POWER INNOVATIONS INTERNATIONAL

LITEON GROUP

60 kW Bi-Directional DC EV Charger
Model EVBC6060

Installation and Operation Manual

MNL222

READ THIS MANUAL CAREFULLY

SAVE ALL INSTRUCTIONS

This manual contains important information regarding Power Innovations International products or processes listed on the title page. Please read all instructions carefully before assembling, installing, or operating equipment. Keep this manual handy for easy reference.

This manual may accompany other instructional guides or manuals for standard installation and operations of the supported products. Please contact Power Innovations if you need additional guides or manuals and have not received them.

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1—Product Overview

This section provides product overview for EVBC6060, Power Innovations International 60 kW Bi-Directional EV Charger.

1.1 Introduction

The EVBC6060 is an all-in-one DC quick charger that enables up to 60kW of bi-directional charging input and output. This product also offers highly flexible and field configurable Vac input power, which accepts the most common distribution voltages, thus reducing overall infrastructure and construction costs.

This charger can also be configured to provide different charging and discharging power, totaling up to 120kW of power in and out. For example, this system could be configured to charge up to 40kW and discharge at 80kW, or vice versa, providing ultimate bi-directional flexibility to meet use case requirements.

1.2 Features and Benefits

- Highly flexible power input with no de-rating
- Bi-Directional charging
- Field replaceable rectifiers and inverters
- Demonstrated >1 Million hours MTBF PSU Topology
- IP54/NEMA 3R Enclosure
- Remote upgrades via Over-the-Air updates

1.3 Applications

- EV infrastructure and service providers
- Retail & Hospitality
- OEM test facilities
- Public & Commercial buildings
- Municipalities
- Small, Mid and Large Fleets & Depots

1.4 Charger Features Identified

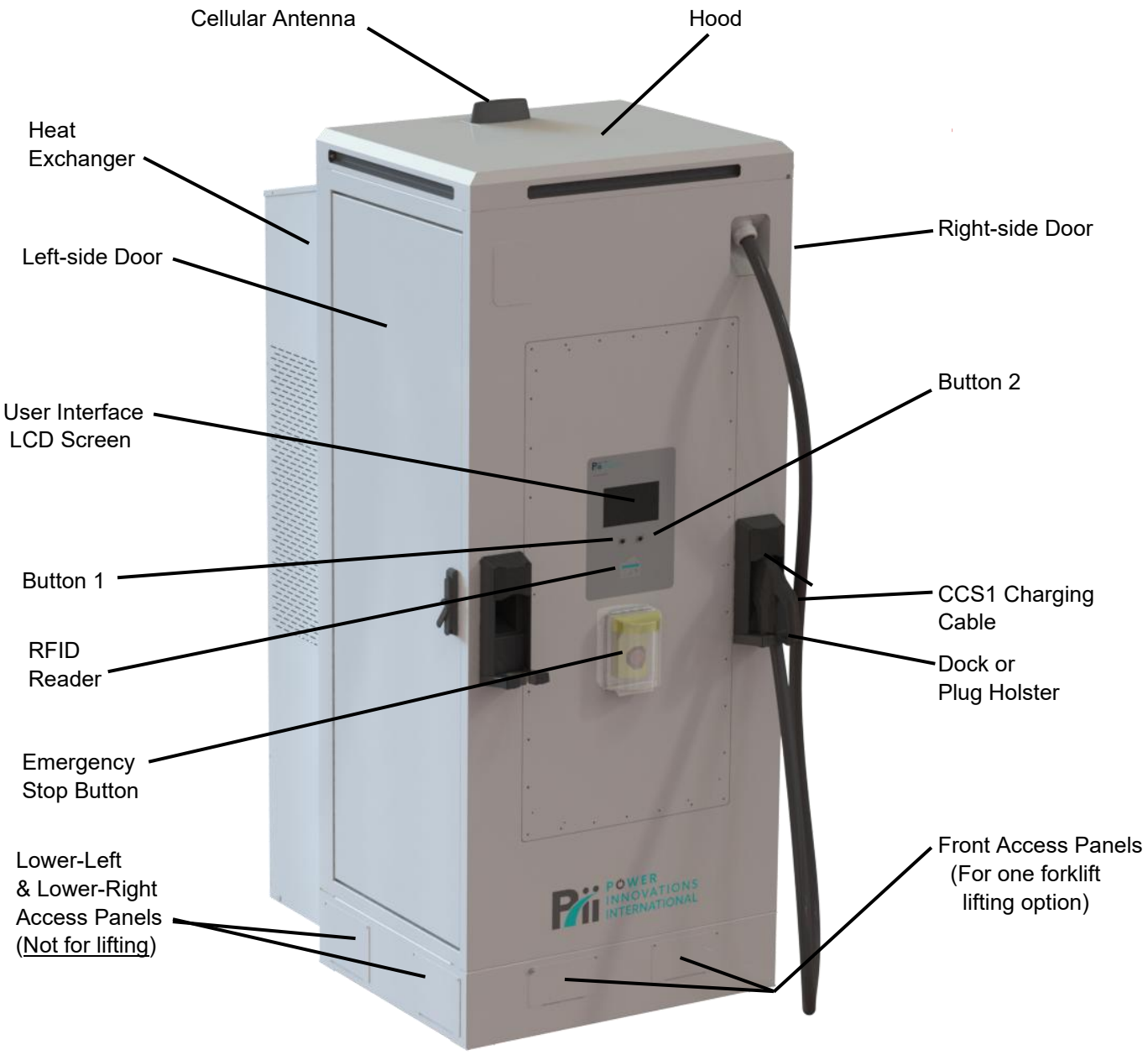


Figure 1 – 60 kW Bi-Directional DC EV Charger, Model without Cable Management shown

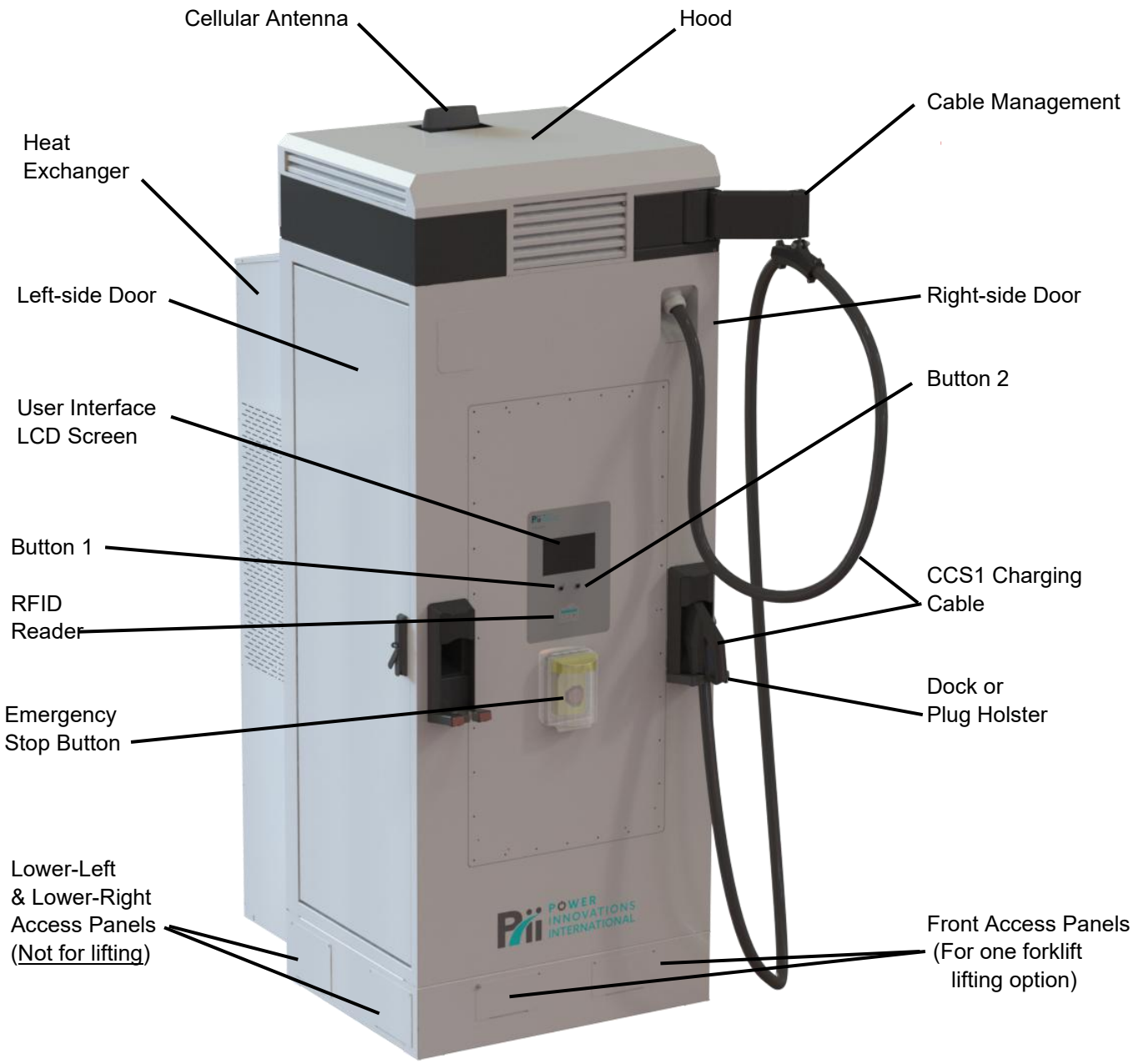
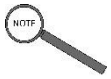


Figure 2 – 60 kW Bi-Directional DC EV Charger, Model with Cable Management shown

1.5 Symbols Used in this Manual

Icons or symbols are occasionally used throughout this manual to help identify safety warnings and other pertinent content contained here. These icons are described in the table below.

Icon	Type of Warning	Description
	**ELECTRICAL WARNINGS**	**WARNING! RISK OF ELECTRIC SHOCK!** ADDITIONAL TEXT THAT FOLLOWS THIS SYMBOL PROVIDES MORE INFORMATION ABOUT THE SPECIFIC WARNING.
	**WARNINGS**	**WARNING! RISK OF ELECTRIC SHOCK!** ADDITIONAL TEXT THAT FOLLOWS THIS SYMBOL PROVIDES MORE INFORMATION ABOUT THE SPECIFIC WARNING.
	**CAUTION!**	**CAUTION!** Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the equipment. Important safety measures may also be described in Cautions.
	**Note**	**Note** Offers practical advice that may be helpful but can be disregarded.

1.6 Acronyms Used in this Manual

Acronym	Explanation
AC	Alternating Current
ADA	American Disabilities Act
DC	Direct Current
EV	Electric Vehicle
PSU	Power Supply Unit
SC	Shelf Controller
SPD	Surge Protective Device

2—Safety and Specifications

The following safety instructions apply throughout the EV Charger installation process. Be familiar with them before moving on to the next section to complete the installation.

2.1 IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS

ELECTRICAL WARNINGS – WARNING! RISK OF ELECTRIC SHOCK!

WARNING! RISK OF ELECTRIC SHOCK!
ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS TYPE OF EQUIPMENT AND THE HAZARDS INVOLVED SHOULD ADJUST, MODIFY, AND SERVICE THIS EQUIPMENT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK!
READ THIS MANUAL THOROUGHLY PRIOR TO INSTALLING AND ENERGIZING THE EQUIPMENT. INSPECTION AND MAINTENENACE OF THIS EQUIPMENT SHOULD BE PERFORMED IN ACCORDANCE WITH THE PROCEDURES DETAILED IN THIS MANUAL.

WARNING! RISK OF ELECTRIC SHOCK!
THIS UNIT CONTAINS NO INTERIOR PARTS THAT CAN BE SERVICED WITHOUT QUALIFIED PERSONNEL. IF MAINTENANCE PROCESSES SPECIFIED IN THIS MANUAL FAIL TO SOLVE THE PROBLEM, QUALIFIED PERSONNEL MUST SERVICE THE UNIT.

WARNING! RISK OF ELECTRIC SHOCK!
THE PURPOSE OF THIS MANUAL IS TO PROVIDE YOU WITH INFORMATION NECESSARY TO SAFELY INSTALL, OPERATE, AND MAINTAIN THIS EQUIPMENT. KEEP THIS MANUAL FOR FUTURE REFERENCE.

WARNING! RISK OF ELECTRIC SHOCK!
SHUT OFF POWER SUPPLY BEFORE BEGINNING INSTALLATION ACTIVITIES OR MAINTENANCE WORK. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK!
THIS EV FAST CHARGER CONTAINS HIGH VOLTAGE POWER THAT IS POTENTIALLY DANGEROUS IF NOT HANDLED PROPERLY.

CAUTION!
The installer is responsible for conforming to all local and national electrical codes and standards applicable in the jurisdiction this equipment is installed in.

2.2 Specifications – 60kW Bi-Directional DC Charger, Model EVBC6060

Electrical Specifications	
Rated Input/Output Power	Standard Configuration: 60kW Charging & Discharging Alternate Configurations: 70/50kW & 80/40kW
AC Grid Voltage	208 or 240Vac 3-Phase Delta (3P + PE) 480/277 Vac 3-Phase Wye (3P + N + PE)
AC Current	195A maximum (208 or 240 Vac 3-phase Delta) 85A maximum (480/277 Vac 3-phase Wye)
Grid Frequency	60 Hz
Grid Isolation	Galvanic, integrated
DC Operating Voltage Range	250 to 450 Vdc; or 520 to 920 Vdc
DC Current	150A maximum
Maximum Efficiency	96%
Power Factor	0.98
Connector & Cable	CCS1 std. (NACS available), 5m (16.4 ft.) cable length
Charging/Data Protocols	DIN 70121 & OCPP 1.6J; (ISO15118-20 & OCPP 2.0.1 roadmap)
Network Interfaces	Cellular 4G LTE, Wi-Fi
Dimension and Weight	
EV Charger Dimensions (H x W x D)	88.8 x 37.2 x 43.8 in. (2257 x 946 x 1113 mm)
Ground Footprint Dimension (W x D)	35.4 x 28.7 in. (900 x 730 mm)
Ground Drill-hole Pattern, Outer Holes	32.3 x 25.2 in. (820 x 640 mm)
Weight	700 kg (1543 lbs.) fully loaded
Mounting	Floor mounted, all-in-one cabinet
Environment Specification	
Operating Temperature Range	-35°C to +50°C
Storage Temperature Range	-40°C to +80°C
Relative Humidity	Up to 95% non-condensing
Altitude - Operation	2000 m (6562 ft.)
Ingression Protection of Enclosure	NEMA 3R; IP54
Certificate/Compliance	
Certifications	Pending; Designed to UL2202, IEEE 1547.1 and UL1741-SB

3—Installing EV Fast Charger

ELECTRICAL WARNINGS – WARNING! RISK OF ELECTRIC SHOCK!

