, explosion or electrical shock.**
- Always use proper lifting techniques, and handle components with extreme care. Each Avalon **system component weighs** between **50 and 100 pounds**. Improper handling may lead to **serious personal injury or equipment damage**.

C. Electrical Safety

- **Strictly adhere to all applicable electrical codes and regulations specific to your jurisdiction** when installing the Avalon ESS. Non-compliance may result in **legal penalties, system malfunction, or severe safety hazards.**
- Follow all established **industry standards, safety protocols, and best practices** when working with electrical equipment. Failure to do so may lead to **serious injury or death, system failure, or legal liability.**
- Use **only** components and accessories that are **explicitly approved by Fortress Power** or **certified** for **compatibility with Fortress Power equipment**. Unauthorized components may compromise **system integrity, void warranties, and create safety risks**.

- **Always ensure proper grounding practices**. Improper grounding can result in **ground loops, electrical shock, fire hazards, or equipment damage**.

D. Battery Safety

- Do **not puncture, drop, crush, disassemble, or attempt to modify the battery** in any way. Doing so may result in **fire, explosion, electric shock, or permanent damage** to the system.
- Each battery module weighs **approximately 94 lbs**. Use extreme caution when lifting, moving, or handling the units. Failure to follow proper handling techniques may result in **serious personal injury or equipment damage**,
- Battery modules contain **voltage potential immediately upon unpacking**. Exercise extreme care during assembly to prevent **short circuits, electrical arcing, severe injury or death.**
- When correctly assembled, battery stacks will **exceed 60V**. Improper handling or assembly may lead to **electric shock, fire, or severe injury. Follow all safety procedures and use appropriate protective equipment.**

1. Installing and Preparing the Equipment

1.1 Preinstallation Equipment Check

Upon receiving your equipment, **please** carefully unbox and inspect all components to **ensure all items in the packing list are included**. If there are **discrepancies, missing items, or visually identifiable damage**, please fill out a support ticket at **www.fortresspower.com/support/** , **including clear photos and a detailed description of the issue**.

1.2 Installation Steps

For optimal installation efficiency, Fortress Power recommends the following order of operations:

a. **Mount and assemble** all equipment and the battery modules into a battery stack.
b. **Install required all breakers** in the SEP.
c. **Install load-shedding boards** if they are part of the system.
d. **Label and route all power conductors** between the SEP, inverter, and battery.
e. **Establish the grid connection** by running and connecting the cables responsible for Avalon's grid integration to the SEP.
f. **Connect the load panel** to the SEP or relocate loads to the SEO if it serves as a critical load panel.
g. Integrate load-shedding elements by routing the live wires from the load breakers through the load-shedding elements, if applicable.
h. **Run all communication wiring** between the SEP, inverter(s), and battery stack(s).
i. **Wire additional components** such as a generator, EV charger, and/or AC Coupled PV system if applicable.
j. **Power on the system** following proper startup procedures.
k. Commission the system using the "**Fortress Power Installer**" mobile application.

l. **Verify off-grid operation** by simulating an outage to confirm system functionality.

1.3 Smart Energy Panel (SEP)

To mount the SEP support bracket onto the wall, ensure that the arrow cutout is pointing upward, as shown in **Figure 1**. Once the bracket is securely in place, position the SEP onto the bracket, aligning it properly. Secure the SEP by fastening the two machine screws provided, one on each side, to ensure stability and proper installation.

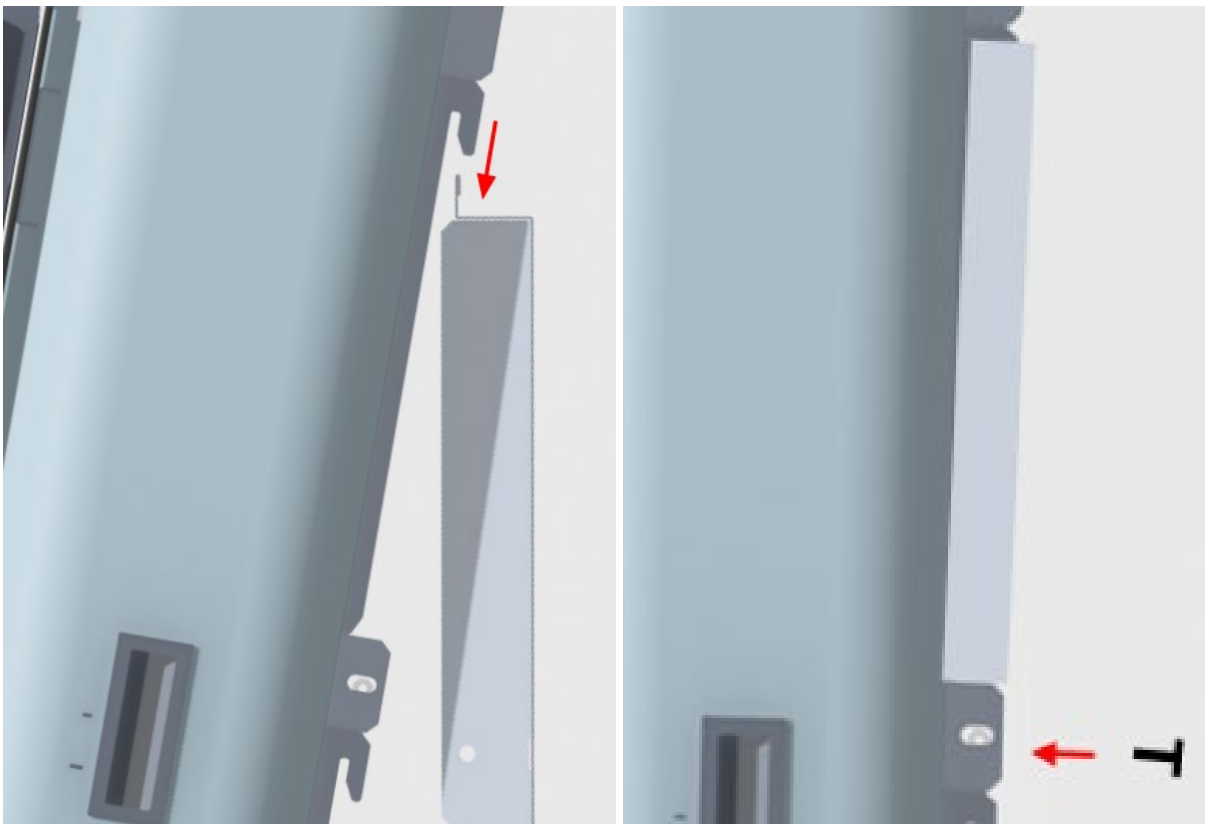


Figure 1: Mounting the SEP

After mounting, you may optionally remove the SEP door for installation or maintenance purposes. To remove the door, first detach the ground cable from the door by removing the 10 mm bolt by securing it. Then, using a flathead screwdriver or pliers, release the four door hinges which hold the door in place, as presented in **Figure 2**. **This option should be used strictly for installation and maintenance only. The door must be reinstalled during commissioning and operation of the Avalon system by ensuring its ingress protection rating is maintained.**

Figure 2: SEP Door Removal

The SEP is equipped with two dead fronts that must be removed for installation and maintenance purposes. To remove the top dead front, unscrew the two Phillips head screws located on either side of the LCD screen (**Figure 3**), then carefully pull the dead front away from SEP and downward. To remove the bottom dead front, unscrew the four Phillips head screws securing it in place and lift it away from the panel (**Figure 3**).

Figure 3: SEP Dead Front Removal

Before wiring the system, ensure that the **'E-STOP'** switch is in the **OFF** position (Figure 4a) and that the **grid isolation switch** is also turned **OFF** (Figure 4b). This precaution is essential to prevent

electrical hazards and ensure a **safe installation process**.

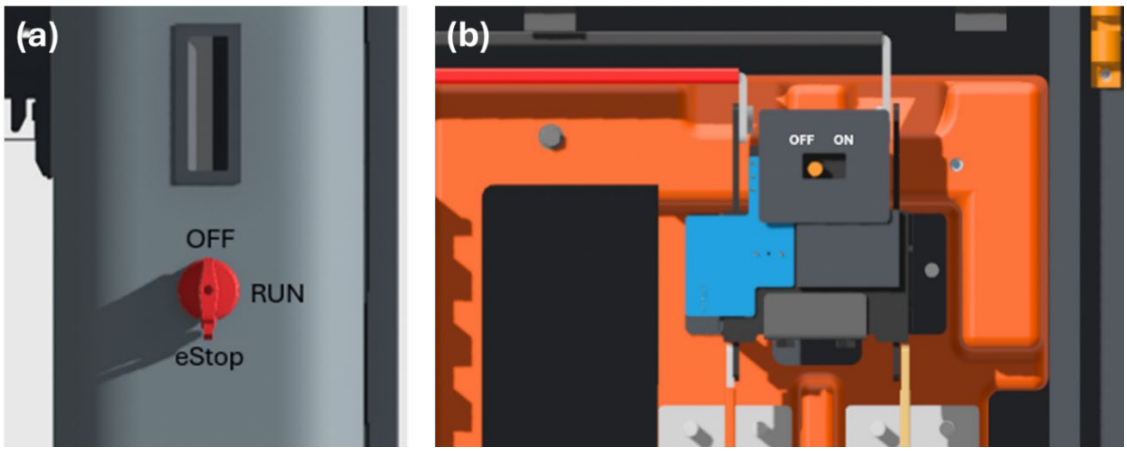


Figure 4: (a) SEP E-STOP switch; (b) SEP grid isolation switch

Inverter-Grid and Inverter-Backup Conductor Wiring (Figure 5, G & B respectively):

The proper installation of two 2-pole breakers in the SEP is **mandatory**:

- **Inverter-Grid Breaker (Figure 5G):** This breaker is included with the system and can be found in the same box as the inverter.
- **Inverter-Backup Breaker (Figure 5B):** This breaker is NOT included with the system and must be sourced and installed by the installer.

Since the inverter-grid breaker is included in the package, it is pre-selected with the correct rating for the inverter size. However, it is the **installer's responsibility** to ensure that the inverter-backup breaker is properly rated.

- For an 11.4kW Avalon Inverter, please use a **60A 2-pole breaker.**
- For a 7.6kW Avalon Inverter, please use a **40A 2-pole breaker.**

The inverter-backup breaker must be of the **Eaton BR 2 series, Siemens Type QP, or equivalent compatible model**. Refer to **Figure 5** for the breaker layout within the SEP. When using the built-in cables for the inverter-grid breaker, **carefully remove the heat shrink** from each conductor before securely landing them onto the provided inverter-grid breaker.

Main Load and Grid Breakers (Figure 5, F & A respectively):

The SEP provides space to land up to a **200A (or smaller) breaker** for **main grid connection** (**Figure 5**, **A)** and the **load disconnect (Figure 5, F)** to facilitate installation and ensure compliance with electrical code requirements. For the main grid breaker, an **Eaton CSR2200N or equivalent model** should be used. These breakers are **not provided** by Fortress Power and must be sourced separately. Additionally, installing these breakers within the SEP is **optional** if it is necessary disconnect requirements are already met elsewhere in the installation. Refer to Figure 5 for the breaker layout within the SEP.

Generator Breaker (Figure 5, C):

The generator breaker is **NOT provided** by Fortress Power and must be sourced separately if generator integration is included in the installation. An appropriately sized breaker should be installed in the SEP at the designated location shown in Figure 5, ensuring that its rating **does not exceed 100A**. The generator cables that connect to both the generator breaker and the generator ports are **pre-wired and clearly labelled** within the SEP. These **pre-wired generator cables must be connected to the generator breaker** during installation. To maintain safety, the generator breaker **must remain in the OFF position** until the startup stage of the installation. **For more information on generator integration please refer to Appendix D.**

AC-Coupled PV Breaker (Figure 5, D):

The AC-coupled PV breaker is **NOT provided** by Fortress Power and must be sourced separately if AC-coupled PV integration is included in the installation. An appropriately sized breaker should be installed in the SEP at the designated location shown in Figure 5, ensuring that its rating **does not exceed 60A**. The AC-coupled PV cables that connect to both the AC-coupled PV breaker and the AC-couples PV ports are **pre-wired and clearly labelled** within the SEP. These **pre-wired AC-coupled PV cables must be connected to the AC-coupled PV breaker** during installation. To ensure safety, the AC-coupled PV breaker **must remain in the OFF position** until the startup stage of the installation. **For more information on AC-coupled PV interconnection please refer to Appendix C.**

EV Charger Breaker (Figure 5, E):

The EV charger breaker is **NOT provided** by Fortress Power and must be sourced separately if EV charger integration is included in the installation. An appropriately sized breaker should be installed in the SEP at the designated location shown in **Figure 5,** ensuring that its rating **does not exceed 60A**. The EV-charger cables that connect to both the EV charger breaker and the EV charger ports are **pre-wired and clearly labelled** within the SEP. These **pre-wired EV-charger cables must be connected to the EV charger breaker** during installation. To ensure safety, the EV charger breaker **must remain in the OFF position** until the startup stage of the installation. **For more information on EV charger integration please refer to Appendix E.**

Using an SEP as a critical load panel:

The SEP features a **200A passthrough capability** from the grid to the load. As a part of the conductor chain, the busbars serve as the connection points for breakers assigned to the AC-coupled PV, generator, EV charger, and inverter-backup circuits. Among these, only the inverter-backup breaker is mandatory, while the others are optional and should only be installed if their respective AC circuits are directly connected to the SEP.

Due to this configuration, there will always be two to five 2-pole breaker slots (or four to ten 1-pole breaker slots) unoccupied. These unused slots may be repurposed as needed. In the case of a partial-home backup application, instead of installing a separate critical load panel and connecting it to the SEP, the critical loads may be directly connected to the busbars within the SEP using conventional breaker, such as the **Eaton BR 2 series, Siemens Type QP, or an**

equivalent model. Please refer to **Table 1** for acceptable breaker ratings.

It is important to note that any code requirements applicable to a critical load panel in your jurisdiction will also apply to the busbars within the SEP. Always ensure compliance with local electrical codes and regulations when making these connections.

A. Grid Breaker
B. Inverter Load Breaker
C. Generator Breaker
D. AC-Coupled PV Breaker
E. EV Charger Breaker
F. Main Load Breaker
G. Inverter Grid Breaker (Included)

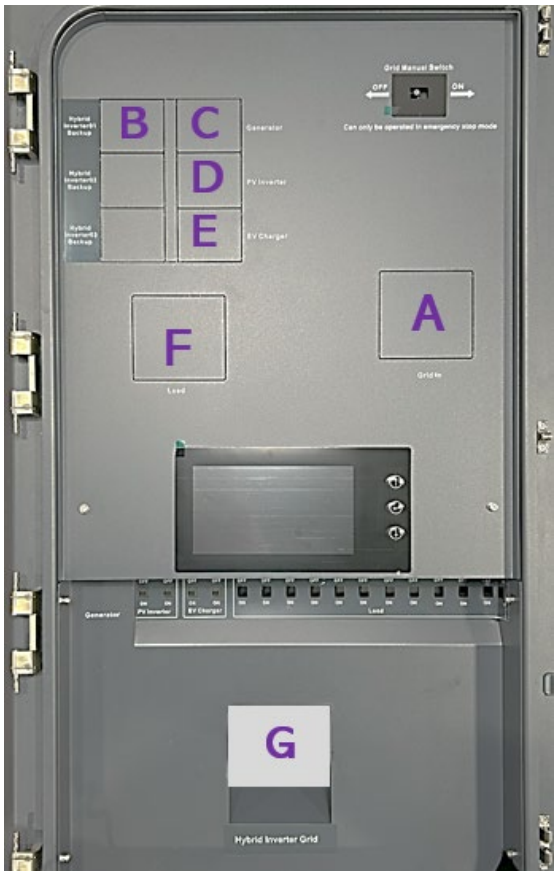


Figure 5: Breakers labelled on the SEP

Table 1: SEP Breaker Sizes

AC Source / AC Load	Breaker size
Main Grid	≤200A
Inverter-backup for 11.4kW inverter	60A
Inverter-backup for 7.6kW inverter	40A
EV charger	60A
Generator	100A
AC-coupled PV	60A
Main Load	≤200A
Inverter-grid	Use all included breakers

Maintaining the **correct phasing** when wiring the **inverter-grid** and **inverter-backup** conductors is **critical**. **Failure to follow this requirement may result in inverter damage and void the product warranty.**

Refer to **Figure 6** for the **inverter-grid breaker** wiring reference:

- **L1 (black)** must connect to the **left** terminal.
- **L2(red)** must connect to the **right** terminal.

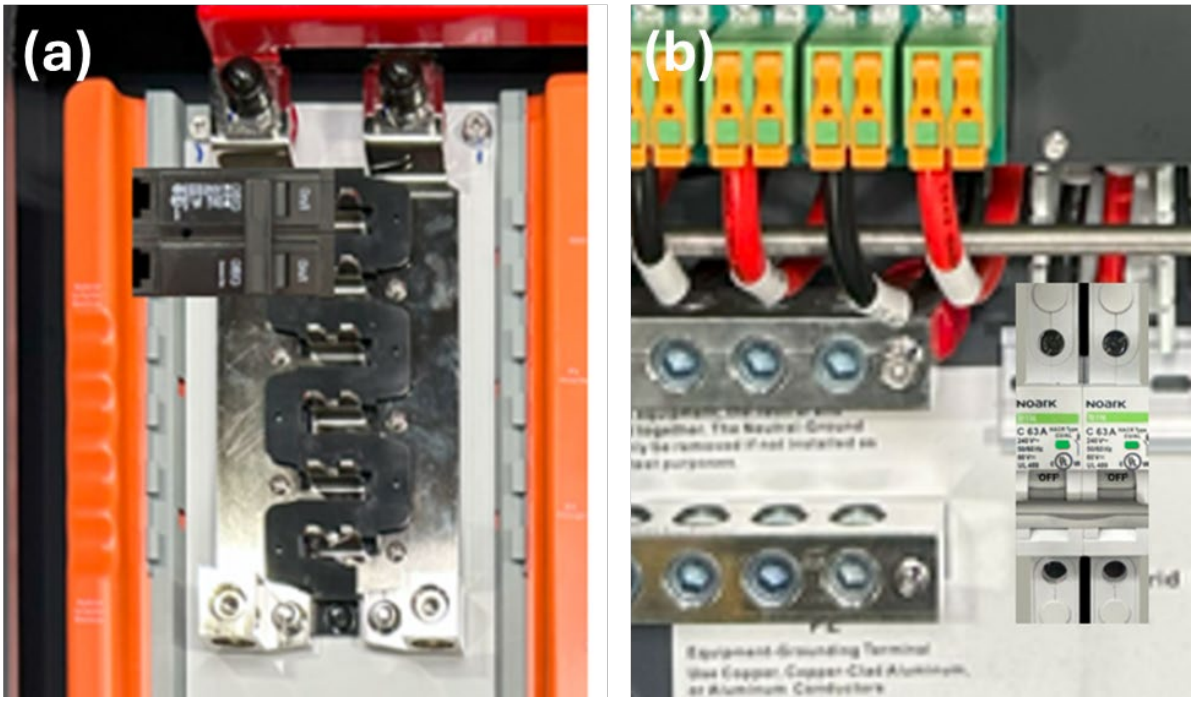


Figure 6: (a) Inverter Backup Breaker; (b) Inverter Grid Breaker

A separate figure later in this manual provides reference for **inverter-backup wiring.** For additional verification before applying voltage, it is strongly recommended to:

1. **Test continuity** between **inverter-grid L1 and inverter-backup L1**.
2. **Perform similar continuity** check between inverter-grid L2 and inverter-backup L2.

