EVBox
Smart Charging
Smart Charging+
Installation manual

EVBOX

POWERED BY
smappee

I'm home!
Let's get started.

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1. Safety instructions

1.1 Safety warning

Carrying out electrical work in a home or workplace can be dangerous.
The Power Box, CT Hub, and Current Transformers are usually installed inside the distribution board under a protective cover. The Genius can be installed both inside and outside the distribution board. Only certified electricians may carry out the installation, which must be in accordance with the national safety regulations.

1.2 Safety precautions

⚡	CAUTION: Risk of electric shock.
⚠	CAUTION: Refer to the accompanying instruction whenever you see this symbol.
⊘	DO NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burns, or arc flash.

Please observe the following safety precautions to avoid potential electric shock, fire, or personal injury:

• Use this product only for its intended purpose.
• Use the product indoors only.
• Only mount the power cable in a sealed enclosure.
• Locate a free fuse or install an additional fuse for the protection of the Power Box. Connect the power cable according to the connection diagram, see next pages.
• The circuit breaker acts as the disconnect device and must meet IEC 60947-2.
• Do not open the equipment or touch any of its electronic circuitry.
• Do not attempt to open, repair, or service any parts.
• Only use the bus and power cables delivered with the product. Category 5 or 6 SFTP network cables are not supplied and must be sourced separately.
• Do not use the product if damaged.
• Do not use damaged current transformers or cables.
• Do not immerse the product in water or any other liquids.
• Do not expose the product to heat, flame, or extreme cold.

1.3 Responsibility

• Assembly, connection, and use must be carried out in accordance with the installation standards currently in force.
• The device must be installed in accordance with the instructions given in this manual.
• Failure to observe the instructions for installing this unit may compromise the device's intrinsic protection.
• The device must be placed in a system that complies with the applicable standards and safety regulations of the country of installation.
• Cables may only be replaced with cables of the correct rating.

1.4 Explanation of safety symbols

The table below explains the safety symbols.

☐	Class II equipment does not require an earth connection.
⚠ IK06	This device has been tested according to IEC 62262 and complies to impact class 6 (impact energy: 1 Joule).

1.5 Residual safety risk

- The device's housing has IK06 impact immunity level. Therefore, it is essential that the housing is not damaged during installation.
- When there is visible damage to the device's housing, it is recommended to replace the device to prevent any hazardous situation to occur.

1.6 Maintenance

- Clean the outside only with a dry, clean cloth.
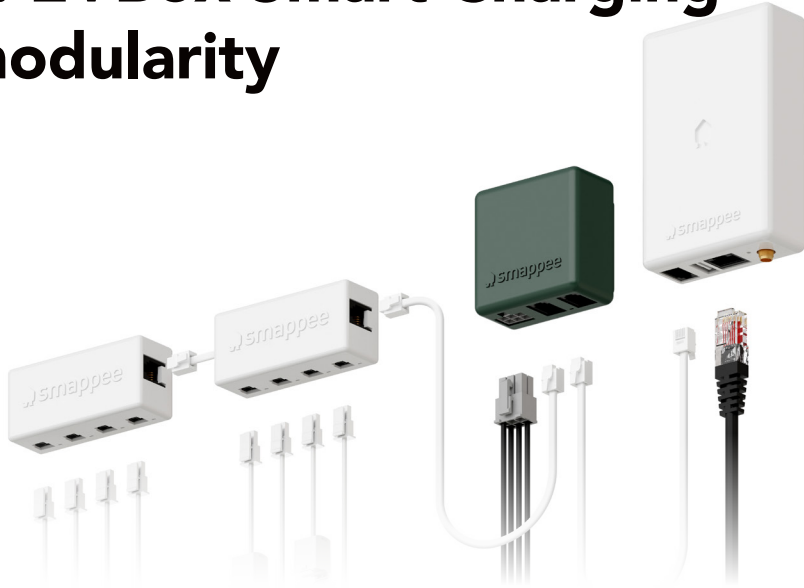- Do not use abrasive agents or solvents.

1.7 Support

Only certified electricians or equivalent may install EVBox Smart Charging. If you have any questions, please contact your local distributor.

In case your local distributor is unable to help you, you can contact EVBox Smart Charging at: **evbox.com/support**.

2. EVBox Smart Charging modularity

2.1 Introduction

EVBox Smart Charging is a modular energy monitoring solution, designed to be easily installed in existing and new installations. The modular design allows you to add additional current transformers (CT) through the use of CT Hubs.

Smart Charging has three essential components:

1. **CT Hubs**: The main components of the monitoring system. You can connect up to 4 CTs or Rogowski coils to the CT Hub to measure different currents, ranging from 0 A to 1000 A. This allows for accurate submetering of (a group of) appliances. Serial-connect CT Hubs to measure different appliances up to a distance of 100 meters (109 yards).
2. **Power Box**: This is the heart of the monitoring system as it provides power to all components. It measures the line voltage of the different connected phases and transfers the data via RS 485.
3. **Genius / Wi-Fi Connect**
   Genius: The gateway between the monitoring system and the Smart Charging Cloud, ensuring secure data storage from different components. It also interacts with third-party components. The communication to cloud is done via Ethernet or Wi-Fi.
   Wi-Fi Connect: The gateway between the monitoring system and the Smart Charging Cloud, ensuring secure data storage from different components. The communication is via Wi-Fi only.

A typical Smart Charging setup consists of one Power Box, one Genius or Wi-Fi Connect, CT Hubs, and CTs. The different components communicate through the Bus cable.

EVBox Smart Charging is further configured using the Smappee Energy Monitor mobile app (available from the Apple App Store® or Google Play™ store). The real-time and historical

monitoring data are accessible for visualisation and analysis purposes.
EVBox Smart Charging is not only a monitoring solution but also an energy traffic controller. This functionality allows automatic interaction with the energy traffic within the installation, which is based on predefined logic embedded in the system.

2.2 Kit overview

Smart Charging is offered in 4 versions:
• Smart Charging 1-phase
• Smart Charging+ 1-phase
• Smart Charging 3-phase
• Smart Charging+ 3-phase

2.3 Hardware pre-configuration

⚠️ IMPORTANT: The components in the kit (Power Box, CT hub(s) and Wi-Fi Connect or Genius unit) are pre-configured and are specific to one kit. These components cannot be used with a different kit.

Typical device combinations are:
Smart charging: CT Hub - Power Box - Wi-Fi Connect
Smart charging+: CT Hub - Power Box - Genius

2.4 Compatibility of Smart Charging with EVBox charging stations

Product	Smart charging compatibility (July 2019)
BusinessLine G3 onwards	Supported. Connection via RS485 on ChargePoint PCB. Refer to below schematic.
HomeLine G3 onwards	Supported. Connection via RS485 on ChargePoint PCB. Refer to below schematic
Elvi	Supported from Q4 2019 onwards. Earlier Elvi charging stations are not compatible.

3. How to install

3.1 General

The installation procedure consists of the following steps:

1. Planning and site preparation: determine the complete monitoring solution.

2. Physical installation: install all EV Box Smart Charging components, and connect the Smart Charging to a charging station.

3. Configuration.

4. Validation of the installation: check the accuracy of live power values.

> ⚠️ IMPORTANT: The components in the kit (Power Box, CT hub(s) and Wi-Fi Connect or Genius unit) are pre-configured and are specific to one kit. These components cannot be used with a different kit.

Note:
- Installation of the Smart Charging requires the Smappee Energy Monitor mobile app.

  GET IT ON Google Play   Download on the App Store
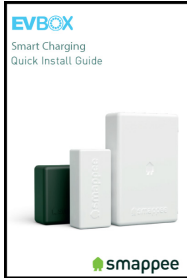
- The mobile app is required both for configuration of EVBox Smart Charging and the monitoring of energy usage. We recommend that both the installer and the user install the app.
- The username and password are specific to one kit and cannot be used with a different kit. Store the Member Card with the username and password in a safe place.

3.2 Inside the box: Smart Charging 1 phase

Wi-Fi Connect

Power Box

CT Hub

2x
Current Transformer

Quick Install Guide

Wall mounting plate

DIN mounting plate

Bus termination plug

Power cable

Bus cable (150 cm)

Bus cable (40 cm)

RJ10 connector

RS485 connector for BusinessLine

3.3 Inside the box: Smart Charging+ 1

Genius

Power Box

CT Hub

3x
Current Transformer

Quick Install Guide

Wall mounting plate

DIN mounting plate

Bus termination plug

Power cable

Bus cable (150 cm)

Bus cable (40 cm)

RJ10 connector

RS485 connector for BusinessLine

RJ10 splitter

3.4 Inside the box: Smart Charging 3 phase

Wi-Fi Connect

Power Box

2x Solid Core 3-Phase CT

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Smart Charging
Quick Install Guide

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Quick Install Guide

Wall mounting plate

DIN mounting plate

Bus termination plug

Power cable

Bus cable (150 cm)

2x Bus cable (40 cm)

RJ10 connector

RS485 connector for BusinessLine

3.5 Inside the box: Smart Charging+ 3

Genius

Power Box

2x Solid Core 3-Phase CT

3x Current Transformer

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Quick Install Guide

Wall mounting plate

DIN mounting plate

Bus termination plug

Power cable

CT Hub

Bus cable (150 cm)

3x Bus cable (40 cm)

RJ10 connector

RS485 connector for BusinessLine

RJ10 splitter

4. Planning and site preparation

4.1 General

The first step is to determine the complete monitoring solution. This consists of listing all the loads that need to be measured, their properties, and the required hardware.

