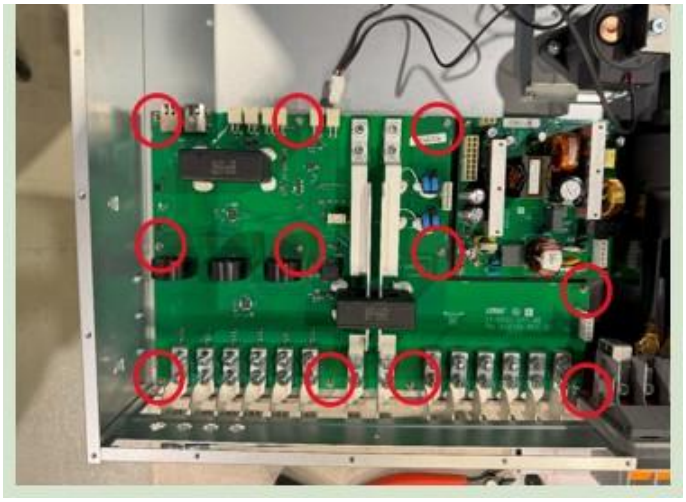
Meter Board Replacement in a 30 kW EV Quick Charger

Introduction

In order to remove and replace the Meter Board installed deep in the Rack Controller in this 30 kW EV Quick Charger, several installed parts in this charger must first be uninstalled.

To maintain the charger's listing, you must purchase replacement parts for this charger from Pii only and installers must be qualified and trained electricians who install the parts according to these instructions.



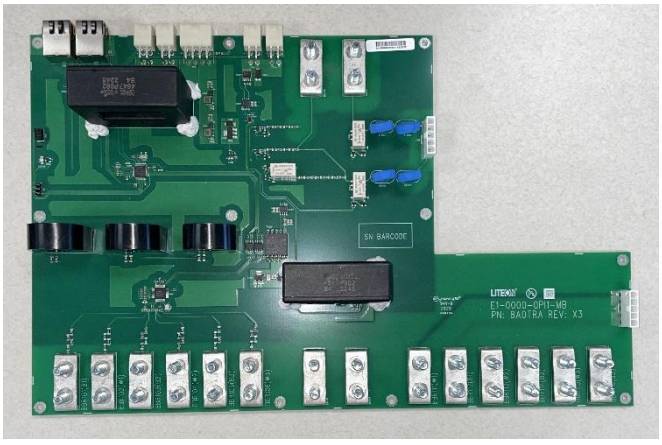


Figure 1: The L-shaped Meter Board: (above) is installed next to Bias Supply is deep in the bottom layer of the installed Rack Controller under the MCU Board in this charger; (below) is uninstalled on table top

CAUTION! Replacement parts used must be purchased from Power Innovations International to maintain the charger's listing.

Replacement Meter Board Part Number

Part #	Description	Supported Pii Charger Models
Meter Board Part #: E1-0000-0PI1	Meter Board installed in this charger's Rack Controller	EVQC030, 30 kW EV Quick Charger

Tools Needed

- PPE
- Diagonal cutters
- Fresh Sharpie
- Masking tape
- Headlamp
- Magnetic dish (for fasteners)
- Socket wrench and extension, 8 & 10 mm
- Phillips screwdriver, 0, 1 and 2 gauge
- Cable ties: min. length 6 in. (152.4 mm); max. width .14 in. (3.6 mm)

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, WHICH IS REQUIRED TO MAINTAIN THE CHARGER'S INTERTEK LISTING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE INJURY OR DEATH.

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 QUICK 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, including providing suitable wire sizes per NEC for the input configuration.

Notice: Before Beginning Replacement

Note:

1. **Wire/cable count and placement vary, by model number**. Not all connections are specified here, so take note of positioning and be methodical when disassembling. Clear, lighted photographs, from varied angles, and labeling with tape and or Sharpie is recommended.
2. **Take care to keep track of fasteners**. If any fasteners are lost, they must be replaced--or else damage or liability may result.
3. **Avoid cross-threading.** Thread nuts and screws first by hand, then with power tools (if desired), to avoid cross-threading. This may seem minor, but it can have major ramifications if not observed.
4. **Recommissioning the unit is not necessary**, as that process will have been completed in the factory.

Replace Meter Board in a 30 kW EV Quick Charger

1. Turn Off EV Quick Charger's AC Main Switch.

a. Remove the lower-front panel on the 30 kW or 60 kW charger using a T25 Torx driver.

