goplug

GoPlug - 40A EV Charging Station

Charging   39.7A
5378Wh   647kWh

IMPORTANT SAFETY INSTRUCTIONS

Read and save these instructions prior to installing and operating your Charging Station. Retain this installation guide for maintenance and troubleshooting information. If you have further questions, contact Customer Service at support@GoPlug.com.

WARNING: To reduce the risk of fire, electric shock, and serious bodily injury, observe the following:
 • Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards.
 • When cutting or drilling into structure, do not damage electrical wiring and other hidden utilities.
 • Use this device only in the manner intended.

CAUTION: The installation of this charging Station must be in accordance with all national and local electrical codes.

CAUTION: Exercise caution and common sense when powering the device. Do not connect to a damaged power source.

WARNING: Power must be disconnected before installation and servicing, cleaning, and other user-maintenance. Failure to disconnect power creates risk of fire, electric shock, and serious bodily injury.

CAUTION: The product warranty will not cover equipment damage or failure that is caused by improper installation or operation.

WARNING: Do not install in an environment that is excessively dusty, conductive, corrosive, or gas-filled, is exposed to open flames (e.g., gas-burning stoves), is near strong chemicals or solvents, or where there is excessive heat, shock, or vibration.

CAUTION: This charging station is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the charging station by a person responsible for their safety. Children should be supervised to ensure that they do not play with the charging station.

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Introduction

About

OpenEVSE started in February 2011 with a simple experiment to try to generate the SAE J1772 pilot signal on an Arduino Board. One experiment lead to another to another until a prototype J1772 compatible controller was born. With lots of feedback and interest from the great folks on the "My Nissan LEAF" Forum a few boards were offered to other hardware hackers (6 were built in the first batch) 6 turned into more and more... Boards and now complete kits have been built all over the world and are reliably charging many EVs all over the globe.

OpenEVSE was released as an Open Source hardware and software project in October 2011.

For more information:

OpenEVSE Information
info@openevse.com

GoPlug Support
support@openevse.com

Technical Specifications

GoPlug is compatible with **Level 1 and Level 2** can be powered by a single phase AC power from 90 – 264V 50 or 60hz including the following common configurations:

- 120V - 240V AC single-phase Line, Neutral and safety ground
- 240V AC split-phase: The two phases must both measure 120V AC to ground.
- 208V AC single-phase Any 2 phases and safety ground

Users Guide

Specifications		GoPlug G40A
AC Input		
Operating Voltage		90 - 264 VAC, 1-Ph
AC Frequency		50 or 60Hz
AC Output		
Current	50A Circuit	6A Minimum - 40A Maximum
Output Power	120 VAC	720 W - 2400 W
	240VAC	1440 W - 9600 W
Features		
Display	Type	LCD 16 Character 2 Lines
	Backlight	Color
Temperature	Sensor	Yes
Time of day clock		Yes
Station Based Timers		Yes
Current Measurement		Yes
Display - kWh added		Yes
Wi-Fi		802.11 b/g/n
Session Options	Add x kWh	Yes
	Charge x min	Yes
Safety		
Power Interlock		Yes
SAE J1772 Pilot Signal		Yes
Ground Monitoring		Yes
Ground Fault Interrupt (GFI)		15ma - 20ma
Welded Contact Detection		Yes
Self test		Power-on and before charge
Over Temperature Monitoring	50%	65°C - 150°F
	25%	68°C - 155°F
	Shutdown	71°C - 160°F
	Resume 100%	62°C - 145°F
Electric Vehicle ID		Yes
Ventilation Check		Yes
Warranty		
Standard		3 Year
Enclosure		
Weight		1.45kg 3.2lbs
Dimensions (H x W x D)	mm	260 x 135 x 70
	Inches	10.3 x 5.3 x 2.8
Environment		Indoor or Outdoor

Safety

Goplug was designed to comply with safety features required by standards documents for Electric Vehicle Charging from SAE J1772, NEC and UL.

Note: The GoPlug G40A charging station has not been certified by UL or a Nationally Recognized Testing Laboratory. GoPlug is currently under evaluation by UL.

