All menu options:

CONFIG Configure EVSE with Type 2 Socket or Fixed cable
Socket EVSE uses a type 2 socket
Fixed EVSE uses a fixed charging cable.

LOCK Enable or disable the locking actuator (config = socket)
Disabled No lock is used
Solenoid Dostar or Ratio lock
Motor Phoenix Contact lock

MODE Use Normal EVSE mode, or Smart/Solar Mode (requires sensorbox)
Normal The EV will charge with the current set at MAX
Smart The EV will charge with a dynamic charge current, depending on sensorbox data, and MAINS, MAX, MIN settings.
Solar The EV will charge on solar power only.

START set the current on which the EV should start Solar charging
-1 -16A

STOP Stop charging when there is not enough solar power available
Disabled - 60 minutes (Disabled = never stop charging)

LOAD BAL Load Balancing mode for 2 to 4 EVSE's
Disabled No load balancing is used
Master Set one of the EVSE's to Master,
Slave1-3 And the rest to Slave 1-3, when using load balancing.

MAINS Set Max Mains current (*)
10-99A

MIN Set MIN charge current for the EV (*)
6-16A

CIRCUIT Set the max current the EVSE circuit can handle (load balancing)
13-80A

MAX Set MAX charge current for the EV
10-80A

SWITCH Set the function of an external switch connected to pin SW
Disabled A push button on io pin SW can be used to STOP charging.
Access B/S An external switch is used to enable/disable access to the charging station. B=momentary pushbutton, S=toggle switch.
Sma-Sol B/S An external switch is used to switch between Smart and Solar modes.

RCMON Connect a Residual Current Monitor for detecting DC leakage current the white connector or the RCM terminal. (active high input)
Disabled The RCD option is not used.
Enabled When a fault current occurs, the contactor will open immediately, and an error message will be displayed on the LCD.

MAINSMET Set type of MAINS meter
Sensorbox Sensorbox will send measurement data to the SmartEVSE
Phoenix C / Finder / Eastron / Custom a Modbus kWh meter is used.

MAINSADR Set the Modbus address for the kWh meter

CAL Calibrate CT1. CT2 and CT3 will use the same cal value. (*)
6.0-99.9A A minimum of 6A is required in order to change this value.
Hold both < and > buttons to reset to default settings.

* Only in Smart/Solar Mode or when Load Balancing has been set to Master.

Load Balancing

Up to four SmartEVSE modules can share one mains supply.

Software configuration

Set one modules **LOAD BAL** setting to *MASTER*, the others to *SLAVE 1,2,3*.
Make sure there is only one Master, and the Slave numbers are unique.

On the Master configure the following:

MODE Set this to *Smart* if a Sensorbox (or configured kWh meter) is used to measure the current draw on the mains supply.
It will then dynamically change the charge current for all connected EV's. If you are using a dedicated mains supply for the EV's you can leave this set to *Normal*.

MAINS Set to the maximum current of the MAINS connection. If the sensorbox detects a current higher then this on one of the phases, it will immediately reduce the current to the EVSE's

CIRCUIT Set this to the maximum current of the EVSE circuit. This will be the maximum current all EV's combined will use.

MAX Set the maximum charging current for the EV connected to -this- SmartEVSE.

MIN Set to the lowest allowable charging current for all connected EV's.

On the Slave's configure the following:

MAX Set the maximum charging current for the EV connected to -this- SmartEVSE.

Hardware connections

Connect the **A**, **B** and **GND** connections from the Master to the Slave(s).
So A connects to A, B goes to B etc..

If you are using Smart/Solar mode, you should connect the **A**, **B** , **+12V** and **GND** wires from the sensorbox to the same screw terminals of the SmartEVSE.

⚠ Make sure that the **+12V** wire coming from the sensorbox is connected to only -one– SmartEVSE.

