Technical Handbook

Flex 180 kW B DC HPC D UL

HE9821001-01

Powering a cleaner tomorrow

Preface

Heliox is committed to develop sustainable energy to build better environment and support the green energy to powering a cleaner tomorrow. Heliox R&D is continuously focusing on enhancement of the existing products and develop new generation of advanced electric charger to empower the Global energy market.

This technical handbook Flex 180 kW power cabinet is a set of task oriented documentation to provide all the information required for safe installation, operation and maintenance of this equipment. The Flex 180 kW is a split-unit system consisting of multiple subsystems:

- A Base Power Cabinet.
- A DC Dispenser Outlet and DC Coupler.

Together these components make up the complete Flex charging system or Electric Vehicle Supply Equipment (EVSE). This Technical Handbook illustrates the Base product: the AC / DC-Converter.

Figure 1: Flex 180 kW

Feedback

Heliox appreciates all feedback and suggestions for improvement. If you have any questions or find any errors in the Technical Handbook, please contact Heliox at the following address:

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Heliox

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Technical Handbook is an integral part of the Electric Vehicle Supply Equipment (EVSE), and the product is Flex 180 kW. It is the responsibility of the copy holder to use the latest versions of the Technical Handbook and related appendices.

It is possible that a service bulletin is issued to give important safety information and these service bulletins are also an integral part of the Technical Handbook.

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Date dd/mmm/yyyy	Version	DM	Description
30-Sep-2022	2.0	AEG	New Template and Updated
08-Dec-2022	2.1	JS	Updated measurements in Site Foundation Layout for EVSE (Figures 18 and 19)
19-Apr-2024	2.2	JS	Updated measurements in Site Foundation Layout for EVSE - Figure 19
27-Nov-2024	2.3	JS	Updated Peak power conversion efficiency to >96%
16-Dec-2024	2.4	JS	Updated 'Peak power conversion efficiency' to 'Peak efficiency'
14-Jan-2025	2.5	JS	- Updated safety distance for use of the product - 3.5.1. Important Safety Instructions - Updated 4.1.2 Moving and Storage Instructions: values for Minimum temperature and Rate of temp. change. - Updated bolt size AC cable lugs to M12.
31-Mar-2025	2.6	PS	Updated the floor plan in 7.3
06-Jun-2025	2.7	AW	Updated AC Connection in 5.2.4
19-Jun-2025	2.8	DJR	Added NRTL remarks
24-Jun-2025	2.9	IM	Updated service intervals and maintenance details Updated contact information Clarified AC and DC connection details

Abbreviation, Definition and Terminology

Abbreviation	Definition / Description
AC	Alternating Current
ACB	Auxiliary Circuit Breaker
ACD	Automated Coupler Device
API	Application Programming Interface
CAN	Controller Area Network
CaaS	Charge as a Service
CCS	Combined Charging System
CE	Conformité Européenne (European Conformity)
CP	Control Pilot
DC	Direct Current
DCC	Demand Connection Code
DSO	Distribution System Owner
EMI	Electro Magnetic Interference
EN	European Norm
ESA	Electronic Sub-Assembly
EV	Electrical Vehicle
EVC	Electric Vehicle Charger
EVSE	Electric Vehicle Supply Equipment
FCR	Field Call Rate
FMEA	Failure Mode and Effects Analysis
GPRS	General Packet Radio Service
GUI	Graphical User Interface
HMI	Human Machine Interface
HV	High-Voltage
IEC	International Electrical Commission
LED	Light Emitting Diode
LV	Low-Voltage
MSDS	Material Safety Data Sheet
N	Neutral
NEC	National Electrical Code
OCPP	Open Charge Point Protocol
PC	Power Cabinet
PCM	Power Converter Module
PDF	Portable Document Format
PE	Protective Earth
PIN	Personal Identification Number
PLC	Power Line Communication
PP	Proximity Pilot
PPE	Personal Protective Equipment
PPWD	Packaging and Packaging Waste Directive
PRE	Power Research Electronics
PU	Power Unit
PUG	Power Unit Group
PWM	Pulse Width Modulation

Abbreviation	Definition / Description
RFID	Radio-Frequency Identification
SCCR	Short Circuit Current Rating
SMI	Standard Module Interface
SOC	State of Charge
SP	Split Power
TFT	Thin Film Transistor
UL	Underwriters Laboratory
UU	User Unit
WLL	Working load limit

Terminology	Definition / Description
C7.5 / M7.5	(1:4:8) is a lean concrete mix which is used in foundation to provide plain surface and to make a disruption between footing and the ground surface. The compressive strength of the concrete after 28 days is 7.5 N/mm².
CCS connector	The CCS plug is used to connect the EVSE to the EV. The CCS connector has the power lines as well as the communication lines for communication between the EVSE and the vehicle.
Control pilot	The control pilot, when the EV is connected, takes care of the communication between the EV and the EVSE. The communication between the EV and the EVSE is hard-wired.
Conical spring washer	Conical spring washer is a, non-destructive, single use, lock washer which has a curved shape. When the hollow side faces down, the washer adds a load to prevent the bolt / nut to undo itself.
EV coupler	The EV coupler is the installation or means, used to connect the EV to the EVSE. Normally it is a mast with either a contact hood for a pantograph or a mast with an inverted pantograph. When there is no pantograph, the EV coupler has a connection with or without a charging column.
IEC	The International Electrotechnical Commission (IEC) headquartered in Geneva, Switzerland, is the organization that prepares and publishes international Standards for all electrical, electronic and related technologies.
MOT type 1	Crushed gravel stones which provides a load bearing layer for road surfaces, pathways and concrete elements.
NEC	National Electrical Code (NEC) is a set of regularly updated standards for the safe installation of electric wiring in the United States.
tZn	Hot zinc plating
Undisturbed soil	Soil unaltered by filling, removal, or other man-made changes with the exception of agricultural activities.

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FLEX 180 KW

1. Technical Handbook Overview

The main objective of the Technical Handbook is to give an overview of the product details, specification, safety information, responsibilities of the personal, installation, operational and maintenance instructions for a correct installation and operation of the EVSE, the Flex 180 kW. This Technical Handbook also provides preventive maintenance tasks, spare parts reference and other required devices information and safety guidelines for better operations and services.

This Technical Handbook is an integral part of the EVSE and all the necessary documentation to be kept with the product for easy access to do the safe installation, operation, maintenance and services. All the authorized personnel must be well aware of the stipulated instructions in the Technical Handbook before starting any work and every personnel must follow the instructions carefully with caution to avoid any mismanagement.

Heliox is not responsible for any damage caused by ignoring the safety warnings, incorrect follow-up or by failure to follow the correct execution of the instructions outlined in any corresponding chapter in the Technical Handbook. If in doubt, stop the work, do not continue and ask for assistance. However, all the necessary documentation needed for the safe installation, operation and maintenance should be available upon request for operators and/or service providers and not following this Technical Handbook is an infringement of the warranty.

2. Introduction

The Flex 180 kW is built from a standard set of modules and components to convert AC power into DC power as requested by the Electric Vehicle (EV) to charge its battery in compliance with applicable rules and regulations.

This chapter provides information about the notational conventions, safety warnings and signs, warranty and liability, qualification of the personnel, use and disposal, target audience and other related information to familiarize the EVSE.

2.1. Notational Convention

The following safety Notational Conventions are illustrated in blocks with the meaning of each sign to have clear understanding and more visibility. These blocks of text require the attention of the reader to avoid dangerous situations and get additional information for an easy understanding:

DANGER
Utmost attention is required for a possible hazard with a high risk that will result in death or serious physical injury to people if the safety precautions are not met.

WARNING
Attention is required for a possible hazard with an average risk that can result in death or causes serious physical injury to people if the safety precautions are not met.

CAUTION
Attention is required for a possible hazard with a low risk that can result in minor to moderate physical injury to people if the safety precautions are not met.

NOTICE
Attention is required for an additional important message but not hazard related, that can result in damage to equipment or its environment when ignored.

Remark
Attention is required for useful additional data to enhance the information or to make the instruction more clear.

Environmental Remark
Attention is required for the environmentally safe disposal of waste, the reuse of materials and the protection of the environment.

2.2. Warning Signs

The following warning signs are illustrated in blocks with the meaning of each sign to have clear understanding and more visibility when it displayed.

Symbol	Description
	**Risk of Electric Shock / High Voltage** Components inside the charger are a risk of shock to persons.
	**Rotating Parts** Indicates a hazardous situation which, if not avoided, could result in injury due to the presence of rotating or moving parts.
	**Pinch Hazard** Indicates a hazardous situation which, if not avoided, could result in injury involving some body parts to be pinched or crushed.
	**Fall Hazard** Indicates a hazardous situation which, if not avoided, could result in injury due to unsafe work at height.
	**General** Indicates a hazardous situation which can result in damage to the product, connected systems and/or the environment.
	**Environmental Damage** Gives special instructions and/or prohibitions to avoid damage to the environment.
	**Protective Earth** Identifying the field wiring equipment grounding terminal (main AC input grounding).
	**General Earth** Identifying various points within the unit that are bonded to ground.

2.3. Warranty and Liability

The EVSE provided by Heliox are subject to the Heliox General Terms and Condition of Sale and Heliox Warranty Terms and Conditions, as published on Heliox-website (https://www.heliox-energy.com/terms-conditions).

2.4. Use of the System

2.4.1. Intended Use

The EVSE is designed to charge an electric vehicle according to the standard for charging electric vehicles (EV) in a safe indoor or outdoor area. The EVSE is to be installed, commissioned, set into service, maintained and serviced by trained and qualified personnel. The EVSE is intended to use during EV battery charge session by well trained personnel based on the set qualification and criteria which stated in 2.5.2. Qualification.

2.4.2. Unintended Use

This EVSE is not designed or intended for use in a hazardous area or in a life-threatening environment which could cause serious damage to the health and safety of the personnel and environment. Other use than the intended use can cause loss of life, (serious) injury to personnel and damage to the EVSE, the connected systems and the environment.

WARNING
This equipment cannot be connected to residential or office power distribution networks

WARNING
Other use than the intended use can cause loss of life, injury and damage to the product, the connected systems and the environment

2.4.3. Disposal

Everyone is encouraged to recycle parts and materials to protect the health and safety of the personnel and environment.

- Dispose the waste and the discarded parts in an environmentally safe manner in accordance with the federal, state and local government rules and regulations.
- Handle and dispose of consumable materials or parts that contain dangerous materials with respect to environmental safety.
- Align with the safety guidelines for the handling, operation, maintenance and the disposal tasks.
- When in doubt, get advice from the supervisor or designated personnel.

2.5. Authorized Personnel

The information given in this document is meant for use by the authorized personnel 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, installation, commissioning, operation and maintenance of the EVSE.

2.5.1. Responsibilities

Work involved with the EVSE always calls for safe work procedures in the vicinity of electrical installations. Refer to the federal, state and local authorities' rules and regulations to comply with the required standard and procedures. It is the sole responsibility of the site owner:

- To keep the occupational, health and safety plan up to date and available.
- To allow only authorized personnel to do the work.
- To keep the spare and repair parts in accordance with the specifications given in this Technical Handbook.

Only authorized personnel who are qualified with the civil, mechanical, electrical, operational, installation, repair and service procedures, who comply with the specific regulations and requirements set by the authorities, manufacturer, employer and owner of the EVSE are allowed to work near, on, or within the EVSE.

2.5.2. Qualification

Qualified and authorized personnel who must have read and understood all the instructions relevant to the work are allowed to execute the procedure: Qualifications and authorizations are based on:

- Personnel are appointed and have accepted the appointment to do the work.
- Qualified personnel must have the skills, knowledge, materials, tools and equipment available to install, commission, operate and maintain the EVSE.
- Qualified and authorized personnel must have completed the relevant Heliox training for the EVSE.
- Personnel must have completed the specific education for the profession concerned.

2.5.3. Acronyms

All the related abbreviations, definitions and terminologies can be referred at the end of this document.

3. Safety Information

The safety information is meant to contribute to the safety of the personnel and equipment during the installation, commissioning / decommissioning process, operation, maintenance work and services throughout the lifecycle.

3.1. Safety Instructions

The personnel who operate, maintain, service or repair the installation and the people in the near vicinity of the EVSE must be informed of the possible hazardous situations. The safety instructions in this section are meant as a guideline and in no way supersede any instruction issued by the federal, state and local government authorities, concerning safety regulatory or any approved safety standard. Therefore international, national and local government authorities' rules and regulations shall always prevail.

Please read carefully and follow the safety instructions before doing any work on the EVSE, the sub-systems or its components. Make sure to read and be aware of all safety warnings and instructions and take notice of the safety instructions that are given for the related systems.

NOTICE
If a government / higher authority has more stringent safety instructions than what is mentioned in these safety guidelines, then the instructions from the government / higher authority shall always prevail.

Read the documentation and understand the instructions before starting any work. Follow the instructions carefully. Heliox is not responsible for any damage caused by poor planning, nor incorrect follow-up or execution of the instructions which are given in the related document. If in doubt, do not continue the work and contact Heliox for assistance.

3.2. Target Group

The EVSE is designed to charge an electric vehicle according to the standard of charging electric vehicles (EV) in a safe environment. This equipment is intended to be used by qualified, well-trained and Heliox authorized personnel only. EVSE should not be commissioned in a hazardous area or any area with an existing safety concern or with an environmental concern.

The information given in this document is meant to be used by the authorized personnel who are involved in the planning, supervision and execution of the given tasks. These tasks are not limited to the handling, transport and storage, installation, commissioning / decommissioning, operation and maintenance work as different skills and authorizations are required to execute the task diligently. Work involved with the EVSE always calls for the safe work procedures in the vicinity of electrical installations. Refer to the federal, state and local government authorities' guidelines and regulations which apply to the site and installation when performing these tasks.

3.3. Safety Guidelines

The safety information is not limited but meant to contribute to the safety of the personnel and equipment during the installation, commissioning / decommissioning, operation, services and maintenance work. Please read carefully and follow the safety instructions before do any work on the system, the sub-systems or its components. Make sure that these safety guidelines are read and aware of all the safety signs, warnings and instructions, and take notice of the safety instructions that are given for the related systems

3.4. Safety Warning

These procedures can have hazardous situations if do not follow the safety precautions and align with the safety instructions and the federal, state and local regulations. Heliox is committed to protect and provide accurate information as complete as possible to warn hazardous situations when installing the EVSE and it is the individual's responsibility to adhere to safety measure with the utmost priority.

All the work involved with the EVSE always calls for the safe work procedures in the vicinity of electrical installations. Personnel are responsible for the supervision and implementation of the instructions given in this guideline and instructions on how to avoid an accident or damage to the equipment when work on the EVSE or related systems. The possibility of serious injury or damage depends upon various factors:

- The professional skills and authorization of the personnel who involved in the planning and the execution of tasks.
- The knowledge of possible hazardous situations where personnel are exposed.
- Execute the tasks carefully and safely.
- Nature of work involved.
- The environmental conditions (e.g. weather, lighting, work area, storm, etc.).

3.5. General Safety Notes

Reference is made to the ISO45001 Standard.
The general safety is the responsibility of the site owner. It is the site owner's responsibility to create an Occupational Health and Safety Assessment (OHSA) plan to make sure that before, during and after the installation, commissioning / decommissioning, operation and maintenance work, the safety of the personnel and the property is safe guarded.

The installation site and the EV equipment installed under the responsibility of the site owner shall comply with the manufacture's installation guidelines but the federal, state and local government authorities directives, standards, rules and regulations shall prevail.

3.5.1. IMPORTANT SAFETY INSTRUCTIONS

DANGER
Do not alter the AC power supply. Only allow a qualified electrician to do the electrical work. Improper connection increases the risk of electric shock.

Make sure to align and comply with these instructions:

- **SAFE THESE INSTRUCTIONS – This manual contains important instructions for Models HE9820014-01, HE9821001-01, HE9821010-01 that shall be followed during installation, operation, and maintenance of the units**
- Follow this manual.
- Comply with all relevant federal, state and local government authorities laws and regulations.
- Do not use the charger if it is damaged.
- Do not use the charger if any cable is damaged.
- Do not modify the charger without the written permission from Heliox. Any change or modification made by the owner without the approval of Heliox can void the warranty policy.
- Only use the charger as intended.
- Only use the charger within the specified technical data.
- The load capacity of the grid must comply with the technical data of the charger.
- Do not touch the inner parts of the charger during, or shortly after operation as charger circuits contain capacitors which can hold a dangerous charge for some time after shutdown. Waiting for a period of at least 5 minutes is recommended.
- Be safe and compliant. Wear personal protective equipment (PPE) as required by the federal, state and local laws, NEC and NFPA70E rules and regulations. Other safety regulations: Safety shoes S3 SRC ESD (ISO20345:2011 & ISO 12568:2010), Work clothing / pants (EN1149-5, EN 13034-6, EN ISO 11611 (Class 1 or higher), EN ISO 11612 (A1 A2 B1 C1 E2 F1), IEC 61482-2), High visibility jacket or vest (EN ISO20471) and Electrical protection gloves 1000V (IEC 60903, IEC 61482-1-2 class 2 and ASTM F2675 / F2675M).
- Wear electric resistance shoes with mechanical protection of nose and sole during maintenance.
- Wear rubber gloves during maintenance if it is unknown if the circuits are completely unenergized.
- Do not operate the charger without the protective devices installed.
- Make sure that the charger is correctly installed. Incorrect installation can void the warranty policy.
- Make sure that water cannot enter into the product and do not open the charger door when it's raining or with any water in the vicinity.
- Wear an ESD-grounded wrist strap during maintenance on printed circuit boards (PCB) only.
- Do not open the door of the charger during operation. Do not use the charger close (within 20 feet (6 mtr.)) of an outdoor motor fuel dispensing device.
- Do not install and use charger products in an area which is not allowed for installation of electrical installations due to the fire, explosion, chemical hazards areas.
- Non-authorized personnel are not allowed to perform service and maintenance tasks.
- Non-authorized personnel are not allowed to access to keys of the cabinets. Only qualified Heliox authorized service provider's personnel can access the internal closure of the charger by using a key.
- The charger and all the related metal accessories must be grounded to reduce the risk of electric shock with an equipment grounding conductor. The charger must be connected to an ACD

(Automated Coupler Device) that is properly installed and must be grounded in accordance with all the safety regulations.

