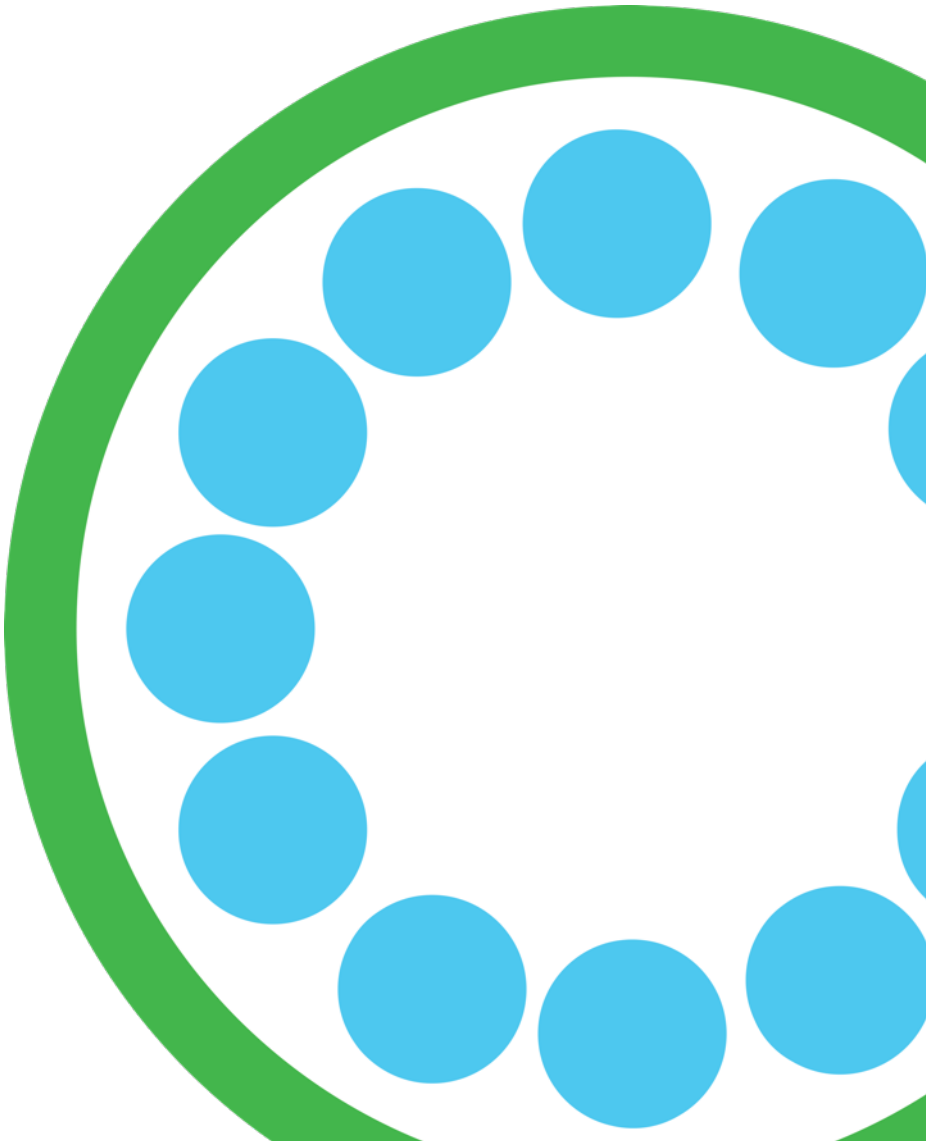
Installation Manual

EV-Box Charging Station

BusinessLine Model



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1. Safety regulations

WARNING: RISK OF ELECTRIC SHOCK.

- Please read the documentation provided with the charging station to acquaint yourself with the safety instructions and directions before installing or using the charging station.
- The charging station is designed and tested in accordance with international standards.
- Use this charging station for charging all mode 3 compatible electric vehicles only. Refer to your vehicle owner's manual to determine if your vehicle is suitable.
- This charging station must be used exclusively for the purpose intended.
- Do not operate the charging station if it or the charging cable is physically cracked, frayed, other otherwise visibly damaged. Please consult the stations owner and/or an electrician right away.
- This charging station contains no user serviceable parts. Please consult EV-Box or a certified electrician for more information. Do not attempt to service the charging station yourself.
- These directions for use are valid for different models of the charging station. It is possible that a number of features are described that are not applicable to your charging station.
- This charging station may only be installed, maintained and repaired by qualified personnel. Incompetent installation or repairs may result in danger to the user.
- Do not install a faulty charging station.
- For instructions on installation, see Chapter 4.
- The charging station is used in combination with a power source. Always switch off the power supply before carrying out maintenance. The charging station contains no internal components that can be maintained by the user. The "0n"/ "Off" and "green" position of the charging station's main switch does not guarantee that the system is disconnected from the power source and does not safeguard against the voltage applied.
- Do not switch on the charging station if the covers are not in place.
- Ensure that the equipment is used under the correct operating conditions.
- Do not use explosive or readily flammable substances in the vicinity of the charging station.
- Persons unable to assess the dangers should not use the charging station.
- Do not direct powerful jets of water onto the charging station, and never operate with wet hands.
- Ensure that the charging cable is **not kinked or jammed**!
- Make sure the charge cable is positioned so it will not be stepped on, driven over, tripped over, or otherwise subjected to damage or stress.
- Ensure that the charging cable cannot come into contact with heat sources.
- Always pull on the plug's hand grip, and never on the cable.
- **While charging the charging cable must be completely unwound and connected to the vehicle without overlapping loops!** This is to avoid the risk of the charging cable overheating.
- In the event of danger and/or accidents, have the charging station disconnected immediately by a competent person (electrician).
- Please carefully read our instructions and the vehicle instructions in your owner's handbook before charging your electric vehicle.

