EVBox BusinessLine

Installation and commissioning manual Part A

EVBox BusinessLine

Installation and commissioning manual Part A

Contents

1. Introduction

Thank you for choosing the EVBox BusinessLine (4th Generation), our best-selling charging station with proven technology and reliability. Built to be connected and intelligent, BusinessLine makes going electric at your workplace or business easier than ever.

This Installation and Commissioning manual tells you how to install BusinessLine and make it ready to use. Carefully read the safety information before you start.

These instructions are valid for several models of the BusinessLine (4th Generation) charging station. It is possible that some features and options described may not apply to your charging station.

1.1. Scope of the document

Keep this manual for the entire life cycle of the charging station.

The installation instructions in this manual are intended for qualified personnel who can assess the work and identify potential danger.

The operating and maintenance instructions are intended for users of the charging station.

This manual comprises two parts:

- Manual Part A - This part contains the instructions.
- Manual Part B - This part contains the illustrations for the instructions.

You must read both parts of the manual.

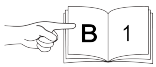
All EVBox manuals can be downloaded from www.evbox.com/manuals.

1.2. Compatibility

The EVBox BusinessLine (4th generation) is not compatible with earlier generations of the BusinessLine charging station. Each Hub-Satellite installation must consist of the same generation of charging stations.

1.3. Symbols used in this manual

Symbol	Explanation
	**DANGER:** Indicates an imminently hazardous situation with a high risk level which, if the danger is not avoided, will cause death or serious injury.
	**WARNING:** Indicates a potentially hazardous situation with moderate risk level which, if the warning is not obeyed, can cause death or serious injury.
	**CAUTION:** Indicates a potentially hazardous situation with a medium risk level which, if the caution is not obeyed, may cause minor or moderate injury or damage to the equipment.

Symbol	Explanation
	**Note:** Notes contain helpful suggestions or references to information not contained in this manual.
	This symbol indicates that the illustrations corresponding to the indicated chapter are to be found in Manual Part B.
1., a. or i.	Action to be followed in the stated order.

1.4. Certification and compliance

	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.
RoHS **Compliant**	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.
	Recycling of materials saves raw materials and energy and makes a major contribution to conserving the environment. Recycle the packaging in accordance with national regulations.

1.5. Product classification

Power supply input	EV supply equipment permanently connected to AC supply network.
Power supply output	AC EV supply equipment.
Normal environmental conditions	Outdoor use.

Access	Equipment for locations with unrestricted access.
Mounting method	Stationary equipment, wall-mounted or pole-mounted.
Protection against electric shock	Class 1 equipment.
Charging modes	Mode 3.

2. Safety

2.1. Safety precautions

DANGER:
Not following the installation and user instructions given in this manual will result in the risk of electric shock, which will cause severe injury or death.

- Read this manual before installing or using the charging station.

DANGER:
Installation, servicing, repair and relocation of this charging station by a non-qualified person will result in the risk of electric shock, which will cause severe injury or death.

- Only a qualified electrician is permitted to install, service, repair and relocate the charging station.
- The user must not attempt to service or repair the charging station as it does not contain user-serviceable parts.
- Local regulations may be applicable and may vary depending on your region / country of use. The qualified electrician must always ensure that the charging station is installed according to the local regulations.

DANGER:
Working on electric installations without proper precautions will result in the risk of electric shock, which will cause severe injury or death.

- Switch off input power before installing the charging station.
- Do not switch on the charging station if it is not fully installed or not secure.
- Do not install a charging station that is faulty or has a noticeable issue.

DANGER:
Operating the charging station when it indicates an error state, or when the charging station or the charging cable have cracks, show extensive wear, or other physical damage, will result in the risk of electric shock, which will cause severe injury or death.

- Do not operate the charging station if the enclosure or an EV connector is broken, cracked, open, or shows any other indication of damage.
- Do not operate the charging station if a charging cable is frayed, has broken insulation, or shows any other indication of damage.
- In the event of danger and/or an accident, a qualified electrician must immediately disconnect the electrical supply from the charging station.
- Contact your installer if you suspect that the charging station is damaged.

DANGER:
Some electric vehicles release hazardous or explosive gasses when charging which will result in the risk of explosion, which will cause severe injury or death.

- Refer to your vehicle user manual to check if your vehicle releases hazardous or explosive gases when charging.
- Follow the instructions given in the vehicle user manual before choosing the location of the charging station.

DANGER:
Extensive exposure of the charging station to water or handling the charging station with wet hands will result in the risk of electric shock, which will cause severe injury or death.

- Do not direct powerful jets of water toward or onto the charging station.
- Never operate the charging station with wet hands.
- Do not put the charging plug into any liquid.

WARNING:
Installing the charging station during wet environmental conditions (for example rain or fog) can result in the risk of electric shock and damage to the product, which can cause severe injuries or death.

- Do not install or open the charging station during wet environmental conditions (for example rain or fog).

WARNING:
Using a damaged charging station or a damaged charging cable may expose the user to electric components and result in the risk of electric shock, which may cause injury or death.

- Make sure that the charging station, the charging cable, and the charging plug are free of damage before starting a charging session.
- Make sure that the contact area of the charging plug is free from dirt and moisture before starting a charging session.
- Make sure that the charging cable is positioned so that it will not be stepped on, tripped over, driven over or otherwise subjected to excessive force or damage. Where applicable, make sure that the charging cable is correctly stowed when it is not in use, making sure that the charging plug does not touch the ground.
- Only pull on the charging plug hand grip and never on the charging cable itself.
- Keep the charge plug away from heat sources, dirt or water.

WARNING:
Using adapters, conversion adapters or cord extensions with the charging station may result in technical incompatibilities and can result in damage to the charging station, which will cause injury or death.

- Use this charging station to charge compatible electric vehicles only. Refer to the charging station specifications in the charging station installation manual for details.
- Refer to your vehicle user manual to check if your vehicle is compatible.

WARNING:
Exposure of the charging station or the charging cable to heat or flammable substances can result in damage to the charging station, which will cause injury or death.

- Make sure that the charging station or the charging cable never come into contact with heat.
- Do not use explosive or readily flammable substances near the charging station.

WARNING:
Using the charging station under conditions not specified in this manual may result in damage to the charging station, which may cause injury or death.

- Only use the charging station under the specified operating conditions in this manual.

WARNING:
Fire safety (Only for Poland):

- When safe to do so, switch off power to the equipment that is burning or endangered by fire.
- Do not use water to extinguish electrical installations and equipment that have a live power supply.
- To extinguish a charging station, use an extinguisher that is specified for use on electrical equipment with a rating of up to 1 kV.

CAUTION:
Charging a vehicle with the charging cable not completely unwound may result in overheating of the cable, which can damage the charging station.