- UL2251 Standard for Plugs, Receptacles and Couplers for Electric Vehicles
- UL2231 Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits
- SAE J1772™ Electric Vehicle Conductive Charge Coupler Standard
- NEC Article 625 Electric Vehicle Charging System Equipment

Power interlock

GoPlug includes an interlock that de-energizes the electric vehicle connector and cable whenever the electrical connector is uncoupled from the electric vehicle **(NEC 625.18)**

Pilot Signal

GoPlug supports the SAE J1772 pilot signal which provides an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts **(NEC 625.19) (SAE J1772)**

Self Check

GoPlug performs a Self-Testing sequence during start up to ensure unit is working properly and safely upon power-up GoPlug checks for:

- GFCI--Ability to respond to a 20mA ground fault
- Missing Ground
- Welded Relay Contact Monitor
- Pilot line status

Ground Monitoring

GoPlug checks ground during power-up and constantly monitors for presence of proper safety ground during operation. If ground is lost charging is discontinued. **(SAE J1772)**

Ground Fault Interrupt

GoPlug includes mandatory Ground Fault Interruption.

- Fault sensitivity of 20ma trip for protection against electric shock of personnel. **(NEC 625.22) (SAE J1772) (UL 2231)**
- After each GFCI event GoPlug will retry charging up to 4 times after a 15 minute delay per event. **(UL 2231)**
- Ground Fault circuit tested during Power on Self-test.

Stuck Relay detection

GoPlug checks relay contacts on power up to ensure relays are functioning properly and providing proper power interlock.

Electric Vehicle Identification

GoPlug verify the pilot signal integrity by checking the Electric Vehicle Diode. The pilot signal must BOTH be at the correct resistance AND pass the "diode check" to activate the circuit. **(SAE J1772)**

Ventilation Required

GoPlug checks for the "Ventilation Required" request from Electric Vehicles with lead acid batteries (not common). By default GoPlug will deny charging if ventilation is not available. With additional hardware and firmware update GoPlug can allow "Ventilation Required" charging if the charging station is equipped to activate ventilation. **(SAE J1772)**

Internal Temperature

GoPlug Continuously monitors the internal temperature of the Charging Station and will shutdown if the internal temperature exceeds 71°C (160°F).

Temperature Throttling

GoPlug Actively reduces charging current during high temperature events in several steps beginning at 65°C (150°F). If temperature drops full current is restored. Charging will be halted if temperature exceeds a critical level.

Installation

Step 1 — Introduction
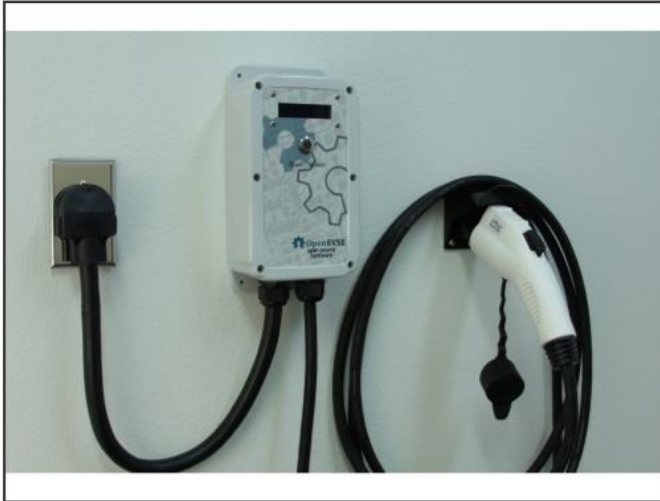
(i) Tools Required

- Drill with 1/4" bit (drywall) or 1/8 bit (wood)

- # 2 Phillips screwdriver

- (Optional) Level

Step 2 — Location

- Your Charging Station should be mounted on a flat surface in close proximity to your plug.

📌 **Note. Why is the power cord so short...?** J1772 and UL standards require a short input cord for enhanced safety. The EV cord is protected with several safety checks and cutoff but the input cord can not be protected. Keeping the input cord short reduces the risk of damage.

⚠️ Turn off power at the circuit breaker.

- Plug in to the socket (with power off) and mark a location that allows a gentle bend of the input cord.

  - **Option - Portable** Mark 2 center holes top and bottom if you plan to use your Charging station on the road. It will be very easy to remove.

  - **Option - Static** For more static install, mark the 4 corner holes.

Step 3 — Drill holes

- Drywall - Drill your holes with a 1/4" drill bit.
  - Insert the drywall anchor and screw in until flush with the wall

- Wood - Drill through the wood or stud with a 1/8" drill bit.