Transport and storage

Ensure that the main power source has been disconnected when storing or transporting the charging station.

No liability can be accepted for damage during transport if the charging station is transported in anything other than the original packaging.

Store the charging station in a dry environment. The storage temperature must be between –25°C and +60°C.

2. Product description

Figure 1: BusinessLine

General
The EV-Box charging station (Figure 1) is compatible with all mode 3 electric vehicles. The charging station is meant for both indoor and outdoor use. Usage of the charging station is allowed in an ambient temperature between -25°C and +60°C. The charging station is connected to a central system for registration of the kWh charged.

Online – Model with modem
The smart charging station is designed with a RFID card reader, a Kilowatt hour meter and a GSM/GPS/GPRS modem. These components together provide for the authorization and communication of the charging session procedure with the central system (BackOffice) for processing and settlement of the transactions as required. **A GSM link with the charging station is essential for the charging station to work properly.** However, a good link cannot always be obtained in enclosed spaces, for instance a closed or underground car park. In cases like this, the modem should be positioned outside the charging station along with the GSM/GPS antenna and connected to the charging station. See Chapter 5.

Safety
There's no power on the socket of the charging station as long as no plug is inserted and it has not been started up by the RFID card. In the models with BXXXX-X**1**00 there is a circuit breaker and a residual current device (type A - 40A-30mA) for each socket. A type B residual current device is available as an option (Table 7, Technical specifications). Models with BXXXX-X**0**01 do not have residual current devices or circuit breakers. All models feature a circuit breaker (C6A) for the control circuit.

Mode 3 Controller
The Type 2 socket is connected to the Mode 3 Controller and locking module in accordance with IEC-61851. This means that the charging station is constantly checking for the presence of a ground connection. In addition, the current is only switched on once a supported charging cable has been correctly connected to both the charging station and the vehicle and the presented RFID card is authorized.

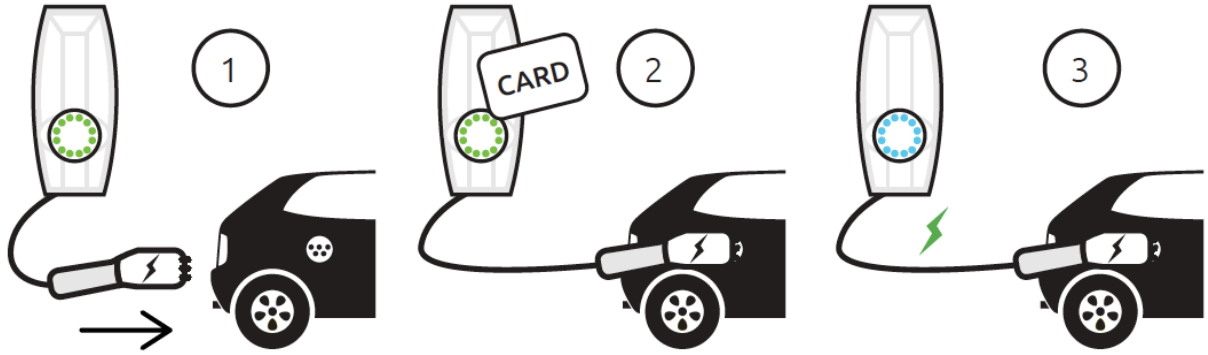
Operation
A charging session may be started by holding an authorized RFID card (Mifare Classic, 13.56Mhz) against the front of the charging station at the round surface showing a hand with a RFID card (Figure 1). If the charging station is not connected to a vehicle and/or is not activated by the RFID card, there is no voltage on the socket.

Warranty
EV-Box warranties its equipment and software against errors and defects in materials and workmanship for twenty-four (24) months from the date of delivery, during which time it will use its best efforts to repair the errors, if any. However, any such problems encountered out of any causes that are not attributable to EV-Box, shall be for customer's risk and account.