- Before you charge the vehicle make sure that the charging cable is completely unwound and has no overlapping loops.

CAUTION:
Putting fingers into or leaving other objects inside the plug port (for example, during cleaning) may cause injury or can damage the charging station.

- Do not put your fingers into the plug port.
- Do not leave objects inside the plug port.

CAUTION:
The use of devices with (electro) magnetic properties in the vicinity of the charging station may damage the charging station and affect its operation.

- Keep and use (electro) magnetic devices at a safe distance from the charging station.

CAUTION:
Not taking precautions against ESD (Electrostatic discharge) can damage electronic components in the charging station.

- Take the necessary precautions against ESD before touching electronic components.

2.2. Moving and storage precautions

Obey the following guidelines when moving and storing BusinessLine:

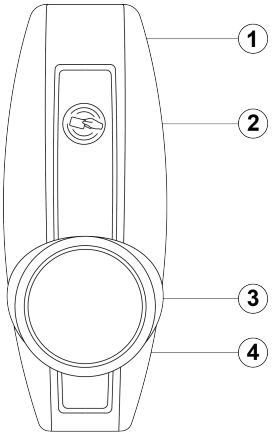
- Disconnect input power before removing the charging station for storage or relocation.
- Only transport and store the charging station in its original packaging. No liability can be accepted for damage incurred when the product is transported in non-standard packaging.
- Store the charging station in a dry environment in the temperature and humidity ranges given in the specifications.

3. Product features

The charging station is compatible with all Mode 3 electric vehicles and is designed for both indoor and outdoor use. Operation of the charging station is approved at ambient temperatures of between -25 °C and +50 °C. The charging station can be connected to a Charging Management System (CMS) for the registration of the number of kilowatt-hours (kWh) charged.

3.1. Description

Description



1. **Charging station**
   The charging station can either be a Hub station or a Satellite station, and in any installation there must be one Hub station (see Hub-Satellite installations on page 21). Up to 19 Satellite stations can connect to the Hub station.
   - A Hub station includes the charge card reader, LED ring, Wi-Fi module, Bluetooth module, cellular modem, smart charging module, and charging cable socket.
   - A Satellite station includes the charge card reader, LED ring and charging cable socket.

   The station is mounted on a ground pole, a wall pole, or directly to a wall.
2. **Charge card reader**
   This is the area where you scan your charge card or key fob. Depending on configuration settings, BusinessLine reads the data from your card to start or stop a charging session.
3. **Socket**
   Connect the plug of a mode 3 charging cable to the socket.
4. **LED ring**
   The LED ring indicates the status of BusinessLine.

Configurations

BusinessLine charging stations come in the following configurations:

- Single socket, communications hub.
- Single socket, satellite.
- Double socket, one communications hub and one satellite.

- Double socket, two satellites.

One BusinessLine Hub station can be connected to a maximum of 19 BusinessLine Satellite stations. A smart grid can be established over all stations in the Hub-Satellite installation. This optimizes power usage and lets more vehicles charge simultaneously should power limitations exist.

3.2. Technical specifications

Technical features

Feature	BusinessLine (4th gen) with RCBO	BusinessLine (4th gen) without RCBO
Charging capacity per socket	Maximum 7.4 kW, 11 kW or 22 kW, depending on installation and set-up.	
Socket type	Type 2.	
Number of sockets	1 or 2.	
Output power per socket	1-phase or 3-phase, 230 V – 400 V, 16 A or 32 A.	
Connection capacity	1-phase or 3-phase, 50 – 60 Hz, wire sizes 2.5 – 16 mm^2.	
Residual-current Circuit Breaker with Overcurrent protection (RCBO) (30 mA AC leakage detection)	• Eaton FRBM4-C32/3N/003-A. • Eaton FRBM6-C16/3N/003-A. • Eaton FRBM6-C32/3N/003-A.	Residual current (30mA) and overcurrent protection to be installed externally. *
Residual direct current detecting device	Complies with Table 2 of IEC 62955, with 6 mA smooth residual DC detection.	
Operating temperature range	-25 °C to +50 °C.	
Humidity (non-regulating)	Max. 95%.	

Feature	BusinessLine (4th gen) with RCBO	BusinessLine (4th gen) without RCBO
Communication	Hub station: • 4G LTE-FDD CAT1 (B1/3/7/8/20) / 3G WCDMA (Band 1/8) / GSM (900/1800 Mhz) Dual band. • Wi-Fi 2.4/5 GHz. • Bluetooth 4.0 for configuration with the EVBox Connect app. • GPS. • RFID reader. Satellite station: • RFID reader.	
Communication protocol	OCPP 1.6 JSON.	

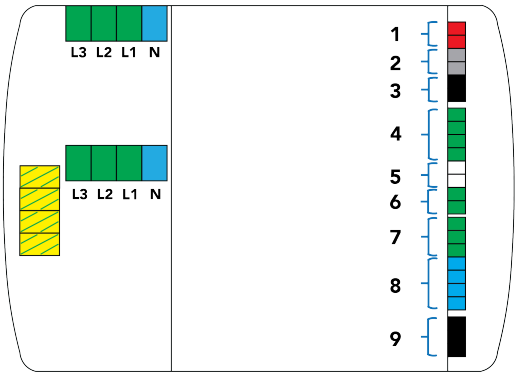
* Each charging station should be protected by a dedicated circuit breaker (MCB) and residual current device (RCD) Type A (> 30 mA AC) in accordance with local laws and regulations. For a three-phase charging station, a dedicated four-pole (three-phase plus neutral (N)) circuit breaker is recommended. Single-phase circuit breakers should not be used for three-phase installations. The RCD must switch off all connected phases and neutral (N).

Physical features

Feature	Description
Certification and compliance	See Certification and compliance on page 4.
Protection	IP55, IK08.
External cover	Polycarbonate.
Max. installation altitude	2000 m above sea level.
Dimensions (mm)	600 x 255 x 410 mm (double socket).
	600 x 255 x 205 mm (single socket).
Weight (kg)	12 kg (double socket).
	10 kg (single socket).

Feature	Description
Mounting	Double socket: Combipole in or on the ground, or on a wall Combipole. Single socket: Combipole in or on the ground, or on a Wall Spacer. See Choose mounting on page 16.
Standard colors	RAL 7016 (dark gray), RAL 9016 (white), RAL 5017 (blue).

