DISPENSER USER MANUAL

(Installation, Operation & Maintenance)

Model Name: **Gen 2 Dispenser**

Model #: RES-D2-CS20

Document Number: 100-PBJ2991-PAI

Version Date: – Mar 25th, 2021

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1. REVISION HISTORY

Version	Description	Date
100-PBJ2991-PAA	Initial Release	Oct 1, 2020
100-PBJ2991-PAB	LV Terminal block labeling updates	Oct 15th, 2020
100-PBJ2991-PAC	Wire guide quick reference update, added network connectivity appendix	Nov 4th, 2020
100-PBJ2991-PAE	Updated user interface screens.	Dec 8th, 2020
100-PBJ2991-PAF	Wire sizing guide and recommendations made to be a separate document.	Dec 23rd, 2020
100-PBJ2991-PAG	Shield termination recommendation change.	Feb 25th, 2021
100-PBJ2991-PAH	Private network access	Mar 25th, 2021
100-PBJ2991-PAI	Offer range for conduit size for ethernet. Updated Pg numbers	May 28th, 2021

2. CONTENTS

3. ABBREVIATIONS

Abbreviation	Definition
ANSI	American National Standards Institute
AWG	American Wire Gauge
CCSM	Combined Charging System Module
EPO	Emergency Power Off
GFDI	Ground Fault Detector Interrupter
HV	High Voltage
IEEE	Institute of Electrical and Electronics Engineers, Inc.
ISO	International Organization for Standardization
ITB	Interface Terminal Board
kVA	Kilovolt Amperes
kW	Kilowatt
LV	Low Voltage
LVPS	Low Voltage Power Supply
MCB	Miniature Circuit Breaker
MIC	Main Converter Controller (Control Board)
MSDS	Material Safety Data Sheet
NEC	National Electric Code
NFPA	National Fire Protection Association
OEM	Original Equipment Manufacturer
PCS	Power Control System
RES	Rhombus Energy Solutions
VAC	Voltage, Alternating Current
VDC	Voltage, Direct Current
VSB	Voltage Sense (Circuit Board)

4. SYMBOLS

Disclaimer

	Danger of electric shock hazard
	Warning: Failure to follow procedures may result in injury or death to the operator
	Caution: Failure to follow procedures may result in damage to the RES Converter.
	Ground connection to the building (or site) ground
	Chassis connected to ground

There may be variance in the exact procedures used to install/operate the RES Equipment. This manual cannot possibly anticipate all such variations nor provide advice or cautions to all. Before deviating from the instructions in this manual, the installer/operator must first establish that neither personal safety, nor the integrity of the RES Equipment is compromised.

Because of the wide variety of uses for power electronics equipment, this manual does not describe every possible application or configuration. All personnel responsible for installing, commissioning, and operating this equipment must have personal assurance of the suitability and proper implementation, installation and of the intended application of this power product. In no event will Rhombus energy systems, Inc., its subsidiaries, employees, or affiliates be responsible or liable for any damages, indirect or direct, resulting from the misuse or incorrect application of this equipment.

The examples and diagrams in this manual are for illustrative purposes only. Because of the wide variety of uses, applications, peripheral equipment, and facility configurations to each installation, Rhombus Energy Solutions cannot assume responsibility or liability for actual use based on the information provided here.

5. IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

THIS MANUAL CONTAINS IMPORTANT INSTRUCTION ON RHOMBUS POWER CONVERSION SYSTEM (PCS) EQUIPMENT THAT SHALL BE FOLLOWED DURING INSTALLATION AND MAINTENANCE.

WARNING: **These are important safety instructions. Save these instructions.**

Failure to follow the cautions and warnings may result in damage to the equipment, personal injury, or death.

This manual contains WARNINGS and CAUTIONS. Warnings indicate actions that may result in an accident, which could cause bodily injury or death. Cautions indicate procedures that could result in damage to the Dispenser or connected PCS equipment. Observe all WARNINGS and CAUTIONS. Failure to do so may result in personal injury or damage to the PCS Equipment.

- Please read entire installation manual and associated safety procedures/warnings prior to installing equipment.
- Store provided service access door key in a secure location.

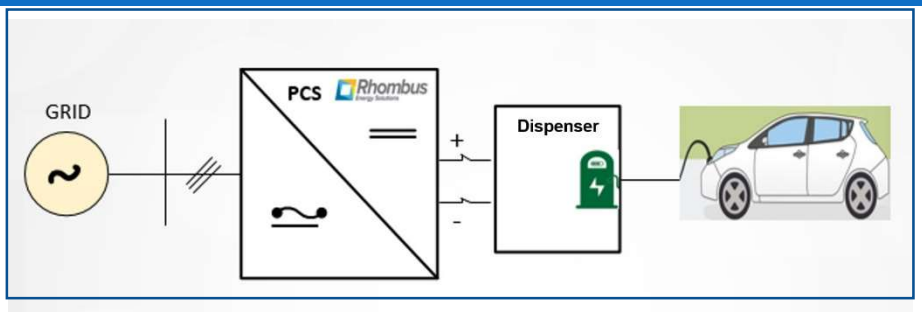
General Safety

- Equipment to be installed and serviced by authorized personnel only.
- Make sure that all grid/PCS and vehicle (Inputs/Outputs) have been disconnected from the dispenser before servicing unit. (Unless specifically required by the procedure with appropriate safety precautions.
- Wear proper level PPE Personal Protective Equipment &/or clothing (gloves, apron, etc.) approved for working on high voltage equipment.
- Keep all guards, screens, and electrical enclosures in place when the system is operating.
- FOLLOW ALL INDUSTRY-RECOMMENDED SAFETY PROCEDURES AND STANDARDS WHEN SERVICING THE PCS

	Equipment is a possible tip hazard. Do not move equipment without appropriate mechanical assistance. (E.g.: Forklift with appropriate capacity rating)

	DANGER: Internal components within the dispenser and its connections may operate at high voltage. Pay close attention to ALL warnings, cautions, and safety instructions. Failure to do so may result in electrical shock leading to personal injury or death.
	**Electrical Connections**: Be sure that all electrical connections and connectors are properly installed and connected with appropriate torque.
	Improper Use: Rhombus Energy Solutions cannot assume responsibility for personal injury and/or equipment damage because of improper installation, use, maintenance, reconfiguration, reprogramming, or other improper actions.
	An incorrectly serviced or operated dispenser system can cause personal injury, component damage, or reduced product life. Malfunction may result from wiring errors, an incorrect or inadequate DC supply or AC grid connection, excessive ambient temperatures or obstructed ventilation, or incorrect software configuration.
	Keep the door closed when operating the system. Additionally, keep all guards, screens, and electrical enclosures in place when the system is operating. Close the inverter enclosure and put all guards and screens in place before energizing the PCS
	Locked Doors: The PCS enclosure should remain locked always during normal operation and should only be unlocked for maintenance by qualified personnel.
	Enclosure keys should be stored in a safe place and should be accessible to appropriate personnel only
	Install dispenser only after reading and understanding the complete instructions as specified in the manual.
	Improper Installation Can result in severe personal injury death and equipment damage. The installer must be qualified to perform the installation of electrical and mechanical equipment.
	Ensure that the mounting method and all connections comply with local codes and ordinances
	Observe all local and national safety regulations.
	Observe local regulations regarding wiring different circuits in the same conduit. In general, all conductors occupying the same conduit must have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the conduit.