WARNING! RISK OF ELECTRIC SHOCK! SHUT OFF POWER SUPPLY BEFORE BEGINNING INSTALLATION ACTIVITIES AND BEFORE REMOVING EV FAST CHARGER'S AC SERVICE PANEL FOR ANY INSTALLATION OR MAINTENANCE WORK. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK! ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS TYPE OF EQUIPMENT AND THE HAZARDS INVOLVED SHOULD ADJUST, MODIFY, AND SERVICE THIS EQUIPMENT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK! DO NOT CONNECT POWER SUPPLY TO THE EV FAST CHARGER UNTIL THE WIRING AND BUS BAR CONFIGURATION IS COMPLETE AND THE AC SERVICE PANEL IS IN PLACE AND SECURE.

3.1 What's Provided with this Bi-Directional Charger Model

Qty.	Model EVBC6060 Component(s) Included
1	60 kW Bi-Directional DC Charger, fully assembled exterior
14	Shelf Controllers (SCs)--2 of 14 reserved for on-board HVAC heat exchg. shelves
21	3.3kW Rectifier Modules (Blue locking tabs) --3 of 21 dedicated to on-board HVAC heat exchanger shelves
18	3.3kW 400V or 800V Inverter Modules (may have White or Teal locking tabs)
3	3.3kW 400V Inverter Modules (White locking tabs), --3 of 3 dedicated to on-board HVAC heat exchanger shelves
2	Configuration Bus Bars: 208V/240V Delta or 480V Wye
4	Eye Bolts, threaded
8	Wedge Anchors, ½ in. x 3 ¾ in.
4	Plastic Phase Barriers (for AC Input Panel)
3	Copper Extensions with ½ in. nuts and washers (for use with Chair/Box Lugs [not provided])
1	Manual MNL222, "*60 kW Bi-Directional DC Charger, Model EVBC6060, Installation and Operation Manual*" (this document)

3.2 Additional Tools and Supplies Required

- Level
- Pencil or Marker
- Tape measure
- Electrical Conduit and Wires
- Hand Drill
- (Optional) Cable Gland, sized appropriately for AC input cable
- (Conditional on AC Input Wiring) Set of 3:
  -Suitable Chair/Box Lugs
  -½ inch Bolt
- T27 Torx driver
- Metric Allen wrench set
- Duct Seal (Recommended)
- Silicon Caulk

3.3 Plan and Prepare Installation Site Layout

1. Do not install or plan to install the fast charger in a hazardous location.

ELECTRICAL WARNING – WARNING! RISK OF ELECTRIC SHOCK! DO NOT INSTALL OR PLAN TO INSTALL CHARGER IN A HAZARDOUS LOCATION.

2. Become familiar with the charger's recommended (green) cable reach areas shown in Figure 3 for charger models without and with cable management, then select the parking stall layout needed for this installation.

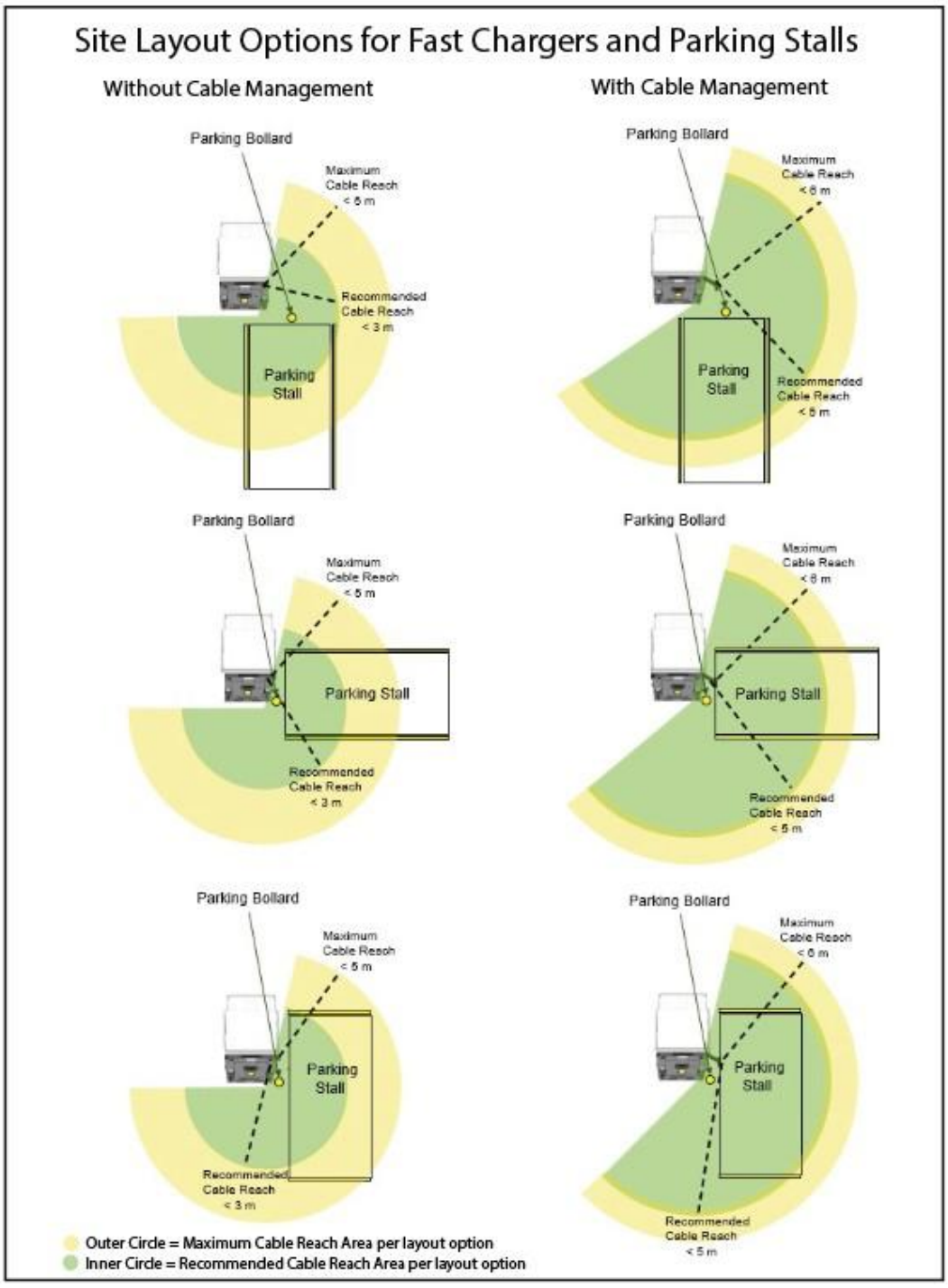
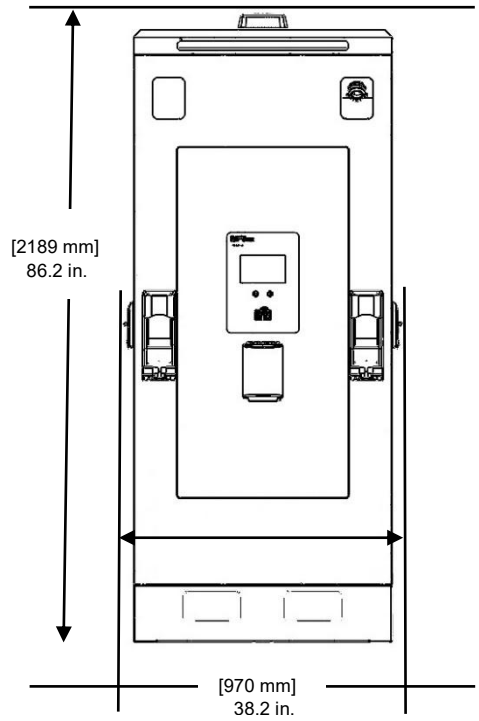


Figure 3 – Layout options for Fast Charger's Parking Stalls showing Cable Reach areas

3. Become familiar with essential dimensions of the 60 kW Bi-directional EV Charger Model EVBC6060, as shown in Figure 4.1 (without cable management) and 4.2 (with cable management)



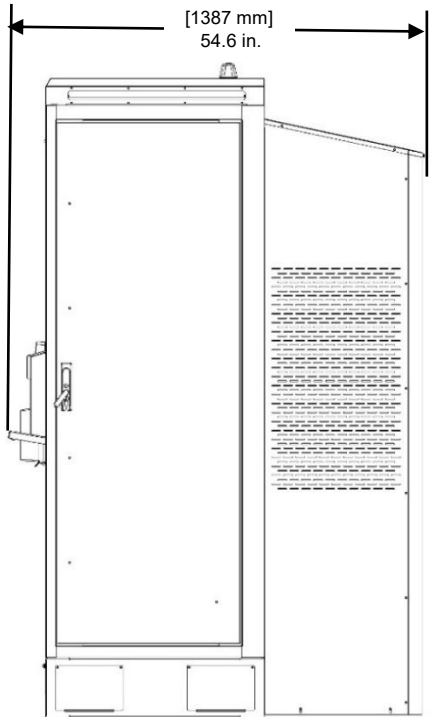
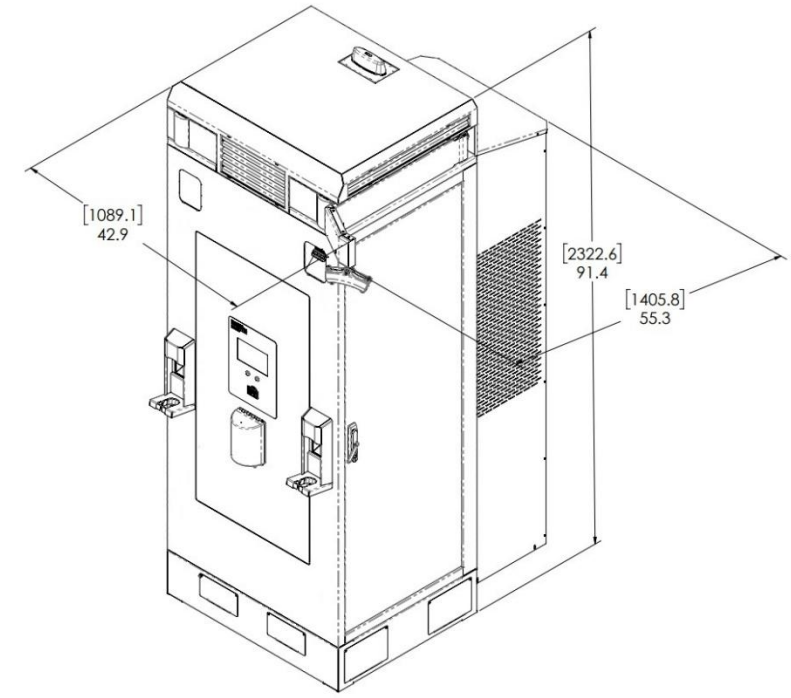


Figure 4.1 – Dimensions of 60 kW Bi-directional charger WITHOUT cable management



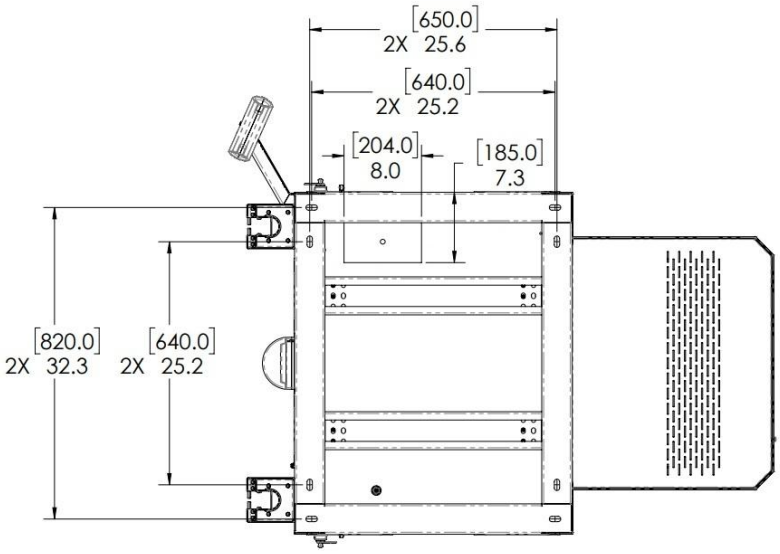


Figure 4.2 - Dimensions of 60 kW Bi-directional charger WITH cable management

4. Complete the layout plan that adheres to the following list:

Note: The following are suggested practices only. Refer to the local codes for site preparations and installation.

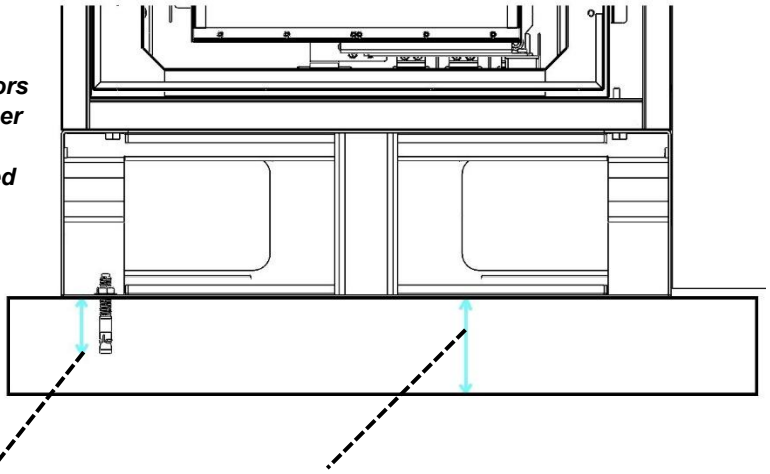


Figure 5 - Wedge anchors secure charger to concrete when installed in concrete 2.75 in.