3.5.2. Industrial and Environment Safety Measures

NOTICE
These safety notes are site owner's responsibilities but mandatory rules and regulations of federal, state and local authorities must be complied.

- Always keep the work area clean, accessible and well ventilated.
- Remove any spills to prevent slippery floors.
- Dispose of waste and discarded parts in an environmentally safe manner in accordance with the manufacturer's instructions and federal, state and local authorities regulations.
- Keep noise and emission levels as low as reasonably possible.
- Do not remove the safety guarding if not strictly required for the work and do not reach beyond any guards.
- Use personal protective equipment (PPE) as required by the laws and regulations.

3.5.3. Personnel Safety Measures

NOTICE
This safety notes are site owner's responsibilities but mandatory rules and regulations of federal, state and local authorities must be complied.

Safety is the collective responsibility of every individual therefore a basic safety precaution to be implemented by every personnel who are qualified and trained to work on sites:

- Use, maintain and store the personal protection equipment (PPE) as indicated.

3.6. Onsite Installation Safety Measures

It is the responsibility of the site owner to make sure that the collective safety measures as well as the personal protective measures and procedures are in place to be adhered. It is the responsibility of the site owner to facilitate valid logistic transport and handling equipment and procedures for the safe handling, transport and storage of the system parts when requested. The customer can instruct a safety professional 3rd party to create safety and health plan before the installation activities begin.

3.6.1. Safety of Onsite Personnel

WARNING
The use of personal protective equipment (PPE) does not mean to ignore the normal safety precautions. The best protection against serious personal injury is care and align to the safety instructions.

Safety precautions are taken to avoid accidents to protect the personnel on site and environment. Therefore, always use applicable Personal Protective Equipment (PPE) when perform the work on the EVSE. PPE is meant to protect health and well-being of the staff who is performing the specific task in a hazardous environment. The incorrect use or lack of maintenance of PPE can result in serious injury to the staff. When the work is in a potentially hazardous situation, do the work with

two staff members, one person should be in command (supervisor) while the other person performs the task.

3.6.2. Onsite First Aid

NOTICE
These safety notes are site owner's responsibilities but mandatory rules and regulations of federal, state and local authorities must be complied.

The first aid kit should be kept clean and stored in an appropriate and easily accessible location. The materials have a shelf life which is limited and indicated by an expiry date.

3.6.3. First Response / Responder

The first responder is responsible for their own safety. At a calamity, the EVSE poses a risk of electrical shock. If a fire is present, first make sure that the electrical power is switched and confirmed off. For handheld fire extinguishers, only use an extinguisher classification which is dedicated for putting out electrical fires.

DANGER
Risk of electrocution or arc-flashes. Do not use water to extinguish an electrical fire. Water is a natural conductor and will cause an electrical shock. An electrical shock can result in serious injury or death by electrocution.

NOTICE
These safety notes are site owner's responsibilities but mandatory rules and regulations of federal, state and local authorities must be complied.

3.7. Safety of the Work Area

3.7.1. Access and Escape Route

Access to the operating area, maintenance area and the escape routes should be kept clear of obstacles, snow and ice at all times. Access to systems and components must be available from suitable places which are accessible from the escape routes.

3.7.2. Storage of Materials and Equipment

Materials and equipment shall be stored indoors, in a well-ventilated and dry area free from direct radiation by heat or sunlight. For consumable materials, refer to the 4.1. Storage and Transport. All hazardous materials should be stored in an appropriate area according to the manufacturer's instructions.

3.8. Safety of Civil Works

Only authorized personnel who are familiar with the civil work procedures and tasks and follow the specific regulations and the requirements set by the federal, state and local government authorities, manufacturer, employer and owner of the EVSE are allowed to do the civil work. Civil work is project

specific due to the actual site situation or specific restrictions therefore the design of the foundation can be different, and Heliox Project Engineering can provide some guidelines if required.

3.9. Safety of Mechanical Works

Only authorized persons who are familiar with the mechanical installation, repair and service procedures, who follow the specific regulations, and the requirements set by the federal, state and local government authorities, manufacturer, employer and owner of the EVSE are allowed to do the mechanical work.

3.9.1. Lifting and Hoisting Safety

WARNING
Equipment can be heavy and weight depends upon the size. Use only certified lifting equipment and procedures and please refer to 4. Logistic Information. Failure to do so can lead to serious injuries and death.

- Make sure that the weather and the work conditions are suitable for an outdoor lifting operation. Mind overhead power lines!
- Do a visual inspection of the lifting equipment and the related maintenance logbook.
- Make sure the lifting equipment is valid, free of any signs of wear and damage. Lifting equipment that has signs of damage or serious corrosion is unsafe to perform the task.
- Work area should not be blocked by any object. Access to the area should remain free.
- Determine the weight and the center of gravity of the part which will be lifted.
- Comply with the safe working limit and the safe load limit of the lifting equipment.
- Use the appropriate lifting equipment to attach to the parts.
- Lift the parts by the instructions of the designated personnel who supervises the lifting operation.
- Lifting must be done according to the instructions stated in 7.8.3. Transport Charger.

3.10. Safety of Electrical Works

Only authorized personnel who are familiar with the electrical installation, repair and service procedures, who comply with the specific regulations and requirements set by the federal, state and local government authorities, manufacturer, employer and owner of the EVSE are allowed to do the electrical work. Electric shock or arc flash can cause personal injuries and equipment damage. Many accidents cause serious electrical shock or serious burns. Fatal shocks are often caused by low, medium and high voltage systems. But even non-fatal electrical shock causes serious injury to persons by e.g. falls from height or arc flashes.

Line of Defense

- Never work on electrical installations that are energized!
- Verify with verified measuring equipment (voltage probe) that the electrical installation is unenergized.
- Use valid, sufficiently rated, insulated tools and regular inspection of the protective earth connections for general condition, contact resistance and signs of corrosion.
- Don't take safety risks while performing a task and if any safety hazards, stop the work immediately.

WARNING
Make sure that it is safe to work on the electrical system. Energized electrical systems are hazardous and can cause electrical shock or arc flashes. Electrical shock or arc flashes can cause serious injury to personnel when not avoided.

- Make sure the work area is made safe.
- Understand and know the construction and circuits of the electrical equipment. Only authorized or trained personnel shall work on EVSE.
- Make sure the tools, materials and equipment are calibrated, valid and suitable for the work (e.g. insulated and rated for 1000V).
- The primary power circuits, especially the incoming AC-Terminals can have a very high short circuit current capacity. Use appropriate measuring equipment on these places. No handheld Multimeter is allowed on the primary power circuits. Use a 2-probe voltage tester instead.
- Identify the possible (feedback) energy sources that can cause a hazard.
- Lock out the EVSE and the related equipment.
- Measure the voltage with a double pole measuring device in conformity with IEC61243-3.
- Make sure the reading is 0 Volt to prove that the system is safe to work on.
- At any time, if the work becomes more hazardous than anticipated for, stop and take the required safety precautions and don't take safety risks.

3.11. Lock-Out / Tag-Out

This procedure states the minimum requirements for the lock-out of the energy sources (electrical power, etc.) that can cause injury to the personnel. If safety instructions are available from federal, state and local government authorities / higher authority shall prevail.

WARNING
Make sure that it is safe to work on the electrical system. Energized electrical systems are hazardous and can cause electrical shock or arc flashes. Electrical shock or arc flashes can cause serious injury to personnel when not avoided.

3.11.1. Make the System Safe

- Look up the log file and scan for anomalies. If in doubt, contact Heliox Support. Refer to the section 9.2. Turn On / Off the EVSE.
- Inform the installation responsible / designated person that a lock-out of the EVSE (or a part of the supply system) is necessary. Use and wear proper PPE.
- After approval, shutdown the system by the usual stop procedure. 9.3.2. Stop the Charge Session.
- Make sure no electric vehicle can be connected to DC-Couplers during the service intervention, attach a warning sign; "Do not operate the system – Work in progress".
- At each remote-control station and each local control station, attach a warning sign: "Do not operate the system - Work in progress".

- Set the applicable switches / disconnectors to the OFF position and make them safe with a dedicated lock-out device (e.g. personal padlock).
- For the electrical circuits, wait at least for 5 minutes to allow the capacitors to discharge before doing any work.
- For spring loaded components, release the spring tension or apply another safety measure.

- Measure the lock-out condition to confirm that the power sources are set to OFF and the capacitors have discharged so they cannot cause any hazardous situations.

3.11.2. Return the System into Operation

- Remove all tools, materials and equipment from the work area.
- Install and secure any protective sheets that was removed earlier.
- Make sure the EVSE and the work area are safe and clean.
- Make sure the safety related provisions are fit for use.
- Remove the locks and tags.

Inform the installation responsible / designated person that the task is completed and the EVSE is ready to get energized.

- Set the applicable switches / disconnectors to the ON position.
- Be aware of possible arc-flashes and return the EVSE into operation for test purposes.
- Wait for the status indicator to become green (continuously) to show that the EVSE is ready.
- Test the emergency stop function.
- Do a test session with an EV connected and test the stop function.
- When the test is successfully completed, return the system into service.

4. Logistic Information

The following logistic information is meant to contribute to the process of the safe handling, transport and storage of the Electric Vehicle Supply Equipment Flex 180 kW or the related spare parts and equipment. The transport of the EVSE also includes the hoisting and lifting tasks.

4.1. Storage and Transport

This section provides the information related to the process of transport and storage of the Electric Vehicle Supply Equipment (EVSE). The personnel, who are involved in the process of the handling, transport and storage as well as the people in the near vicinity of the EVSE must be informed of possible hazardous situations. The instructions in this document are meant as a guideline and in no way supersedes any instruction issued by the federal, state and local government authorities or higher authority or any safety regulatory standard.

4.1.1. Packaging

The EVSE has a standard packaging which is suitable for land-based enclosed or tarped transport and indoor storage. The EVSE is placed in a wooden crate which is fixed onto the pallet. In special cases, air-freight compliant packaging may be used.

The image on the right side shows how the product is packaged and ready to ship. The total measurement of the package is 39.4" x 39.4" x 98.4" (1000mm x 1000mm x 2500mm).

Total weight of the packaging is 1499.1 lbs (680 kg).

Figure 2: Packaged EVSE

4.1.2. Moving and Storage Instructions

Rapid changes in the temperature can cause condensation. All equipment shall be stored in a conditioned warehouse to avoid any condensation. The packaging is designed for indoor storage only.

Description	Specification
Packaging	Original packaging, free of damage and contamination
Protection	From radiation from heaters, and direct sunlight (UV)
Environment	Indoor, dry and well ventilated
Minimum temperature	-4°F [-20°C]
Maximum temperature	122°F [+50°C]
Relative humidity [%]	Between 5 and 95, no condensation allowed
Rate of temp. change	0.9°F/min [0.5°C/min]

4.1.3. Storage of Spare Parts

Spare parts are labelled and packaged for indoor storage. Outdoor storage is prohibited. Spare parts should be visually inspected periodically and if found to be damaged, should be replaced and must not be used.

4.1.4. Inventory of Hazardous Material

The EVSE complies with the RoHS Directive for the restriction of hazardous substances in electrical and electronic equipment.

4.2. Handling and Safety

CAUTION
Handle with care. Prevent sudden shocks and dropping. Rough handling can cause injury to persons and will cause (serious) damage to the equipment.

Refer the Safety Information stated in this Technical Handbook to get more detailed information on various safety procedures.

4.2.1. Goods Received Notes (GRN)

Receipt of goods

- It is the responsibility of the transporter / shipment company to make sure the shipment arrives in an undamaged state.
- Inspect the shipment for missing parts and physical damage as soon as the shipment arrives. If discrepancies are seen, report immediately to the carrier or shipping company and Heliox. For future reference, make clear photographs and include them in the damage report.
- In case of missing or damaged parts, new or repaired parts should be made available before connection to the grid and commissioning of the EVSE.
- Leave the transport tools and the original packaging in place as long as possible to protect the parts against ambient conditions and physical damage.
- If the packaging is opened for inspection upon arrival, reinstall the packaging in its original state to protect the shipment against ambient conditions and possible damage during handling, transport and storage.

Upon receipt of the charger, the related parts and equipment to make sure that:

- The packaging is clean and free of physical damage.
- The parts are correctly identified (labelled) and free of physical damage.
- The shipment is complete in accordance with the supplied packing list.
- The preservation materials and packaging are valid for the intended storage period and location.
- The parts are stored correctly.

4.2.2. Unpacking

Dispose of the packing materials in an environmentally safe manner in accordance with the manufacturer's instructions and local and international regulations. The unpacking is generally done by the following method:

- Remove lid.
- Remove side walls.
- Remove Styrofoam.
- Remove shrink wrap.

4.2.3. Lifting and Hoisting

Refer to the Safety Information stated in this Technical Handbook for detailed safety information. The following points provide general guidelines:

- Note the maximum load of the equipment and the associated accessories.
- Only use the equipment and its accessories for the purposes for which they are intended.
- Always use the prescribed safety accessories: helmets, shoes and gloves.
- Ensure the safety of those nearby; cordon off the area and put out warning signs.
- Test and approve self-designed accessories before use.
- Make sure in advance that the hoisting equipment is fit to use; report shortcomings or doubts about this to the supervisor.
- Work only with approved and undamaged accessories.
- Ensure a stable and flat base.
- Hazard identification and risk assessment are an integral part of planning a lift.
- All persons involved in planning/performing lifting and maintaining lifting equipment shall be trained and competent for their role. Refresher training and periodic assessment is necessary to assure competence.
- All lifting devices and equipment shall be visually examined before use.

Figure 3: Lifting Graphic

Lifting of the EVSE can be done by using forklift with the following steps:

- Inset the fork fully into the pallet opening.
- Lift the fork with pallet jack.
- Transfer the unit (EVSE) wherever it intends to move.
- Bring down the fork and place the EVSE on the stable surface.
- Remove fork.

WARNING
Equipment can be heavy and weight depends upon the size. Use only certified lifting equipment and procedures and read the lifting equipment manuals to perform the task. Failure to do so can lead to serious injuries and death.

The handling and lifting equipment shall be rated and certified for the work. Note that certain equipment requires a trained and certified operator. The site owner, installation partner or their representative shall provide a validated hoisting and lifting plan wherever applicable. Refer the Technical Specifications for dimensions and weights.

However, the installer / site owner does not have to provide a hoisting plan as long as their method is in line with the standard way of lifting. In any case if specific solutions are needed, Heliox Project Engineering can be asked to review practices and methods to provide assistance.

4.2.4. Unpacking

Dispose of the packing materials in an environmental safe manner in accordance with the manufacturer's instructions and local/international regulations. The unpacking is generally done by the following method:

- Remove lid.
- Remove side walls.
- Remove Styrofoam.
- Remove shrink wrap.

5. Technical Specifications

This section provides technical specifications as well as the compliancy details of the Electric Vehicle Supply Equipment (EVSE) and information on torque values.

5.1. General Design

Description	Specification
Human Machine Interface	Emergency stop and Stop button are standard positioned on the door of the base product. The product can have optional external Emergency stop, Stop button and RGB status indicator.
Ingress Protection	NEMA 3R
	IP 54 (only for Europe)
Mechanical Impact Protection	IK10

5.2. Electrical Specification

5.2.1. Power Input Requirements

This equipment contains earth leakage current protection devices (ground fault interrupters) according to UL2231.

Description	Specification
Input connections	3-Phase, 480 Vac: GND, L1, L2, L3. Note: Phase balanced load, no neutral wire required.
Input power, full load	205 kVA.
Input power, idle	100 VA.
Input AC line voltage range	480VAC +6%/-13%.
Input AC line frequency	60 Hz.
Input AC phase current, nominal	247 A @ 480 VAC.
Input AC phase current, max	283 A @ 417VAC.
Input AC phase current, MCB	400 A, this equipment has a circuit breaker (MCB) with a trip level set at 300A.
Power factor	>0.98 above 50% load.
Peak efficiency	>96%
Total Harmonic Distortion	V< 2%, I< 5%.
Dielectric withstand	3000 Vac (Test voltage between internal live parts and accessible parts 3000 Vac is not applicable to all parts). Dielectric strength according UL2202 /IEC61439 for grounded equipment.
SCCR	35 kA.

5.2.2. Power Output

Description	Specification
Output DC voltage range	150 – 1000 Vdc
Rated DC output power	Triple DC output: 3x60 kW Single DC output: 180 kW
Rated DC output current	Triple DC Output: 3x83 A Single DC Output: 1x250 A

5.2.3. Connected Services

Description	Specification
Cellular	2G, 3G, 4G Modem, LAN
Back office	OCPP Based Backoffice, e.g. Chargesight, DepotFinity

5.2.4. AC Cable

Description	Specification
AC cable	▪ Maximum size: 600KCMIL (300 mm2). ▪ Maximum number of wires per phase: 2. ▪ Temperature class: 194° F (90° C). Notes: ▪ AC cable is not included in the delivery. Sizing and ordering of the AC cable is the scope of the installer. ▪ This equipment requires narrow tubular cable lugs (narrow tongue / narrow flange). ▪ It is prohibited to use aluminium cables without bi-metallic cable lugs (Al-Cu) and contact grease (HPG ContactAl or equivalent). ▪ There is limited space in the cabinet to connect to the cable, cable flexibility class K or M is recommended. ▪ The size of the ground wire is dependent on the sizing of ground conductor according to NEC. ▪ The minimum ground wire is 35mm2 (2 AWG).
AC cable connection to busbar	The main incoming AC-wires are connected to 1-hole connection plates [hole size 0.51" (13mm) for 7/16" (M12) bolts]. These connection plates require narrow flange cable lugs [maximum tab size; width 1.26", height 0.65"] Connection material is not included in the equipment. Contractor to provide nut, conical washer, cable lug, and M12 Class 8.8 (7/16" Grade 5) zinc plated bolt.

Figure 4: Example of a Narrow Flange Cable Lug

Notice
Actual cable size calculations to be done by installer based on AC input requirements, local regulations and the type plate information. Technical Specification is stated in 5.2.1. Power Input Requirement.

