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: Intec, Parc Meani, Bangor, 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

About

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

<table>
<thead>
<tr>
<th>AC Input</th>
<th>Model:  emonEVSE32-1PH</th>
<th>Model:  emonEVSE32-3PH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>230 VAC (1PH+N)</td>
<td>400 VAC (3PH+N)</td>
</tr>
<tr>
<td>AC Frequency</td>
<td>50Hz</td>
<td>50Hz</td>
</tr>
<tr>
<td>Supply cable max outer diameter</td>
<td>18mm</td>
<td>18mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC Output</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>6A - 32A</td>
<td>6A - 32A</td>
</tr>
<tr>
<td>Output Power @230V</td>
<td>7.4kW</td>
<td>22kW</td>
</tr>
<tr>
<td>AC Contactor</td>
<td>40A (IEC 61095 / IEC 60947-5)</td>
<td>40A (IEC 61095 / IEC 60947-5)</td>
</tr>
<tr>
<td>EV Socket</td>
<td>Non-locking</td>
<td>IEC 62196 Type 2 (Mennekes)</td>
</tr>
</tbody>
</table>

### Features

<table>
<thead>
<tr>
<th>Display</th>
<th>Type</th>
<th>LCD 16 Character 2 Lines</th>
<th>LCD 16 Character 2 Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backlight</td>
<td>Color (RGB)</td>
<td>Color (RGB)</td>
<td></td>
</tr>
<tr>
<td>Temperature Monitoring</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Real Time Clock (RTC)</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Current Measurement</td>
<td>Real-time, kWh session, kWh Total</td>
<td>Real-time, kWh session, kWh Total</td>
<td></td>
</tr>
<tr>
<td>Session Options</td>
<td>kWh limit</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Time limit</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>WiFi Connectivity (2.4GHz)</td>
<td>Web UI control, Emoncms, MQTT data-logging</td>
<td>Web UI control, Emoncms, MQTT data-logging</td>
<td></td>
</tr>
<tr>
<td>Open API (RAPI)</td>
<td>Serial / HTTP/ MQTT 2W</td>
<td>Serial / HTTP/ MQTT 2W</td>
<td></td>
</tr>
<tr>
<td>Low standby power consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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 |

### Warranty

| Standard | 3 Year | 3 Year |

### Enclosure

| Material | White ABS Plastic | White ABS Plastic |
| Protection Rating | IP44 | IP44 |
| Weight | 3Kg | 3.3Kg |
| Dimensions (H x W x D) | 300 x 230 x 100 mm | 300 x 230 x 100 mm |

### Standards Compliance

| WEEE 2012/19/EU (Reg No. WEE/KG4239XX) | | |
|---------------------------------------|------------------------|

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EmonEVSE Installation

The following notes are a 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: https://shop.theiet.org/code-of-practice-for-electric-vehicle-charging-equipment-installation-2

The EmonEVSE requires:

- Dedicated **duel-pole** (Line and Neutral both disconnected) **Type-B RCD** with 6mA DC leakage protection e.g Chint NL210, Proteus 63/2/30B
  - 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/
- **32A Curve C MCB** overcurrent protection
- Dedicated circuit for the EVSE
- Earth rod* or CPC disconnection 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 for power connectors should 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 <150Ω for reliable charging of all vehicle types (this exceeds the 200 Ω requirement of BS7671).

The EmonEVSE contains an integral RCD which trips at 17mA 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 IP44 waterproof rated. It’s preferable to install the unit in a sheltered location. Please ensure enclosure font 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 should 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. If this does not happen navigate to http://openevse, http://openevse.local or http://192.168.4.1

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

Select your WiFi network from list of available networks

- Enter WiFi PSK key then click Connect
OpenEVSE should now connect to local WiFi network
- Re-connect device to local WiFi network and connect to OpenEVSE using http://openevse.local, http://openevse or local IP address 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_V3.x/

Illustration 2: EmonEVSE Eco Mode (Solar PV divert) example
Power on self-test errors

Possible errors returned during the self test are:

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Description</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFCI Self Test Failed</td>
<td>EmonEVSE did not detect a GFCI Fault during test</td>
<td>Check GFCI CT and Self test coil</td>
</tr>
<tr>
<td>Earth Ground Test Failed</td>
<td>EmonEVSE could not detect a Ground</td>
<td>Check Ground Connections and AC_Test lines</td>
</tr>
<tr>
<td>Stuck Relay Test Failed</td>
<td>EmonEVSE read AC voltage before Relays were closed</td>
<td>Check Relay and AC_Test Lines</td>
</tr>
</tbody>
</table>

Session Errors

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Description</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFCI FAULT</td>
<td>EmonEVSE detected a ground leakage of &gt; 20ma</td>
<td>EmonEVSE will rerun GFCI self-test and retry charging. If Ground fault indicates immediate failure. Charging is suspended. If GFCI continues regularly Contact Support</td>
</tr>
<tr>
<td>NO GROUND</td>
<td>EmonEVSE lost connection to ground</td>
<td>Check Electrical Ground, Contact Support</td>
</tr>
<tr>
<td>STUCK RELAY</td>
<td>Power was detected when line should be open.</td>
<td>Contact Support</td>
</tr>
<tr>
<td>VENT REQUIRED</td>
<td>EmonEVSE read a pilot signal at 3V</td>
<td>Ventilation requested by the Electric Vehicle.</td>
</tr>
<tr>
<td>DIODE CHECK</td>
<td>EmonEVSE did not detect a Vehicle</td>
<td>Ensure Charge handle is dry and clean. Contact Support.</td>
</tr>
<tr>
<td>HIGH TEMP</td>
<td>High temperature event (over 62C), detected during last charging session temperature throttling was engaged.</td>
<td>Investigate cause of high temperature event. Charge at lower current, keep unit out of direct sunlight and check internal wiring.</td>
</tr>
<tr>
<td>OVER TEMPERATURE</td>
<td>Temperature over 72C detected</td>
<td>If outside air temperature is very hot, keep station out of direct sunlight and charge at lower current. Check internal wiring and contact Support.</td>
</tr>
</tbody>
</table>

Safety

EmonEVSE was designed to comply and exceed safety requirements for Electric Vehicle Charging from SAE J1772 / B5 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)1248672607

Resources:
- WiFi Gateway Setup: https://guide.openenergymonitor.org/integrations/evse-setup/
- EVSE WiFi Gateway technical guide: https://github.com/openevse/ESP32_WIFI_V3.x/
- OpenEnergyMonitor Setup: https://guide.openenergymonitor.org

Web Store
- https://shop.openenergymonitor.com

Website
- https://openenergymonitor.org
- https://openevse.com/

WiFi Gateway Firmware: http://github.com/openevse/ESP8266_WIFI_v2.x/

EmonEVSE Controller Firmware: https://github.com/openenergymonitor/open_evse
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)1248672607
Email: support@openenergymonitor.zendesk.com
https://openenergymonitor.org
https://shop.openenergymonitor.org

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