The checklist provided helps you to determine all necessary technical information for the next steps and also to collect all the necessary hardware.

Solar			Requirements
No	Grid – 1 Phase (1P+N)	**EVBox Smart Charging** 1 Phase Edition	• Wi-Fi (2.4 GHz) • Øwire < 10 mm
	Grid – 3 Phase (3P+N)	**EVBox Smart Charging** 3 Phase Edition	• Wi-Fi (2.4 GHz) • Øwire < 7 mm
Yes	Grid – 1 Phase (1P+N)	**EVBox Smart Charging +** 1 Phase Solar Edition	• Wi-Fi (2.4 GHz) or Ethernet • Øwire < 10 mm
	Grid – 3 Phase (3P+N)	**EVBox Smart Charging +** 3 Phase Solar Edition	• Wi-Fi (2.4 GHz) or Ethernet • Øwire < 7 mm
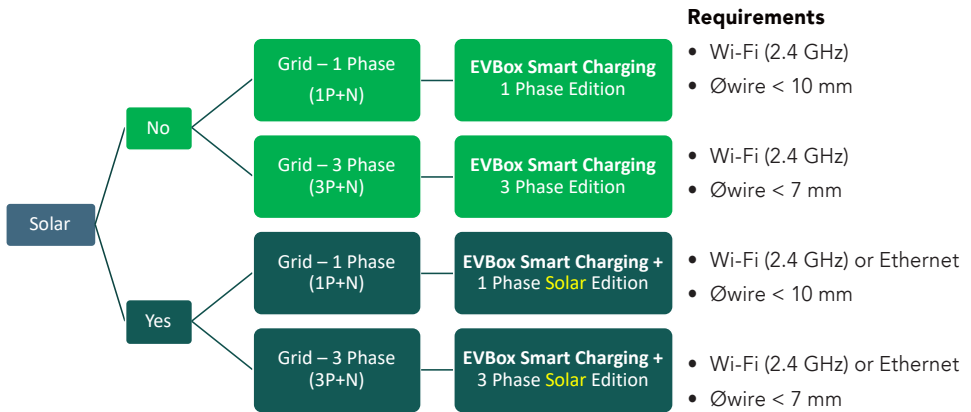
Note: If the requirements are not met, a custom package is required.

4.2 General architecture (what is to be monitored)

	Single or multiple metering locations: Where are the circuit breakers or appliances to be monitored? (Location inside the building, distances between them, etc.).
	Total load (main service): yes/no?
	Specific appliances? (e.g. HVAC, Heat pump, EV, Solar, etc.). Are they on separate circuit breakers or are they powered from a wall socket?
	Circuits (main sockets, lighting area, etc.).

4.3 Details

	System: Verify the mains voltage – single phase (1P), three-phase 3P+N (3*400) or 3P (3*230)

	How are the total load, solar, circuits, and/or appliances fused?
	Phases of each measured load (circuits and appliances): Single-phase, three-phase, 3P+N (3*400V), voltage, frequency, power, amps.
	Cross-sectional area or diameter of the wiring.
	How will a stable internet connection be provided to the energy monitor: Wi-Fi, Ethernet?

4.4 Tools (not included)

	Multimeter
	Screwdrivers
	Wire stripper
	Flashlight
	Needle-nose pliers
	Wire cutter
	RJ10 crimping tool
	Optional: drill, drill bits and screws

4.5 Supplies (not included)

	Cable ties
	Circuit breaker, 6 A, single-phase or three-phase (for Power Box only)
	Ethernet cable if wired communication is used
	External Wi-Fi antenna if there is a weak Wi-Fi signal
	Category 5 or 6 SFTP network cable (for RS485 connection to charging station)
	Cable gland (for BusinessLine network cable routing through base)

5. Physical installation

5.1 General

This procedure describes the required steps for the physical installation of EVBox Smart Charging.

⚠️ WARNING: For safety purposes, it is necessary to power off the installation before proceeding with the physical installation.

5.2 Install components

Note: These instructions are applicable for both single phase and three phase installations.

Note: Do not switch on the power to the Power Box before all physical components are installed and Smart Charging is connected to the EV charging station. All component must be installed so the the Wi-Fi Connect or Genius unit can detect the components. Alternatively, you can reboot the installation after completing the physical installation but before setting up the Wi-Fi connection.

1. Install the Power Box on the same electrical group as the charging station.

2. Connect the power cable according to the connection diagram, see next pages.

3. Install the Wi-Fi Connect or Genius unit.

4. Mount the current transformers (CT) on the power cables. The arrow shown on the CT (K > L) has to point in the direction of the current flow.

5. Connect the CTs to their corresponding CT Hub.

6. Make the following connections:
   a. The first CT hub to Port A of the Power Box using the supplied Bus cable.
   b. Connect all the CT hubs with the supplied Bus cable or a custom twisted-pair RJ10 cable.
   c. Plug the supplied bus termination plug in the free port of the last CT Hub.
   d. Connect Port B of the Power Box to Port B of the Wi-Fi Connect or Genius unit using the (longest) supplied bus cable or a custom twisted-pair RJ10 cable.

Note: DO NOT switch on the power at this time.

In a three-phase installation, all phases must be connected to the Power Box according to the wiring diagram. This means that the appropriate wires of the power cable must be connected to their respective phases (L1, L2, L3).

In a three-phase environment, the wires should run through the solid core. However, in case of thicker wires, you must use three CTs instead of the solid core CT (available as a **three phase CT kit**).

Label the current transformers on the clamp and connector side to enhance visualisation.

The arrow indicated on the CT or Solid Core 3-Phase CT (K > L) must point in the direction of the current flow.

Mount the supplied bus termination plug in the free port of the last CT Hub.

You can use a custom RJ10 cable instead of the standard Bus cable. The RJ10 must be a twisted pair cable. Pins 1 and 4 and Pins 2 and 3 must be twisted pairs. See the Bus cable specification in section 11.

5.3 Connection diagram - Smart Charging 1-phase
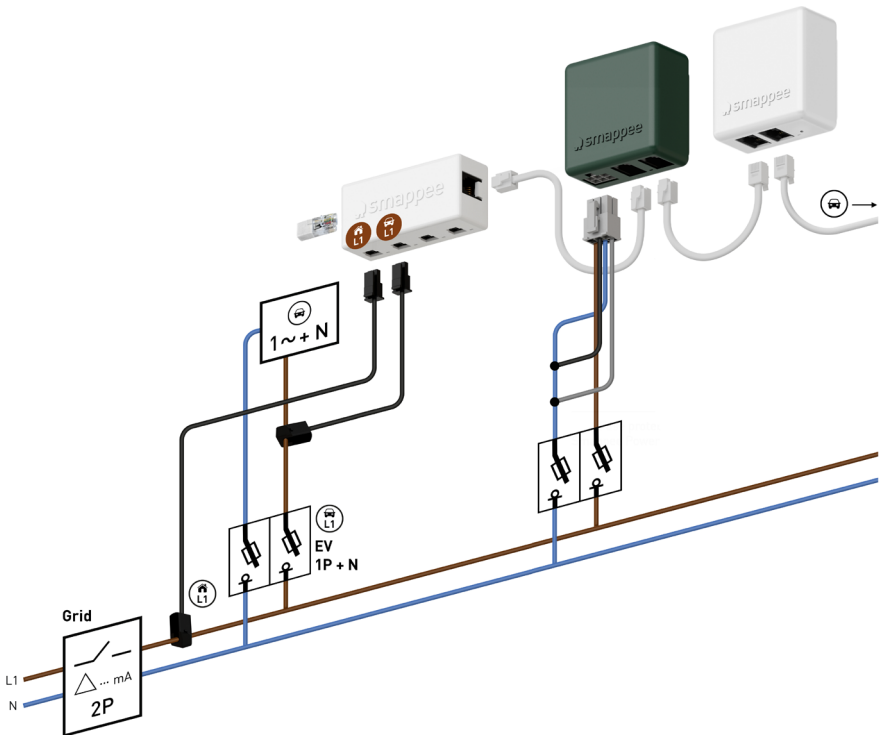
▬	Brown – L1
▬	Blue – Neutral

Note: The Power Box L2 + L3 connections are connected to neutral in a single phase installation.