5.2.5. DC Cable

Description	Specification
DC cable	▪ Maximum size: 250KCMIL (120mm2). ▪ Maximum number of wires: 1. ▪ Temperature class: 194° F (90° C). Notes: ▪ DC cable is not included in the delivery. Sizing and ordering of the DC cable is the scope of the installer. ▪ This equipment requires narrow flange cable lugs. ▪ If aluminium cables are used, the installer shall use proper connection material intended for the application; aluminium cables terminated on copper terminals. Connection material: Method 1: Aluminium cables lugs with integrated connection grease in combination with Bi-metallic transition plate with connection grease. Method 2: Bi-Metallic cables lugs with integrated connection grease. The connection grease (electrical joint compound) shall have a alumina penetrating filler, like zinc. Example, ContactAL, HPG. ▪ There is limited space in the cabinet to connect to cable, cable flexibility class K or M is recommended. ▪ The size of the ground wire is dependent on the sizing of ground conductor according to NEC. The size of the ground wire has to be at least #4 AWG (16mm2). ▪ PE cable needs to be calculated according the DC and AC cables used.
DC cable connection to busbar	▪ Connection materials are included in the equipment (nut, conical washer, bus bar with M10 class 8.8 stud). ▪ Cable lugs must be narrow with a max tang width of 0.98" with a hole size to accommodate M10 (3/8") stud. Notes: ▪ The conical washers are direction sensitive. Install the washers with the dome side towards the mounting nut.

5.3. Cabinet Mechanical Specification

Description	Specification
Material	Powder Coated Steel, C4H
Color	RAL 7035, (light grey)
External Dimensions:	
Depth	31.5" (800 mm)
Width	31.5" (800 mm)
Height	90.55" (2300 mm)
Weight	1323 lbs (600 kg)

5.4. Ambient Conditions

Description	Specification
Base product standard ambient temperature range	-4° F to 104° F (-20° C to 40° C) Full output power
Base product extended ambient temperature range	-22° F to 113° F (-5° C to 45° C) Derating on output power / output current
Relative humidity	Between 5% and 95%, no condensation allowed
Altitude, above sea level	Maximum: 6561 ft (2000 m)

5.5. Environmental Specifications

Description	Specification
Environment	This equipment is designed for outdoor use.
Audible noise [dB(A) @ ft]	<60 dB(A) @ 3.3 ft (1 m)
Air, max. temp	660425 gal/h (2500 m3/h), 131°F (55 °C) Note: This equipment produces hot air. Provide sufficient ventilation

5.6. Product Compliance

5.6.1. Product Test and Approval Process

Standard	Version	Title
2014/35/EU		Low Voltage Directive
2014/30/EU		EMC Directive
2014/863/EU		RoHS Directive (3)
IEC 60529	1989 A1: 1999 A2: 2013	Degrees of protection provided by enclosures (IP code)
IEC 61439		Low-voltage switchgear and control gear assemblies

Standard	Version	Title
Part 1	ed2 2011	General rules
Part 2	ed2 2011	Power switchgear and control gear assemblies
IEC 62262	2002	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
UL 2202	Ed3 2022	Standard for Electric Vehicle (EV) Charging System Equipment
UL 2231-1	ed2 2012	Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General requirements
UL 2231-2	Ed2 2012	Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
NEMA 250	2018	FCC Rules & Regulations 47 CFR Chapter 1 – Part 18 Subpart B

5.6.2. Standard Used as Guidelines

Communication guidelines (DIN 70121 and ISO 15118) have been extensively tested within Heliox and EV OEMs.

Standard	Version	Title
DIN 70121	2014	Electromobility – Digital communication between a DC. EV charging station and an electric vehicle for control of DC. charging in the Combined Charging System
ISO 15118	ed 1	Road vehicles – Vehicle-to-Grid Communication Interface
Part 1	2019	General information and use-case definition
Part 2	2016	Network and application protocol requirements
Part 3	2015	Physical and data link requirements
DIN 55633-1	2021	Paints and varnishes – Corrosion protection of steel structures by protective paint systems
Part 5		Protective paint systems
ISO 3740	2019	Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards
SAEJ1772	2017	SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler

6. Product Description

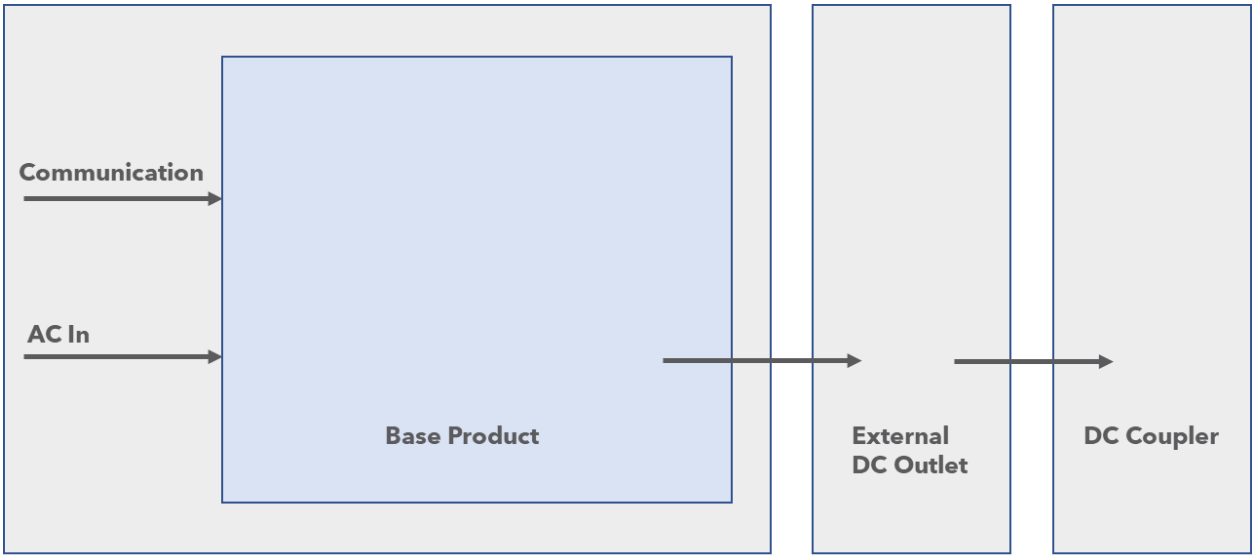
This section outlines the physical product description of the EVSE.

6.1. Product Architecture

The EVSE product architecture is a split-unit system consisting of a power unit and one or more DC outlet(s).

6.1.1. Block Diagram

Refer the Figure below to understand the EVSE which has one main module shows that a split-unit system is made up of base product - DC Outlet - DC -Coupler.



From base to DC outlet, the connection should be SMI, DC, and PE

Figure 5: Electric Vehicle Supply System – Block Diagram

NOTICE
Please refer to the outlet installation manual for details regarding the installation of the DC outlet(s).

6.2. Components Information

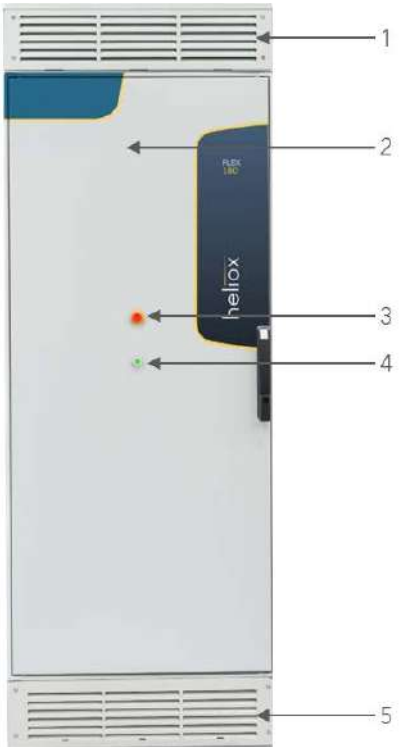


Figure 6: EVSE Components

1. Ventilation grid (air outlet)
2. GPRS antenna
3. Emergency stop
4. Stop touch-button with charger status indicator combined.
5. Ventilation grid (air inlet)

Status Indicator

The status of the charging process is indicated by the status indicator which is part of the stop button. The stop button with the integrated status indicator is installed at the front door. This image shows the item 4 above.

The following table provides details on status Indicator. Note; this color scheme is default and can be changed by the EVSE owner.

Color	Duration [s]	Description
None	-	The charger is in an unavailable state.
Green, blinking	60	The charger is in the initialization phase.
Green, continuous on	continuous	The charger is in standby and awaits an EV to connect.
Blue, blinking	20	The charger starts or stops a charging cycle.
Blue, steady	continuous	The charger charges an EV.
Red, steady	continuous	The charger has a fault and is not ready to use.

The Status Label

The status label is attached next to the stop button / status indicator to explain the function of the stop button / status indicator.

READY: The charger is in standby and available.

CHARGING: The charger charges an EV.
Press the button to abort the charging session.

ERROR
The charger has a fault and is not ready to use.

Figure 7: Charger Status Indicator

6.2.1. Markings and Labels

The Type Plate

The type plate gives the identification and the electrical details of the EVSE. The image and fields below are an example. The type plate varies to some degree but generally it contains the information below. Note that "A" emblem could be replaced by any 3rd party Nationally Recognized Test Lab (NRTL) that provides the ANSI certification and listing.

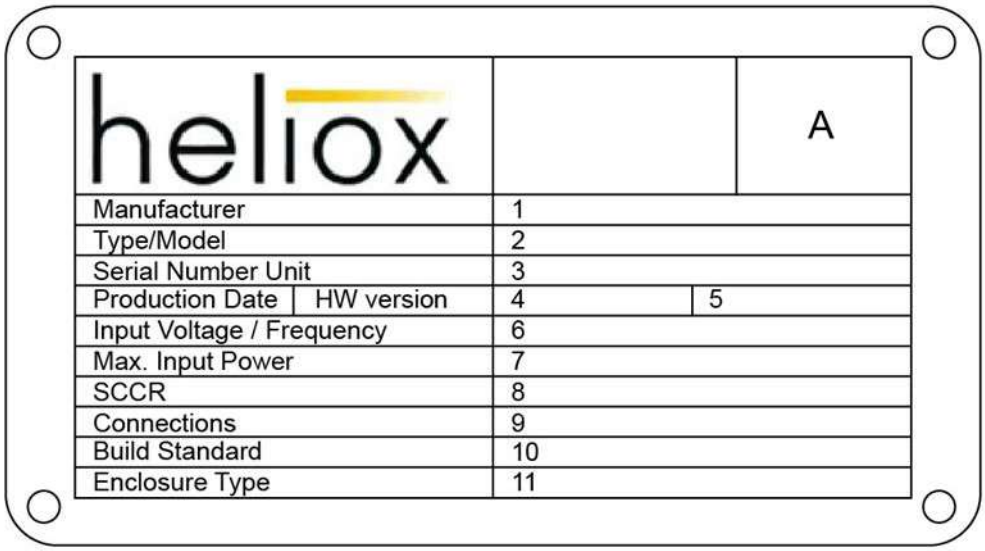


Figure 8: Type Plate - Component Information

<table>
<tr><th colspan="2">These fields show the cabinet specific details:</th><th></th></tr>
<tr><td colspan="2">A. Company logo of the NRTL
1. Manufacturer name
2. Product type/model</td><td rowspan="2">3. Serial number of the unit
4. Date of production
5. HW version
6. Input voltage, Frequency
7. Maximum Input power
8. Short Circuit Current Rating
9. Connections
10. Build Standard
11. Enclosure Type</td></tr>
<tr><td></td><td>The explanation of the Type/model: B DC HPC D UL:
B - Power B stands for 3x60 kW
DC - Direct Current
HPC - High power Charger
D - Dynamic
UL - UL</td></tr>
</table>

6.3. Description of Base Product Modules

The base function is to convert AC-Energy from the grid to DC-Energy for the DC-Outlet. The base product also monitors and controls the operation of the EVSE:

- AC inlet to connect to the grid.
- Power conversion electronics to convert the AC-Power into DC-Power.
- Power router module is a power connection matrix of DC contactors to connect the Power conversion electronics and distribute the DC power to one or more DC outlets.
- Climate control to keep the EVSE at operational temperature.
- System manager to monitor and control the operation of the EVSE.
- All electric circuit to convert AC-Energy from the grid to DC-Energy and interface to the DC-Outlet modules.
- The ventilation grid air outlet to release the hot air from the cabinet.
- The ventilation grid air inlet to allow fresh air to enter the cabinet.
- The GPRS antenna to allow for communication with a back-office.
- The stop button / status indicator to stop the charge session by hand to show the operational status of the charger (RGB LED Ring showing the charge status: green = available, red = error, blue = charging).
- The emergency shutdown button to stop the charge session immediately to bring a safe situation which to be used only in emergency situations.
- The forklift pockets to allow for the installation of the cabinet with the use of a fork lift truck.
- Eye bolts to lift charger to destination.

6.4. Product View

The following images illustrate the main components and different angle of the product:

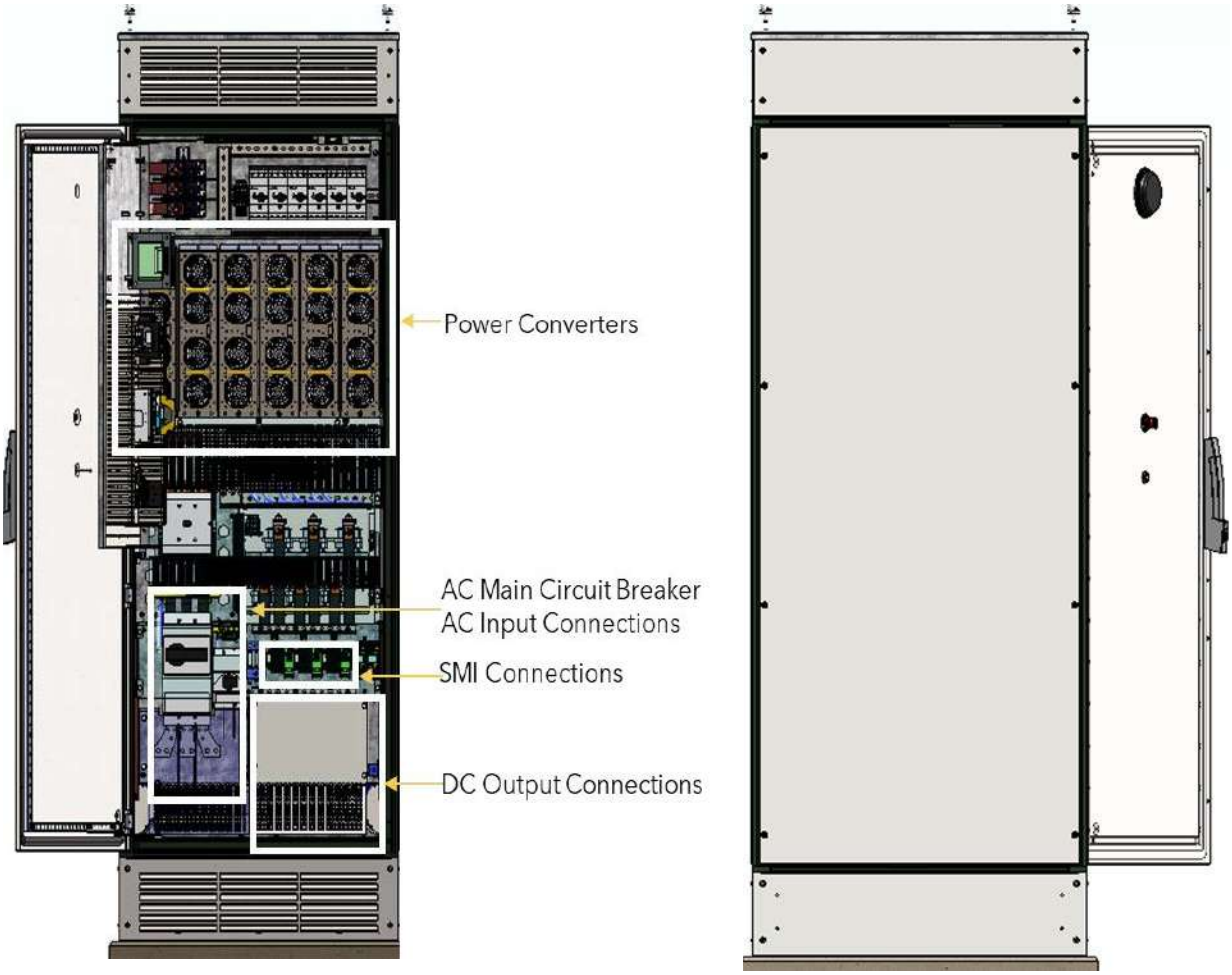


Figure 9: Product View- Inside and Outside Cabinet

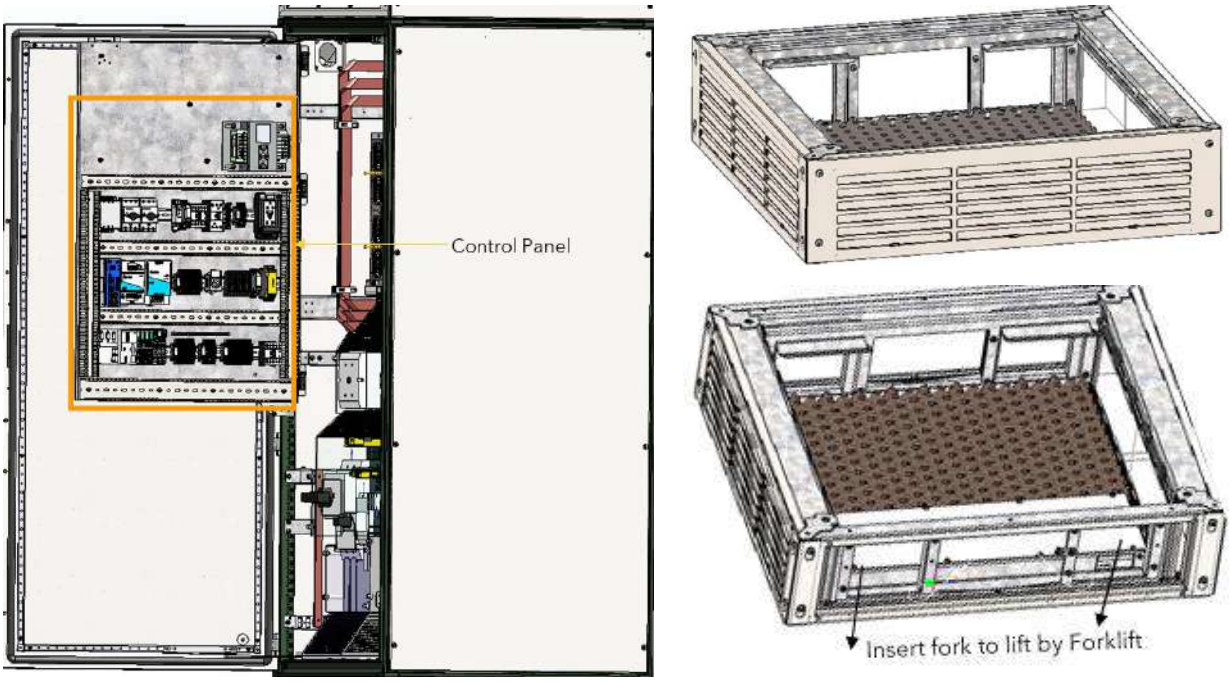


Figure 10: Product View- Control Panel and Base

7. Installation Instruction

This section illustrates the requirements and instructions for the installation of the Electric Vehicle Supply Equipment (EVSE), the Flex 180 kW. It also provides information on civil work to detail the ground work to be done, mechanical installation to detail the lifting, mounting, and installation work to be done and electrical installation to detail the electrical work to be done.