6. PRODUCT SPECIFICATIONS



The Rhombus Dispenser provides the interface and high-power CCS Type 1 DC connection to your EV.

ELECTRICAL (High Voltage DC)

OPTION 1: CONNECTION TO 60 KW PCS (RES-DCVC60-480)

Nominal Output Power	**60kW**
Output Voltage (Vdc)	270 – 870 Vdc
Output Current (Adc)	200A (Max)

OPTION 2: CONNECTION TO 125 KW PCS (RES-DCVC125-480)

Nominal Output Power	**125 kW**
Output Voltage (Vdc)	530 – 920 Vdc
Output Current (Adc)	200A (Max)

SAFETY AND OPERATIONAL RATING

Dispenser Enclosure Rating	NEMA 3R
Safety Standards	UL standards 2202*, 2231*
Cooling	Natural convection
Operational Temperature	-20 °C to 45 °C (-4°F to 113°F) Output power derating may apply above 45°C (113°F)
Storage Temperature	-30 °C to 60 °C (-22°F to 140°F)
Operating Humidity	0 to 95% (Non – Condensing)

**Certification in progress. Expected completion Oct 2020.*

DIMENSIONS

Envelope Dimensions	22W x 17D x 75H inches
Weight (Including 20' charging cable)	~182lbs.
Shipping Crate Dimensions	86W x 33D x 28H inches
Shipping Weight	~388 bs.

**Please see appendix for dispenser dimensions.*

NOTE: Rhombus reserves the right to alter product offerings and specifications at any time without notice and is not responsible for typographical errors that may appear in this document.

7. PRE-INSTALLATION NOTES

IMPORTANT SAFETY INSTRUCTIONS

- Ensure that the appropriate wiring, circuit protection, and metering are in place at the installation location by reviewing the specifications, wiring diagrams, and grounding requirements described in this Installation manual.
- Confirm that the installation site location evaluates the following needs:
    - Appropriate wiring and conduit.
    - Appropriate floor/ground load capacity and footprint area.
    - Equipment access for installation and/or removal.
    - Site Selection to consider adequate space for equipment service and maintenance.
        - **Consider space required for door swing or panel removal clearance and access.**
        - **Adequate space for air to circulate through the equipment and or enclosure consistent with local, state, and national electrical installation guidelines. Do not block the intake or exhaust ports.**

    - The PCS and dispenser must be connected to appropriately sized earth ground.
    - All communication and electrical wiring should be protected in steel conduit.

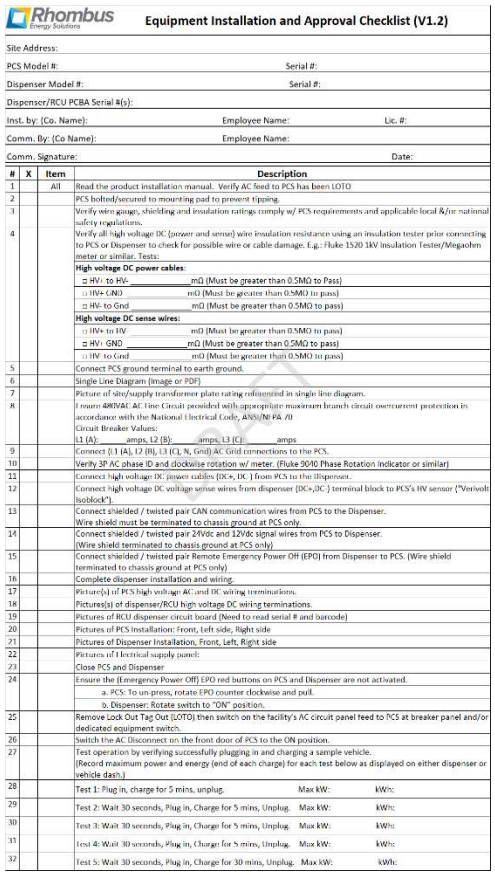
- **Please see separate "Rhombus DC Fast Charger Wire Requirements Guide" for details about wire types, sizing and supplier suggestions. Recommended wire is available for purchase separately through Rhombus Energy Solutions or may be purchased through the customers own wiring supplier/distributor.**

- **Evaluate compliance w/ local rules and regulations before finalizing wire/cable selections.**

- The dispenser offers hardwired ethernet connectivity as "standard" and Wi-Fi &/or cellular connectivity as a recommended option. Please determine the dispenser options and configurations along with the customers connectivity preference when evaluating the hard wired ethernet infrastructure. See Appendix for additional information on network connectivity.

8. INSTALLATION CHECKLIST

Note: **Completed checklist required for product warranty and support eligibility.** Please read manual prior to installation for important safety and installation details. Complete, sign and submit this checklist & supporting information to your Rhombus sales or service representative. (Sample image below. Digital (preferred) &/or full size print out available separately)



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Equipment Installation and Approval Checklist (V1.2)

Site Address:

PCS Model #: Serial #:

Dispenser Model #: Serial #:

Dispenser/RCU PCBA Serial #(s):

Inst. by: (Co. Name): Employee Name: Lic. #:

Comm. By: (Co Name): Employee Name:

Comm. Signature: Date:

#	X	Item	Description
1		All	Read the product installation manual. Verify AC feed to PCS has been LOTO
2			PCS bolted/secured to mounting pad to prevent tipping.
3			Verify wire gauge, shielding and insulation ratings comply w/ PCS requirements and applicable local &/or national safety regulations.
4			Verify all high voltage DC (power and sense) wire insulation resistance using an insulation tester prior connecting to PCS or Dispenser to check for possible wire or cable damage. E.g.: Fluke 1520 1kV Insulation Tester/Megaohm meter or similar. Tests: **High voltage DC power cables:** ☐ HV- to HV- _____mΩ (Must be greater than 0.5MΩ to Pass) ☐ HV+ GND _____mΩ (Must be greater than 0.5MΩ to pass) ☐ HV- to Gnd _____mΩ (Must be greater than 0.5MΩ to pass) **High voltage DC sense wires:** ☐ HV+ to HV _____mΩ (Must be greater than 0.5MΩ to pass) ☐ HV- GND _____mΩ (Must be greater than 0.5MΩ to pass) ☐ HV- to Gnd _____mΩ (Must be greater than 0.5MΩ to pass)
5			Connect PCS ground terminal to earth ground.
6			Single Line Diagram (Image or PDF)
7			Picture of site/supply transformer plate rating referenced in single line diagram.
8			Ensure 480VAC AC Line Circuit provided with appropriate maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70 Circuit Breaker Values: L1 (A): _____amps, L2 (B): _____amps, L3 (C): _____amps
9			Connect (L1 (A), L2 (B), L3 (C), N, Gnd) AC Grid connections to the PCS.
10			Verify 3P AC phase ID and clockwise rotation w/ meter. (Fluke 9040 Phase Rotation Indicator or similar)
11			Connect high voltage DC power cables [DC+, DC-] from PCS to the Dispenser.
12			Connect high voltage DC voltage sense wires from dispenser [DC+,DC-] terminal block to PCS's HV sensor ("Veriwell Isoblock").
13			Connect shielded / twisted pair CAN communication wires from PCS to the Dispenser. Wire shield must be terminated to chassis ground at PCS only.
14			Connect shielded / twisted pair 24Vdc and 12Vdc signal wires from PCS to Dispenser. (Wire shield terminated to chassis ground at PCS only)
15			Connect shielded / twisted pair Remote Emergency Power Off (EPO) from Dispenser to PCS. (Wire shield terminated to chassis ground at PCS only)
16			Complete dispenser installation and wiring.
17			Picture(s) of PCS high voltage AC and DC wiring terminations.
18			Pictures(s) of dispenser/RCU high voltage DC wiring terminations.
19			Pictures of RCU dispenser circuit board (Need to read serial # and barcode)
20			Pictures of PCS Installation: Front, Left side, Right side
21			Pictures of Dispenser Installation, Front, Left, Right side
22			Pictures of Electrical supply panel:
23			Close PCS and Dispenser
24			Ensure the (Emergency Power Off) EPO red buttons on PCS and Dispenser are not activated. a. PCS: To un-press, rotate EPO counter clockwise and pull. b. Dispenser: Rotate switch to "ON" position.
25			Remove Lock Out Tag Out (LOTO) then switch on the facility's AC circuit panel feed to PCS at breaker panel and/or dedicated equipment switch.
26			Switch the AC Disconnect on the front door of PCS to the ON position.
27			Test operation by verifying successfully plugging in and charging a sample vehicle. (Record maximum power and energy (end of each charge) for each test below as displayed on either dispenser or vehicle dash.)
28			Test 1: Plug in, charge for 5 mins, unplug. Max kW: kWh:
29			Test 2: Wait 30 seconds, Plug in, Charge for 5 mins, Unplug. Max kW: kWh:
30			Test 3: Wait 30 seconds, Plug in, Charge for 5 mins, Unplug. Max kW: kWh:
31			Test 4: Wait 30 seconds, Plug in, Charge for 5 mins, Unplug. Max kW: kWh:
32			Test 5: Wait 30 seconds, Plug in, Charge for 30 mins, Unplug. Max kW: kWh:

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Warranty and Maintenance Terms and Conditions Acceptance

Company Name	
Contact Information	
Commercial	Name: Address: Phone #: E-mail:
Technical / Maintenance	Name: Address: Phone #: E-mail:
Site and Product Information	
Site Address: (filled in by Rhombus)	
PCS Model #: (filled in by Rhombus)	Serial #:
Dispenser Model #: (filled in by Rhombus)	Serial #:

Customer has received, read and agreed to Rhombus Terms and Conditions as they relate to product warranty, liability and associated preventative maintenance as defined in Exhibit A (Attached)

Authorized Customer Representative

By:

Name:

Title:

Date:

Completed form to be provided to your Rhombus sales representative. Customer will be notified of warranty activation upon receipt of signed form.

RECOMMENDED TOOLS FOR INSTALLATION

Items typically needed for PCS installation

- Forklift
- Lifting strap for dispenser (Min: 200lb rating)
- 1000V Rated Multimeter
- Fluke 1520 1kV Insulation Tester/Megaohm meter or equivalent.
- Fluke 9040 Phase Rotation Indicator or equivalent.
- #2 Phillip Head Screwdriver
- Metric standard and deep sockets + open-ended wrenches up to 17mm.
- Metric HEX keys.

9. INSTALLATION

UNPACKING THE EQUIPMENT

- Upon receiving the Dispenser and PCS Equipment, inspect for signs of damage that may have been caused during shipping. If damage is found, contact Rhombus Energy Solutions at 1-888-978-6564.
- Use forklift with appropriate capacity rating to safely move equipment using the lifting eyes on top of the dispenser.

IMPORTANT: Always transport and store the Rhombus Power Converters in its original packaging and upright orientation.

WIRING REQUIREMENTS AND PRE-TESTS

Before connecting the wiring, note the following requirements:

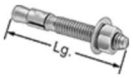
1. Follow safety and building codes when installing the Dispenser &/or PCS Equipment.
2. External wiring (when required) shall follow the National Electric Code, ANSI/NFPA 70.
3. Any external wiring is the responsibility of the installer.
4. All communication and high voltage electrical wiring should be protected in steel conduit.
5. The circuit breaker at the panel must be OFF. Comply with lockout/tagout safety procedures if applicable.
6. Use 90°C or higher rated copper wire only.
7. The grounding conductor is to be grounded to earth at the service equipment, or when supplied by a separately derived system, at the supply transformer.
8. Installer must have an insulated grounding conductor as part of the branch circuit that supplies the PCS and Dispenser.
9. All connections must comply with all local codes and ordinances.
10. PRIOR to terminating & connecting high voltage DC power, verify all high voltage DC (power and sense) wire insulation resistance using an insulation tester to check for possible wire or cable damage. *(E.g.: Fluke 1507 1kV Insulation Tester/Megaohm meter or similar.)*

Tests:

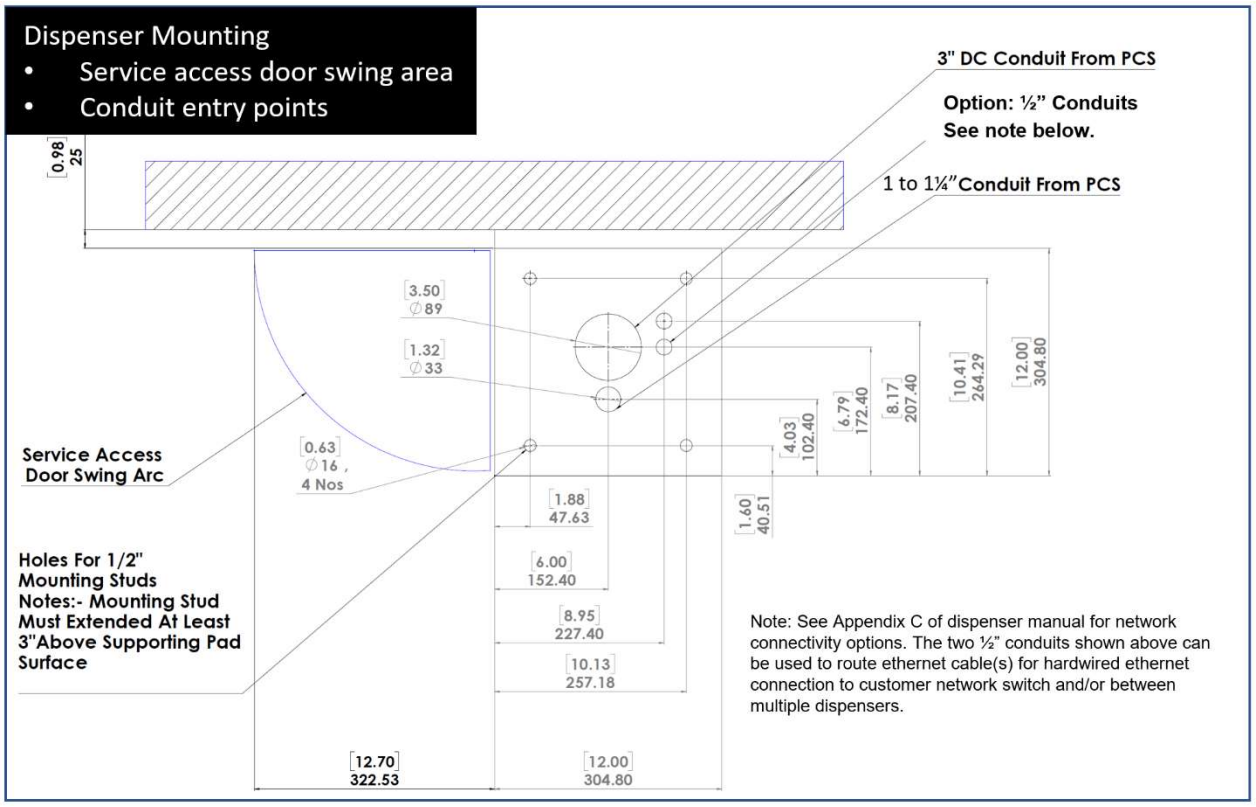
a. (DC+) to (DC-) power cables
b. (DC+) power cable to chassis ground
c. (DC-) power cable to chassis ground
d. (DC+) to (DC-) Remote Sense Wires
e. (DC+) Remote Sense Wire to chassis ground
f. (DC-) Remote Sense Wire to chassis ground