⚠️ REMARK: The above wiring and colour scheme is indicative. National regulations must be respected. Wiring for Europe must be at least 1mm^2 / 600 V and protected by a 6 A circuit breaker.

5.4 Connection diagram - Smart Charging+ 1-phase
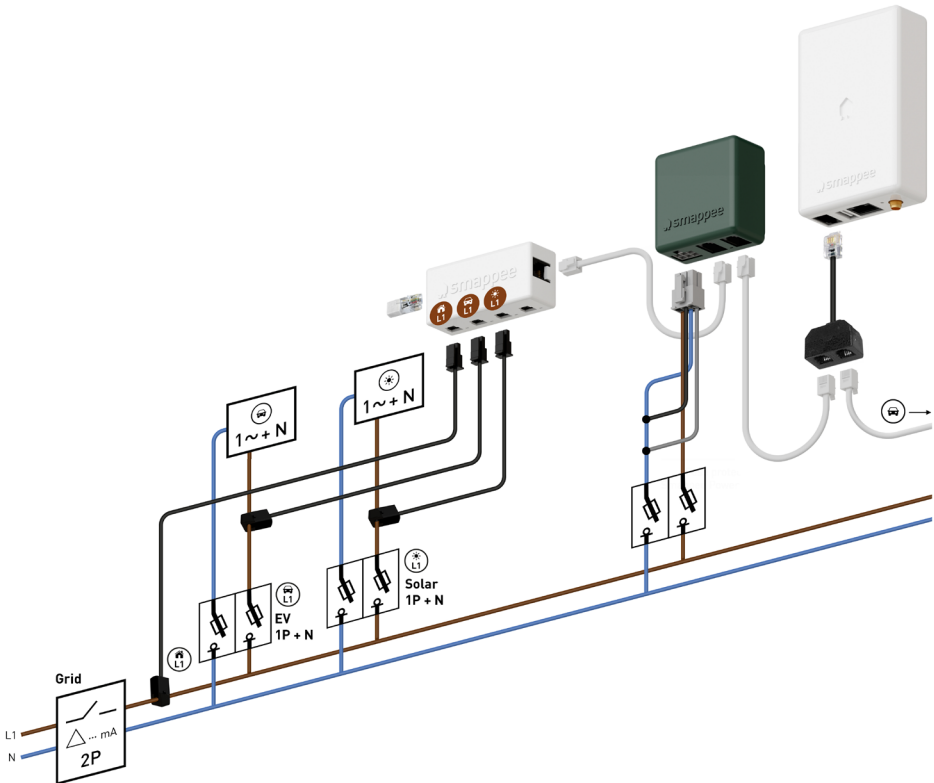
	Brown – L1
	Blue – Neutral

Note: The Power Box L2 + L3 connections are connected to neutral in a single phase installation.

⚠️ REMARK: The above wiring and colour scheme is indicative. National regulations must be respected. Wiring for Europe must be at least 1mm^2 / 600 V and protected by a 6 A circuit breaker.

5.5 Connection diagram – Smart Charging 3-phase & Neutral (3*400V)

Brown – L1
Black – L2
Grey – L3
Blue – Neutral
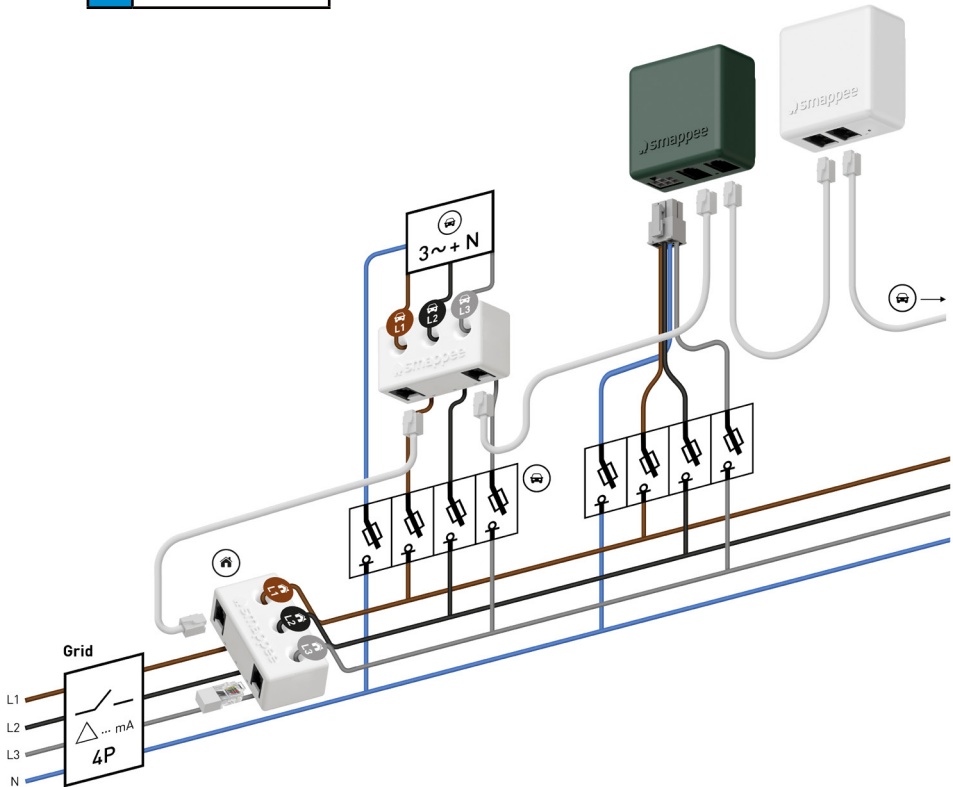
⚠️ REMARK: The above wiring and colour scheme is indicative. National regulations must be respected. Wiring for Europe must be at least 1mm² / 600 V and protected by a 6 A circuit breaker.

5.6 Connection diagram – Smart Charging+ 3-phase & Neutral (3*400V)

	Brown – L1
	Black – L2
	Grey – L3
	Blue – Neutral

⚠️ REMARK: The above wiring and colour scheme is indicative. National regulations must be respected. Wiring for Europe must be at least 1mm^2 / 600 V and protected by a 6 A circuit breaker.

5.7 Connect charging station

The following sections describe the connection of EVBox Smart Charging to the following types of charging station:

- BusinessLine G3
- BusinessLine G4
- HomeLine
- Elvi v2

For each type of charging station, refer to the related Installation Manual for instructions about removing the cover to access the Smart Charging connection points.
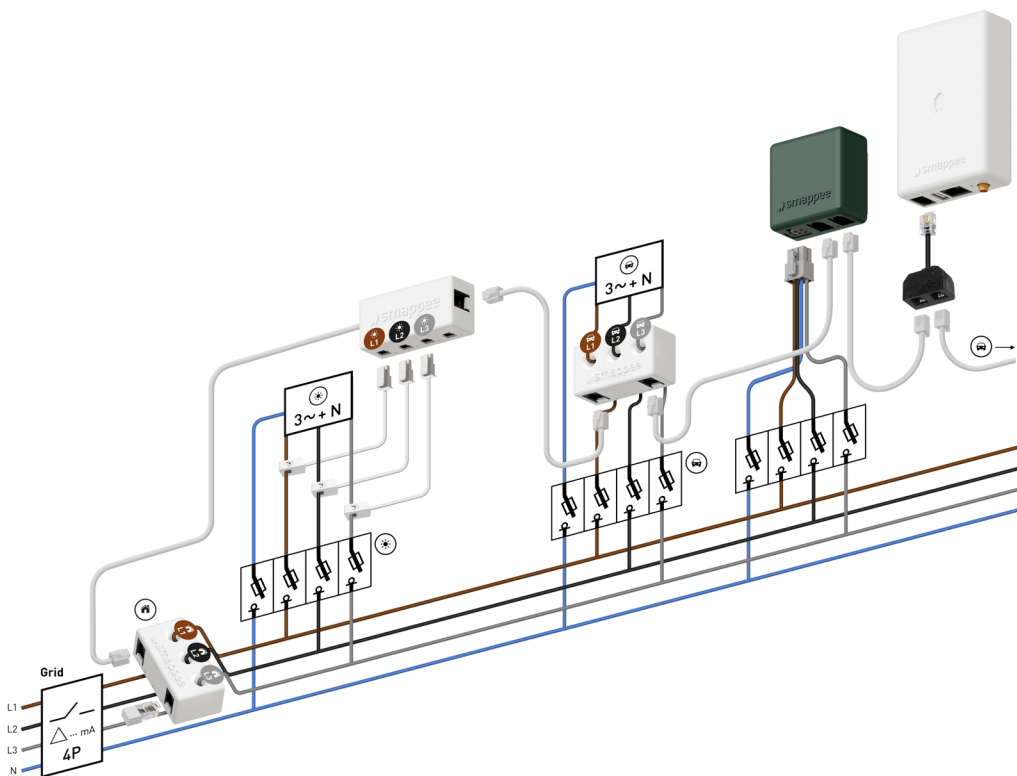
> ⚠️ WARNING: You must read and obey the safety precautions listed in the installation manual before you remove the cover from an EVBox charging station.

