

**POWERCHOICE 360X CABINET**

# Installation manual



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# 1. Preface

This section gives the requirements and instructions for the installation of the Electric Vehicle Supply Equipment (EVSE), the PowerChoice 360X.

## **1.1 About the document**

This document is part of the technical handbook which is an integral part of the Electric Vehicle Supply Equipment (EVSE), cabinet of the PowerChoice 360X.

### **1.1.1 Structure of this document**

This document gives a descriptive summary of the EVSE. Aim of the description is to give a better understanding of the requirements and the EVSE operation

For easy access to the information, this document is divided into chapters.

The chapters are:

- the preface, to give an introduction to the content and the use of the document;
- the civil work, to detail the work to be done;
- the mechanical installation, to detail the lifting and installation work to be done;
- the electrical installation, to detail the electrical work to be done before commissioning can start.

### **1.1.2 How to use the documentation**

This document is part of the technical handbook which is an integral part of the Electric Vehicle Supply Equipment (EVSE), the PowerChoice 360X.

This document gives the requirements and instructions for the installation of the Electric Vehicle Supply Equipment (EVSE), the PowerChoice 360X.

## **1.2 Target groups**

The information given in this document is meant for use by the authorized persons who are involved with the planning, supervision and execution of the given tasks. These tasks are, but not limited to, the handling, transport and storage and the installation.

For the execution, different skills and authorizations are required. For generic information, refer to the introduction of this technical handbook.

Work involved with the EVSE always calls for the safe work procedures with and in the vicinity of electrical installations. Refer to the local authorities for the rules and regulations that apply and prevail.

## 2. Introduction

The installation of the EVSE requires administrative work to obtain the required permits as well as work to prepare for the cables, supply, and the foundation of the EVSE. Contact your local representative to obtain the necessary permits.

For locations where the EVSE is exposed to direct sunlight and high ambient temperatures for most of the day, it is recommended to install protection from direct sunlight.

For locations where the EVSE is exposed to the possibility for collisions with vehicles, consider the installation of collision prevention equipment.

After completion of the supply and civil work, the EVSE is installed mechanically onto the foundation. When the mechanical work is completed the EVSE is electrically connected and commissioned.

Summarized the civil and construction work requires:

- The physical installation of the foundation and the EVSE cabinet;
- The installation of (underground) AC cable and conduits between the EVSE and the AC power supply station;
- The installation of the upstream transformer and switchgear;
- The installation of required earth electrode(s);
- The electrical installation and commissioning of the EVSE;
- If applicable, the installation of a network connection for remote communication;
- The construction and lining of a parking place (charging place) for the EV;
- As applicable, any work related to the road signs and markings.

As covered in earlier sections of this handbook, this product has several deployment configurations. These deployment configurations include, but aren't limited to, variations of:

1. A standalone unit with attached CCS cable
2. This base unit with a single or several remote CCS cable outlets  
(outlet detail covered in a separate dedicated handbook).
3. This base unit with a single or several remote inverted pantograph outlets  
(outlet detail covered in a separate dedicated handbook).
4. This base unit with a combination of remote CCS cable outlets and inverted pantograph outlets.

## 2.1 Site Layout Considerations

There are several aspects to locating the EVSE equipment at a macroscopic scale that improve performance, lifetime, and ease of operation. These items are very dependent on the end user's site and intended use, so they are covered as concept considerations in this section.

- The access of the installation site shall be of sufficient size to allow the transport packages for the EVSE equipment to pass. If the access doors/gates/corridors are too small for the safe transport of the transport packages, special provisions may need to be made to allow installation. The maximum size of the EVSE package is 920x1170x2430 mm (LxWxH). Note: These details are for each cabinet.
- For locations where the EVSE is exposed to direct sunlight and high ambient temperatures for most of the day, it is required to install protection from direct sunlight or place the EVSE under shade.
- For locations where the EVSE is exposed to the possibility for collisions with vehicles, it is highly recommended to install collision prevention equipment. This may be in the form of bollards or a significantly raised curb/EVSE footing.
- For locations with significant snow accumulation or snow drifts, it's recommended to install barriers or a shelter to protect snow from blocking air intake vents. Airflow needs should be respected in all installations. The EVSE is air cooled by a set of internal fans which take in the air from the ventilation grids in the bottom of the charger cabinet and release the warm air from the ventilation grids in the top of the charger cabinet. The air intake has filters to prevent contamination of the internal side of the charger cabinet. Keep the ventilation grids free from debris and obstacles to allow for a free flow of air.
- The maintenance tasks for the EVSE are done from the top and the front of the charger cabinet. Consider this when spacing units and planning service with vehicles present.
- The operation area is at the front of the charger cabinet. Normally, the charging process is started, monitored, and stopped automatically by the EV. In case of abnormal operation, it is possible to stop the charging process with the Charge abort button or the emergency stop button.
- The escape routes are very location specific and shall comply with the national and local rules and regulations. Keep in mind that a safe escape route is provided during the maintenance tasks (with the door open).
- The base unit can supply from 1 to 3 external DC outlets. Even if these are not initially all deployed, reservation of space is prudent to allow future expansion.