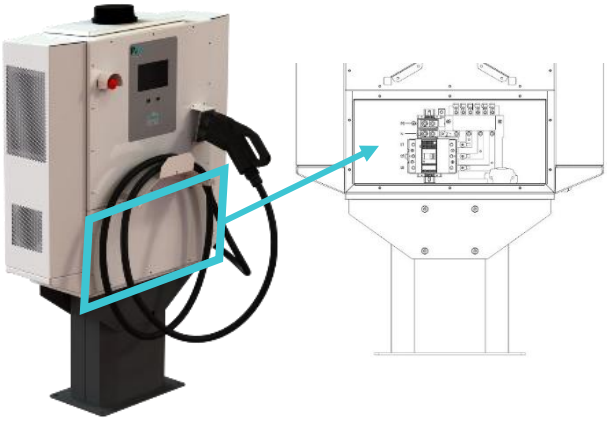
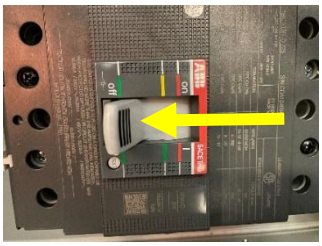


Figure 2: EV quick chargers' lower- front panel of 30kW charger

b. Turn OFF chargers AC main switch inside the 30 kW charger.

Figure 3: 30 kW charger's AC Main Switch inside charger in OFF position



OFF

2. Be mindful that charger's AC input wires are still live.

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

The **input** wires inside the open lower-front panel coming up from the bottom remain **live**—Do not touch!

The remainder of the system is without power and can be handled safely.

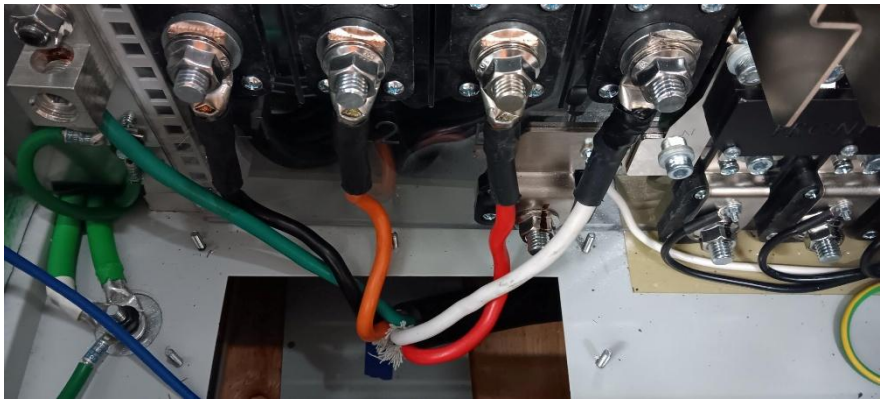
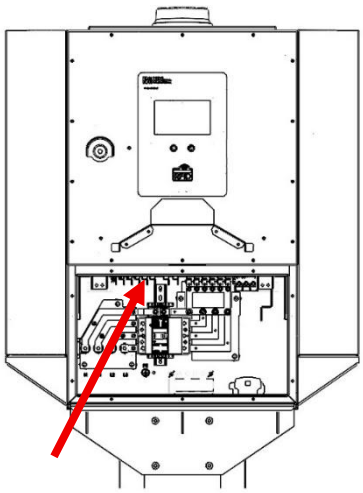


Figure 4 – WARNING! Don't touch Input wires inside right-side door if they are live live

3. Disconnect all wires connected to Rack Controller (Figures 5-7).

a. At the top of the opened lower-front panel (Figure 5), locate the wires connected to the rack controller.



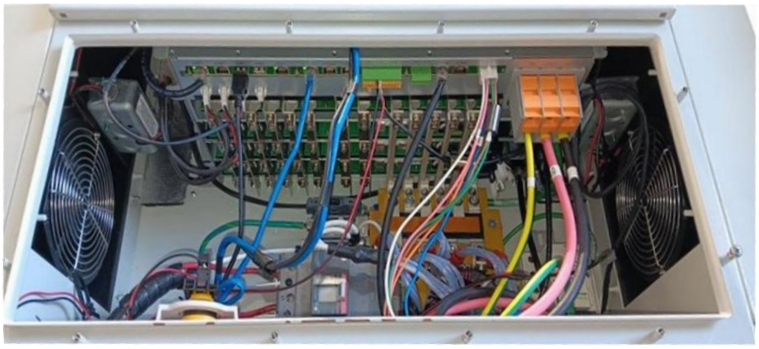


Figure 5: Locate all wires connected to the installed Rack Controller inside top of charger's opened lower-front panel

b. Label and/or photograph all labels with the dashed line area in Figure 6.