These checks ensure proper phasing alignment and help prevent equipment damage.

1.4 Inverter

Mount the inverter bracket on the wall, ensuring that the arrow cutout is pointing **upward**. Carefully lift the inverter onto the bracket, aligning it properly, and secure the unit by fastening the **provided screw on each side** using a **T20 Torx wrench** (included with the inverter), as shown Figure 7.

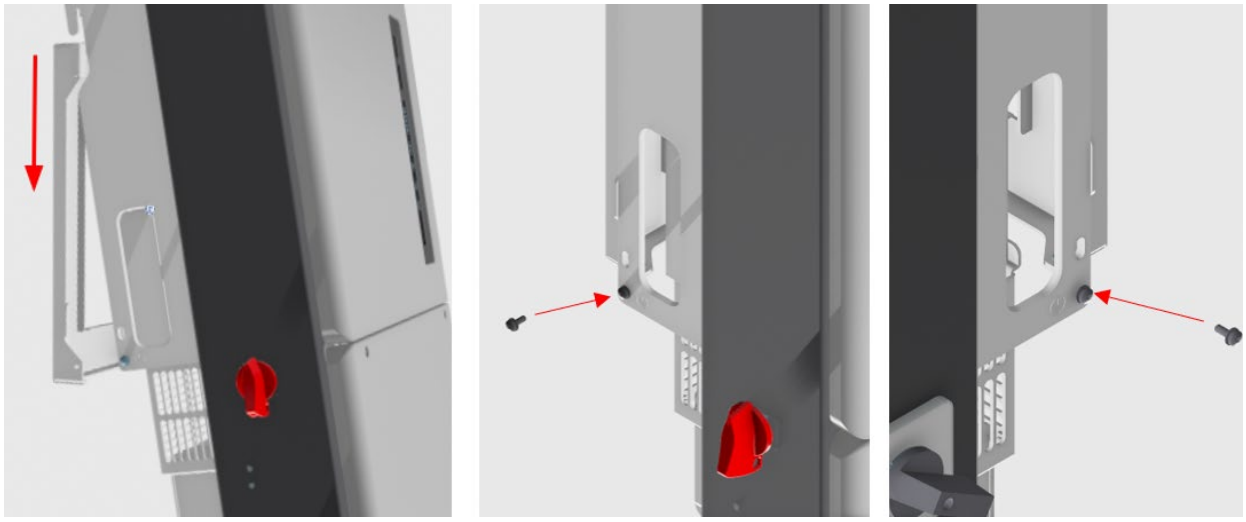


Figure 7: Mounting and Securing Inverter

Before wiring the inverter, ensure that both the **DC Disconnect,** and the **mode selector** are set to the **OFF position** (Figure 8a-b). This step is critical to prevent electrical hazards and ensure a safe installation process.

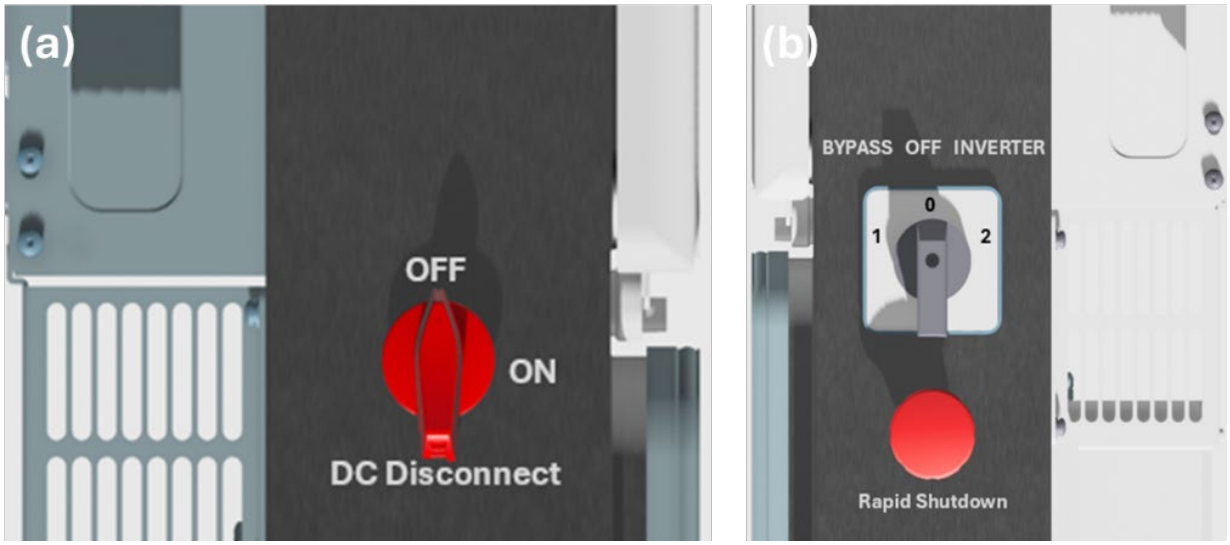


Figure 8: (a) Inverter DC Disconnect; (b) Inverter Mode Selector

Remove the **inverter service compartment** using the **T20 Torx wrench** provided with the inverter **(see Figure 9)**. Ensure that all power sources are disconnected before proceeding.

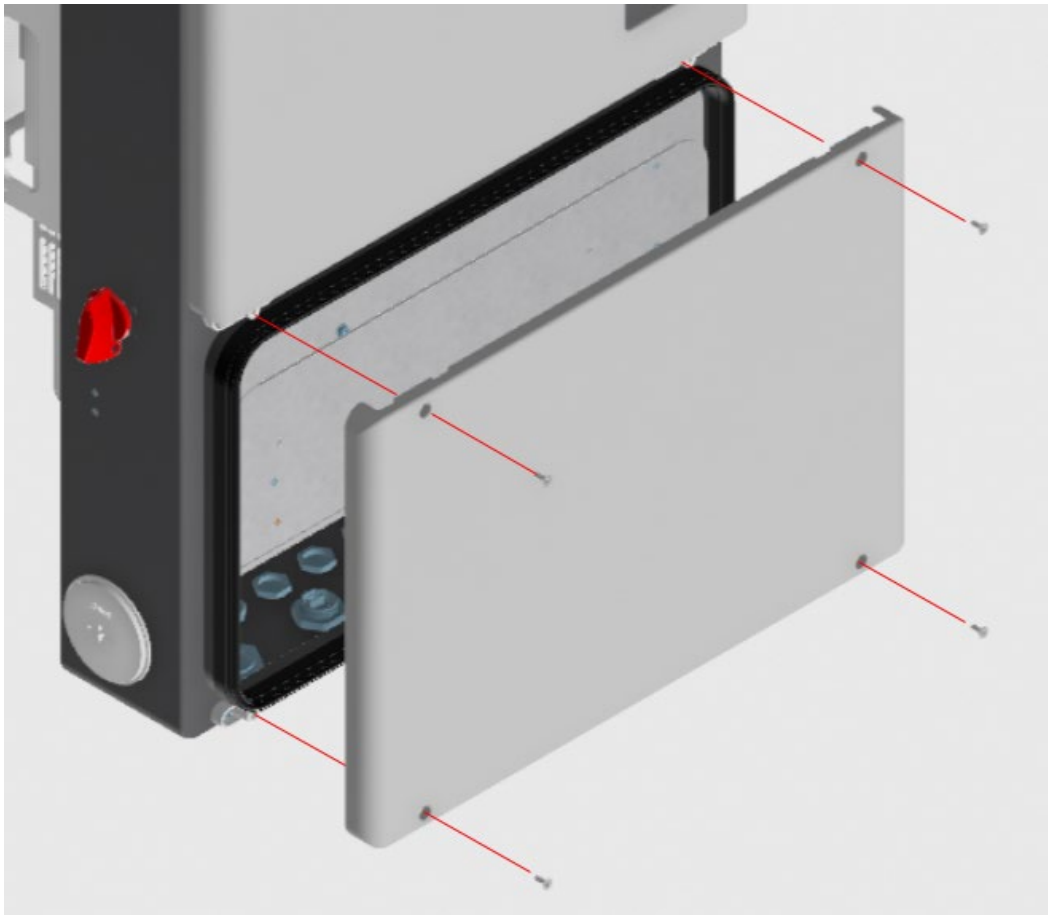


Figure 9: Inverter service cover removal

Once this step is completed, you may proceed with **battery assembly**. Be sure to **take note of the knockout locations**, considering their relevance to your specific **installation environment and requirements** to ensure proper cable management and system integration.

1.5 Battery Unit/Stack

Unbox the **battery modules** and associated equipment and **carefully measure the voltage of each individual battery module** before proceeding with the installation (Figure 10). Each module should have an expected voltage of approximately 49V. Ensure that the voltage variance between the **highest and the lowest measurements doesn't exceed 0.25V** and that the battery modules are **free from any visible damage.** If any discrepancies in voltage or physical effects are identified, discontinue the installation and contact technical support for further assistance.

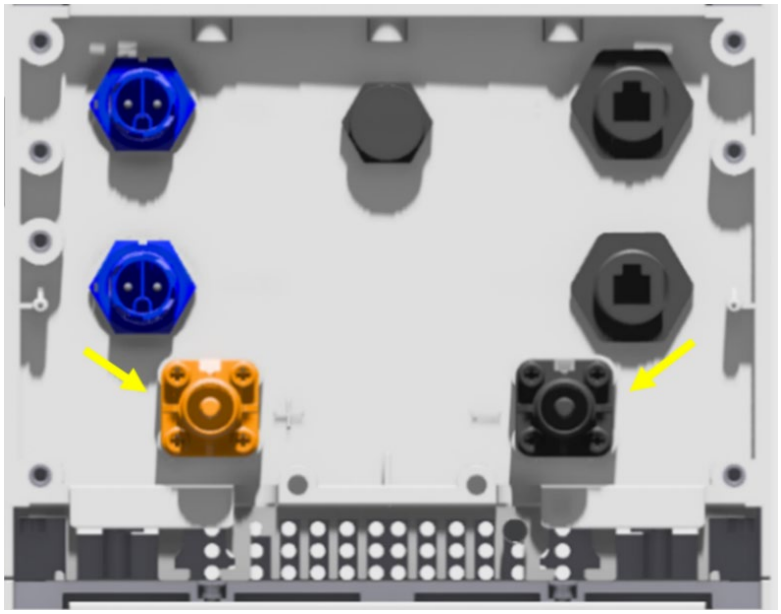


Figure 10: Battery module terminals

Assemble the **battery base** by securely mounting **the support legs to the base bracket (see Figure 11).** Each support leg includes an additional **hex nut** for **tightening and leveling**, which should remain positioned beneath the base. If **ground anchors** are utilized, they can be directly attached to the base as depicted in Figure 11. Ensure proper alignment and stability before proceeding with the installation.

Place the **first battery module** on the **base**, ensuring proper alignment on all sides for the installation of the brackets. Secure the module to the base using the **H3 hex bolts** and the brackets provided (**see Figure 12**). Note that **L-brackets** are included for securing the battery stack to the wall for additional stability.

Repeat this process steps for **each remaining module in the stack**, ensuring that **each module is securely fastened** before placing another on top. This step is critical to **prevent tipping and maintain stability** during and after installation.

Once all battery modules are securely stacked, **install the BMS module** on top of the stack and fasten it using the **bolts and brackets provided**. Ensure all connections are properly aligned before proceeding to the next installation steps.

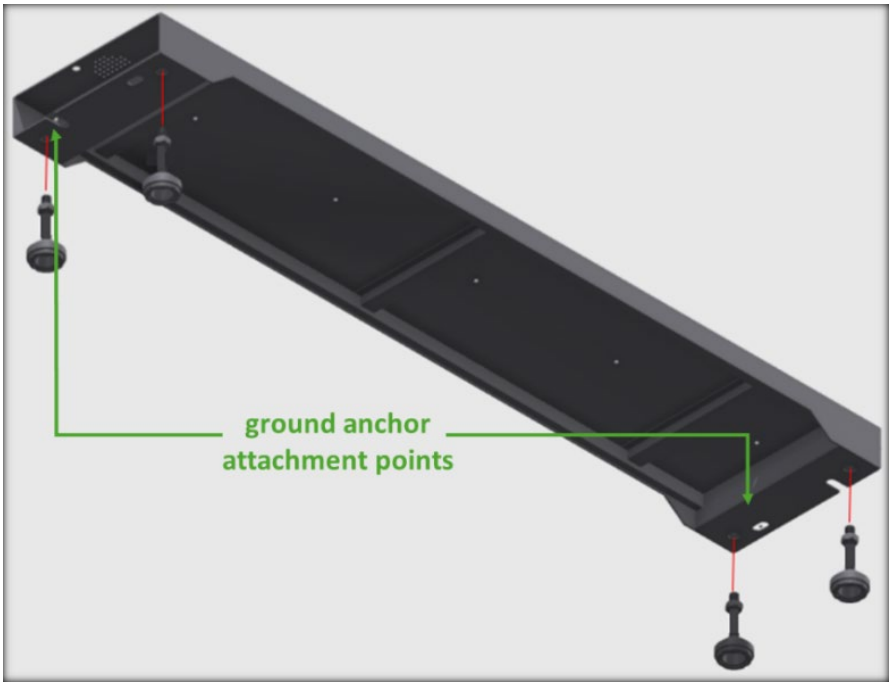


Figure 11: Battery Support Legs

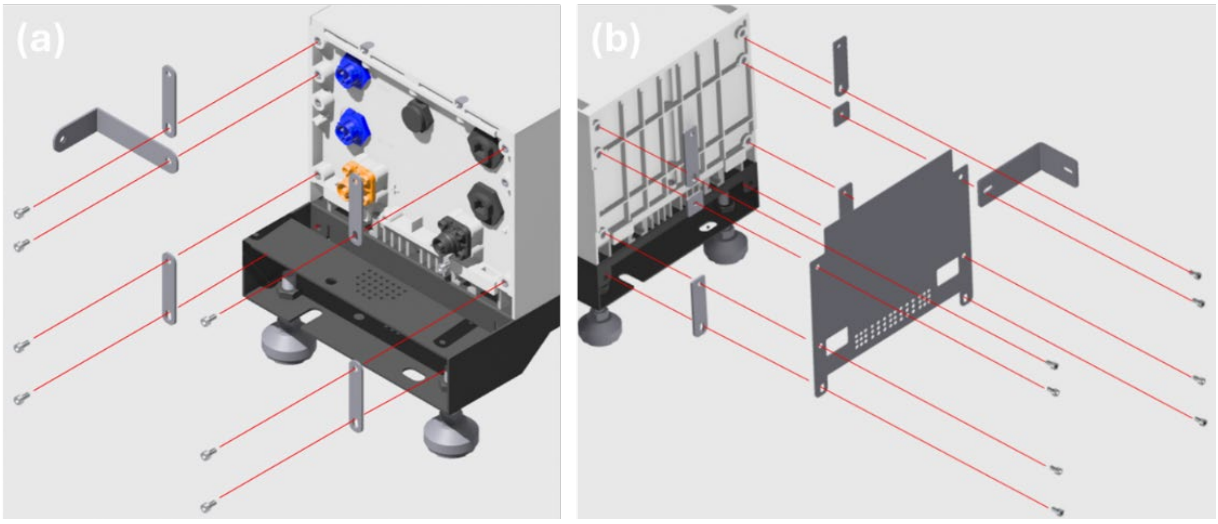


Figure 12: Securing the battery modules using the brackets

Before proceeding with wiring, ensure that the **BMS module breaker** is set to the **"OFF"** position Figure 13) and that the **battery power button is not pressed in**. The power button is **self-latching** and should be **flush** in the **"OFF"** position. Once these checks are verified, you may proceed with the wiring of the battery stack, following all the safety and installation guidelines.

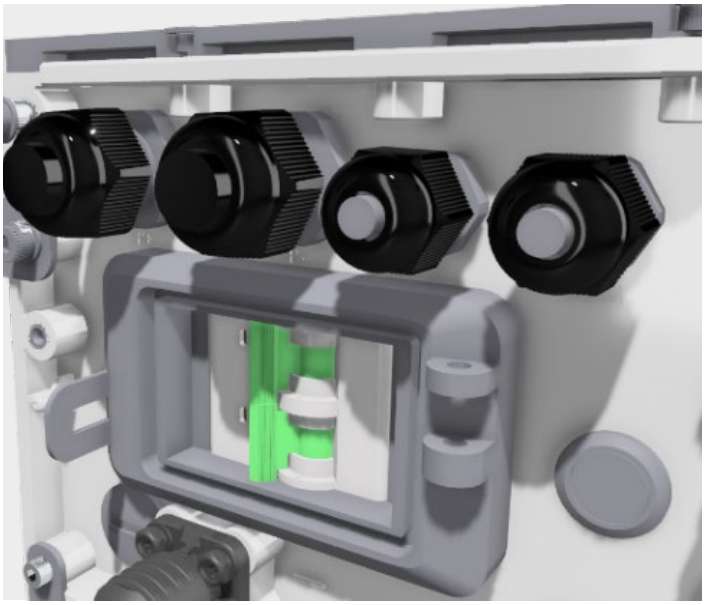


Figure 13: The battery breaker and the battery power botton

Grounding Wires:

Use the **ground (green/yellow) cables** to electrically connect the **aluminum heatsinks** of consecutive battery modules to each other. Secure the ground cables to the heatsinks using the **H4 hex bolts** provided (Figure 14a). For all intermediate modules in the stack, the **ground cable lugs will overlap**, with **two lugs held in place with a single bolt** (Figure 14b). Only the **topmost (BMS) and bottommost battery modules** will have a **single ground lug connection**. Ensure all connections are properly tightened to maintain a secure and reliable grounding path.

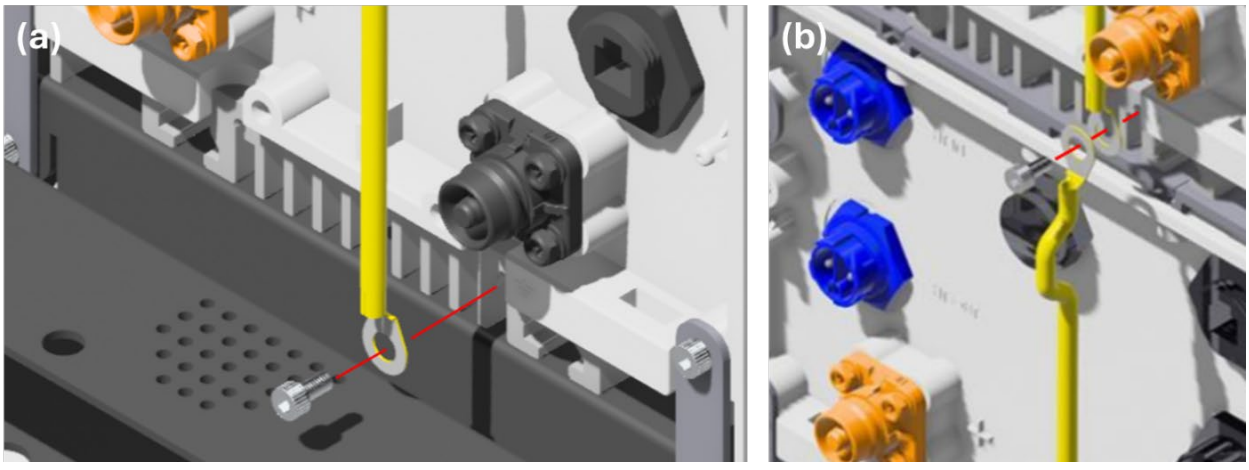


Figure 14: Module-to-module ground wiring

Module to Module Communication Cables:

Using the **Ethernet (gray) cables provided** (see Figure 15), connect the first cable to the **BMS module** and the **topmost battery module**. Continue this process sequentially by connecting each battery module to the one directly below it until reaching the **bottom battery module**.