DISPENSER MOUNTING AND CONDUIT INTERFACE GUIDE

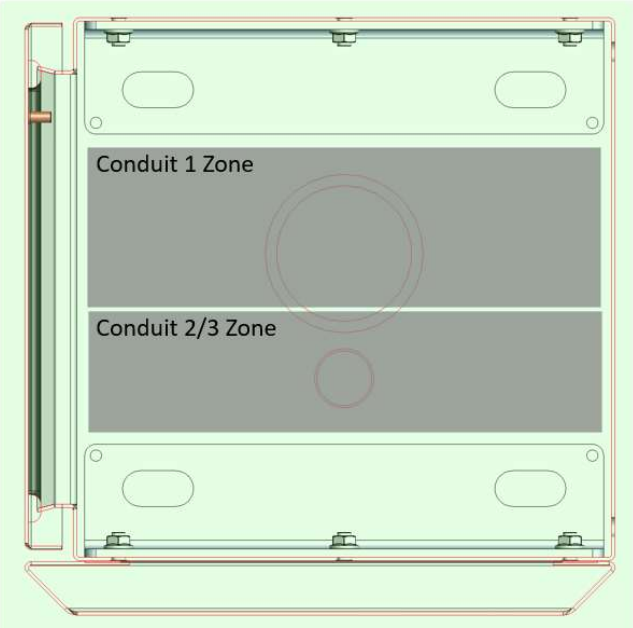
Recommend ½" or larger corrosion resistant studs or wedge anchors pad to secure PCS to the concrete mounting pad with appropriate washer. McMaster example.



Galvanized Steel Stud Anchors for Concrete
1/2" Diameter, 5-1/2" Long
97110A302



Note: See Appendix C for network connectivity options. The two ½" conduits shown above can be used to route ethernet cable(s) for hardwired ethernet connection to customer network switch and/or between multiple dispensers.



Conduit Overview
See "DC Fast Charger Wiring Guide for more details"

	Cable Description	# of Conductors	Notes
Conduit 1 3", Steel	**60kW and 125kW Charger Options Conduit: DC Power (Steel, typically ~3" Dia)**		
	High Voltage DC Power	2	1000V, 200A Red/Black
	High Voltage Sense +/-	2	1000V, Red/Black
	Ground/Earth	1	Green
Conduit 2 1 ¼", Steel	**60kW & 125kW PCS Charger Options Conduit: Low Voltage / Communication (Steel, typically ~ 1 ¼ ")**		
	15VDC (+/-)	2 + Shield	5A
	24VDC (+/-)	2 + Shield	1A
	CAN (H,L)	2 + Shield	Shielded, Twisted Pair
	EPO (In/Out)	2 + Shield	Shielded
	Modbus (Rx/Tx)	2 + Shield	Shielded, Twisted Pair
Conduit 3 (Optional) ½"- ¾"	Ethernet		CAT 5e, Shielded

Note: Maintain spacing of at least 1" between Conduit 1 and either 2 &/or 3.

DISPENSER WIRING

WARNING: Determining the PCS and Dispenser electrical requirements and installating the appropriate wiring must be performed by a qualified electrician.

Ensure the PCS power is off and appropriate Lock Out/Tag Out safety procedures are followed before connecting or servicing dispenser wiring.

Note: The PCS includes capacitors that retain energy after the PCS is powered off. Wait at least 5 minutes with the power off before opening either the PCS or Dispenser service access doors.

STEP: 1 Locate high voltage, low voltage, ground and communication connections and termination points.

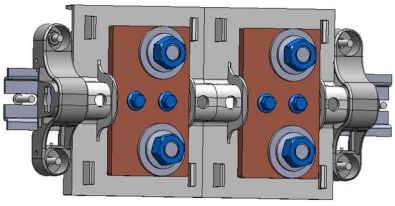
STEP:2 Connect the ground to the Terminal Grounding bar located on electronics mounting plate.

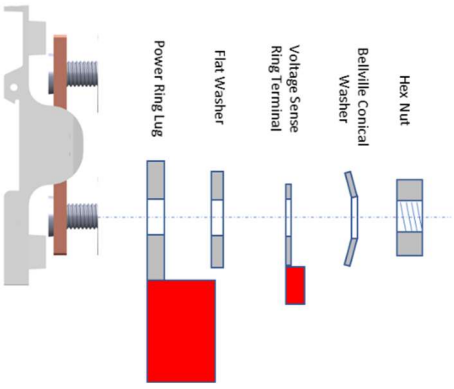
The dispenser is shipped with a cover on the Terminal grounding bar.

- Remove the Terminal grounding bar covering.
- Take the No. #2 Philips screwdriver to loosen the screw
- Insert the ground cable (refer to torque table for cable size) in the screw opening.
- Tighten the Screw as per the torque specifications.

STEP: 3 Connecting the DC power and sense connections to the bottom studs on the power terminal block.

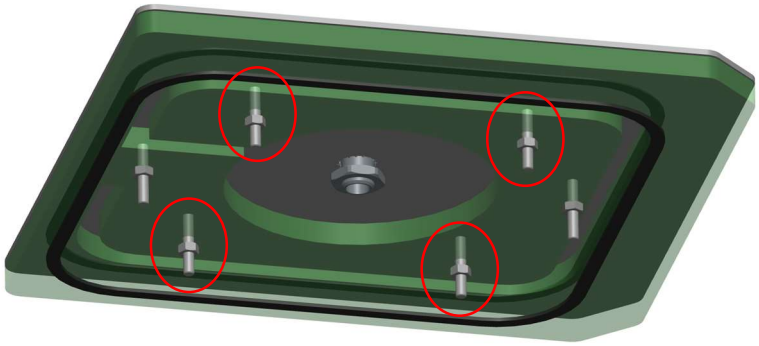
- You will need a ¾" wrench and deep socket to remove the terminal block nuts.
- After removing the nuts, remove the lock washer and flat washer.
- Crimp appropriately sized lugs to the power cables following the lug supplier and associated crimping tool recommendations. Recommended lug hole ~size 0.4" (10mm)
- Crimp appropriately sized voltage sense ring terminal to the voltage sense wires from the PCS. Recommended hole size ~0.4" (10mm)
- Assemble w/ power and voltage sense lugs as illustrated below. (Make sure there is NO WASHER placed between the power ring lug and the terminal block as this may result in a high resistance connection that may cause a fire.)
- Tighten and torque the nut to 265in-lbs [30Nm] or as indicated on equipment torque label.