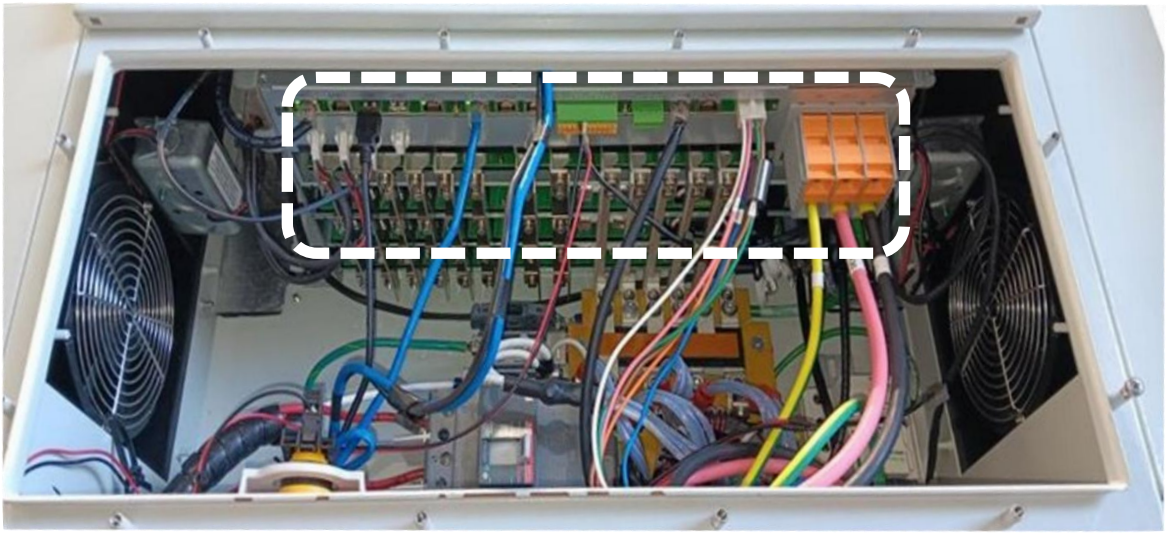
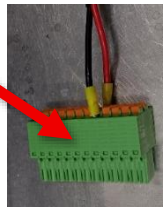


Figure 6 – Wires and connectors to be disconnected before uninstalling Rack Controller

c. Remove all cables/wires within the dashed line area in Figure 6 as follows:
(1) Depress retaining latches and then pull cables.
(2) Insert a lever into quick-connect holes and pivot to release PE, L1, L2.
(3) Gently wriggle-out connectors with multiple pins, if necessary.
(4) Unplug green and orange connector, rather than its red/black wires.



4. Remove 28 bus screws from the front of the rack controller.

a. Still inside the opened lower-front panel, use #2 Phillips bit to remove the 28 bus screws -- or 2 rows of 14 screws, nearest to the front of the charger.

Figure 7 – The 28 bus screws (or 2 rows of 14 screws) closest to the front of the charger must be removed before rack controller can be pulled from charger

b. Set the 28 screws aside for re-installation later.

5. Remove left-side and right-side Heat Exchanger (HX) (Figure 7).

a. Remove bottom socket cap screws (2 on each Heat Exchanger) with a 6 mm hex driver and extension.
b. Lift heat exchanger (HX) cover vertically to remove.
c. If HX cover is sticking, you may be required to strike this surface with rubber mallet.
d. Set each cover aside.

Figure 8 – Removing Heat Exchangers from both sides of the charger

e. Use an M8 socket to remove the 20 fasteners from each heat exchanger (HX), (20 from left-side HX and 20 from right-side HX. This will also require an extension on your drill (Figure 9).

Figure 9 – Removing 20 fasteners from each heat exchanger (HX) (left-side HX and right-side HX

f. Remove the heat exchanger(s), carefully guiding attached wires out through the opening (Figure 10).