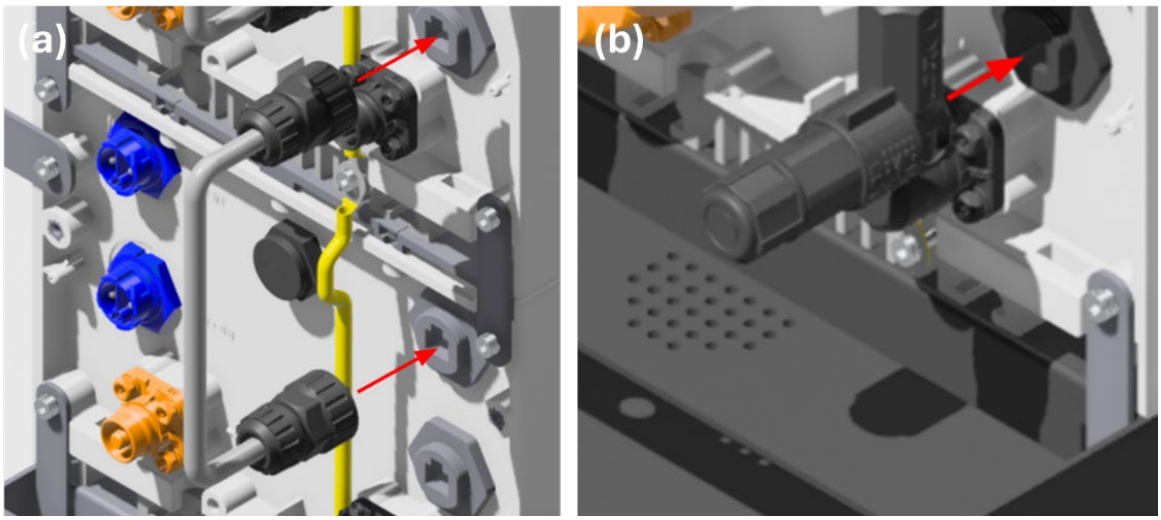


Figure 15: Battery Stack Communication Wiring

Once all modules are connected, install the termination plug into the last Ethernet port at the bottom of the stack, as shown in the installation diagram (Figure 15). These cables have **watertight connectors**, which must be properly tightened to ensure a secure and moisture-resistant connection, particularly for **outdoor installation**. Refer to **Appendix A** for detailed instructions on properly securing these connectors.

Power Cables:

Proceed with **wiring the battery conductors** as illustrated in the figures below. Each **module and power cable** are **color coded** for clarity:

- **Orange** for **positive (+)** connections
- **Black** for **negative (-)** connections

Begin by **connecting each battery module sequentially**, starting from the **bottom of the stack**, using the designated **orange (positive)** and **black (negative)** cables (see Figure 16). Subsequently, complete the **BMS module connections** as follows:

1. Connect the **orange-to-orange cable** from the **positive (+) terminal of the topmost battery module to the positive (+) terminal of the BMS module.**
2. Connect the **black-to-black cable** from the **negative (-) terminal of the BMS module** to the **negative (-) terminal of the bottommost battery module** (see Figure 17).

Ensure that **all connections are properly secured and tightened** to maintain a **safe, stable, and reliable system operation.**

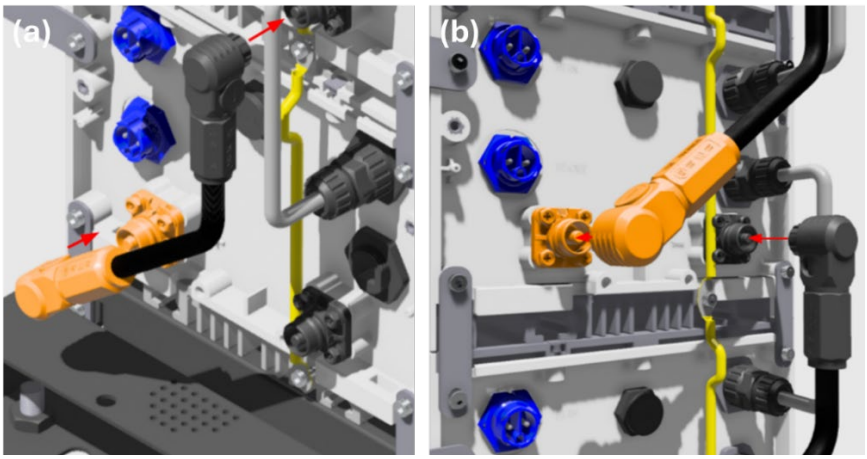


Figure 16: Battery Module-to-Module Wiring

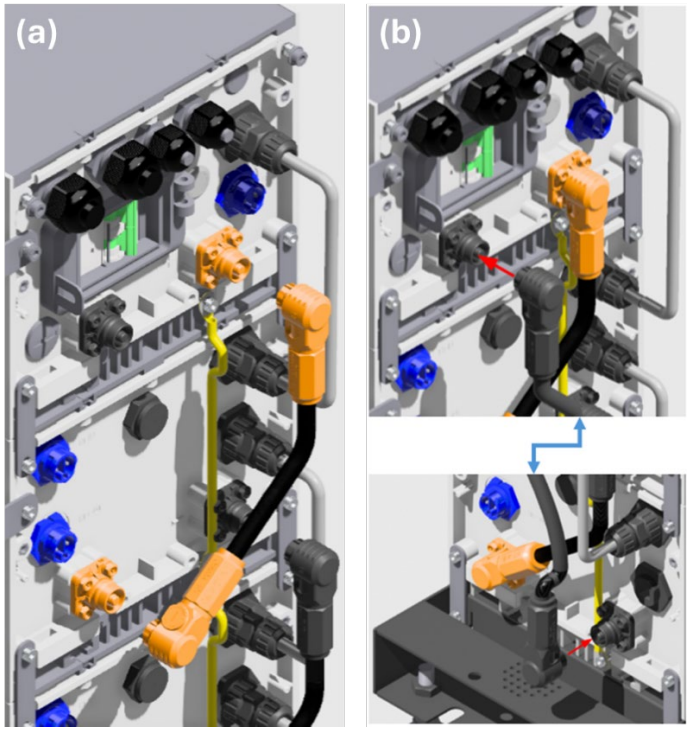


Figure 17: BMS Module to Battery Modules Power Wiring

Integrated Heater Cables:

Using the **provided blue cables,** start connection at the **BMS module** and proceed by wiring each battery module together, following the same method as the communication cables, as shown in Figure 18. Once all modules are connected, install the **blue termination plug** into the **remaining port of the bottom battery module** to complete the circuit.

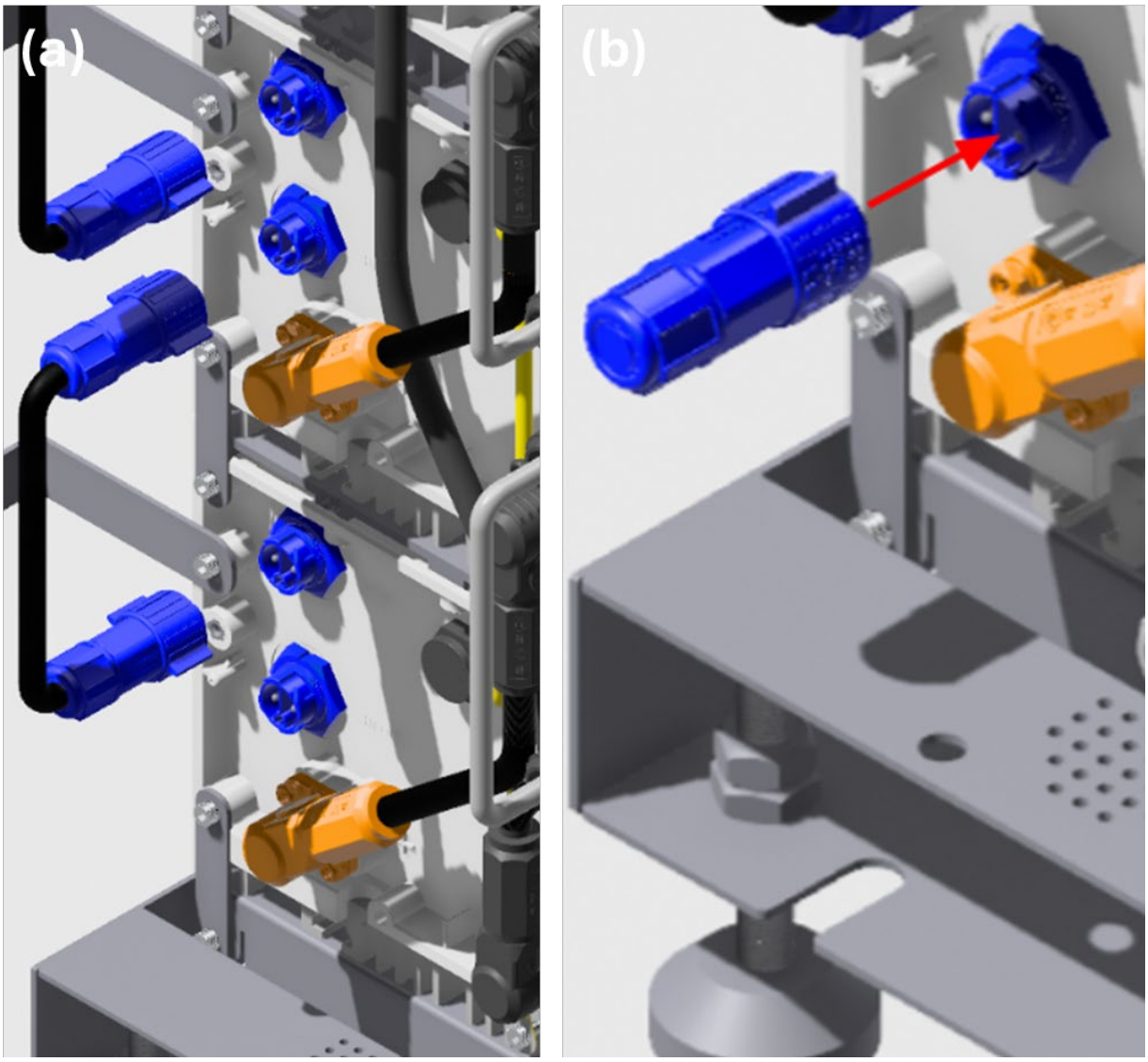


Figure 18: Integrated heater wiring

The battery assembly is now complete and ready for interconnection with the rest of the Avalon ESS. Refer to **Figure 19** below for a visual representation of the fully wired battery stack. Ensure all connections are secure a properly tightened for optimal system performance before proceeding with the next step of installation.

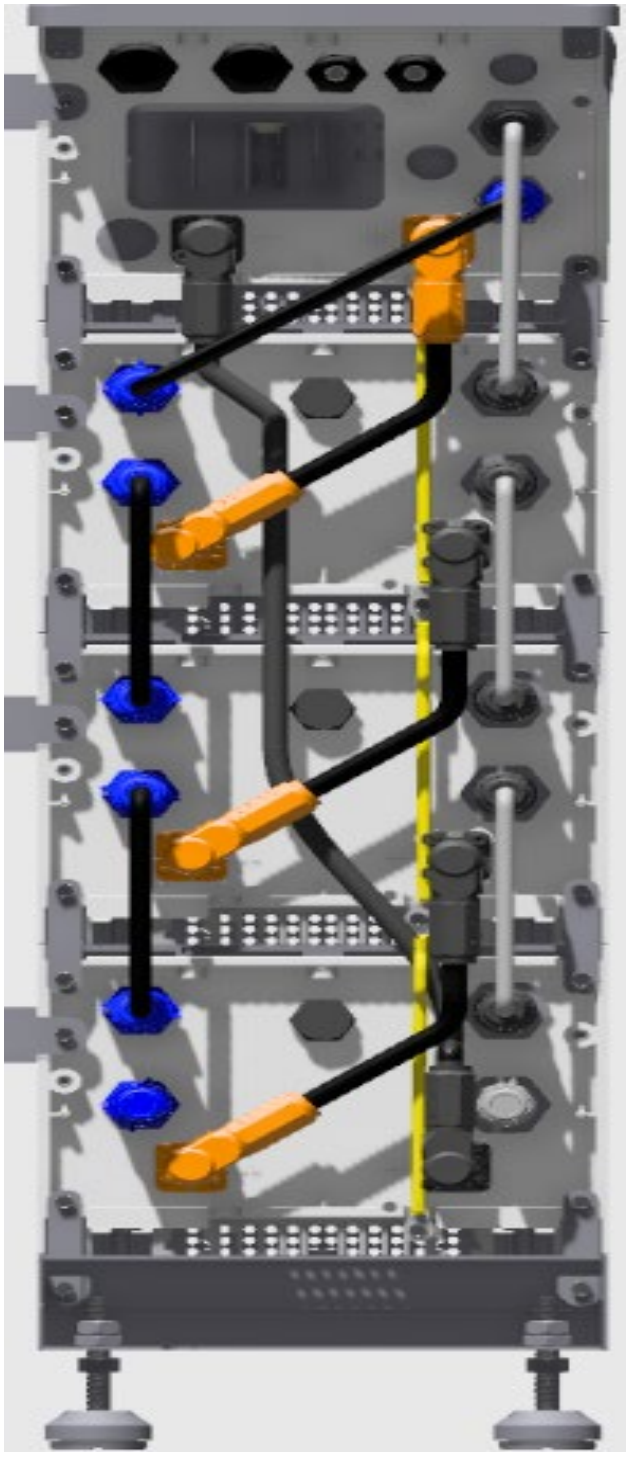


Figure 19: *Fully Stacked and Wired Battery Unit*

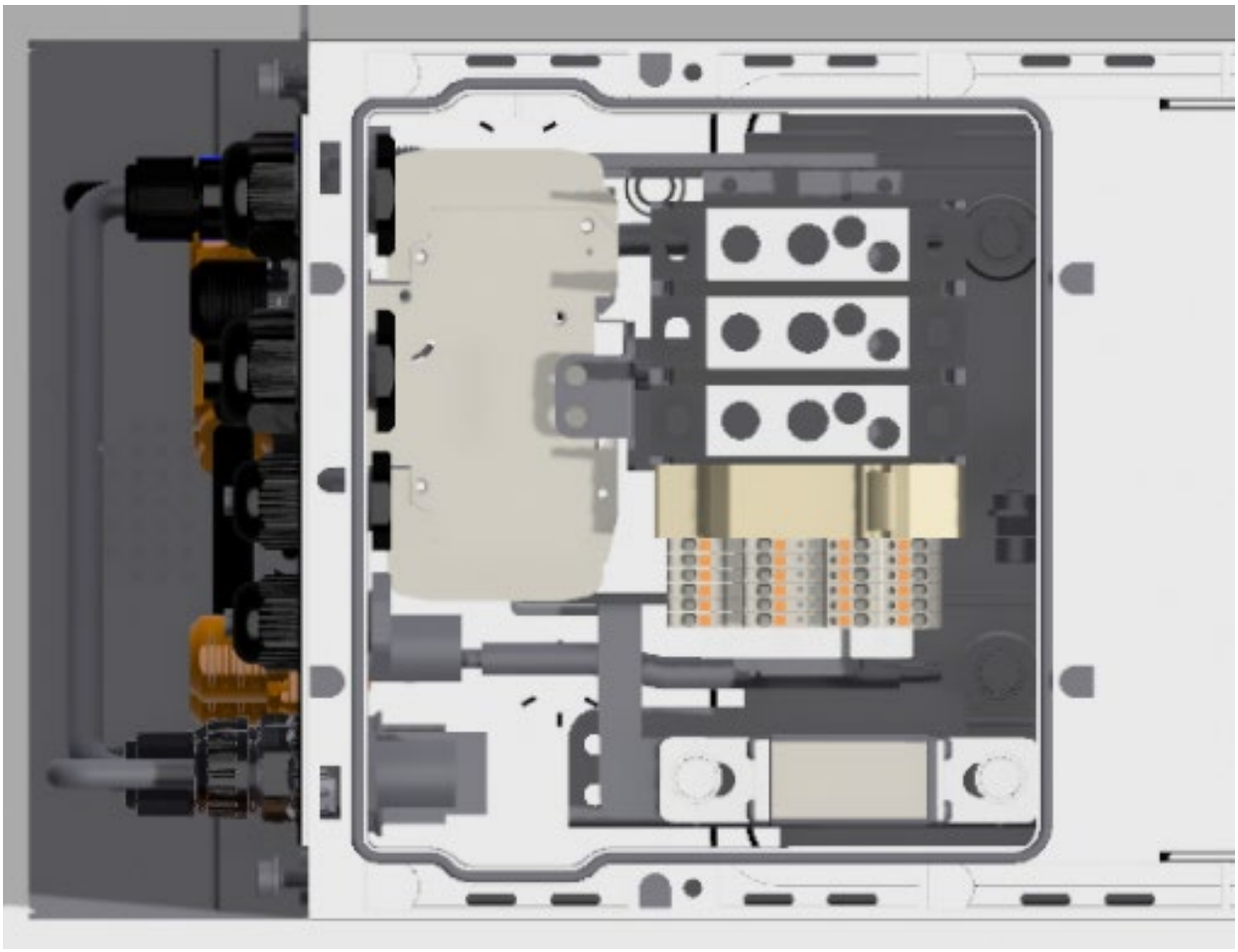


Figure 20: Battery service compartment

For interconnection, power conductors from the inverter to the battery terminal may be routed from either side of the battery stack.

1. If using the **left side (Figure 20)**, the **plastic cover must be drilled** to accommodate the installation of a conduit or conduit adapter.
2. If using the **right side**, drilling through the plastic is required to access the internal **conduit run (Figure 22)**. After drilling, install the **1-inch conduit adapter** included in the **BMS packaging**, as shown in **Figure 21.**

Ensure that all conduit connections are properly secured to maintain system integrity and compliance with installation requirements.