- Center mount - Screw in the screws leaving the head extended by 1/2".

Step 4 — Mount Charging Station

- **Center Mount (Portable)** - Slide screws through the large opening. Shift the station either to the left or right. Tighten the screws as necessary to keep the station in place.

- **Corner Mount (Stationary)** Screw in the 4 screws.

Step 5 — Mount Holster

- Use the Holster as a template and mark the holes.

- Drywall - Drill your holes with a 1/4" drill bit.
  - Insert the drywall anchor and screw in until flush with the wall

- Wood - Drill through the wood or stud with a 1/8" drill bit.

ⓘ Tip - Screw in the top screws first and tilt the holster up for easier access to the top holes.

Operation

Display

The GoPlug P50 Advanced displays various colors based on state if equipped with a Red - Green - Blue (RGB) Liquid Crystal Display (LCD).

The colors are:

Color	GoPlug State	EV State	J1772 State
White	Booting	N/A	N/A
Green	Ready	Not Connected	State A
Yellow	Ready	Connected	State B
Blue	Charging	Charging	State C
Red	Error	N/A	Error

LCD Text

The Standard LCD used on GoPlug P50 has 2 lines and 16 Characters per line.

Top Line Left Side

Ready	GoPlug is ready
Charging	GoPlug is ready to Charge
Error	GoPlug has detected an Error
Stopped	GoPlug has been stopped
Waiting	GoPlug is waiting for a timer
Sleeping	GoPlug is sleeping

Top Line Right Side- The Right side displays information about the Service level and Current setting of the Pilot. In the "Ready" States the LCD displays the Service Level L1 - 120V or L2 - 240V and the Maximum current allowed by the Charging Station.

Bottom Line- The Bottom line displays information about the state of the Electric Vehicle and the current charging session.

EV Not Connected	GoPlug does not detect an EV
EV Connected	GoPlug detected an EV

While in the Charging state the LCD will display the watt hours added for the current session on the left and the Total Life time in kWh on the right.

Real Time Clock

GoPlug includes a Real Time Clock which allows charging station-based timers. See the Button Menu section to set the current time, Start and Stop times. These timers are independent of timers set on the vehicle.

Battery – GoPlug includes a CR1220 coin cell battery installed on the back side of the LCD. This battery can be replaced with a CR1216, CR1220 or CR1225 at the end of its life. Note the battery is not required for normal operations, it serves to keep time after a power failure.

Button Menu

Menu options can be accessed with the push button switch. The menu operates on **_Long_** press and **_Short_** press.

All options are available in the "Ready" State. If a vehicle is connected only session options are available.

Long Press - Press and hold down

Short Press - Press and release

- To access the menu, press the button and hold it down until the menu displays.
- Scroll through the options with a short press the button.
- Change the value of an option Press and hold.
- Scroll through the available values for that particular option short press.
- Select the desired value Press and hold.

Button Menu Options

- Default Current (Max 40A. Do not exceed 80% of Circuit/Breaker Rating)
- Session Options
    - Charge Limit (add xxx kwh)
    - Time Limit (charge for xx minutes)

Power on Self Test

Self Check

GoPlug performs a Self-Testing sequence during start up and every time before beginning to charge to ensure all safety features are working properly including:

- GFCI--Ability to respond to a 20mA ground fault
- Missing Ground
- Welded Relay Contact Monitor
- Pilot line status with Vehicle Identification
- Internal Temperature

Possible errors returned during the self test are:

GFCI Self Test Failed	GoPlug did not detect a GFCI Fault during test	Check GFCI CT and Self test coil
Earth Ground Test Failed	GoPlug could not detect a Ground	Check Ground Connections and AC_Test lines
Stuck Relay Test Failed	GoPlug read AC voltage before Relays were closed	Check Relay and AC_Test Lines

Errors

GFCI FAULT	GoPlug detected a ground leakage of > 20ma	GoPlug will rerun GFCI self-test and retry charging. If Ground fault indicates immediate failure. Charging is suspended. If GFCI continues regularly Contact Support
NO GROUND	GoPlug lost connection to ground	Check Electrical Ground, Contact Support
STUCK RELAY	Power was detected when line should be open.	Contact Support
VENT REQUIRED	GoPlug read a pilot signal at 3V	Ventilation requested by the Electric Vehicle.
DIODE CHECK	GoPlug did not detect a Vehicle	Ensure Charge handle is dry and clean. Contact Support.
OVER TEMPERATURE	Temperature over 72C detected	If outside air temperature is very hot, keep station out of direct sunlight and charge at lower current otherwise Contact Support.