3. Control

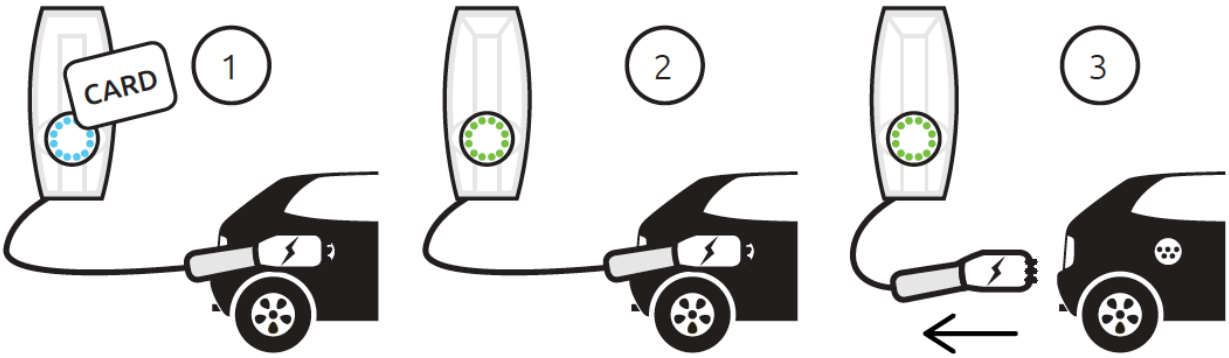
Charging stations with RFID reader

Start charging



1. Use your charging cable to connect the EV-Box station to your vehicle.
2. Present your charging card (RFID Card) to the card reader.
   The charging station will react with a tone. This indicates your card is being validated. It's possible that the LED ring will flash yellow for a couple of seconds.
3. The transaction will start automatically (LED ring is Blue).

Stop charging:



1. Present your charging card (RFID Card) to the card reader.
2. The charging session stops (LED ring will be GREEN or Off)
3. Unplug the charge cable from the EV-Box and your vehicle.

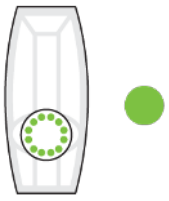
Charging Stations without RFID charging card / modem

For charging stations that don't operate with a RFID card, there will be either a key switch (or pushbutton) or with an AUTO-START. With the key switch you turn the key or push the start button to start or stop the transaction. For AUTO-START just plug the charging cable into the vehicle and the charging station to start the transaction. Unplug the charging cable from the vehicle to stop the transaction.

LED ring indicator

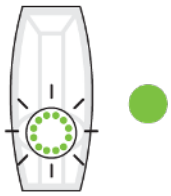
The socket is surrounded by an LED ring. It shows the status of the charging station, so that you can see which mode the charging station is in (see Chapter 8). A blinking yellow LED-ring (once every second) indicates a paused charging session. This is only possible in a Hub-Satellite configuration (see chapter 6). Charging automatically resumes when power becomes available. For charging stations that don't operate with a RFID card the Led ring is off in stand-by mode. For RFID card operated charging stations the LED ring is green in stand-by mode.

Green or OFF



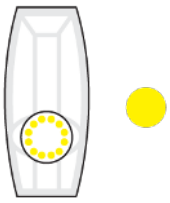
Stand-by or ready for use

Flashing GREEN



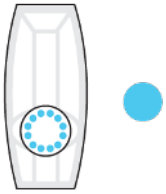
Your charging card is being verified

YELLOW



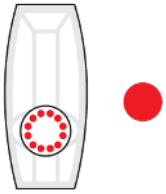
Awaiting communication from your vehicle or vehicle is fully charged

BLUE



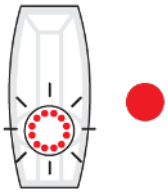
Charging

RED



Faulted, please contact the service desk

Flashing RED



Your charging card is not authorized to start a session

Note for installers

Once the installation has been done, the LED ring indications can be tested with an appropriate test equipment or with a service card. These are available as an option.

4. Installation

Safety requirements

⚠ Connecting and installing the charging station must be done by a qualified technician. The owner or user is responsible for the installation, operation and maintenance of the charging station, whereby both the law regarding the safety of persons, animals and property must be observed, as well as the installation instructions in force in the country of use.

⚠ Read the installation instructions before you start work on the installation.

⚠ The charging station complies with Safety Class I (the charging station is supplied with a ground terminal for safety) and voltage Category III.

⚠ The incoming and/or outgoing terminals for the alternating current are fitted with an uninterruptible grounding for safety. If it is plausible that the ground safety has been damaged, the charging station must be taken out of operation and secured against being activated accidentally.

⚠ Ensure the correct supply voltage/power and ensure that the meter cabinet is made properly safe.

⚠ Each charging station should be protected by a residual current device Type A (>30mA/AC). The residual current device must switch off all the phases connected and the "N". A residual current device Type B with direct current fault detection >6mA/DC is necessary for certain electric vehicles. See the vehicle's owner's manual. The applied RCB must comply with local law and regulations.

⚠ Never replace a safety component by one of another type.

- All components were correctly connected and operationally tested before dispatch of the charging station.
- Before switching on the charging station check that the power source available corresponds to the configuration settings of the charging station as described in the manual and that all the cables in the charging station have been properly connected.
- Ensure that the equipment is used under the correct operating conditions.
- Never operate the charging station in wet or very dusty surroundings.
- Ensure that there is always adequate free space (at least 20cm) around the charging station for ventilation purposes.