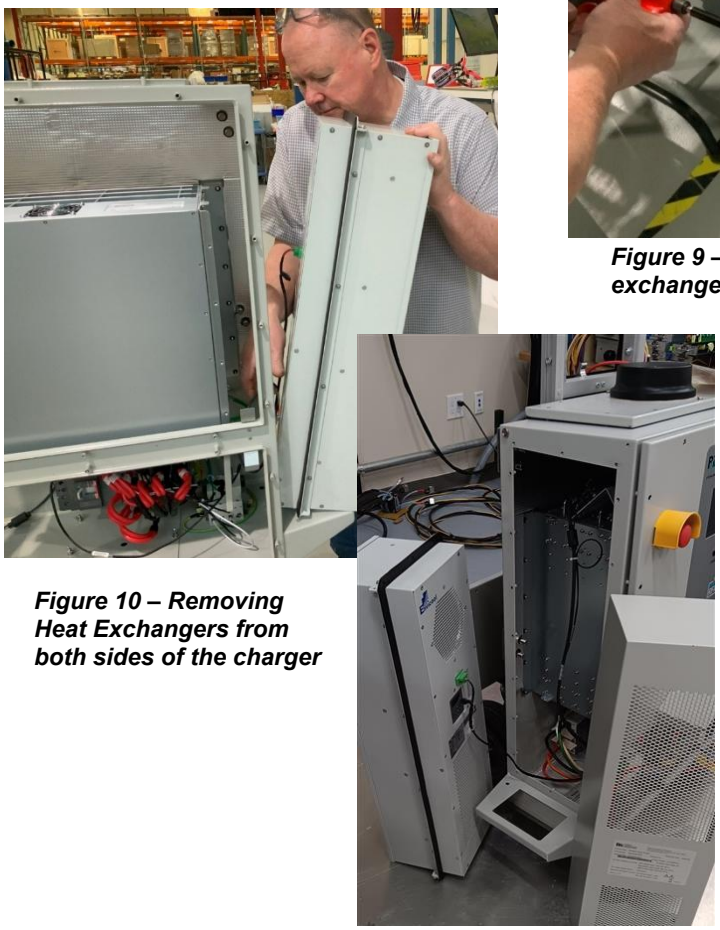


Figure 10 – Removing Heat Exchangers from both sides of the charger

g. Remove 8 forward screws from each side of the charger (Figure 11).

Figure 11 – Eight forward screws on each side of the charger are accessible once HX covers are removed

6. Detach Charger's Upper-front Panel.

a. Using a T25 Torx driver, remove the 14 M5 screws securing the upper-front panel to the charger (Figure 12).

b. While supporting the bottom of the upper-front panel (which has cables attached), tip the top of the panel away from the charger, then carefully guide the cables out from behind the charger's front bracket (Figure 13).

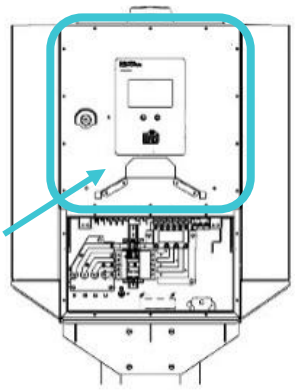


Figure 12: Upper-front panel on charger is secured with 14 screws

Figure 13: Guide cables out from behind charger's front bracket

c. Move the upper-front panel (with RFID circuit board, display screen, and cable hanger still attached) and place it face down on a table. (Note: Cardboard or cloth on the table will help you avoid scuffing any part of the panel face or cable hanger face).

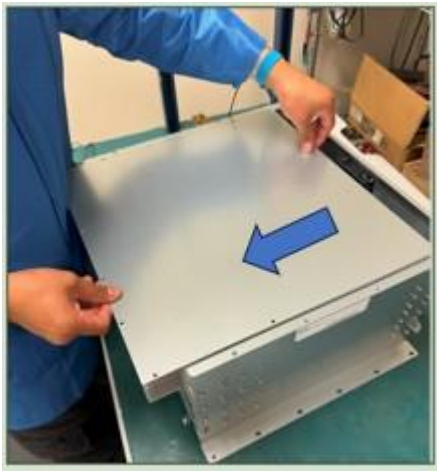
Figure 14: EV quick chargers' upper-front panel face down on table

7. Extract rack controller (approx. 23 lbs) with top cover still on.

- **a.** Lift the rack controller with its top cover still secured out the front of the opened upper-front.
- **b.** Place on a raised surface (e.g. table) for working ease.
- **c.** Connector designators face you, reading upright and horizontally.