Connect to EVBox Smart Charging

The Connection uses an RS485 connection between the Wi-Fi Connect or Genius unit and the charging station.

1. Install the Category 5 or 6 SFTP network cable along the route from the Wi-Fi Connect or Genius unit to the charging station. Leave enough cable at each end to make the connections.

2. Install the RJ10 connector (supplied) on the the Wi-Fi Connect or Genius unit end of the network cable:
   Note: The unused wires of the network cable cable remain unconnected.
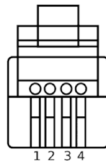
	1 – Do not connect
	2 – RS485 – A
	3 – RS485 – B
	4 – Ground

3. When a Genius unit is used, connect the RJ10 Splitter (supplied) to the unit.

4. Connect the RJ10 connector to the Wi-Fi Connect or the RJ10 Splitter.

5. Continue with connecting the network cable to the charging station.

BusinessLine G3

① In the charging station, find the RS485 connection on the modem board PCB. The figures below will help you find the connection.

② Route the network cable into the charging station along the same route as the power cable. When the cable enters the base of the station, drill a hole and use a cable gland.
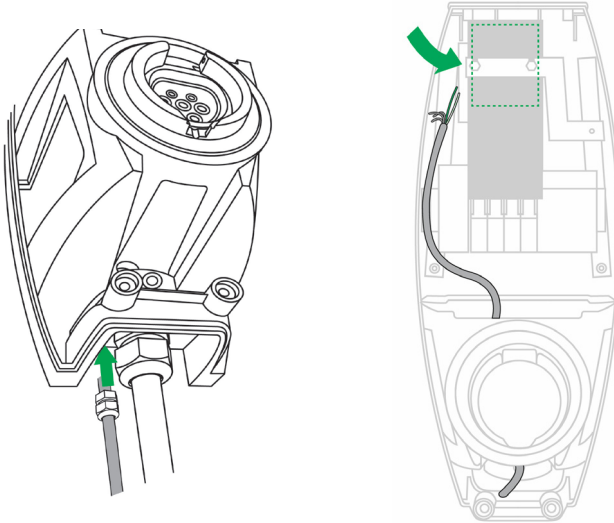
③ Connect the network cable to the modem board PCB using the gray 2-pole Phoenix plug (supplied):

- Green > RS485 pin A
- Green/White > RS485 pin B

HomeLine

1 In the charging station, remove two hex-bolts then move the controller and modem PCB up out of the support.

2 Find the RS485 connection on the modem board PCB.
The figures below will help you find the connection.

3 Route the network cable into the charging station along the same route as the power cable.
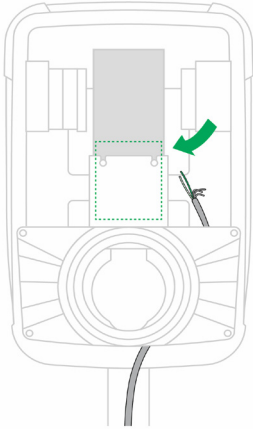
4 Connect the network cable to the modem board PCB using the gray 2-pole Phoenix plug (supplied):

- Green > RS485 pin A
- Green/White > RS485 pin B
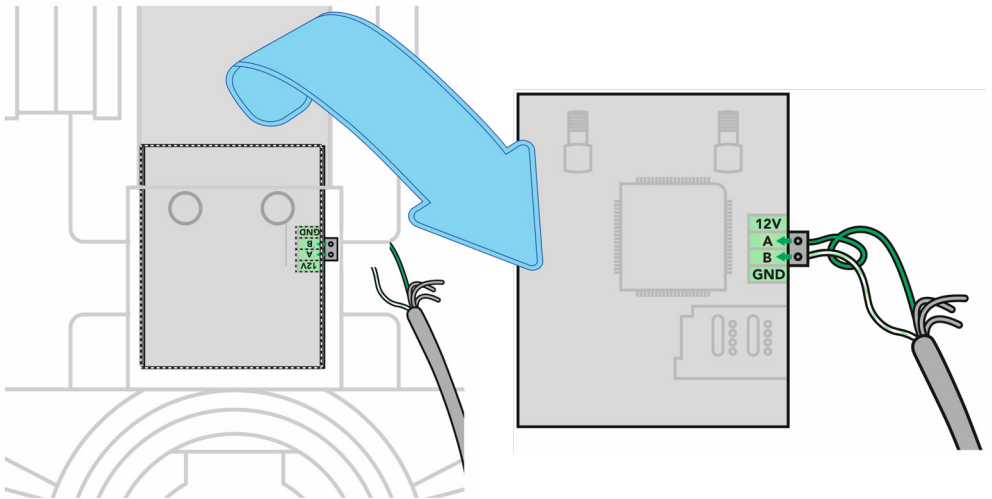
Elvi

Note: This is only applicable for Elvi model from Q4 2019 onwards.

1. In the charging station, find the RS485 connector blocks on the DIN rail. The figures below will help you find the connection.

2. Route the network cable into the charging station along the same route and using the same cable gland as the power cable. Cut an additional hole in the cable gland for the network cable.
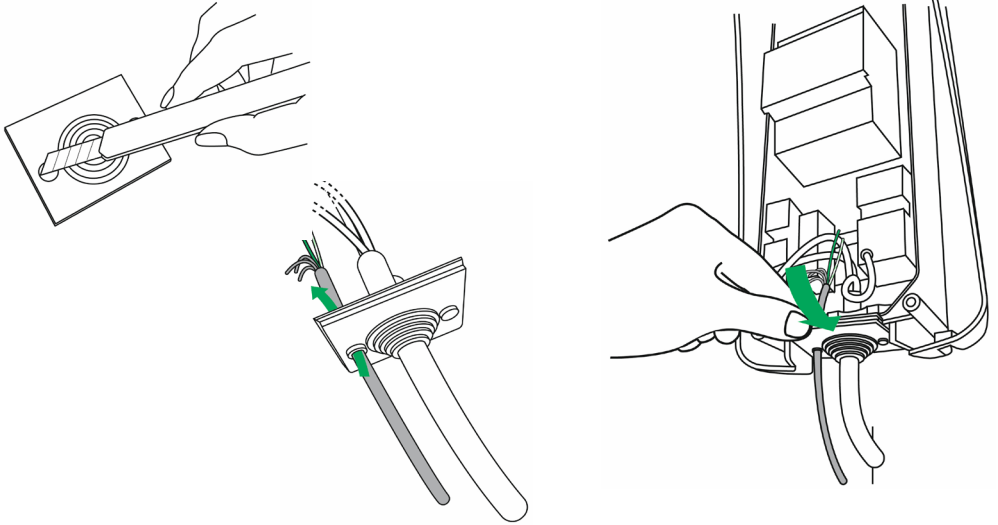
3. Connect the network cable to the RS485 connector blocks on the DIN rail:

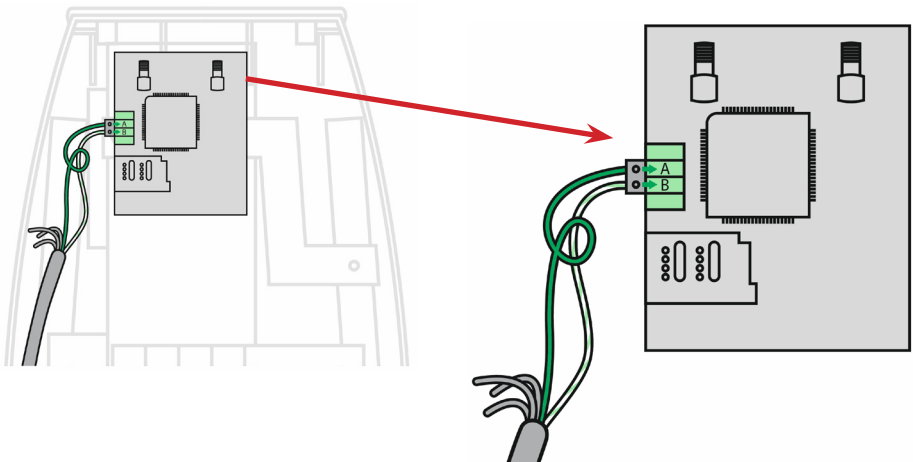   - Green > Connector block 3
   - Green/White > Connector block 4
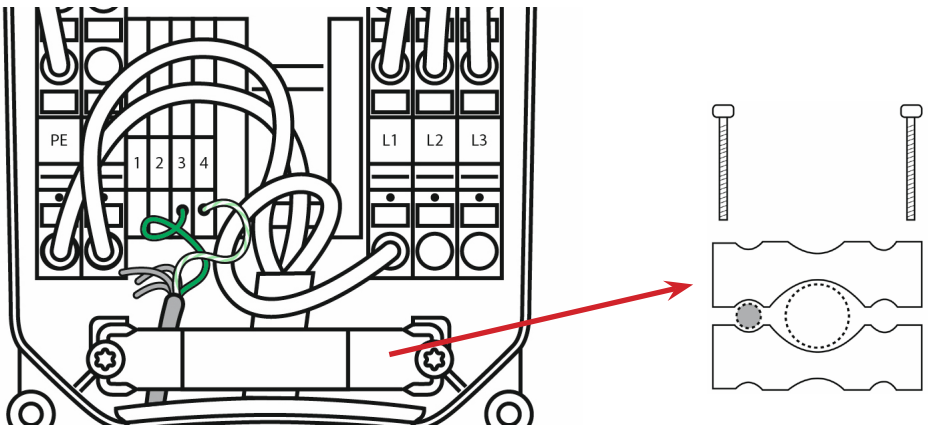
BusinessLine G3

1 In the charging station, find the RS485 connection on the modem board PCB.
The figures below will help you find the connection.