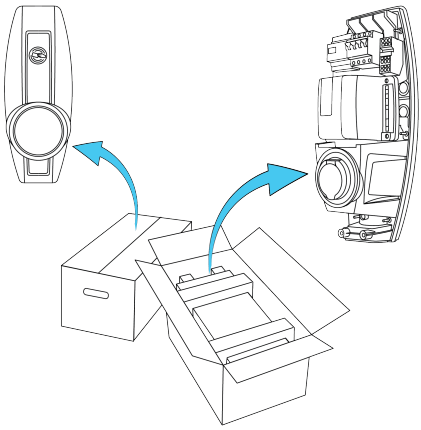
3.3. Controller connections



Connection group	Description
1 - 2 pin, red	External relay
2 - 2 pin, blue	kWh meter
3 - 2 pin, black	RS485 hub-satellite communication
4 - 4 pin, green	Inputs Pin 1 - Ground Pin 2 - Radio ripple control receiver input for VDE-AR-N 4100 (IN-2) Pin 3 - RCBO temperature sensor input (IN-1) Pin 4 - 12V
5 - 2 pin, white	RS485 MAX protocol (smart charging) communication
6 - 2 pin, green	Socket temperature sensor

Connection group	Description
7 - 3 pin, green	Control pilot
8 - 4 pin, blue	LED ring
9 - 3 pin, black	Lock motor

3.4. Delivered components



Item	Description
Charging station	EVBox BusinessLine unit (single socket Hub or single socket Satellite, or double socket Hub with Satellite, or double socket 2x Satellites).
Cover	1x EVBox BusinessLine cover (for a single socket). 2x EVBox BusinessLine covers (for a double socket).
Cover label set	Information and usage labels to be applied to the cover after installation.
M6 bolt and washer	Double socket station only: To ground the mounting pole to a double socket charging station.
120 Ω resistor	To terminate the RS485 connector of the last Satellite charging station in a Hub-Satellite installation.
Hex key, 1x	To open the cover of the unit.

Item	Description
Instructions folder	Installation and Commissioning manual, security code and station ID.

3.5. Optional components

Depending on the installation, the following components can also be required. Contact your supplier to order the optional components.

Note:
The installer is responsible supplying the power cables, data cables and any minor items required for the installation.

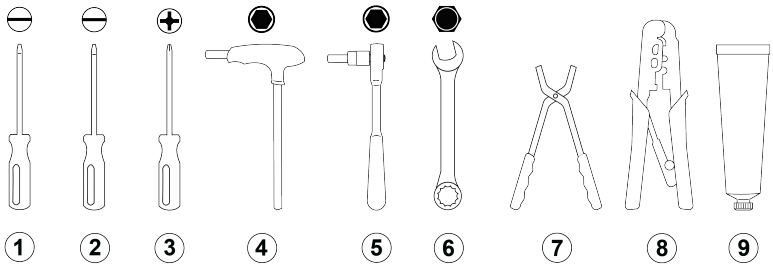
Component	Part number
EVBox Combipole (in the ground).	290150
EVBox Combipole (floor mount).	290305
EVBox Combipole (wall mounted, for a double socket station only).	290600
EVBox Adapter Kit to install a single socket station on a ground or floor-mount Combipole.	290165
EVBox Wall spacer to install a single socket station directly on a wall.	290190
EVBox Test Box with fixed cable (to test the functioning of the charging station).	462322

EN

4. Installation instructions

4.1. Prepare for installation

4.1.1. Tools and material required



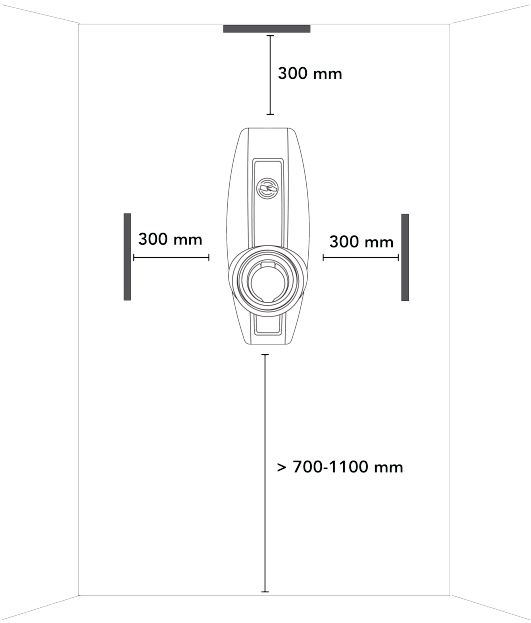
1. Screwdriver, flat blade, 4 mm.
2. Screwdriver, flat blade, 8 mm.
3. Philips screwdriver, PH2.
4. Hex keys, 4 mm, 5 mm and 6 mm.
5. Socket wrench with 4 mm, 5 mm and 6 mm hex sockets, ¼ inch drive.
6. Wrench, 8 mm.
7. Wire stripper (power cable).
8. Wire stripper (network cable).
9. Silicone grease.

4.1.2. Plan for installation

The following recommendations are a guide to help you plan the installation of the charging station.

Choose location

- Position the charging station, where possible, in a location where it is not exposed to sunlight and vulnerable to external damage.
- The minimum free space around the charging station is 300 mm.
- The location must allow the charging cable to remain within its bending tolerance.



Note:
The above illustration indicates a standard installation height. Observe and comply with the local accessibility regulations.

Pre-installation checklist

- The local installation regulations are identified and are followed.
- All necessary permits are obtained from the local authority that has jurisdiction.
- The existing electrical load has been calculated to find the maximum operating current for the charging station installation.
- **For the BusinessLine without an RCBO**: A miniature circuit breaker (MCB) and residual current device (RCD, Type A, 30 mA AC leakage detection) are installed upstream and have ratings that correspond to the local power supply as well as to the required charging power.
- The correct specification of power supply cable has been routed to the installation area, and there is sufficient cable length to strip and connect the wires.
- The power supply cable remains within its bending tolerance during and after installation.
- The power supply cable and the optional Smart Charging network cable comply with the specifications for the charging station that you are going to install.
- The required tools and materials are available on site. See Tools and material required on page 15.

4.1.3. Choose mounting

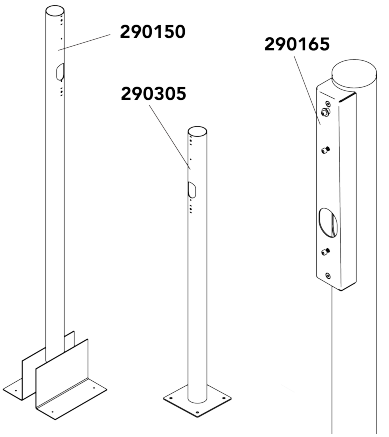
EVBox BusinessLine charging stations can be mounted in the following ways:

Pole mounting in the ground or on the floor

BusinessLine charging stations, both single and double socket versions, can be mounted on an EVBox

Combipole set into the ground, or on a EVBox Combipole fixed to the floor (see Optional components on page 14).

