



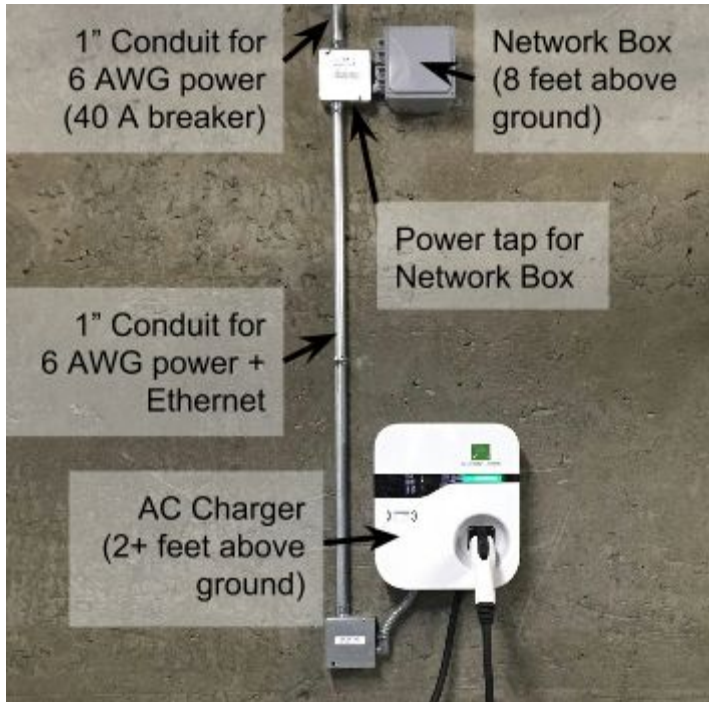
Design and Install Specifications - USA
July 2015

install@EverCharge.net

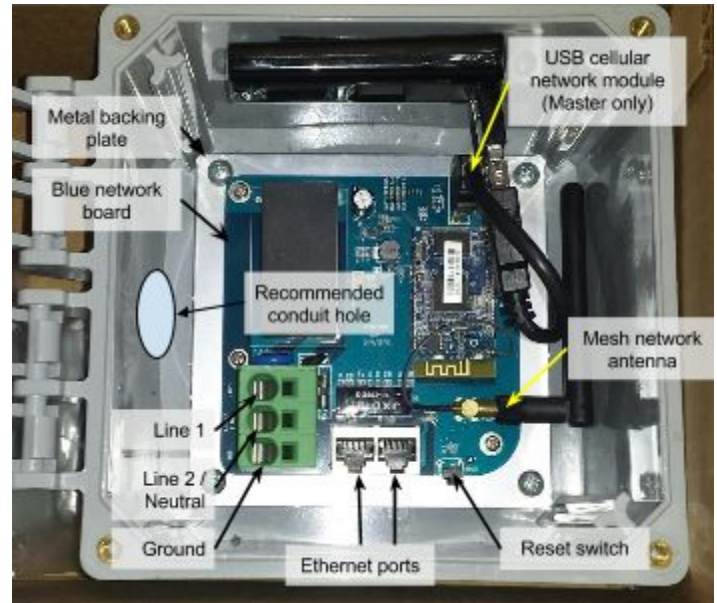
888.342.7383

Single-page install guidelines

This page is designed to serve as a quick overview of the full EverCharge system install specifications. Do not solely use this page for installation, as required system configuration and testing is not covered here. Contact EverCharge at install@EverCharge.net or 888.342.7383 if you have any questions, comments, concerns, or need clarification on anything in this document.



Example installation image



Inside the Network Box

AC Charger requirements

- 208-240V @ 40 amps (110-120V NOT OK)
- 6 AWG copper conductor/ground
- Individual 40A breaker for each AC Charger
- 1" trade size conduit
- Mount at least 18 inches (450 mm) above floor inside, 24 inches (600 mm) outdoors
- Shielded Ethernet connection to Network Box
- Charge cable (18 feet / 5.5 m) reaches vehicle plug and does not block walkway

Network Box requirements

- Verizon cellular signal required for Master only
- Mount roughly 8 feet (2.5 m) above floor, away from other conduit/pipe
- All wiring must be far from antennas
- Line-of-sight necessary for multiple boxes
- Boxes mounted either vertically one level apart or horizontally < 200 feet (60 m) apart (but not both)
- All antennas must be same orientation (vertical)
- Any always-on power OK (110-240V)

Shopping list / required tools

- 1-1/4" fitting for AC charger knockout
- 1" trade size conduit (distinctive color?)
- 6 AWG copper conductors
- Torx T30 and T20 bits
- Junction boxes
- Mounting screws/bolts for Network Box
- Insulated Ethernet cable (rated for 300V)
- Laptop with an Ethernet port

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Parts included in the EverCharge system

Each parking space with charging service will need:

<p>EverCharge AC Charger</p> 	<p>EverCharge Network Box</p> 	<p>EverCharge Access Cards (x2)</p> 
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1. How the EverCharge system works

1.1. Power management

The EverCharge system is a network of Level 2 40 amp AC Electric Vehicle (EV) chargers that takes advantage of the fact that not all vehicles are charging at the same time, allowing more vehicle chargers to be installed at a given site. By using patented power management technology to regulate the power to vehicles based on their needs, **the EverCharge system can allow up to 10x as many vehicles to charge at any site** and reduce the need for more prohibitively expensive electrical upgrades.