8. Remove rack controller's top cover.

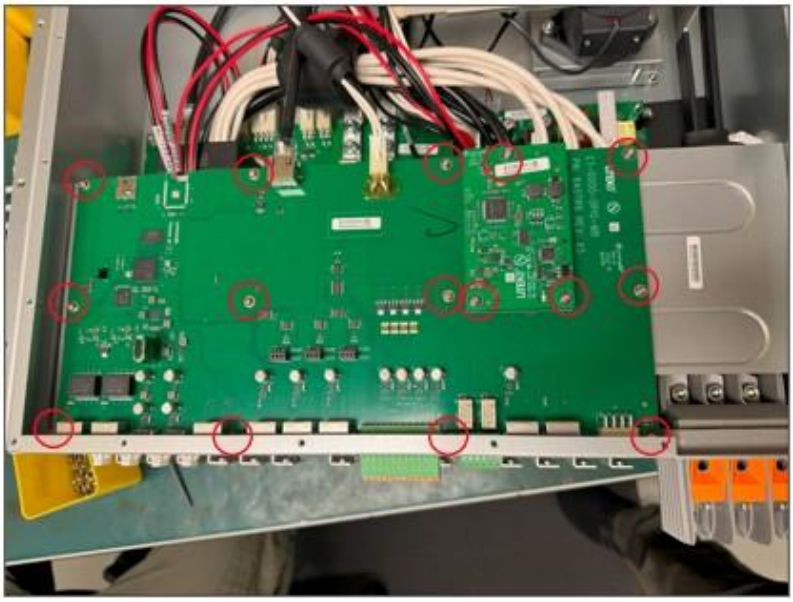
- **a.** Remove 16 screws securing the rack controller's top cover in place.
- **b.** Slide the top cover out the front.



9. Remove MCU board and CP Board

a. MCU is the Printed Circuit Board attached to small silver shelf with 12 screws and with CP Board attached on top of MCU Board with 3 screws.

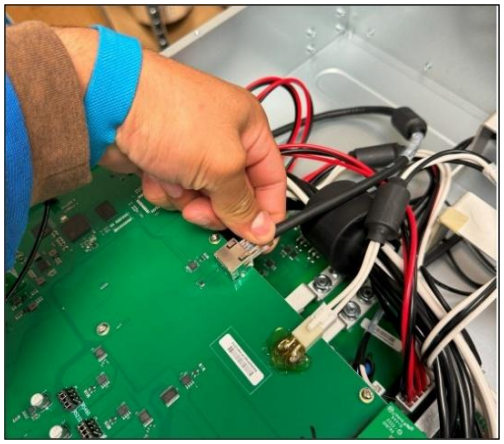
b. Note location of cables: Take picures of cable connections to be restored.

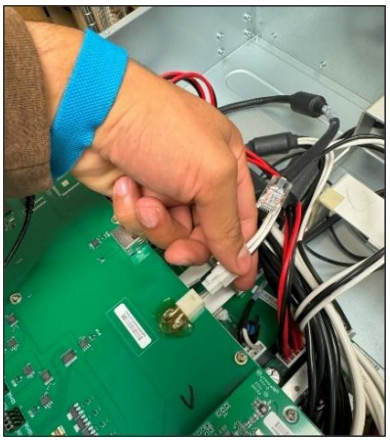


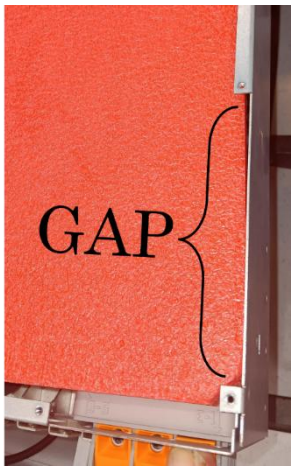
c. Remove all cables connected to MCU and CP Board.

d. Remove screws holding MCU and CP Boards in place: Either 15 screws in all or 4 side screws and 1 front screw (#1 bit).

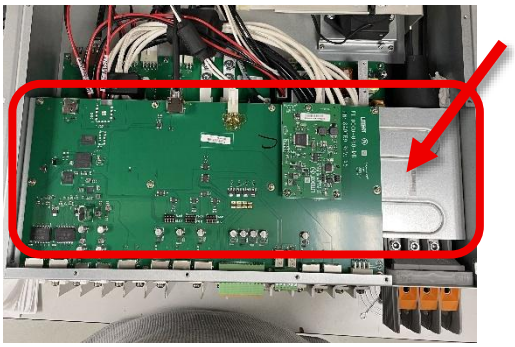
e. Lift MCU Board and CP Board out (first through gap in enclosure lip) and then carefully set aside for reinstalling later.