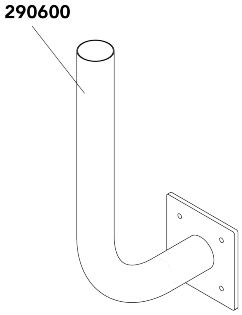
- The double charging station can be mounted directly onto a Combipole without additional parts or accessories.
- The single charging station is attached to a Combipole with the BusinessLine Adapter Kit.



Pole mounting on a wall

Double socket BusinessLine charging stations can be mounted on an EVBox Combipole mounted on a wall (see Optional components on page 14). Wall mounting has the following requirements:

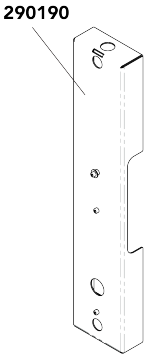
- The wall must be able to hold a load of at least 70 kg.
- Mount the Combipole onto a vertical surface so the bottom of the charging station is between 70 cm and 110 cm above ground level.



Wall mounting

A single charging station can be mounted on an EVBox Wall Spacer fixed directly to a wall (see Optional components on page 14).

- The wall must be able to hold a load of at least 70 kg.
- Install the wall mount at a height of between 900 and 1200 mm above ground level.



4.1.4. Power supply requirements

DANGER:
Connecting the charging station to the power supply other than as specified in this section can result in incompatibility of the installation as well as the risk of electric shock, and thus cause damage to the charging station, and injury or death.

- Only connect the charging station to a power supply in a configuration that is specified in this section.

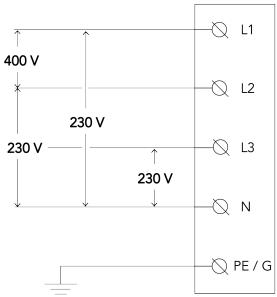
Earthing system	TN-system	PE-cable.
	TT-system IT-system	Earth electrode, installed separately.
Power input (phase)	1-phase	230 V ±10% 50/60 Hz.
	3-phase	400 V ± 10% 50/60 Hz.

MCB (Miniature Circuit Breaker)	16 A installation: use a 20 A MCB, C-characteristic. 32 A installation: use a 40 A MCB, C-characteristic. **Note:** • A MCB is only required for a charging station without RCBO. • The MCB should match the amperage settings of the charging station and the maximum current available for the station, considering MCB manufacturer specifications. • Consider the availability of additional sources of power (for example solar) together with a dynamic load balancing system (optional).
RCD (Residual Current Device)	40 A, 30 mA AC type A. BusinessLine has a 6 mA DC leakage detection internally. **Note:** • A RCD is only required for a charging station without RCBO.

Note:
For a TT or IT electric grid with 230 V from line to line, the charging station must be installed with one phase being connected to terminal L1 and the other phase being connected to terminal N.

Power supply wiring

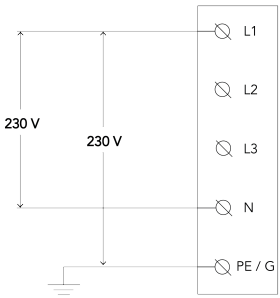
The table below shows how to connect the power supply to BusinessLine, depending on the specifications of the power supply cabinet and the version of BusinessLine.

Option 1: 400 V 3-phase with neutral For 3-phase use of a Wye-connected secondary, all three phases (L1, L2 and L3) and neutral must be connected. Each phase voltage must measure 230 V to neutral.	

Option 2: 230 V 1-phase with neutral

For 1-phase use of a Wye-connected secondary, only a single phase (L1 or L2 or L3) and neutral on the grid must be connected to the L1 and N on the charging station. This phase voltage must measure 230 V between line and neutral.

CAUTION:
Only a BusinessLine with a 1P+N RCBO or a BusinessLine without an RCBO must be connected to a single phase grid. A BusinessLine with a 3P+N RCBO must not be connected to a single phase grid.

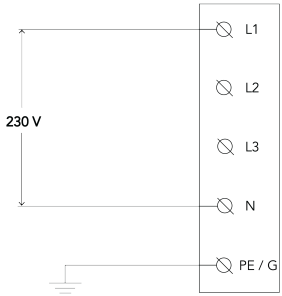


Option 3: 230 V 1-phase without neutral

In this configuration (without neutral and 230 V from line to line), connect any two lines (L1, L2 or L3) of the grid to L1 and N on the charging station.

WARNING:
In this configuration, the charging station operates only from a single phase (L1). Do not connect the remaining phases L2 and L3.

CAUTION:
Only a BusinessLine with a 1P+N RCBO or a BusinessLine without an RCBO must be connected to a single phase grid. A BusinessLine with a 3P+N RCBO must not be connected to a single phase grid.



4.1.5. Route power supply cables

Use minimum 2.5 mm^2 and maximum 16 mm^2 copper wire, depending on the power rating and distance between the meter cabinet and the charging station. The voltage drop must not exceed 5% (it is advisable to have a maximum allowable voltage drop of 3%).

For a charging station with a RCBO: When you calculate the length and the diameters of the power cables, make allowance for the rated short circuit current capacity of the RCBO inside the station.

- For the 3-phase 32A RCBO, the short circuit current is 4.5 kA.
- For the 3-phase 16A RCBO and the 1-phase 32A RCBO, the short circuit current is 6 kA.

A double socket charging station with a product number 'Bxxx2-Ex801' has two separate power cable inputs. A double socket charging station with a product number 'Bxxx2-Ex901' has a single power cable input. Refer to the product type guide for more information.

Route the power supply cables to the position where the charging station will be installed. Make sure of the following:

- There must be enough cable for it to extend at least 500 mm out of an installed Combipole or Wall Spacer.
- There must be enough cable for it to move and bend safely during installation of a Combipole.

Note:
The power cable enters the station via the backplate for single stations, and through the top of the Combipole for double stations. When a single socket charging station is installed on a Wall Spacer, the recommended cable entry is through a cable gland in the base of the charging station.

The maximum power rating per connector is specified below.

Power per connector	Input type	RCBO	Output current
Single socket charging station			
7.4 kW	1x 1-phase 230 V, 32 A	Yes	1x 32 A
11 kW	1x 3-phase 400 V, 16 A	Yes	1x 16 A
22 kW	1x 3-phase 400 V, 32 A	Yes	1x 32 A
22 kW	1x 3-phase 400 V, 32 A	No	1x 32 A
Double socket charging station			
7.4 kW	2x 1-phase 230 V, 32 A	Yes	2x 32 A
11 kW	2x 3-phase 400 V, 16 A	Yes	2x 16 A
22 kW	2x 3-phase 400 V, 32 A	Yes	2x 32 A
22 kW	1x 3-phase 400 V, 32 A	Yes	2x 32 A
22 kW	2x 3-phase 400 V, 32 A	No	2x 32 A

4.1.6. Hub-Satellite installations

A Hub-Satellite charging station installation can consist of up to 19 satellite stations connected to a Hub station. A Hub-Satellite installation is easier and more economical to manage than individual Hub stations because it has only one Hub station, and it enables a smart grid to be established across the connected stations, which optimizes power usage.