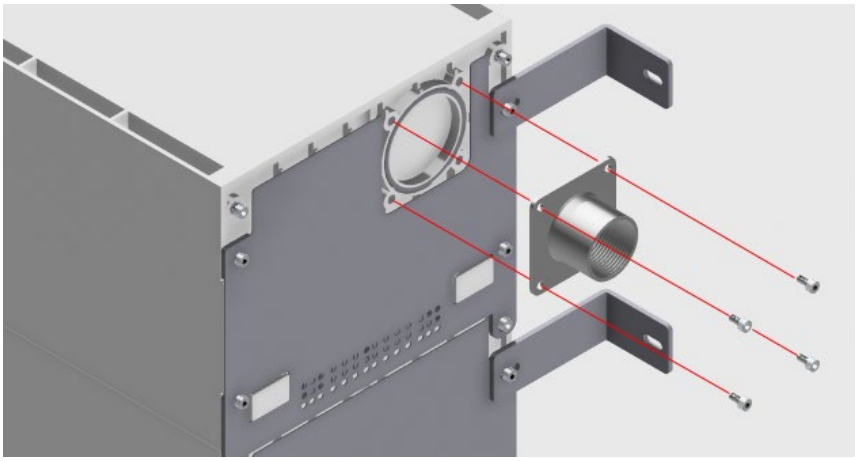


Figure 21: Right-side Battery Conduit Adapter

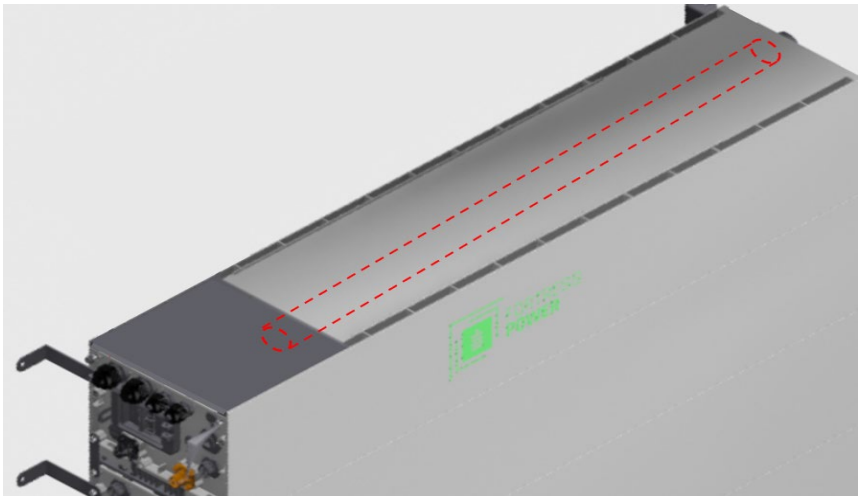


Figure 22: BMS Module Internal Conduit

Conductor Interconnection

Before proceeding with **conductor wiring**, verify that **all breakers are in the open position (OFF)**, and that **no active voltage** is present in the system. Ensure that:

- The **battery is completely OFF.**
- The **inverter is not receiving any active voltage** from solar panels
- No **AC voltage** is present anywhere in the system.

These precautions are **critical for safety** and must be followed to prevent electrical hazards during installation.

2. Interconnecting Avalon Elements with Power Conductors

2.1 General Information

Knockout locations on SEP and Inverter:

Avalon SEPs and Avalon inverters are designed with multiple conduit entrances to accommodate various wiring configurations. Please see the specifications in Figure 23 and Figure 24 for the sizes of these entrances:

Ensure that all conduit fittings are appropriately selected and securely installed to comply with safety standards and installation requirements. Properly sealing the conduit entrances helps protect the system from environmental exposure and ensures long-term reliability.

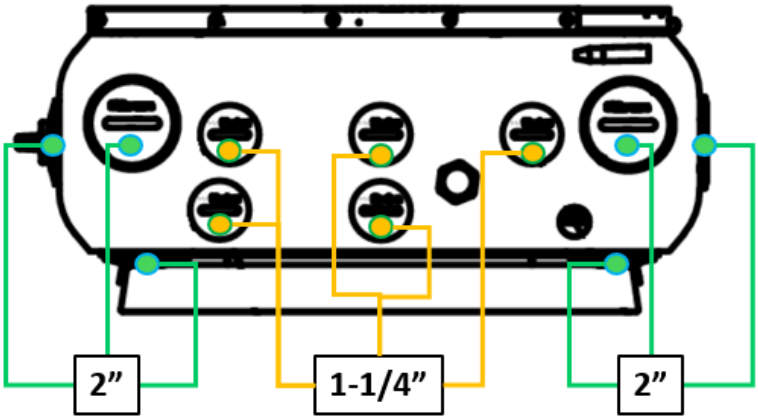


Figure 23: SEP Conduit Sizing

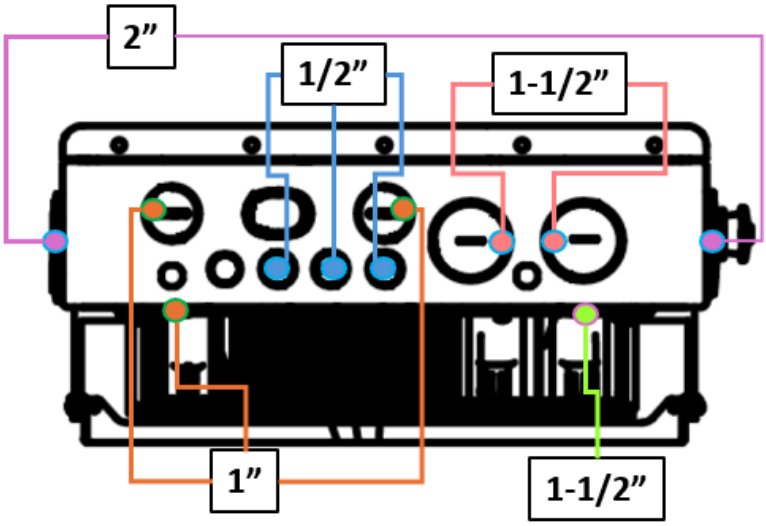


Figure 24: Inverter Conduit Sizing

Wire Sizing Chart:

All power conductors and cables used for interconnecting the equipment must be appropriately sized to ensure optimal performance and safety. See the chart in Table 2 for the recommended

wire gauge guide based on system specifications.

Ensure that all wiring complies with local electrical codes and regulations are applied during installation.

Table 2: General Wire Size Guide

Wire Name	Purpose	Making Connection	Wire Gauge Guide
PV Cables (Customer supply)	PV DC connection to the inverter	From the PV array to the DC+ and DC- terminals in the inverter	6AWG
Battery Cables (Customer supply)	Battery DC connection to the inverter	From the battery (+) and (-) terminals to the inverter BAT+ and BAT- terminals	4 or 6AWG
AC Grid Cables (Customer supply)	Inverter AC connection to the SEP	From the OCPD in the SEP to the AC-GRID L1 and L2 terminals	6AWG
AC Backup Cables (Customer supply)	Inverter AC connection to the backup subpanel	From the backup subpanel OCPD to the inverter AC-BACKUP L1 and L2 terminals	6AWG
Ground Cables (Customer supply)	Grounding conductors for the system	From the SEP ground bar to the ground bar inside the inverter wire box	6AWG
Meter RS485 Cable (Included in BMS package)	Communication between inverter & meter	From meter to terminal Meter_A and Meter_B. For more details, refer to Battery installation guide.	22-16AWG

Bonding Neutral and Ground:

If the Avalon SEP is installed as the first point of disconnect, use the included jumper cable to bond the neutral and the ground, ensuring that the preexisting bond is removed.

If the Avalon SEP is **NOT** installed as the first point of disconnect, retain the preexisting bond and discard the jumper cable provided.

Ensure that all grounding and bonding connections comply with local electrical codes and installation standards to maintain the system safety and proper operation.

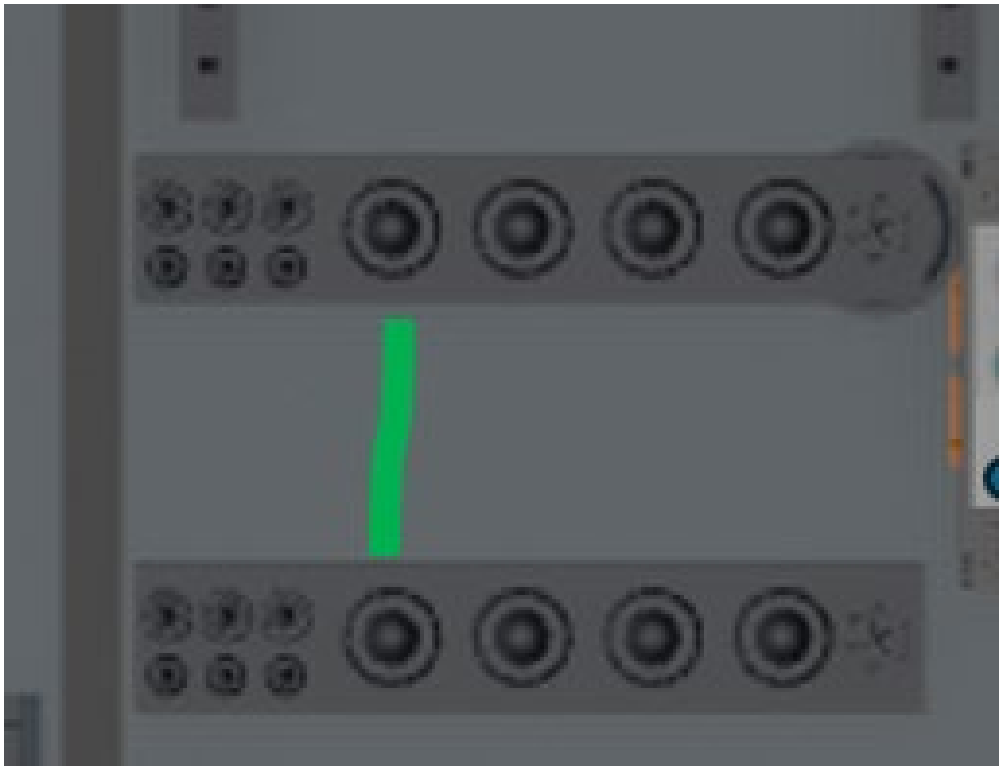


Figure 25: Neutral-Ground Bonding Location in SEP

SEP Conductor Connections:

For ease of installation and to provide **additional maneuvering space**, the **LCD screen and its supporting crossbar** may be removed. To do so, first **unplug the ribbon cable located** in the top right corner of the display. Then, **remove the two Phillips head screws** securing the crossbar, which in turn supports the LCD screen. Once detached, carefully set aside the screen and crossbar, ensuring that the ribbon cable and screws are kept in a **secure location** for reinstallation after the installation process is complete.

Load-Shedding Board Installation:

Load-shedding boards are **optional components** that are **not pre-installed** in the SEPs. Since installing these boards after introducing power conductors into the SEP can be challenging. Hence, it is **strongly recommended** to install the load shedding board(s) before interconnecting any equipment. This approach ensures a **more efficient installation process** and prevents potential difficulties in accessing and securing boards once wiring is in place.

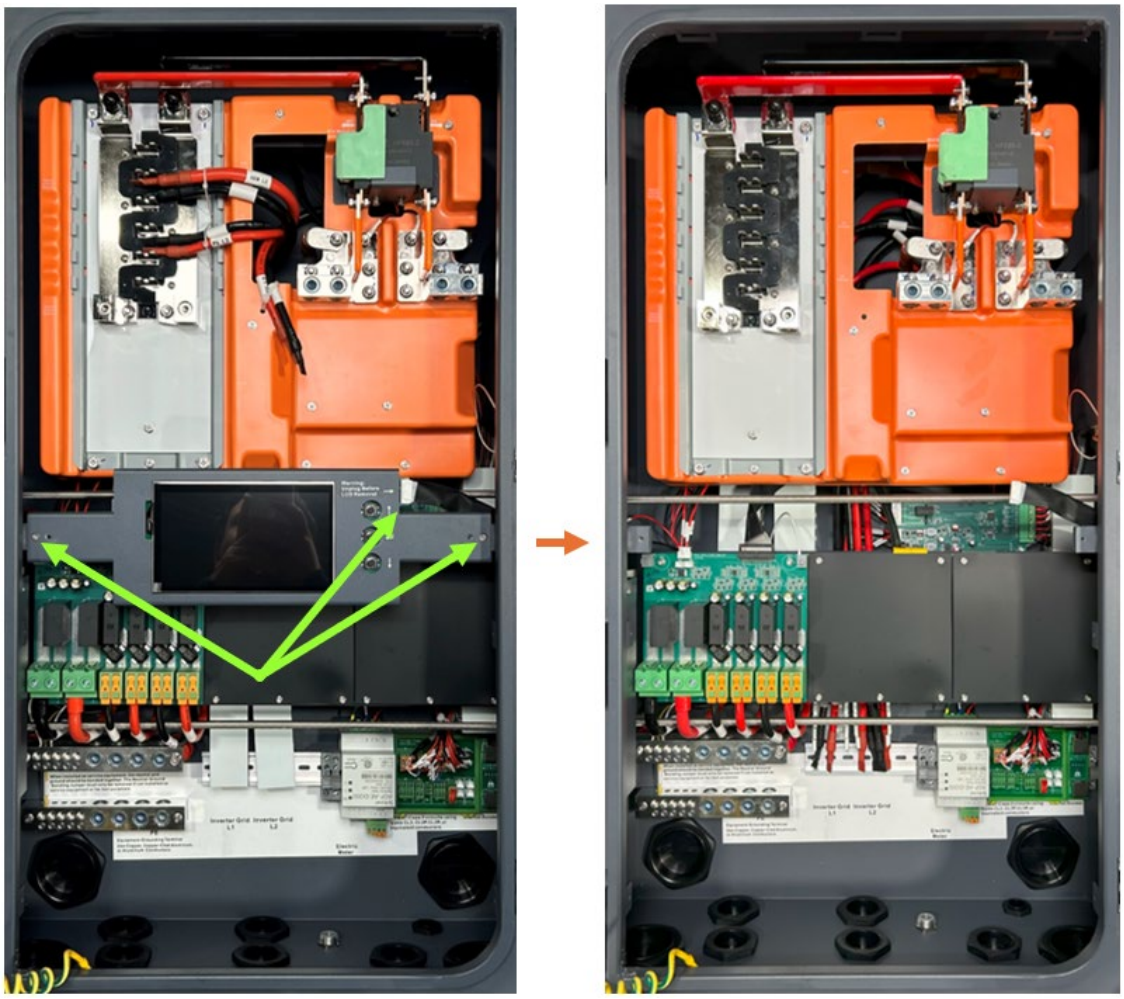


Figure 26: Removing the Screen and the Crossbar

CT Placement:

Each SEP is supplied with **a pair of 200A CTs** that must be installed correctly to ensure accurate measurement of **energy import/export**. The CTs must be positioned so that the load and the grid connections are on the opposite sides, ensuring that no loads are **upstream**, allowing the system to properly account for power flow. In a **whole-home backup configuration**, the CTs may be installed **inside the SEP**, wrapped around the conductors interconnecting with the **utility grid.** For a **partial-home backup configuration,** the CTs must be installed outside the SEP, positioned between the utility meter and the **main electrical panel**, wrapped around the **service conductors**. Regardless of the configuration, **both CTs in the pair must be installed with their arrows pointing in the same direction— away from the SEP.**

For installation with **400A utility service**, an additional pair of CTs is required; in such cases, please contact **technical support** to request the necessary components.

2.2 Inverter-SEP Power Interconnection

- Refer to **Figure 27**.
- **Grounding Connections:**
  - Connect the **inverter backup ground (B-PE)** to the **ground bar of the inverter**, then connect the **inverter ground bar** to **the ground bar of the SEP**.
- **Inverter-Grid Connections:**
  - Connect the **inverter grid L1 (G-L1) and L2 (G-L2)** to the **breakers provided with the Avalon package**, which should already be installed in the SEP if the previous instructions were followed.
  - Connect the **inverter grid neutral (G-N)** to the **neutral busbar in the SEP**, ensuring that the color coding is precisely followed, as shown in the reference figure 29.
- **Inverter-Backup Connection:**
  - Connect the **inverter backup L1 (B-L1) and L2 (B-L2)** to the **installer-sourced breaker**, which should already be installed on the **main busbars of the SEP**, if prior instructions are followed.
  - Connect the **inverter backup neutral (B-N)** to **the neutral busbar in the SEP.**

Maintaining the correct phasing of the inverter-grid and inverter-backup wires is imperative. Failure to comply with this requirement may result in inverter damage and void product warranty. Ensure all connections are verified before proceeding.

The importance of grounding the inverter-load PE port, as shown in the following figure, cannot be overstated.

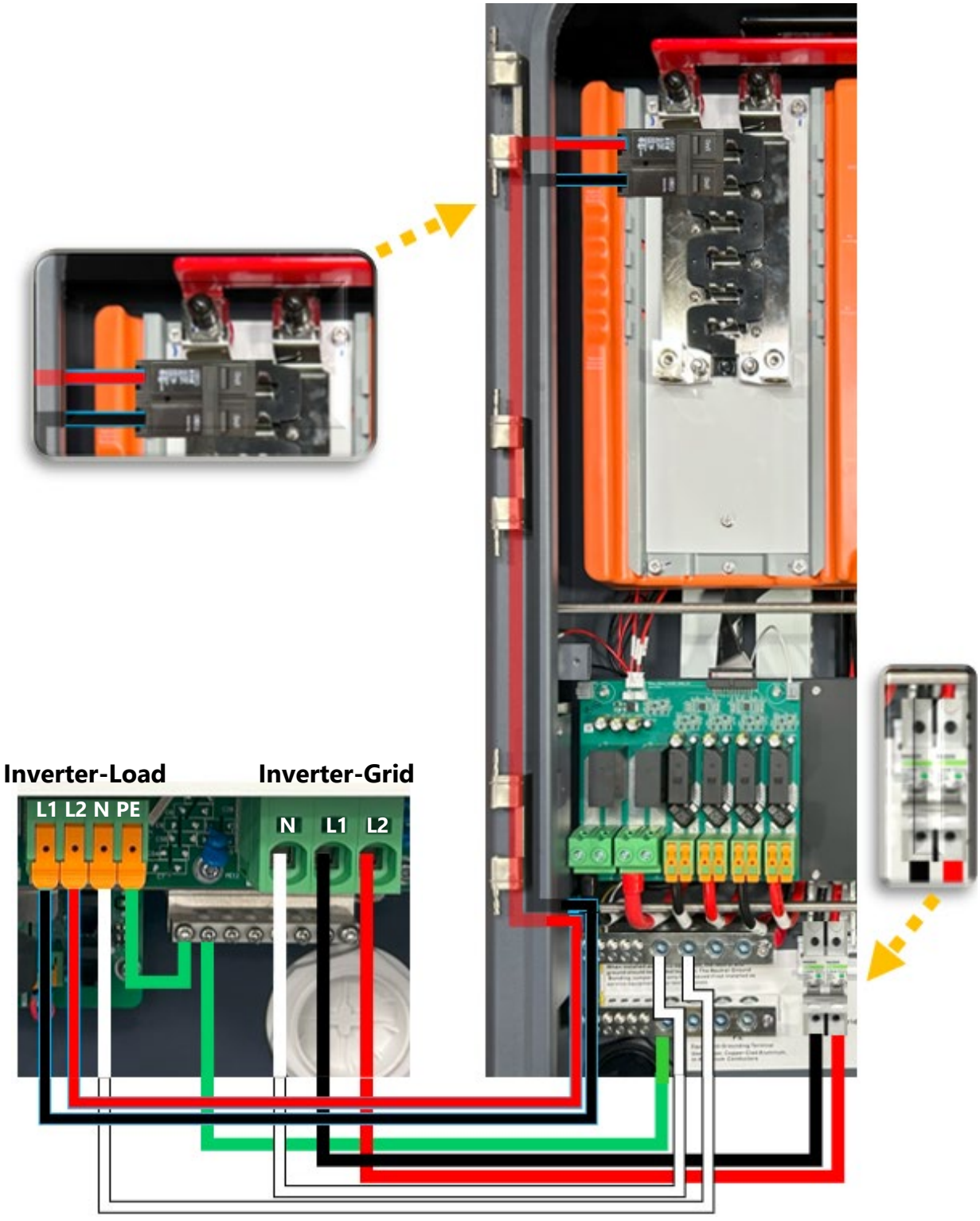


Figure 27: Inverter to SEP Interconnection

2.3 Inverter-Battery Power Interconnection

Refer to **Figure 28 and 29** for proper wiring instructions. Connect the **positive terminal** of the

battery to the **inverter's positive (BAT+) port** and the **negative terminal** to the inverter's **negative (BAT-) port**. The battery ground terminal should be connected to the ground bar in the inverter but may also be connected to the ground bar of the SEP if preferred. Ensure all connections are secured tightened and comply with installation standards before proceeding.