7.1. Introduction to Installation Procedures

Please work with qualified parties to ensure that all required activities and steps are taken to safely work through the site design and the EVSE installation process. After completion of the site preparation work, the EVSE is installed mechanically onto the foundation locations. When the mechanical work is completed the EVSE is electrically connected and commissioned.

The installation works require:

- The site preparation including physical installation of the foundation if applicable and the EVSE cabinet.
- Installation verification measurements and visual installation check.
- Electrical installation cables, connections and all fuse boxes / switchgear, etc..
- Installation of AC cable and conduits between the AC switchgear and the EVSE.
- Installation or upgrade of the upstream transformer and switchgear, if needed.
- Installation of earth electrodes if needed.
- Electrical installation and commissioning of the EVSE.
- Mechanical structures for ground work DC Couplers and CCS Cable management.
- Collision protective devices like bollards.
- Ductwork, cable ladders, cable trays for the purpose of guiding AC, DC and SMI-Cables to and from the base station.

This product has several deployment configurations, these deployment configurations include, but not limited to variations of:

- A standalone unit with attached CCS cable.
- This base unit with a single or several remote DC outlet cabinets and columns
  And with that you cover most of the DC outlets.

7.2. Site Installation Layout

There are several aspects to locating the EVSE equipment to improve performance, lifetime, and ease of operation. These items are dependent upon the installation site and intended use:

1. The access of the installation site shall be of sufficient size to allow the logistics / transportation 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 36x46x95.5 inches (920x1170x2430 mm) (LxWxH).

2. Equipment cannot be installed on asphalt to prevent increased ambient temperatures due to the heat island effect.

3. For locations where the EVSE is exposed to the possibility for collisions with vehicles, it is recommended to install collision prevention equipment. This may be in the form of bollards or a significantly raised curb / EVSE footing (equipment pad).

4. 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 considered 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 free flow of air.

5. The maintenance tasks for the EVSE are done from the top and the front of the charger cabinet. Allow service personnel to the equipment a clear passage from obstacles to perform the tasks.

6. 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 stop button or emergency button.

7. The escape routes are location specific and shall comply with the federal, state and local government authorities rules and regulations. Keep in mind that a safe escape route is provided during the maintenance tasks with the door open.

8. 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.

9. Close the conduits entering into the Base Station to avoid bypassing the air dust filters and consequently polluting the equipment. Failing to do so will void the warranty.

7.3. Floor Plan

7.3.1. Air intake and air exhaust

The air intake is at the bottom of the cabinet and the air exhaust at the top. The air intake and exhaust are located at the front and left, right or rear, depending on the type of arrangement and the available free space.

Cabinets must have at least 2 sides free for air intake and air exhaust, as shown in Figure 11.
If this requirement is not met, it will lead to early derating.
Due to air cooled ventilation the bottom of the EVSE has to be free from debris or obstruction.

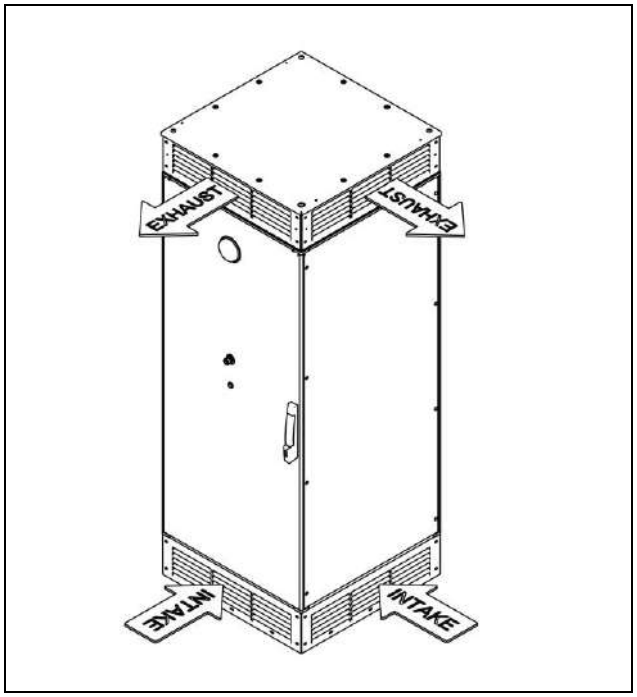


Figure 11: EVSE cabinet air intake and exhaust

7.3.2. Door clearance

To enable the charger access door to fully open, a clearance of 51.2" (1300 mm) (X axis) and 31.5" (800 mm) (Y axis) is required.
See Figure 12.

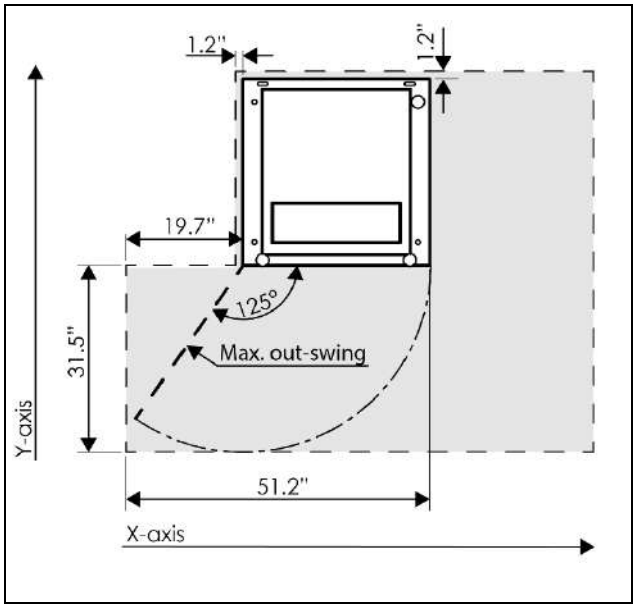


Figure 12: Top view EVSE cabinet - door clearance

7.3.3. Cabinet arrangements

In the figures below you see the installation layout of a stand-alone cabinet and 4 different types of cabinet arrangements. The layouts represent a top view of the charger cabinets.
A cabinet arrangement type is defined by the position and orientation of the chargers, the number of chargers and the required clearance space.

- Unblocked air intake and exhaust on 2 sides of the cabinet are sufficient for propre ventilation.
- If possible, avoid air intake via the back side of the cabinet, since the inlet at the back is not equipped with a demister filter.
- The door swing shall not be blocked, additional clearance space may be required. See Figure 12.
- The front of each cabinet needs a minimum clearance space of 31.5" (800 mm) so the door of the cabinet can be fully opened.
- 27.6" (700 mm) is the minimum clearance space for servicing corridors electrical equipment; IEC 60364-7-729.
- (**A**) Anchor positions accessible from the front and rear of the charger.
- (**B**) Anchor positions accessible from the left and right of the charger.
- Secure the charger at the indicated positions (**A** and/ or **B**) to a steel riser, concrete foundation or solid floor.
- Measurements of the required maintenance area and the recommended clearances are shown in inches.

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.

Stand-alone

- The front of each cabinet needs a minimum clearance space of 31.5" (800 mm) so the door of the cabinet can be fully opened.
- [1]Air intake and exhaust at the front and rear, left, or right side with a minimum clearance of 27.6" (700 mm).
- [1]The minimum clearance space for the sides without and air intake and exhaust is 1.2" (30 mm).
- In case that the anchor positions at the rear, indicated with (**A**), are not reachable the charger may be secured on three bolts; position **A** (left), **A** (right), and **B1** or **B2**.

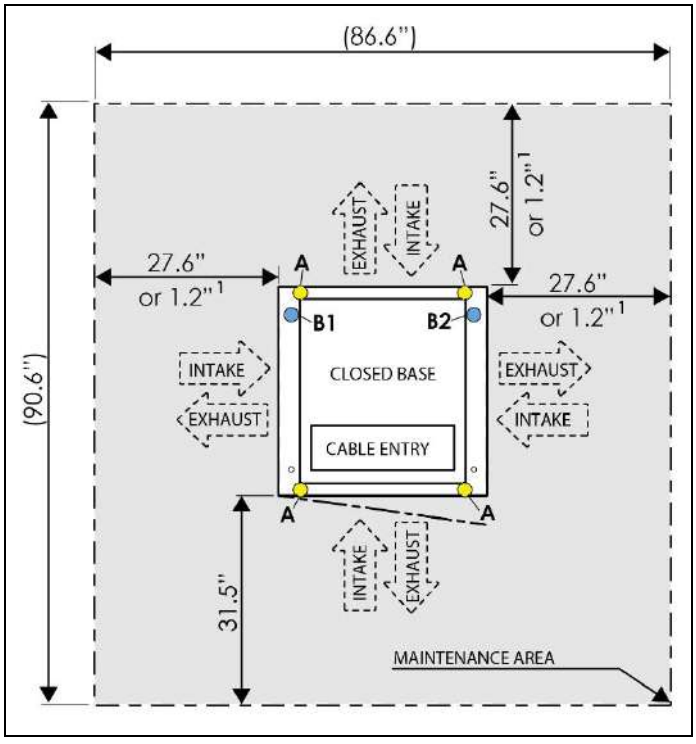


Figure 13: Stand-alone cabinet

Pair arrangement

- The front of each cabinet needs a minimum clearance space of 31.5" (800 mm) so the door of the cabinet can be fully opened.
- Air intake and exhaust at the front and rear, left, or right side with a minimum clearance of 27.6" (700 mm).
- The minimum clearance space for the sides without an air intake and exhaust is 1.2" (30 mm).
- (**A**) Anchor positions accessible from the front and rear of the charger.
- (**B**) Anchor positions accessible from the left and right of the charger.
- Secure the charger at the indicated positions (**A** and **B**) to a steel riser, concrete foundation or solid floor.

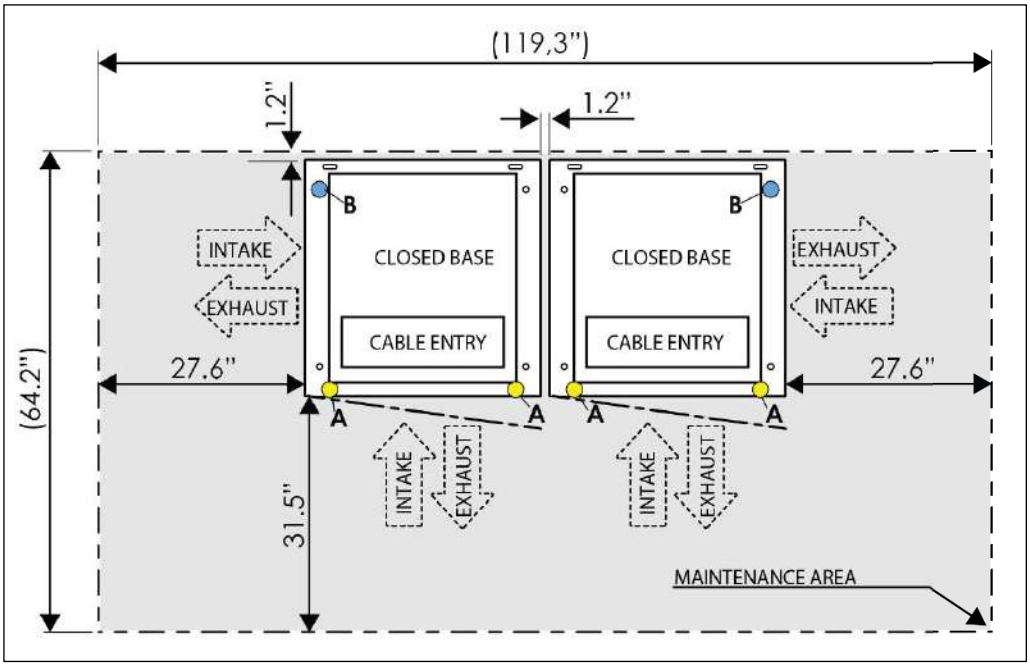


Figure 14: Cabinets in pair arrangement

Line arrangement

- The front of each cabinet needs a minimum clearance space of 31.5″ (800 mm) so the door of the cabinet can be fully opened.
- Air intake and exhaust at the front and rear, left, or right side with a minimum clearance of 27.6″ (700 mm).
- The minimum clearance space for the sides without an air intake and exhaust is 1.2″ (30 mm).
- (**A**) Anchor positions accessible from the front and rear of the charger.
- Secure the charger at the indicated positions (**A**) to a steel riser, concrete foundation or solid floor.
- A line arrangement consists of a minimum of 2 and a maximum of 6 chargers.

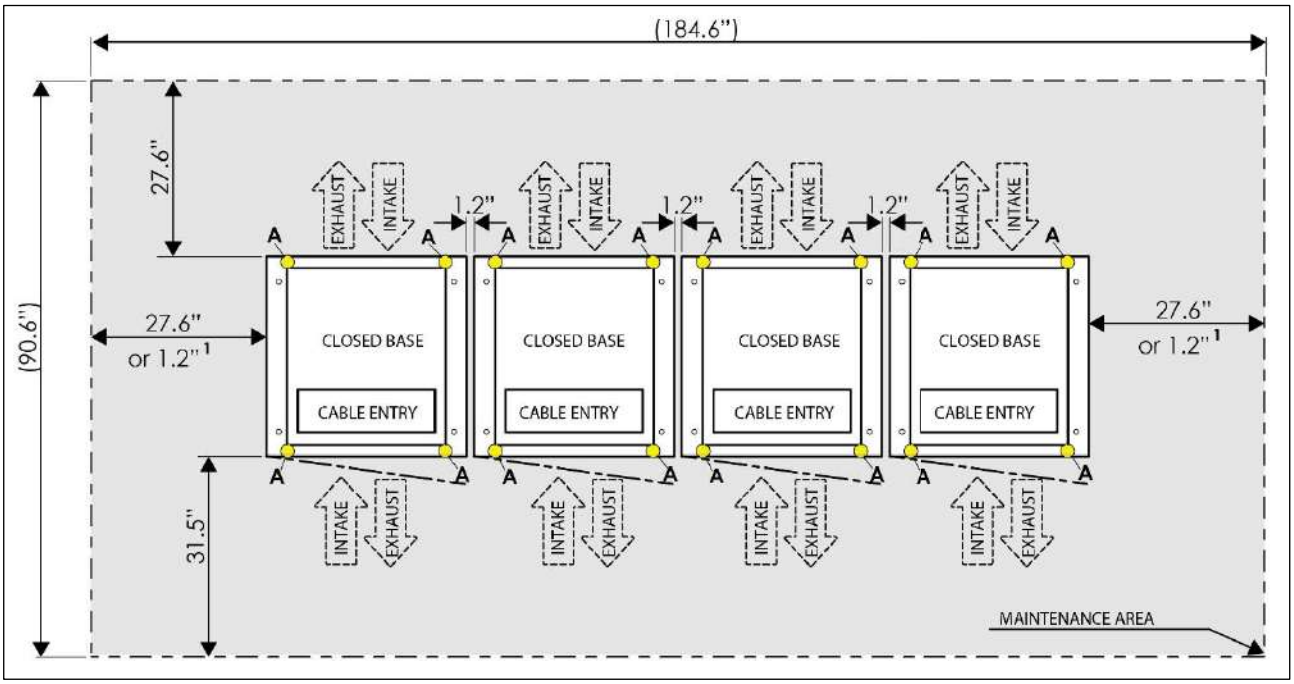


Figure 15: Cabinets in line arrangement

- [1]The required clearance space to the left or right of this arrangement is 27.6″ (700 mm) left and 1.2″ (30 mm) right or vice versa.

Back-to-back arrangement

- The front of each cabinet needs a minimum clearance space of 31.5" (800 mm) so the door of the cabinet can be fully opened.
- Air intake and exhaust at the front, left, or right side with a minimum clearance of 27.6" (700 mm).
- The minimum clearance space for the sides without an air intake and exhaust is 1.2" (30 mm).
- (**A**) Anchor positions accessible from the front and rear of the charger.
- (**B**) Anchor positions accessible from the left and right of the charger.
- Secure the charger at the indicated positions (**A** and **B**) to a steel riser, concrete foundation or solid floor.