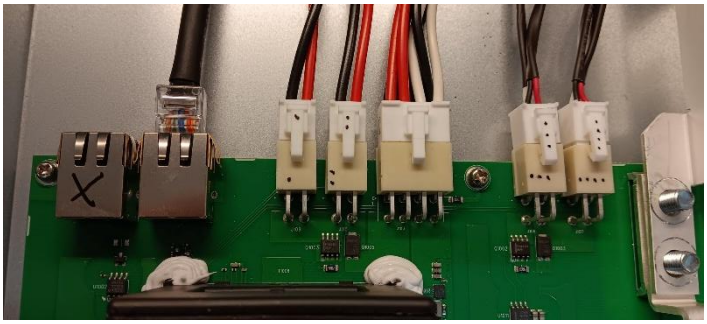




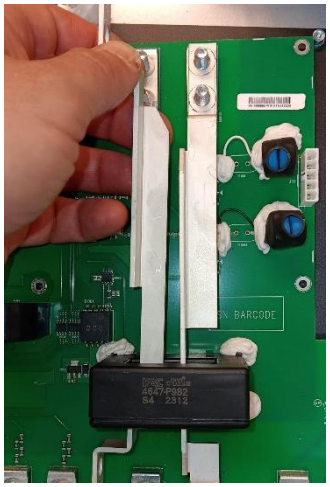
10. **Remove Small Silver Shelf that MCU Board was mounted to.**
    - **a.** Note the small silver shelf that was installed under MCU Board.
    - **b.** Remove screws on both sides, securing the shelf inside the rack controller box.



11. **Remove Meter Board.**
    - **a.** This is the L-shaped board (larger of two boards) mounted in bottom of rack controller box.
    - **b.** Remove cable ties with diagonal cutters, careful not to harm wires.
    - **c.** Mark “X” on empty receptacle(s).
    - **d.** Mark with Sharpie to distinguish identical connectors.

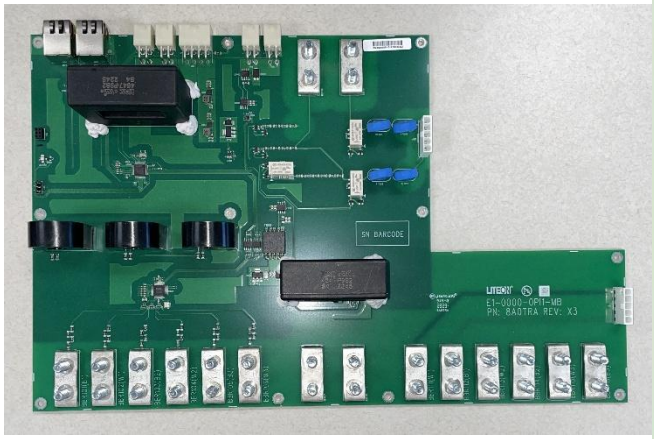


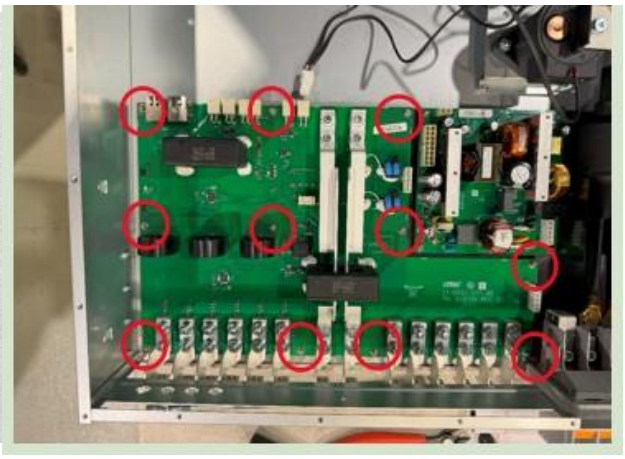
- **e.** Photograph and disconnect all click-in cables.
- **f.** Remove the thirty-two 10mm nuts.
- **g.** Remove all terminals from their studs.
- **h.** Pull all twelve 10AWG wires together through square & arched sensors.
- **i.** Remove two L-shaped relay busbars.
- **j.** Remove two straight DC busbars (passing through other square sensor). Note: Roll each on its axis, to maneuver out.
- **k.** Remove the 14 bus brackets.
- **l.** Remove the 11 PCB mounting screws.
- **m.** Lift PCB out of enclosure and set aside, careful not confuse with new one.