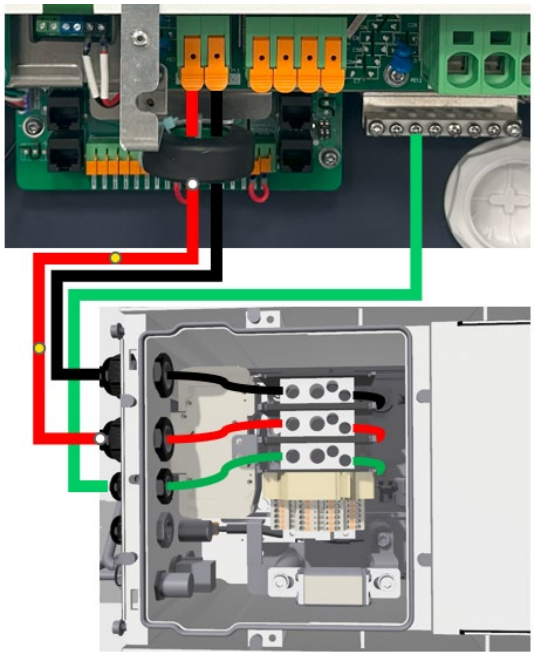


Figure 28: Common battery to inverter power and battery to inverter ground connections

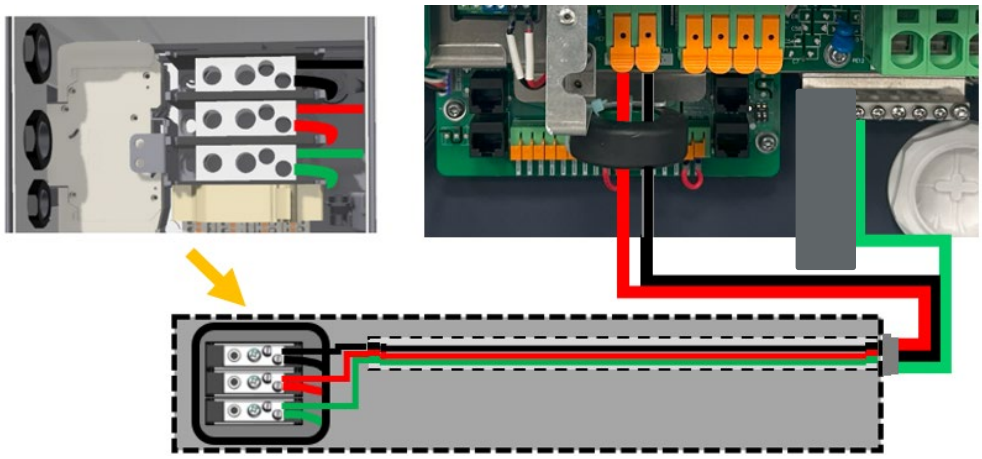


Figure 29: Alternative battery to inverter power and battery to inverter ground connections

2.4 SEP-grid Power Interconnection

Refer to **Figure 30** for proper wiring instructions. Connect the **grid L1 and L2 cables** to the **SEP busbars** or to the grid breaker in the SEP if one has been installed. Additionally, connect the **neutral and ground conductors** to their respective busbars within the SEP. Ensure all connections are **secured tightened** and comply with electrical installation standards before proceeding.

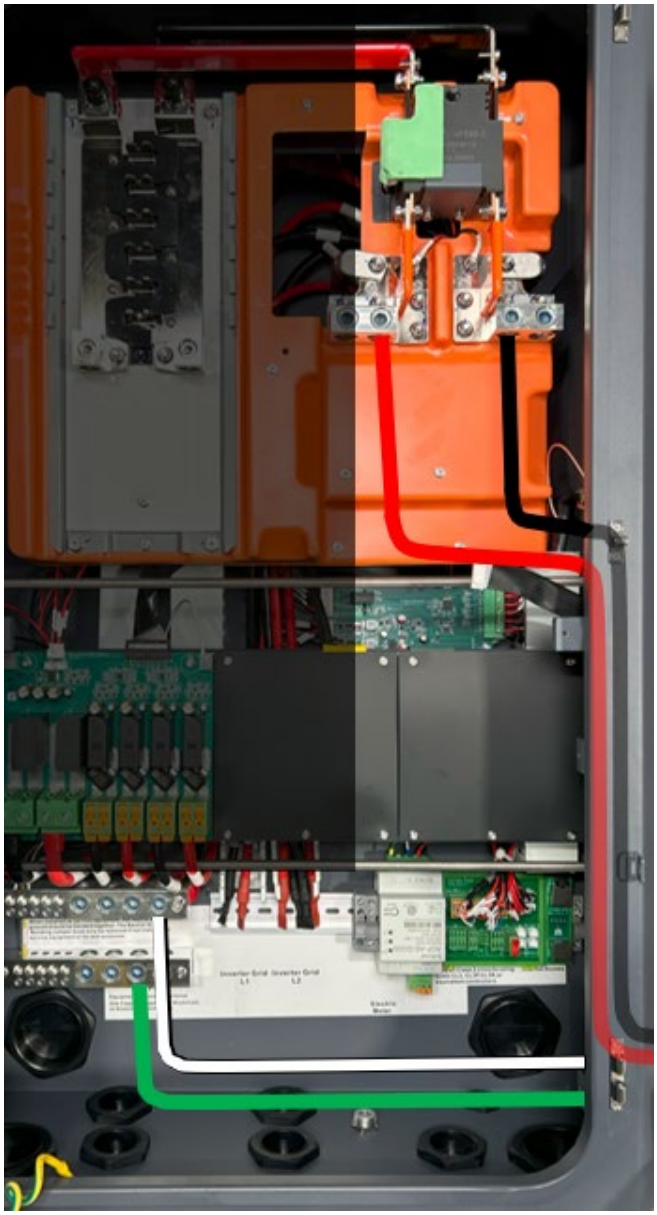


Figure 30: Inverter to Grid Interconnection

2.5 SEP-load Power Interconnection

Refer to **Figure 31** for proper wiring instructions. Connect the **backed up electrical panel's L1 and L2 cables** to the **SEP busbars** or to **the load breaker in the SEP**, if one has been installed. Connect the **electrical panel neutral to the neutral busbar in the SEP**.

Additionally, if load circuits need to be relocated to the SEP busbar, or if circuits are controlled by the load-shedding system, this work must be completed at this stage. For detailed information on load-shedding, refer to **Appendix F**.

Figure 31: Inverter to Load Interconnection

3. Interconnecting Communication Between Avalon Elements

3.1 General Information

The **Avalon ESS** includes **communication cables** for interconnecting **the inverter, SEP, and BMS**. If longer cables are required, please use **CAT5/6 STP (Shielded Twisted Pair)** cables should be used to minimize **electromagnetic interference** and ensure reliable communication.

Please note that the **diagrams provided** may differ slightly from the actual product, as **continuous improvements** are being made to enhance installation efficiency.

If, during commissioning, one or more Avalon system elements do not appear on the installer application screen, it indicates that the SEP is unable to communicate with the missing component(s). In such cases, thoroughly inspect all connections and verify the integrity of the communication cables to resolve the issue before proceeding.

3.2 Battery-to-inverter Communication

The battery-to-inverter internal communication connectivity diagram is provided in Figure 32**. The current Avalon BMS units have communication ports occupied by the adaptor connector to which the inverter to battery communication cables connect directly**. Verify all connections before proceeding with commissioning.

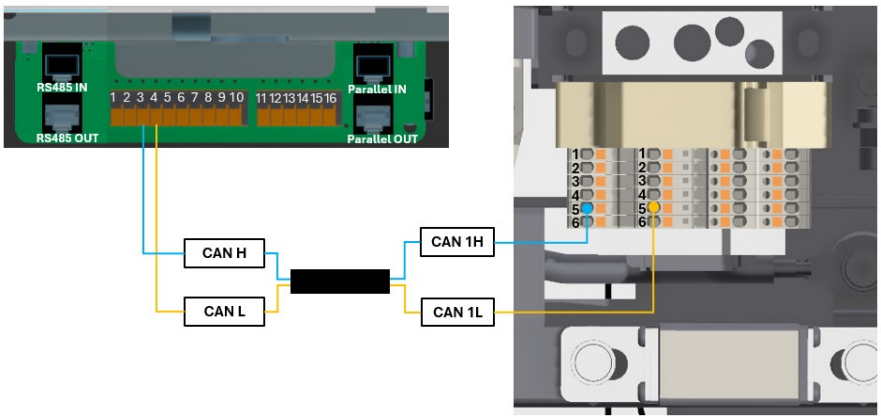


Figure 32: Battery-Inverter Internal Communication

3.3 Inverter-SEP Communication

The inverter-to-SEP communication connectivity diagram is provided in Figure 33. Refer to this diagram for proper wiring and connection of the communication cables between the battery and the inverter to ensure seamless integration into a reliable system operation. Verify all connections before proceeding with commissioning.

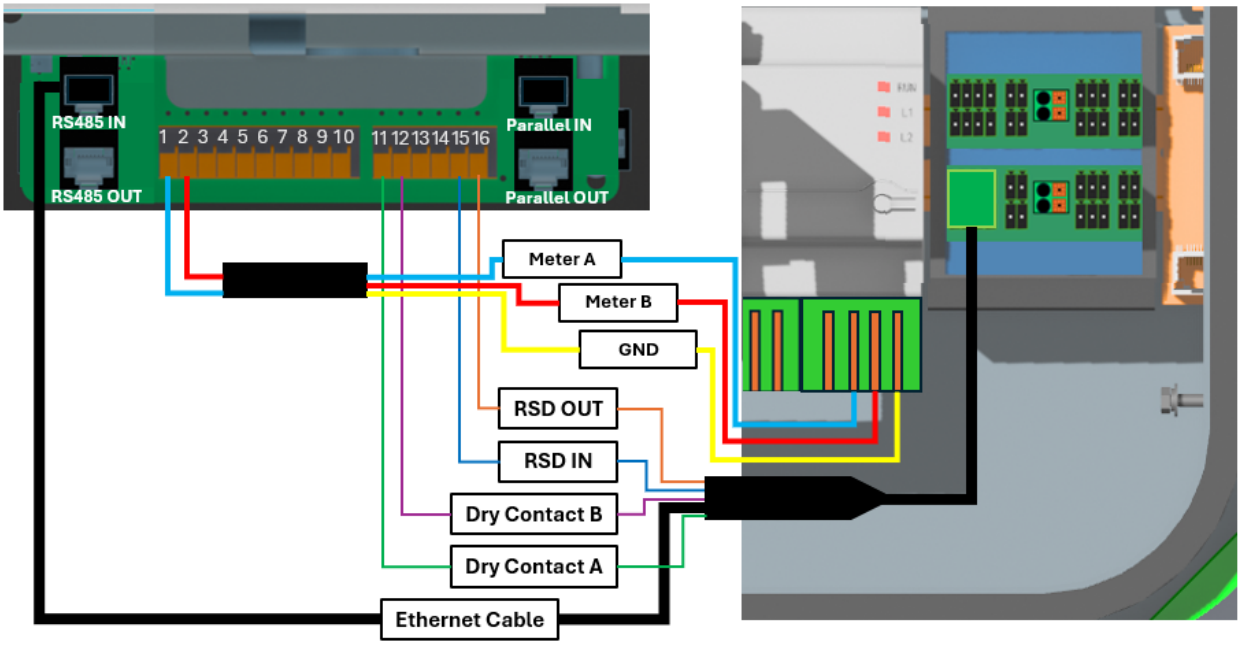


Figure 33: Inverter-SEP Communication

3.4 Battery-SEP Communication

Please note that the **battery supplies 24V DC power source** to the SEP. It is **critical** to carefully follow the **wiring diagram** provided below to ensure the correct connection and **prevent damage** that may result from **reversed polarity**. Verify all connections thoroughly before powering the system.

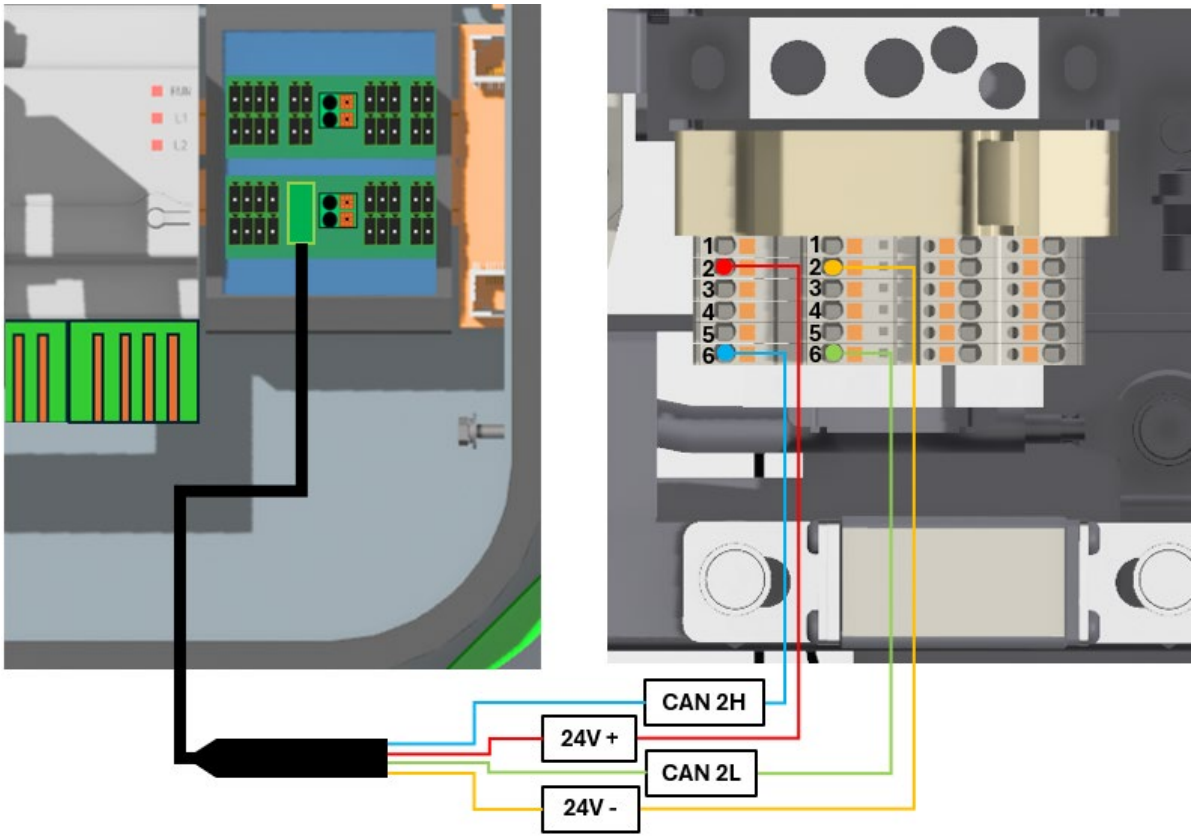


Figure 34: Battery-SEP Communication

4. System Startup

System Startup:

Before powering the system, ensure that **all tools and materials** are removed from the **system compartments**, and that all components are **clean and free of dust or debris**. Please follow the steps below to **safely power the system** and reverse this sequence to properly **de-energize** the system when needed.

1. Power on the battery:
   - Flip **ON** the battery breaker.
   - Press the **self-latching battery button** and wait for the **green battery light** to appear (approximately 3 seconds).
   - If **multiple batteries are in use**, repeat the above steps immediately for the second battery.
2. Wait for the battery power to turn on your inverter:
   a. Each battery requires a **1-minute start up sequence** before supplying voltage to the **inverter**.

   b. Confirm that your inverter(s) has/have turned on by checking the **inverter display** for a **battery symbol and a round status symbol**.
3. Set the inverter to operational mode:
   a. Turn each **inverter** to **"Inverter" mode** using **the right-hand side selector switch**.
4. Power on the SEP:
   a. Turn **ON** the **main grid breaker**.
   b. Turn **ON** the **main load breaker**.
   c. Turn **ON** the **inverter grid breaker.**
   d. Turn **ON** the **inverter load breaker.**
5. Activate the SEP and commission the system:
   a. Turn the SEP **"E-Stop"** switch to **"Run".**
   b. Select **"Commission"** on the **SEP screen.**
   c. Using the **Fortress Power Installer app**, proceed with **system commissioning**.
6. Enable additional system components (if applicable):
   a. Once **commissioning is complete**, turn ON the AC-coupled breaker, generator breaker and EV charger breaker, if these components are included in the installation.
7. Finalize the battery assembly:
   a. Install the **rubber top cover** and **plastic shrouds** for the wiring section (see Figure 35a and 35b).

After completing these steps, the Avalon ESS is fully operational and ready for use.

