

EmonEVSE – WiFi connected EV charging station



Non-tethered IEC 62196 Type-2 (Mennekes) socket OpenEnergyMonitor in partnership with OpenEVSE

- emonEVSE32-1PH: 32A Single phase (7.4kW)
- emonEVSE32-3PH: 32A Three-phase (22kW)

Manufactured in Wales by OpenEnergyMonitor: Caban Cyf, Brynrefail, Gwynedd, LL55 3NR

openevse.com
openenergymonitor.org

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@openenergymonitor.zendesk.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, 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.

Introduction

EmonEVSE WiFi connected non-tethered IEC 62196 Type-2 (Mennekes) socket EV charging station is a collaboration between OpenEVSE and OpenEnergyMonitor.org.

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The OpenEVSE Project and Source code has been evaluated by the Open Source Hardware Foundation and meets the requirements for Open Hardware. The registration number for EmonEVSE is US000028.

EmonEVSE Datasheet

Specifications		Model: emonEVSE32-1PH	Model: emonEVSE32-3PH
AC Input			
Operating Voltage		230 VAC (1PH+N)	400 VAC (3PH+N)
AC Frequency		50Hz	50Hz
Supply cable max outer diameter		18mm	18mm
AC Output			
Current		6A - 32A	6A - 32A
Output Power @230V		7.4kW	22kW
AC Contactor		40A (IEC 61095 / IEC 60947-5)	40A (IEC 61095 / IEC 60947-5)
EV Socket	Non-locking	IEC 62196 Type 2 (Mennekes)	IEC 62196 Type 2 (Mennekes)
Features			
Display	Type	LCD 16 Character 2 Lines	LCD 16 Character 2 Lines
	Backlight	Color (RGB)	Color (RGB)
Temperature Monitoring		Yes	Yes
Real Time Clock (RTC)		Yes	Yes
Current Measurement		Real-time, kWh session, kWh Total	Real-time, kWh session, kWh Total
Session Options	kWh limit	Yes	Yes
	Time limit	Yes	Yes
WiFi Connectivity (2.4GHz)		Web UI control, Emoncms, MQTT data-logging	Web UI control, Emoncms, MQTT data-logging
Open API (RAPI)		Serial / HTTP/ MQTT	Serial / HTTP/ MQTT
Low standby power consumption		2W	2W
Safety			
Power Interlock		Yes	Yes
Pilot Signal		Yes	Yes
Ground Monitoring		Yes	Yes
Ground Fault Interrupt (GFI)		15mA - 20mA	15mA - 20mA
Welded Contact Detection		Yes	Yes
Cable current rating detection (PP)		Yes	Yes
Self-test		Power-on and before energizing	Power-on and before energizing
Temperature Throttling	50%	65°C	65°C
	25%	68°C	68°C
	Shutdown	71°C	71°C
	Resume 100%	62°C	62°C
Max Operating Temperature		-30°C to +50°C	-30°C to +50°C
EV Diode Check		Yes	Yes
Ventilation Check		Yes	Yes
Approval		CE	CE
Standards Compliance		LVD 2014/35/EU (BS EN 60335-1:2012+A13:2017 & BS EN 60950-22:2017) EMC 2014/30/EU (BS EN 61000-6-1:2007 & BS EN 61000-6-3:2007+A1:2011) RED 2014/53/EU (EN 301 489-1 V2.1.1) EV Charging Compliance (mode 3): BS EN 61851-1-2019 / IEC 61851-1-2017) & BS EN 61851-22:2002/IEC 61851-22:2001 RoHs 2011/65/EU WEEE 2012/19/EU (Reg No. WEE/KG4239XX)	
Warranty			
Standard		3 Year	3 Year
Enclosure			
Material		White ABS Plastic	White ABS Plastic
Protection Rating		IP54	IP54
Weight		3Kg	3.3Kg
Dimensions (H x W x D)		300 x 230 x 100 mm	300 x 230 x 100 mm

EmonEVSE Installation

The following is recommendation for a typical domestic installation in the UK.

EmonEVSE should be installed by a competent electrician in accordance with BS7671:2018+A1:2020 (18th edition) and IET code of practice.