## 2.2 Floorplan

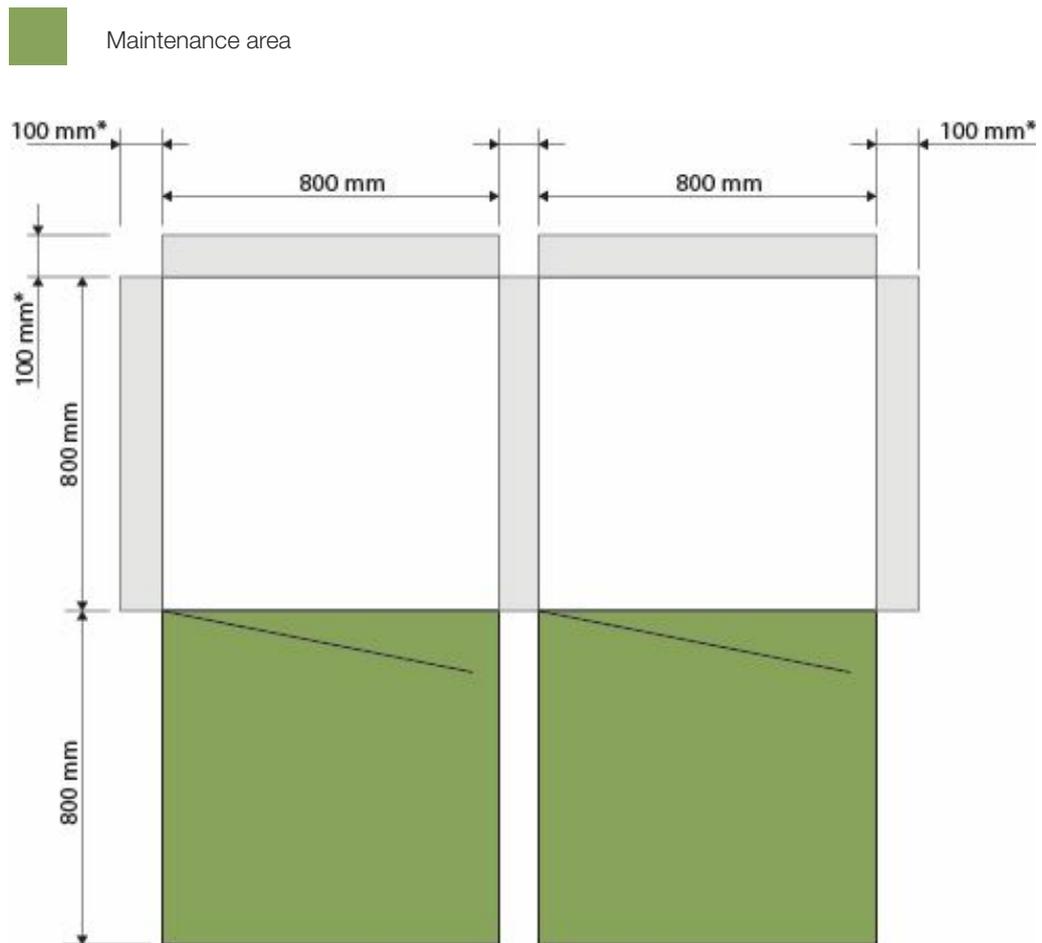
The EVSE is designed for a side-by-side installation, with the back of the cabinet against a wall or freestanding. Due to air cooled ventilation the bottom of the EVSE has to be free from debris or obstruction.

It is mandatory to respect a clearance of 100 mm at the rear and in between separate units. In the front, the recommended clearance is 1500 mm to provide space for servicing the equipment. Note that these clearances may be significantly impacted by site-specific situations such as a restriction in accessibility that require further clearance consideration for egress. Please consult with local site engineering as needed.

Measurements shown in the image below are recommended clearances. 10 mm is the minimum clearance between the EVSE and other EVSE or objects at the back and sides. This clearance requires a fork-lift installation.

\* 100 mm of clearance between units at the back and sides is the recommended in order to allow space provisions that make the installation possible with a crane or hoist.