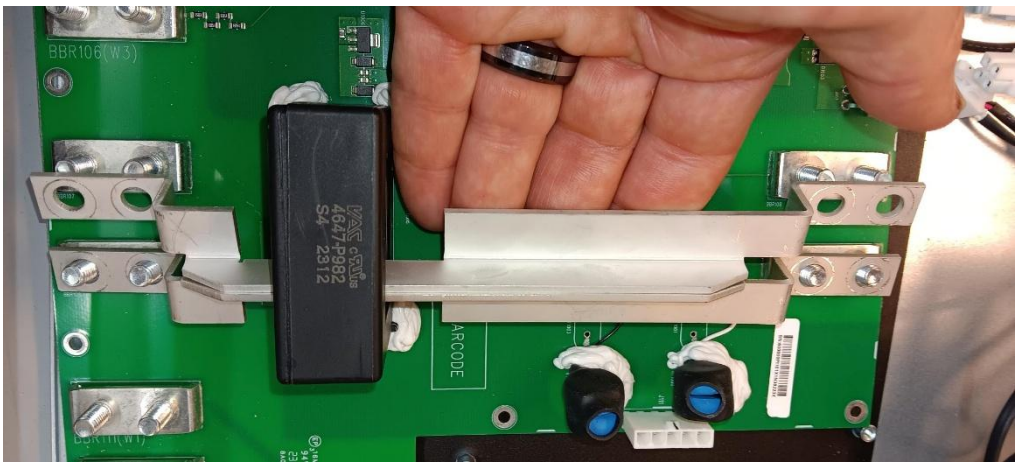
12. Install New Meter Board.

- **a.** Mount PCB to bottom of enclosure with 11 screws (tighten, not overly)
- **b.** Connect all cables. Refer to photos and Sharpie marks for aid.





- **c.** Guide straight DC busbars through square GFCI sensor and onto studs.
  - i. Tilt both on axis, to maneuver the second into place.



  - ii. Tighten 4 nuts onto front studs. Interior studs, leave nuts off.
- **d.** Attach L-shaped DC busbars to relays with 2 screws (tighten)
  - i. Atop previously placed cables
  - ii. Attach & tighten 4 nuts on meter board side
- **e.** Place the 14 bus brackets onto their double studs (no nuts, yet)
- **f.** Guide twelve 10AWG wires together, through the square sensor
  - i. Then the black bundled wires through arched sensors
    - a. B1, through arch closest to enclosure
    - b. B2, though center arch
    - c. B3, through innermost arch

g. Attach 10AWG terminals
  i. Atop bus brackets and their double studs
  ii. Number placement is printed on circuit board
    a. B1,W1,B2,W2,B3,W3 (side nearest enclosure)
    b. W1,B1,W2,B2,W3,B3 (other side)
  iii. Angled portion of terminal positioned upward
  iv. Push bus bracket laterally against both studs, to keep straight
    a. (Crooked brackets will not align with external busbars)

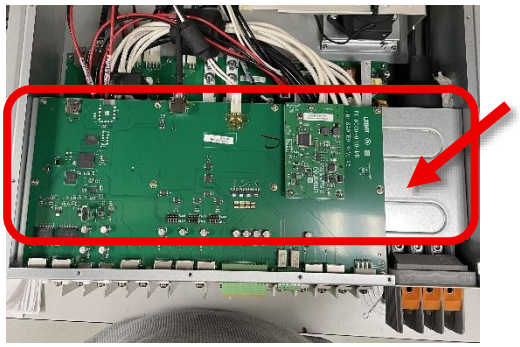
h. Install the four Molex 2-pin cables (distinguished by Sharpie markings)
  i. +48V SW, +48V SW, +24V Modem, +24V Aux

i. Cable-tie all loose wires (except 2 MCU board cables)

13. Re-install Small Silver Shelf for MCU Board Mounting

a. Return the small silver shelf to its original mounted position in rack controller box.