WiFi

Overview
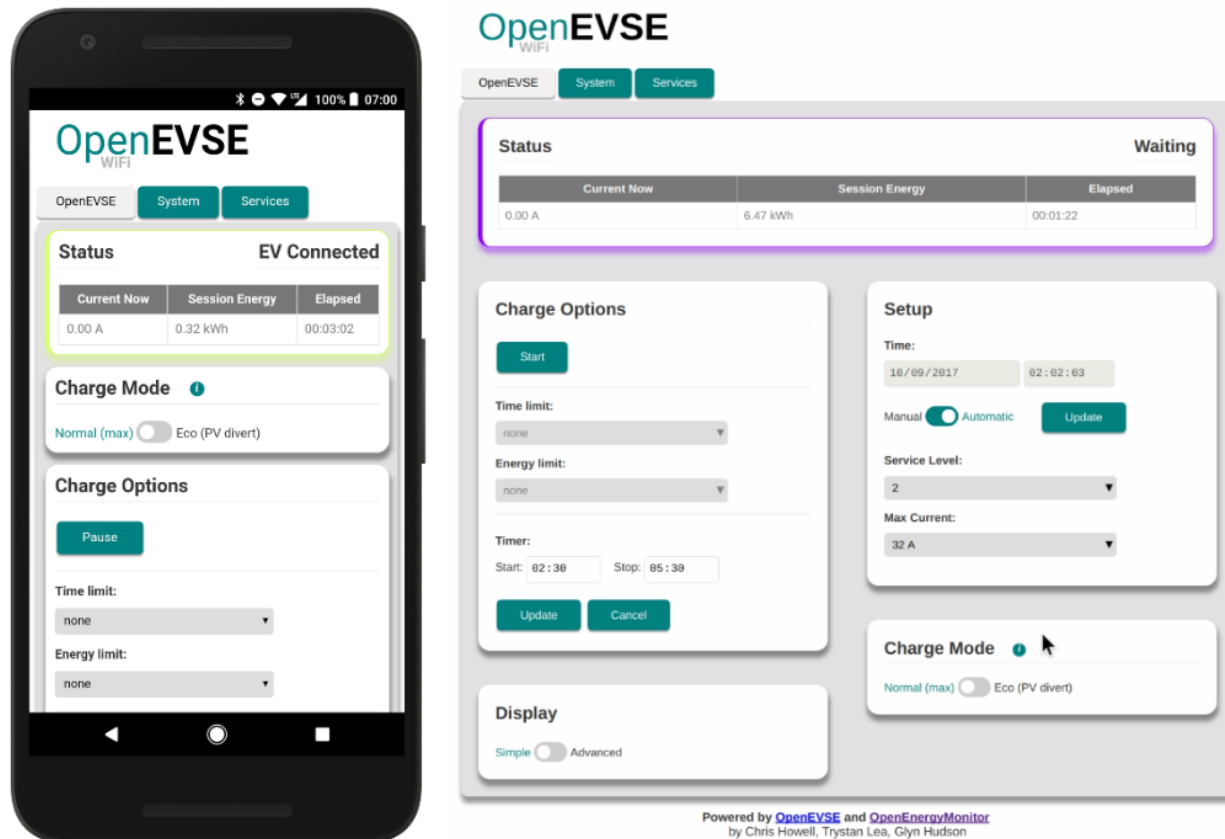
The WiFi gateway communicates with the GoPlug controller via serial utilizing the existing RAPI API serial interface. The web interface is served directly and can be controlled via a connected device over the network.