The EverCharge system is listed for and complies with:

- [UL 916 Energy Management Equipment](#)
- [NEC 2014 Article 625 Electric Vehicle Charging System](#)

1.2. Wireless communication

The EverCharge system uses Network Boxes to communicate in a wireless mesh network to regulate power. Once the system is installed, it can easily be configured by plugging a laptop into an open Ethernet port located in the Master Network Box. Should wireless communication fail, the system will automatically shut off.

1.3. Cellular data

The Master Network Box, which is installed in the location with the best cellular network connectivity, is designed to send data back over a cellular network. The Master Network Box can be identified by a USB modem stick connecting to the top-right corner of the network board. This data is used for billing, analytics and maintenance. Any other Network Boxes in the installation connect through the Master.

2. Making a site plan

2.1. Determine the number of vehicles

First, determine how many vehicles will be charging at the site. EverCharge recommends individual EverCharge AC Chargers for each vehicle at a site, however it is possible to enable multiple vehicles to share a single AC Charger station via EverCharge Access Cards, covered in [Section 5.1, step 4](#).

2.2. Determine the recommended capacity for the system

The chart below shows the power needed to supply a Charge Group. A Charge Group (see [Section 2.5](#)) is a group of vehicles that are all drawing power from the same panel or breaker. Each AC Charger requires an individual 40A overcurrent protective device (circuit breaker, fuse disconnect, etc.).



The following table has LOOSE guidelines. EverCharge written approval is required for all infrastructure design. install@EverCharge.net

AC Chargers	Capacity	Voltage	kW
1-2	40A	208V	6.6
2-5	70A	208V	8.3
5-12	100A	208V	20.8
12-18	150A	208V	31.2
20-45	225A	208V	46.8

2.3. Determine the available capacity

Use this checklist to note the nominal ratings for the building, starting at the main feeder and switchgear:

- ☐ Main Feeder: _____ amps
- ☐ Switchgear: _____ amps
- ☐ Panel Board: _____ amps
- ☐ Meter Demand Reading: _____ amps (observed at time of visit)
- ☐ Main Breaker: _____ amps (at the meter)
- ☐ 480 / 208V Transformer: _____ (if applicable)
- ☐ Panel Breaker Rating: _____ amps
- ☐ # of Phases on the Panel: _____
- ☐ Line Voltage: _____ Volts
- ☐ Panel Rating: _____ amps
 - ☐ Existing Loads on the Panel: _____ amps
 - ☐ Estimated Available Panel Capacity: _____ amps
- ☐ Subpanel Rating: _____ amps (if applicable)
 - ☐ Existing Loads on the Subpanel: _____ amps
 - ☐ Estimated Available Subpanel Capacity: _____ amps

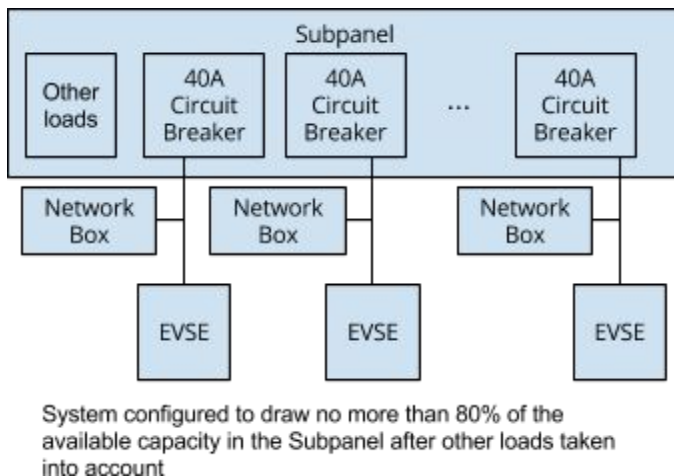
Connect the EverCharge system to an existing 208V or 240V subpanel if electrical capacity and physical space is available. If there is capacity but not available space, the installation will require a new subpanel. In sites where there is not sufficient capacity on an existing 208V/240V panel, it may be necessary to install a new 45kVa, 75kVa or 150kVa 480/208V transformer.

2.4. Standard layouts

There are two standard configurations for the EverCharge system, shown in Figures 2.4.1 and 2.4.2. When possible, always upsize the wire gauge to support future additional charger installs. Each AC Charger must be connected to a 40 amp breaker and a Network Box. If two chargers are adjacent, they can both connect to the same Network Box. Contact EverCharge for site-specific layout approval at install@EverCharge.net.