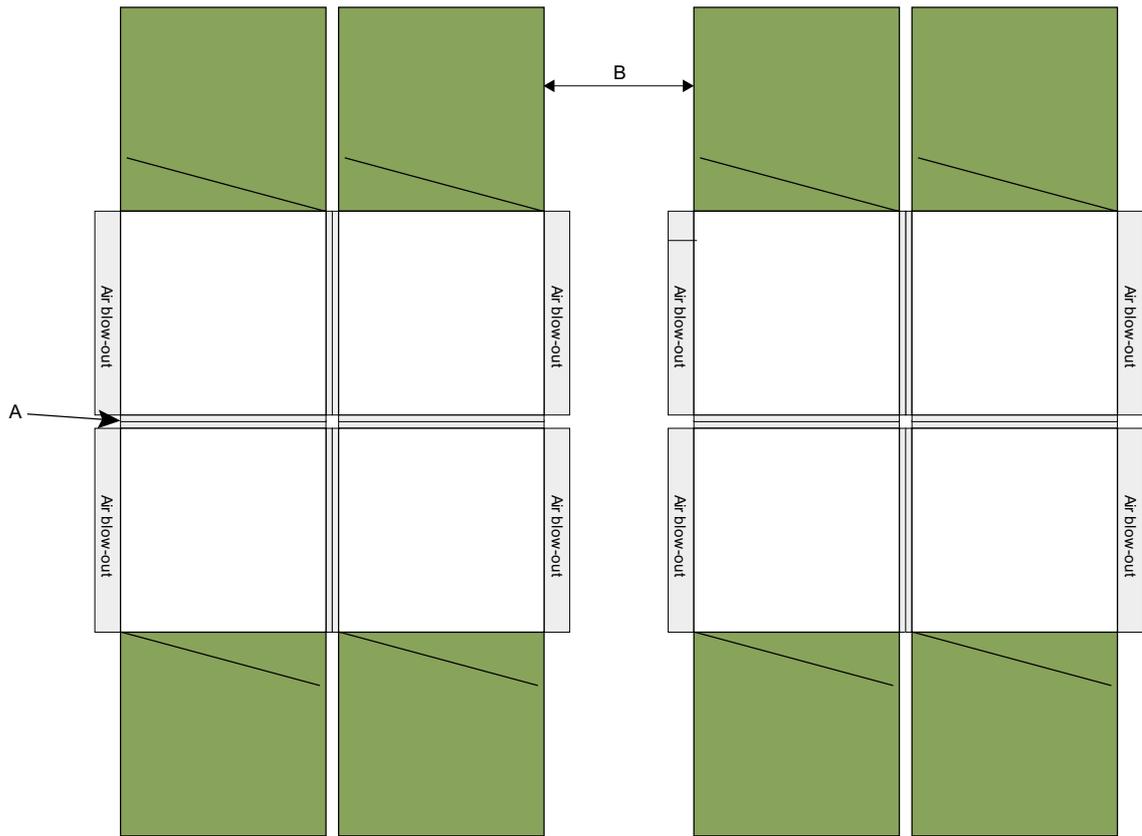
Note: The two cabinets are linked with each other.



### Caution

When planning a site layout, additional space may be required to allow for a safe route of egress. All local codes for safe egress must be followed.

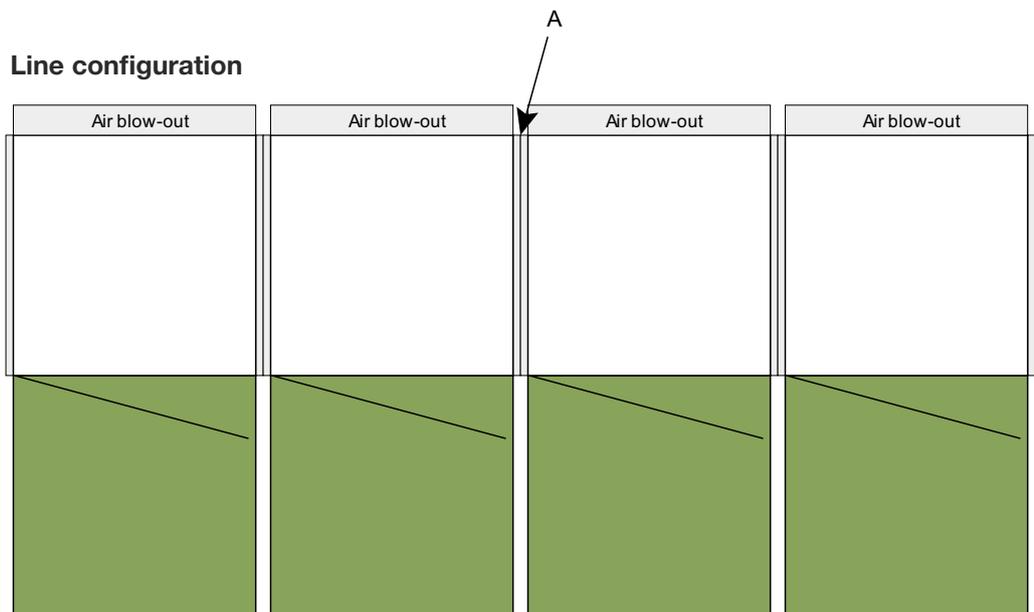
## 2.2.1 Block configuration



A Minimum clearance of 15 mm per product creates 30 mm minimum spacing between.

B The distance between two blocks must be at least 610 mm.

## 2.2.2 Line configuration



A Minimum clearance of 15 mm per product creates 30 mm minimum spacing between.

Note: The cabinets are placed next to each other.

### 2.2.3 Cable gland plate

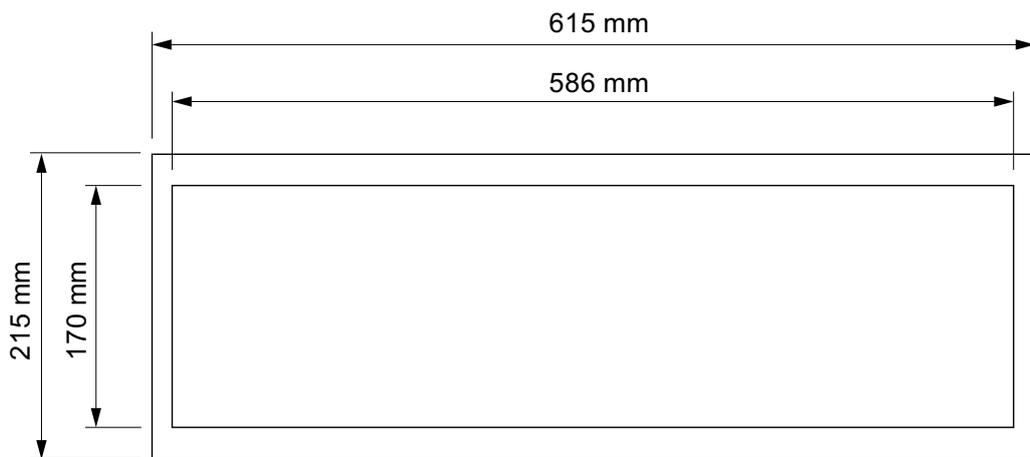


**Note:**

The details below are for each of the base product cabinet.