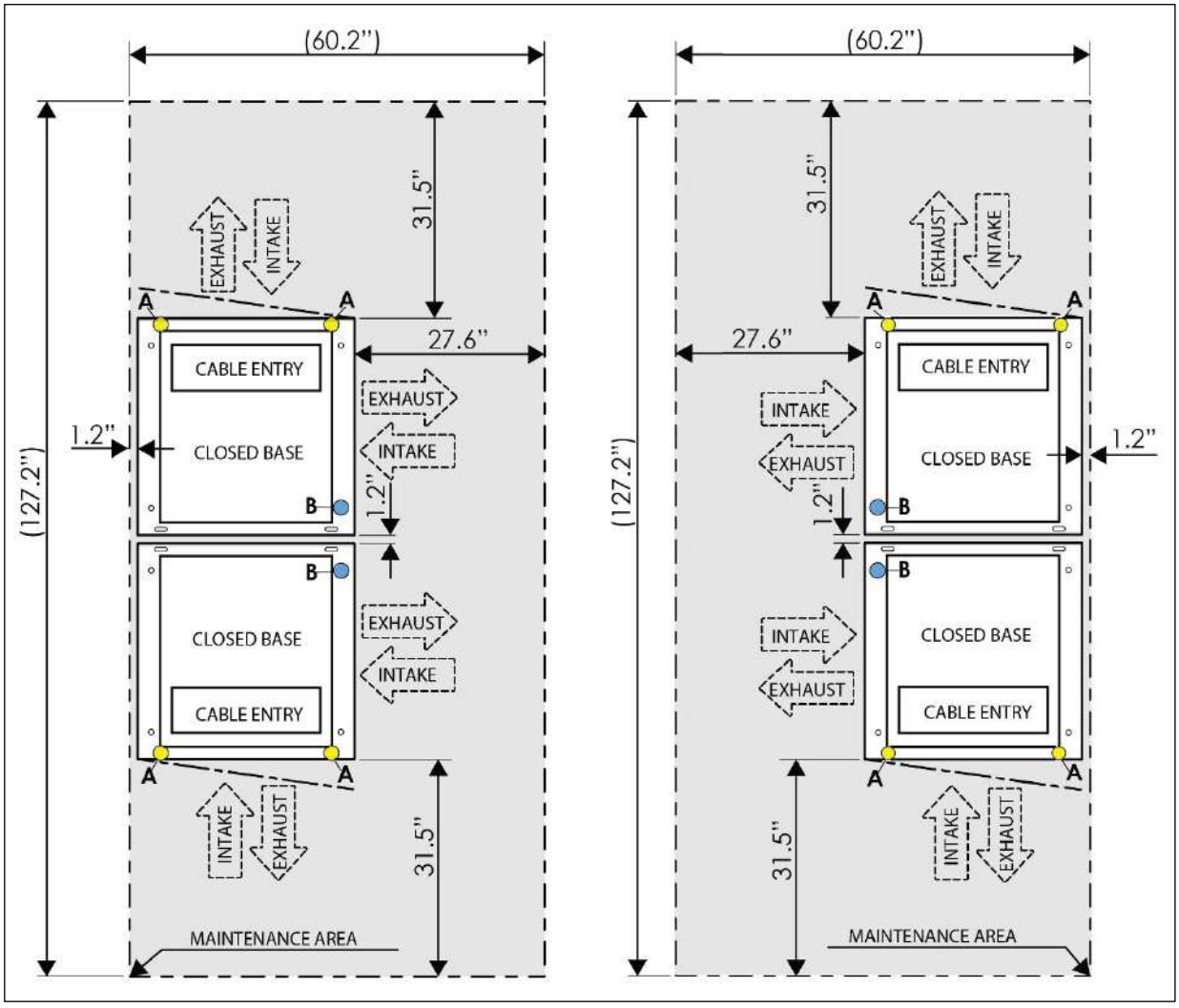


Figure 16: Cabinets in back-to-back arrangement

Block arrangement

- The front of each cabinet needs a minimum clearance space of 31.5" (800 mm) so the door of the cabinet can be fully opened.
- Air intake and exhaust at the front and rear, left, or right side with a minimum clearance of 27.6" (700 mm).
- The minimum clearance space for the sides without an air intake and exhaust is 1.2" (30 mm).
- (**A**) Anchor positions accessible from the front and rear of the charger.
- (**B**) Anchor positions accessible from the left and right of the charger.
- Secure the charger at the indicated positions (**A** and **B**) to a steel riser, concrete foundation or solid floor.

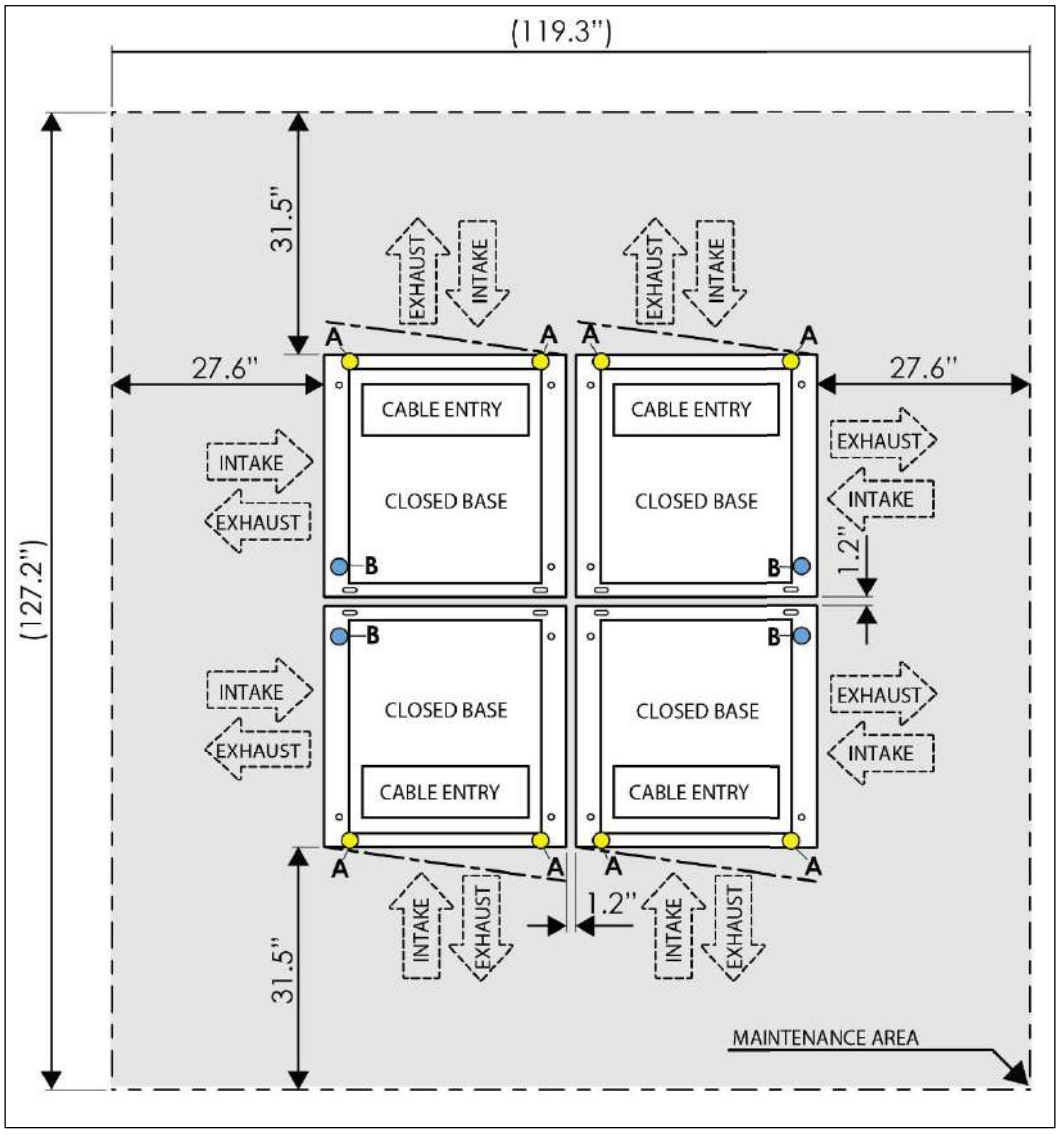


Figure 17: Cabinets in block arrangement

7.4. Cable Gland Plate

By default, a blank plate is provided. This plate may come from the factory in several ways:

- It may be solid to allow for field punching (to be field punched by the installer in the US region).
- It may be pre-drilled to allow easily sourced cord grips.
- It may be pre-populated with standard cord grips.

Note: Once the installation is completed, the installer should install the cable gland plates which should be air and water tight. Air tight cable gland plates ensures a correct temperature behaviour and the water tightness ensures the compliance with the enclosure rating. However, this is the responsibility of the installer to comply with the required AC cable based on the cable gland plate where the AC is predrilled.

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

The base station has 2 cable gland plates. One at bottom level of plinth and one at the top level of the plinth. Both cable gland plates must be used if the system is placed on the riser / platform. If the unit is placed on a equipment pad, then the bottom cable gland plate can be left out but the conduits must be closed in all situations. This is very important for the correct air flow and continuous protection from dust.

Both cable gland plates will be delivered without holes and must be drilled the hole on site to allow conduit connectors to be placed in the cable gland plate. It is very important that the conduits that rise from the ground are air tight.

If the unit is placed at a riser / platform the conduit connectors can be placed at bottom level. NEMA Type 3R approved cord grips should be used. Inside the cabinet the self-tapping screws can be found for fixating the cable gland plate.

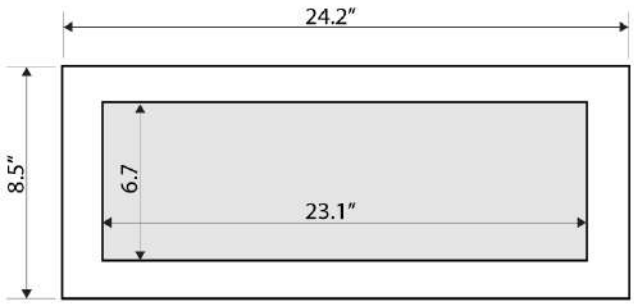
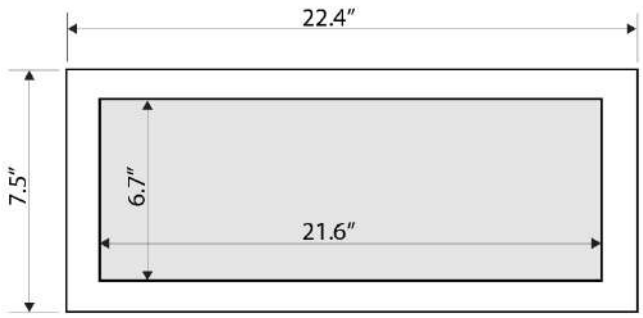


Figure 18: Top Gland Plate Layout

The following are the available options but first one is default:

1. Cable gland plate with no holes.
2. Cable gland plate with predrilled holes.
3. Cable gland plate prepopulated with cable glands.



The bottom gland plate dimensions are 7.5x22.4 inches (190x570mm) from the outside perimeter, the inside perimeter are 6.7x21.6 inches (170x548mm).

Figure 19: Bottom Gland Plate Layout

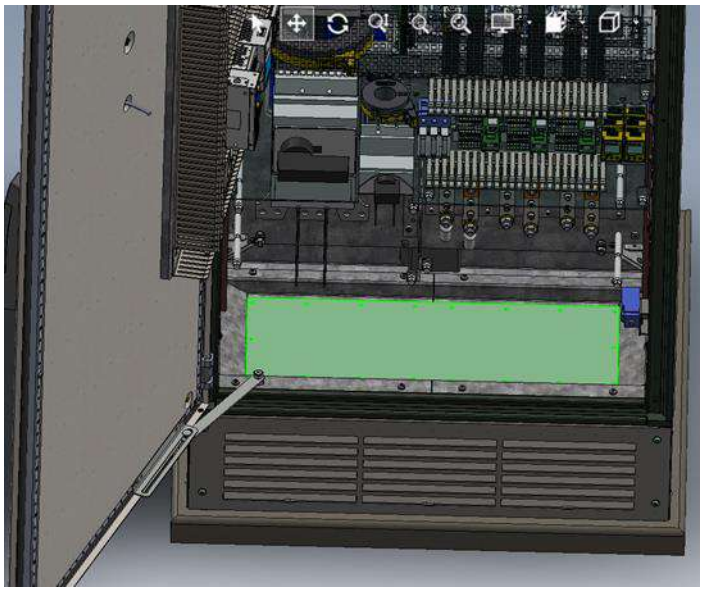


Figure 20: Cable Gland Plate Locations

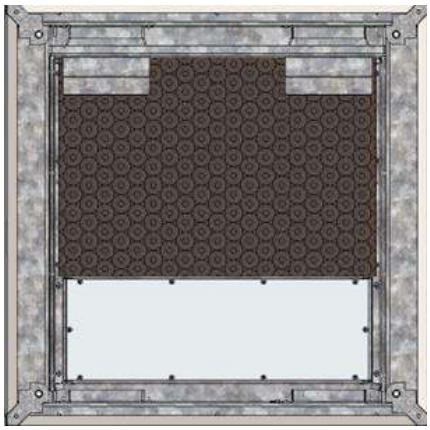


Figure 21: Bottom Gland Plate

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. 3D picture of the gland plate inside of the cabinet and 3D picture of the cable gland plate inside of the base frame

NOTICE
Installer is responsible to ensure that the enclosure rating (NEMA 3R) of the cabinet is maintained while complying with the required / local codes and installation standard.

NOTICE
Custom gland plate composition can be provided: (Only a close closed cable gland plate will be provided to be field punched by the installer in the US region).

- **Fully Closed Plate**
  The installer is responsible for fabrication and maintaining the enclosure rating of the cabinet.

- **Custom Fabricated Plate**
  The installer explains to Heliox which holes at which position are required. Installer is responsible for fabrication and maintaining the enclosure rating of the cabinet.

7.5. Site Civil Works

For most installations, some form of civil work will be needed.
This works shall meet all the federal, state and local government authorities codes, standards, rules and regulations.

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

- Civil works are executed in compliance with the federal, state, and local government authorities directives, standards, rules, and regulations (example; NEC/NFPA70E).
- The DC cable is routed in its own duct and protected against the ground water.
- The PE is covered in the conduit for DC, and the AC auxiliary, AC from the SMI, should have their own conduit. DC+, DC- and PE have their own conduit and SMI, the interlock, e-stop, ethernet and CAN have their own conduit and the AC for the SMI has its own conduit.
- The cable ducts are buried at least 50 cm (20 inches) apart or routed in EMC shielded cable trays or metal conduit.
- There is a conduit from transformer to base product (AC Power).
- There are 3 conduits from base station to DC Outlet (SMI (comms), AC Aux, DC Power).

Note:

- Local regulations may allow the Aux AC Power cable to be put in the communication conduits if the cables insulation classes are chosen carefully.
- If the system contains multiple DC Outlets (max 3). There might be more DC-Power conduits depending on the architecture (static vs dynamic charging).
- DC Power conduit is routed directly from Base station to each DC Outlet in case of parallel dynamic charging.
- SMI (Ethernet, Door Interlock &E-Stop) and AC Aux Power may be routed directly from Base product to the DC-Outlets or daisy chained from Base product to DC Outlet 1, to 2, to 3. SIM (CAN Bus) shall be daisy chained from Base product to DC-Outlet 1, to 2, to 3.

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

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

Cable Ducts: Conduits; underground conduits hard resin pipe not galvanized steel to prevent corrosion. Above ground installation can be made in galvanized steel conduits, cable ladders, cable trays.

7.6. Foundation Requirements

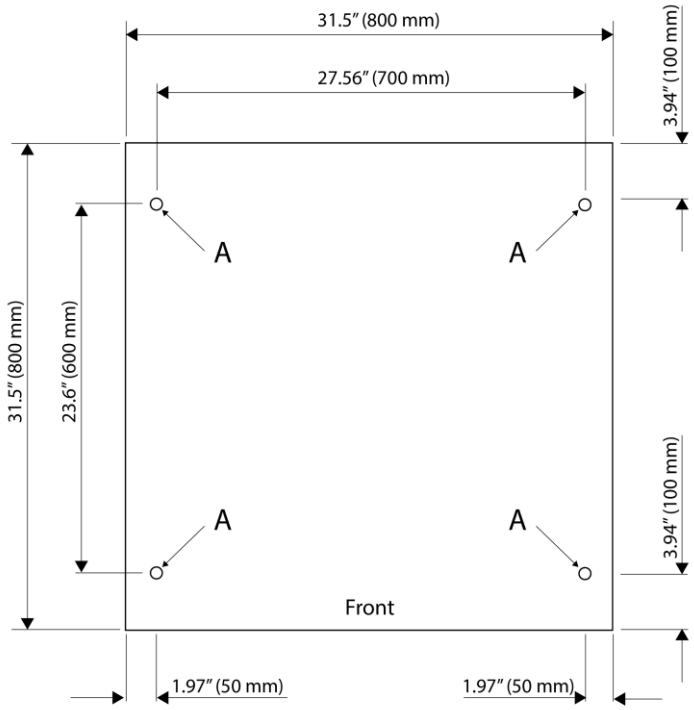


Figure 22: Site Foundation Layout for EVSE

The EVSE is placed on the foundation. The foundation shall be as flat as possible with a maximum slant of 1/12 inches (2mm) across the bottom of the EVSE. Please refer the Technical 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 or 7/16" anchor bolts are required to mount EVSE to the foundation surface (1/2" in the US region, property class 8.8 and surface treatment; hot dip galvanized (for outdoor use)).

Recommendation: Consult with site engineering for requirements on bolt depth, epoxy, and any special requirements resulting from the foundation material.

Input conduits:
- AC input

Output conduits:
- DC output.
- 480 VAC output wiring.
- Signal (SMI) interface wiring.

SMI: Standard Module Interface, inside of the SMI the following connections are included:
- AC.
- E-Stop.
- Interlock.
- CAN.
- Ethernet.

Should only have a different conduit if the other cables insulation classes are not compliant with the highest voltage rated cable in that conduit.

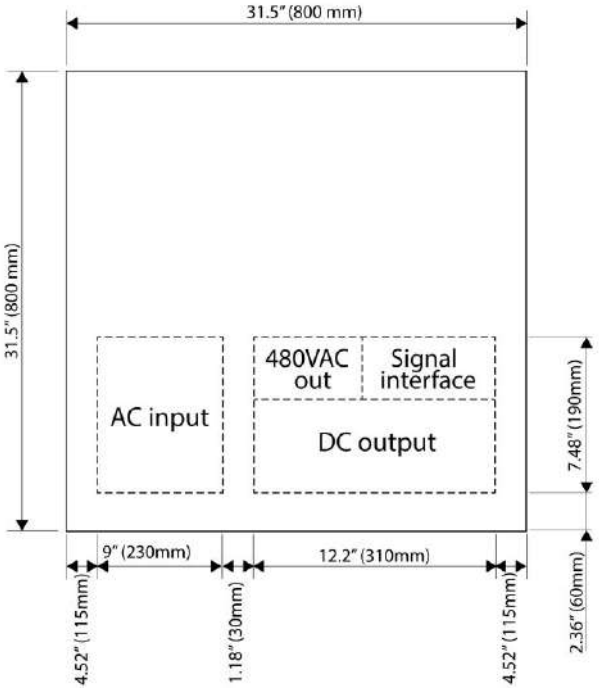


Figure 23: Section of Foundation Layout

NOTICE
Depending on the number of external DC outlets, several sets of output conduits may reside in up to 3 output areas. The conduits should stub-up at least 2" above the expected water table level. The conduits should be closed with duct seal (Stopaq Aquastop 2100 or similar).