Location

Position the charging station, where possible, in surroundings not subject to extreme sunlight and where damage from outside cannot occur. The charging station can be installed on a stainless steel pole, which can be ordered with the charging station, whereby the supply cable

enters through the bottom of the pole. The other option is to mount it onto a sturdy wall between 90cm and 120cm from ground level. The supply line is fed through a cable gland at the lower side of the aluminium base plate or the hole on the back side of the base plate. The wall must be able to bear a load of 40kg.

Power supply cable
The charging station is furnished with one or two 16A or 32A sockets, depending on the type. Some charging stations with two sockets are equipped with an internal safety. These charging stations must be connected with ONE power supply cable fitted with a properly dimensioned circuit breaker (type c) in the meter cabinet

For charging stations without internal security each socket must be fitted with its own power supply cable, each fitted a properly dimensioned RCB taking in account de-rating according to IEC61439-2. The appropriate wire gauge of the supply cable depends on the power rating and the distance between meter cabinet and charging station. The voltage drop must not exceed 5%, it is advisable to take into account a maximum allowable voltage drop of 3%. The maximum wire gauge that can be fitted is 10mm^2.

Wall mounting
Mount the charging station on a flat surface with the bottom of the charging station between 70cm and 110cm above ground level. At least 20cm of free space around the station must be available for ventilation purposes. The wall must be able to bear a load of 40kg. The power supply cable can be inserted either through the bottom gland of the charging station or through the hole on the back side of the base plate . For charging stations equipped with an attached charging cable the power supply cable must be inserted via the hole on the back side of the base plate.

Pole mounting
Our charging stations can be mounted on a pole in the ground.
To this end EV-Box offers its' CombiPole (art. no. 290150 – Figure 2). Our double BusinessLine stations can be mounted directly on the CombiPole without additional provisions. Our single BusinessLine stations are to be attached to our CombiPole by using the provided BusinessLine Adapter Kit (art. no. 290165 – Figure 3). The BusinessLine Adapter Kit is provided with a separate installation manual.

Important NOTE: Only single BusinessLine charging stations with a permanently attached charging cable can be mounted on the CombiPole. This is done by using the BusinessLine AdapterKit. A pole mounted version of the double BusinessLine station with permanently attached charging cables is not available yet at the time of writing.

Figure 2 / 3 / 4

In the ground: To install the pole itself dig in the pole to 60cm below ground level and align vertically (Figure 5). Ensure that the holes for securing the charging station are in the correct position with respect to the relevant parking place(s). The pole is provided with anchor blades of 300 mm x 300 mm. Place the BusinessLine base unit on the Adapter Kit's (Figure 4) and tighten the nuts evenly with a hex key so that the base part is not deformed. The charging stations' front cover needs to lock in tightly on the base unit to ensure IP54 level protection.

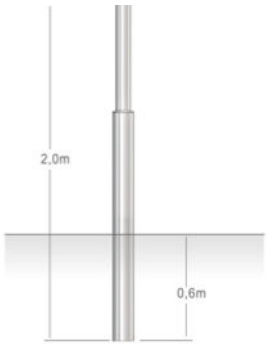


Figure 5: Installing a pole

On foundations: A pole is available as an option with four bolts for securing to foundations or on a concrete floor. The base plate measures 195mm x 195mm with four holes for attachment. The foundation must be able to bear a load of 40kg.

Wall Mounting Bracket
The charging station can also be installed on a wall bracket. The bracket is attached to a plate measuring 195mm x 195mm with four holes for attachment. Install the bracket at a height of 90 – 120 cm. The wall/foundation must be able to bear a load of 40kg.

Power Supply cable
Lead the supply cable through the slot in the bottom of the pole/bracket and ensure that it protrudes at least 50 cm above. Ensure that the power supply cable has sufficient room so that small movements of the pole/bracket do not lead to a break in the supply cable.


Figure 6: Positioning the hex socket bolts

Connecting charging station

- During installation disconnect the power supply both in the distribution box and by means of the operating switch in the charging station.
- Accidental switching on of the current during installation must be prevented. The installation technician must take adequate measures to ensure this.
- Protect the working environment against unauthorized persons and inform the surrounding area about the work, for example set up caution tape or warning notices.
- Use the correct tools and provide resources and protection measures.


Figure 7: Installing charging station

Disassemble the cover(s). These are attached to the underside of the charging station with two hex socket bolts (Figure 3). For this you will need the Hex key (5mm) provided. Slide the charging station over the pole (Figure 4).

1. Be sure not to trap any lose wires during the process.
2. Check whether the pole/bracket goes far enough (40 cm) into the charger and rests on the upper support.
3. Ensure that the power supply cable is passed through and insert it into one of the holes on the pole, so that it can be easily connected.
4. Connect the power supply cable(s) to the main switch(es) or installation block.
5. Hold the power supply cable in place with a zip-tie (for strain relief).