2 Route the network cable into the charging station along the same route as the power cable.
When the cable enters the base of the station, drill a hole and use a cable gland.
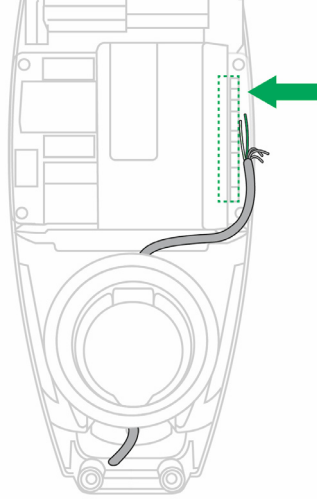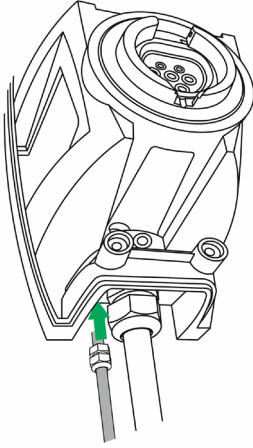
3 Connect the network cable to the controller gray RS485 connector using the gray 2-pole Phoenix plug (supplied):

- Green > RS485 pin A
- Green/White > RS485 pin B

RS485 { B
        A
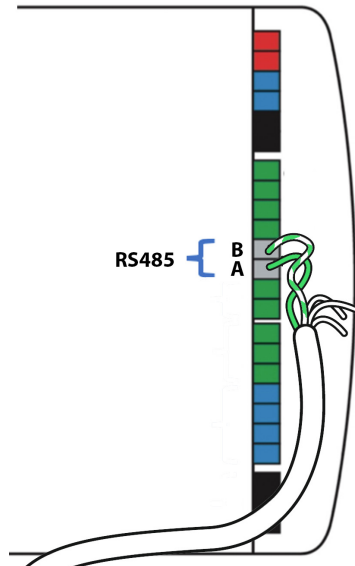
5.8 Check physical installation

> ⚠️ WARNING: Make sure that it is safe to supply power. All wiring connections must be completed and the the cover must be on the charging station and secured.

1. Supply power to the installation.

2. Use a digital multimeter to determine which phase powers the different loads in the electrical system. Please note that the colour code inside the fuse box and/or the phase numbering may be incorrect.

   Note: 0 volt is measured when both loads are on the same phase.

6. Cloud connectivity

During start-up, the EVBox Smart Charging Wi-Fi Connect or Genius will check the internet connectivity used.

Option A – Connection through Ethernet: The internet connection is established automatically. The LED on the Wi-Fi Connect or Genius shows a steady green when ready.

Option B – Connection using Wi-Fi:
• The Wi-Fi Connect or Genius opens its hotspot allowing the configuration of the Wi-Fi network and password.
• The Wi-Fi Connect or Genius LED shows yellow when the hotspot can be selected in the list of available Wi-Fi networks on your smartphone.
  Note: It can take few minutes before the hotspot is open.
• Make sure your mobile data (3G/4G) is switched OFF on your smartphone before proceeding.
• For more details about the Wi-Fi properties, refer to Addendum 2.

💡	Resetting the Wi-Fi For connecting the Wi-Fi Connect or Genius to another Wi-Fi network or for changing the authentication password, select in the Smappee Energy Monitor app Settings > Your Smappee Monitors > Smart Charging > Infinity components > Smappee Wi-Fi Connect or Genius > Change your Wi-Fi settings and follow the steps in the app.
	Genius reset button: Press using a small pin. Reset button
	Wi-Fi Connect reset button: Press using a small pin.
	Factory reset Perform a factory reset when you re-install a Smart Charging monitor at another location or when you need to start with the factory settings. Press the reset button of the Wi-Fi Connect or Genius with a small pin until the LED shows blue (approximately 20 seconds). During this process, the Wi-Fi Connect or Genius LED first shows purple, then yellow, then no colour, and finally blue.
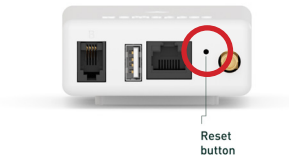
7. Configuration

EVBox Smart Charging is configured using the Smappee Energy Monitor app. This app can be used from the installer's or user's smartphone or tablet.

When the Smart Charging has been configured, the user uses the Smappee Energy Monitor app to monitor their energy usage.

7.1 Download app and log-in

1 Download the Smappee Energy Monitor app onto your smartphone or tablet.

2 Log-in to the app with the user's username and password.

The username and password are on the Member card that is provided with the Smart Charging kit.

Note: The username and password are unique to the kit and cannot be used on a different installation.
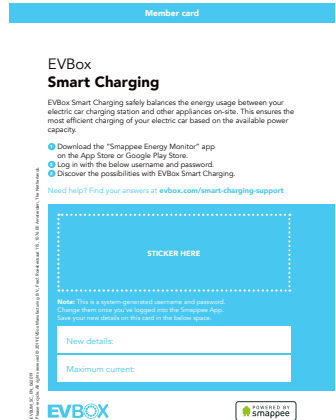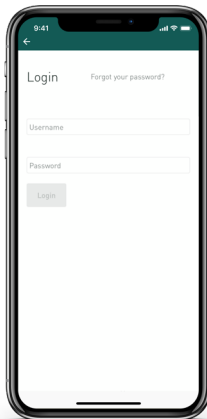
Note: It is recommended to change the name of the installation to the customer's preference (for example, 'My EV station').

7.2 Configure Smart Charging

1 In the app, select **Set up connection**.

Follow the instructions shown in the app. You will set-up the following features:

- Internet conectivity - set the Wi-Fi network to which EVBox Smart Charging must connect to.

- Overload protection - Enter the maximum current that the main circuit breaker can supply.
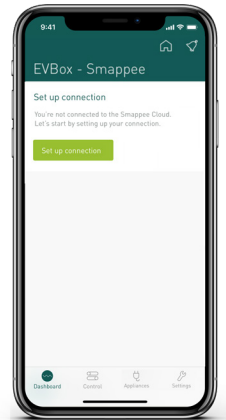
8. Validation

Once installation is complete and configured, validate the functions of EVBox Smart Charging.

You must check that all CTs are operational and measuring the correct power values for the loads. Incorrect line voltage and current mapping can cause incorrect power values measurment and inaccurate monitoring data, and incorrect functioning of the charging station.

To check the correct operation of EVBox Smart Charging, the system provides real-time values for all measured loads.

There are two options to visualize real-time values:

• The Smappee Energy Monitor app reports in real-time the active power values for each input.
• The Smappee Dashboard reports in real-time the active and reactive power, line and phase voltage, power factor, and current of each input. Log-in with the username and password on https://dashboard.smappee.net, then select **Live electricity values**.