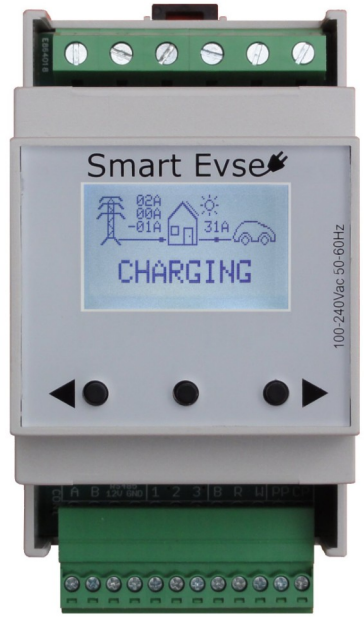
The source code and more instructions can be found on Github:
https://github.com/SmartEVSE/smartevse and on www.smartevse.nl

Designed and manufactured in Holland by
STEGEN ELECTRONICS
Westeinde 15 | 1606 CZ Venhuizen | The Netherlands
www.stegen.com | +31 228 8512 19

Smart EVSE v2.2

Charge controller for electric vehicles

QUICK MANUAL 1.11
SOFTWARE VERSION 2.10



Description

The SmartEVSE is a J1772 / IEC61851 compatible charge controller for electric vehicles. It features connections for a mains contactor and locking actuator.
Up to four SmartEVSE modules can be connected together, to allow for load balacing between charging stations. All module parameters can be configured using the display and buttons.

Safety notes and warning instructions

⚠ Read the installation instructions completely.

- Installation, operation and maintenance may only be caried out by qualified electricians. Follow the installation instructions as described.
- When installing the controller, use a suitable voltage measuring device to ensure that no mains voltage is present.

Building the EVSE

In order to build a complete EVSE (charging station) you will need:

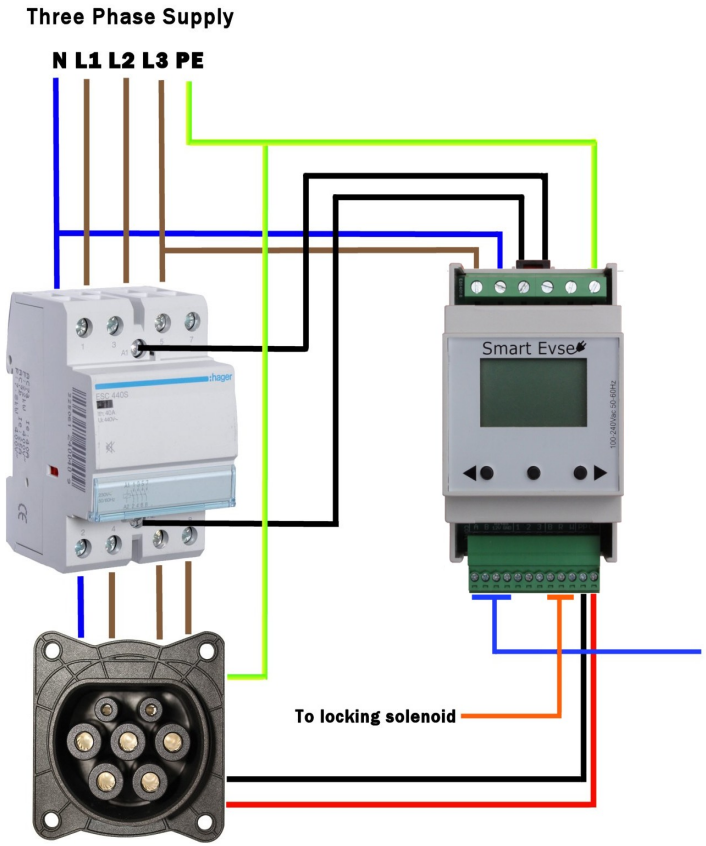
- SmartEVSE.
- 4 pole NO Contactor rated for the max charging current.
- Fixed charging cable or socket with locking solenoid.
- Enclosure with DIN rail. (for example Famatel type 3958)
- Terminal blocks (Wago TOPJOB S)

When using a **fixed** charging cable, make sure there is a resistor between PP and PE in the Charging Plug. Otherwise the EV will not start charging. This resistor is already fitted in the plug on all factory made cables.

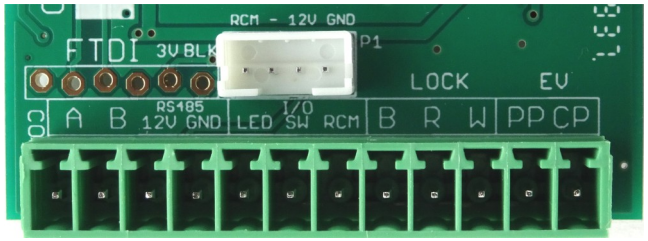
100 Ohm = 63A
220 Ohm = 32A
680 Ohm = 16A

⚠ The EVSE needs to be protected with a circuit breaker and residual-current circuit breaker, usually located near or in the distribution board.