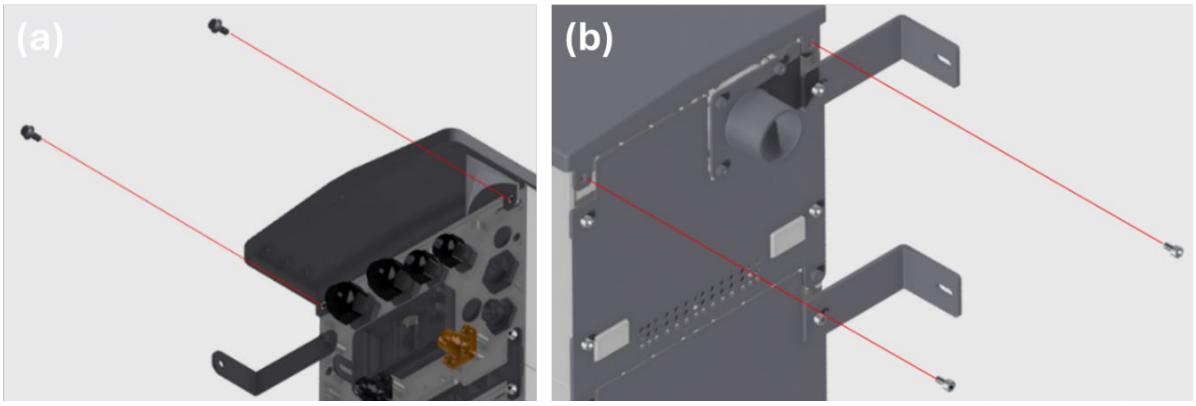


Figure 35: Battery Top Cover Installation

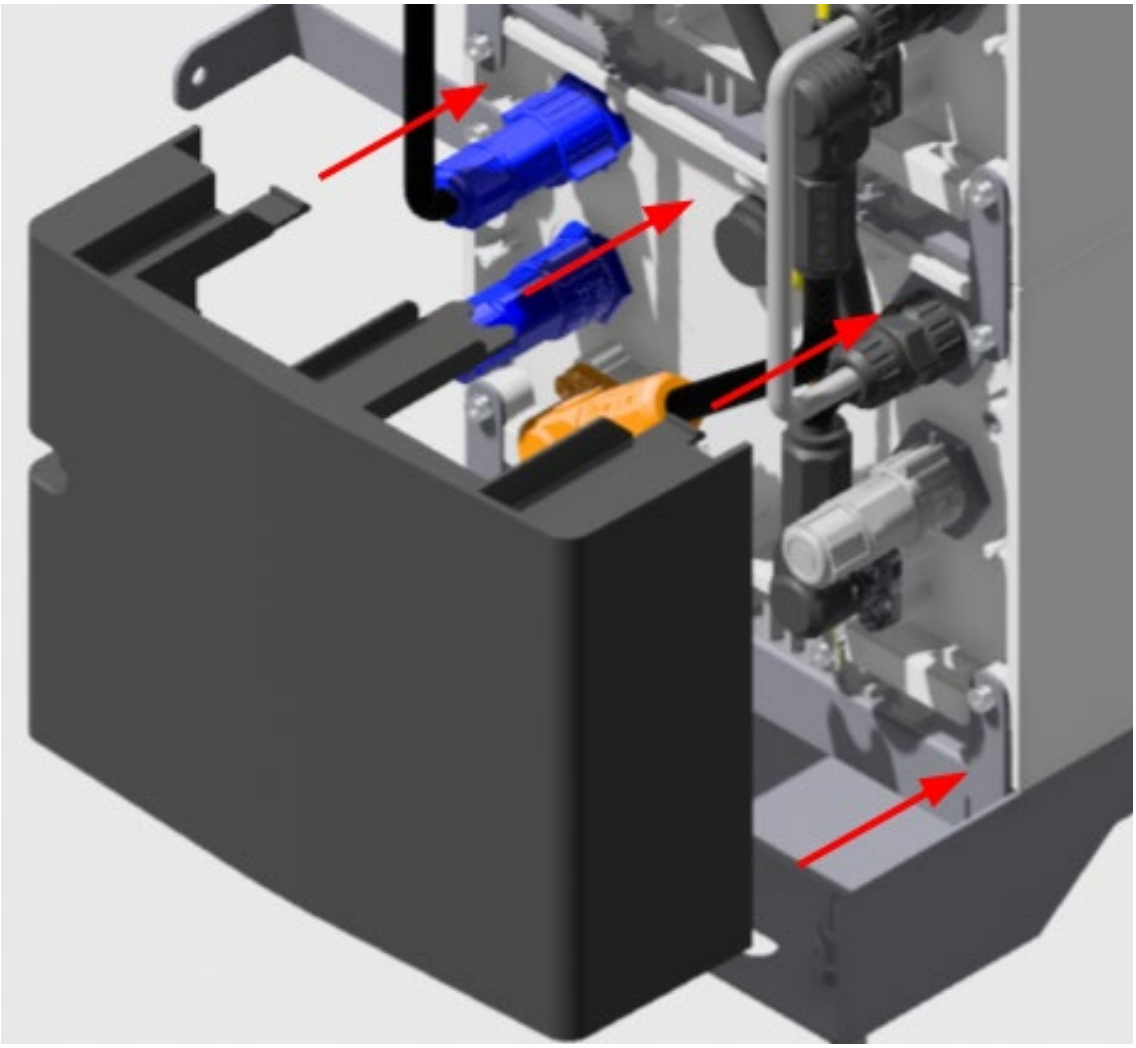
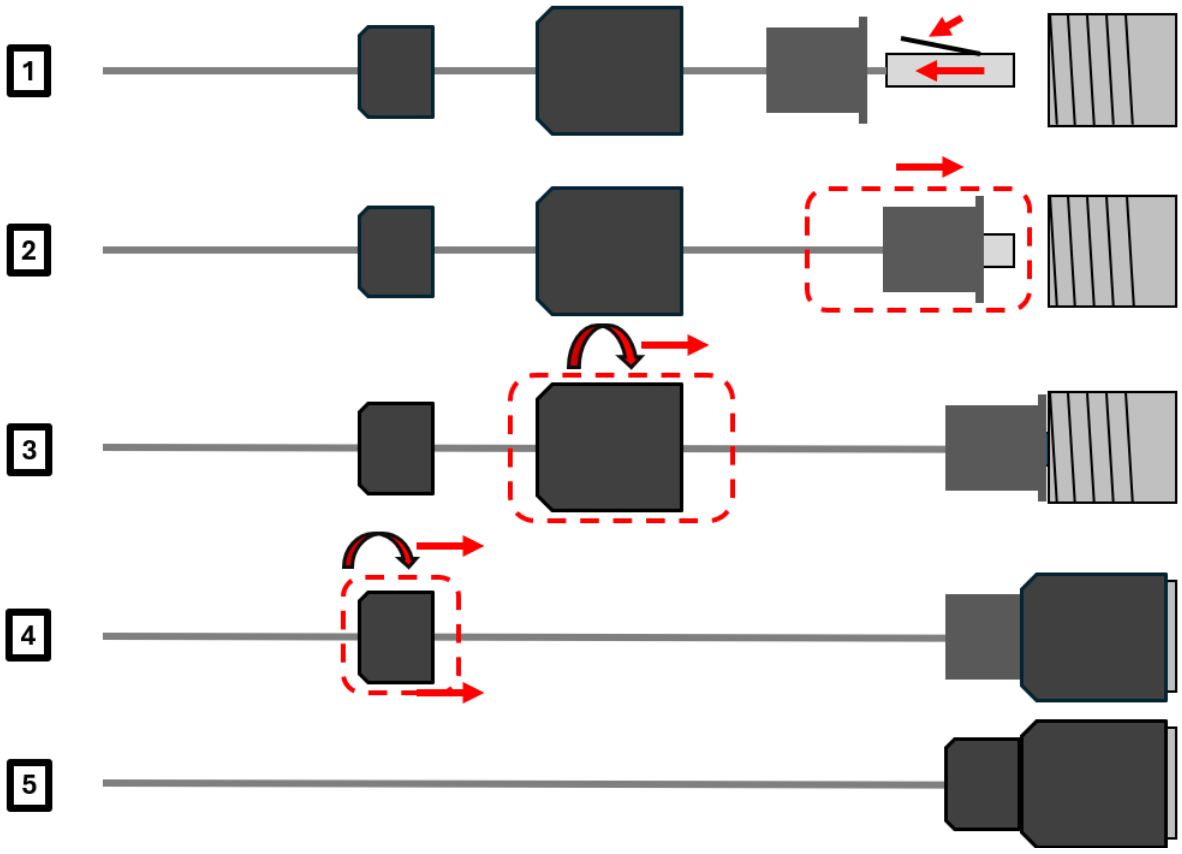
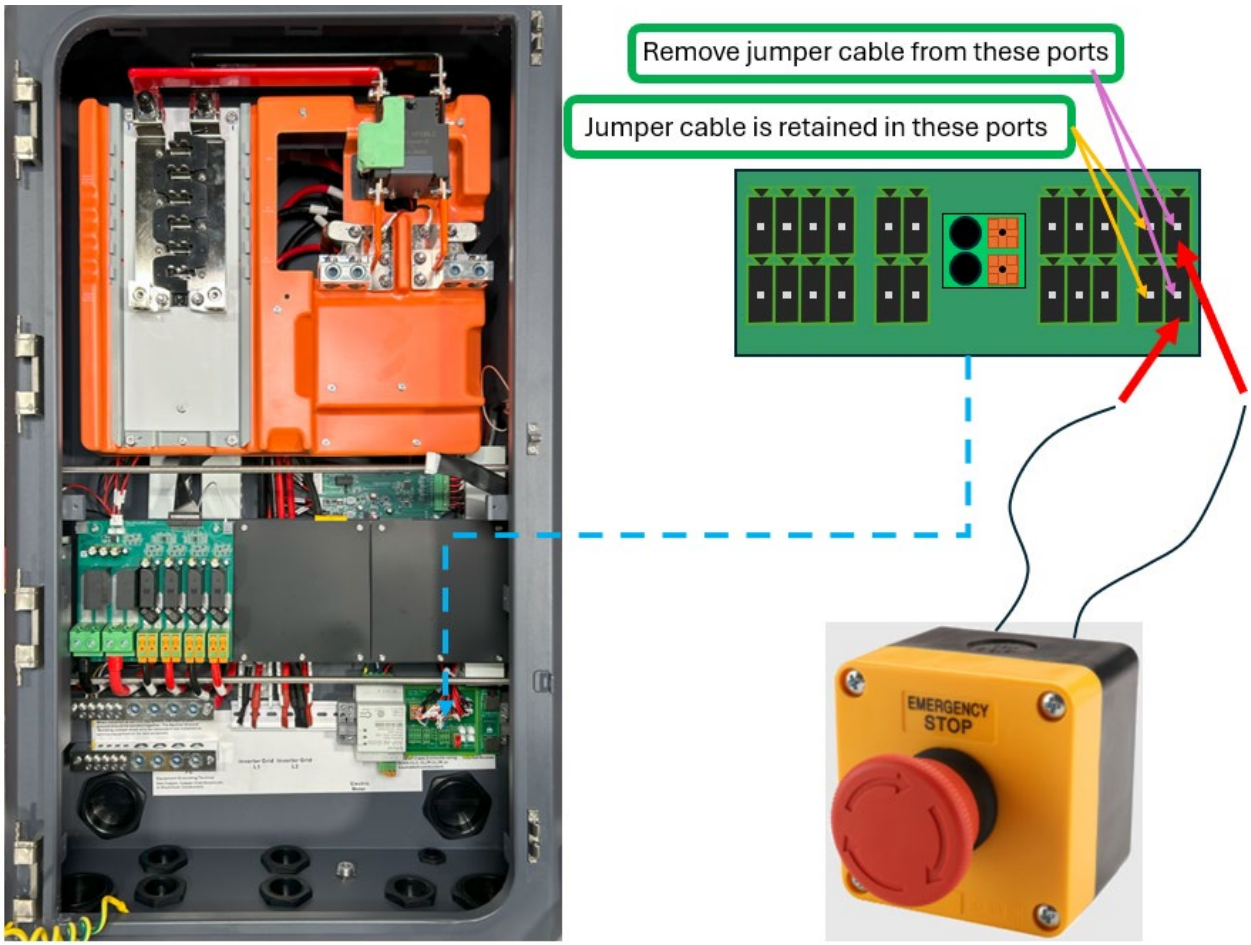


Figure 36: Battery Side Cover Installation

Appendix A: Water-resistant communication connectors



Appendix B: Additional e-Stop Switch



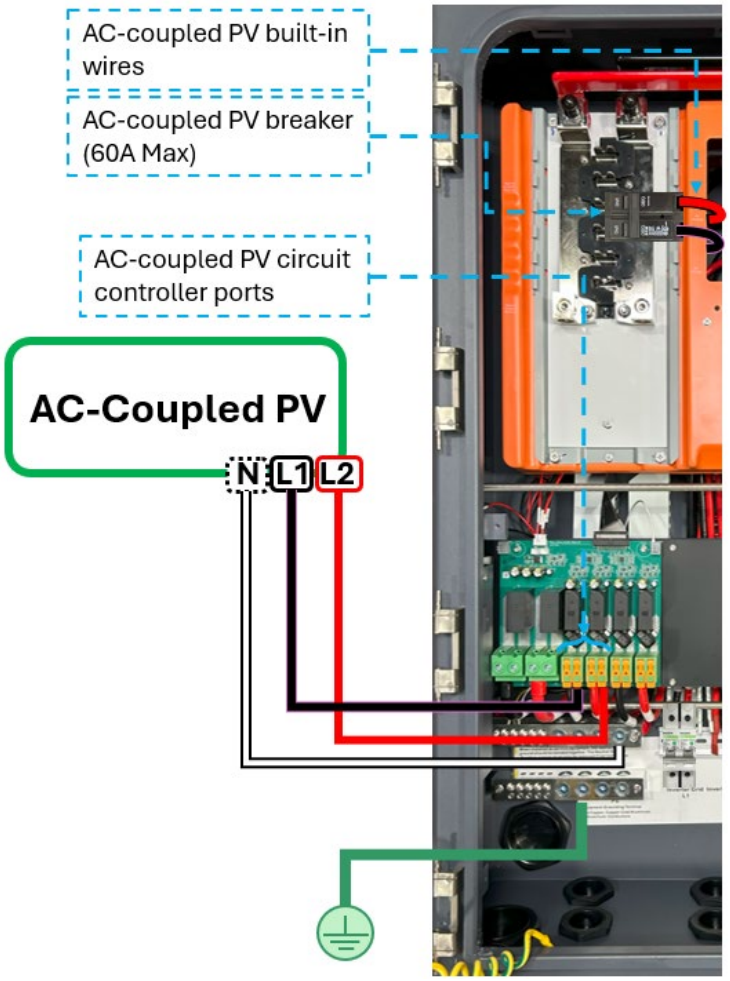
Appendix C: AC-coupled PV direct interconnection

AC-coupled PV may be connected directly to the SEP, provided that their total power output does not exceed 12kW. To achieve this interconnection, L1 and L2 should be connected to the AC-coupled circuit control contactor ports, and, when applicable, the AC-coupled PV ground should

be connected to the ground busbar within the SEP.

Once the AC-coupled PV power cables are properly connected, a breaker (Eaton BR 2 series or equivalent, 60A max) must be installed on the main busbar in the designated area in the SEP. The cable that connects the breaker to the contactor; the final step is to connect the other end of this cable to the breaker to complete the installation.

Ensure that all connections are securely tightened and comply with local electrical codes before proceeding with system commissioning.



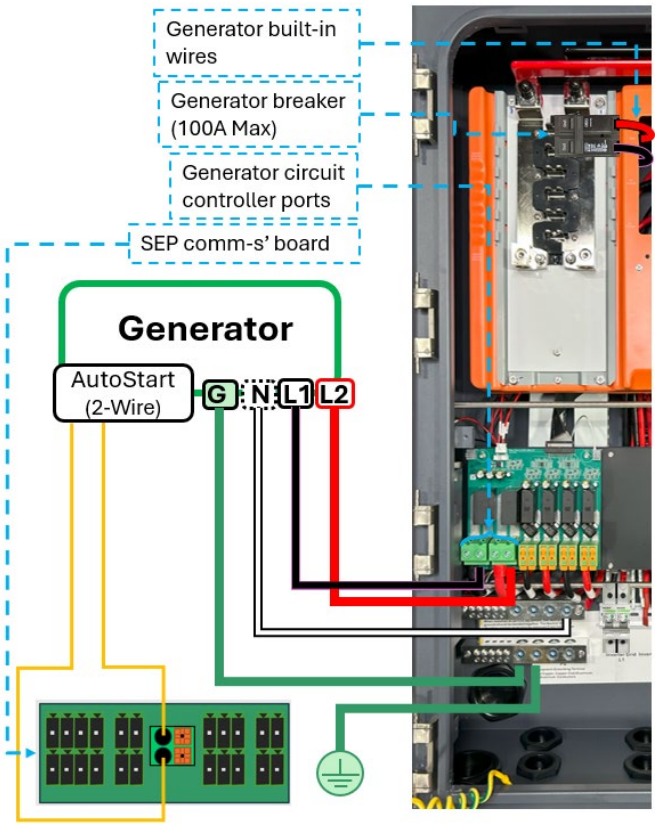
Appendix D: Generator direct interconnection

The power demand imposed on the generator by the battery bank, loads, or a combination of both must not exceed 24kW, regardless of the generator's size or rating. The latter remains true for a generator of any size and rating. To interconnect a generator with the SEP, connect L1 and L2 of the generator to the generator circuit control contactor ports, and if applicable, connect the generator ground and neutral to the ground and neutral busbars of the SEP, respectively.

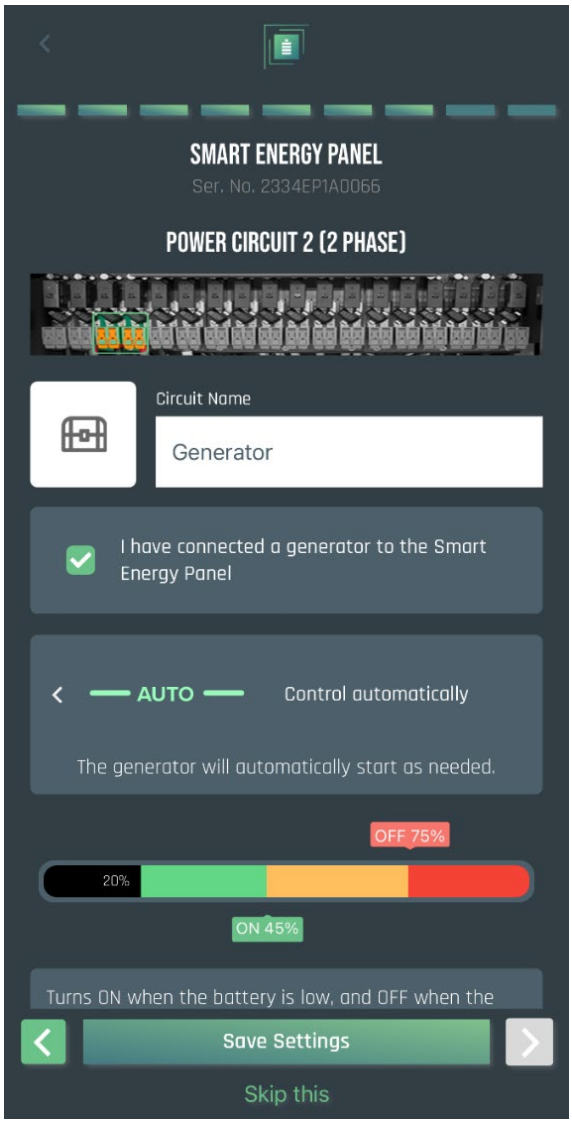
Once the generator power cables are in place, install a breaker (Eaton BR 2 series or equivalent,

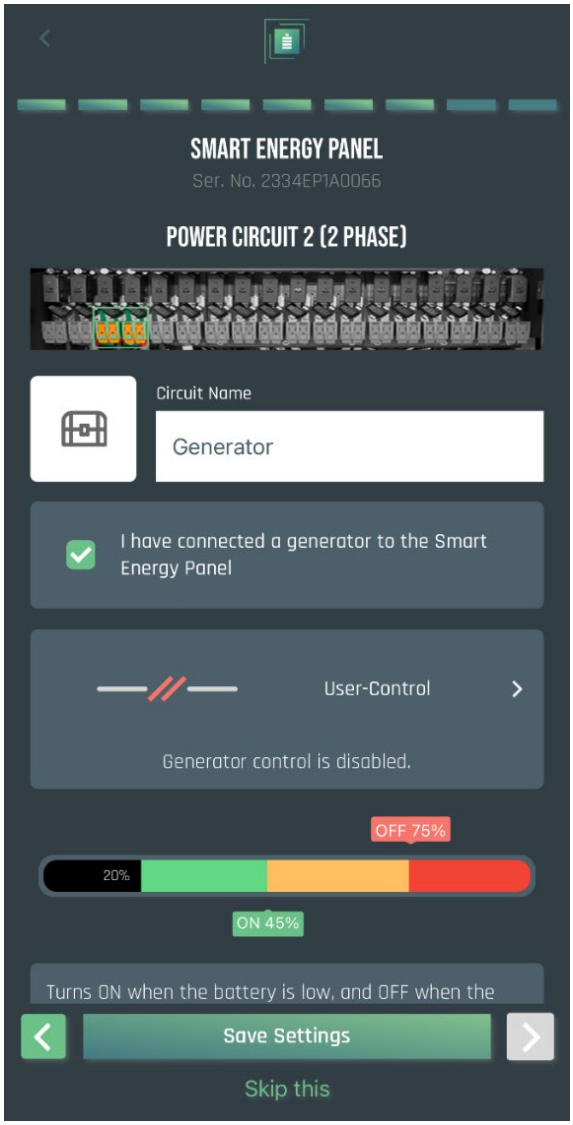
100A max) on the main busbar in the designated area within the SEP. The cable connecting the breaker to the contactor is pre-installed in the SEP and already connected to the contactor; the final step is to connect the other end of the cable to the breaker to complete the power connection.

Ensure that all connections are securely tightened and comply with local electrical codes before proceeding with system commissioning.