A cable gland plate is provided. This plate may come from the factory several ways: 1. it may be solid, to allow for field punching, 2. It may be pre-drilled to allow easily sourced cord grips, or 3. it may be pre-populated with standard cord grips.

By default, a blank plate is provided.



When openings for 3 cord grips are present but not used, make sure to close these openings with IP54 approved methods to ensure the IP54 rating.

The outer dimensions mentioned on the plate are the dimensions of the cable gland plate. The inner dimensions are the available space for drilling and placing glands.



**Note:**

Installer is responsible to ensure that the enclosure rating of the cabinet is maintained while complying with local codes and installation standard.



**Note:**

Custom gland plate composition can be provided:

1. Blank plate  
Installer is responsible of fabrication and mainlining the enclosure rating of the cabinet.
2. Custom fabricated plate  
Installer explains Heliox which holes at which position are required.  
Installer is responsible of fabrication and mainlining the enclosure rating of the cabinet.

# 3. Civil work



**Note:**

The details below are for each of the base product cabinet.

For most installations, some form of civil work will be needed.

It is the responsibility of all parties working on the project to ensure the civil, mechanical, and electrical works are executed in compliance with the, local and national codes, standards, rules and regulations.

It is the sole responsibility of the site owner, to make sure:

- the civil works are executed in compliance with the, local and (inter) national Directives, Standards, Rules and Regulations;
- the AC cable is protected against the ground water;
- the DC cable is routed in its own duct and protected against ground water;
- the PE and CP (optional signal) cable, AC auxiliary cable are routed in their own duct and protected against ground water;
- the cable ducts are buried at least 50 cm apart, or routed in EMC shielded cable trays.



**Danger:**

Failing to adhere to these points may result in a variety of consequences from damaged equipment to personal harm or death.



**Note:**

All cable ducts must be protected for ingress of water. An underground cable duct does protect of ground water, however if open at surface level, then also rain or sea water might flood into the duct, worsening the electric behavior and can cause situation in which the charger goes over to a malfunction state.

### 3.1 The foundation



**Note:**

Depending on the number of external DC outlets, several sets of output conduits may reside in the up to 3 output areas.



**Note:**

The information below are for each of the base product cabinet.

The EVSE is placed on the foundation. The foundation shall be as flat as possible with a maximum slant of 2 mm across the bottom of the EVSE equipment. Please see the specification section of the technical handbook for details on product weight. Please consult local code for appropriate foundation design to comprehend regional needs.

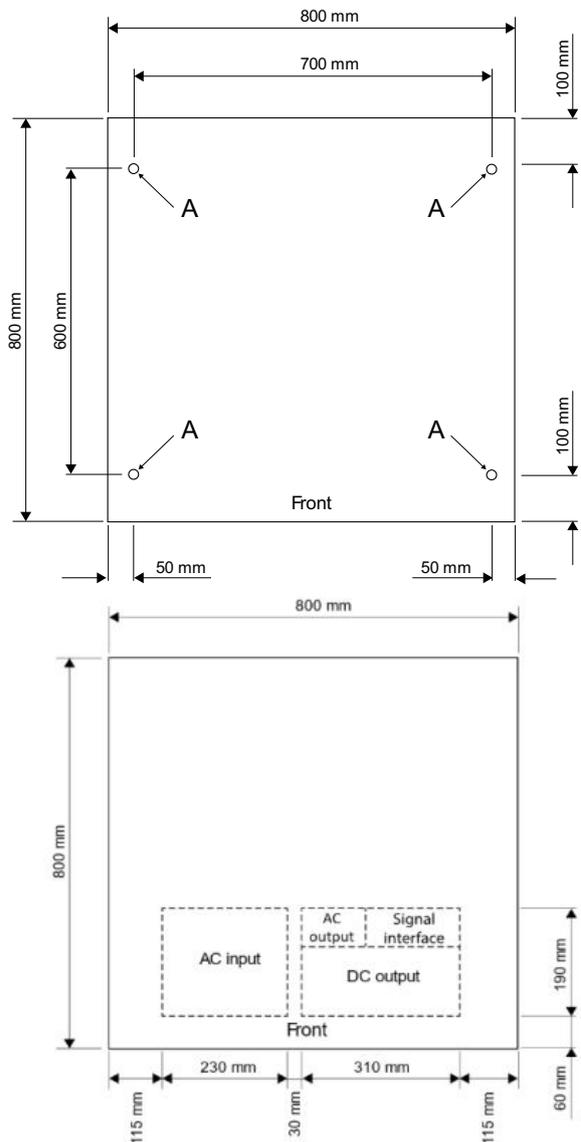
A: M12 anchor bolts are required to mount EVSE equipment to the foundation surface. Consult with site engineering for requirements on bolt depth, epoxy, and any special requirements resulting from the foundation medium.

