

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.

MODE Use Normal EVSE mode, or Smart 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.

LOADBL Load Balancing mode for 2 - 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

MAX Set MAX charge current for the EV

10-80A

MIN Set MIN charge current for the EV (*)

6-16A

LOCK Enable or disable the locking actuator (config = socket)

Disabled No lock is used

Solenoid Dostar or Ratio lock

Motor Phoenix Contact lock

CABLE Set the max current the charging cable can handle (config = fixed)

13-80A

CAL Calibrate CT1. CT2 and CT3 will use the same cal value. (smart mode)

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.

ACCESS Use an external (momentary) switch to enable/disable charging.

Disabled A push button on io pin SW can be used to STOP charging.

Enabled An external switch on io pin SW is used to enable/disable access to the charging station.

RCMON Connect a Residual Current Monitor for detecting DC leakage

current to IO3. (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. Press any button to reset.

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

Load Balancing

Up to four SmartEVSE modules can share one mains supply.

Software configuration

Configure the SmartEVSE's load balancing option (**LOADBL**) and set one module to **MASTER**, the others to **SLAVE 1,2,3**.

Make sure there is only one Master, and the Slave numbers are unique.

Example: For a two unit Load Balancing setup, set the first module to Master, and the second to Slave 1.

On the Master configure the following:

MODE Set this to *Smart* if a Sensorbox with CT's 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 this to the capacity of the mains supply. 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.

After setting the Slave's load balancing option, there will be an error message on the display: "ERROR NO SERIAL COM"

This indicates, that the Slave unit was not able to communicate to the Master. This message will disappear after the modules are correctly wired up.

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 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/smarteve>

And on www.smarteve.nl

Designed and manufactured in Holland by



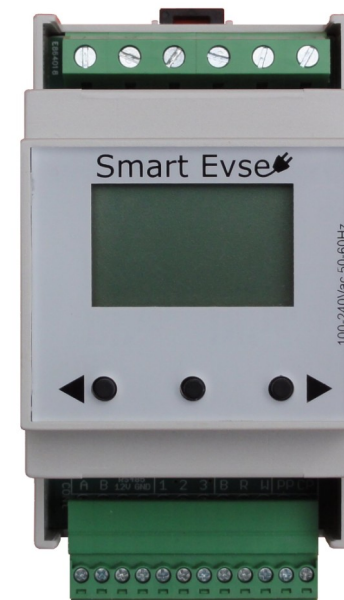
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Smart EVSE v2.2

Charge controller for electric vehicles

QUICK MANUAL 1.10

SOFTWARE VERSION 2.07



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 balancing 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 carried 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

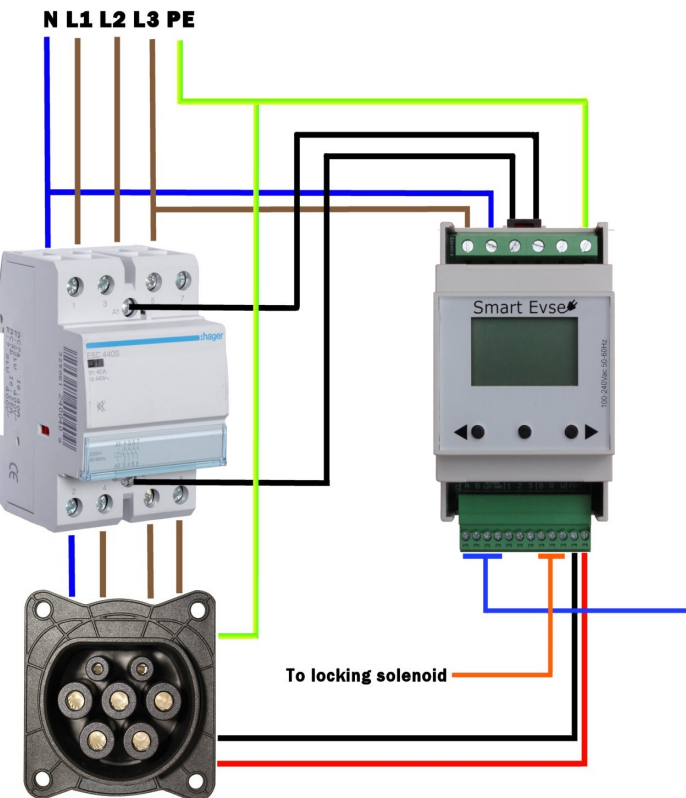
220 Ohm = 32A

680 Ohm = 16A

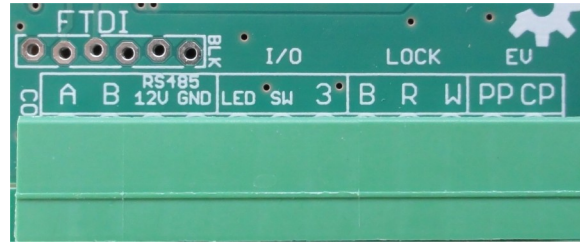
⚠ The EVSE needs to be protected with a circuit breaker and residual-current circuit breaker, usually located near or in the distribution board.

Diagram

Three Phase Supply



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. A (optional) switch can be connected to the **SW** terminal and **GND**. It can be used to start/stop charging.. Terminal **3** can be used with an external DC residual current sensors. (see menu option RCMON)

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 charging current, depending on other loads that use the same mains connection. We call this smart mode, and it will require the following extra items:

- Sensorbox
- Current Transformers (type SCT 013-000) one for each phase
- 4+ wire cable for the connection between SmartEVSE and Sensorbox.

The Sensorbox should be placed where the Mains connection enters the building. Usually 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.

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.