Best Practices for Installation Site

(a) Select location where charger will not be in direct sunlight.

(b) Charger should be mounted on a concrete pad or driveway that is 4 inches thick or thicker. The wedge anchors will secure the charger to the concrete when the anchors are installed to a depth of |2.75 inches (7.2 mm) and secured. (Figure 5).

(c) When laying out placement of 2 or more chargers, ensure the minimum space between chargers will be 1067 mm (42 inches) to help ensure proper user accessibility around each charger (Figure 6).

(d) When laying out placement of each charger, ensure the back of the charger will be at least 915 mm (36 inches) away from any wall or other structure to allow heat exchanger to function as designed.

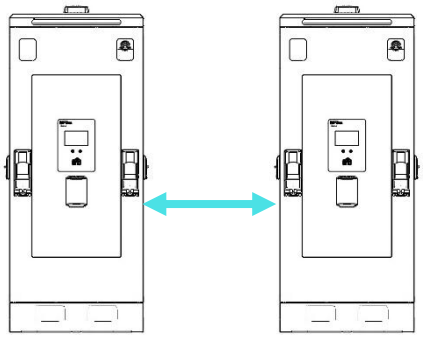


Figure 6 – Minimum space between chargers is 42 inches (1067 mm)

5. Pre-mark concrete for charger placement using measurements provided in Figure 7. Be sure to include at least the outer footprint, inner footprint, and teal rectangle area. The teal rectangle shows recommended area for AC power-in conduit/cable to emerge from concrete. Anywhere inside charger's inner footprint is acceptable if the conduit is close to ground level and cable is long enough to be re-routed to the charger's right-front corner. But the teal rectangle area has the large opening left by the removeable plate.

Outer Footprint Dimensions = 35.4 x 28.7 inch (900 x 730 mm
Inner Footprint Dimensions = 29.1 x 22.4 inch (740 x 570 mm)

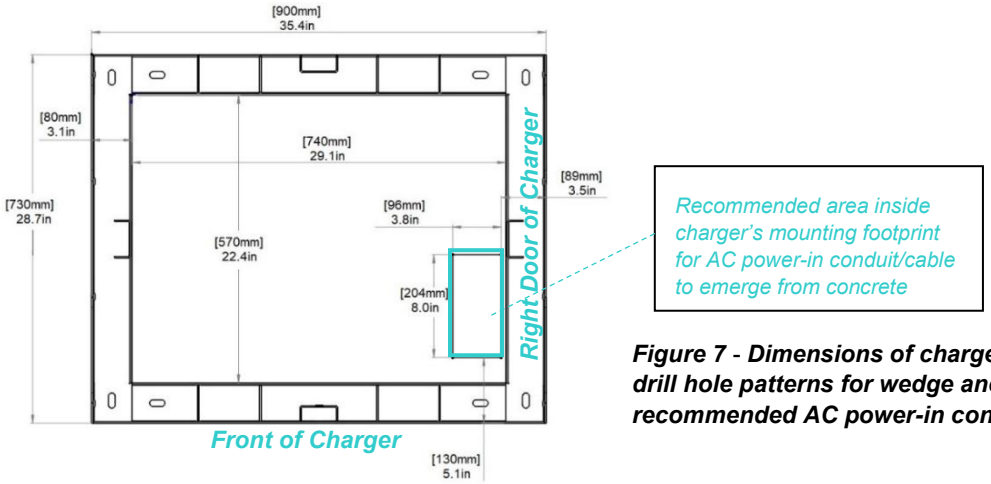


Figure 7 - Dimensions of charger footprint, drill hole patterns for wedge anchors, and recommended AC power-in conduit/cable area

3.4 Mount Charger Cabinet onto Concrete Pad or Driveway

ELECTRICAL WARNINGS – WARNING! RISK OF ELECTRIC SHOCK!
WARNING! RISK OF ELECTRIC SHOCK! SHUT OFF POWER SUPPLY BEFORE BEGINNING INSTALLATION ACTIVITIES AND BEFORE REMOVING EV FAST CHARGER'S AC SERVICE PANEL FOR ANY INSTALLATION ACTIVITY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK! DO NOT PROVIDE LIVE POWER TO THE EV FAST CHARGER UNTIL THE WIRING AND BUS BAR CONFIGURATION IS COMPLETE AND THE AC SERVICE PANEL IS IN PLACE AND SECURE.

CAUTION! - This EV Bi-Directional charger weighs about 1466 lbs. (665 kg) before installation and 1543 lbs. (700 kg) after fully loading with rectifier modules, inverter modules, and shelf controllers (SCs). To help avoid injury, use a crane or forklift AND lifting partners when lifting/moving charger onto wedge anchors.

CAUTION! - Do not attempt to put forklift forks in any of the side panel openings at the bottom of the charger (see red X's in Figures 14-15). The forklift forks should only be inserted into the 2 open front panels of the charger to avoid damaging the charger.

1. Ensure AC power-in to EV Fast charger installation location is turned OFF at site's upstream AC breaker.
2. Route AC power-in conduit / cable up through concrete pad or driveway within pre-marked rectangles of charger's footprint (Figure 8), leaving sufficient cable length to route cable up front-right corner of mounted charger.

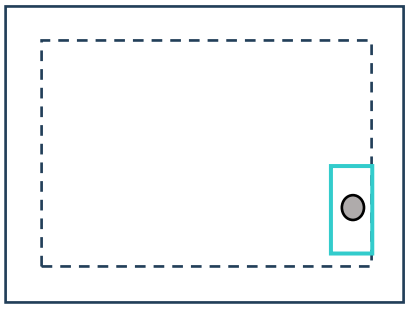


Figure 8 - AC power-in cables routed out of concrete within charger's footprint marks on ground

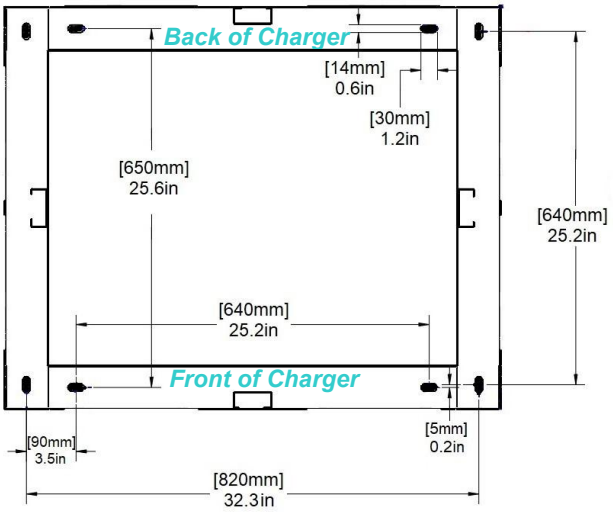


Figure 9- Dimensions for Drill hole patterns (8 drill holes darkened)

3. (Recommended) Add Duct Seal around opening of conduit/cable coming out of the concrete.
4. If you don't have access to a fast charger mounting template:
EITHER - Skip to Step 5 now and wait until prompted in Steps 11-16 to: (1) use the charger itself as a template for marking drill holes on the concrete, (2) move the charger and drill the holes, and then (3) install the wedge anchors.
OR - Complete Steps 4.1 - 4.3 now to: (1) use a tape measure and mark the drill hole patterns on the concrete, (2) drill the holes, and (3) install wedge anchors.

4.1 Mark the drill hole patterns (black ovals shown in Figure 9) summarized here:
--*Inner 4 mounting hole pattern:* 25.2 x 25.6 inch (640 x 650 mm);
--*Outer 4 mounting hole pattern:* 32.3 x 25.2 inch (820 x 640 mm);
--*Notice Center offsets between two sets of holes:*
-Outer hole center is 3.5 in. (90 mm) from nearest Inner hole center.
-Each Outer hole center is 0.2 in. (5 mm) closer to center of charger depth than nearest Inner hole center.
4.2 Drill the 8 holes in concrete needed for 8 wedge anchors using a 12 mm (1/2 in.) diameter drill bit.
4.3 Remove washer and nut from wedge anchors and hammer all 8 wedge anchors into pre-drilled holes.

5. Open charger's right-side door and then locate the removable plate secured with wingnuts and washers to the floor of the charger (Figure 10).

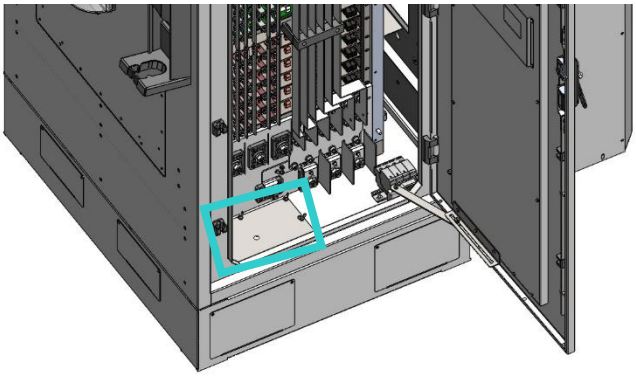


Figure 10 – Charger's right-side door opened shows removable metal plate on charger floor

6. Remove all 8 sets of M5 wingnut, split washer, and flat washer that secure the removable plate to the charger floor (Figure 11); then remove the plate, taking care not to damage gasket attached to down-side of plate (Figure 12), and set the plate and hardware aside until after charger is moved to and anchored to concrete and pilot hole in plate is later enlarged.

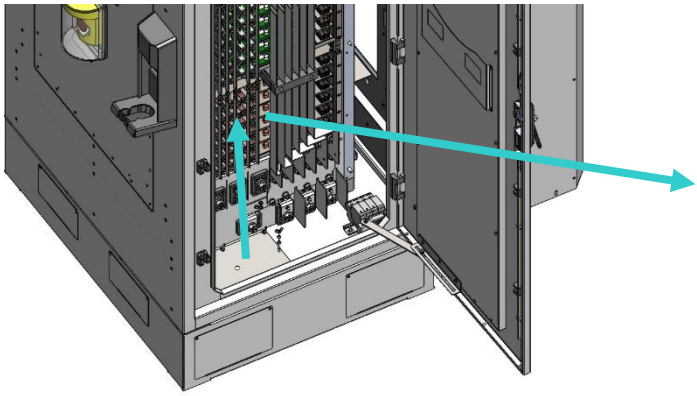


Figure 11 - Removable plate inside right door of charger is removed before moving charger onto concrete with conduit

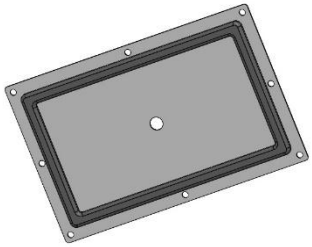


Figure 12 - Down-side of Removable Plate

7. Disconnect the charger from its pallet:

a. Using a T27 Torx driver, remove lower access panels on the left and right sides to reach the 4 inside corners of the charger (Figure 13).

b. Reach into opened lower access panels and remove the 4 hex bolts and washers securing the charger to the pallet.

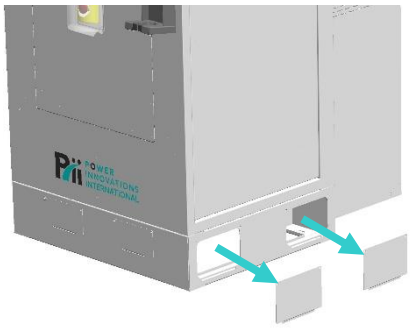


Figure 13 - Removing left and right access panels to access 4 hex bolts and washers securing charger to pallet

8. Prepare the charger to be moved by a forklift using one of the two supported methods:

One way to move the charger by a forklift is to remove the front-bottom panels at the bottom of the charger's front side (Figure 14), insert the forks through the front openings (Figure 15) towards the back, and then lift and move the charger. If you plan to use the forklift openings, remove the 2 front panels now and skip to Step 10.

CAUTION! Do not attempt to put forklift forks in any of the side panel openings (shown with red Xs in Figure 14 and Figure 15). To avoid damaging the charger, the forklift forks should be 45 inches or shorter in length, and should only be inserted into the 2 open front panels of the charger.

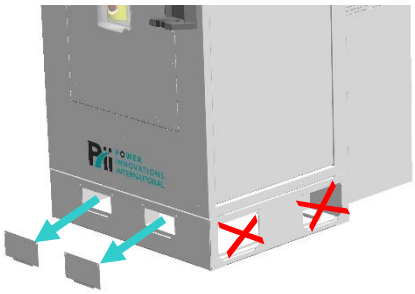


Figure 14 - Removing front and back access panels to prepare for forklift to lift off pallet

Another supported way to move the charger using a forklift requires installing eyebolts (provided) and then connecting lifting strap with hardware to the eyebolts (lifting straps and hardware not provided). To use a forklift with eye bolts and lifting straps with hardware, continue in Step 9 to remove the hood and properly install eye bolts.

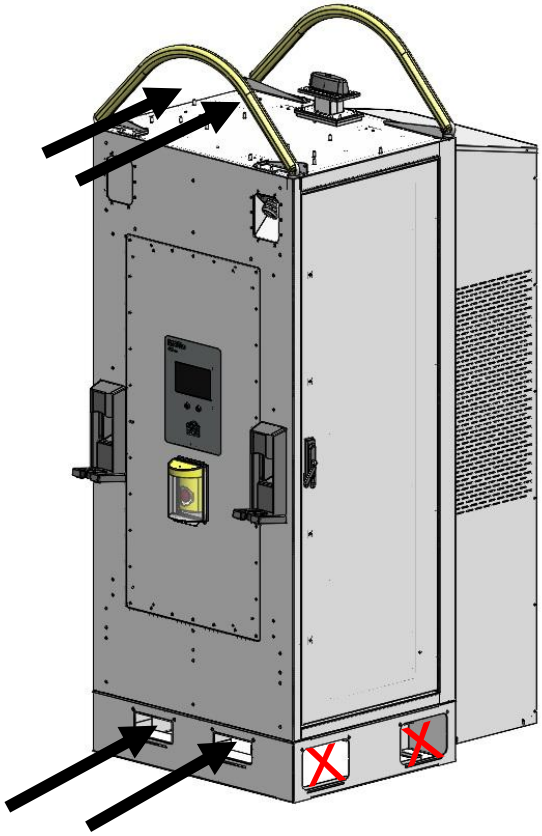


Figure 15 – Forklift forks may be inserted into either the two open front panels or 2 lifting straps connected to eye bolts on top of charger

9. If you need to install eye bolts, remove charger's hood and corner hardware as needed and install eye bolts:

a. **For Low Profile Hood model (Figure 16):** Use a Phillips screwdriver to remove the 4 screws and their washers securing hood to the top of the charger inside hood recesses, 2 on upper-left side and 2 on upper-right side, and then set screws, washers, and hood aside. Then, to make room for 2 rear eyebolts, using a hex bolt wrench, remove both rear-corner hex bolts on the top of the charger; then set the 2 hex bolts aside. All other hardware, including the brackets, can remain in place.