Input conduits:

- AC inputs

Output conduits:

- DC output
- AC output wiring
- Signal interface wiring



**Note:**

The cable ducts need to be mounted just a bit above the ground (20 – 50 mm), to prevent water entering the duct.

## 3.2 Ventilation



**Note:**

The details below are for each of the base product cabinet.



**Note:**

When the iron grids are rotated, the IP degree of IP54 is affected for the water ingress part, Take this into account. Dust ingress however is not affected.

The EVSE is air cooled by a set of internal fans which take in the air from the ventilation grids in the bottom of the charger cabinet and release the warm air from the ventilation grids in the top of the charger cabinet. The air intake has filters to prevent contamination of the internal side of the charger cabinet.

Keep the ventilation grids free from debris and obstacles to allow for a free flow of air.

The airflow of the exhaust of the charger can be directed upwards or downwards. By default the iron grids are installed to blow downwards. This blow downwards configuration is mandatory when the chargers are placed outdoor, in an environment where water can fall on the charger or in any other situation that it is demanded that the water ingress/IP degree must be at least IP54.

For indoor installations where there will be no water falling on the charger, the iron grid of the exhaust can be rotated such that the blow off is upward. This is beneficial to take hot air away when the chargers are installed indoor and where the air-removal is at the top/ceiling of the room the chargers are in.



Upward blow off



Downward blow off

# 4. Mechanical installation

The mechanical installation is executed either by a dedicated party of Heliox, or it is the scope of supply of the site owner. For details, refer to contract as signed and agreed upon.

Note that the mechanical installation requires hoisting or lifting tasks.

It is the sole responsibility of the installer, to make sure:

- the mechanical installation work is executed in compliance with the, local and (inter) national Directives, Standards, Rules and Regulations;
- the Hoisting and lifting work is executed by certified persons and valid equipment.



**Danger:**

Failing to adhere to these points may result in a variety of consequences from damaged equipment to personal harm or death.



**Caution:**

Be careful when you handle the coated (painted) parts. Damaged coating can cause corrosion. Corrosion can cause (serious) damage to the parts in the future.



**Note:**

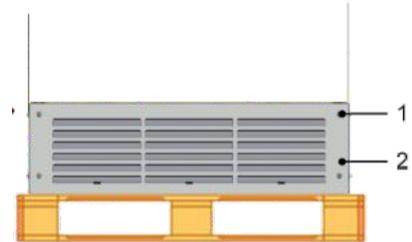
The details of the mechanical installation mentioned below are for each of the base product cabinet.

## 4.1 Preparation

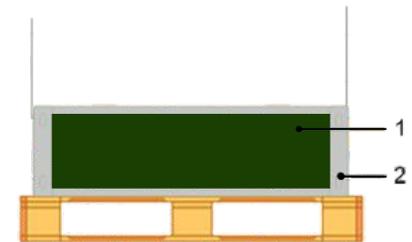
1. Put the pallet with the cabinet on a flat and stable surface with sufficient space to work.
2. Remove and discard the packaging material.
3. Dispose of the packaging material in accordance with the local regulations.

## 4.2 Use a forklift to transport the charger

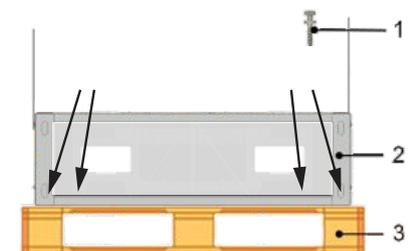
1. Remove the screws (1) on both ends and the ventilation grid (2).
2. Put the parts in a safe place to prevent damage.



3. Remove the demister filter (1) from the cabinet (2).
4. Remove the dust filter. Shift the filter within its bracket upwards. Pull/swing out at the bottom to the front. Remove it.



5. Find and remove the screw bolts with the washers (1) that attach the cabinet (2) to the pallet (3).
6. Also behind the back panel the charger is screwed to the pallet. Remove and discard the screw bolts with washers (there is no filter or demister present at the back).



### Note:

The fork lift pockets are blind, there is an endplate. Note that the forklift pockets allow for a fork width of 130mm.

7. Make sure, the fork lift truck is valid for the work and the driver is certified.
8. Before lifting, for stability purposes, close and lock the door.
9. Carefully, drive the forks into the forklift pockets.
10. Carefully, remove the cabinet from the pallet and put it on a flat and stable surface.
11. Remove the pallet from the work area.

### 4.3 Remove the charger cabinet from the pallet

1. Remove the bolts (1) on top of the roof (4x).
2. Mount the lifting eyes (2) instead (4x).
3. Connect the lift to the lifting eyes.
4. Before lifting, for stability purposes, close and lock the door.
5. Lift the cabinet and move it to a flat and stable surface.

Note that this operation may be done via hoisting, as described, or by fork lifting procedure.



# 5. Electrical installation



**Danger:**

Risk of electrocution. Make sure, it is safe to work on the electrical installation. Energized electrical systems are hazardous and can cause electrical shock. Electrical shock can cause (serious) injury to persons.