Diagram



Low voltage connections



All low voltage connections are made with a 12 pin pluggable connector. Just above the connector is the 6 pin **FTDI** connection for uploading new firmware and accessing the command line interface (CLI).

A, **B**, **12V** and **GND** connections are used to connect the sensorbox. (optional) **A, B** and **GND** should be connected to each module if you choose to use load balancing between SmartEVSE modules.

A 12v LED can be connected between the **12V**(+) and the **LED**(-) terminal.
An (optional) switch can be connected to the **SW** terminal and **GND**. It can be used to start/stop charging and toggle between charge modes.
An (optional) RCM14-03 DC residual current sensor can be connected to terminals **RCM** or the 4 pin white connector.

B, **R**, **W** (lock) need to be connected to the locking solenoid or 12V motor that will lock the charging cable in it's socket. (see next page)

PP (proximity pilot) signal will determine what max current the charging cable can handle, and needs to be connected to the charging socket. In case of a fixed cable, this signal is not used.

CP (control pilot) signal communicates with the EV, and will also inform the EV the maximum allowed charging current.
This signal needs to be connected to the CP pin of the charging socket, or connected to the CP wire if using a fixed cable.

Sensorbox (optional)

The SmartEVSE is capable of dynamically adjusting the chargecurrent, depending on other loads that use the same mains connection. We call this smart mode, and it will require the following extra items:

- Sensorbox v1.5 with Current Transformers, one for each phase or Sensorbox2 and a compatible smart meter with P1 port.
- 4+ wire cable for the connection between SmartEVSE and Sensorbox.

The Sensorbox should be placed where the mains connection enters the building. Usually this is just after the kWh meter, this allows it to measure the total current for each phase and send this information to the SmartEVSE.

Clip the current transformers on the L1,L2 and L3 wires, and plug the other end of each cable into the Sensorbox v1.5.
For the Sensorbox2, plug the RJ12 cable into the smart meter and Sensorbox2

The data cable coming from the Sensorbox should be connected to terminals **A**, **B**, **+12V** and — **GND** of the SmartEVSE

The Locking Actuator

A locking actuator can be used to lock the charging plug into the socket. It will lock the cable when charging starts, and will unlock the cable after charging has stopped.

The SmartEVSE supports at least three types of locking actuators:

Dostar locking solenoids have three wires and can be connected directly to the **B**(lue) **R**(ed) **W**(hite) terminals on the module.
Sometimes the locking action is reversed (it locks, while it should unlock), you will then have to swap the red and white wires.
Make sure to set the Lock option in the menu to SOLENOID

The Ratio locking actuator has also three wires, connect them as follows:
B: Blue R: Black W: Red

Make sure to set the Lock option in the menu to SOLENOID

The Phoenix contact locking motor has 4 wires and needs to be connected as follows:

B: BL/YL
R: BL/GR + BL/BR
W: BL/RD
Make sure to set the Lock option in the menu to MOTOR

Incase of a power failure, the SmartEVSE will quickly unlock the charging cable from the socket automatically.

When the SmartEVSE is used with a fixed charging cable, this function is not used.

Error Messages

If an error occurs, the SmartEVSE will stop charging, and display one of the following messages:

ERROR NO SERIAL COM CHECK WIRING No signal from the Sensorbox or other SmartEVSE (when load balancing is used) has been received for 10 seconds. Please check the wiring to the Sensorbox or other SmartEVSE.

ERROR NO CURRENT There is not enough current available to start charging, or charging was interrupted because there was not enough current available to keep charging. The SmartEVSE will try again in 60 seconds.

ERROR HIGH TEMP The temperature inside the module has reached 65° Celsius. Charging is stopped.
Once the temperature has dropped below 55°C charging is started again.

RESIDUAL FAULT CURRENT DETECTED An optional DC Residual Current Monitor has detected a fault current, the Contactor is switched off.
The error condition can be reset by pressing any button on the SmartEVSE.