Data communication between the stations uses a RS485 serial data connection.

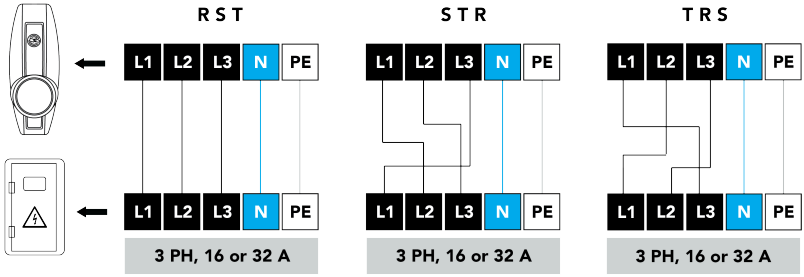
For more information see chapter Connect Hub-Satellite network cables on page 27.

4.1.7. Phase rotation

For charging stations that connect to a 3 phase supply in a Hub-Satellite installation, to avoid overloading the first phase with one-phase electric vehicles we recommend rotating the phases as shown below.

Note:
If phase rotation is used you must configure the correct phase rotation settings with the EVBox Connect App.

Single 3-phase 400 V AC 16 or 32 A power cable



4.1.8. Power configuration for smart grid

If multiple three-phase satellite charging stations are connected in the smart grid, it is recommended to swap the primary phase to distribute power consumption as evenly as possible over all phases (see Phase rotation on page 21).

For optimal performance of the smart grid, you must configure the maximum charging current for the Hub Satellite installation and the phase rotation using the EVBox Connect App.

4.1.9. Smart Charging (optional)

A Smart Charging system, using the RS485 MAX protocol, to optimize load balancing can be connected to the Hub charging station. Route a SFTP Category 6 network cable from the Smart Charging system to the installation area of the Hub charging station. For outdoor installations, use a UV stabilized network cable. Make sure that there is sufficient cable length to strip and connect the cable to the charging station. See Connect Smart Charging network cables on page 27 for cable connection instructions.

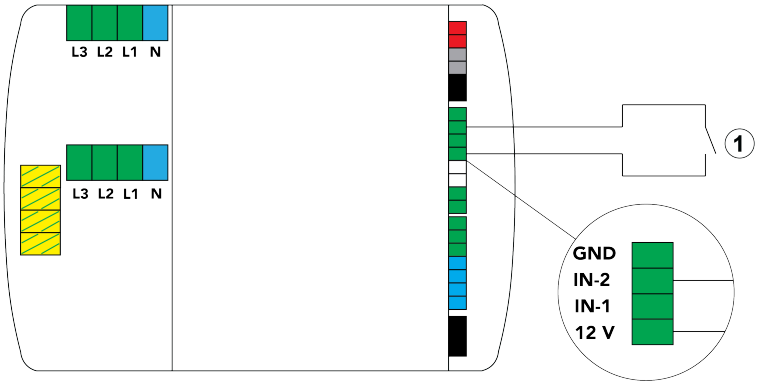
4.1.10. Implementation of VDE-AR-N 4100: 2019-04 (only for Germany)

All EVBox charging stations can be controlled directly by a distribution network operator (DNO). Charging stations with a total rated power of more than 12 kVA must be controlled in accordance with Technical Connection Rules VDE-AR-N 4100: 2019-04. A radio ripple control receiver enables the charging station to be switched off directly.

Registration with the local distribution network operator is required.

Make sure the input for a radio ripple controller receiver is correctly configured in the CMP backend.

Connect the radio ripple control receiver to the controller as shown in the diagram.



1.	Radio ripple control receiver controlled by the DNO. • The station operates normally when the relay is open. • The station is switched off when the relay is closed.

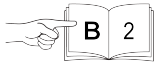
4.2. Install charging station

When the installation area is prepared and the charging station mounting systems are installed you can then install and connect the charging stations.

Compatibility

The EVBox BusinessLine (4th generation) is not compatible with earlier generations of the BusinessLine charging station. Each Hub-Satellite installation must consist of the same generation of charging stations.

4.2.1. Install the station



See the corresponding illustrations in manual B.

1. If the cover is installed, remove the cover or covers from the charging station.

   Note:
   A double socket charging station has two covers.

   a. Use the hex key (supplied) or a socket wrench with a hex socket to remove the screws at the bottom of the charging station.

   b. Open the cover from the bottom and lift it off the charging station.

   c. Put the cover front side up in a place where it cannot be damaged.

2. **For a double socket charging station**: Mount on a ground, floor or wall Combipole.

a. Lift the double socket charging station onto the Combipole, feeding the power cables and optional RS485 communication cables through the back plate of the station.

Note:
A double socket charging station can have one shared power cable or two separate power cables, and may have RS485 communication cables for Hub-Satellite and Smart Charging communication. During installation, feed the power and RS485 communication cables through the backplate of the charging station to which the cables will be attached.

b. Make sure that the charging station slides fully down the pole to rest on the internal stop inside the charging station.

c. Route the ground cable from the ground terminal block to the Combipole grounding point.

d. Align the grounding point in the station with the pre-drilled grounding hole in the Combipole. Connect the ground cable to the grounding point with the 4 mm bolt and washer (supplied).

e. Disconnect the connectors from the right side of the controller.

f. Loosen but do not remove the bolts attaching the controller to the bracket.

g. Move the controller up to release the bolts from the slotted holes in the bracket, then move the controller to one side to access the attachment points.

h. Tighten the clamps with a socket wrench to secure the charging station on the Combipole.

i. Move the controller back into position on the four bolts.

j. Tighten the four bolts.

k. Connect the connectors to the right side of the controller.

3. **For a single socket charging station**: Mount on an Adapter Kit or on a Wall Spacer

Note:
The mounting of the station on an Adapter Kit or a Wall Spacer is the same.
- The Adapter Kit is used to mount the station on a Combipole.
- The Wall Spacer is used to mount the station on a wall.

a. Install the EVBox Adapter Kit on the Combipole, or install the Wall Spacer on the wall (see Optional components on page 14). Adjust three bolts and washers on the Adapter Kit or Wall Spacer to the correct distance to engage with the backplate of the station.

b. Lift the single socket charging station onto the Adapter Kit or Wall Spacer, feeding the power cables and optional RS485 communication cables into the station.

Note:
When a charging station is installed on a wall, the recommended cable entry is through a cable gland in the base of the charging station.

c. Disconnect the connectors from the right side of the controller.

d. Loosen but do not remove the bolts attaching the controller to the bracket.