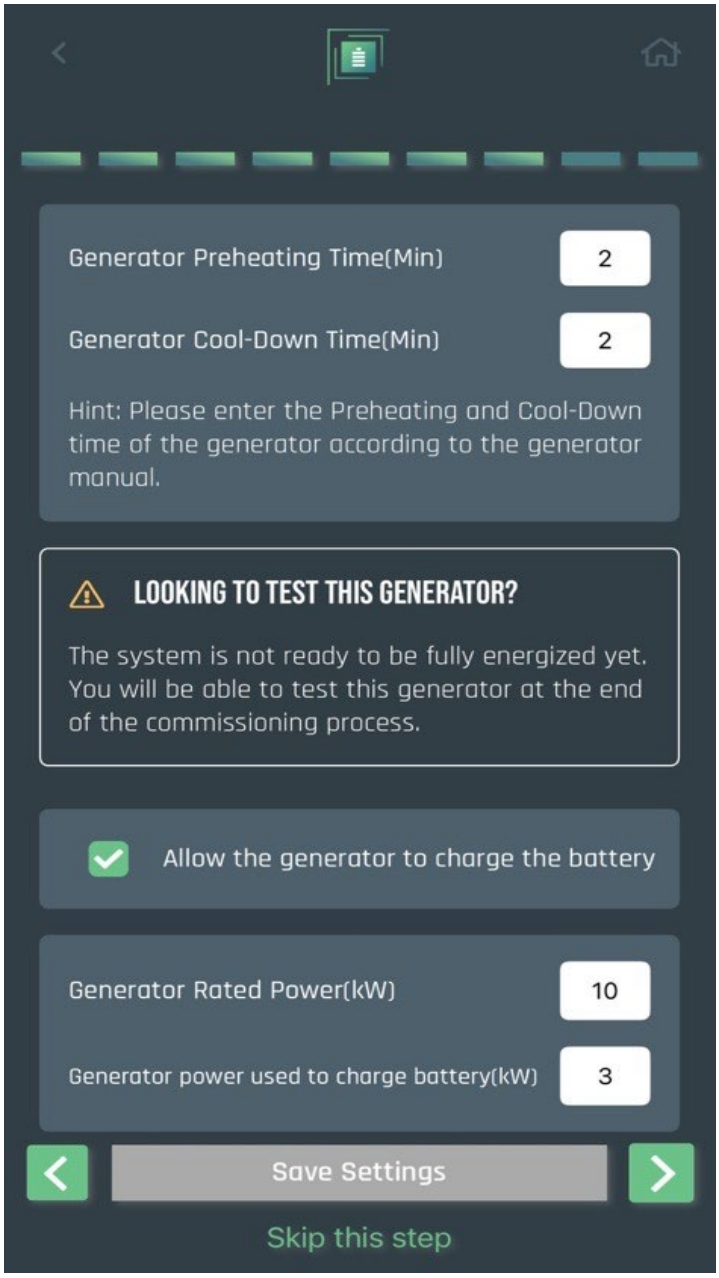


The generator can operate in either **manual start mode ("User Control")** or **auto start mode ("Auto")**. In **auto start mode**, the generator is controlled by the **two-wire start connection** to the SEP and will automatically turn **on or off** based on the battery percentage. Additionally, the **generator warm-up** and **cool-down times** can be configured through the installer app to optimize performance. It is critical to note that **if the** Avalon system is configured in **auto start mode**, **the generator must not be manually turned on,** as this may interfere with the system's automated control functions.





On the **same screen** in the installer app, the **generator size ("Generator rated Power")** and the **maximum power the battery is allowed to draw from generator output ("Generator power to charge battery")** must be specified. Configuring these settings is essential to **prevent overloading the generator** and ensure stable system operation. Properly setting these parameters allows the system to **efficiently manage power distribution** and maintain generator reliability.

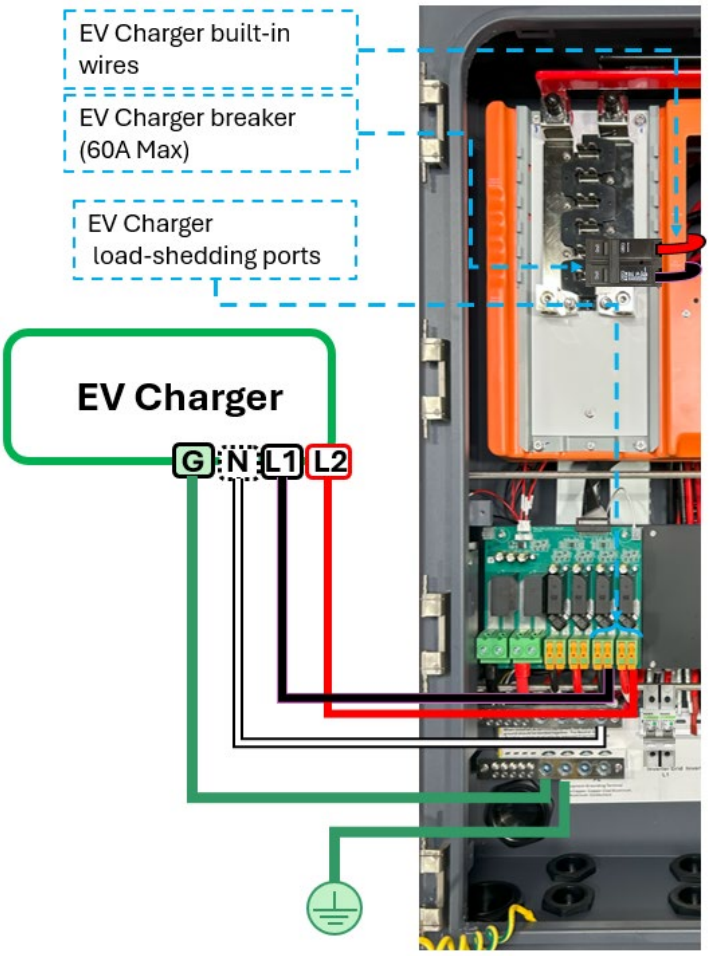

Generator Preheating Time(Min)
2
Generator Cool-Down Time(Min)
2
Hint: Please enter the Preheating and Cool-Down time of the generator according to the generator manual.
LOOKING TO TEST THIS GENERATOR?
The system is not ready to be fully energized yet. You will be able to test this generator at the end of the commissioning process.
Allow the generator to charge the battery
Generator Rated Power(kW)
10
Generator power used to charge battery(kW)
3
Save Settings
Skip this step

Appendix E: EV Charger direct interconnection

To properly integrate an EV charger with the SEP, follow these steps:

1. **Power Connections:**
    a. Connect **L1 and L2** of the **EV charger** to the **dedicated load shedding ports** in the SEP.
    b. If applicable, connect the **EV charger ground** to the **ground busbar** in the SEP.
    c. If applicable, connect the **EV charger neutral** to the **neutral busbar** in the SEP.
2. **Breaker Installation:**
    a. Install a **60A breaker (Eaton BR 2 series or equivalent)** on the **main busbar** in the designated area within the SEP.
    b. **The cable that connects the breaker to the contactor** is **pre-installed in the SEP** and already connected to the contactor.
    c. **The final step** is to **connect the other end of the cable to the breaker** to complete the power circuit.
3. **Final Checks:**
    a. Ensure all connections are securely tightened.
    b. Verify compliance with local electrical codes and safety standards.
    c. Double-check all wiring before proceeding with system commissioning.

Following these steps ensures a **safe, compliant, and efficient** connection of the **EV charger** to the **Avalon SEP system.**

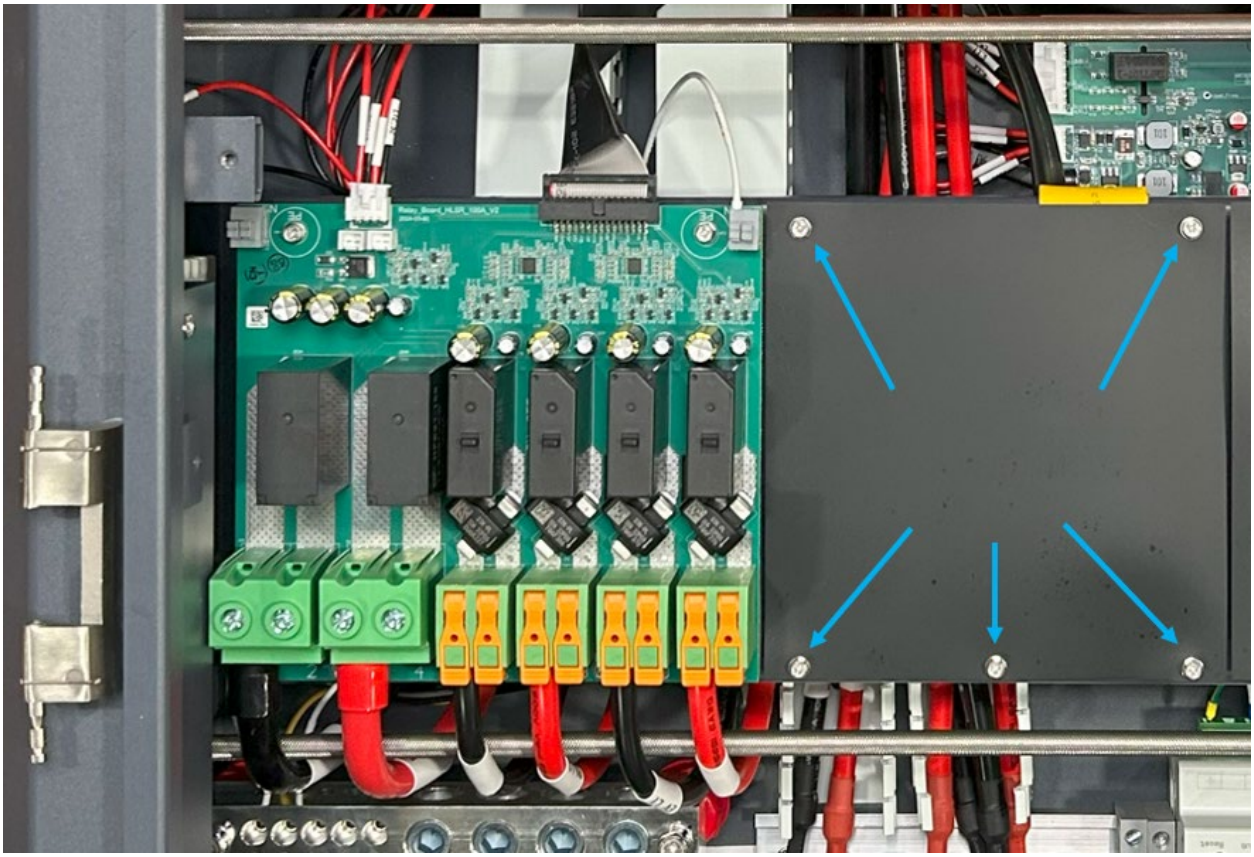

EV Charger built-in wires
EV Charger breaker (60A Max)
EV Charger load-shedding ports
EV Charger
G
N
L1
L2

Appendix F: Load Shedding

To install load a shedding board, follow these steps:

1. Remove the Black Cover:
    a. Uncover and remove the five Phillips head screws securing the black cover.
    b. This will expose the connector for the load shedding board.
2. Install the load shedding board:
    a. Position the load shedding board in place of the removed black cover,
    b. Secure the board using the same five Phillips head screws.
3. Connect the board:
    a. Release the connector from its secure position.
    b. Plug the connector into the newly installed load shedding board to complete the connection.

Ensure all screws are properly tightened and the connector is securely attached before proceeding with system commissioning.