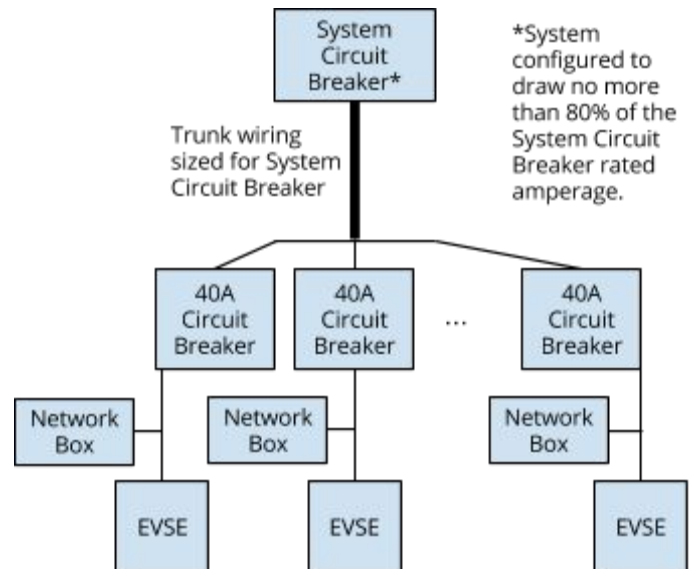
Case 1 - Figure 2.4.1

In Case 1, all AC Chargers are connected to individual circuit breakers in a subpanel that is shared with other non-EverCharge loads. Refer to [Section 2.2](#) to suggest a possible panel size for available capacity on the subpanel. The EverCharge system will be configured in [Section 5](#) to not exceed 80% of this available capacity regardless of the number of EverCharge 40A circuit breakers in the panel.



Case 2 - Figure 2.4.2

In Case 2, all AC Chargers are connected to a larger circuit breaker. Each has a 40A breaker box installed adjacent to the AC charger. In this configuration the larger circuit breaker should be rated to meet the recommended available capacity from [Section 2.2](#). The EverCharge system will be configured in [Section 5](#) to not exceed 80% of the rating of the larger circuit breaker.



2.5. Charge Groups

In larger EverCharge system installations, groups of AC Chargers can draw power from independent power sources. The set of AC Chargers drawing from the same power source is called a Charge Group. Nearly all installations require only one Charge Group, but the system supports many. The amount of power that the EverCharge system will draw is set at the Charge Group level, which is then shared by individual AC Chargers.

- In Case 1, the available power for the Charge Group is **80% of the available capacity on the subpanel**, after other loads on the subpanel have been taken into account.
- In Case 2, the available power for the Charge Group is **80% of the rating of the larger circuit breaker**.

2.6. Confirm cellular service

Verizon Cellular service at the install location needs to be determined by the installer. If no service exists at the parking space, additional network boxes in the garage will be needed to provide service. Refer to [Section 4](#) to plan accordingly.

2.7. Best practices for expandability

2.7.1. Consolidate and upsize wiring

As much as possible, consolidate feeders to supply charging. Try to use higher-gauge wire when possible to make future expandability easier.

2.7.2. Subpanels and trunk wiring in large garages

In large-dimension garages, EverCharge suggests installing centrally-located subpanels and trunk infrastructure to deliver power to distant vehicles. To reduce installation costs, EverCharge does not recommend trunk wiring rated over 200A.

2.7.3. Install junction boxes

Junction boxes should be installed every 20-50 feet (6-15 meters) and on every level of the garage to provide easy expandability for future vehicles.

2.7.4 Use distinctive conduit

To easily identify EV charging equipment in the garage, consider using conduit with a distinctive color, like green, on runs from the electrical room out to subpanels and chargers.

3. Installing the EverCharge AC Charger

3.1. Before installing

Refer to the example installation image on the right.

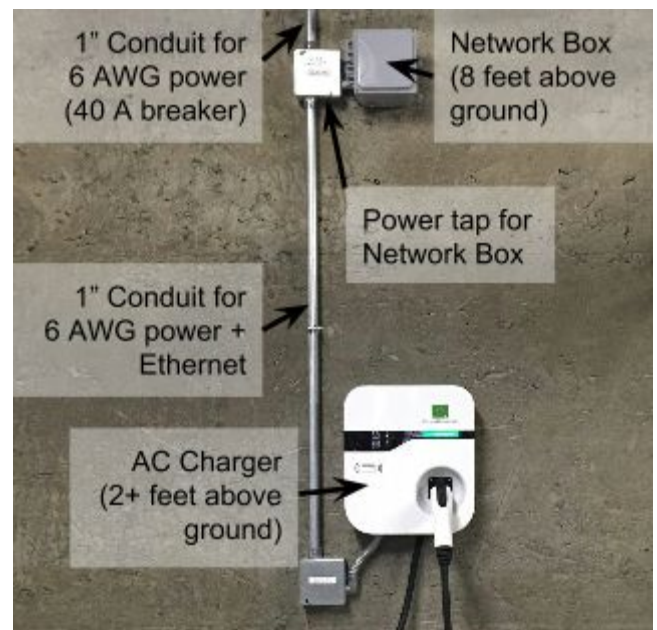
3.1.1. Choose an appropriate mounting location