WARNING
The conduits must be sealed off due to the airflow of the charger in the frame / basement. The airflow will go partly through the conduit which results in unclean air in the charger that can cause damage over time.

7.7. Ventilation

The EVSE is air cooled by a set of internal fans which take in the air from the ventilation grids on the bottom sides (2) of the base product cabinet and release the hot air from the ventilation grids on the top of the base product cabinet. The air intake has filters to prevent contamination of the internal side of the base product cabinet.

The two air inlets and the air outlets should not be blocked by any wall or other cabinet and should be free. Keep the ventilation grids free from debris and obstacles to allow for a free flow of air.

The airflow of the exhaust of the base product can be directed upwards or downwards. By default, the iron grids are installed to blow downwards. This blow downwards configuration is mandatory when the base product is placed outdoors, in an environment where water can fall on the base

product or in any other situation that it is demanded that the water ingress/IP degree must be at least NEMA 3R.

For indoor installations where there will be no water falling on the base product, 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 base product is installed indoor and where the air-removal is at the top / ceiling of the room the base product located.

Note: The downward blow off is used indoor, the indoor location must have a good ventilation system.

Figure 24: Louver Direction and Downward Blow Off

NOTICE
Heliox delivers NEMA 3R equipment according to the type plate, so the standard grill mounting method must be used.

7.8. Site Mechanical Installation

Mechanical installation is required to properly install the EVSE. Note that the mechanical installation requires hoisting or lifting tasks that may require multiple people or machines for that purpose.

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

Specialized work, such as hoisting and lifting shall be executed by certified persons with appropriate equipment.

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

7.8.1. Installation Procedure

CAUTION
Be careful when handling the coated or painted parts. Damaged coating can cause corrosion. Corrosion can cause serious damage to the parts in the future.

7.8.2. Preparation

- Make sure that the packaged unit is placed on a flat and stable surface with sufficient space to work.
- Remove and recycle the packaging material.
- Recycle the packaging material in accordance with the local regulations.

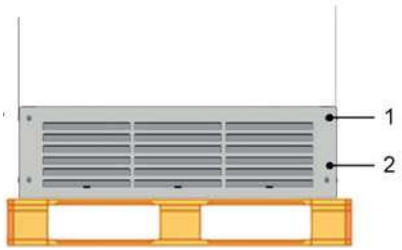
7.8.3. Transport Charger

The charger may be transported via a forklift or a hoist operation. The following subsections describe each step:

Use Forklift to Transport the Charger:

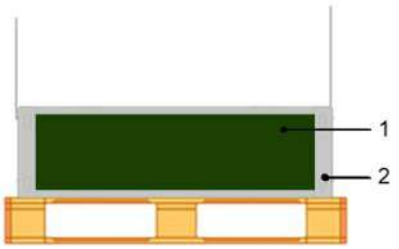
1. Remove the screws (1) on both ends and the ventilation grid (2). Screws: Hex socket button screws M6

Note: The image on the right shows the base of the charger mounted on a pallet. Remove the ventilation grid positioned at the front by unscrewing the M6 Hexagon socket button head screws (4x).



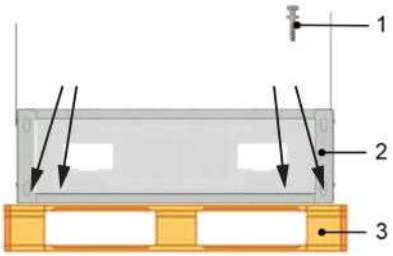
2. Put the parts in a safe place to prevent damage or loss.

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



NOTICE
The forklift pockets are blind. Therefore, the fork will not extend completely through the unit. The fork should engage until it touches the endplate. Fork engagement length is 42inches. Note that the forklift pockets allow for a fork width of 130mm (5.12 inches).

5. Remove the screw bolts with the washers (1) that attach the cabinet (2) to the pallet (3).

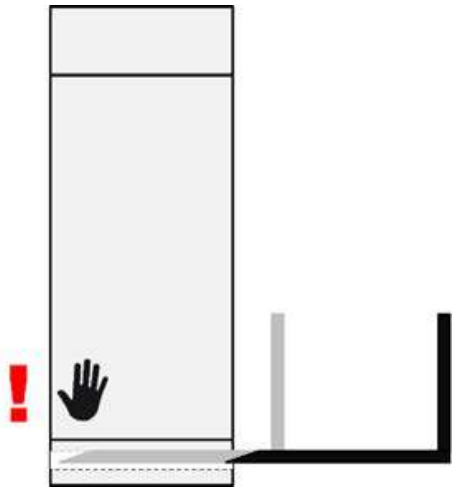


6. Repeat for the screw bolts accessible via the same process with the back panel. Remove and discard the screw bolts with washers (there is no filter or demister present at the back). Back panel should stay when using forklift.

7. Make sure, the forklift truck is rated for the work and the driver is certified and experienced.

8. Before lifting, for stability purposes, close and lock the door.

9. Carefully, drive the forks into the forklift pockets.
   Notice: the forklift pockets are blind.



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.

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

Use Hoist to Transport the Charger:

1. Remove the bolts (1) on top of the roof (4x).

2. Mount the eye bolts (2) in place of the bolts that were removed in step 1 (4x). Pass the screwdriver through the "eye" and turn around to tighten the eye bolts.

3. Ensure that the shoulder of the eye bolt will be firmly seated against the top plate of the roof to be lifted.

Lifting eye bolt; steel C15E, zinc plated.
DIN 580 / ISO 3266

4. Never use an eye bolt that shows signs of wear and damage.

5. Make sure that the threads on the shank and receiving hole are clean.

6. Connect hoisting strap to the lifting eye bolts.

7. Before lifting, for stability purposes, close and lock the door. If equipped, make sure that the CCS cable is put on the cable tray in an orderly arrangement, such that it cannot be damaged when lifted.

8. Lift the cabinet and move it to a flat and stable surface. It may need to use water sealing washers if the bolts are removed.

The hoisting bolts have to be placed back on the top after lifting the cabinet in place.

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

7.9. Site Electrical Installation

DANGER
Risk of electrocution. Only authorized people shall work on electrical systems. Follow best practices to ensure safe work on the electrical installation. Energized electrical systems are hazardous and can cause electrical shock. Electrical shock can cause serious injury to persons including death.

For successful operation of the charging equipment the grid service needs to be provided. It is the responsibility of all the parties working on the project to ensure the civil, mechanical, and electrical works are executed in compliance with the federal, state and local government authorities codes, standards, rules and regulations. Specialized work, such as proper electrical terminations shall be executed by certified persons with appropriate equipment.

The cable entry and exit for this unit passes through cable plates on the bottom of the unit. The installer will need to punch holes in the plate and provide proper listed cable grips to secure and protect the cables passing through the cable plate. The cable gland plate is needed for successful operation of the charging equipment and shall not be left out. They must be punched and used with proper accompanying hardware. The pass-through areas are shown in the section 7.6. Site Foundation.

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

7.9.1. Electrical Power Connection

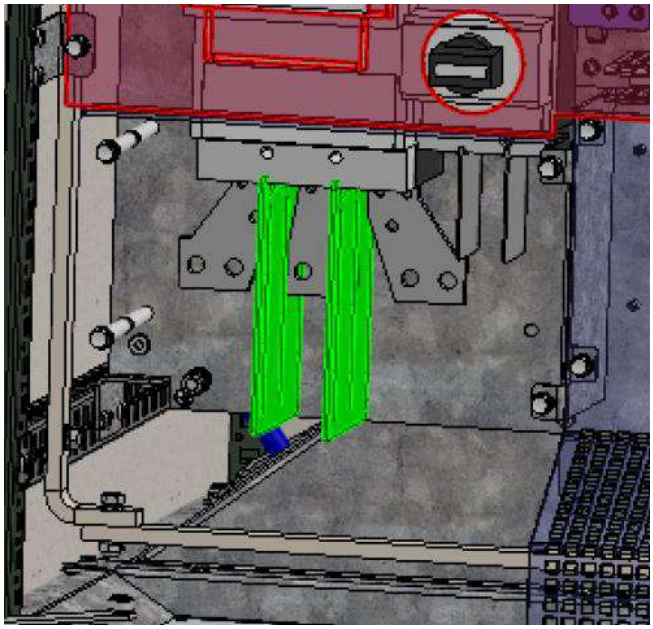
The AC power supply is connected to the phase connection points on the main circuit breaker in the EVSE. The cables must be terminated and connected in accordance with the instructions given by the manufacturer of the switch and the local code. Federal, state and local government authorities always prevail over any decision in this regard.

After the cable lugs are installed and torque tightened, a torque mark must be applied for future reference. The appropriate torque value is AC input cables 274 in-lbs (31Nm). It is mandatory to ensure that the EVSE cable entry and exit (where applicable) is sufficiently sealed at the base to prevent rodents to enter the cabinet. Please browse the 6.4. Product View for more details.

7.9.2. AC Configuration

Incoming AC power supply:

- 3P+Protective earth.
- Short Circuit Current Rating (SCCR): 35kA



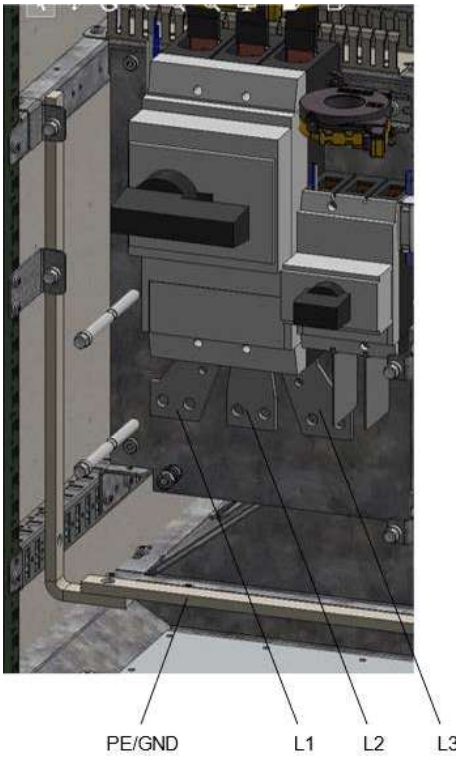


Figure 25: Phase Isolator Plate

7.9.3. Grounding Instruction

The unit has to be connected to the ground wire provided with the incoming AC-Connection.

The base station is grounded by means of separate ground wire connected directly to the transformer ground in the upstream installation. Right side figure shows PE (ground) connection on the Ground rail highlighted in green.

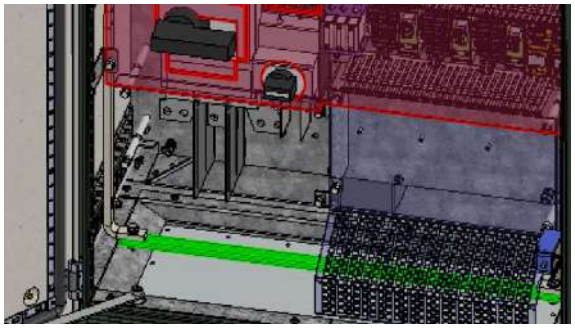


Figure 26: Ground Connection

7.9.4. Electrical Procedures

1. Set the switches in the OFF position.

2. Lock-out / Tag-out the upstream supply to the EVSE and the related systems to ensure that the EVSE cannot be energized unintentionally.

3. Ensure the electrical parts and connections are clean, dry and free of corrosion.

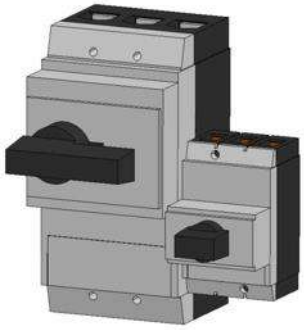


Figure 27: Electrical Switch

7.9.5. Install Cable Lugs and Shrink Sleeves

As applicable, the AC power supply cable can be as multicore cable or as separate cables. The AC power supply has the phases (L1, L2 and L3) and the protective earth (PE / Ground). The AC power supply cable must meet the following requirements:

- Cable shall be of a UL insulation type rated to at least 90 °C.
- Cable shall be fitted with a compatible compression lug.
- Compression lug shall have tinned surface.
- Compression lug shall be narrow tongue style single hole lug.
- Compression lug shall be rated to at least 90 °C.
- Compression lug shall be compatible with material uses (copper or aluminum).
- Compression lug should have hole sized to accept a 7/16" (M12) bolt size or compatible bolt.
- Compression lug shall be UL rated for supply use.
- Heat shrink shall be UL rated for 480VAC or greater and 90 °C or greater.

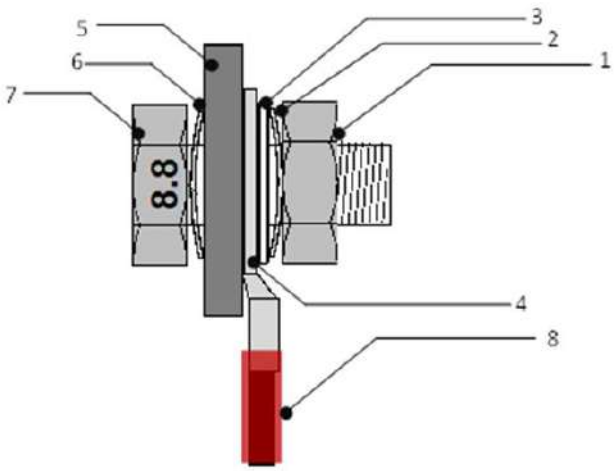
NOTICE
Narrow cable lugs are needed for AC connection, standard cable lugs will not fit. Narrow tongue lugs are often special order long lead time parts.

CAUTION
Be careful when installing the conical spring washer. The hollow side must face the busbar. Incorrect installation will cause serious damage to the equipment.

1. Feed the AC power supply cables into the EVSE.

2. Install the cable lug and the shrink sleeve to the cable in accordance with the manufacturer's instructions.

1 Nut
2 Conical washer
3 Flat washer
4 Cable Lug
5 Bus bar
6 Conical washer
7 Bolt (Quality 8.8)
8 Heat shrink



NOTICE
The AC-Input of the charger has balanced loaded phases, a neutral connection is not required.

7.9.6. Connect Output Connections

This unit is always connected to 1 or max 3 external DC Outlets:

- If the base station has multiple DC outlets connected the same amount of DC-Power pairs must be provided.
- The DC cable shall be routed in its own duct.
- GND can be routed in the DC-Power conduit or in the communication conduit.
- The SMI AC Supply (480VAC supply) shall be routed in its own duct.
- The DC and Communication conduit shall be at least 20 inches (50cm) away from each-other, or routed in EMC shielding raceways such as rigid conduit (EMT or RGS, both metal and galvanized).

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.

NOTICE
The EVSE unit described in this manual may support several different output configurations.

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

7.9.7. Connect Output Connections

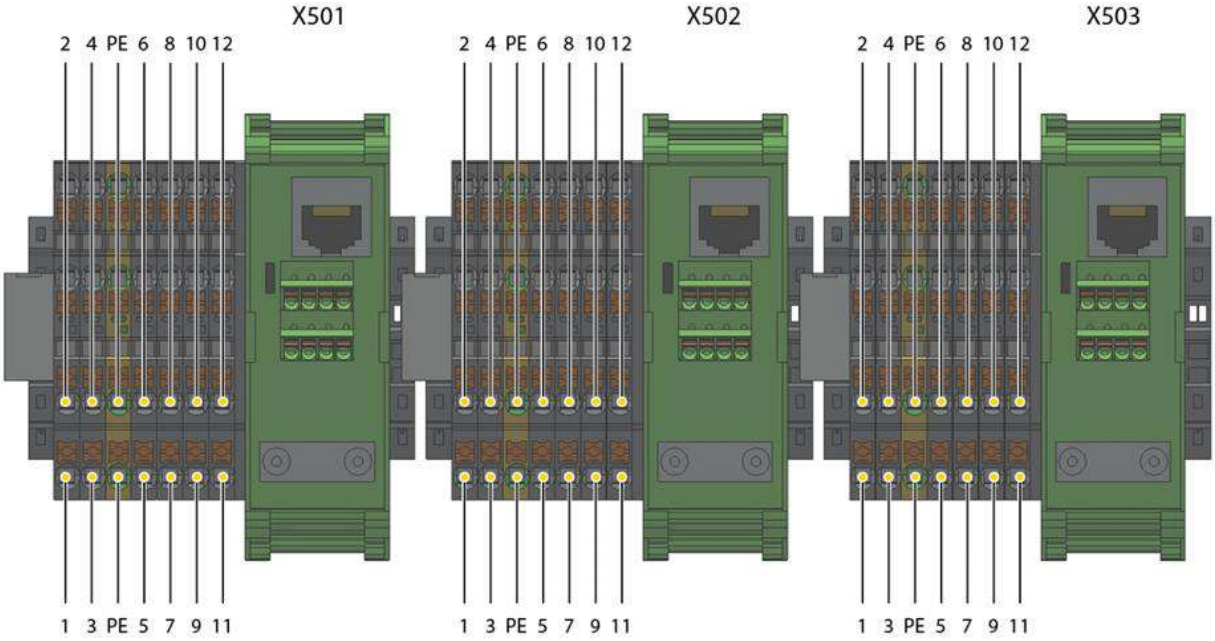
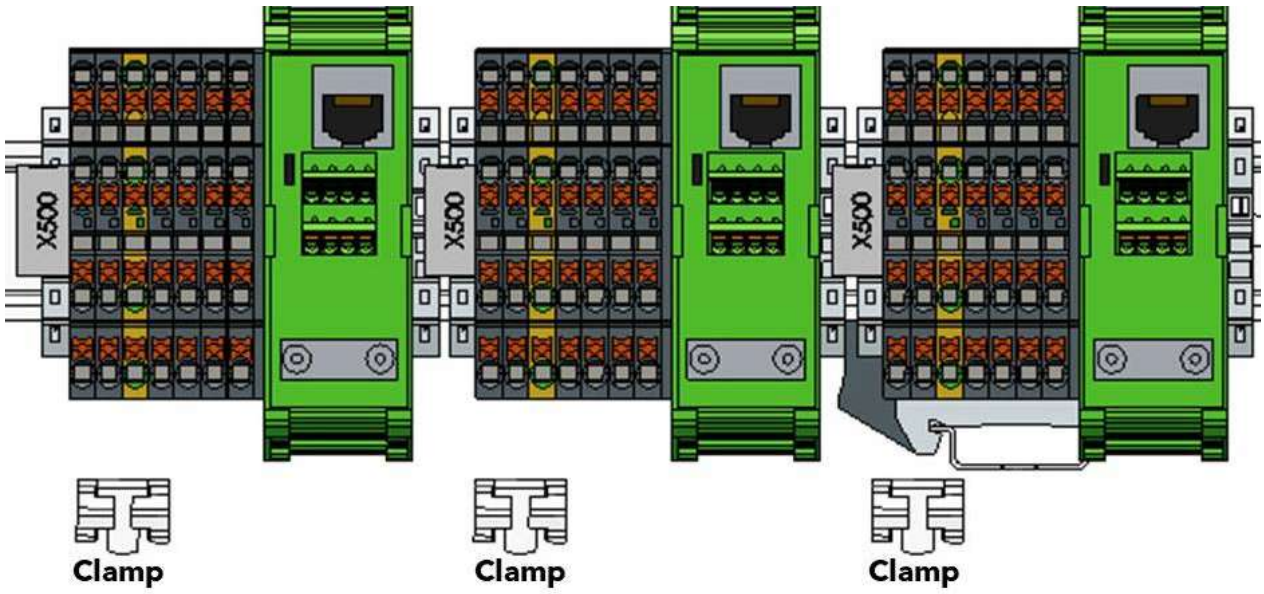