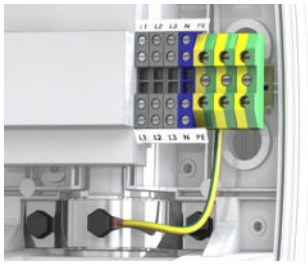


Figure 8: Securing the ground

6. Holes have been pre-drilled in the pole to attach the charging station by means of the M6 bolt supplied.
7. Connect the pole to the ground with the ground cable and the M6 bolt + washer supplied to the lowermost tube terminal. (Figure 5).
8. Now tighten the tube clamps that have been pre-mounted. For this use the two M10 socket spanners (Figure 6).
9. Check all plug connections (on the sealed printed circuit with RFID reader) by firmly pressing the connectors.

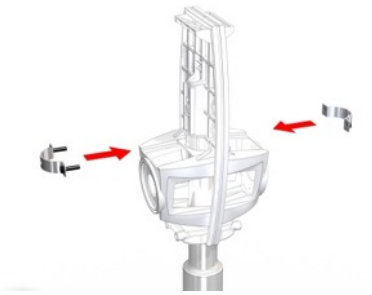


Figure 9: Tube terminals

Finishing installation

1. Ensure that the circuit breaker / residual current device in the meter cabinet is in the "On" position and that the main switch in the charging station is off.
2. Check the resistance value of the ground. This depends on the user settings. Certain EVs may need a special grounding resistance. Refer to your EV owner's manual. If grounding is not sufficient a grounding rod must be implemented closest to the charging station.
3. Hang the covers onto the frame by inserting the top into the edge at the top of the frame and hinging them downwards (Figure 7).

Figure 10: Installing covers

⚠ Please note! Make sure that each cover locks into the frame properly and that the rubber pads are in place in order to guarantee IP54 protection.

4. Check also that the cover locks securely into the open notch at the bottom of the frame.
5. Switch on the supply current at the main distributor / meter cabinet. The charging station will now carry out an automatic test. The LED ring around the socket shows the following color indications during the test (max. 60 seconds)
   a) **RED flashing**: Booting, running test protocol and looking for connection to the network.
   b) **GREEN or OFF:** Stand-by, ready for use. (LED ring is off for charging stations with pushbutton or autostart, for RFID operated charging stations Led ring is green in stand-by mode).
6. Carry out a functional test on both connectors in accordance with the specifications of the charging station. For this use a test box for charging stations supplied as an option.
7. You can now tighten the cover bolts at the bottom using the Hex key. (**TIP**: When the charging station is mounted on a wall the space for tightening these cover screws is very limited. *use a small ratchet with a Hex key bit – 5mm*)

Maintenance
Dirt on the outside of the charging station can be cleaned off using a damp soft cloth. The owner or user is responsible for the maintenance of the charging station, whereby both the law regarding the safety of persons, animals and property (in NL NEN 3140) must be observed, as well as the installation instructions in force in the country of use.

Product and environmental characteristics

The charging station has been CE-certified by the manufacturer and bears the CE logo. The relevant declaration of conformity may be obtained from the manufacturer.

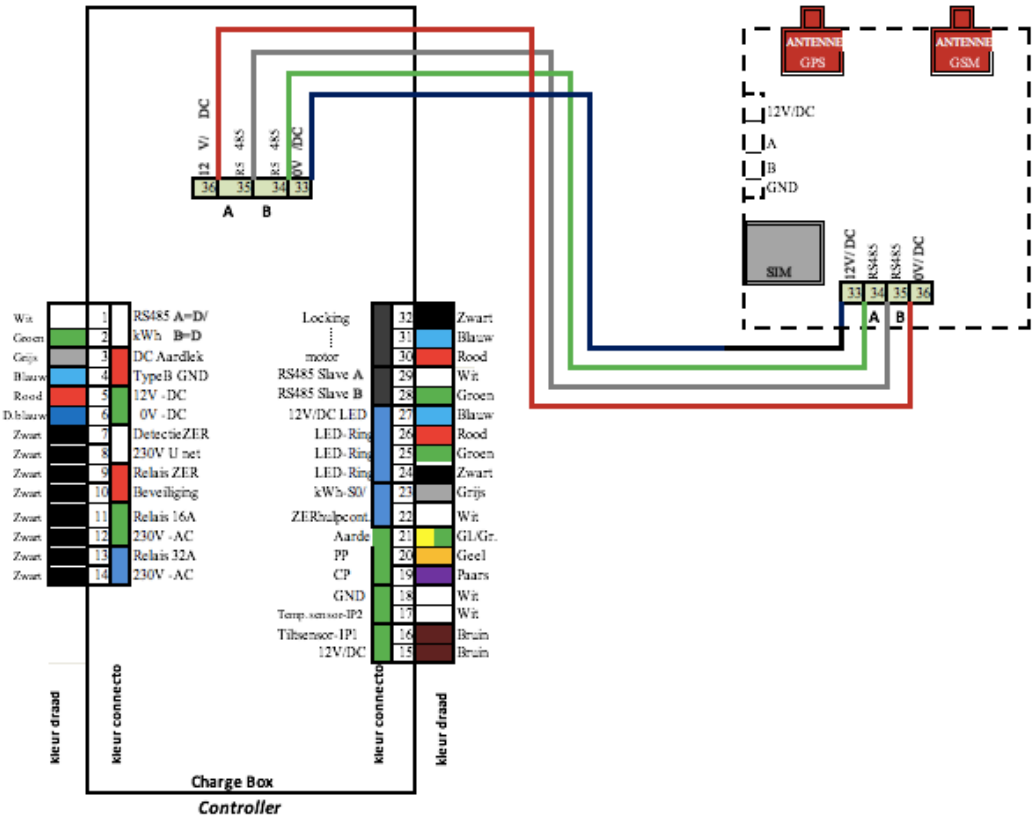
The charging station complies with the RoHS Directive (RL 2011/65/EU). The relevant declaration of conformity may be obtained from the manufacturer.