1 Check the status LEDs on the Smart Charging devices (see Addendum 1).

2 Check the live submetering values, including for the charging station.
   a. Start charging the EV car or switch on an appliance with known power consumption and check that the value in the yellow circle increases by the rated consumption.
   b. Check the live submetering values at the bottom of the Dashboard screen
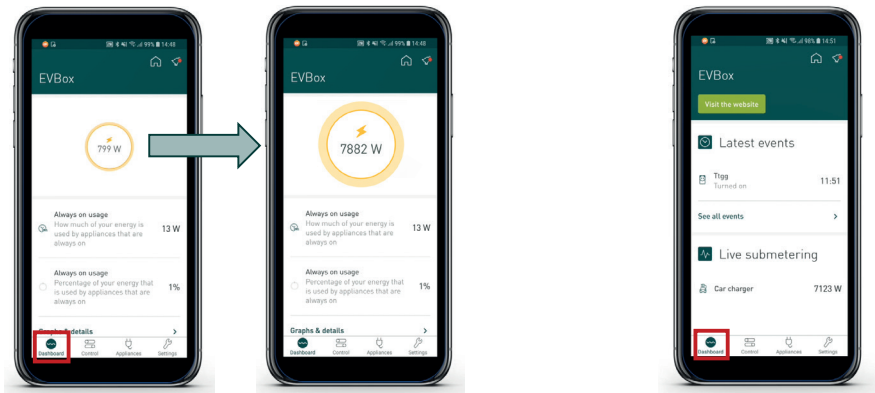
9. Finish

Finish the installation:

1. Write down the maximum current of the main circuit breaker on the Member Card.
2. Explain the customer where to change username and password:
   a. Go to **Settings**:
      - In **Profile**, change the user name and Email address.
      - In **Password**, change the password.
   b. Write new username and password on the Member Card.
3. Give the Member Card to the customer.
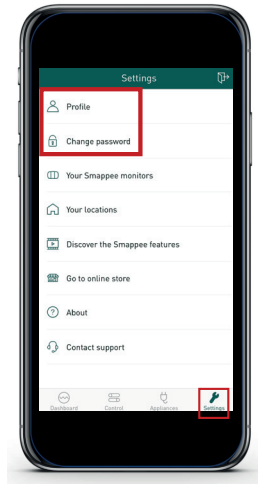
4. Check that the LED of the Wi-Fi Connect/Genius is 'green breathing', and that the live values are correct and visible in the app.
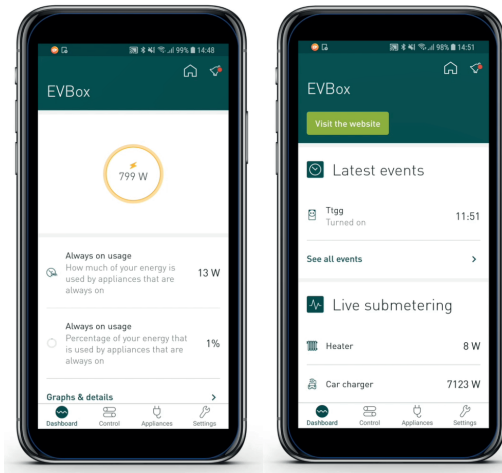
10. Troubleshooting

Problem	Possible cause	Possible resolution
EVBox Smart Charging does not switch on.	The power cable is connected incorrectly to the circuit breaker.	Verify that the power cable is connected according to the connection diagram.
	Circuit breaker is not switched on.	Switch on circuit breaker.
	RJ10 cable is not inserted in the correct port of the Power Box.	The RJ10 cable from the Wi-Fi Connect or Genius must connect to Power Box Port B.
	The power cable is not connected to the Power Box.	Connect the power cable to the Power Box.
One or more CT Hubs are not available in the mobile app.	RJ10 cables between CT Hubs are not connected properly.	Check that the CT bus is inserted in Port A of the Power Box and all CT Hubs are connected using RJ10 cables. Insert the bus termination plug in the open port of the last CT Hub.
		Check that all CT Hubs have a green flashing LED.
	EVBox Smart Charging is switched on before all CTs were connected.	Switch Smart Charging off, wait 30 seconds, then switch it on again.
No real-time measurements of the connected CTs.	CT is not connected properly to the CT Hub.	Check the connector of the CT into the CT Hub.
	CT is not closed correctly.	Close the CT correctly.
During installation the Smappee Energy Monitor app states that the serial number of the W-Fi Connect or Genius is invalid.	The Wi-Fi Connect or Genius has already been installed at another location.	Perform a factory reset. Keep the reset button of the Wi-Fi Connect or Genius pressed in for approximately 20 seconds until the LED shows blue. Restart the configuration procedure.

Problem	Possible cause	Possible resolution
The Genius LED flashes red.	The monitor had a working Internet connection and the connection was lost.	Restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in.
		For a Wi-Fi connection: If restarting does not solve the issue, press the reset button of the Wi-Fi Connect or Genius for approximately 10 seconds until the LED is yellow. In the Smappee Energy Monitor app select Settings – Your Smappee Monitors – Smart Charging – Infinity components – Smappee Genius - Change your Wi-Fi settings and follow the steps.
		For an Ethernet connection: If restarting does not solve the issue, check if the Ethernet cable provides a working internet connection. Plug in the Ethernet cable firmly in the Wi-Fi Connect or Genius.
The Genius LED is blue.	The Genius is starting.	Wait for 5 minutes.
	The Genius is unable to start.	Restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in, and waiting 5 minutes. If the problem persists, contact support.
The Genius LED flashes blue after startup with an Ethernet connection.	The Ethernet cable is not connected correctly.	Check the Ethernet cable connection and restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in.

Problem	Possible cause	Possible resolution
The Wi-Fi Connect or Genius LED is red after startup with an Ethernet connection.	The Ethernet cable is not connected correctly.	Check the Ethernet cable connection and restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in.
	Internet connection is down.	Check and solve the internet connection and restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in.
	A firewall blocks outgoing communication.	Check the firewall rules. For details, see Addendum 2
The Wi-Fi Connect or Genius LED flashes red after startup with an Ethernet connection.	The Internet connection was lost.	Check and solve the internet connection error, then restart the Wi-Fi Connect or Genius by unplugging the RJ10 cable and plugging it back in.
CT Hub is not recognised during installation.	The Bus cable A (RJ10 cables between CT Hubs) is not connected correctly.	Check that all required RJ10 cables are connected and the bus termination plug is plugged in the free port of the last CT Hub. Each CT LED flashes once every three seconds on input A when the connection is operational.
	When the Power Box LED is flashing once per second, there is a communication error between the CT Hubs and the Power Box.	Check that the CT Hubs are connected to port A of the Power Box and the Genius to port B. Carry out a restart.
		Check if the CT Hub LED on input A is flashing. If not, remove and exchange the CT Hub and carry out a restart.
		If a custom RJ10 cable is used, check the operation of the RJ10 cable and review the Bus cable specification in Chapter 11.

Problem	Possible cause	Possible resolution
The main feed measurement values are incorrect.	Power Connectors L1, L2, L3 do not correspond with the current phases (phase-mapping).	Use a multimeter to check that the voltage L1, L2, L3 corresponds with the Load Configuration of the Grid (phase setting). See the tips in Chapter "Validation".
The Smappee Smart Energy Monitor app values are 0 (zero).	CTs are not connected or incorrectly connected.	Check all CT connections.
The Smappee Smart Energy Monitor app values are negative.	CTs connections are swapped.	Make sure all CTs have correct wire connections.
		Solar panels are installed but not configured in the app.

11. Bus cable specification

Custom RJ10 cables can be used for installations.
Please note the following specifications and limitations:

- A cable containing 2 unshielded twisted pairs.
- Straight connection: pin 1 to 1, etc.
- Unshielded.
- Pins 1 & 4 Pins 2 & 3 must be twisted pairs.
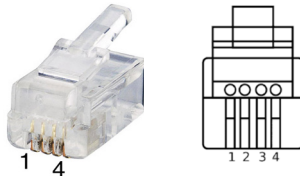
- Characteristic impedance of 100 ohms.
- AWM style 2835: 60° / 30V – 24 AWG.
- The maximum length of each bus is 100 m (109 yards):
    - The total length of the CT Hub bus must be no more than 100 m (109 yards).
    - The length of the Genius-Power Box bus is also no more than 100 m (109 yards).
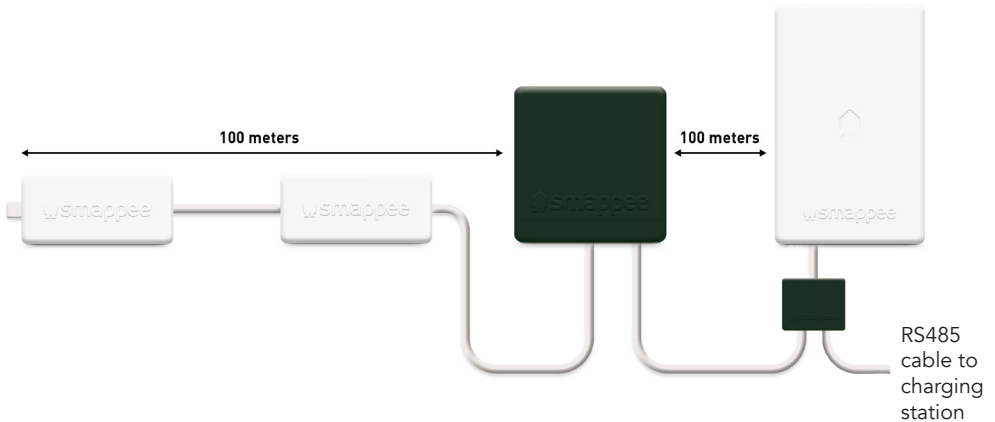
Note: The bus termination plug must be plugged into the output socket of the last CT Hub.