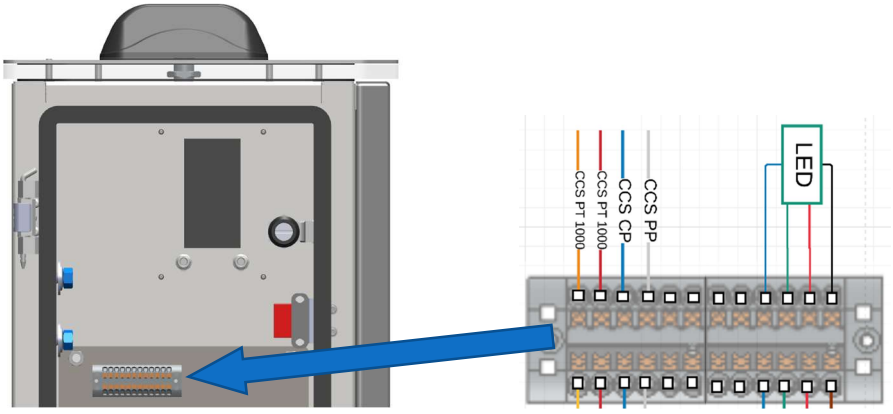


STEP: 4 LED Status Indicator Installation and Connections.

a. Fasten LED top assembly to dispenser using 4x fasteners shown using a 10mm wrench or socket.



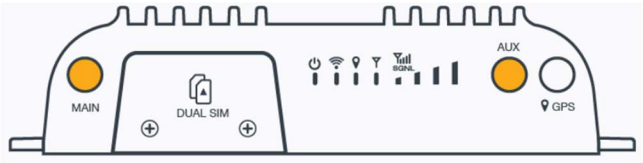
b. Connect LED wires to terminal block matching the wire colors.



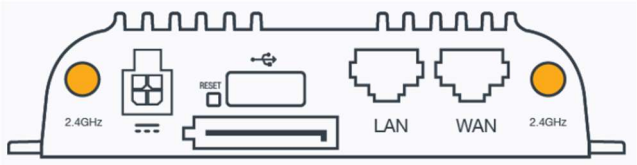
STEP: 5 Modem Antenna Connections.

There are 4x antenna connections.

a. Attach the 2x LTE Cellular antenna cables to the ports marked “MAIN” and “AUX” on the modem and labeled “2G/3G/4G” on the antenna cables.

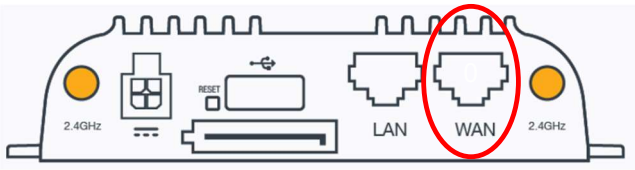


b. Attach the 2x Wi-Fi antenna cables to the ports marked “2.4GHz” on the modem and “WLAN” on the antenna cables.



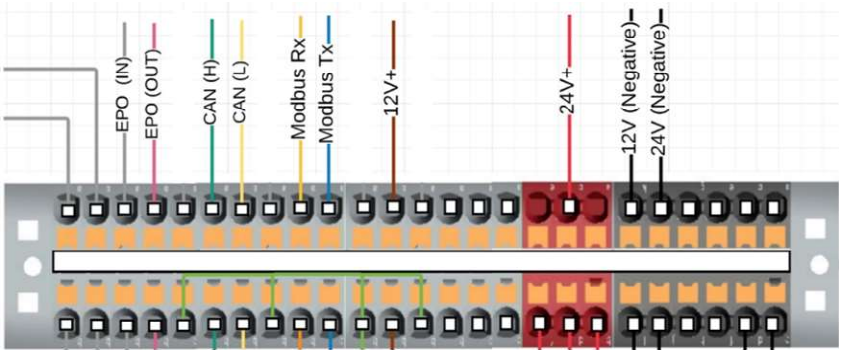
STEP: 6 (Optional): Customer supplied ethernet connection.

a. Attach ethernet cable from customer supplied internet to the modem's "WAN" port. This solution offers cellular fail-back / fall back in the event the wired interconnection was to fail. (Additional IT support may be required to offer the necessary access/permissions to the customers supplied internet connection.



STEP: 7 Connect Low Voltage and Communication Connections.

a. Connect low voltage power and communication connections as indicated below.
b. To help ensure reliable communication, the use of shielded, twisted pair wiring is recommended. (~3-4 twists/inch)



10. DISPENSER OPERATION

SAFETY CHECKS / PREPARING THE PCS FOR OPERATION

Performing a routine safety check each time before starting the charging equipment will minimize both the risk of injury to the operator and potential damage to the charging equipment. Before operating the charging equipment:

- Inspect the equipment for visible signs of damage.
- Inspect externally connected wires and cables for signs of damage, such as fraying or cracked insulation.

NOTE: *Additional safety checks may be necessary depending on the installation of the RES Equipment. The safety checklist above is not intended to be all-inclusive.*

To power-up the PCS Equipment after proper installation follow these procedures:

1. Ensure that all electrical connections are clean, torqued, and free of wire strands and metal shavings.
2. PCS and Dispenser doors should be closed and locked before applying power.
3. Turn circuit breaker and/or grid supply circuit switch on.
4. Turn PCS ON.
5. A green LED signals the PCS initial power up sequence is OK. The PCS should now be ready for operation.

DISPENSER STATUS LEDs

A multi-color status LED is mounted on the top of the dispenser enclosure.

LED Color	Status	Description
None	OFF	Disconnected
Green	ON	Connected
Green/Blue	Flashing	Authorization, Cable Check, Pre-Charge.
Blue	ON	Charging Active/Complete
Red	ON	Fault

DISPENSER TOUCH DISPLAY

Touch display screens content and options may be limited to start. These are expected to improve and expand over time.

Screens

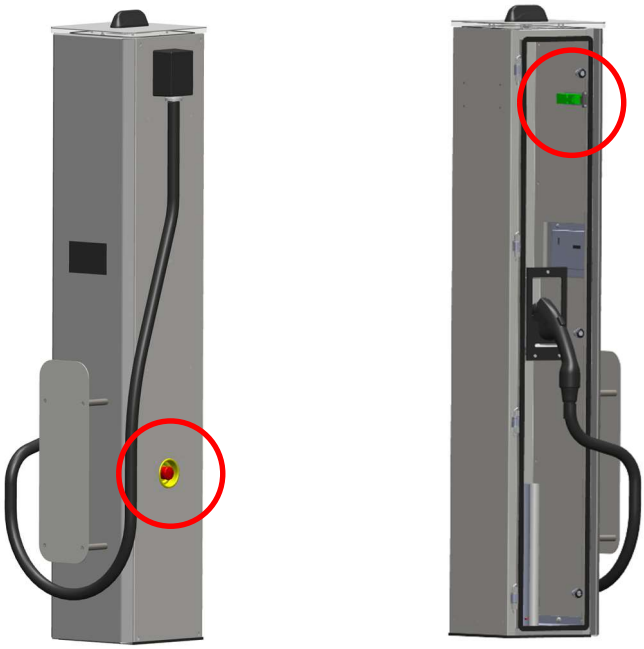
1) Screen Saver: Note: Touch screen to open charge next charge status screen
2) Charge Status: (Indicates charging state and power level
3) Session End: Indicates time charge session ended.