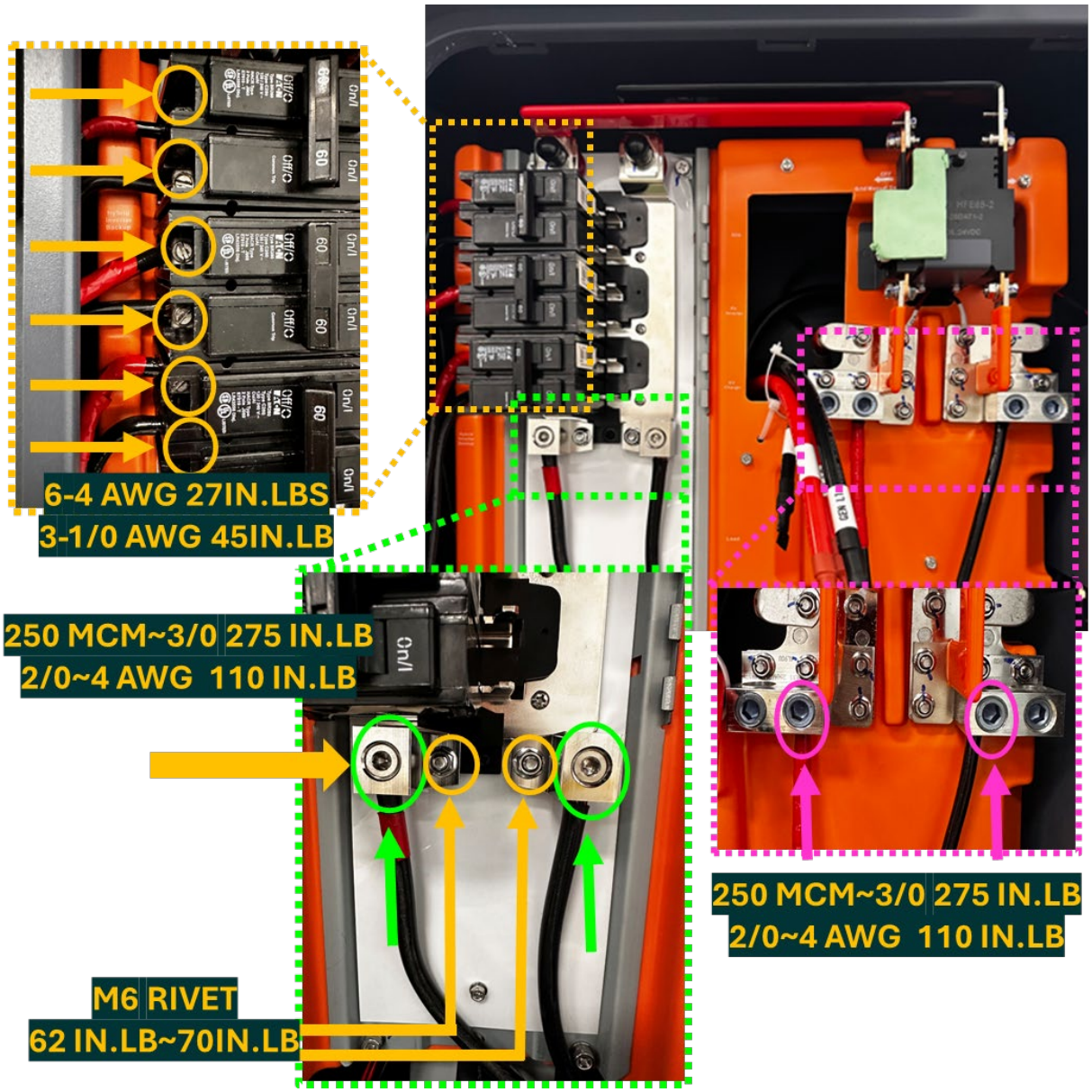


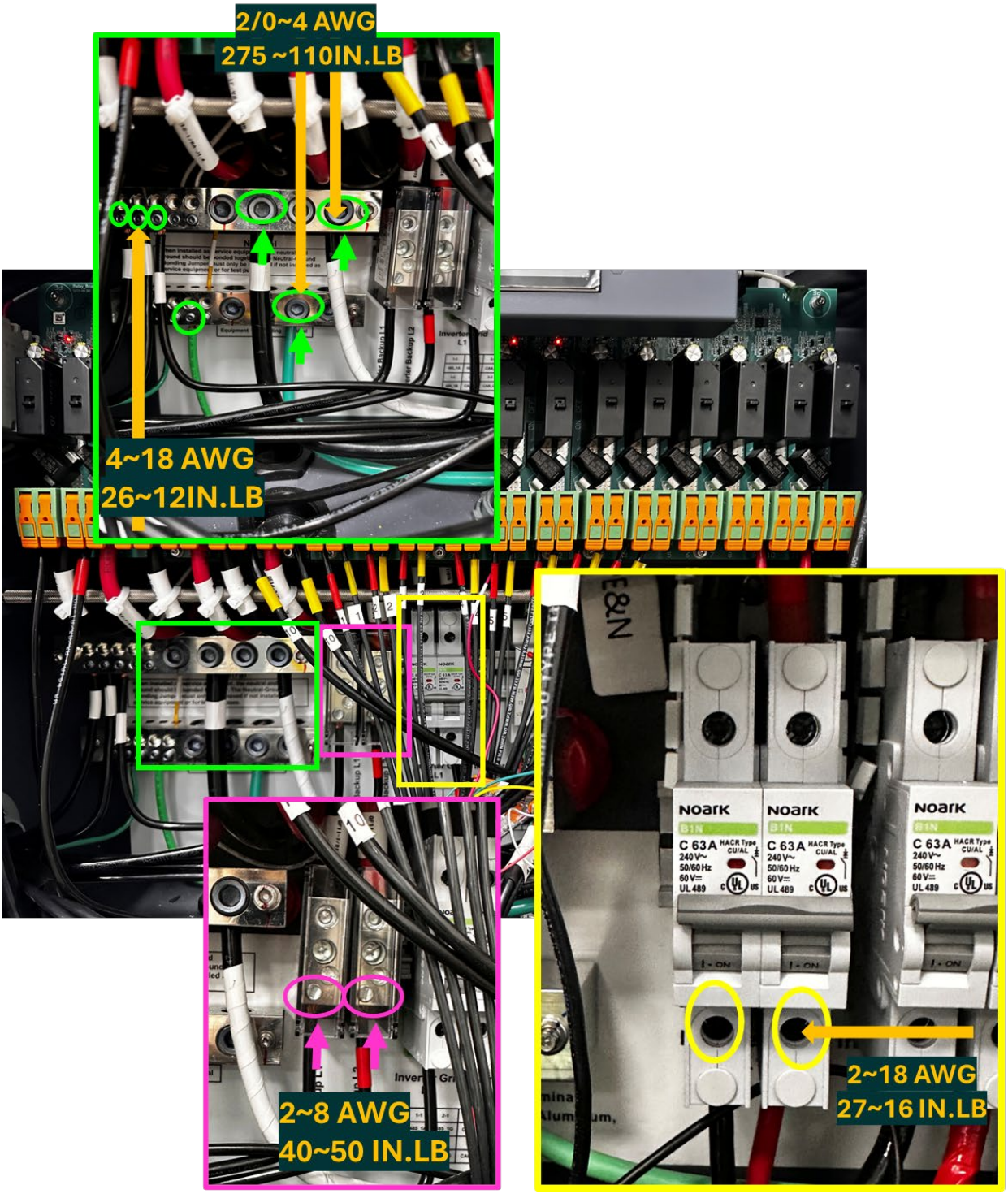

Single-Phase Load
Single-pole Load Breaker in an Electrical Panel


Split-Phase Load
Double-pole Load Breaker in an Electrical Panel

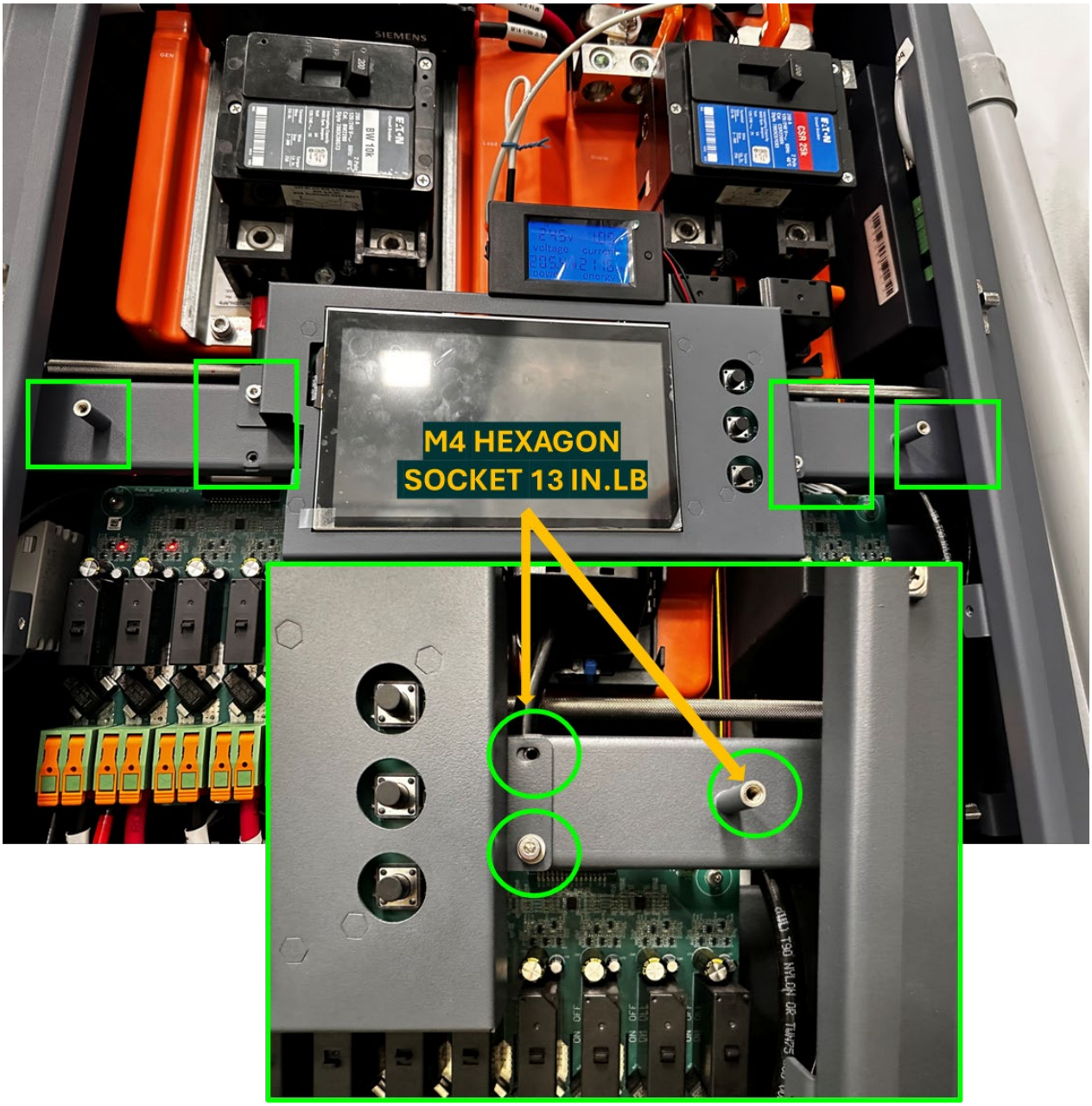
Appendix G: Torque Specifications for Screws and Bolts to assemble Avalon SEP and Inverter

Smart Energy Panel:



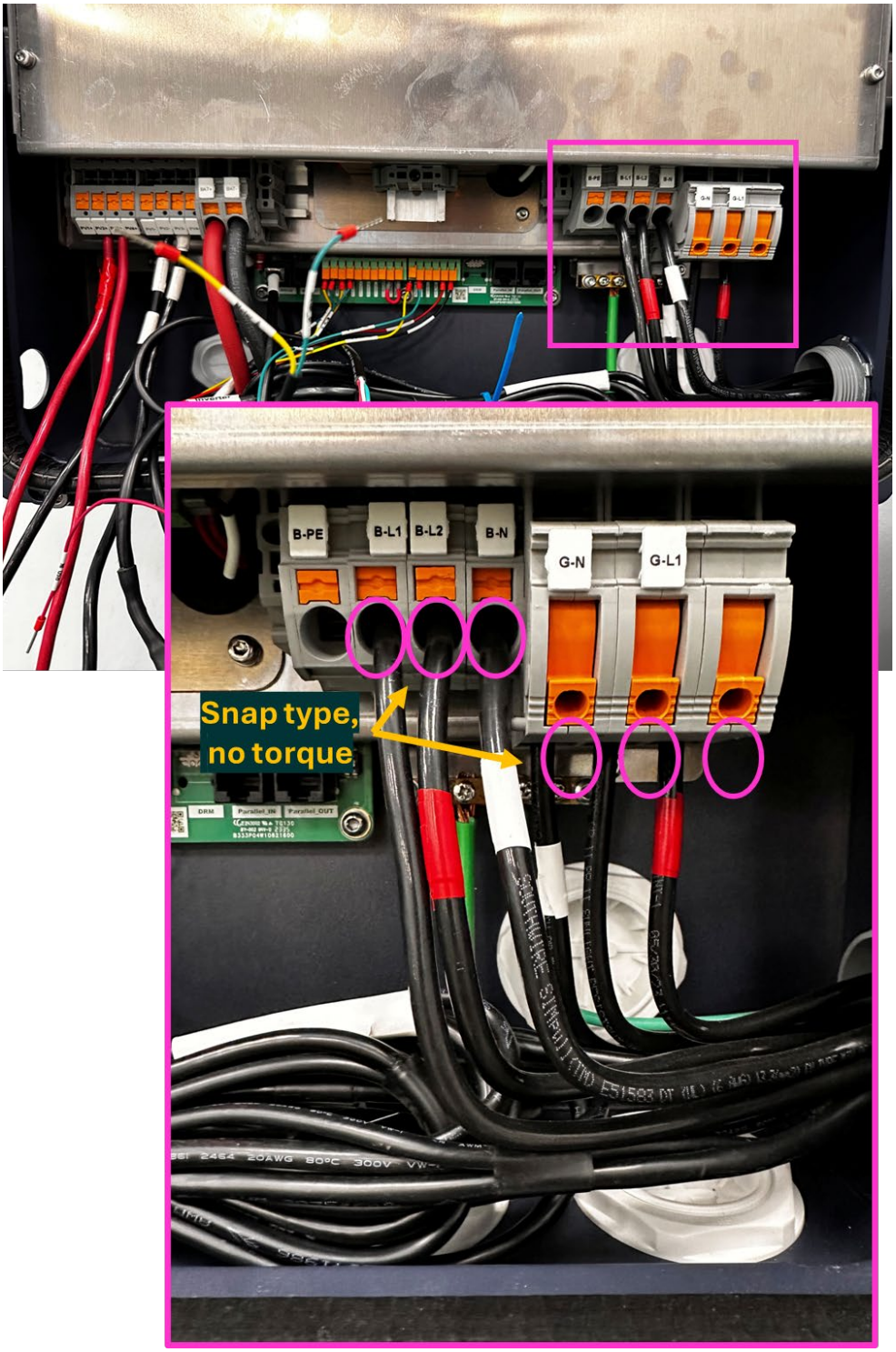

2/0~4 AWG
275 ~110IN.LB
4~18 AWG
26~12IN.LB
2~8 AWG
40~50 IN.LB
2~18 AWG
27~16 IN.LB
Noark
C 63A

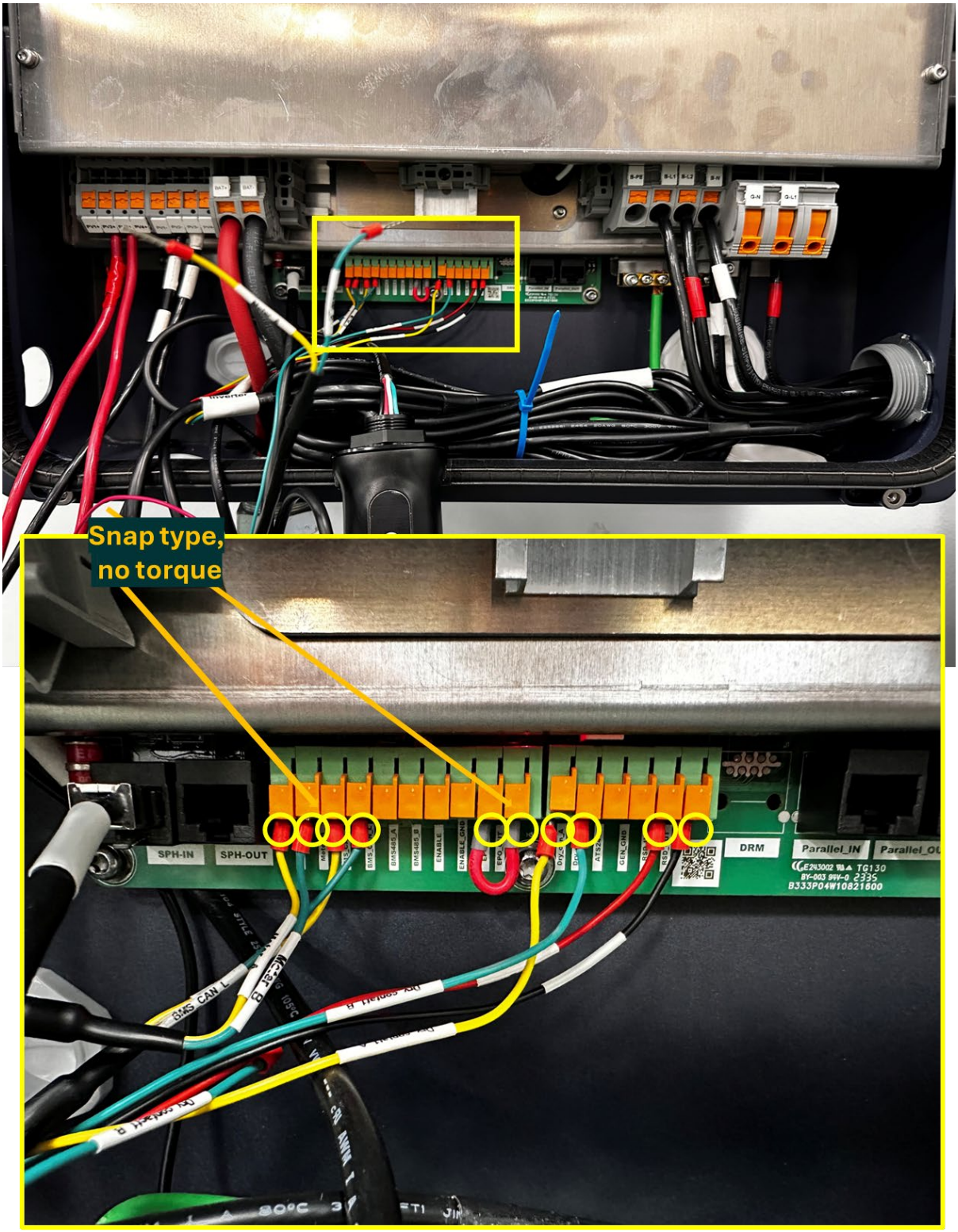

6~20 AWG
4.5 IN.LB
Snap type,
no torque

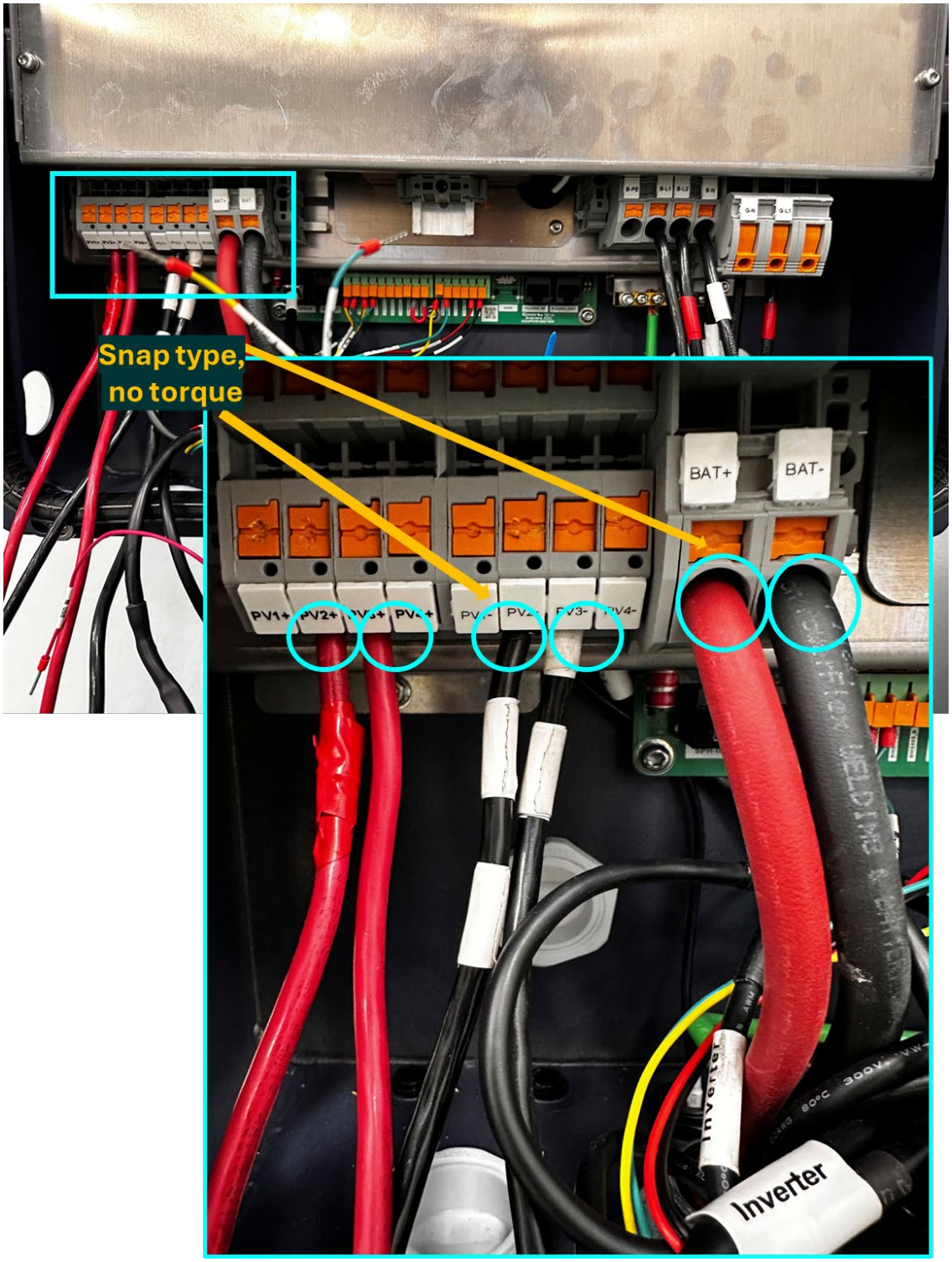

M4 HEXAGON
SOCKET 13 IN.LB


M4 HEXAGON
SOCKET 13 IN.LB
OFF
ON
Grid Manual Switch
Hybrid Inverter
GEN
EV Charger
Load
Grid In
PV Inverter
Load 01
Load 02
Load 03
Load 04
Breaker01
Breaker02

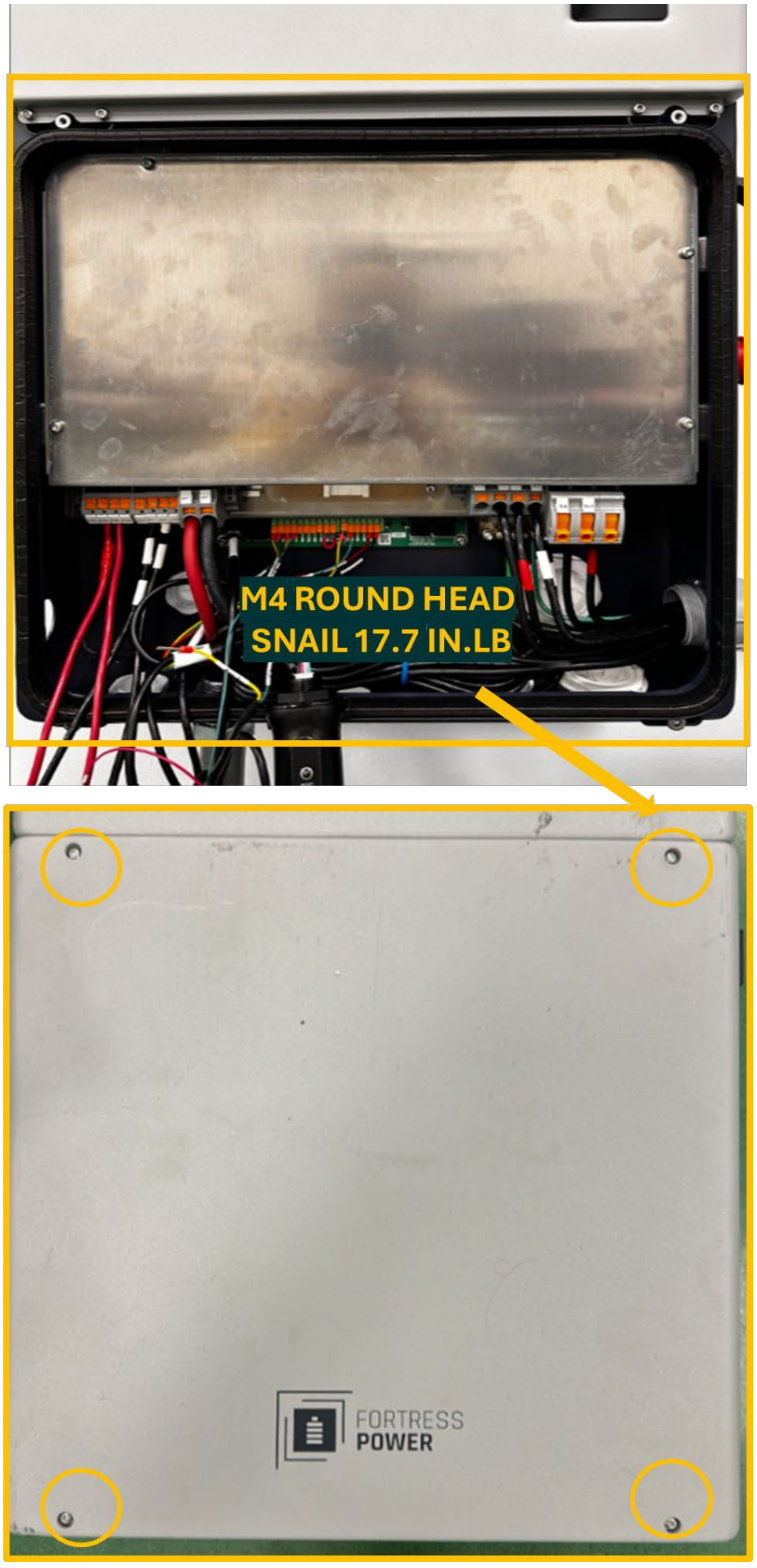
Avalon Inverter




Snap type,
no torque
SPH-IN
SPH-OUT
DRM
Parallel_IN


Snap type,
no torque
BAT+
BAT-
PV1+
PV2+
PV3-
PV4-
Inverter


M5 CROSS HEAD
BOLT 25 IN.LB


M4 ROUND HEAD
SNAIL 17.7 IN.LB
FORTRESS
POWER