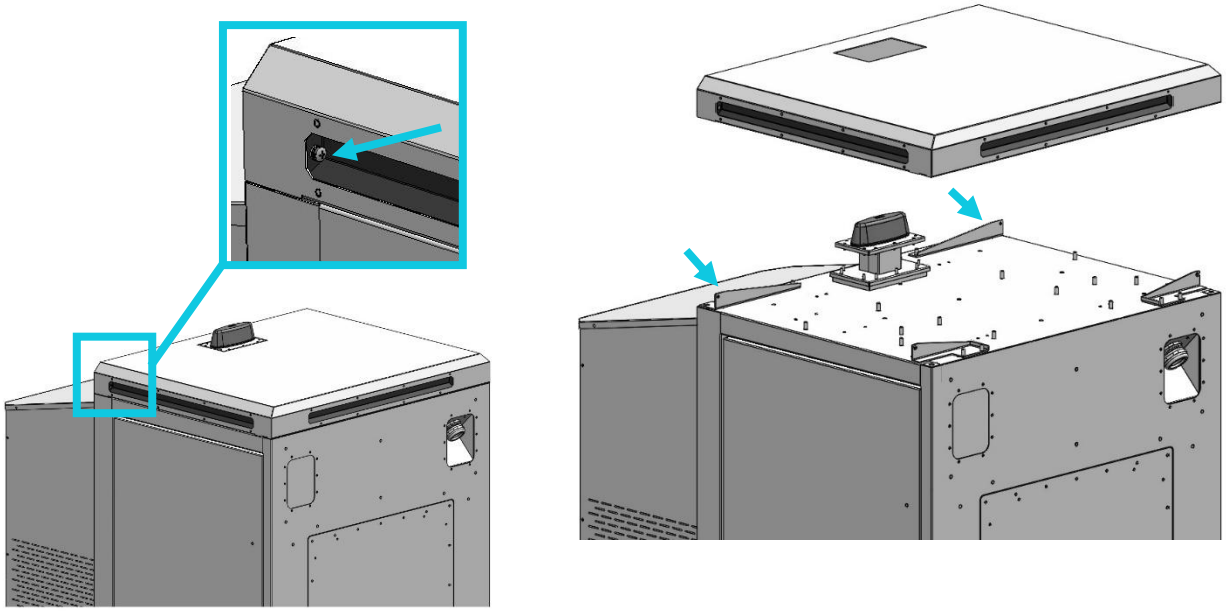


Figure 16 –Low profile hood: Four screws (2 upper-left and 2 upper-right) secure hood to charger

For Vented Hood model (Figure 17): Use Phillips screwdriver to remove the 10 screws and their washers securing the hood to the top of charger and set hood and screws aside. Then, to make room for 2 front eyebolts, using a Hex bolt wrench, remove 4 M8 Hex nuts, 2 from the left-front corner bracket and 2 from the right-front corner, then remove both corner brackets.

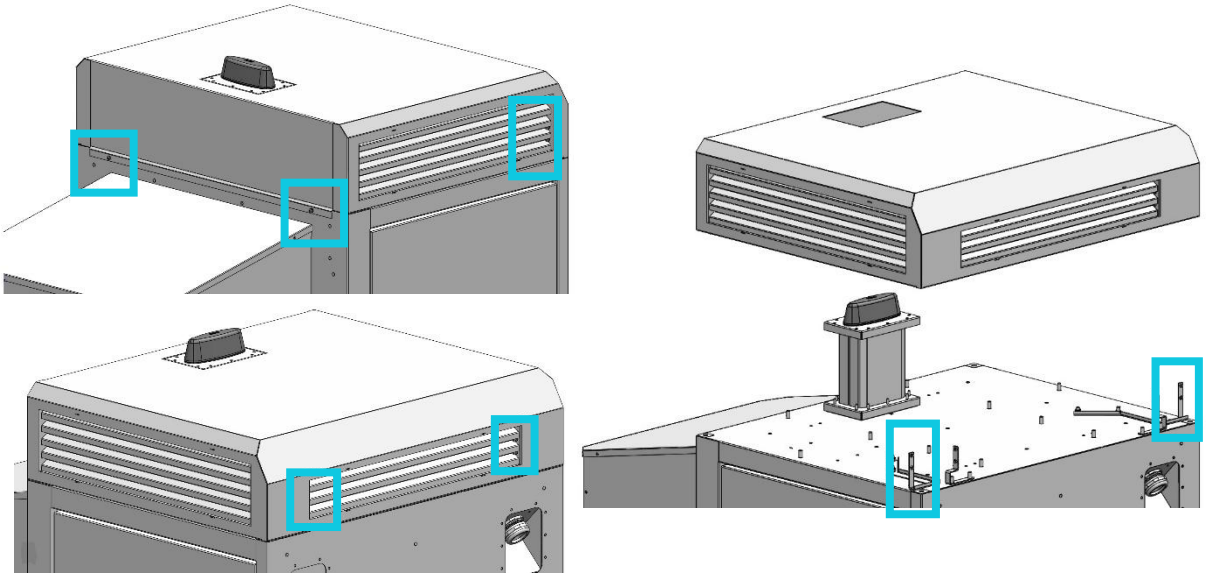


Figure 17 –Vented hood: Ten screws in hood secure hood to charger: (2 in back, 2 in each of hood's side vents near front, and 4 in hood's front vent). Two M8 hex nuts secure front-corner brackets to the top of the charger.

b. Fully install the 4 eye bolts provided into the pre-drilled holes in the top of charger.

Note: When fully installed, none of the threads on the eyebolts will be above the roofline (Figure 18).

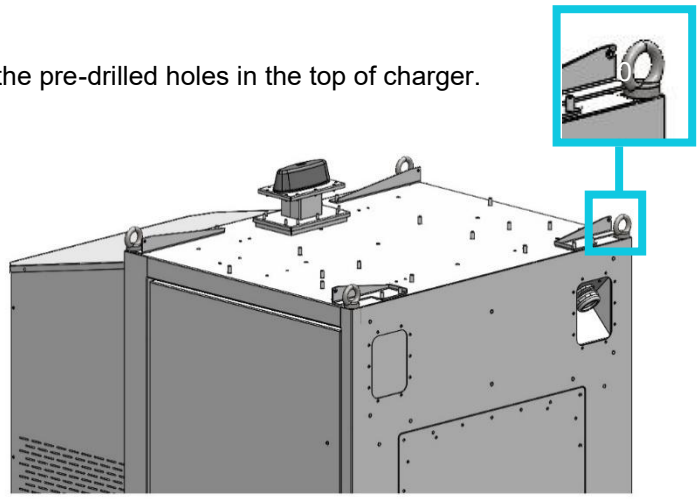


Figure 18 – Installing eye bolts

10. Using moving partners and a forklift with either the front-to-back bottom forklift openings or lifting straps connected to eye bolts on the top of the charger, move the charger to the prepared concrete location:

CAUTION! If using front-to-back bottom openings:
To avoid damaging the charger, when inserting forklift forks into the bottom openings of the charger, ensure forklift forks are 45 inches or shorter, an ONLY insert forks into the 2 open front panels (see Figure 15).

CAUTION! If using eye bolts and lifting straps: Eye bolts must be in line with lifting straps (as shown in Figure 17 and Figure 18) so that straps can only pull eye bolts to their left or right.

a. Ensure removable plate is still off the right-side floor and out of the charger.

b. Safely lift the charger off the pallet and move charger to concrete location pre-marked with charger's outer and inner footprints and with AC power conduit/cable emerging inside inner footprint (Figure 7 and 8).

c. If wedge anchors were pre-installed, skip to Step 16 now.

11. Lower the charger onto the pre-marked outer footprint on the concrete and over the power-in cable/conduit (like Figure 19, but without wedge anchors pre-installed).

12. Using a marker or pencil, reach inside open bottom panels and mark all 8 wedge anchor windows.

13. Safely lift the charger off the prepared location on concrete and temporarily move it aside. The 8 wedge anchor window markings should look like the 8 markings in Figure 9.

14. Using a 12 mm (1/2 in.) diameter drill bit, drill 8 holes in the concrete within the 8 wedge anchor window markings.

15. Remove washer and nut from wedge anchors and then hammer all 8 wedge anchors 2.75 inches into pre-drilled holes (anchors shown installed in Figure 19).

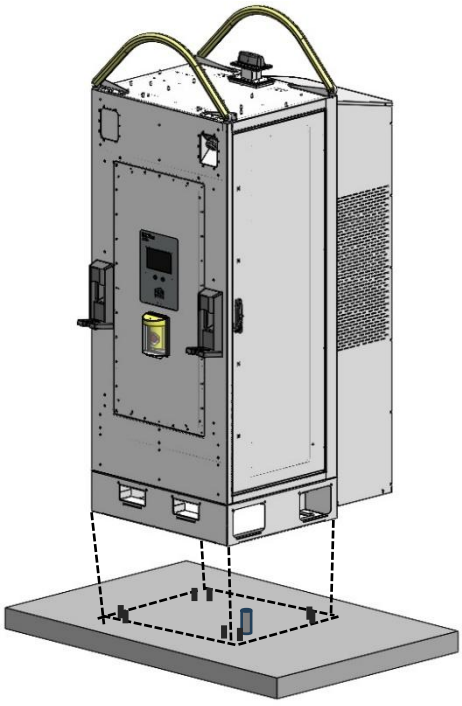


Figure 19 - Lower Fast Charger onto eight pre-installed wedge anchors

16. With washers and nuts still removed from installed wedge anchors, safely lower the charger over the installed wedge anchors and conduit/cable in concrete (Figure 19) so that all 8 anchors feed into their own window.

17. Secure charger to concrete using the eight M12 wedge anchors installed and 8 washers and nuts that came with the wedge anchors. Tighten nut down using a torque setting of 780±10 in-lbs (90±10 N-m) (Figure 20).

18. Re-attach all lower access panels to the bottom of the charger using their original screws (Figure 20).

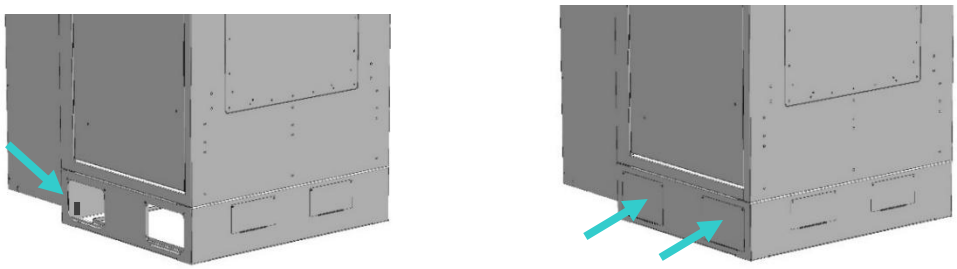


Figure 20 – Tighten washer-nut sets over wedge anchors and then re-attach all lower panels

19. On the top of the charger, remove the 4 eyebolts, return the 2 hex bolts to their original position behind the rear brackets, then use the 4 original screws to re-secure the hood to its original position.

3.5 Install Shelf Controllers, Rectifier Modules, and Inverter Modules

ELECTRICAL WARNINGS – WARNING! RISK OF ELECTRIC SHOCK!

WARNING! RISK OF ELECTRIC SHOCK! ENSURE POWER SUPPLY IS SHUT OFF BEFORE STARTING OR CONTINUING INSTALLATION ACTIVITIES AND BEFORE OPENING EV FAST CHARGER'S TOP PANEL. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

This EV Fast Charger ships with many of its components pre-installed, such as a cellular antenna, CCS1 charging cable, and empty power shelves. Essential charger components that do not ship preinstalled are shelf controllers (SCs), rectifier modules and inverter modules. These can be installed anytime and in any order prior to powering the charger on.

Note: We recommend you first mount the Fast Charger in its permanent location (section 3.4) BEFORE you install the SCs and PSUs. This will greatly lessen the weight of the charger while it is being moved and positioned.

To install shelf controllers and power supply units:

1. Ensure AC power to EV Fast charger is turned OFF at site's upstream AC circuit breaker.
2. Open EV Fast Charger's left-side door.
3. Locate charger's main switch below the empty shelves (Figure 21) and determine if the main switch is in the ON position (Figure 22) or the OFF position (Figure 23).