The AC electrical installation is executed either by a dedicated party of Heliox, or it is the scope of supply of the site owner. For details, refer to contract as signed and agreed upon.

It is the sole responsibility of the site owner:

- to install and connect the AC power supply between the AC power supply grid and the EVSE;
- to install, when stipulated by local rules, to install and connect an earth electrode next to the charger cabinet;
- to make sure, the AC power supply is compliant with the (inter) national Directives, Standards, Rules and Regulations.

Failing to adhere to the local and (inter)national Directives, Standards, Rules and Regulations, guidelines and technical details herein can result in unforeseen problems and delays of any kind.

## 5.1 Electrical power connection



**Note:**

The details of the electrical installation mentioned below are for each of the base product cabinet.

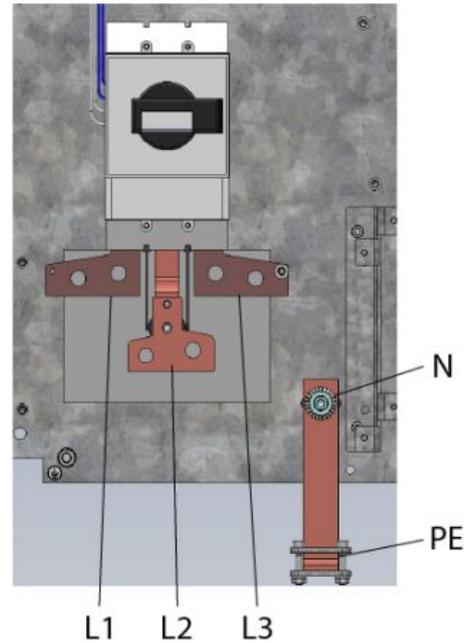
The AC power supply is connected to the phase widgets extensions of the main circuit breaker in the EVSE. The cables must be terminated and connected in accordance with the instructions as given by the manufacturer and (inter) national Directives, Standards, Rules and Regulations.

After the cable lugs are installed, torque tightened, apply a torque mark for future reference. The torque values are listed in the section: Technical specifications.

It is mandatory to make sure, the feed through of the incoming cables are closed to prevent rodents to enter the cabinet.

### 5.1.1 AC configuration

Incoming AC power supply:  
TN-C: 3P+PE  
TN-S: 3P+N+PE  
Short current rating: 35kA



### 5.1.2 Grounding instructions

This unit must be connected to a grounded, metal, permanent wiring system; or an equipment-grounding conductor is to be run with circuit conductors and connected to equipment-grounding terminal or lead on battery charger. Connections to battery charger shall comply with all local codes and ordinances.

### 5.1.3 Grounding instructions

1. Set the switches in the off position.
2. Lock-out/Tag-out the upstream supply to the EVSE and the related systems to prevent that the EVSE can get energized unintentionally.
3. Make sure, the electrical parts and connections are clean, dry and free of corrosion.

## 5.2 Electrical power connection

As applicable, the AC power supply cable can be executed as a multicore cable or as separate cables. The AC power supply has the phases (L1, L2 and L3), neutral (N) and the protective earth (PE).

It is assumed that the AC power supply cable has copper cores and the cable lugs have a tinned surface.



#### Note:

Narrow cable lugs are needed for AC connection, standard cable lugs will not fit.

1. Do a visual inspection for damage and contamination.
  - The cable is clean and shows no signs of damage.
2. Feed the AC power supply cable(s) into the EVSE.
3. Allow for sufficient over length for future repair of the connections.
4. Install the cable lug and the shrink sleeve to the cable in accordance with the manufacturer's instructions.

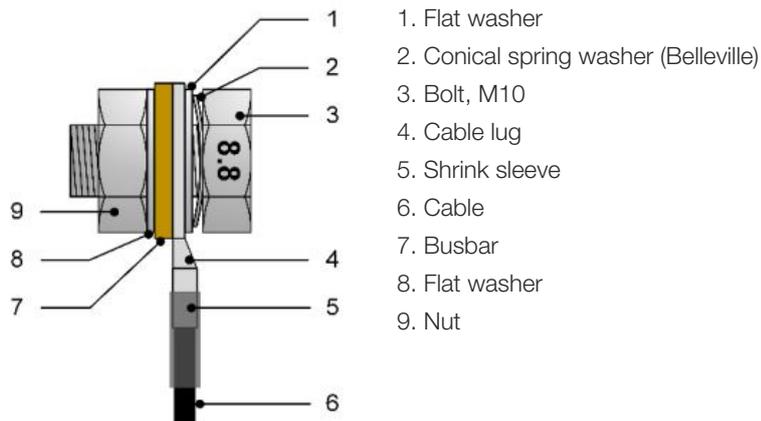
### 5.3 Connect the AC power supply cables



#### Caution:

Be careful when you install the conical spring washer. The hollow side must face the busbar. Incorrect installed conical spring washers are not short-circuit proof. Incorrect installation will cause (serious) damage to the equipment.

1. Feed the AC power supply cable(s) into the EVSE.
2. Allow for sufficient over length for future repair of the connections
3. Make sure, sufficient length is available for 3x a repair session.
4. Install the cable lug and the shrink sleeve to the cable in accordance with the manufacturer's instructions.