The EverCharge AC Charger should be mounted on a wall or column adjacent to the electric vehicle parking space. Make sure that:

- The distance to the vehicle charge port is not longer than the charge cord length of 18 feet (5.5 meters)
- The charge cord will not obstruct a walkway
- The AC Charger is in a location protected from a vehicle collision
- The AC Charger MUST be positioned such that the charging cord receptacle is at least 18-24 inches (450-600 mm) above the ground [NEC Article 625.50]

3.1.2. Power and grounding requirements

The AC charger requires 208-240V across two legs. The AC Charger must be connected to a grounded, metal, permanent wiring system via the equipment grounding terminal on the charger.



3.1.3. Mounting and installation parts

EverCharge recommends the following parts for an AC Charger installation:

EverCharge-supplied components:

- Mounting bracket
- Torx T30 bolts (x3) for securing the AC charger to the mounting bracket
- Cable hanger bracket (optional)
- Torx T20 1/4" expansion bolts (x2) for concrete mounting
- No. 8 wood screws (x2) for wood mounting

Installer-supplied components:

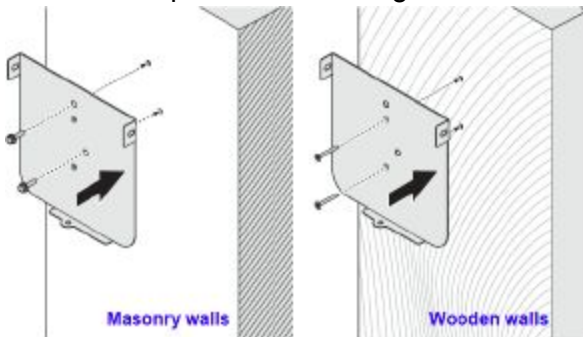
- Conduit of trade size 1" (27mm)
- 1-1/4" fitting for conduit knockout on AC Charger
- Enough junction boxes to comply with the Expandability Best Practices in [Section 2.7.3](#)
- Copper No. 6 AWG 75°C circuit conductors
- 40 amp circuit breaker
- Insulated Ethernet cable rated for 300V at 200°C for Network Box connection

3.2. Step-by-Step AC Charger installation instructions

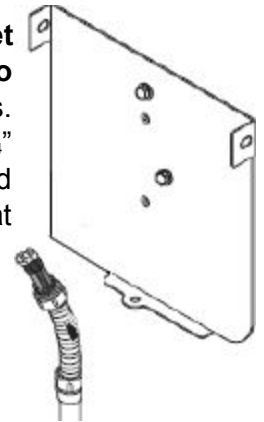


Disconnect electrical power prior to installing the AC Charger. Failure to do so may cause physical injury or damage to the electrical system and charging unit.

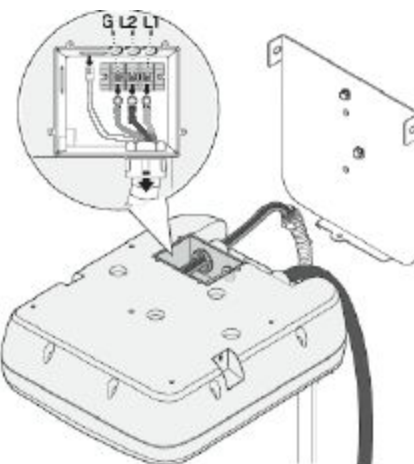
1. **Drill bolt holes** in the wall for the mounting bracket and optional cable hanger.



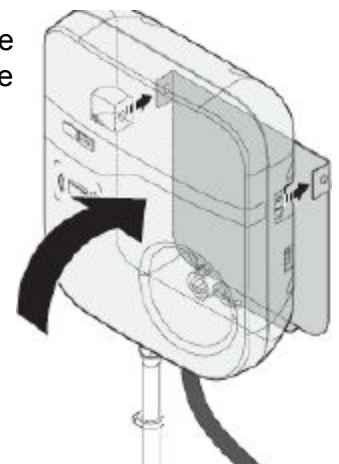
2. **Secure mounting bracket and optional cable hanger to wall** using appropriate bolts. For masonry, use 1/4" expansion bolts. For wood studs, use #8 wood screws at least 2 inches in length.