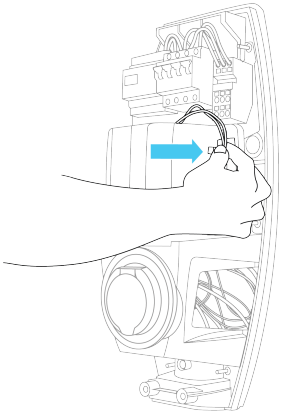
e. Move the controller up to release the bolts from the slotted holes in the bracket, then move the controller to one side to access the attachment points.

f. Tighten the three bolts to secure the charging station to the Adapter Kit or Wall Spacer.

g. Move the controller back into position on the four bolts.

h. Tighten the four bolts.

i. Connect the connectors to the right side of the controller.



4.2.2. Connect power cables

See the corresponding illustrations in manual B.

Connection of the power input cable to a BusinessLine charging station depends on the model, as shown in the following table:

Note:
Use minimum 2.5 mm^2 and maximum 16 mm^2 copper wire, depending on the power supply available and the distance from the power supply cabinet.

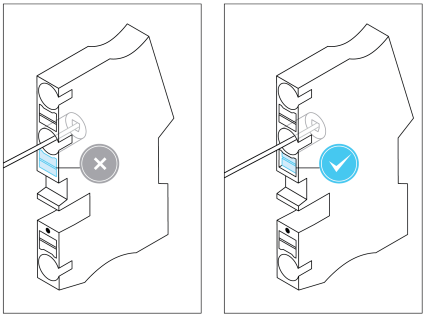
Input type	RCBO	Power cable connection
Single socket charging station		
1x 1-phase 230 V, 32 A	Yes	Direct to RCBO.
1x 3-phase 400 V, 16 A	Yes	Direct to RCBO.
1x 3-phase 400 V, 32 A	Yes	Direct to RCBO.
1x 3-phase 400 V, 32 A	No	To single terminal block.
Double socket charging station		

Input type	RCBO	Power cable connection
2x 1-phase 230 V, 32 A	Yes	Direct to RCBO.
2x 3-phase 400 V, 16 A	Yes	Direct to RCBO.
2x 3-phase 400 V, 32 A	Yes	Direct to RCBO.
1x 3-phase 400 V, 32 A	Yes	To single terminal block. Internal wiring connects power to both RCBOs.
2x 3-phase 400 V, 32 A	No	To two terminal blocks.

1. Cut and strip the power cables to the required length.
2. With stranded (flexible) wiring, use wire end sleeves with a ferrule length of 12-15 mm (0.47-0.60 in) and apply a square crimp for optimal fit into the RCBO or terminal blocks.
3. **For direct connection to a RCBO:** Connect a power cable directly to a RCBO as follows:
   a. Connect the wires of the power cable to the input terminals on the RCBO.

      Note:
      When multiple charging stations are connected to one power supply cabinet, consider using phase rotation (see Phase rotation on page 21).

   b. Connect the protective earth/ground (PE/G) wire to the PE/G terminal block.
   c. Pull on the wire to make sure it is correctly connected. The indicator on the terminal block must be in the locked position.



4. **For connection to a terminal block:** Connect a power cable to a terminal block as follows:

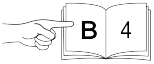
a. Connect the power wires and the PE/G wire of the power cable to the input terminals on the terminal block.

Note:
When multiple charging stations are connected to one power supply cabinet, consider using phase rotation (see Phase rotation on page 21).

b. Pull on the wires to make sure they are correctly connected. The indicators on the terminal block must be in the locked position.

5. Secure the power supply cables with one or more cable ties.

4.2.3. Connect Hub-Satellite network cables



See the corresponding illustrations in manual B.

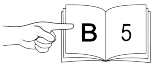
In a Hub-Satellite system, the hub contains the communication module and communicates with the satellite stations using a data cable. The network cables are attached in series between the communication port of each satellite then to the communication port in the hub. The communication port is the black 2-pin connector on the right side of the controller.

- Use a RS485 connector, 2-pin, black, for each RS485 connection.
- Use SFTP Category 6 network cable suited to the RS485 protocol for the data connection.
- Use the green/green-white twisted pair of wires for the RS485 connections.
- One BusinessLine hub can be connected to a maximum of 19 BusinessLine satellites.
- In a double BusinessLine station, the RS485 connection between the hub and satellite (or satellite and satellite) is already in place. Make sure to connect the incoming RS485 cable on one side of the station (for a Satellite) and the outgoing RS485 cable on the other side of the station to ensure a proper serial network.
- Always terminate the Hub-Satellite network with a 120 Ω terminal resistor (see Delivered components on page 13) on the black RS485 connector of the last station in the series.
- For correct operation of a smart grid, a Hub-Satellite configuration must be connected from a single power cabinet. If a group of charging stations is powered from a different power cabinet then that group stations must be a separate Hub-Satellite configuration.
- This method of installation cannot be used in a Star-shaped or T-shaped network because reflections can occur in the cable.
- In a Hub-Satellite installation, if one or more LED rings constantly flash red then there is a crossed connection in one of the satellite RS485 connections.

Connect the Hub-Satellite network cables in accordance with the diagram.

Note:
RS485 data communication configurations in a Star-shaped or T-shaped network will not function correctly because signal reflections can occur in the network. Refer to the schematics for examples of Star-shaped and T-Shaped networks.

4.2.4. Connect Smart Charging network cables

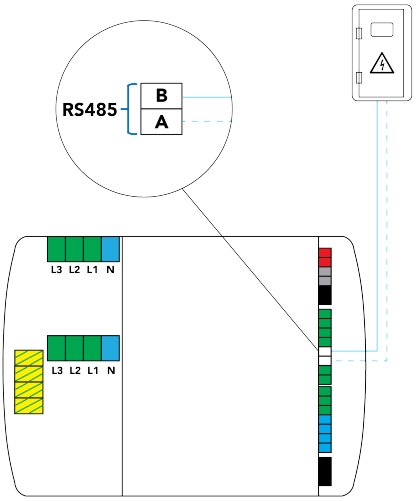


See the corresponding illustrations in manual B.

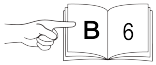
Route the RS485 MAX protocol (smart charging) network cable from the power supply cabinet to the controller in the charging station. The network cable is connected to the grey connector on the right side of the controller in the Hub station.

- Use a RS485 connector, 2-pin, white, for the RS485 connection.
- Use SFTP Category 6 network cable suited to the RS485 protocol for the data connection.
- Use the blue/blue-white twisted pair of wires for the RS485 connections.
- For correct operation of a smart grid, a Hub-Satellite configuration must be connected from a single power cabinet. If a group of charging stations is powered from a different power cabinet then that group stations must be a separate Hub-Satellite configuration.

Connect the smart charging network cables in accordance with the diagram.



4.2.5. Install cover



See the corresponding illustrations in manual B.