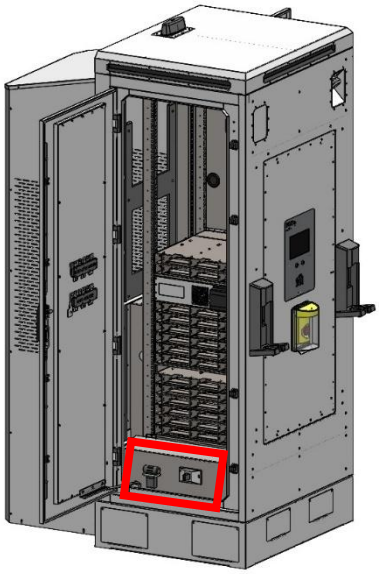


Figure 21 – Main Switch and its removeable handle shown in a fully loaded 60kW Bi-Directional Charger (inside left-side door)

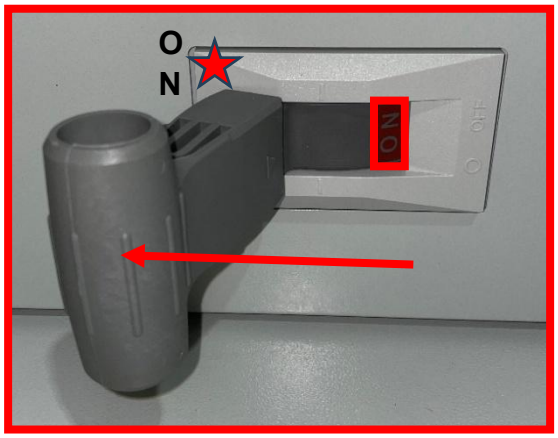


Figure 22 - Main Switch (shown with handle on) in the ON position

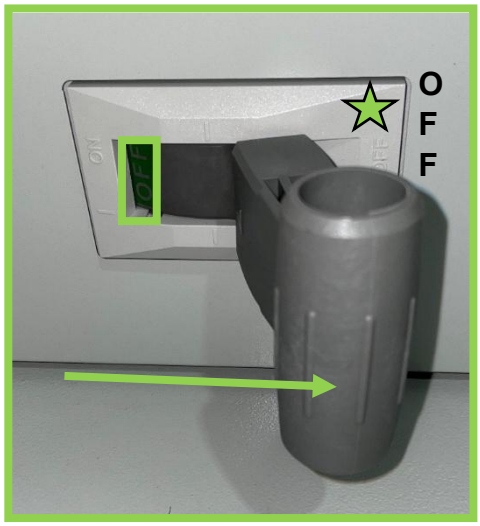


Figure 23 - Main Switch (shown with handle on) in the OFF position

4. Ensure Main Switch is in the OFF position (Figure 23) before proceeding with installation. If main switch is in the ON position (Figure 22):

    a. Retrieve main switch handle from its hanger (Figure 24).

    b. Slide handle onto main switch's switch (Figure 25).

    c. Switch main switch to OFF position.

    d. Return main switch handle to its hanger.

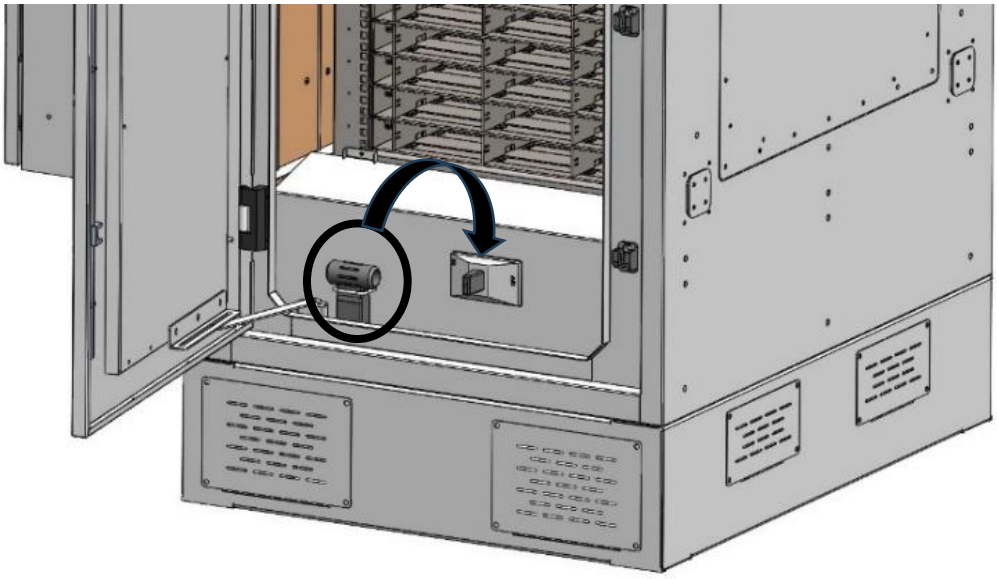


Figure 24 – Main Switch Handle in handle hanger

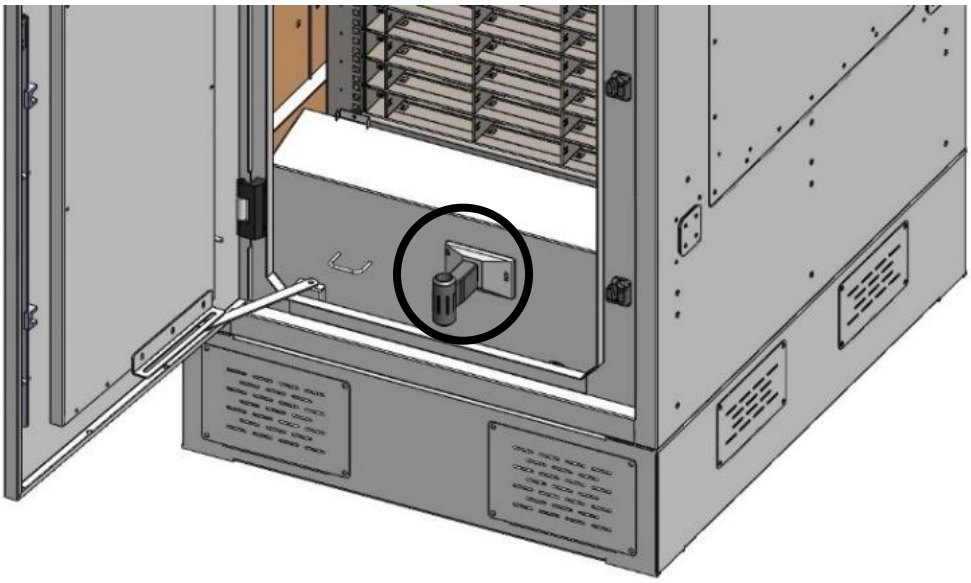


Figure 25 –Main Switch Handle slid onto the main switch

5. Also inside the left-side door and starting at the first open slot at the bottom-left of each of the charger's power stacks (Figure 26), insert 1 Shelf Controller (SC) (Figure 27) per shelf, including Heat Exchanger Controller shelves, and secure each one with its built-in screw (Figure 28).

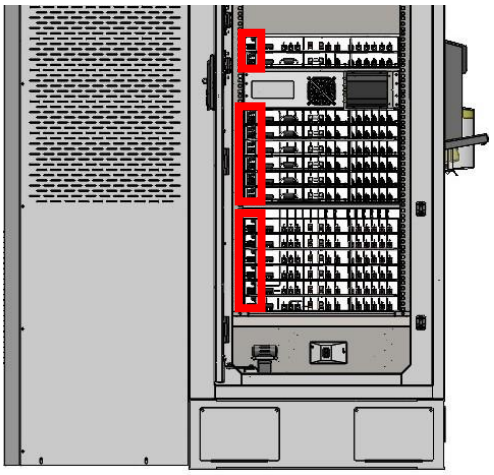


Figure 26 – Empty shelves in charger's bottom power stack with six empty shelf controller slots highlighted

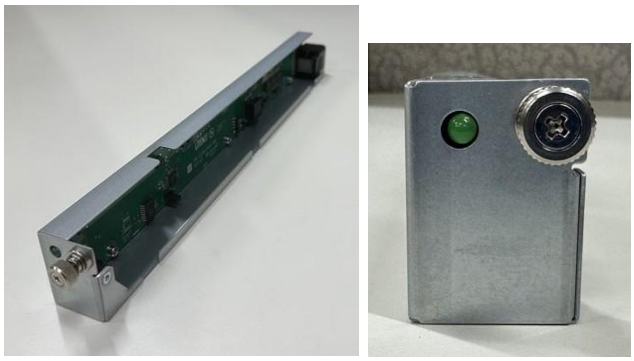


Figure 27 - Shelf Controller

Figure 28 – Install and Secure Shelf Controllers

6. Insert 3 blue-tabbed Rectifier modules (see Figure 29) into each power stack shelf using the same orientation as Figure 30 (with the locking-tab side of each module closer to its shelf controller than to the module's other side), and so each locking tab clicks into the locked position (pull handle to test the lock).

Figure 29– Rectifier Module

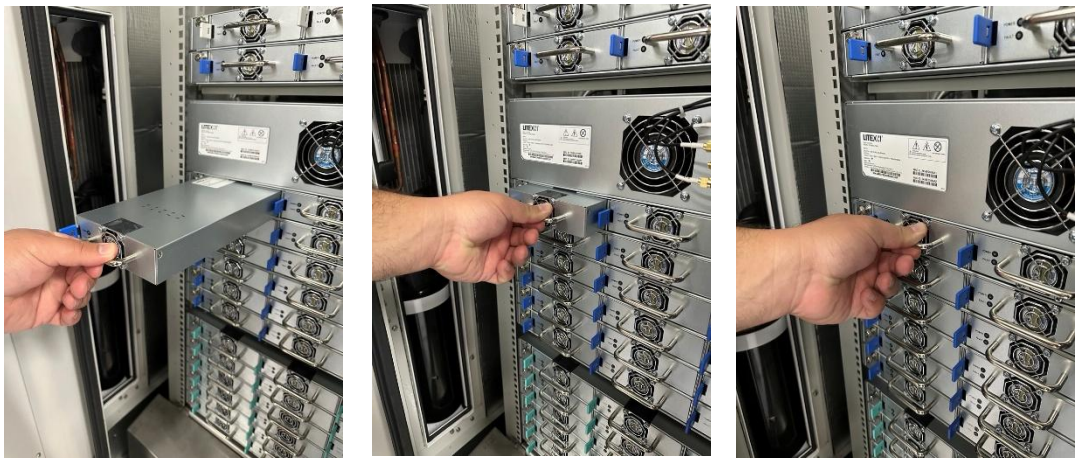


Figure 30 - Install Rectifier Modules with Locking Tab sides closer to Shelf Controllers

7. Locate the Heat Exchanger (HX) Controller shelf set, unloaded, in this bi-directional charger (Figure 31), which is located above the Rack Controller. The HX Controller powers the Heat Exchanger.

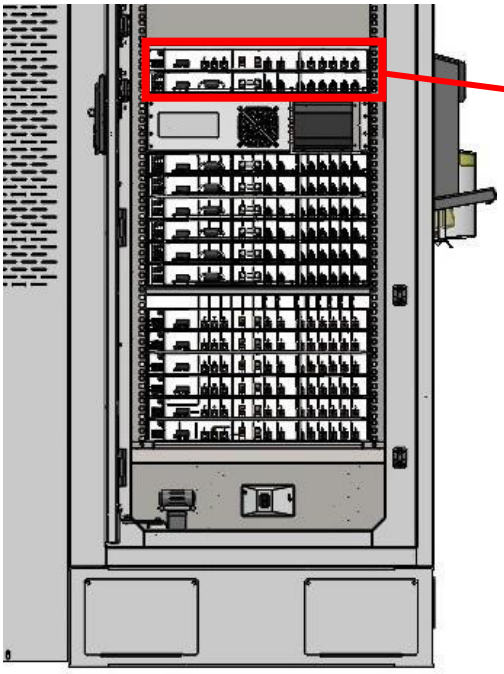


Figure 31 – Heat Exchanger (HX) Controller shelf set location in the 60 kW Bi-Directional

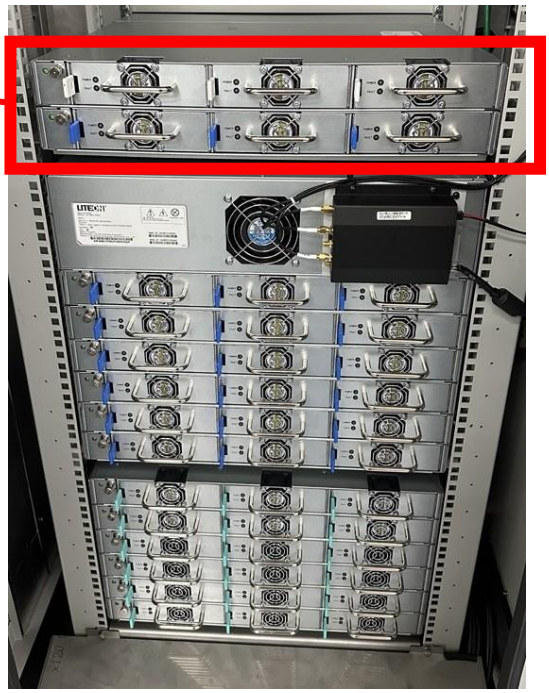


Figure 32– HX Controller has two dedicated shelves: Upper Shelf for three (3) Inverter modules (with white tabs or black tabs, depending on custom order requirements) Lower Shelf for three (3) Rectifier modules (with blue tabs)

8. Insert 3 additional Rectifier Modules (with blue tabs) into the lower shelf of the HX Controller shelf set (indicated in Figure 33).

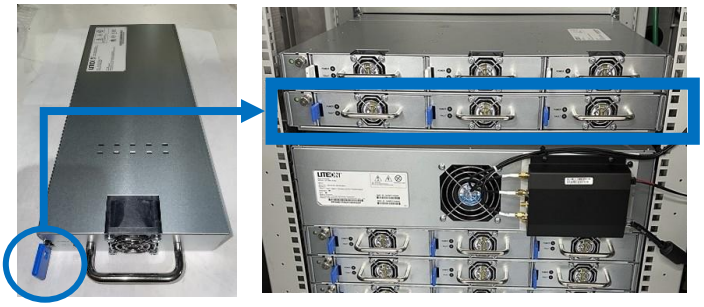


Figure 33 – Rectifier modules (blue tabs) installed in lower shelf of Inverter Shelf Set

9. Insert the 3 Inverter Modules (with either white tabs or black tabs) into the upper shelf of the HX Controller shelf set (see Figure 34).