Live demo: https://openevse.openenergymonitor.org

Features

- View & Control all GoPlug functions
    - Start / pause
    - Delay timer
   - Time limit
    - Energy Limit
    - Adjust charging current

- OhmConnect integration (California USA only)

Network Setup

On first boot, GoPlug will broadcast a WiFi access point (AP) `GoPlug_XXX`. Connect to this AP (default password: `gopluggo`) and the captive portal should forward you to the log-in page. If this does not happen navigate to http://goplug, http://goplug.local or http://192.168.4.1

Note: You may need to disable mobile data if connecting via a mobile

- Select your WiFi network from list of available networks
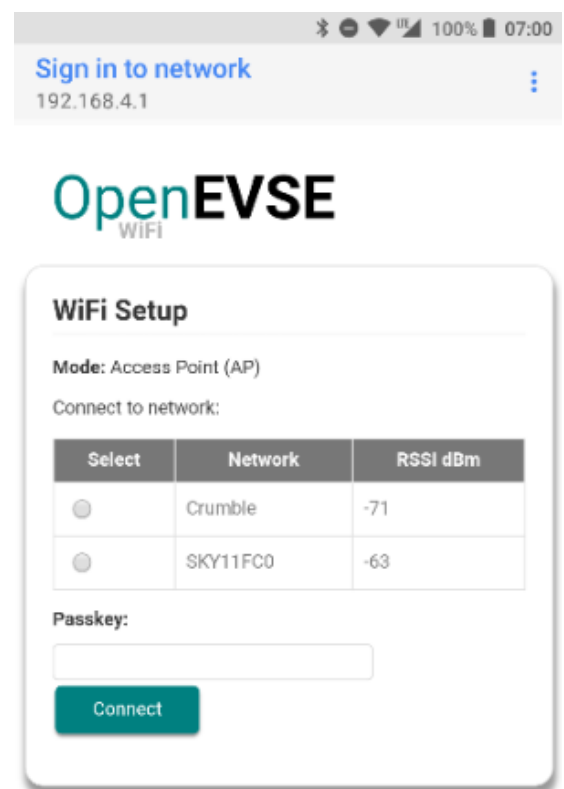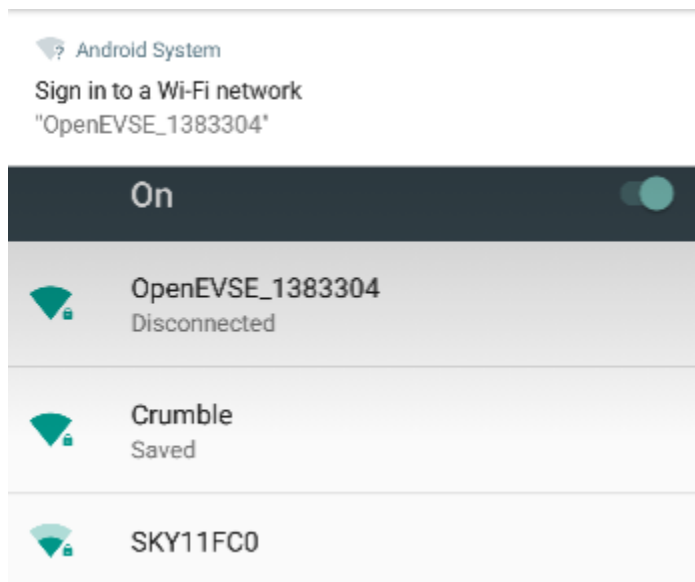
- Enter WiFi PSK key then click `Connect`

- GoPlug should now connect to local WiFi network

- Re-connect device to local WiFi network and connect to GoPlug using http://GoPlug.local, http://GoPlug or local IP address.

GoPlug Web Interface

All functions of the GoPlug can be viewed and controlled via the web interface. The interface is optimized to work well for both desktop and mobile.

OhmConnect

USA California only Join here

Video - How does it Work https://player.vimeo.com/video/119419875

-Sign Up -Enter Ohm Key

Ohm Key can be obtained by logging in to OhmConnect, enter Settings and locate the link in "Open Source Projects" Example: https://login.ohmconnect.com/verify-ohm-hour/OpnEoVse Key: OpnEoVse

System

Authentication

Admin HTTP Authentication (highly recommended) can be enabled by saving admin config by default username and password.

HTTP authentication is required for all HTTP requests including input API

Firmware can be uploaded via the web interface, see GoPlug Wifi releases for latest updates.

Additional Resources

Online Solutions, Forums and Trouble Tickets
http://support.openevse.com
E-mail support@openevse.com

Online Guides
http://guides.openevse.com

Store
http://store.openevse.com

Website
http://www.openevse.com

Source Code - Firmware - Schematics, etc.

https://github.com/openevse