1. **For a Charging station with a RCBO**: Switch the RCBO to the I (on) position.
2. Install the cover:
   a. Apply silicone grease to the seal around the charging station frame to ensure protection against water and dirt.
   b. In the station, make sure that the wiring around the charging socket is clear of the charging socket locking mechanism.

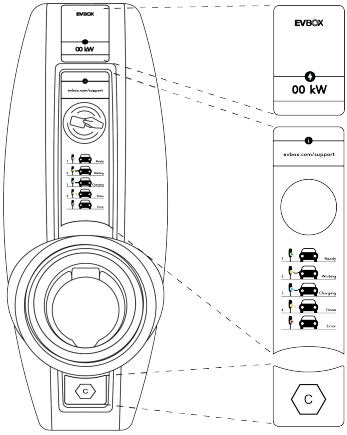
c. Put the top of the cover over the top edge of the charging station frame and then pull the cover downwards.
   - Make sure that no wires are trapped around the edge of the cover.
   - Make sure that the cover locks onto the frame and the rubber seals are in position to ensure protection against water and dirt.

Note:
A double socket charging station has two covers.

d. Tighten the bolts at the bottom of the cover using a 5 mm hex key or a socket wrench with a 5 mm hex socket.

e. For a double charging station install the second cover in the same way.

3. Install a cover label set on each cover.



BusinessLine is ready for commissioning.

CAUTION:
Do not switch on power to BusinessLine at this time. You must first register BusinessLine with the CMP before power is switched on.

4.3. Commissioning

Commissioning BusinessLine connects it to a Charging Management Platform (CMP), ready to charge a vehicle. In a Hub-Satellite installation, only the Hub BusinessLine is connected to the CMP, with the Satellites connected through this Hub using RS485 data communication.

A Hub model can connect up to 20 connectors (1 Hub and 19 Satellites, each with two connectors) to a CMP. The Hub uses either a pre-programmed SIM to connect to the CMP through a cellular network, or a Wi-Fi connection to a local Wi-Fi router.

Note:
It is important that BusinessLine is first registered with the CMP before power is supplied. This allows BusinessLine to find and connect to the CMP URL automatically.

4.3.1. Configuration details

The BusinessLine configuration details are on the sticker in Part B of this manual. You will need the configuration details of a Hub BusinessLine to commission a standalone Hub or a Hub-Satellite installation.

4.3.2. Register BusinessLine with CMP

Activate the Hub BusinessLine with the CMP on the CMP website or using the CMP-specific app. Contact the Charging Point Operator (CPO) for details about the charging station activation procedure.

4.3.3. Download EVBox Connect app

Use the EVBox Connect app to set up the Hub BusinessLine and connect it to the URL of the CMP.

Download and install the EVBox Connect app on your smartphone or tablet:

4.3.4. Commission EVBox BusinessLine

Make sure that BusinessLine is registered with the CMP before you connect power (see Register BusinessLine with CMP on page 30).

1. Switch on electrical power to BusinessLine.
   BusinessLine powers up and runs the start-up sequence.
   Bluetooth is activated and BusinessLine searches for the device that is running the EVBox Connect app.
2. On your smartphone or tablet, switch on Bluetooth and open the EVBox Connect app.
3. Select **START PAIRING** in the app.
   A list of charging stations is shown.
4. Select the BusinessLine Bluetooth ID (registration number).
   The LED ring shows flashing purple when pairing using Bluetooth is active.
5. Select the BusinessLine Bluetooth ID and follow the instructions in the app. The following details from the BusinessLine configuration sticker (see Configuration details on page 30) are required for the app:
   - The product Bluetooth ID.
   - The product security code.
6. Use the app in the Installer mode to configure the following settings:

a. For a charging installation connected using the pre-programmed SIM:
   - The applicable Charging Management Platform (CMP). (Do not manually add the CMP URL.)
   - The charge current. For a single charging station, the maximum charge current sets the maximum output current for a single socket. For a Hub-Satellite installation, the maximum charge current sets the maximum output current for the complete Hub-Satellite installation.

b. For a charging installation connected to Wi-Fi:
   - The Wi-Fi connection.
   - The applicable Charging Management Platform (CMP). (Do not manually add the CMP URL.)
   - The charge current. For a single charging station, the maximum charge current sets the maximum output current for a single socket. For a Hub-Satellite installation, the maximum charge current sets the maximum output current for the complete Hub-Satellite installation.

c. The following settings can also be configured using the app:
   - Charger Access Control. Select the required access control for the charging station.
   - LED Ring brightness.
   - LED Ring ON or OFF when BusinessLine is in idle mode.
   - Charging station name.
   - Adding and removing charge cards used to activate a charging session (only for an offline charging station)
   - Updating the firmware.

7. Follow the instruction in the app to reboot BusinessLine.

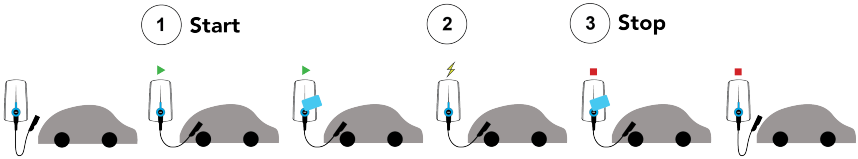
8. Operate BusinessLine using an electric vehicle (EV) or the EVBox Test Box to confirm correct operation. For a Hub-Satellite installation, operate each station in the installation to confirm correct operation.

BusinessLine is connected to a CMP and is ready to use.

5. Operation instructions

5.1. Start and stop a charging session

1. Start charging
   - Plug the charging cable into your car.
   - If you use a charge card or key fob, hold it in front of the reader on the charging station to start charging.*
2. Your car is charging.
3. Stop charging.
   - If you use a charge card or key fob **, hold it in front of the reader on the charging station to stop charging.*
   - Unplug the charging cable from your car.



* When the charging station is configured to only accept charge cards or key fobs. See Commissioning on page 29.

** You must use the same charge card or key fob that you used to start the charging session.

5.2. LED indicator ring

LED ring color	What it means	What to do
 LED ring off or green.	The charging station is ready for use.	• Connect the charging cable. • Select the authorization method (for example, charge card, or key fob).
 LED ring flashing green.	The charge card or key fob is being authorized.	Wait until the LED ring shows blue.
 LED ring blue.	The charging station is charging the vehicle.	• Wait until the vehicle has charged. • Stop charging at any time.