10. Close the left-side door.

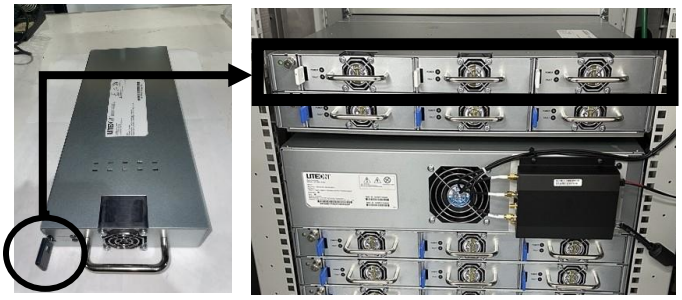


Figure 34 – Inverter modules (white or black tabs) installed in upper shelf of Inverter Shelf Set

3.6 Configure Cellular Modem and Registering Charger on Network

WARNING! RISK OF ELECTRIC SHOCK!
DO NOT CONNECT AC POWER SUPPLY TO EV FAST CHARGER UNTIL PHYSICAL SIM CARDS ARE INSERTED INTO CELLULAR MODEM AND TOP PANEL COVER AND SCREWS ARE REINSTALLED.

Note: Physical SIM cards for cellular modem must be provided by product owner or administrator.

To configure cellular modem with physical SIM card and register the charger on the backend network:

1. Ensure AC power to EV Fast charger is turned OFF at site's upstream AC breaker.
2. Open EV Fast charger's left-side door and locate the pre-installed modem (Figure 35).

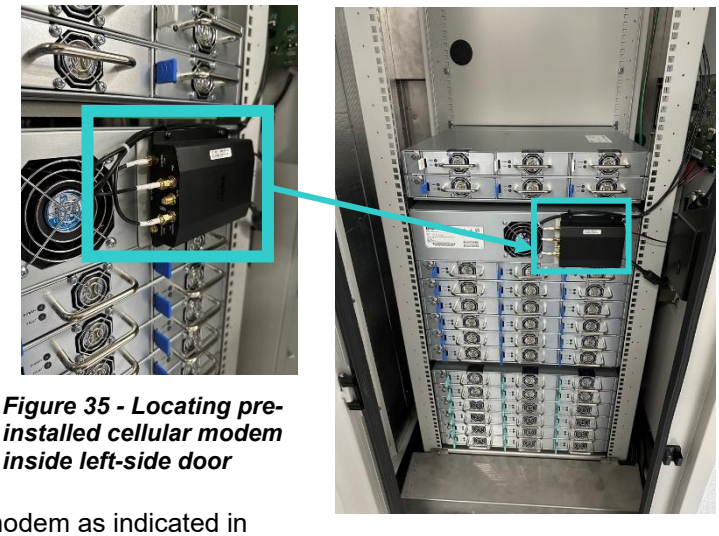


Figure 35 - Locating pre-installed cellular modem inside left-side door

3. Remove the screw from the face of cellular modem as indicated in Figures 36 and then remove slot cover to expose modem's expansion slots.

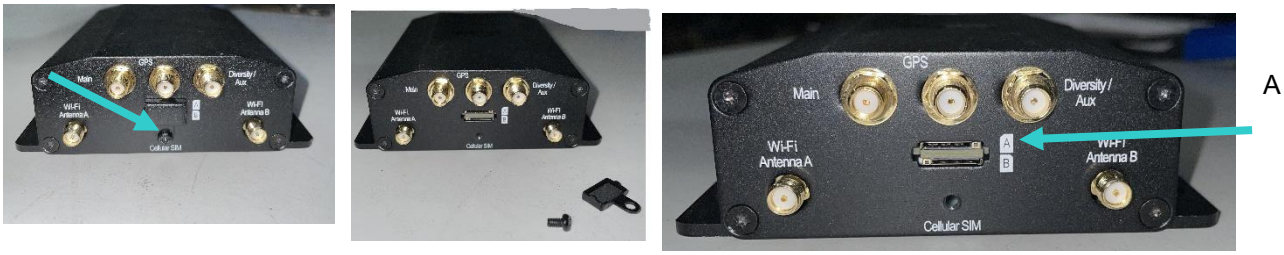


Figure 36 - Removing screw and small slot cover to expose SIM card slots A and B

4. Insert a physical SIM card in slot A only.
5. Return slot cover to its original position on modem and secure it with original screw.
6. Close the left-side door.
7. Register this EV charger as one of the supported devices on the owner's backend network.

   Later, after you have configured and wired the AC power input and applied power to the charger, the modem will find the cellular network and attempt to automatically connect.

3.7 Configure and Wire AC Input Power

ELECTRICAL WARNINGS – WARNING! RISK OF ELECTRIC SHOCK!

WARNING! RISK OF ELECTRIC SHOCK!
SHUT OFF POWER SUPPLY BEFORE BEGINNING INSTALLATION ACTIVITIES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

WARNING! RISK OF ELECTRIC SHOCK!
DO NOT PROVIDE LIVE POWER TO THE EV FAST CHARGER UNTIL BUS BAR CONFIGURATION AND AC WIRING IS COMPLETE AND THE AC SERVICE PANEL IS IN PLACE AND SECURE.

WARNING! RISK OF ELECTRIC SHOCK!
ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS TYPE OF EQUIPMENT AND THE HAZARDS INVOLVED SHOULD ADJUST, MODIFY, AND SERVICE THIS EQUIPMENT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

1. Ensure AC power to EV Fast charger is turned OFF at site's upstream AC breaker.
2. Open the right-side door of charger (see Figure 37).

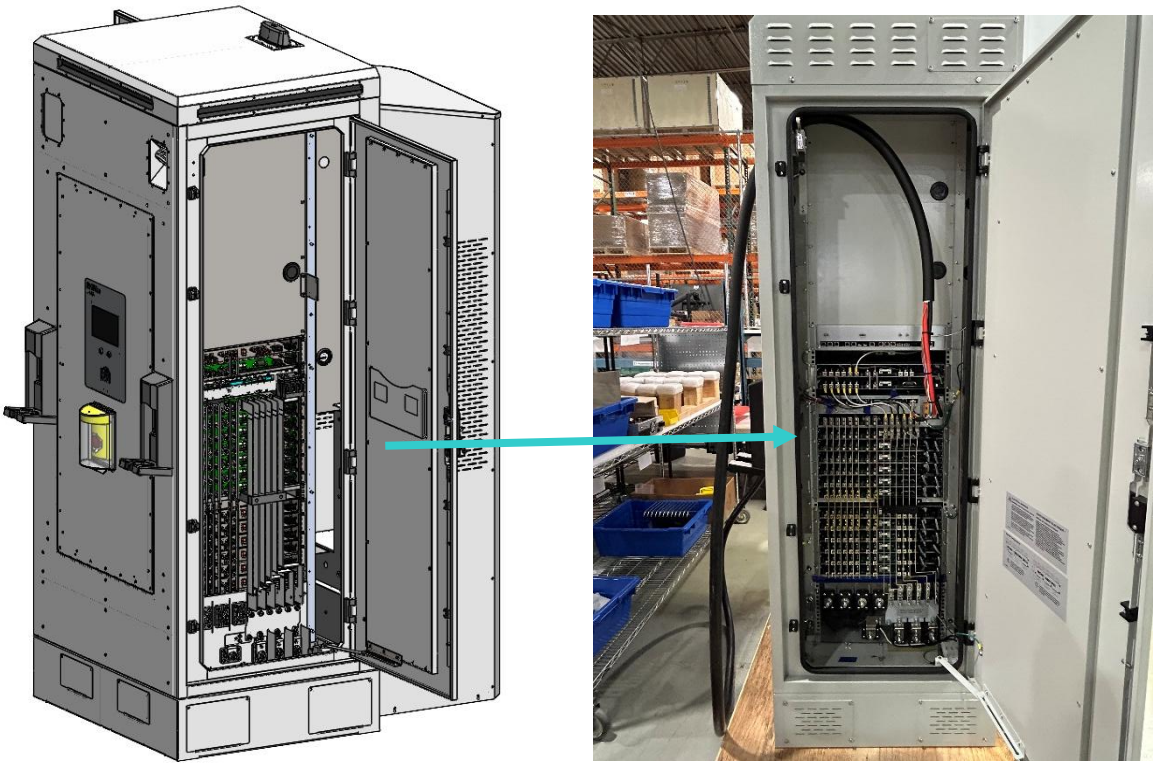


Figure 37 - Opening 60 kW Bi-Directional Charger's right-side door

3. Determine the size of opening needed in the Removeable Plate (based on the size of conduit coming into charger through the opening behind the right-side door).

4. Using a drill, enlarge pilot hole in removeable plate outside of and away from the charger. Ensure new hole is large enough to feed AC power-in conduit and wires through (see Figure 38).

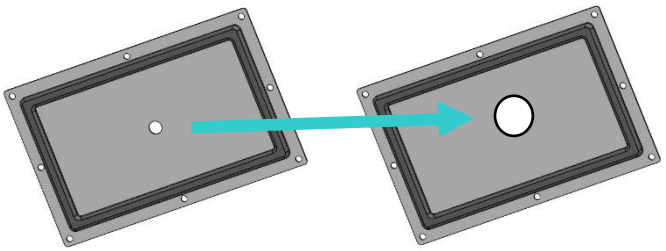


Figure 38 - Enlarge pilot hole in removable plate to fit over conduit used for AC Input wires

5. Inside the right-side door of the charger, slide the removeable plate (gasket-side down) over the AC power-in conduit/cable (Figure 39), taking care not to damage the gasket, and then lower the plate back onto the 8 small studs. We recommend using a cable gland (installer supplied), sized appropriately for the cable being fed through plate to complete this step OR using duct seal after re-securing plate to the charger in step 7.

6. Return the 8 sets of M5 wingnut, split washer, and flat washer to studs and hand-tighten to secure plate to charger (also Figure 39).

7. (Recommended) If you didn't use a cable gland in step 5, use Duct Seal now around conduit or cable being fed through the removable plate.

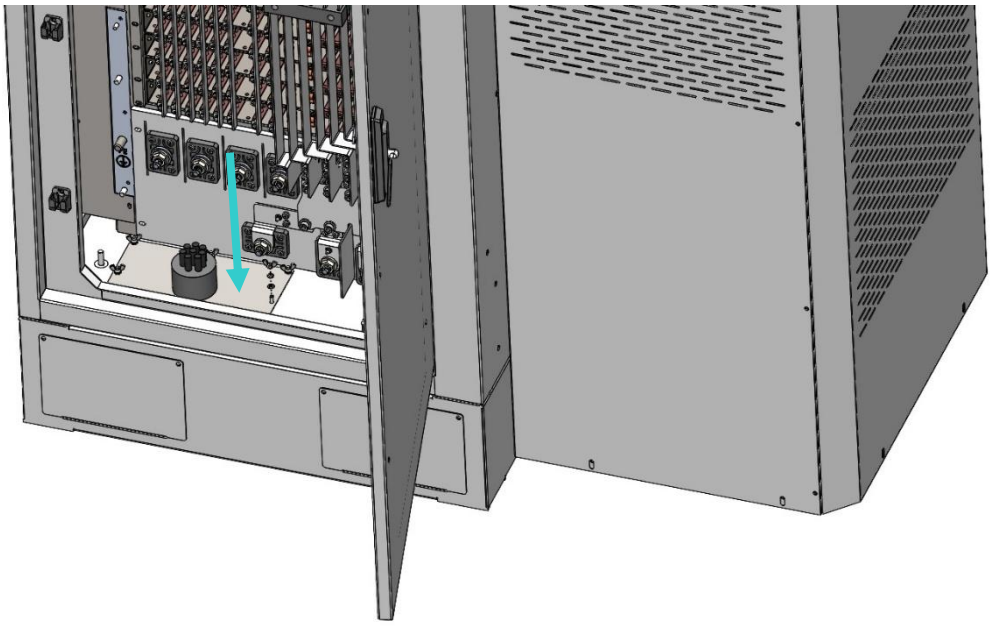


Figure 39 - Placement of Removable Plate inside bottom of charger (optional Cable Gland not shown)

8. Locate Bus Bar near bottom right-side. A temporary plastic spacer plate is installed, as shown in Figure 40, your charger's bus bar needs to be configured: **Continue to the next step** to begin configuring the bus bar.

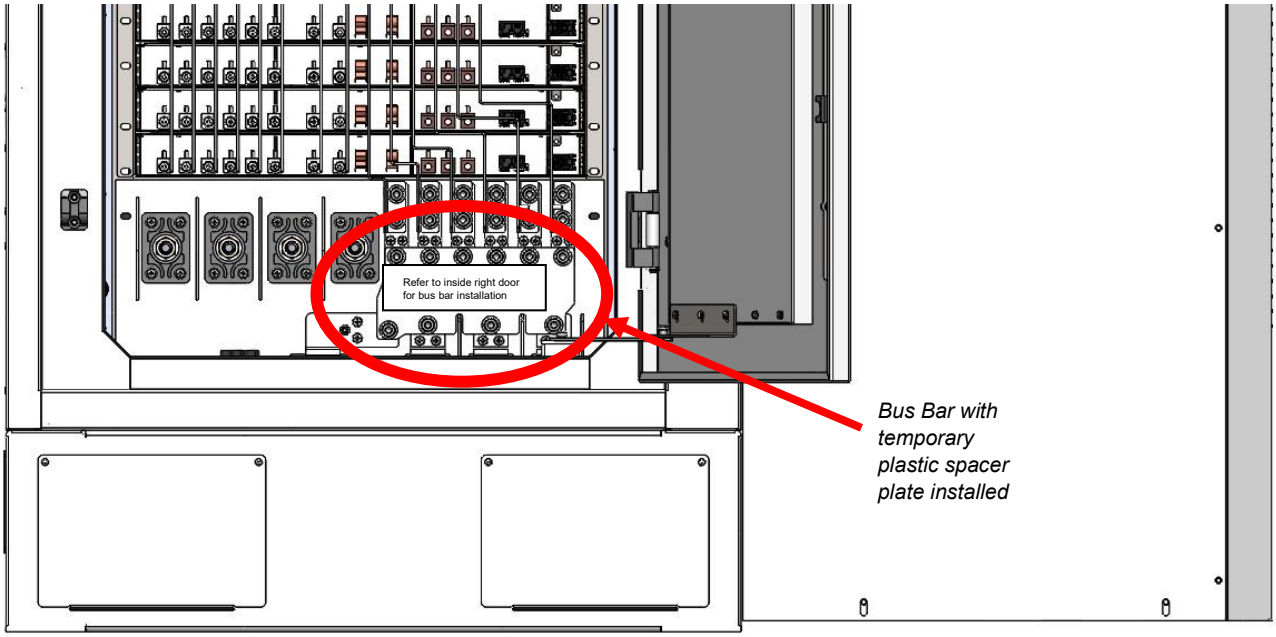


Figure 40 - Bus Bar with temporary plastic spacer plate installed

9. Remove the six M6 and four M8 socket head cap screws that secure plastic spacer plate to Bus Bar (Figure 41), remove spacer plate from Bus Bar, and discard spacer plate.