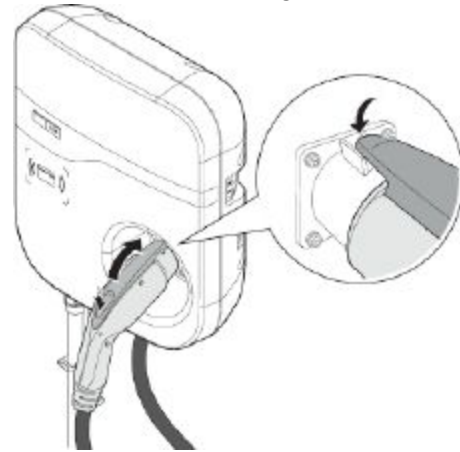
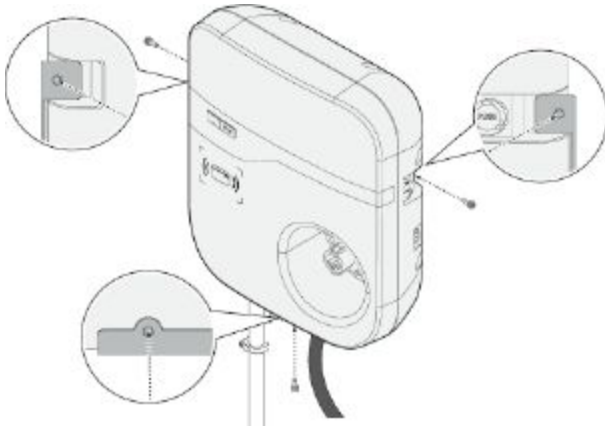
3. **Connect wiring to charger** in accordance with local codes. Use No. 6 AWG 75°C copper conductors and shielded Ethernet cable rated for 300 V and 200°C. The charger requires 208-240V.



4. **Align screw holes** of the mounting bracket with the AC Charger holes.



5. **Install and secure** with three screws to the support bracket.
6. **Attach charge cable to plug** and hang the rest of the cable on the cable hanger if installed.



3.3 Code authority

In electrical codes prior to NEC 2014, intermittent EVSE charging loads were considered to be continuous, requiring overcurrent protection at 125% of the combined max load of each charger unit, whether or not any load management system was operating. In NEC 2014, a provision was added that specifically allows for the EverCharge system of power management:

NEC 2014 625.41 Rating

Electric vehicle supply equipment shall have sufficient rating to supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article. **Where an automatic load management system is used, the maximum electric vehicle supply equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system.** [emphasis added]

This language was also adopted in a [California supplement](#) that went into effect as section “625.14 Rating”. The EverCharge system is designed to operate in accordance with the above code requirement, and presence of language substantially similar to the above in code requirements is assumed throughout.

4. Installing the EverCharge Network Box



The Master EverCharge Network Box MUST be installed in a location with Verizon cellular reception. If you believe there is no cellular service of any kind please make that clear when you contact EverCharge with your findings.

4.1 Inside the Network Box

The gray 6x6x4” Network Box contains a blue network board attached to a metal backing plate. Network Boxes communicate in a wireless mesh network via the black antenna on the right side. Master boxes will have a USB cellular network module attached via hook-and-loop to the top of the box and connected to the network board.

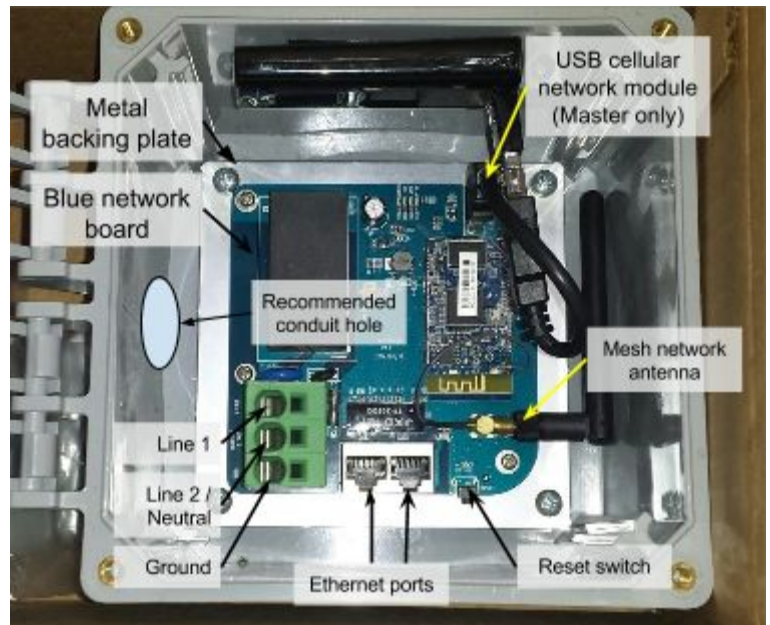
4.2. Before installing

4.2.1. Connection requirements

The Network Box must be connected to any always-on 110-240V power source and ground. Each Network Box can control up to two EverCharge AC Chargers via shielded Ethernet cables. Network Boxes do not require a connection to an AC Charger if they are just being used to fill in the wireless mesh network.

4.2.2. Power requirements and wiring in-line with an AC Charger

Each EverCharge Network Box consumes less than 0.1A at 110-240V. The Network Box can be wired on the same 40A breaker with the AC Charger using the tap rule [NEC 240.21(B)(1), quoted below], as long as the tap conductor is not over 10 ft (3 m) long and has an ampacity of at least 4 amps. EverCharge considers the tap a field installation and the Network Box is a control device in a different enclosure from the tap location.