EMERGENCY STOP

The dispenser includes two Emergency Power Off (EPO or E-Stop) switches wired in series w/ the remote PCS.

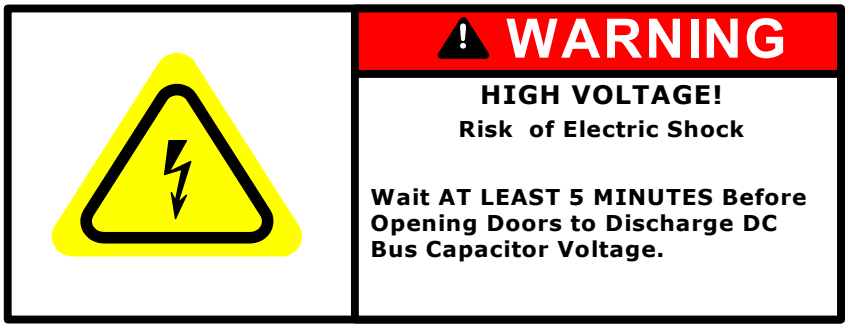
1) **External "Mushroom" Button**: Located on the lower right side of the dispenser when looking at the front display screen. Twist the button to allow the button to pop out and reset.
2) **Service Door Interlock Switch**: Located just inside the dispenser's service access door on the upper right-hand side. Close the service access door to reset the switch.

The PCS will initiate a shut down and open contactors when either of these switches is either opened or pressed.



11. MAINTENANCE

SAFETY PRECAUTIONS FOR EQUIPMENT MAINTENANCE



- Use proper caution before opening the doors or working on the equipment.
- Disconnect the DC and AC before servicing the RES Equipment, since the DC input can be supplied by either PCS or connected Electric Vehicle.
- The RES Equipment's DC-link capacitors will hold a charge for up to 5 minutes after the RES Equipment has been shut off, and the grid and DC input load or source have been disconnected from the RES Equipment. Wait 5 minutes before opening enclosure doors.
- Verify the 0V at the DC terminals with appropriately rated test instrumentation before working on the system.
- Remove jewelry, watches, rings, and metal objects that can cause short circuits.
- Use anti-static wristbands when servicing electronic components.
- Be sure that all electrical connections and connectors are properly installed and connected with proper torque. Torque specifications for customer interface terminals can be found in this manual or equipment labels.
- For continued protection against risk of fire, only use replacement fuses of the same type and rating as the originally installed fuses.
- Avoid hazardous voltage situations that could result from unsafe conditions such as, but not limited to, the following:
    - Back-feed from the utility.
    - Improper grounding.
    - Handling electrical leads or devices with wet hands, or on wet ground.
    - Frayed electrical leads.
    - Working with or on an electrically hot system or component, or when connected to an energized load.
    - Improper connection or re-connection of the terminal leads.
    - Short circuits.
    - Energized power sources including emergency power
    - Possible battery bank connection to the DC bus.

HIGH VOLTAGE ELECTRICAL EQUIPMENT MAINTENANCE

NOTE: Failure to follow the maintenance guidelines may negatively affect the performance of the RES Equipment and may void the warranty.

Due to thermal cycling, certain fasteners may loosen over time, resulting in increased impedance and possible damage caused by heat. After an initial break-in period of ~30 days, all of the high-power cable connections listed should be re-torqued to the torque values specified on the PCS labels or document wiring table.

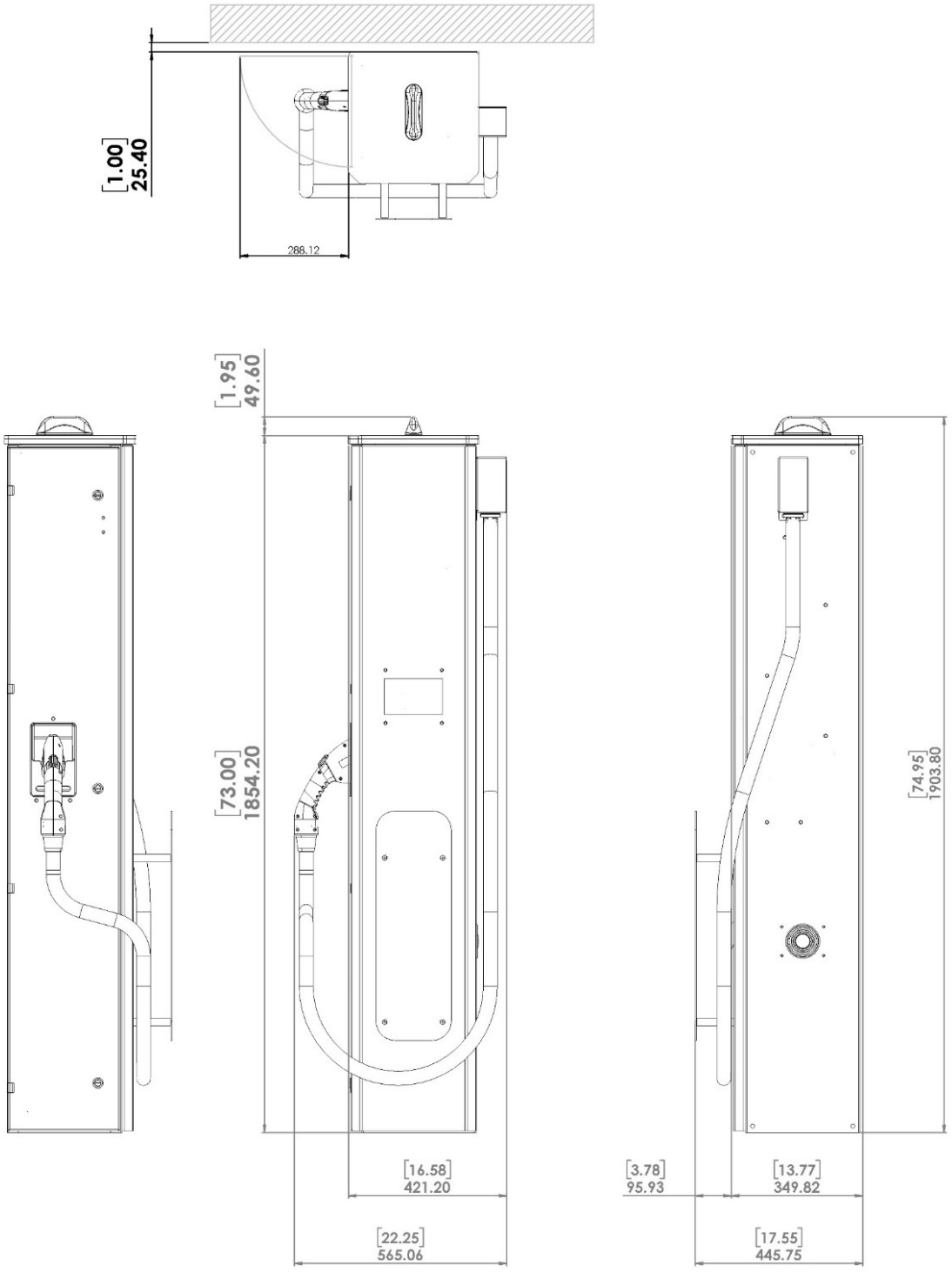
Additionally, these fasteners should be checked at 12-month intervals and re-torque as necessary.