### 5.4 Connect the Output Connections

When an external EV coupler is used, the responsible parties must reference the detailed information provided in the documentation that comes with the EV-coupler.

- The items in sections preceding this still apply in order to install the base unit.
- An additional set of outputs is needed to be installed to connect the base unit to the external coupler or couplers.
- The DC cable shall be routed in its own duct.
- The PE and CP (optional signal) cable shall be routed in their own duct with the control wires and Ethernet.
- The 400VAC supply shall be routed in its own duct
- The DC and CP ducts shall be at least 500 mm away from each-other, or routed in EMC shielding raceways such as rigid conduit.

The DC+ and DC- cables of the external DC outlet must be connected onto the interface panel inside the base module to the DC+ and DC- connections. The other connections must be made onto the terminal strip in output groups from left to right (X501, X502, or X503) as called for in a site-specific system layout.

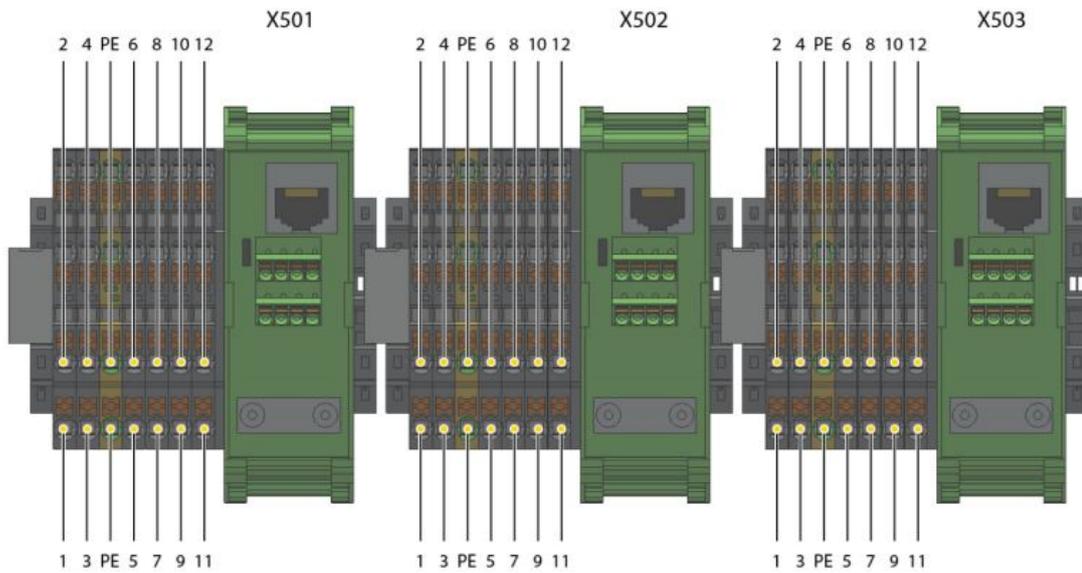


#### Note:

The EVSE unit described in this manual may support several different output configurations. Please refer to the site system layout documentation along with the EV-coupler documentation for detail on all connections needed at a site.

Earth cable must be connected to rail A-PE1.1.

## 5.4.1 Output terminal connections



Cable	Function	Wire color/number	Base station connection
AC IN	L1	BK1	X501:1
	L2	BK2	X501:2
	L3	BK3	X501:3
	N	BU	X501:4
	PE	GN/YE	X501:PE
CAN from base product	CAN_H	WH	X501:5
	CAN_L	BN	X501:6
	Shield		500SH2
Low voltage interface		Not used	X501:7
		Not used	X501:8
Emergency stop from base product	Emergency Stop 1	BK1	X501:9
	Emergency Stop 2	BK2	X501:10
Interlock In (Door switch from base product)	Door 1	BK3	X501:11
	Door 2	BK4	X501:12
Ethernet from base product	Communication		X501:13



### Note:

If the X501 group is not available, use the next terminal strip group available from left to right (X502 or X503).

### 5.4.2 Interconnection between cabinets

The interconnections between cabinets must be made at the moment of installation of the cabinets.

Cable	Function	Wire color/ number	The base station connections* interlink between two cabinets
CAN from base station	CAN_H	WH	X503:5 (cab A) – X503:5 (cab B)
	CAN_L	BN	X503:6 (cab A) – X503:6 (cab B)
	Shield		500SH3 (cab A) – X500SH3 (cab B)
Incoming PE/GND interconnection	PE/GN	GR/YE	PE/GND1 busbar (cab A) - PE/GND1 busbar (cab B)
Emergency stop from base product	Emergency Stop 1	BK1	X503:9 (cab A) – X503:9 (cab B)
	Emergency Stop 2	BK2	X503:10 (cab A) – X503:10 (cab B)

\*Note: Cab A & cab B are the master cabinet and slave cabinet respectively for the Flex 360KW charger.

### 5.4.3 Output terminal wiring

The wiring mentioned here is recommended, but may not be compliant with local code. Please consult with qualified site engineering personnel to ensure and select wiring that meets all local codes and regulations.