NEC 240.21(B) Feeder Taps

Conductors shall be permitted to be tapped, without overcurrent protection at the tap, to a feeder as specified in 240.21(B)(1) through (B)(5). The provisions of 240.4(B) shall not be permitted for tap conductors.

(1) Taps Not over 3 m (10 ft) Long

If the length of the tap conductors does not exceed 3 m (10 ft) and the tap conductors comply with all of the following:

1. The ampacity of the tap conductors is
 - a. Not less than the combined electrical loads on the circuits supplied by the tap conductors, and
 - b. Not less than the rating of the of the equipment containing an overcurrent device(s) supplied by the tap conductor or not less than the rating of the overcurrent protective device at the termination of the tap conductors.
2. The tap conductors do not extend beyond the switchboard, switchgear, panelboard, disconnecting means, or control devices they supply.
3. Except at the point of connection to the feeder, the tap conductors are enclosed in a raceway, which extends from the tap to the enclosure of an enclosed switchboard, switchgear, a panelboard, or control devices, or to the back of an open switchboard.
4. For field installations, if tap conductors leave the enclosure of the vault in which the tap is made, the ampacity of the tap conductors is not less than one-tenth of the rating of the overcurrent device protecting the feeder conductors.

4.2.3. Master and Node Network Boxes

EverCharge Network boxes are shipped pre-configured as Masters or Nodes. The Master is distinguished by the presence of a Cellular Module attached via hook-and-loop to the top of the box. Each site will have one Master, and any other boxes on the system will be Nodes, with no communication to the cellular network other than through the Master.

4.2.4. Ethernet and high voltage wires in the same conduit

Shielded Ethernet cable and high voltage wire can share the same conduit as long as there are no connections, and the insulation rating of the Ethernet cable exceeds the power level in the conduit. Shielded Ethernet cable with an insulation rating of at least 300V must always be used.

4.2.5. Network Box placement and mounting



Metal objects (like conduit or pipe) will block or limit Network Box signal.

- For required functionality, EverCharge encourages mounting the Network Box approximately 8 feet (2.5 meters) high on a column or wall adjacent to the charger, above the height of vehicles, but not so high that the box is at the same height as other pipes running along the ceiling.
- Whenever multiple Network Boxes are necessary, consult EverCharge for system layout.
- **The objective is to obtain line of sight communication whenever possible** and at the very least have no metal conduit, metal plumbing, or metal structures blocking communication between Network Boxes.
- Select a mounting location no further than 200 feet (60 meters) horizontally or one level vertically from another Network Box.
- All Network Boxes in the system must be able to communicate with at least one other Network Box in the wireless mesh network. Install as many Network Boxes as needed to complete the network given the “200 feet or one level apart” guideline as a max range for a each box.
- For example: Do not place a Network Box next to the ceiling on a wall then expect the signal to reach up to the next level of the garage and 200 feet horizontally to a second Network Box. Instead, mount one Network Box on the lower level as normal (8 feet up), the second Network Box on the level immediately above (also 8 feet up), and the third 200 feet away on the same level as the second Network Box.

4.2.6. Mounting and installation parts

The following tools are recommended for the EverCharge Network Box installation:

EverCharge-supplied components:

- 4x Mounting Feet and screws
- Enclosure door screws (discard the plastic hole covers)

Installer-supplied components:

- Shielded Ethernet cable cut to length
- Power cable with an ampacity of $\geq 10\%$ of the circuit breaker capacity [NEC 240.21(B)(1)4]
- Mounting screws or bolts appropriate for the mounting surface

4.3 Step-By-Step Network Box installation instructions



Do not coil excess wiring of any kind including Ethernet in the Network Box. Keep power wiring as far away as possible from the antenna and cellular module.

1. **Mount:** Turn the Network Box upside down and fasten the mounting feet with the included screws. Mount the Network Box to the wall using any acceptable fastening technique, keeping in mind the positioning requirements in [Section 4.2.5](#).
2. **Install Conduit:** Unscrew the backing plate from the enclosure and safely store. Drill a conduit hole on the side of the box opposite from the black mesh network antenna (the hole should be on the side with the hinge). Secure the conduit to the box as appropriate. Reattach the metal backing plate before pulling wire.
3. **Connect Power and Ethernet:** Insert a screwdriver into each terminal, then insert the wire and remove the screwdriver to clamp. Connect the shielded Ethernet cable coming from an AC Charger to an open Ethernet port.
4. **Position Antenna:** All mesh network antennas must be oriented the same direction for proper communication. Keep all antennas as close to vertical as possible.