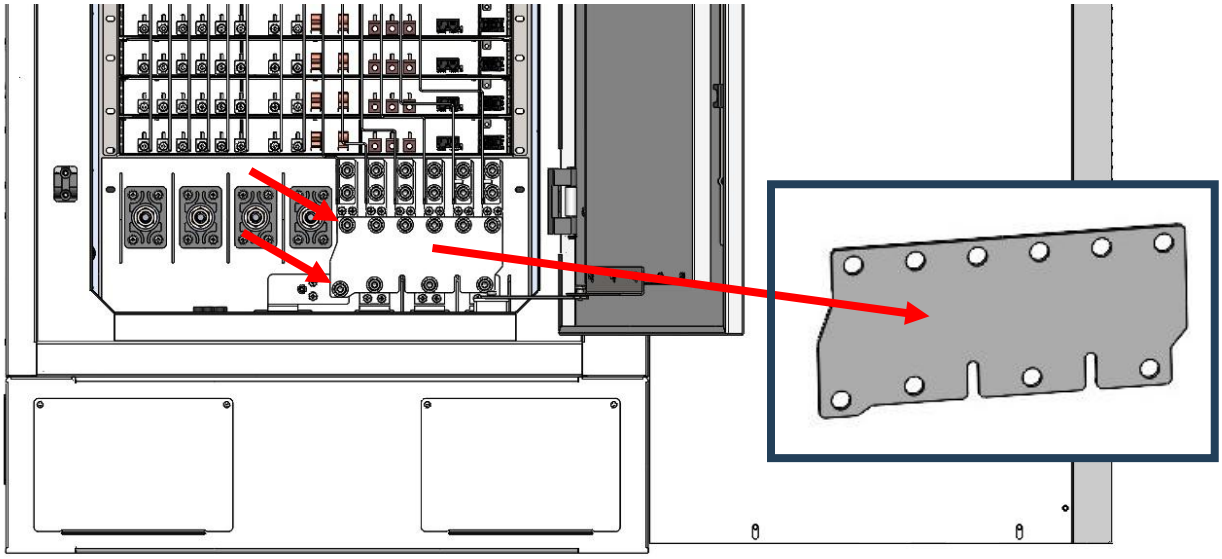


Figure 41 - M6 and M8 socket head cap screws must be removed to remove plastic spacer plate

10. Determine which of the two supported AC Input Power configurations is required for this installation (see Figure 42).

208V/240V 3-phase Delta (3-wire + PE): *Line 1, Line 2, Line 3, Ground*

480V 3-phase WYE (3-wire + Neutral + PE): *Line 1, Line 2, Line 3, Neutral, Ground*

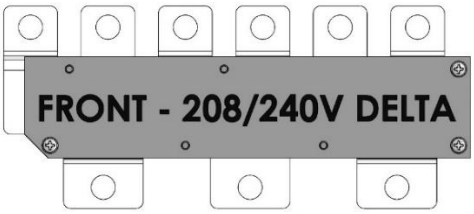
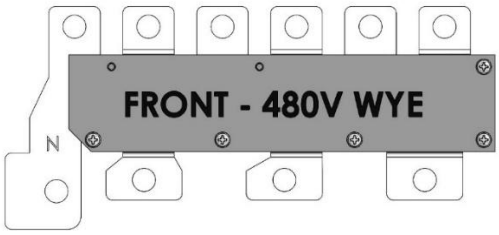
208/240 V 3-phase Delta ***(3-wire + PE)***	**480 V 3-phase WYE** ***(3-wire + Neutral + PE)***
	
CAUTION! Do not use this Delta configuration bus bar for a 480V 3-phase Wye (3-wire + Neutral + PE) source, which requires a neutral.	**CAUTION! This source requires the Neutral line to be supplied and connected to prevent damage to equipment.**

Figure 42 - Configuration Bus Bar to install for each supported AC Input Power Configuration

CAUTION! Configuration Bus Bar must be loaded on and anchored to Bus Bar with the "FRONT" etching or stamp facing out, as shown in Figures 35 and 38.

11. The two configuration bus bars/plates shown in Figure 42 are included with your charger and ship in their storage position anchored inside the left door (see Figure 43). Select the configuration bus bar required for your site's AC Input Power Configuration and unscrew it from the door.

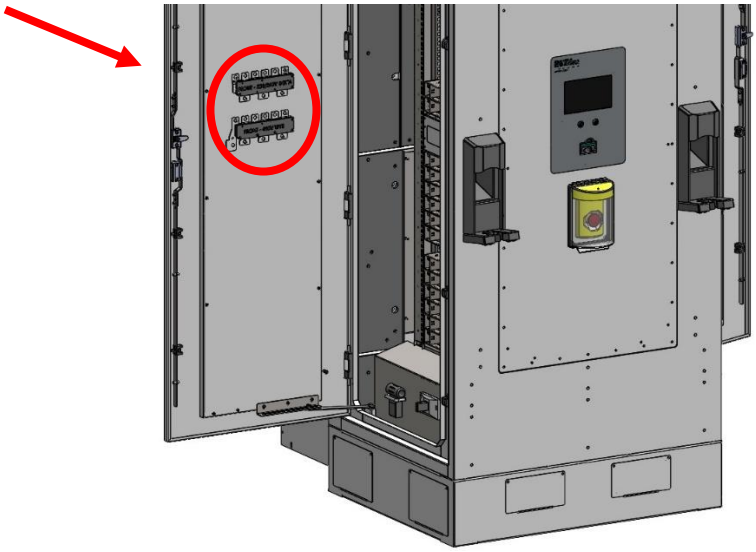


Figure 43 - Inside left door is shipping/storage location of 2 configuration bus bars

12. Install the configuration bus bar/plate required for this charger's AC input power as follows:

a. Place selected configuration bus bar/plate on the bus bar with its "FRONT" etching or stamp facing out (such as the "FRONT – 480V WYE" example shown in Figure 44).
b. Secure 6 upper socket head cap screws, hand tight only and not over 424 in-lbs (48 N-m).
c. Secure 4 lower socket head cap screws, hand tight only and not over 424 in-lbs (48 N-m).

CAUTION! Configuration Bus Bar must be loaded and secured on Bus Bar with the "FRONT" etching or stamp facing out, as shown in Figure 44.

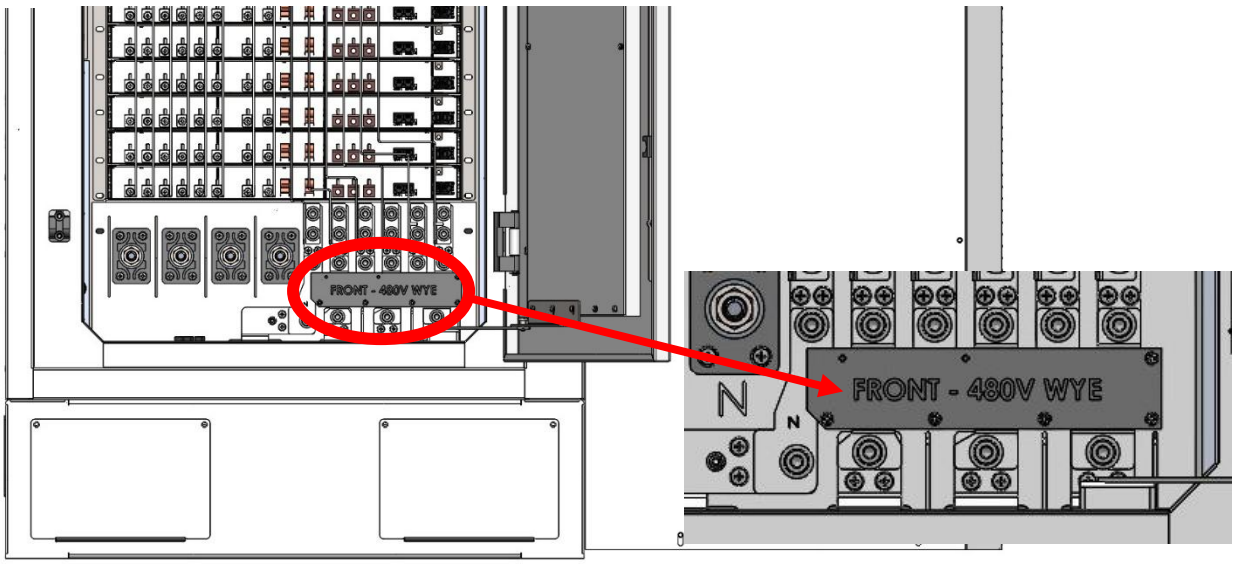


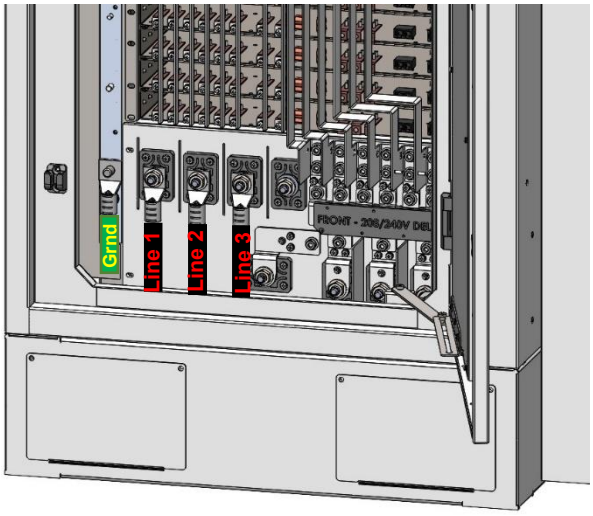
Figure 44 - FRONT – 480V WYE Configuration shown secured on Bus Bar

13. Notice the two AC input power wiring configurations shown in Figure 45, then select the wiring configuration and the ring terminals or Chair/Box lugs needed for this charger's AC power configuration.

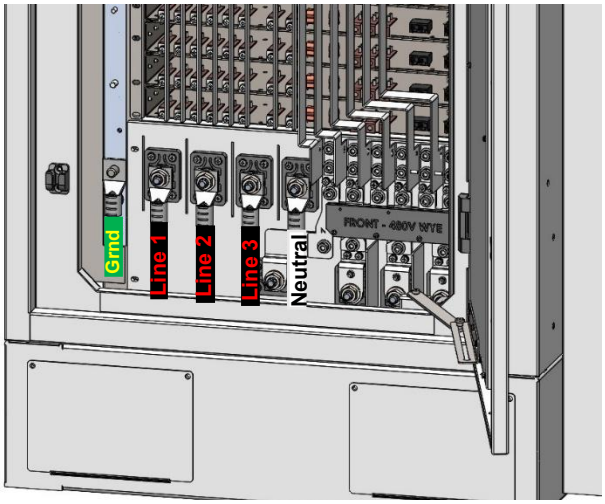
- **Earth Ground (PE):**
  Ring Terminal for Earth Ground must fit 1/2 in.(M8) diameter stud (Figure 45).
- **Neutral Wire**:
  Ring terminals for Neutral wires must fit 1/2 in. diameter Junction Block stud (see Figure 45).
- **Line Wires:**
  Option A - Ring terminals for Line wires must fit 1/2 in. diameter Junction Block stud (see Figure 45)
  or
  Option B - Chair/Box Lugs with Spacers may need to use three Aluminum Chair/Box lugs (not included) with three copper extensions (included - see Figure 46).

Note: When prompted in the next step, the nuts provided to secure the ring terminals or the copper extensions to their studs should be tightened to 34-39 N-m (300-345 in-lbs.) Likewise, the bolts securing Chair/Box lugs to the copper extensions should also be tightened to 34-39 N-m.

AC Input Power: 208V/240V Delta

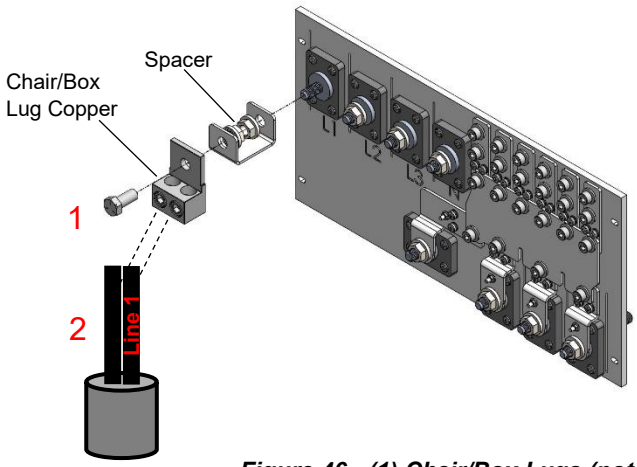


AC Input Power: 480V Wye



CAUTION! This 480V Wye source requires the Neutral line to be supplied and connected to prevent damage to the equipment.

Figure 45 - AC Input Wiring for different AC Input Power Configurations



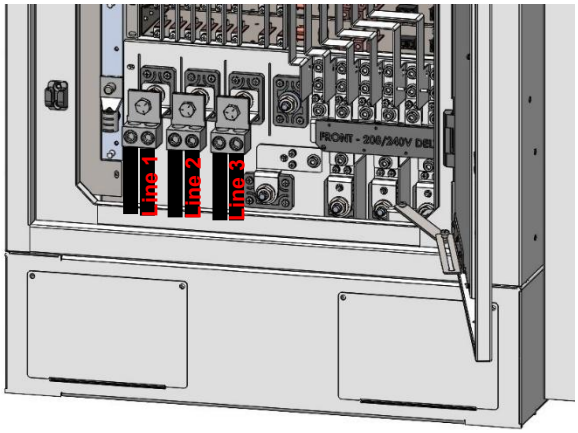


Figure 46 - (1) Chair/Box Lugs (not provided) with Copper Extensions (provided) can be used in place of Ring Terminals (2) when wiring AC input Lines 1, 2, or 3

14. Wire AC Input Power to charger's AC Main Switch connectors using properly-sized ring terminals or Chair/Box lugs (not provided) with nut-washer sets and copper extensions (provided):

a. If using ring terminals (Figure 45), secure each wired ring terminal to the stud required using the washer and nut provided, then tightened the nut to 34-39 N-m (300-345 in-lbs.).

b. If using Chair/Box lugs with copper extensions (Figure 46):

i. Secure each copper extension to the stud required using the washer and nut provided, then tightened the nut to 34-39 N-m (300-345 in-lbs.).

ii. Secure each Chair/Box lug to a copper extension using Chair/Box lug-specific bolt and hardware (not provided), then tightened the bolt to 34-39 N-m (300-345 in-lbs.).

iii. Install AC Input Power wires required into appropriate Chair/Box lugs and secure.