Electrical and electronic appliances, including accessories must be disposed of separately from the general municipal solid waste. Recycling of materials saves raw materials and energy and makes a major contribution to conserving the environment.

5. Installing the modem externally

A GSM link with the charging station is essential for the charging station to function properly. However, a good link cannot always be obtained in enclosed spaces, for instance a closed or underground car park. In cases like this, the modem can be positioned outside the charging station along with the GSM/GPS antenna and connected to the charging station. The procedure is as follows:

- Remove the modem from the controller to which it is fixed by pinching the top points of the white feet on which it rests using pliers.
- Remove the GPS/GSM antenna from the frame.
- Find a suitable point where the GSM signal is well received.
- Install 4-pole plugs on the modem and the controller. These plugs can be obtained separately.
- Make the connection below. A 4-core RS485 cable (STP/FTP, Profibus or equivalent) should be used for this. The maximum distance between the modem and the charging station is 1,200m. With large distances (over 60m) it may be necessary to install a 12V external power supply.
- Install the modem and antenna in a closed cabinet (IP54). An assembly set with all the materials needed for this (excl. cable and 12V power supply) is available as an option, part# 470050.

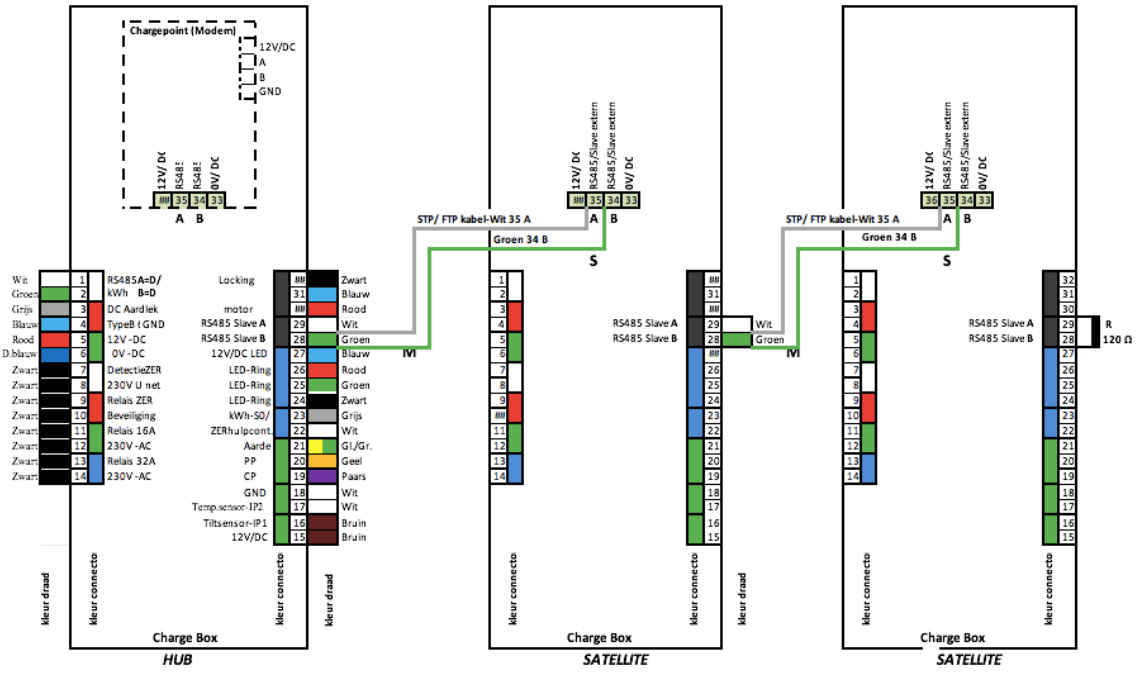


6. Adding extra connectors (Satellites)

Several charging stations without a modem (Satellites) can be linked to a charging station with a modem in a hub / satellite connection thus forming a grid. The grid can support up to a total of 20 sockets. The advantages are that control of the charging stations is simpler and that, for locations with a poor GSM link, only a single modem has to be installed externally. Also a smartgrid can be established over all sockets thus optimizing power usage, enabling more electrical vehicles to charge simultaneously should power limitations exist The Satellite charging stations are connected in a chain.