Using the appropriate torque wrench, re-torque all fasteners as indicated on equipment labels. Be careful not to over-torque any connection, as damage to the wiring or terminal may occur.

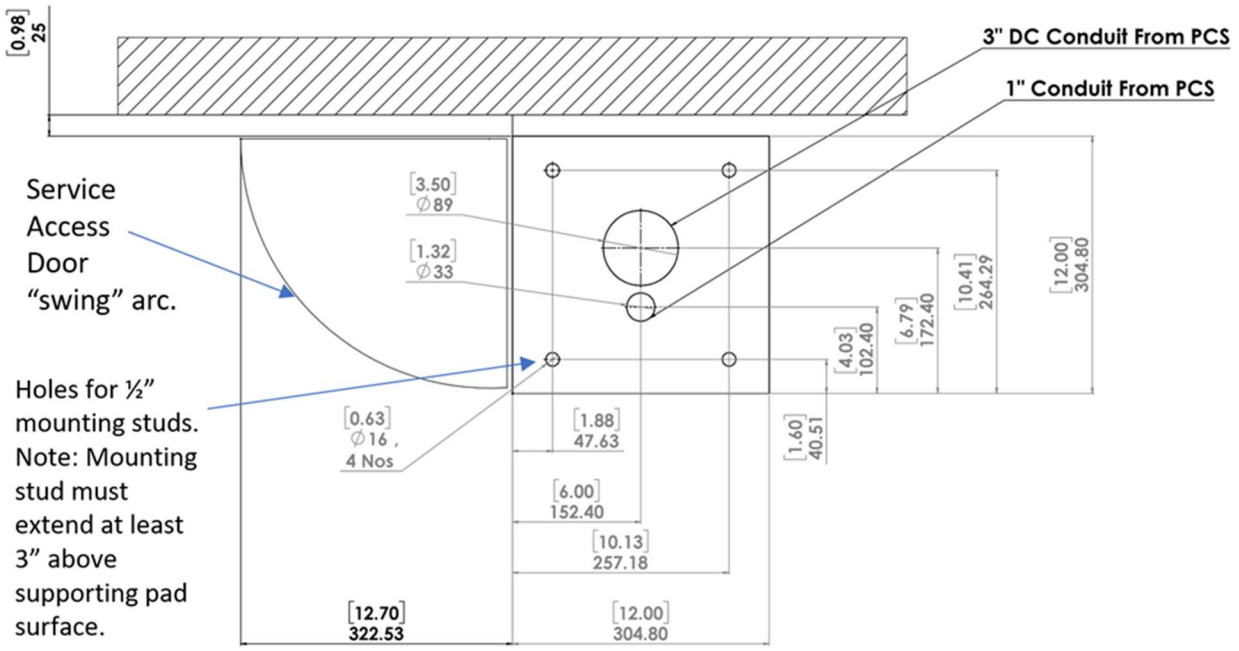
MAINTENANCE ITEM	INTERVAL
Re-Torque Field Installed Fasteners	After 30 days from initial start-up; every 12 months thereafter

12.APPENDIX

APPENDIX 1A: DISPENSER DIMENSIONS



APPENDIX 1B: INSTALLATION CLEARANCE REQUIREMENTS



APPENDIX 1C: EVSE CONNECTIVITY (Network + Web) OVERVIEW and FAQ's

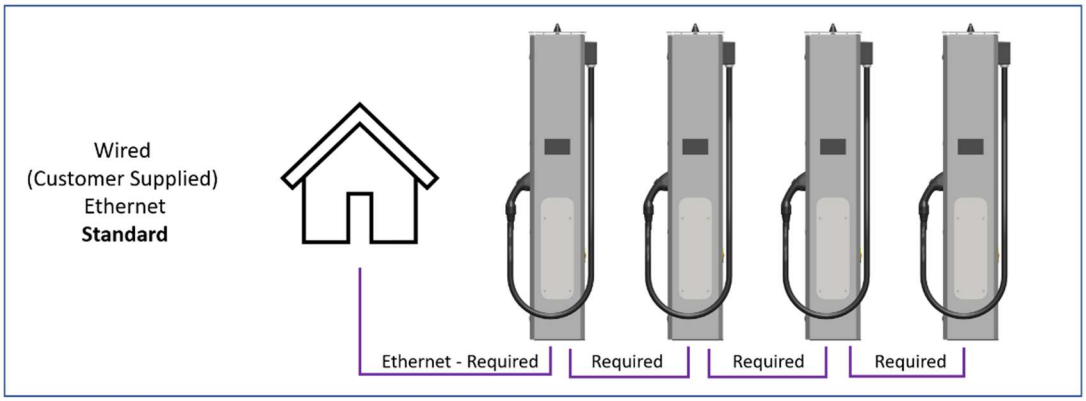
PURPOSE

Rhombus V2G Charging systems (PCS + Dispenser) offers local network and or web connectivity options to support control, data collection and troubleshooting functionality.

EVSE DISPENSER CONNECTIVITY OPTIONS

ETHERNET (STANDARD)

- Customer to provide wired ethernet connection to dispenser(s).
- Note: For Device Access via Private Site/Customer Network Firewall please share the link below with the site IT manager to for review/approval.
    - https://customer.cradlepoint.com/s/article/Series-3-NCM-Access-via-a-Private-Network

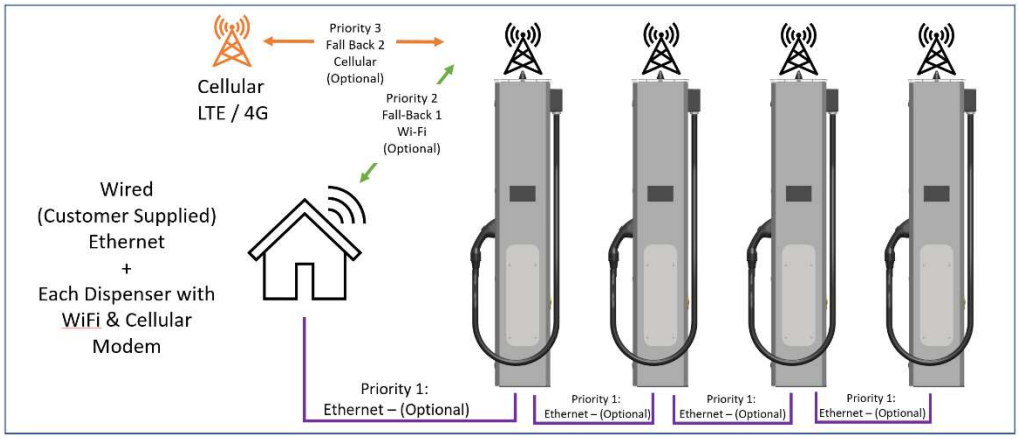


ETHERNET + CELLULAR + WIFI (OPTIONAL)