The EmonEVSE requires:

- Dedicated circuit
- RCD: dual-pole **Type-B RCD** with 6mA DC leakage protection e.g Chint NL210, Proteus 63/2/30B, IMO B10R2040-30-B
 - Single-phase: <https://shop.openenergymonitor.com/type-b-rcd-1p-n-chint-nl210-63-263-30/>
 - Three-phase <https://shop.openenergymonitor.com/type-b-rcd-3p-n-chint-nl210-63-463-30/>
- MCB: **32A Curve C** or **40A Curve B MCB** overcurrent protection
- EmonEVSE should be earthed in accordance with BS7671:2018+A1:2020.
- Earth rod* or CPC disconnection / O-PEN detection device e.g Matt-e unit should be used when applicable**.
- **PME earth facility shall not be used as means of earthing if EVSE is connected to an EV located outdoors.** See BS7671:2018+A1:2020 Section 722.411.4.1
- Screw terminals to be tightened to **2Nm**
- **All terminals in the EmonEVSE should be checked for correct tightness upon final installation**
- Unit should be wall mounted using stainless steel screws and wall plugs (provided)

**Earth-rod impedance must be $<150\Omega$ for reliable charging of all vehicle types (this exceeds the 200Ω requirement of BS7671).*

***It's possible to get a single unit which combines Type-B RCD, MCB and O-PEN protection in a single unit e.g Matt:e SP-EVCP-B, Garo G8EV40PMEB or Proteus AEVB63M40*

The EmonEVSE contains an integral RCD which trips at 20mA AC, this RCD will auto-reset and will display status on the LCD. See Safety and Session Errors in the EmonEVSE user guide.

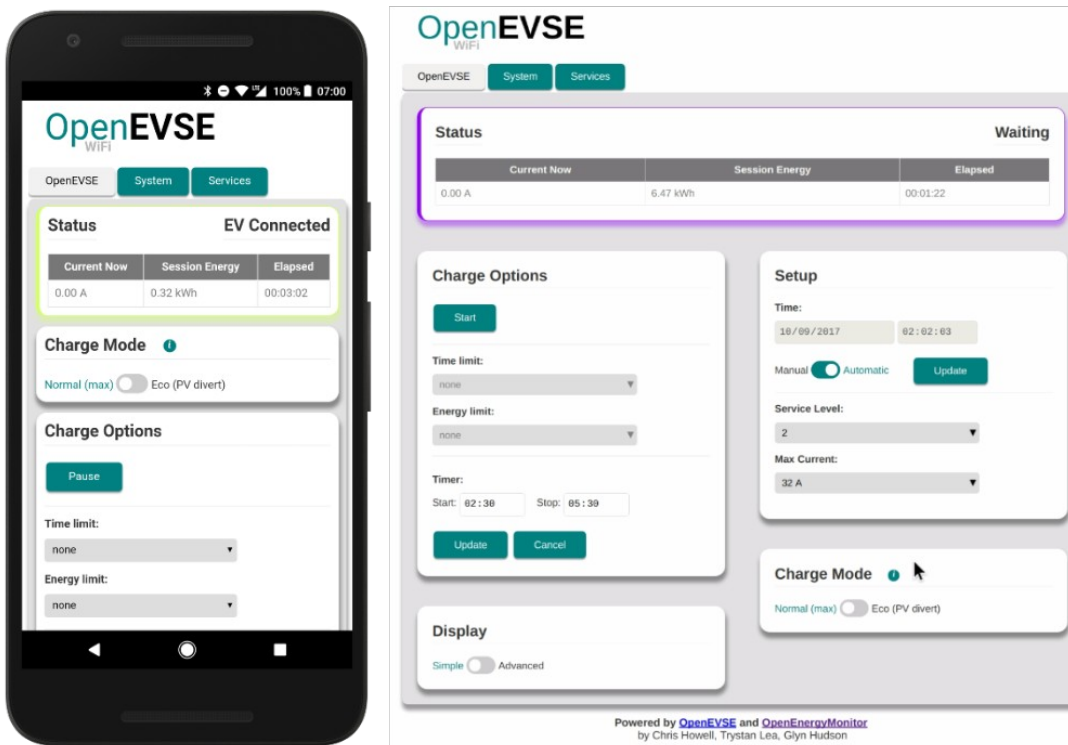
Weatherproof

The EVSE enclosure is IP56 rated. It's preferable to install the unit in a sheltered location. Please ensure enclosure front housing is fully attached and waterproof seals are intact and clean of debris. It's important that the 4x enclosure screws (top/bottom) are fully tightened and the rubber seals are in place.

Do not over-tighten the screws attaching the EVSE base-plate to the wall, since this could distort the enclosure compromising the waterproof seal.