- Use a green 4-pole plug on the Satellite "S" side and a black 2-pole plug on the Hub side of the controller. These are available as a separate set, part# 471040
- Make the connection below. The network must be set up with a cable suited to the RS485 protocol. (STP/FTP, Profibus or equivalent cable).
- The maximum number of sockets that may be connected to a single modem is 20.
- The network must be closed off with a terminal resistance of 120 Ω at terminals 28 and 29, where more than 6 sockets (3 double charging stations) are installed. The terminator resistance is available as a separate set, part #471041.
- In the case of a Star or T network, reflections can occur in the cable. This method of installation is not possible for this use.

For correct performance of the smartgrid it is **essential** that you contact your supplier to set the maximum power available on the grid.
If multiple three phase satellite stations are connected in the smartgrid it is also advisable to swap the primary phase to distribute power consumption as evenly as possible over all phases. Be sure to note the connector number printed on the mode 3 controller board and the phase it uses as its primary phase. **For optimal performance of the smartgrid it is essential to inform your supplier of these changes as well.**

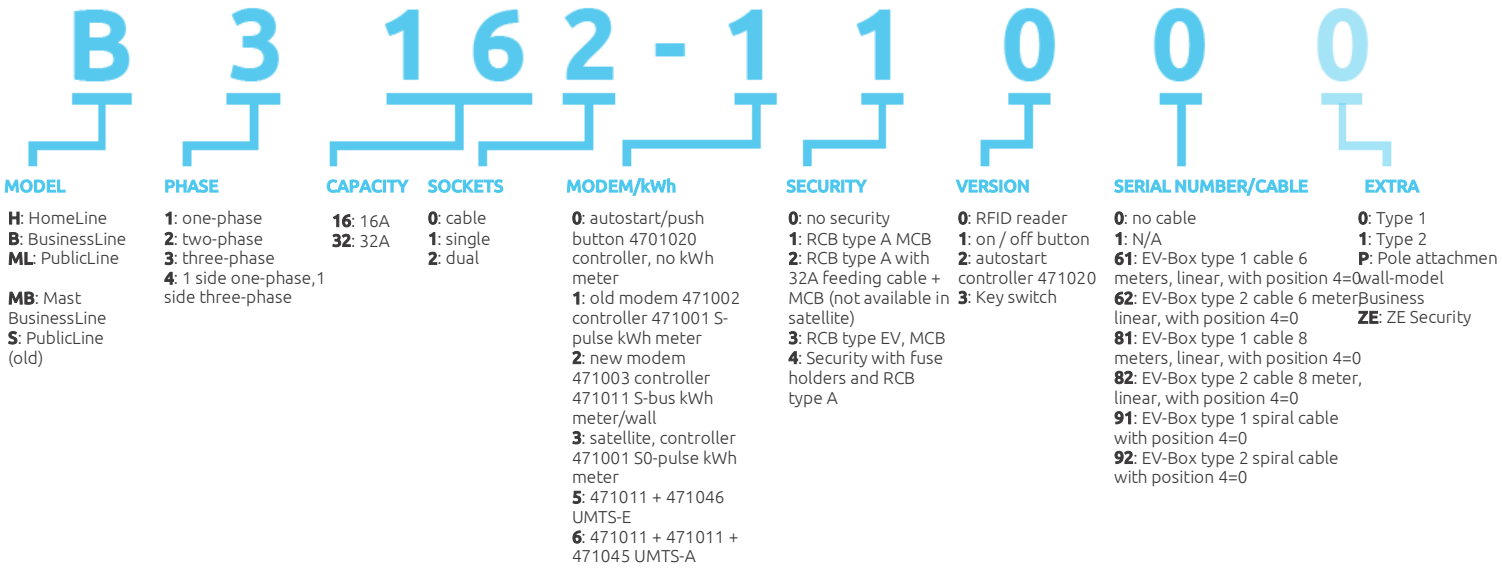


7. Technical Specifications

These are general specifications for the BusinessLine. You can find more details about the technical specifications in the "Downloads" section of EV-Box.com.

Item	Description
Connection capacity	1-phase or 3-phase, 50Hz, between 2.5 – 10mm2
Output power per connector	1-phase or 3-phase, 230V – 400V, 16A or 32A
Secondary power supply	12VDC – 2.5A
Load capacity per socket	3.7kW, 7.4kW, 11kW, 22kW
Communication	GPS / GSM / GPRS Modem / controller with RFID reader
Temperature range	- 25°C – +60°C
Moisture (non-regulating)	Max. 95%
Protection class	IP54
Protection class for socket	IP54
Max. Installation height	+2,000m NAP
Dimensions in mm	600 x 250 x 400 for double model 600 x 250 x 200 for single model
Housing	Polycarbonate (Bayblend)
Housing (rating)	IK9
Communication protocols	OCPP 1.2, 1.5 and 1.6
Weight	8 kg (single) 14 kg (double)

Type number guide:



8. Troubleshooting

EV-Box highly recommends the installation work to be done by a qualified electrician and or installation partner.