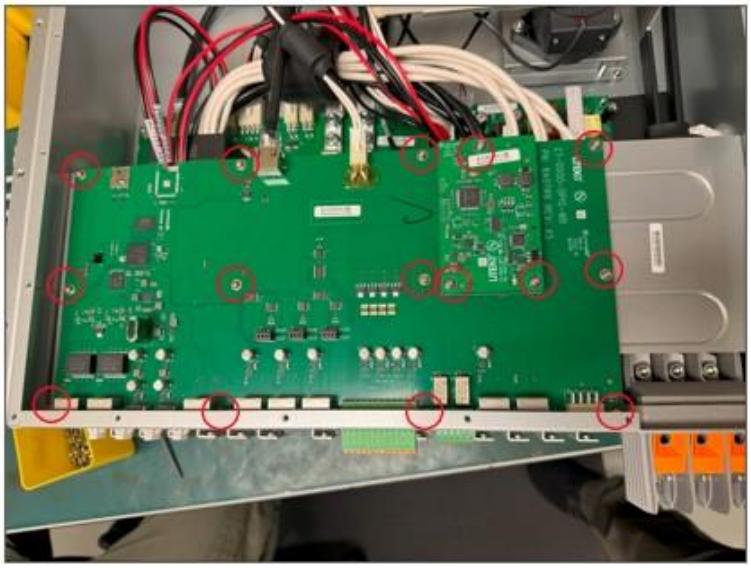
b. Restore screws on both sides of the shelf to secure it inside the rack controller box.

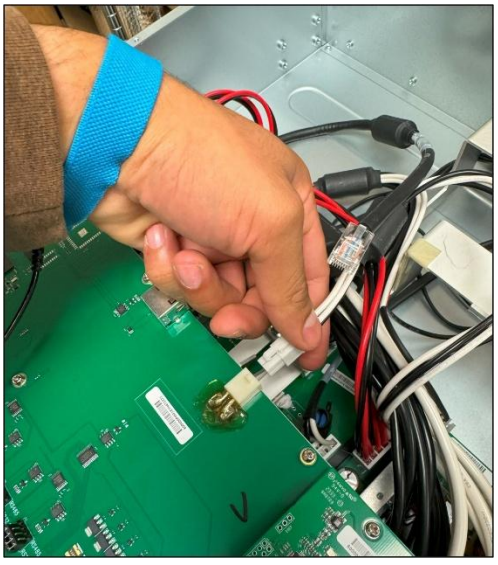


14. Re-Install MCU Board and CP Board.

a. Mount MCU and CP Board with 16 screws (tighten, not overly).

b. Re-connect all cables as captured in your photos.





15. Re-install Rack Controller's top cover.

a. Slide the top cover back into place on the top of the rack controller

b. Restore 16 screws to top cover to secure the top cover in place.

16. Reinstall rack controller into charger

a. In upper-front opening (connectors downward, place rack controller with wiring connectors facing down and top cover facing outward.

b. Fasten 16 side screws (8 on each side).

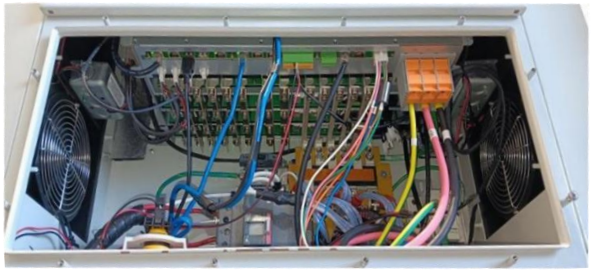
c. Reconnect cables/wires through opened lower-front opening.

i. Ensure retaining latches are engaged.

ii. Terminati PE, L1, L2 at Quick Connect

iii. Take care that these are each inserted fully

iv. Insert a lever into hole above each wire and torque until fully closed



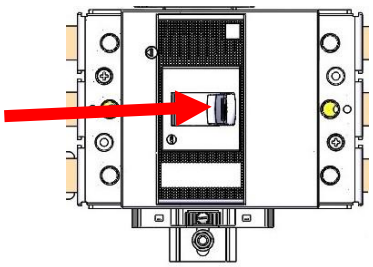
17. Replace heat exchangers and covers to charger

a. Terminate their wiring at +48V connectors on rack controller.

b. Hang HX on both sides of 30 kW charger and secure with original screws.

18. Close the internal breaker (power “on”).

a. In the open lower-front panel, turn chargers AC main switch to the ON position (Figure U).



ON

19. Reinstall upper and lower-front panels.

a. Reinstall lower-front panel and secure with the original screws using a T25 Torx driver and torque screws to 142±10 in-lbs (16±5 N-m).

b. Turn ON upstream power to the unit.