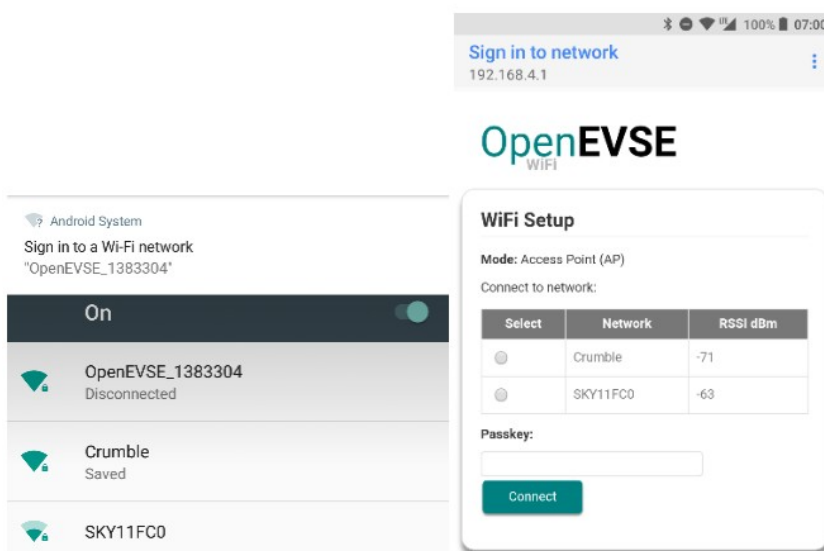
EmonEVSE Web Interface Quick Start

All functions of the OpenEVSE can be viewed and controlled via the web interface.



WiFi Connection

On first boot, OpenEVSE will broadcast a WiFi access point (AP) OpenEVSE_XXX. Connect to this AP (default password: openevse) and the captive portal should forward you to the log-in page.



Select your WiFi network from list of available networks

- Enter WiFi PSK key then click Connect
- OpenEVSE should now connect to

Illustration 1: EmonEVSE WiFi Setup

local WiFi network

•Re-connect device to local WiFi network and connect to OpenEVSE using local IP address or hostname displayed on LCD on first connection and each time on startup.

If WiFi connection / re-connection fails (e.g. network cannot be found or password is incorrect) the OpenEVSE will automatically revert back to WiFi access point (AP) mode after a short while to allow a new network to be re-configured if required. Re-connection to existing network will be attempted every 5 minutes.

For a full EVSE web interface setup guide e.g. Emoncms, MQTT, SolarPV divert see:

<https://guide.openenergymonitor.org/integrations/evse-setup/>

For technical details of the WiFi gateway e.g. remote open API control see:

https://github.com/openevse/ESP32_WiFi_V4.x/

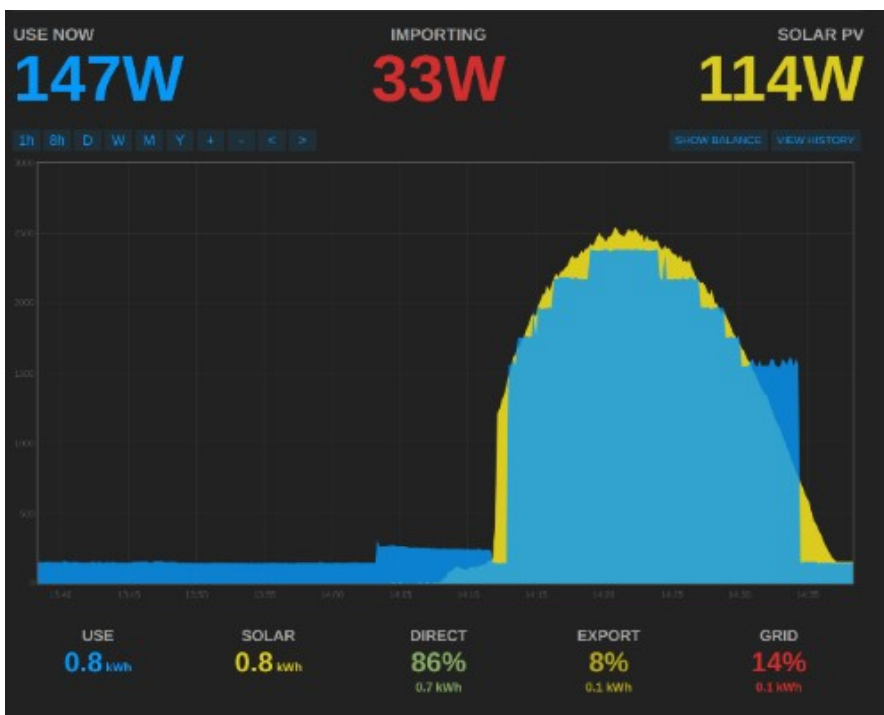


Illustration 2: EmonEVSE Eco Mode (Solar PV divert) example

Power on self-test errors

Possible errors returned during the self test are:

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

Session Errors

GFCI FAULT	EmonEVSE detected a ground leakage of > 20ma	EmonEVSE 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	EmonEVSE lost connection to ground	Check Electrical Ground, Contact Support
STUCK RELAY	Power was detected when line should be open.	Contact Support
VENT REQUIRED	EmonEVSE read a pilot signal at 3V	Ventilation requested by the Electric Vehicle.
DIODE CHECK	EmonEVSE did not detect a Vehicle	Ensure Charge handle is dry and clean. Contact Support.
HIGH TEMP	High temperature event (over 62C), detected during last charging session temperature throttling was engaged.	Investigate cause of high temperature event. Charge at lower current, keep unit out of direct sunlight and check internal wiring.
OVER TEMPERATURE	Temperature over 72C detected	If outside air temperature is very hot, keep station out of direct sunlight and charge at lower current. Check internal wiring and contact Support.

Safety

EmonEVSE was designed to comply and exceed safety requirements for Electric Vehicle Charging from SAE J1772 / BS EN 61851-22:2001 / NEC / UL

Power interlock

EmonEVSE includes an interlock that de-energizes the electric vehicle connector and cable whenever the electrical connector is uncoupled from the electric vehicle.

Pilot Signal

EmonEVSE 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.

Self Check

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

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

Ground Monitoring

EmonEVSE checks ground during power-up and constantly monitors for presence of proper safety ground during operation. If ground is lost charging is discontinued.

Ground Fault Interrupt

EmonEVSE includes mandatory Ground Fault Interruption (GFCI).

- Fault sensitivity of 20ma trip for protection against electric shock of personnel.
- After each GFCI event EmonEVSE will retry charging up to 4 times after a 5 minute delay per event.
- Ground Fault circuit tested during Power on Self-test.

Stuck Relay detection

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

Electric Vehicle Identification

EmonEVSE 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.

Ventilation Required

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

EV Cable current rating detection

EmonEVSE complies to BS EN 61851:1:2001 proximity detection mechanism to detect the maximum current rating of a non-tethered EV cable. Charging current is not allowed to exceed the maximum rating of the EV charging cable in use.

Internal Temperature

EmonEVSE Continuously monitors the internal temperature of the Charging Station and will shutdown if the internal temperature exceeds 71°C.

Temperature Throttling

EmonEVSE Actively reduces charging current during high temperature events in several steps beginning at 65°C. A persistent warning is displayed on the LCD during an after a high temperature event. If temperature drops full current is restored. Charging will be halted if temperature exceeds the critical level 71 °C.

Resources

Support

Community Forum: <https://community.openenergymonitor.org/c/integrations/openevse>

E-mail: support@openenergymonitor.zendesk.com

Tel: +44(0)1286 800870

Resources:

- [WiFi Gateway Setup: https://guide.openenergymonitor.org/integrations/evse-setup/](https://guide.openenergymonitor.org/integrations/evse-setup/)
- [EVSE WiFi Gateway technical guide: http://github.com/openevse/ESP32_WiFi_v4.x/](http://github.com/openevse/ESP32_WiFi_v4.x/)
- [OpenEnergyMonitor Setup: https://guide.openenergymonitor.org](https://guide.openenergymonitor.org)
-

Web Store

- <https://shop.openenergymonitor.com>

Website

- <https://openenergymonitor.org>
- <https://openevse.com/>

WiFi Gateway Firmware: http://github.com/openevse/ESP32_WiFi_v4.x/

EmonEVSE Controller Firmware: https://github.com/openenergymonitor/open_evse

Warranty

The emonEVSE EV charging station unit is **guaranteed for a period of 3 years from the date of purchase**. The guarantee covers component, material and workmanship factory defects. In the unlikely event of any of the above defects we will, at our discretion either repair or replace the unit at no cost.

The guarantee is subject to the following conditions:

- The unit has been correctly installed following the instructions in the User Guide
- The unit is used with an electrical supply rating printed on the data-plate sticker
- The unit has only been used to charge an electric vehicle
- The unit has not been altered, modified or customised by any person not authorised by us. This includes the use of non-certified firmware modification.
- Connector protection cover is closed when EV cable is not connected

The guarantee does not cover:

- Damage resulting from transportation, improper use, neglect or improper installation.
- Damage due to water ingress from improper installation.

Contact Information

Telephone: +44(0)1286 800870

Email: support@openenergymonitor.zendesk.com

<https://openenergymonitor.org>

<https://shop.openenergymonitor.org>

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