Figure 28: Output Connections

Cable	Function	Wire Color / Number	Base Product*
AC Out	L1	BK1	X50x:1
	L2	BK2	X50x:2
	L3	BK3	X50x:3
	PE	GN/YE	X50x:PE
CAN BUS to DC outlets	CAN_H	WH	X50x:5
	CAN_L	BN	X50x:6
	Shield		50xSH2
Low voltage interface	Not used	Not used	X50x:7
	Not used	Not used	X50x:8
Emergency stop from DC outlet	Emergency Stop	BK 1	X50x:9
		BK2	X50x:10
Interlock In (Door switch from DC outlet)	Door	BK3	X50x:11
		BK4	X50x:12
Ethernet to DC outlets	Communication		X50x:13

Note: Base Product* column, small 'x' stands for 1, 2 or 3, depending on the base station configuration.

Note: It is important to connect the shielding of the CAN cable into the cable clamps that are in the product. If CAN cable shielding is not connected to the clamps or floating shielding can create issues in the field, the picture below shows the clamp.



Notice
CAN BUS X50X:5 and X50X:6 are not to be connected as 3 separate CAN BUS connection from base to DC Outlet but are to be connected in daisy chain.

7.9.8. Output Terminal Wiring

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

Fixed Installation with Remote Cabinets			
Item	**Function**	**Cable example**	**Connection**
E-stop	Emergency stop	Multi-core control cable, shielded, 4 x 18AWG 4xAWG18	Ferrules / snap-in
Interlock	Enable system*		
CAN	CAN communication	CAN BUS Unitronic FD CP (TP) plus UL/CSA 1x2x0,34	Ferrules / snap-in
ETH	Ethernet communication	S/FTP (Shielded/Foil Twisted Pair) . CAT 6 is sufficient	Ferrules / snap-in
AC Supply	3P 480 V AC+PE	H07-RNF, Size-4	Ferrules / snap-in

* Function emergency stop needs 2 wires #18 AWG and function interlock (door switch) needs 2 wires #18AWG.

NOTICE
Any standard cable may be used as long as specifications are the same or better.

7.9.9. DC Connections

1. Feed the DC power supply cables into the EVSE.

2. Install the cable lug and the shrink sleeve to the cable in accordance with the manufacturer's instructions.

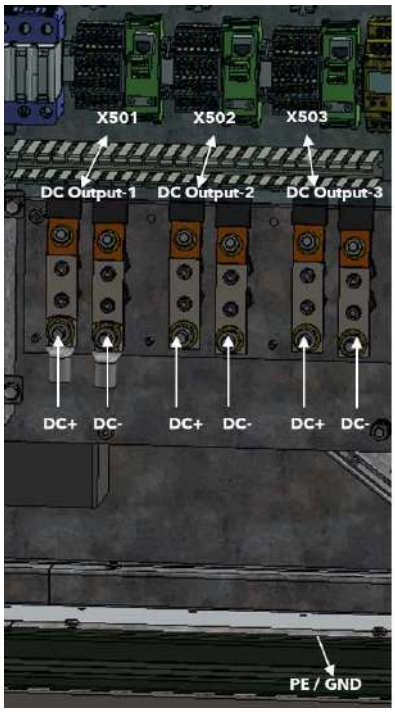


Figure 29: DC Connections

Cable	Function	Wire color/number	Torque Value	Base station connection
DC+ to DC outlet	DC+	Black (red labelled)	40Nm	DC+ busbar
DC- to DC outlet	DC-	Black (blue labelled)	40Nm	DC- busbar
GND to DC outlet	PE	Green or Green / Yellow	Specific PE clamp (Rittal SV 3456.500). Torque mentioned on the clamp itself	PE Rail

Fixed Installation with Remote Cabinets			
Item	**Function**	**Cable example**	**Connection**
DC+, DC-	Floating DC output voltage	Rated voltage Uo/U: 0.6/1kVac (0.9/1.8kVdc), double wall jacket, flexibility (Class K/M), 250kCMIL (max cable cross section).	Cable lugs, M10, galvanized, class 8.8 UL approved heat shrink rated for 1000V or greater
GND/PE	Ground (Protective Earth)	Flexibility (Class K/M), 250kCMIL (max cable cross section)	Cable clamp, bus bar thickness: 10 mm

Note:
The size of the DC+ and DC- wires depends on the current, length, installation method and customer efficiency requirements. The size of the protective ground (PE/GND) is minimum 16mm2 [4AWG] and can be up to 50% of the live conductor size. Follow for sizing of DC+. DC- and GND the installation code (NEC/IEC).

CAUTION
Hold the cable while tightening the nut at the right torque.

NOTICE
Any cable can be used as long as the products comply with the manufacturer product manual and NEC.

7.10. 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 AC-In connections, DC-out connections and GND-Connections.
   - Verified with resistance meter, example Hioki RM3548.

2. Do an insulation check of the AC supply cables utilizing IEC 60364-6 (International) or local equivalent procedure (NEC for US).
   - 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.

4. Make sure, it is safe to do the resistance test with the use of valid, calibrated equipment.

5. Measure the CAN-Bus, this should result in 60Ohms. The base station and DC outlet(s) should be switched off when conducting this test. 60 Ohm between CAN-L and CAN-H terminal. The base station should be voltage free when conducting this measurement.

6. Check the shielding of the CAN cable is connected to the cable clamp of the SMI. Not connecting the shielding or a floating shielding can cause issues during charging.

7. Validate the operation of the resistance tester.

7.11. EVSE Preconditioning

NOTICE
After installation, the EVSE must be preconditioned to comply to the climatic specifications as listed in document Technical Specifications.

When not stored, the EVSE system must always be preconditioned. The EVSE and separate DC outlet cabinets are prepared for climate preconditioning.

1. Connect a temporary or the permanent 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- (20mA) and overcurrent at the feeding side of the cable.

2. Open cabinet door.
3. Unlock the secure lock of the control panel located on the top.
4. Locate the service switch which is located on the center of the control panel.
5. Turn off the service switch, which is located at the center of the small mounting panel.

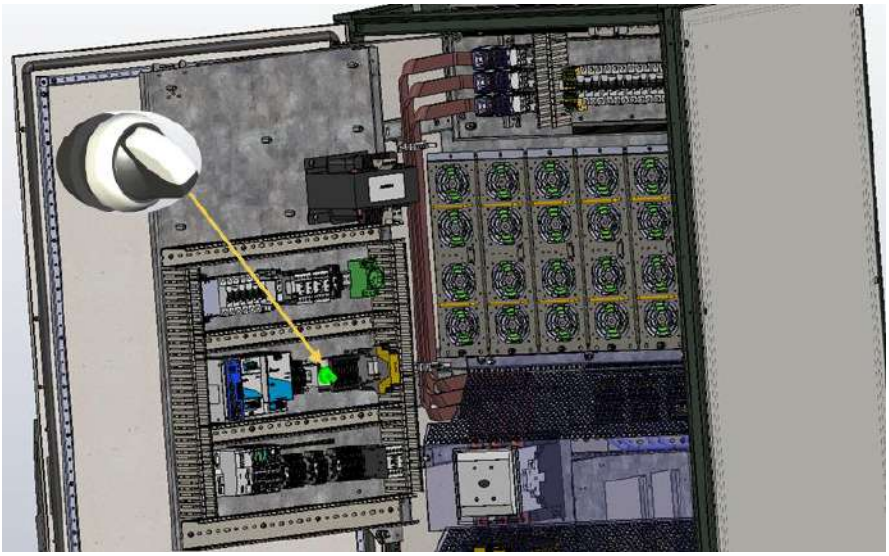


Figure 30: Service Switch

6. Then turn auxiliary circuit breaker on.

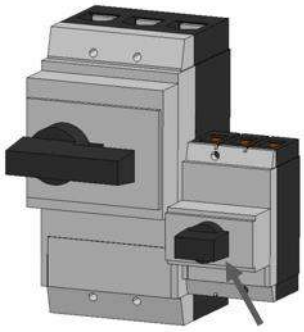


Figure 31: Circuit Breaker

7. Close cabinets (Base station and all connected DC outlets).

8. Preconditioning will take place automatically as long as supply voltage is provided.

NOTICE
After delivery of the product on-site, the installer is responsible for climate control, which means storing the products in a suitable environment 'storage'. The installer is also responsible for powering on the product.

8. Commissioning

This section provides guidance on commissioning of the product in a safe environment based on the standards set by the federal, state and local government authorities rules and regulations.

8.1. Commissioning of the System

Commissioning of the EVSE is done by the Heliox service and installation engineers. Commissioning procedure is detailed in a separate commissioning instruction document which is drafted per project. Refer to the project documentation that is attached to the contract which is signed and agreed upon.

8.2. Preliminary Commissioning Procedure

The following procedures must be completed before starting the commissioning process by the Heliox certified service engineer / technicians:

1. All the installation work is completed as per the specification.

2. Grid power is available.

3. Local technician to be available to assist to switch the power on.

4. An electrical vehicle compliant with the applicable charge technology standard of the charging station is available to perform the functional tests.

5. Safety procedures must be completed, various safety signs must be placed, and PPE is available to do the last minute risk analysis before begin the onsite commissioning procedures.

6. Various service personnel to be coordinated in advance to perform the required tasks on site as per the requirements and ensure that all the required materials are also available on site during the planning phase.

7. Follow the federal, state and local government authorities protocol and comply with the various standards as required.

8.3. Commissioning Report

Commissioning procedures must be recoded and reported to analyse the efficiency of the EVSE product to verify the performance vs production. System anomalies can be detected during the commissioning process, but it must be rectified with proper documentation to submit to the concern parties for evaluation.

Nobody shall be allowed to change any parts of the equipment / device settings or software configuration without written permission from Heliox.

9. Instruction for Use

This section outlines the operational instruction of the Heliox Electric Vehicle Supply Equipment (EVSE) to support the understanding of the product operation in order to familiarize the instruction for use.

9.1. Contact Information

Call us any time, any day, at +1 (855) 950-6339, option 9, or by submitting a case directly via https://emobility.usa.siemens.com/s/submitCase

Heliox Technology Inc.
150 Ottley Drive NE
Suite A
Atlanta, GA 30324, USA

9.2. Turn On / Off the EVSE

An official handover from installer to after-sales to be done in order to switching on the equipment. The handover should contain the report of the installer showing all applicable NEC/NFPA70E measurements which have been performed especially ground continuity, isolation values, voltage levels at the input terminal, field rotation and so on. An installation check must be passed without safety and functional issues before switch on the equipment. The person who switches on the unit / equipment is responsible for the above process.

9.2.1. Switch the EVSE ON

WARNING
Make sure the charger is switched OFF and it is not in charging mode before opening the controller cabinet door.

1. Set the service switch to OFF.
2. Make sure the main power switch and the auxiliaries power switch are set to OFF.
3. Set the main power switch to ON.
4. Set the auxiliaries power switch to ON. The base product will start up. Outlets needs to be switched ON separately
5. Close the cabinet door.
6. Do a check if the LED ring becomes green.
7. Hold and push the door handle to lock the cabinet door. Make sure the door fits correctly in the framework.

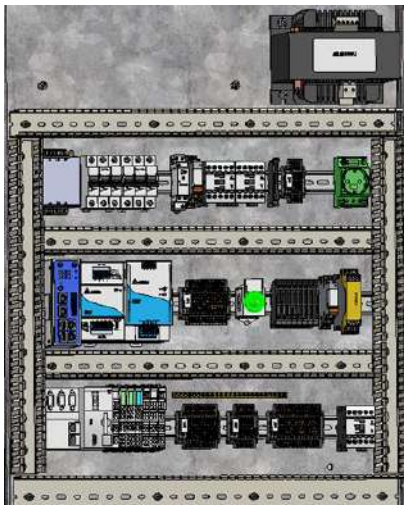


Figure 32: EVSE Switch

9.2.2. Switch the EVSE OFF

WARNING
Wait at least 5 minutes after the charger is switched OFF to apply maintenance or other work to the charger. Residual voltages might not have reduced to save levels and verify deenergized circuits with a 2-pole voltage tester.

1. Make sure the charger is not in charging mode (constant blue of flashing blue LED). If so, stop the charging process (refer 9.3.2. Stop the Charge Session).
2. Open the cabinet door.
3. Set the auxiliaries power switch to the OFF position.
4. Wait until the charger stops. All lights / LEDs in the cabinet are OFF.
5. Set the main power switch to OFF.
6. Close the cabinet door.
7. Hold and push the door handle to lock the cabinet door. Make sure the door fits correctly in the framework.

9.3. Operation of EVSE

This section provides familiarization of EVSE daily operation. The operation of the EVSE is always in relation with an Electric Vehicle which acts as a client to receive the energy and the EVSE acts as a host to supply the energy. The EV batteries only get charged when the communication is completed and uninterrupted during the charge session.

1. Emergency button to stop the product due to an unexpected calamity.
2. Stop button / status indicator

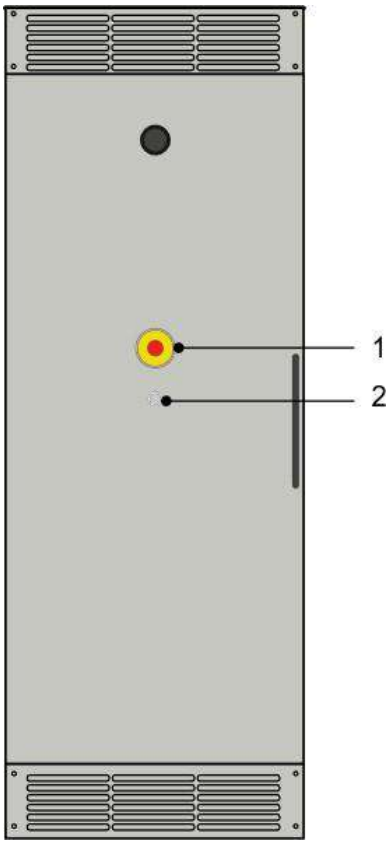


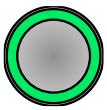
Figure 33: Emergency Button

9.3.1. Start the Charge Session

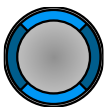
1. Stop the EV at the correct position.

2. Activate the hand brake.

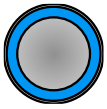
3. Make sure the power of the EVSE is switched on.
   The EVSE is in standby. The status indicator shows green continuously.



4. Connect the EVSE to the EV by the means of EV coupler used. A communication protocol is started.
   The status indicator goes to blue, blinking.

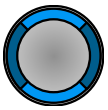


5. After the communication is established, the charge session will start automatically. The status indicator shows blue continuously.

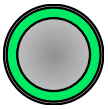


9.3.2. Stop the Charge Session

1. When the charging session is completed, the status indicator goes to blue, blinking.



2. When ready for a safe disconnection, the status indicator goes to green continuously.



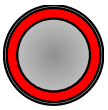
3. Disconnect the EVSE from the EV.

9.4. Disintegrated Operation

Communication Lost is when the coupler disconnects during a charge session (PE and / or CP loses contact) the system enters into a shutdown mode (safe-save operation). When communication with the back office is lost, the system remains charging under pre-set conditions.

9.4.1. Communication Lost while Charging

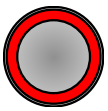
When the communication gets lost during the charge session, the EVSE starts the stop sequence and initiates an emergency stop situation and the status indicator shows red continuously



9.5. Emergency Stop

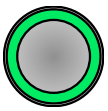
WARNING
Only use the emergency button in an emergency situation.

When push the emergency stop button, the charge session is immediately aborted. The EVSE starts the stop sequence and initiates an emergency stop situation and the status indicator shows red continuously.



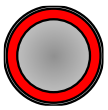
Turn the emergency stop button clockwise to release (button will automatically return to the original position). Pulling is not necessary as the button does return to the original position automatically.

After releasing the emergency stop the EVSE gets a signal that the emergency situation is resolved, the reset sequence is



started automatically. When completed satisfactorily, the status indicator shows green continuously.

9.6. Troubleshoot



If the charger is in an error state (red indicator), the user can try to do a soft reset:

1. Press the emergency button
2. Release the emergency button. The system will reinitialize and restart. If the fault is resolved and not service critical, the system will become available again.