Problem	Possible cause	Solution
Charging station does not react	• No power to charging station	• Are the residual current device and circuit breaker in the meter cabinet on? (**check by user)** • Is main switch in the charging station on? (if installed, must be done **by electrician).** • Is the supply cable entering the charging station live? • Turn the charging station on again
Charging station does not emit clear tone when it is turned on	• Control current circuit breaker (C6) is off • 12V is not on (check light on 12V supply is off) • Small plugs on the controller are not fully pushed in • Wiring harness runs too close to the 12V supply, with the result that the magnetic field activates the safety module of the 12V supply.	• Is the control current circuit breaker (C6) on? There is a clear tone when the circuit breaker is switched on • Is there 230V on the input terminals of the power supply? If this is not the case, check the circuit breaker • Is there 12V on the output terminals of the power supply? If this is not the case, switch off the C6 circuit breaker and wait two minutes before switching on again. If there is still not 12V DC on the output, the power supply should be replaced. • Snugly fit all plug connections, in particular to the controller unit. • Relocate wiring harness
Residual current device trips constantly	• Grounding error in the charging station • Special ground resistance is needed for the vehicle • Fault in the vehicle or defective charging cable	• Check electrical wiring for damage. Replace damaged wiring • Moisture or condensation on electrical connections. Dry the connections if necessary • Replace the charging cable • Measure the grounding resistance and compare it with the resistance required by the supplier of the vehicle, e.g. Renault Zoe < 150 Ohm.
LED ring lights up red constantly	• Residual current device and/or circuit breaker are off	• Switch on residual current device and/or circuit breaker
One or more LED ring(s) continues to flash red in Hub / Satellite configuration	• Crossover in Hub / Satellite connection. • Charge point cannot be located.	• Check RS485 cabling 1:1 • Press modem into position. • Check 12V power supply status to the Hub (Charging station with modem).

Problem	Possible cause	Solution
LED ring continues to light up yellow	• Charging station waiting for the vehicle • Vehicle is fully charged • Faulty charging cable • Grounding resistance too high, with certain vehicles this must be < 150 Ohm. • Vehicle is on a timer	• Are the plugs properly inserted in the vehicle and charging station? (**check by user)** • Grounding resistance correct? (grounding measurement by electrician) • Replace the charging cable (have fixed cable replaced by an electrician) • Change the setting of the timer in the vehicle. (**check by user)**
Charging station does not start charging, LED ring flashes green for 30 seconds, followed by 10 x red. Then LED ring green or off.	• Plug not locked • Vehicle not connected • Lock in charging station blocked.	• Is the plug pushed far enough into the charging station? (**check by user)** • Is the plug properly inserted in the vehicle? (**check by user)** • Check the plug for damage or bent pins. (**check by user)** • Check whether there is something in the socket. (**check by user)** • Check whether the wiring harness is blocking the red locking handle. (**check by electrician)**
Plug does not come out of charging station	• Incorrect card used to stop charging (LED ring flashes purple briefly) • Unlocking pin will not lift	• Use the same card to stop charging as to start charging • Push the plug further into the charging station and hold the card against the card reader again • Turn power in the meter cabinet off and then on again after two minutes • The red handle on the lock can be manually turned upwards to unlock **by the electrician**.
Red LED starts flashing immediately after the card is held against the reader	• Charging card is not authorized for charging at this charging station. • There is no communication with the Back Office.	• Check that the charging card is registered correctly. (authorized for use on public charging stations) (**check by user)** • Check the settings of your charging station in your online account (**check by user)** • Check whether the modem is in contact with the cellular network.

9. EU Declaration of Conformity

MANUFACTURER'S DECLARATION

(in accordance with Appendix II-B of the Machinery Directive)

EV-Box B.V., Pedro de Medinalaan 31, 1086XP Amsterdam, The Netherlands, declares under sole responsibility that the product:

Article B116X-XXXX: EV-Box Charging station 1-phase 16A

Article B132X-XXXX: EV-Box Charging station, 1-phase 32A

Article B316X-XXXX: EV-Box Charging station, 3-phase 16A

Article B332X-XXXX: EV-Box Charging station, 3-phase 32A

to which this declaration refers is CE certified and complies with the essential requirements of EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC in accordance with standards:

EN 61000-6-3 (2007) & IEC 61851 Part 22CDV (06 15-12-2010) section 11.12 (EMC)

EN 61000-6-2 (2005) & IEC 61851 Part 22CDV (06 15-12-2010) section 11.12 (EMC)

EN 61000-3-2 (2006)

EN 61000-3-3 (1995) + A1 (2001) + A2 (2005)

EN 60950-1 (2006) + A11 (2009) + A1 (2010)

IEC 61851-1 (2010)

IEC 61851-22 (2002)

IEC 60364-4-41 (2007)

EN 62196-1 (2003)

EN 60335-1 (2012) + AC (2014) Safety of household and similar appliances