5. System configuration and testing

After physically installing all of the AC Chargers and Network Boxes, before users can charge their cars, the system must be configured so that at no point does the system ever try to draw more power than is safe. The following tools/materials are required for configuration:

- The serial numbers and locations of all EverCharge AC Chargers
- A laptop computer with an Ethernet port
- The Master Network Box with an open Ethernet port
- Ethernet cable of appropriate length to temporarily connect the laptop to the Master Network Box
- EverCharge Access Cards (2x for each AC Charger)

5.1. Configuration instructions

1. Plug in to Ethernet to configure

With all EverCharge hardware powered on, use an Ethernet cable to connect to the Master Network Box and navigate to 192.168.0.1. Enter the password `EverCharge_pass` and click “Log In”.



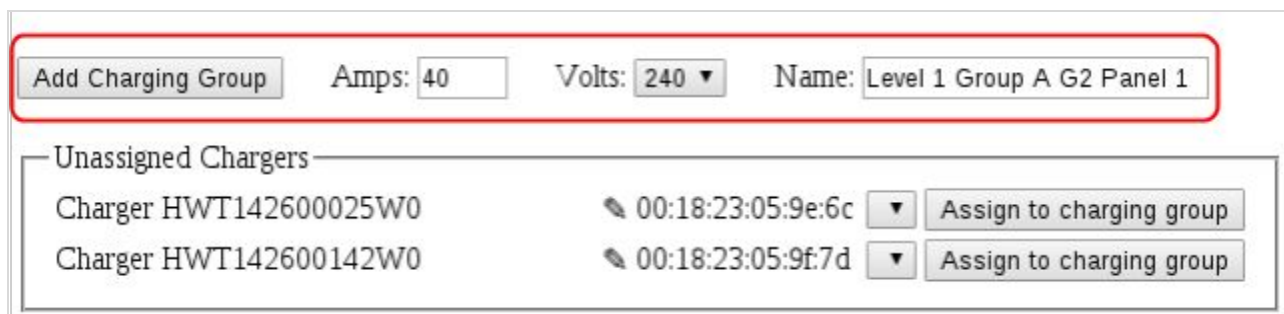
2. Create Charge Group(s)

Enter the desired **Maximum Current Draw** in amps, line Voltage (Volts) and descriptive name for the charge group, including the garage level and panel identifier. For example: “Level 1 Group A G2 Panel 1”. Then click “Add Charging Group” to create that Group. Repeat as necessary if multiple Charge Groups need to be created.



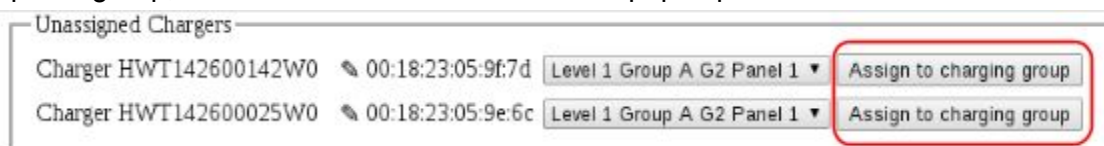
The amps value for the Charge Group is the maximum that the system will draw from the breaker or subpanel. This value should never exceed 80% of the available capacity on the subpanel or larger breaker.

Remember that a Charge Group, defined in [Section 2.5](#), means a group of EverCharge AC Chargers that are sharing the electrical capacity of a single subpanel or larger breaker as shown in Case 1 or Case 2 in [Section 2.4](#).



3. Assign AC Chargers to Charge Groups

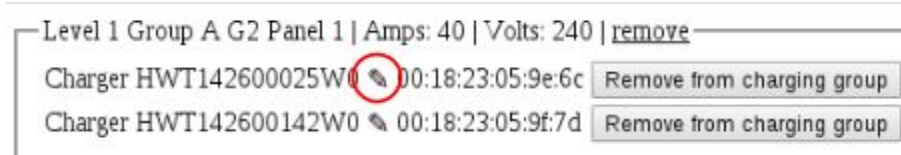
The AC Chargers that are connected to the wireless mesh network will automatically appear. Select the appropriate Charge Group for each charger, then click “Assign to charging group” to assign each charger to the appropriate group, and click “OK” on the window that pops up.



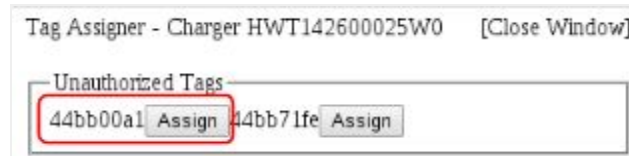
4. Assign and test access cards

Each AC Charger comes with an envelope containing two access cards. To assign the cards to the AC Charger: first tap each card, one at a time, to the image of a card on the front of the charger. The AC Charger should immediately beep twice, followed by another beep (and red LED flash) within 10 seconds.

After both cards have been tapped to the charger, click the small pencil icon next to the AC Charger serial number (highlighted here with a circle around it) to view the cards that have been tapped recently.



A window pops up. Assign cards to the charger. Each card has a unique serial number, and cards can be distinguished with an app on any NFC-equipped smartphone, such as [NFC Reader](#) for Android.



After assigning cards, test an assigned card by tapping it to the charger again. It should beep twice, then within 10 seconds, it should beep twice again and the LED should cycle between green/orange for two minutes, indicating the card was authorized and the system is ready to charge.