LED ring color	What it means	What to do
 LED ring yellow.	The car is fully charged.	• Stop the charging session using the authorization method used for activation (for example, charge card or key fob). • Unplug the charging cable.
 LED ring flashing yellow.	Charging session is in queue (applicable for Smart Charging only).	When power becomes available, charging will start or resume and the LED ring will show blue.
 LED ring red.	An error has occurred.	Check Troubleshooting on page 33 for a solution.
 LED ring flashing red.	The charge card or key fob is not authorized.	• Authorize the user. See Commissioning on page 29. • Contact the charge card service operator if necessary. • A Satellite charging station has become disconnected from the Hub charging station.
	A Satellite charging station has become disconnected from the Hub charging station.	Check the Hub-Satellite RS485 network connection. See Connect Hub-Satellite network cables on page 27.
 LED ring flashing purple.	The Hub charging station is in Bluetooth pairing mode and ready to pair with the EVBox Connect app.	See Commissioning on page 29.

5.3. Troubleshooting

Troubleshooting must only be done by a qualified electrician unless otherwise stated. Incorrect installation, repairs or modification can result in danger to the user and may void the warranty and liability.

This is a general troubleshooting guide listing the most common issues. If you are not able to solve an issue, visit www.evbox.com/support for further help from our service pages and support team.

Problem	Possible cause	Solution
Charging station does not react.	No power to charging station.	• Check that the residual-current device and circuit breaker on the main power supply panel are on. • Switch off the main power supply, wait 20 seconds, then switch on the main power supply again. • Check that the power supply cable connected to the charging station is live. The LED ring green should show green.
Charging station does not emit clear tone when switch is set to on.	• Small plugs on the controller are not fully pushed in. • 230V connections are not connected correctly.	• Check that the circuit breaker (RCBO) is on. • Check for 230 V on the input terminals of the controller. • Ensure all wire and plug connections are secure, especially on the controller.
Residual current device trips constantly.	Grounding error in the charging station.	• Examine electrical wiring for damage. Replace damaged wiring. • Moisture or condensation on electrical connections. Dry the connections where necessary. If necessary, repair seals on charging station
	Fault in the vehicle or defective charging cable.	Replace the charging cable.
	Ground resistence is too high for the vehicle type.	Measure the ground resistance and compare it to the resistance required by the supplier of the vehicle.

Problem	Possible cause	Solution
LED ring flashes red immediately when the card is held against the reader.	Charge card is not authorized for charging at this charging station.	• Check that the charge card is authorized for use on public chargers. (Check by user.) • Check the settings of your charging station in your online account. (Check by user.)
	There is no communication with the backend.	Use the EVBox Connect App to check that the hub station or hub module has a connection to the cellular network or Wi-Fi.
LED ring shows constantly red.	Grounding fault.	• Check that the electrical installation is correctly grounded. • If necessary, add additional grounding closer to the installation.
In a hub-satellite installation, one or more LED rings constantly flash red.	Crossed connection in one of the satellite RS485 connections.	Examine RS485 cabling and connections.
	No connection with the hub charging station.	Examine RS485 cabling and connections.
LED ring always shows yellow.	Vehicle is fully charged.	Disconnect the charging cable.
	Charging station is waiting for vehicle.	Check that the charging cable plug is inserted into the vehicle correctly. (Check by user.)
	Vehicle is on a timer.	Change the setting of the timer in the vehicle. (Done by user.)
	The charging cable has a fault.	Replace the charging cable. (Done by user.)
	Ground resistance is too high for the vehicle type.	Measure the ground resistance and compare it to the resistance required by the supplier of the vehicle, for example Renault Zoe < 150 Ω.

Problem	Possible cause	Solution
LED ring shows blue for a few seconds, then changes to yellow.	Vehicle will not charge.	• Make sure that the minimum current accepted by the car is not higher than the minimum current supplied by the station. (Check by user.) • Check the line-to-line and neutral-to-line voltages at various locations on the power circuit(s). • Check that the electrical installation is correctly grounded.
Charging station does not start charging. LED ring flashes green for 30 seconds, then flashes red 10 times. LED ring changes to green or goes off.	No response from the backend portal account.	Use the card again to start the charging. If the problem remains, contact your operator or service provider for further support. (Check by user.)
	Plug not locked.	• Is the plug pushed far enough into the charging station? (Check by user.) • Examine the plug for damage or bent pins. (Check by user.) • Examine the socket to see if it is blocked by an object. (Check by user.)
	Vehicle not connected.	Is the plug properly connected to the vehicle? (Check by user.)
	Charging station lock is blocked.	Check if the charging station internal wiring harness blocks the plug locking mechanism.
Plug cannot be removed from charging station.	Incorrect card used to stop charging (LED ring flashes purple briefly).	Use the same card to stop charging as to start charging. (Check by user.)

Problem	Possible cause	Solution
	No response from the backend portal account.	Use the card again to stop the charging. If the problem remains, contact your operator or service provider for further support. (Check by user.)
	Plug lock will not release.	• Push the plug further into the charging station and hold the card against the card reader again. (Check by user.) • Switch off the main power supply, wait 20 seconds, then switch on the main power supply again. • Remove the cover then manually turn the lever on the plug locking mechanism upwards to the unlock position. • Check if the charging station internal wiring harness blocks the plug locking mechanism.

6. Appendix

6.1. Glossary

Abbreviations and acronyms	Meaning
AC	Alternating Current.
CMP	Charging Management Platform. The backend platform that links a charging station to the CPO.
CPO	Charging Point Operator. The owner and/or operator of the charging station installation.
DNO	Distribution Network Operator. The owner and/or operator of the power supply network.
EV	Electric Vehicle.
EVCS	Electric Vehicle Charging Station.
HMI	Human Machine Interface.
LED	Light Emitting Diode.
OCPP	Open Charge Point Protocol.
RCBO	Residual-current circuit breaker with over-current protection.
URL	Uniform Resource Locator (URL): the web address of a CMP.

6.2. Disclaimer

The present document is drawn up by way of information only and does not constitute an offer binding upon EVBox. EVBox has compiled the contents of this document to the best of its knowledge. No express or implied warranty is given for the completeness, accuracy, reliability or fitness for particular purpose of its content and the products and services presented therein. Specifications and performance data contain average values within existing specification tolerances and are subject to change without prior notice. Prior to ordering, always contact EVBox for the latest information and specification. EVBox explicitly rejects any liability for any direct or indirect damage, in the broadest sense, arising from or related to the use and/or interpretation of this document. EVBIM_072021 © EVBox Manufacturing B.V.

EVBox strives to manufacture products of the highest quality. EVBox products are fully CE certified and compliant with the essential requirements of EMC Directive 2014/30/EU, Low Voltage Directive 2014/35/EU, Radio Equipment Directive 2014/53/EU and Restrictions of Hazardous Substances Directive 2011/65/EU (as amended by 2015/863/EU). More details can be found at evbox.com or in this installation manual. EVBox products are sold with a limited warranty described at evbox.com/general-terms-conditions.

EVBox Manufacturing B.V.
Kabelweg 47
1014 BA Amsterdam

The Netherlands
www.evbox.com/support