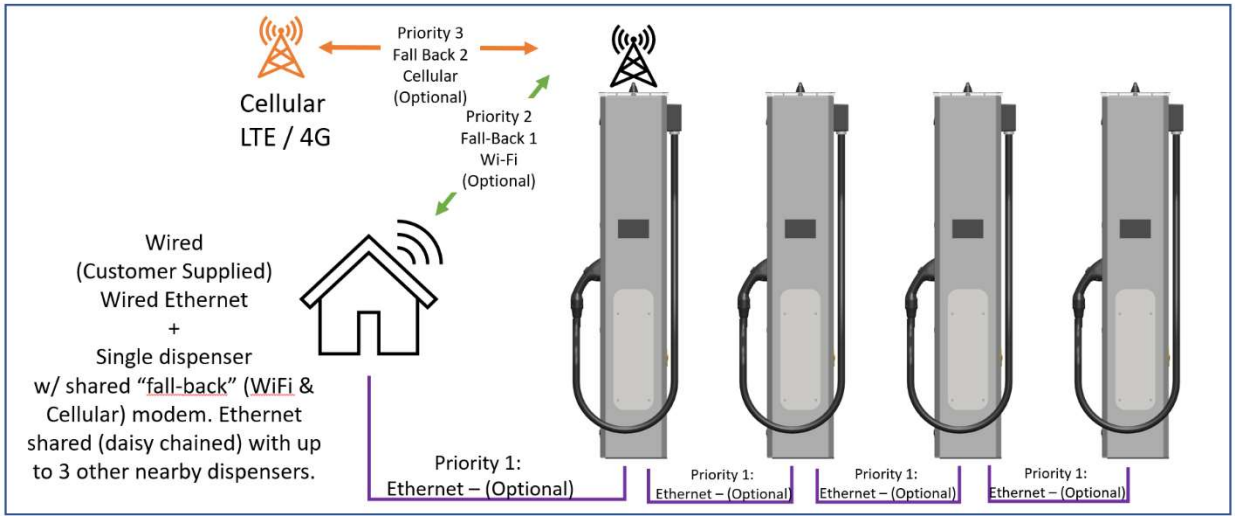
Rhombus offers optional (recommended) hardware upgrades to include cellular modem + Wi-Fi connectivity to the dispenser.

- Supports web connectivity for customers without access to wired connectivity to the dispenser.
- Support redundant "fallback" web connectivity if customer supplied wired ethernet &/or Wi-Fi connectivity fails. This option provides communication redundancy to aid remote diagnostic support that could be caused by local wired or wi-fi network connectivity difficulty. The system will prioritize use of the customers local network when available but automatically switch to cellular connectivity if it is unable to establish a wired or Wi-Fi web connection.

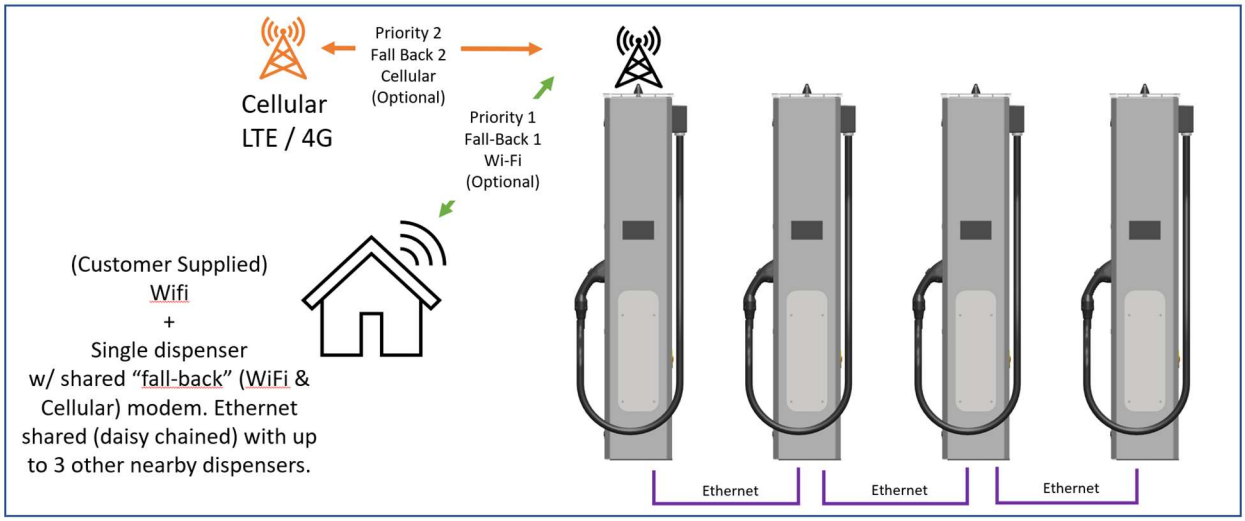
Sample Config 2



Sample Config 3



Sample Config 4



Service Provider(s)

- Verizon

DATA USAGE

- Varies: Estimate 1-3GB/dispenser/month.
    - Data consumption may be higher during initial setup/commissioning.
    - Higher data consumption typical with V2G rather than “charge only” operation.
- Cellular only connectivity (V2G) plan: Assumes average of 1.5Gb/dispenser/month.
- Cellular “fallback” plan: Assumes ~90%+ of data provided by customer provided web connectivity (E.g.: Cable modem). Estimate average of <=100Mb/dispenser/month
    - This option is highly recommended even for customers providing hardwired ethernet and/or Wi-Fi connectivity to aid remote troubleshooting and support of systems in the field.

NETWORK CONNECTIVITY FAQ’S

Q: Can one cellular modem support multiple dispensers.

A: Yes, one cellular modem could support up to 4x dispensers. This option would require either hardwired ethernet wiring between dispensers and/or Wi-Fi/cellular modem hardware upgrades in all dispensers. In this configuration, cellular SIM may be installed in only one modem. “Fall-back” connectivity redundancy may be reduced with this approach. Data consumption scales with the number of connected dispensers.

Please see your Rhombus sales representative to discuss connectivity options, recommendations and for more information on monthly/yearly cellular pricing plan options

Note: Monthly pricing bundled into single yearly charge.

SPARE PARTS LIST

*RSQ: Recommended stock quantity

Rhombus PN	Component Description	Qty	Service Interval	Ranking
100-EAH2853-PAA	Supply Equipment Communication Controller	1	As Required	Med
100-EAH2155-PAA	Insulation monitoring accessory PCBA.	1	As Required	Med
100-EAS1668-PAA	Insulation monitoring device for AC 690 V and DC 1000 V IT systems	1	As Required	Med
100-EAY1711-PAA	CCS Type 1 200A Cable and Connector, 25ft	1	As Required	High
100-MBH2904-PAA	Cord Grips, with mesh	1	As Required	Med
100-MBH2222-PAA	Locknut and O-Ring cord grip	1	As Required	Med
100-CCA0789-PAA	EPO / E-Stop Button	1	As Required	Med
100-EAU1460-PAA	High Power Terminal Block	2	As Required	Low
100-CCA0902-PAA	Door Interlock Switch	1	As Required	Med
100-MAB2776-PAA	Door Safety Switch Bracket	1	As Required	Med
100-EAS2911-PAA	LED Light Strip Wiring Asm	1	As Required	Med
200-EAH2847-PAA	VectorStat VS10 Asm	1	As Required	Med
100-EAS2855-PAA	Network switch	1	As Required	Med
100-EAV2967-PAA	7" Touch Screen	1	As Required	High
100-EAY2958-PAA	Cable, LVDS + LED backlight to VS15	1	As Required	Med
100-EAY2988-PAA	Cable, Touch Display to USB	1	As Required	Med
100-EAH2968-PAA	Adapter/Bridge, Touch Display to Cable	1	As Required	Med