CAUTION! Ring terminals or chair/box lugs should maintain suitable spacings. The ring lugs or chair/box lugs should be vertical when tightened.

Reminder: The installer is responsible for conforming to all local and national electrical codes and standards applicable in the jurisdiction this equipment is installed in.

15. After all input power wires have been secured to AC Main Switch studs, insert and seat the four plastic phase barriers provided (Figure 47) in between the AC Input Power wiring.

16. Using Silicon caulk, secure each phase barrier in place with a small bead of caulk on each side of each barrier.

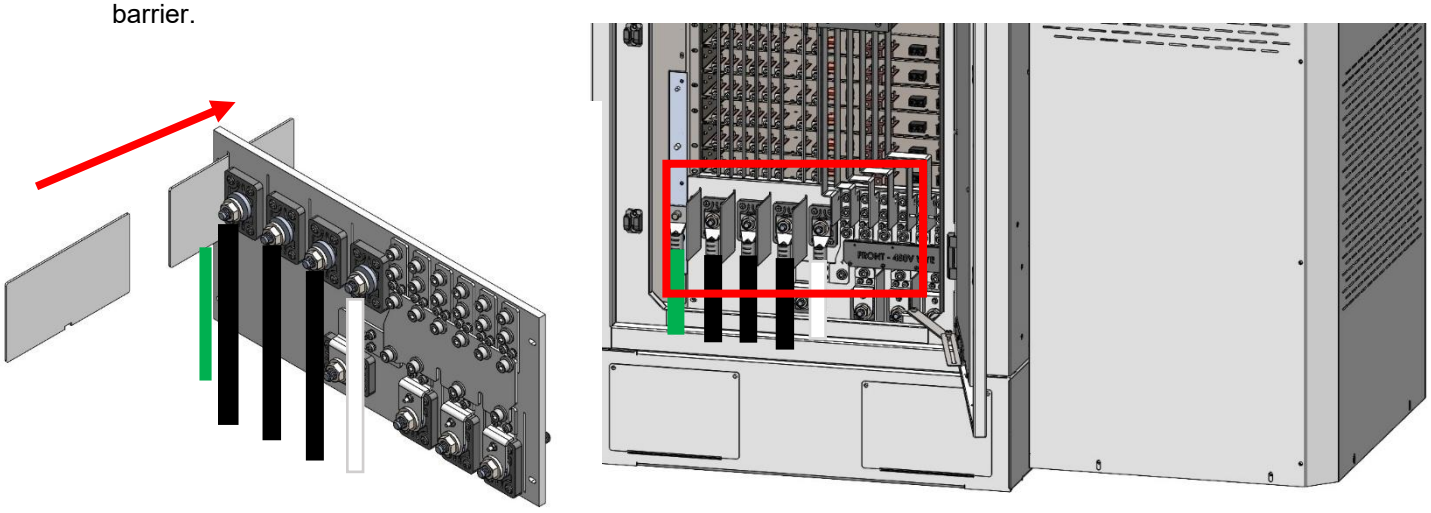


Figure 47 - AC Input Wiring for different AC Input Power Configurations

17. Close the right-side door.

18. At site's AC circuit breaker, turn on breaker and check voltage input. If voltage input is not OK, turn OFF AC circuit breaker and troubleshoot the issue. If voltage input is OK, open left-side door of charger and move charger's Main Switch to the ON position (Figure 48).

19. Close left-side door. This EV Fast Charger is now ready for use.

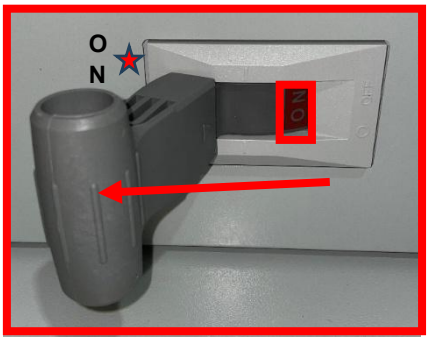


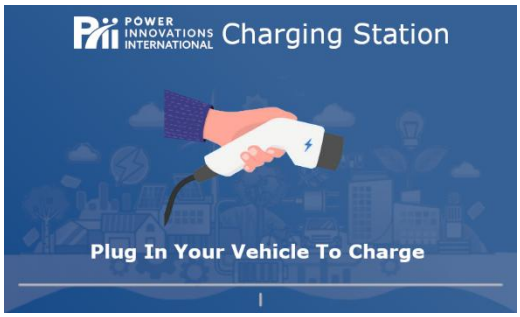
Figure 48 – Main Switch in the ON position

4—Operating 60 kW Bi-Directional DC Charger

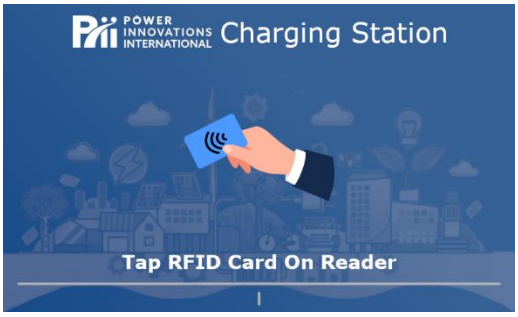
4.1 Charge an EV using a Single-cable EV Charger Model

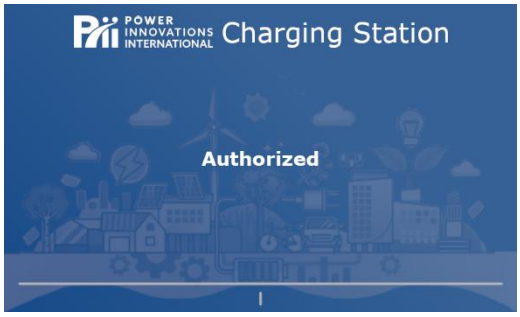
To charge an electric vehicle (EV) with a Single-cable EV Charger model:

1. Lift EV cable plug from holster and plug into EV.

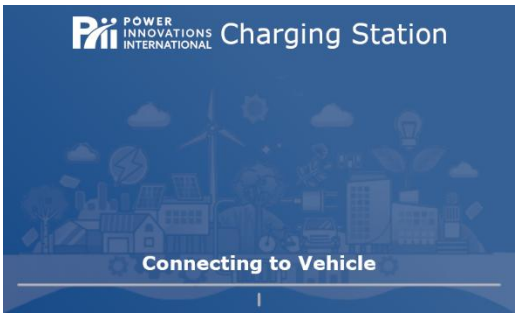


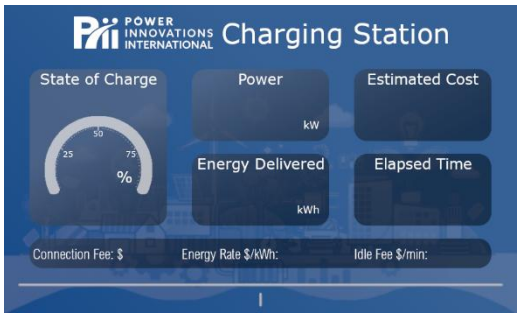
2. Tap ID card on RF card reader and wait for authorization.





3. Follow on-screen displays to verify charger connects to vehicle and begins charging cycle.





Throughout the charging cycle, the progress of the charge displays.

4.2 End a Charging Session

1. To end the charging cycle early (before a full charge is complete), simply unplug (disconnect) the CCS1 handle/plug from the vehicle.

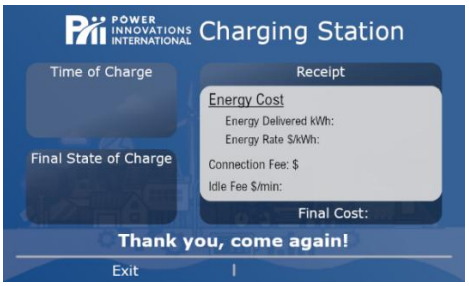
Note: Emergency Stop is not intended to be pressed to stop a normal charging session. It is intended for use in case of an emergency.

In case of emergency, if unplugging handle safely is not possible, use Emergency Power Off button: Lift cover over the Emergency Power Off button, press the button, and follow the on-screen prompts.

Figure 49 –Pressing Emergency Power Off button is only for Emergencies. DO NOT press to stop a normal charging session.

2. At the end of the charging cycle (when EV Battery is fully charged or if charging cycle was ended early), the following prompt displays. Return the charging cable to its dock/plug holster. Once charging cable is disengaged from EV and placed in its dock/plug holster, an on-screen summary/receipt displays.

When Cable is unplugged from EV



Final Screen on Single Cable Charger

3. Ensure charging cable is seated correctly in its dock/plug holster: Whenever the charging cable plug is being returned to the holster, tilt the handle back to angle the plug up as you lift the handle and press it into the holster. The cable below the handle should clear (or be behind) the holster's rubber gate (Figure 50-52).

Figure 50 - Charging Cable holsters have a rubber gate that helps ensure properly seated handle

Figure 51 - Charging Cable handle docked correctly with cable behind holster's rubber gate

Figure 52 - Charging Cable handle not docked correctly (cable still outside holster's rubber gate)

5—Maintaining EV Fast Charger

ELECTRICAL WARNING: SHUT OFF POWER SUPPLY AT AC BREAKER BEFORE BEGINNING INSTALLATION ACTIVITIES AND BEFORE REMOVING EV FAST CHARGER'S AC SERVICE PANEL FOR ANY MAINTENANCE WORK. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

CAUTION! Maintenance tasks should only be completed annually or as needed and as directed in this section. When in doubt, contact Power Innovations on how to proceed.

5.1 Restart after Emergency Power Off

Pressing the Emergency Power Off button will stop the current charging cycle or session. Every time the Emergency Power Off button is pressed, it stays recessed until it is reset to prepare for the next charging session.

To reset Emergency Power Off button:

1. Lift Emergency Power Off button cover and rotate the button clockwise (Figure 53) to unlock it and pop it out.
2. Close button cover.

Figure 53 - Reset Emergency Power Off button

5.2 Replace Surge Modules in Surge Protective Device

This EV Fast Charger is equipped with a Surge Protective Device (SPD), located on the floor of the charger behind the right-side door (see Figure 54).

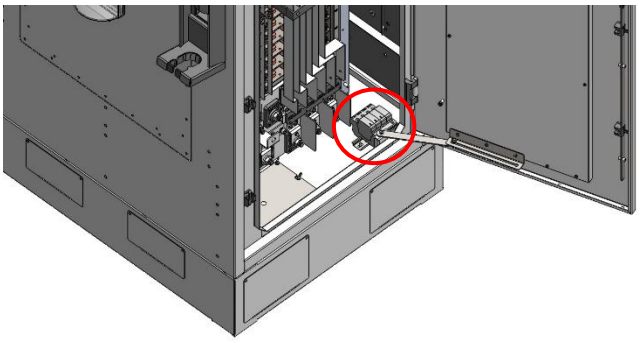


Figure 54 - Surge Protective Device that contains replaceable surge modules

The SPD contains four replaceable Surge Modules. A window in each module indicates its status by color (see Figure 55):

- Green = OK
- Red = Replace

If surge modules need to be replaced, the replacement modules should have:

- Same manufacturer as charger's original SPD
- Same MCOV value as charger's original SPD and modules

If you need assistance in ascertaining SPD manufacturer, MCOV value, or surge module replacement process, contact Power Innovations.

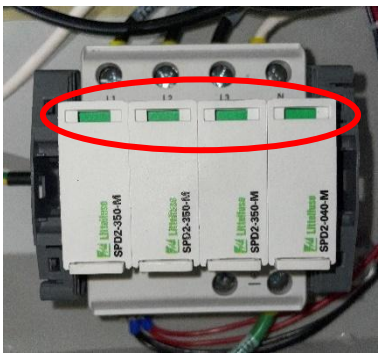


Figure 55 - SPD with four green modules

6—Regulatory

UL & CSA

Pending; Designed to UL2202, IEEE 1547.1 and UL1741-SB

7—Warranty

Power Innovations International warrants that products purchased hereunder are free and clear of all liens and encumbrances.

Power Innovations International warrants that products are to be free from material or workmanship defect under normal use for a period of two (2) years from the invoice date.

In the event that any defect is found under normal usage conditions during the above warranty period, Power Innovations International will be responsible for repair or replacement at its sole discretion and subject to the replacement may be refurbished products.

All repair covered by this warranty must be done at Power Innovations International factory, or other repair facilities as designated by Power Innovations International unless Power Innovations International specifically directs that this service be performed at another location or service provider.

Customer shall, at its own costs, be responsible for shipping the defective products to the designated repair facilities subject to a RMA issued by Power Innovations International.

Power Innovations International will be responsible for shipping the repaired or refurbished unit back to the customer.

Power Innovations International shall not have any warranty obligations for claims: (i) caused by the misuse or abuse of products by end users; (ii) caused by modifications or repairs made to the products or disassembly of products by any person other than Power Innovations International, unless receiving Power Innovations International authorization; (iii) in relation to the appearance damage.

This Warranty Term states the exclusive liability of Power Innovations International and the exclusive remedy of buyer/customer with respect to any claim or defects of the products.

8—Contact Information

If there are any questions or comments about this product, please feel free to contact us.

Power Innovations International, Inc.

Web: www.powerinnovations.com/support

Phone: 801-785-4123

Mailing Address: 1305 South 630 East, American Fork, UT 84003