Addendum 1 / Color code explanation

Wi-Fi Connect or Genius

🟩	**Green breathing**	The Wi-Fi Connect or Genius works correctly.
🟦	**Blue steady**	The Wi-Fi Connect or Genius is starting. This may take up to 5 minutes. The LED may briefly go off during that time.
🟩	**Green steady**	Network connection is successful, but the Wi-Fi Connect or Genius is not yet activated on a location. Ethernet: Connected to the local network. Wi-Fi: Connected to Wi-Fi and local network (Wi-Fi password is correct). 3G/4G Dongle: Connected to the 3G/4G network.
🟦	**Blue flashing**	The Wi-Fi Connect or Genius is ready to be connected to the local Wi-Fi network.
🟥	**Red steady**	The Wi-Fi Connect or Genius has no connection to the internet during startup. Connection issue.
🟥	**Red flashing**	The Wi-Fi Connect or Genius had a working internet connection but has lost its connection to the Smappee cloud.
🟨	**Yellow steady**	The Wi-Fi hotspot access point has been activated to allow the Wi-Fi Connect or Genius to reconfigure the Wi-Fi settings.
🟨	**Yellow flashing**	Smappee is trying to open a Wi-Fi hotspot access point. Wait a few seconds and the LED will become a steady yellow.

CT Hub

LED at input A, B, C or D. **3 flashes per second, on any of the inputs A, B, C, D.**	Indication of the selected CT input during CT configuration.
LED at input A. **Short flash per 3 seconds.**	CT Hub is switched on.
LED at input A. **One flash per second.**	Communication error.
LED at input A. **Two flashes per second.**	Configuration problem.

Power Box

LED between port A and B one flash per 5 seconds.	Power Box is powered on and operating correctly.
LED between port A and B one flash per second.	Smappee Bus A error.

Addendum 2 / Wi-Fi connection properties and firewall rules

Wi-Fi connection properties

- 2.4 GHz Wi-Fi only, preferably with automatic channel selection.
- Networks without DHCP server are not supported.
- WPA or WPA2 encryption mandatory.
- Networks without security are not supported.
- SSID must be visible and should not be hidden during installation. SSID must NOT contain the following characters: é ç è ä /\ " à î ô ï.
- Allowed special characters for the Wi-Fi password: # $ % @ ? / \ .
- MAC filtering must not be active on the router.
- Your firewall must allow outbound secure HTTP connections.
- The maximum number of characters for the WPA2/PSK is 20.

> 💡 The DHCP service of your router assigns the IP address of your Smart Charging.

Firewall rules

If you use a firewall, you must apply the following firewall rules to allow traffic from and to the Smart Charging:

- Inbound rules: any IP - disabled, any port - disabled.
- Outbound rules: any IP - allowed, any port - allowed.

Addendum 3 / Components overview

Kits

Description	Article number
Smart Charging 1p, 50A	SMARTC-1P50A
Smart Charging 3p, 50A	SMARTC-3P50A
Smart Charging+ 1p, 50A	SMARTCPLUS-1P50A
Smart Charging+ 3p, 50A	SMARTCPLUS-3P50A

💡 You can also use a custom RJ10 cable. See the Bus cable specification in Chapter 11.

Spare parts

Description	Article number
Smart Charging Genius	SMARTC-GENIUS
Smart Charging Wi-Fi Connect	SMARTC-WCONNECT
Smart Charging Power Box	SMARTC-PBOX
Smart Charging CT Hub	SMARTC-CTHUB
Smart Charging CT 50A	SMARTC-CT50A
Smart Charging CT 50A short	SMARTC-CT-S-50A
Smart Charging CT 100A	SMARTC-CT100A
Smart Charging CT 200A	SMARTC-CT200A
Smart Charging CT 400A	SMARTC-CT400A
Smart Charging CT 1000A Rogowski Coil	SMARTC-CT1000A-RC
Smart Charging Solid Core CT	SMARTC-CTSC
Smart charging 3 Phase CT kit, 50A	SMARTC-3PCT50A

💡 If you need to measure higher current values, please contact your local distributor for more information or contact us at evbox.com/support.

EVBox Smart Charging
CT Hub

CT inputs
Current Transformers

Smappee Bus A
connector

- Measure currents ranging from 0 A to 1000 A
- Daisy-chain up to 9 Solid Core 3-Phase CTs or combine with CT Hubs to measure up to 28 inputs and up to a distance of 100 meters (109 yards)
- Connect CTs and Rogowski coils to the CT Hubs

The CT Hub is the main component of the Smart Charging monitoring system. You can connect up to 4 Current Transformers (CTs) or Rogowski coils to a CT Hub to measure different currents, ranging from 0 A to 1000 A. This allows for accurate submetering of (a group of) appliances. Daisy chain several CT Hubs to measure different installations up to a distance of 100 meters (109 yards).

Dimensions:
70 × 31 × 23 mm (2.75 x 1.22 x 0.90 inches)
Weight:
29 g (1.02 oz)
Working temperature:
-10 °C to 70 °C (14 °F to 158 °F)
Storage temperature:
-20 °C to 90 °C (-4 °F to 194 °F)
Relative humidity:
0 % - 95 % non-condensing
Operating altitude:
0 – 2,000 m (0 – 6,562 feet)
EMC:
IEC-61326-1, FCC 47 part 15
Safety:
IEC61010-1:2010/COR1:2011

IP rating (IEC 60529):
IP X0
Impact rating (IEC 62262):
IK 06 (Impact Energy: 1J)
Intended environment conditions:
Pollution degree 2
Overvoltage conditions:
Overvoltage category II
Connectivity:
– 	Smappee Bus A
– 	4 inputs for split core CTs (50 A, 100 A, 200 A, 400 A, 800 A) and Rogowski coils (400 A, 1000 A)
– 	More than 1000 A (Contact EVBox)
Included accessories:
Smappee Bus cable 40 cm (15.75 inches)

EVBox Smart Charging
Power Box

Voltage terminal
Voltage reference
connector

Port A   **Port B**

- Works with almost any electricity network worldwide
- Energy metering functionalities
- Measure up to 28 loads
- Provides power to the entire system

The Power Box is the compact and robust heart of the EVBox Smart Charging monitoring system as it provides power to all components. It's compatible with almost any electricity network worldwide and is DIN-rail mountable. It offers energy metering functionalities such as measurement of the current, the line voltages, phase voltages, active and reactive energy. The Power Box is the interface for CT Hubs via the Smappee Bus A. In combination with the CT Hub, the Power Box can measure up to 28 loads. The measured data is transferred via ModBus-485 (Smappee Bus B).

Dimensions:
55 × 55 × 26.6 mm
(2.17 x 2.17 x 1.05 inches)
Weight:
44 g (1.55 oz)
Working temperature:
-10 °C to 50 °C (14 °F to 122 °F)
(Higher working temperatures possible depending on connected loads)
Storage temperature:
-20 °C to 90 °C (-4 °F to 194 °F)
Relative humidity:
0% - 95% non-condensing
Operating altitude:
0 – 2,000 m (0 to 6,562 feet)
EMC:
IEC-61326-1, FCC 47 part 15
Safety:
IEC61010-1:2010/COR1:2011
Impact rating (IEC 62262):
IK 06 (Impact Energy: 1J)

IP rating (IEC 60529):
IP X0
Power supply input:
90 – 264 V AC
Power consumption:
8 W max
Voltage measurement inputs:
L1, L2, L3, N Topology and maximum nominal ranges:
–   Single phase - ~ : 240 Vrms
–   Split phase: 120/240 Vrms
–   3 phase (3 wires) - 3~ : 240 Vrms
–   3 phase (4 wires) – 3~: 240/415 Vrms
Frequency:
50/60 Hz
Intended environment conditions:
Pollution degree 2
Overvoltage conditions:
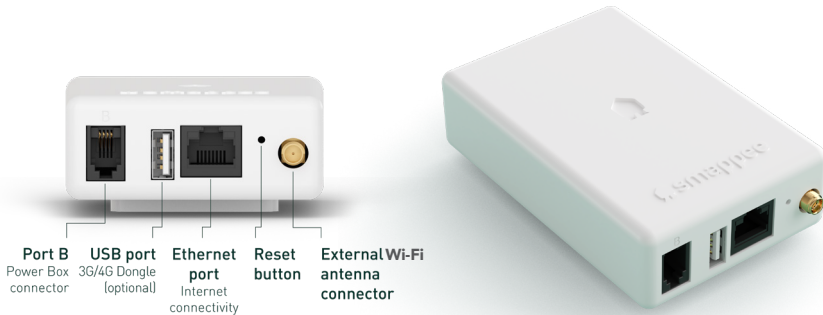overvoltage category II

Connectivity:
–   Smappee Bus A
–   Smappee Bus B
Accessories included:
–   DIN mounting plate
–   Power cable 90 cm open-ended (35.43 inches)
–   Bus termination plug

EVBox Smart Charging
Genius

Port B **USB port** **Ethernet** **Reset** **External Wi-Fi**
Power Box 3G/4G Dongle port button antenna
connector (optional) Internet connector
connectivity

- Gateway between monitoring system and Smappee cloud
- High-end HEMS/BEMS allowing dynamic load balancing and smart control
- Compatible with various communication protocols
- Future-proof thanks to over-the-air updates
- Connectivity via Ethernet, Wi-Fi or 3G/4G (optional)

The Genius is the gateway between the monitoring system and the Smappee cloud, ensuring secure data storage from different components via Ethernet, Wi-Fi, or 3G/4G (optional). In case of network outage, it will store the data for two days. It communicates and interacts with third party components, Smappee Gas & Water and Smappee Switch. Thanks to these various options, the Genius allows EVBox Smart Charging to take on the role of a Home or Building Energy Management System (HEMS or BEMS) and guarantee optimised self-consumption.