Fixed installation with remote cabinets			
Mnemonic	Function	Cable example	Connection
E-stop	Emergency stop	Lapp, Ölflex, 190 CY, 4xAWG18	Ferrules/snap-in
Interlock	Enable system		
CAN	CAN communication	Lapp, Unitronic BUS CAN, 1x2x22AWG	Ferrules/snap-in
ETH	Ethernet communication	Lapp, Etherline PN Cat. 7, 4x2x23/1AWG	Ferrules/snap-in
AC Supply	3P+PE/GND+N OR 3P+PE/GND	Lapp, Ölflex, 190 CY, 4x12AWG	Ferrules/snap-in



**Note:**

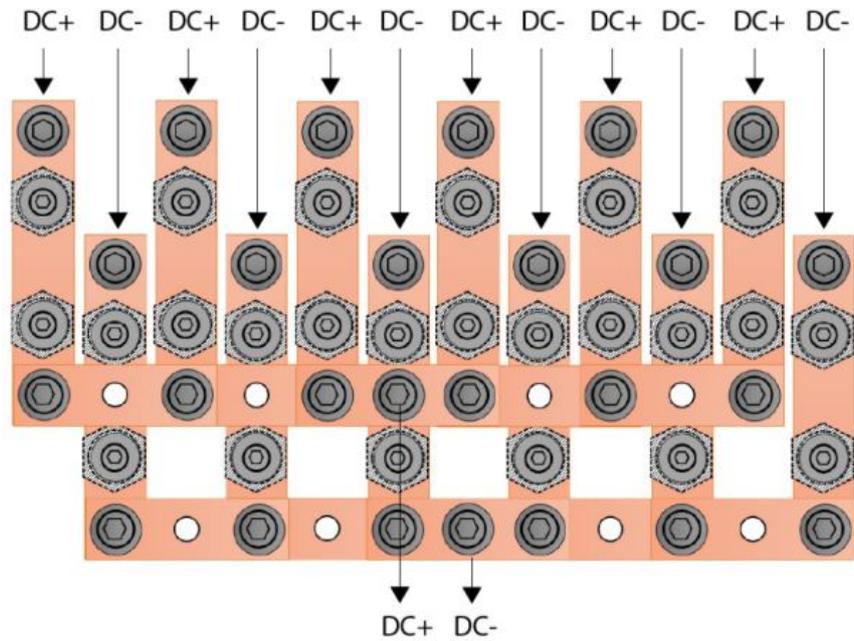
Any other brand for the cable connections may be used as long as specifications are the same or better.

#### 5.4.4 DC-connections



**Note:**

The details of the electrical installation mentioned below are for each of the base product cabinet.



#### 5.5 After installation checks

1. Make sure, visually and by measurement, that the connections are made correctly and at proper locations.
  - The connections are torque tight and marked.
  - The resistance is below 0.0250 mOhm per high current connection
2. Do an insulation check of the AC supply cables utilizing IEC 60364-6 or local equivalent procedure.
  - The AC supply cables are fit for service and not showing significant damage from installation.
  - The insulation test report is completed and available.
3. If the test fails, do any necessary corrective work such as replacing the defective cable.

## 5.6 EVSE preconditioning



**Note:**

After installation the EVSE must be preconditioned to comply to the climatic specifications.



**Note:**

Between the FAT and the SAT of the system, the installer is responsible and liable for complying to the climatic specifications.

When not stored, the EVSE system must always be (pre)conditioned. The EVSE (and separate DC outlet cabinets) are prepared for climate (pre)conditioning.

Preconditioning:

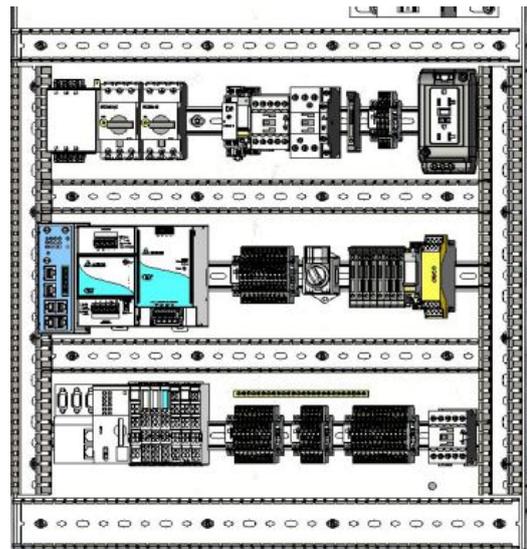
1. Connect a temporary or the incoming AC cable to L1/L2/L3.



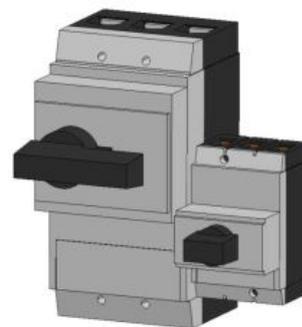
**Warning:**

If a temporary (removable) or alternative ac power supply is used instead of the permanent ac power supply intended for use with the charger, the ac supply must be able to provide sufficient power for the connected evse and dc outlets in this system. Additionally it must be protected against residual- (<30ma) and overcurrent at the feeding side of the cable.

2. Set first service switch off for each of the base product cabinets



3. Then turn auxiliary circuit breaker on for each of the base product cabinets.
4. Close cabinets (EVSE and all connected DC outlets).
5. Preconditioning will take place automatically as long as supply voltage is provided



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