If the charger takes longer than 10 seconds to respond after tapping a card, it does not have a good connection with the Master Network Box. Make sure all antennas are vertical and there is no conduit/metal pipe near the antenna side of any Network Box.

Multiple users can use the same AC Charger by assigning more cards, but this is not recommended.

5.2. Installation summary checklist

Use the following checklist to make sure that everything has been installed and configured correctly:

- ☐ Transformer, Main Breaker, Panel, subpanel have available capacity (check [Table 2.2.1](#))
- ☐ Junction Boxes along the entire electrical run for future expandability
- ☐ If applicable, trunk infrastructure wiring sized for the system breaker size
- ☐ AC Chargers are securely and safely mounted on the wall, column, or pedestal adjacent to the electric vehicle parking space
- ☐ AC Chargers are connected to 208V-240V and a 40 amp breaker with No. 6 AWG wire
- ☐ Each AC Charger is connected with shielded Ethernet cable to a Network Box
- ☐ Each Network Box has been supplied with always-on power
- ☐ System has been configured via an Ethernet connection to the Master Network Box
 - ☐ Master Network Box installed in location with best cellular signal
 - ☐ Charge Group(s) created
 - ☐ Each AC Charger assigned to a Charge Group by serial number
 - ☐ Access cards assigned and in envelopes for customers
- ☐ Send EverCharge the site configuration including locations of each charger and it's serial number. Be sure to include photos of the install at install@EverCharge.net

6. Indicator LEDs and troubleshooting

6.1. AC Charger troubleshooting

AC CHARGER INDICATOR LIGHT	STATUS	TROUBLESHOOTING INSTRUCTIONS
SOLID GREEN	OK: Ready / Idle	N/A
FLASHING GREEN / YELLOW	OK: Card authenticated / In queue to charge	Plug in vehicle, wait for charging to begin.
FLASHING GREEN	OK: Charging	This is the appropriate indication that the vehicle is plugged in and charging properly
SOLID RED	ERROR: Wiring / ground fault	Check wiring. Charger needs 208V-240V. If problem persists contact EverCharge
FLASHING RED	ERROR: check Network Box	The charger will flash red until a connection with the Network Box is established. If light continues to flash red, check the Ethernet connection and power to the Network Box. If problem persists contact EverCharge
SINGLE RED FLASH (within 10 seconds of tapping card)	ERROR: Card not authenticated	Assign card to charger via configuration interface
SINGLE RED FLASH (more than 10 seconds after tapping card)	ERROR: Network timeout	Adjust antenna - Network Box does not have good connection with master. All antennas must be in same orientation (vertical)

6.2. EverCharge Network Box troubleshooting

NETWORK BOX INDICATOR LIGHT	STATUS	TROUBLESHOOTING INSTRUCTIONS
1 SOLID GREEN 1 SOLID YELLOW	READY	
FLASHING GREEN FLASHING YELLOW	BOOTING	Please wait for the device to finish booting

7. Specifications

7.1 EverCharge AC Charger specifications

Charging Interface	SAE J1772 compliant charging plug
Input Rating	208-240 Vac, single phase, 40 A, 60 Hz
Connections and Wiring	L1, L2, and grounded, hardwired with terminal block
Standby Power	< 5 W
Output Rating	208-240 Vac, single phase, 30 A maximum, 60 Hz, 7.2 kW max.
Internal Residual Current Detection	20 mA CCID per UL 2231
Upstream Breaker	2-pole 40 A breaker on dedicated circuit, non-GFCI type
Electrical Protection	over current, short circuit, over voltage, under voltage, ground fault, surge protection, over temperature
Status Indicators	standby, charging, fault, warning
Buttons/Switches	charger on/off, stop charging
Operating Temp.	-22 F to +122 F (-30 C to +50 C)
Humidity	95% relative humidity, non-condensing
Charging Cable Length	18ft (5.5 m) straight cable
Ingress Protection	NEMA 3R
Cooling	Natural cooling
Dimensions (W x H x D)	13.8 x 15.7 x 5.0 inches (350 x 400 x 126 mm)
Net Weight	15.4 lbs (7kg)
Certificate	UL, cUL

7.2. EverCharge Network Box specifications

Input Rating	120-240Vac, single phase, 0.1A, 60Hz
Power Connections and wiring	L1, L2 / Neutral and Ground
Nominal Current	0.1A
Energy Management	Limits power to AC Charger per UL 916
Upstream Breaker	Wire in parallel with AC Charger on the same 2 pole, 40A breaker
Network Interface	Dual Ethernet port to support up to 2 x AC Chargers
Electrical Protection	Overcurrent protection
Status indicators	Power, Data
Ingress protection	NEMA 4X
Dimension (W x H x D)	6 x 6 x 4 inches (152.4 x 152.4 x 101.6 mm)
Net Weight	2.0 lbs (0.90 kg)
Certificate	UL, UL 916(Power Management)