Dimensions:
108 × 69 × 25 mm (4.25 x 2.72 x 0.98 inches)
Weight:
119 g (4.20 oz)
Working temperature:
-10 °C to 60 °C (14 °F to 140 °F)
Storage temperature:
-20 °C to 90 °C (-4 °F to 194 °F)
Relative humidity:
0 % - 95 % non-condensing
Operating altitude:
0 – 2,000 m (0 to 6,562 feet)
EMC:
IEC-61326-1, FCC 47 part 15
Safety:
IEC-60950-1
IP rating (IEC 60529):
IP X0
Intended environment conditions:
Pollution degree 2

Overvoltage conditions:
Overvoltage category II
Connectivity:
–   Ethernet 100BASE-T
–   Wi-Fi 2.4 GHz
–   2G/3G/4G (optional USB Dongle)
–   RF433MHz/915 MHz
–   Smappee Bus B
Accessories included:
–   Wall mounting plate
–   Smappee Bus cable 150 cm (59 inches)

EVBox Smart Charging
Wi-Fi Connect

Port B   Port B

- Gateway between monitoring system and cloud via Wi-Fi
- Future-proof thanks to over-the-air updates
- Cost-effective alternative to the Genius
- Ensures secured data storage from components
- 1-day data storage in case of network outage

The Wi-Fi Connect is, similar to the Genius, the gateway between the monitoring system and the cloud (Smappee or other), ensuring secure data storage from different components. Data is transferred via Wi-Fi. In the event of a network outage, data will be stored for one day. It offers load-balancing for EV charging stations but does not offer smart control functionalities for addition appliances. The Wi-Fi Connect is a cost-efficient way to add intelligence to the Smart Charging setup.

Dimensions:
55 mm x 55 mm x 26.6 mm
(2.17 x 2.17 x 1.05 inches)
Weight:
45 g (1.59 oz)
Working temperature:
-10 °C to 60 °C (14 °F to 140 °F)
Storage temperature:
-20 °C to 90 °C (-4 °F to 194 °F)
Relative humidity:
0 % - 95 % non-condensing
Operating altitude:
< 2,000 m (0 to 6,562 feet)
EMC:
IEC-61326-1, FCC 47 part 15

Safety:
IEC-60950-1
IP rating (IEC 62262):
IP X0
Intended environment conditions:
Pollution degree 2
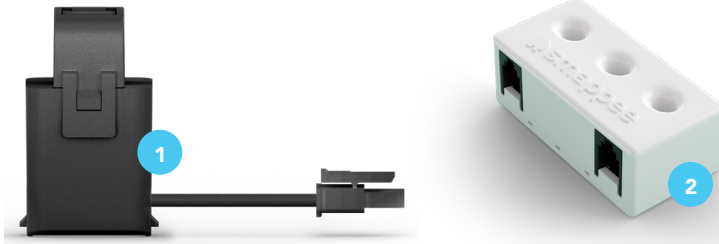**Overvoltage conditions:**
Overvoltage category II
Connectivity:
Wi-Fi 2.4 GHz
Accessories included:
–   Wall mounting plate
–   Smappee Bus cable 150 cm (59 inches)

EVBox Smart Charging
Current Transformer (CT)

A wide array of Split Core CTs that are compatible with the CT Hub are available. In addition, a Solid Core 3-Phase CT is also available.

① Split Core CTs

Type	Article number	L × W × H (mm)	L × W × H (inches)	Max. wire diameter	Cable length	Color
50 A	SMARTC-CT50A	25.5 × 40.5 × 26	1 × 1.59 × 1.02	10 mm / 0.39 inches	150 cm / 59.05 inches	Black
50 A	SMARTC-CT-S-50A	25.5 × 40.5 × 26	1 × 1.59 × 1.02	10 mm / 0.39 inches	30 cm / 11.81 inches	White
100 A	SMARTC-CT100A	32 × 44.5 × 31	1.26 × 1.75 × 1.22	16 mm / 0.63 inches	180 cm / 70.87 inches	Black
200 A	SMARTC-CT200A	50.5 × 66.5 × 41	1.99 × 2.62 × 1.61	24 mm / 0.94 inches	150 cm / 59.05 inches	Black
400 A	SMARTC-CT400A	--	--	--	--	--

② Solid Core 3-Phase CT 50 A

- Typically used for 3-phase measurements.
- Accuracy class 0.2%.
- Daisy-chain up to 9 Solid Core 3-Phase CTs or combine with CT Hubs to measure up to 28 inputs and up to a distance of 100 meters (109 yards).
- Small, compact.
- Cost-effective alternative to the CT Hub with CTs.

Input current:
3 × 50 A
Dimensions:
59 × 35 × 23 mm
(2.32 × 1.38 × 0.91 inches)
Weight:
45 g (1.59 oz)
Working temperature:
-10 °C to 70 °C (14 °F to 158 °F)

Storage temperature:
-20 °C to 90 °C (-4 °F to 194 °F)
Relative humidity:
0 % - 95 % non-condensing
EMC:
IEC-61326-1, FCC 47 part 15
Connectivity:
Smappee Bus A
Included accessories:
Smappee Bus cable 40 cm
(15.75 inches)

12. Warranty

12.1 EVBox warrants to Customer on delivery and for a period of three (3) years thereafter that the Products are free from material defects in material and workmanship and conform in all material aspects with the specifications as explicitly listed in the Documentation, except for charging cables, their connectors and software, for which the warranty is limited to three (3) months from delivery. Except as stated in this clause 12.1, EVBox provides no warranties of any kind in respect of the Products.

12.2 Subject to clause 12.3, EVBox shall, at its option, repair or replace defective Products, or refund the price of defective Products if:
(a) Customer gives notice in writing during the warranty period within a period of fourteen (14) days after the Customer has discovered or should reasonably have discovered that some or all of the Products do not comply with the warranty as set out in clause 12.1;
(b) Customer returns such Products to EVBox (at the location specified by EVBox) at Customer's cost and following the RMA (return merchandise authorization) instructions from EVBox, if the nature of the Product allows such return; and
(c) EVBox is given a reasonable opportunity of examining such Products and provided by Customer with all information it may reasonably require to proceed to such examination. With respect to repair, EVBox is entitled to apply problem-avoiding restrictions and/or Workarounds.

12.3 EVBox shall not be liable for the Products' failure to comply with the warranty in clause 12.1 if:
(a) Customer makes any further use of such Products after giving a notice in accordance with or failed to provide notification within fourteen (14) days as set out in clause 12.2;
(b) The Error arises because Customer failed to follow EVBox's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Products or (if there are none) good trade practice (such as but not limited to use of the Products with parts, accessories or software not provided or approved by EVBox);
(c) The Error arises as a result of EVBox following any customisation or Product specification supplied by Customer;
(d) Repairs or other interventions on the Products are performed by persons not trained for this purpose, against EVBox's oral or written instructions, or with parts not supplied or approved by EVBox; or
(e) The Error arises as a result of fair wear and tear, wilful damage or negligence by Customer and/or a third party, or abnormal working conditions (such as but not limited to damages resulting from vandalism, animals, high-pressure cleaners, or Error in connected vehicles).

12.4 In all cases, the following are excluded from the coverage of the warranty:
(a) Travel costs and labour costs of repair, including time spent on preliminary work or on disassembly and reassembly, if the repair of the Products is to take place at the installation site due to the nature of the Products;
(b) Cleaning, routine maintenance and preventative maintenance operations of the Products as defined in the Documentation, as well as the supply of products necessary for these operations;
(c) Restarting operations after the Product has been secured, for example by circuit breakers, ground fault circuit interrupters (GFCIs), fuses or emergency stops; and
(d) In general, all operations on site, especially if no parts need to be replaced.

12.5 The Agreement shall apply to any repaired or replacement Products supplied by EVBox.

This warranty statement is subject to change.
Please refer to **evbox.com/general-terms-conditions** for the latest version.

I'm all set!
Let's charge.

EVBOX