If the fault is not resolved, start the issue resolution process by contacting the first line of support. If necessary, they will be directed to higher levels of support in accordance with the complexity of the issue.

10. Maintenance Information

This section illustrates the requirements and instructions for the maintenance of the Electric Vehicle Supply Equipment (EVSE), the Flex 180 kW, particularly equipment maintenance tasks and the instructions for the preventive maintenance. The maintenance instructions are dependent upon the training of the user. When a dedicated maintenance training is concluded satisfactorily, user will automatically receive the maintenance instructions that come with it.

10.1. Introduction to Maintenance

This section outlines the planning of maintenance and the related operational and preventive maintenance tasks. The typical preventive maintenance tasks are defined as the visual inspections, technical cleaning and change the filter elements, etc. when applicable. Further tasks are to do the operational tests and adjustments of the systems and the components. The operational and the preventive maintenance tasks are done with the parts and the tools which are normally available in the standard toolset of an electrical maintenance engineer.

10.2. Maintenance Prospect

Maintenance is a prospect to keep the EVSE and the related components in a safe, technical reliable and economic viable condition. Well planned executed maintenance is carried out to keep the equipment operational without failure to avoid the downtime and economical loss where a company shows its reliability, efficiency, maintenance and performance management. Maintenance is a well-balanced mixture of knowledge, doing the right thing at the right time, maintenance processes, analysis and assessment. Preventive maintenance and condition-based maintenance either human assessment or sensor assisted.

10.2.1. Preventive Maintenance at Progressive Intervals

Preventive maintenance at progressive intervals to execute the scheduled preventive maintenance tasks of the nearest interval during a scheduled or an unscheduled maintenance activity or a repair of the EVSE. The maintenance intervals inform when at least which tasks must be done. However, there can be unscheduled events in between these intervals. If the EVSE or a related component is out of service for whatever reason, it is cost-efficient to do the upcoming preventive maintenance tasks as well, but make sure the given tasks are done at least one time per interval.

10.2.2. Preventive Maintenance Legal Inspection

It can happen that the given maintenance interval does not meet the maintenance requirements from the authority for legally demanded tasks, e.g. the insulation measurements. In these events, the maintenance interval as demanded by the legal authorities prevails. For the detailed information and the instructions, please refer to the statutory and regulatory standards and directives as issued by the federal, state and local government authorities and other legal documents.

10.2.3. EVSE Initial Maintenance

The aim of the EVSE initial maintenance is to make sure that the EVSE and the related components, after a major repair or an overhaul, operate within the specified parameters. These initial maintenance procedures are also done when the EVSE or related component is returned into service after a period of 3 months of standstill.

10.2.4. EVSE Operator Maintenance

The operator maintenance is limited to daily inspections and maintenance tasks that do not require electrical skilled personnel who are allowed to operate and maintain the electrical installation. Typical operator tasks are visual inspection and cleaning of the external side as well as cleaning and installing new air filter elements.

10.3. Preventive Maintenance

Planning and scheduling the maintenance are intervals based on the calendar time or the calculated running hours. The maintenance is done at least one time per given interval or more frequent as required by the operational profile. The maintenance intervals are meant as a guideline. Always take into account the operational profile to align with the manufacturer's instructions.

10.3.1. Preventive Maintenance Schedule

The preventive maintenance schedule is calendar time based. Note that if an examine task is not satisfactorily, an on-condition task needs to be done to restore the EVSE in a serviceable condition. The maintenance intervals are:

- Annually means: Do the task at least 2x per year.
- 5 years means: Do the task at least 1x per 5 year.
- 10 years means: Do the task at least 1x per 10 year (overhaul).

Annual maintenance is performed based on the "Warranty Policy and SLA", however:

- If the charger doesn't reach the annual minimum charge cycle, then the annual maintenance can be postponed to reach the annual minimum charge cycle.
- If the charger exceeds the annual maximum charge cycle, then an additional maintenance can be performed based on an additional maintenance fee.

The letters in the maintenance schedule table identifies the lowest skill set to execute the task. The given letters are:
O (Operator): The owner or a designated service employee of the EVSE.
A (Authorized Service): A person who is allowed by education and training to execute the task.
H (Heliox Service): A person from the Heliox service department.

Interval/Task		Annually	5 Year	10 Year
1. Examine and Clean External Side				
1.1	Examine and clean the external side	O		
1.2	Keep ventilation grid of charger free from debris / snow			
2. Examine and Clean Internal Side				
2.1	Examine and clean inside the cabinet	A		
2.2	Examine the rooftop exhaust filters	A		
2.3	Clean or replace the rooftop exhaust filters	A		
2.4	Examine the fans	A		
2.5	Clean the fans	A		
2.6	Examine the electrical heaters	A		
2.7	Clean the electrical heaters when necessary	A		
2.8	Examine the bottom inlet filter	A		
2.9	Clean or replace the bottom inlet filter	A		
2.10	Test the electrical heater	A		
2.11	Test the (cooling) fan	A		
3. Examine and Test the Electrical Circuit				
3.1	Examine the electrical connections	A		
3.2	Tighten the electrical connections when necessary	A	H	H
3.3	Examine the electrical components	A		
3.4	Examine the power converter	A		
3.5	Clean the fan (PCM)	A		
3.6	Measure the insulation resistance	A		
3.7	Measure the ground connections	A		
3.8	Revise the ground connections			
3.9	Test the residual current device	A		
3.10	Test the stop button	A		
3.11	Install the new (cooling) fans		H	H
4. Mandatory Checks				
4.1	Examine external side	A		
4.2	Rework external side if necessary	A		
4.3	Examine door seal and lock	A		
4.4	Clean and grease the seal	A		
4.5	Test Emergency Button	A		
4.6	Test a charge session	A		

10.3.2. Preventive Maintenance Caution

Following preventive maintenance safety cautions are provided to support the preventive maintenance task in a safe and efficient manner without harm to the service personnel and the environment or the product.

CAUTION
Do not use any aggressive or chemical cleaning agents. The component is only resistant to water. Aggressive / chemical cleaning agents can cause (serious) damage to the component.

CAUTION
Do not use a high-pressure jet, any sharp tools or any scouring pads. The high-pressure jet, any sharp tools or the scouring pads will make the surface rough or cause damage to the surface. The rough surfaces will contaminate more quickly and can cause serious damage to the surface.

10.3.3. Examine and Clean External Side

Task 1.1 Examine and clean the external side

The EVSE is made of galvanized steel which has a powder coating to prevent the EVSE for deterioration by ambient conditions. To keep the powder coating in a good condition, it is necessary to clean the surface at regular intervals.

- Examine the external side.
- Clean if necessary. Use a wet cloth and mild soap (wash & shine).

Task 1.2 Keep the ventilation grid of charger free from debris

- The ventilation grid provides air flow. Make sure that the ventilation grid is free of debris and snow.

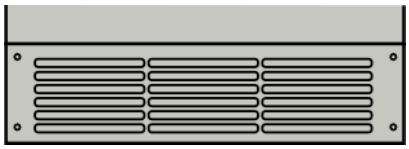


Figure 34: Airflow Ventilation

10.3.4. Examine and Clean Internal Side

Task 2.1 Examine and clean inside the cabinet

- Check the interior of the cabinet for anomalies. Make sure there is no condensation inside the cabinet.
- Use an anti-static vacuum cleaner to clean the interior of the cabinet from top to bottom.

Task 2.2 Examine the rooftop exhaust filters

- There are 3 exhaust filters, one in front and one on each side. If the exhaust filters are dry and have a very minor pollution degree, it is allowed to clean the dust filters with a vacuum cleaner.
- It is recommended to exchange the dust filters.
- Replace the exhaust filters of the rooftop or clean the removed filters if feasible.

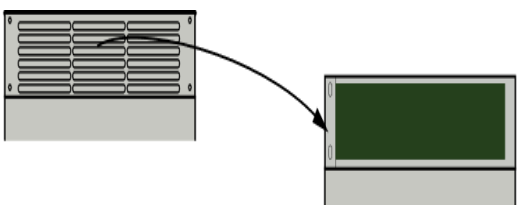


Figure 35: Rooftop Exhaust Filters

Task 2.4 Examine and clean the fans if necessary

- Examine the fans in the cabinet. Make sure that the fans are working properly.
- Make the fans dust free if necessary.

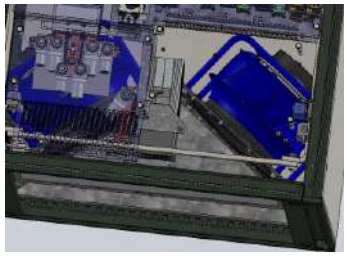


Figure 36: Cabinet Fans

Task 2.6 Examine and clean the electrical heater if necessary

- Examine the electrical heater. No wires should hang directly above the fan.
- Make the fans dust free if necessary.
- Make sure that the fans can rotate freely.

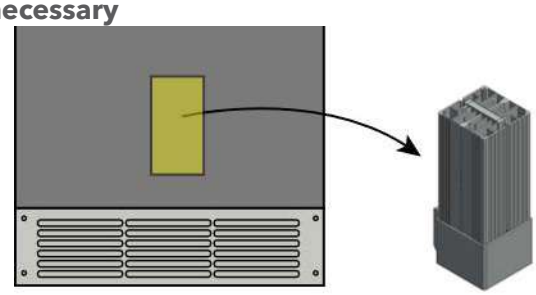


Figure 37: Electrical Heater

Task 2.8 Examine and clean/replace the bottom inlet filters

There are 3 inlet filters, one in front and one on each side. If the exhaust filters are dry and have a very minor pollution degree, it is allowed to clean the dust filters with a vacuum cleaner.

- It is recommended to exchange the dust filters. Replace the bottom inlet filters or clean the removed filters if feasible.

Figure 38: Bottom Inlet Filters

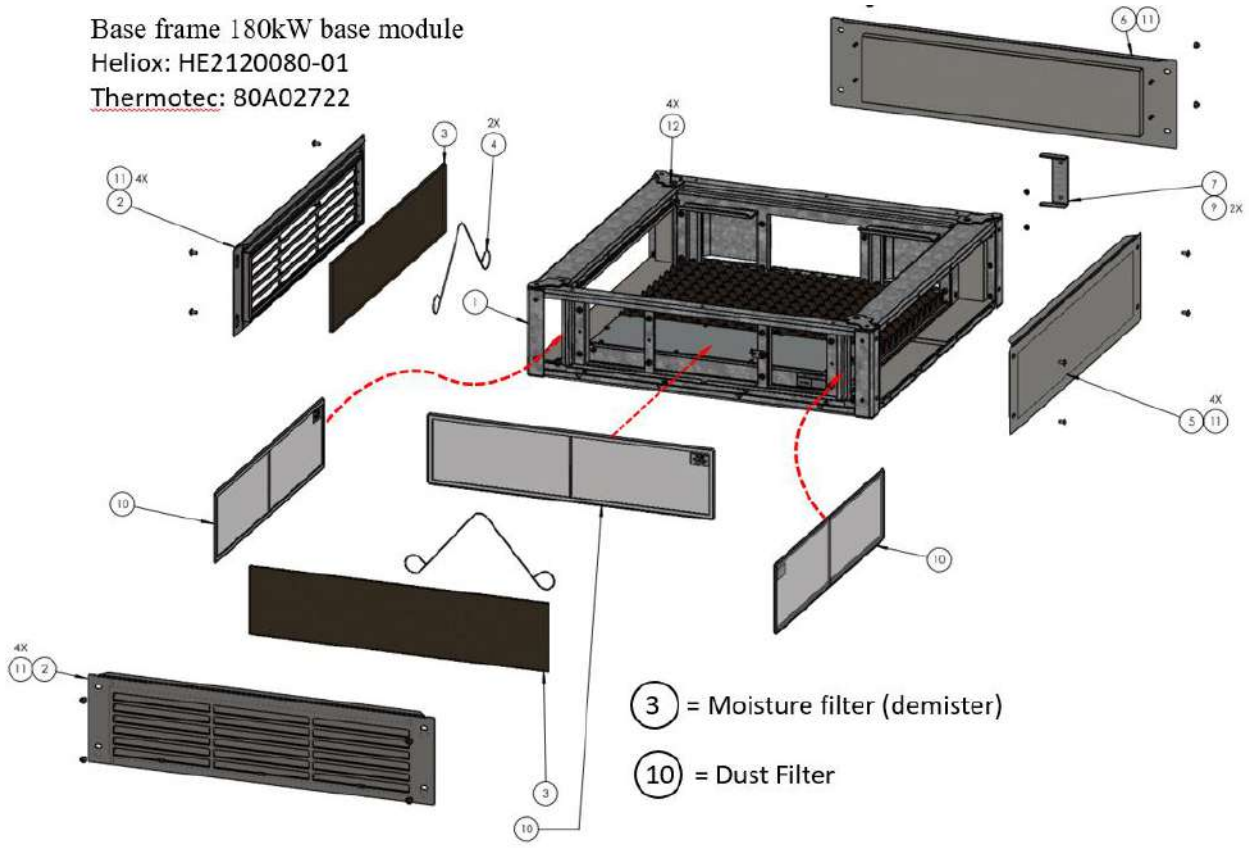


Figure 39: Various Filters

When the interior of the cabinet shows signs of pollution, it might be an indication of a few things. These are mentioned below:

- The bottom inlet air filters are competently saturated with dust participles. Replace air filter.
- The bottom inlet air filter is installed incorrectly. The filter material is direction sensitive. Correct the installation.
- The air pollution surrounding the charger contains very fine particles which cannot be blocked by the dust filter. Contact Heliox.
- The cable gland plate in the bottom plate is missing or not closed correctly or the ducts / conduits are not sealed completely. In this case the air dust filter is bypassed and the fans are sucking the unfiltered air. Correct the installation.

Task 2.10 Test the electrical heater

- Apply cold spray to the temperature sensor (1) to test whether the heater starts (2).
- Repair or restore broken or loose connections.

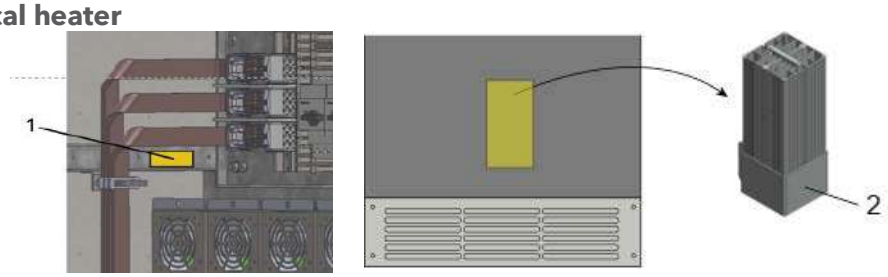


Figure 40: Testing Electrical Heaters

Task 2.11 Test the cooling fans

- Install new cooling fans on bottom of the cabinet.
- Use hot air gun to heat up the temperature sensor (see task 8) to test whether the cooling fans start.

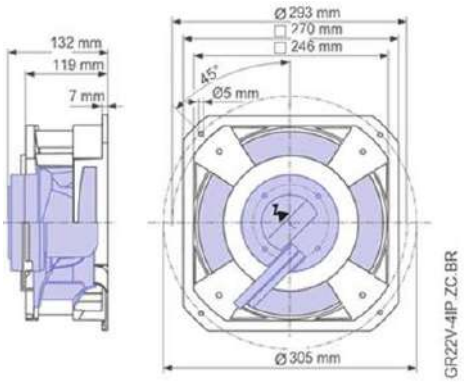


Figure 41: Test Cooling Fans

10.3.5. Examine and Test the Electrical Circuit

Task 3.1 Examine the electrical connections

- Check the wires and connections: Connections that have torque marking and are not moved are okay.
- Check the tightening torques: To do this, the connections must be loosened, conical washers and spring washers must be replaced, and the bolts and nuts must be tightened with the correct torque and marked for torque.

However, adjusting the connection is only to be done for the torque marking that is shifted. For example, the connection shows visual signs of overheating, the connection is measured with a temperate measuring device and shown to be hot. If a connection was hot it is not sufficient to be re-torqued.

Task 3.3 Examine the electrical components

- Check all components for anomalies (discoloration, corrosion and damage).

Task 3.4 Examine the power converter

- Examine the power converter (PCM).
  - Check mounting.
  - Check connectors behind the PCM.
  - Examine the fan for contamination.

- Clean the fan of the power converter.
  Check the manual of the PCM for maintenance procedures.

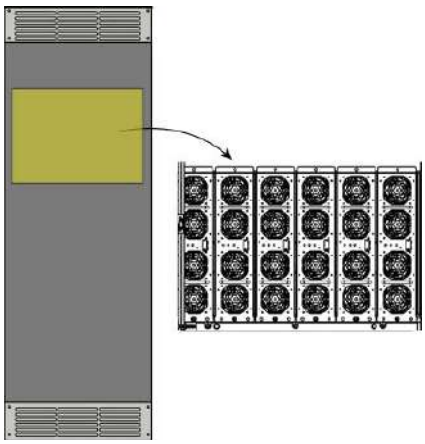


Figure 42: Power Convertor

Task 3.7 Measure the ground connections

- Check the grounding of the charger via the AC network: <5 Ohm. Revise the ground connections if necessary.
- Check for ground continuity from all accessible metal parts to the central ground bar in the base product. The resistance shall be lower then 0.1 Ohm.

Task 3.9 Test the residual current devices

- Test the function with the self-test buttons.

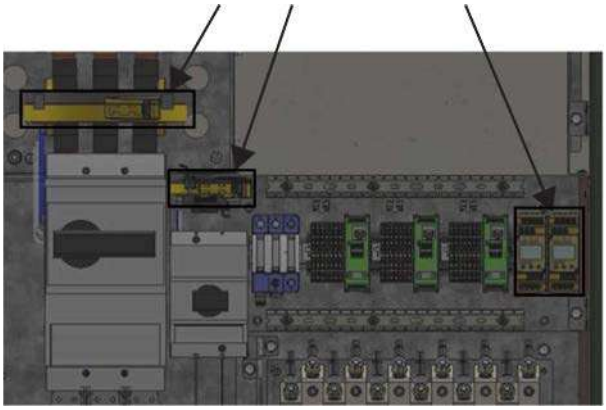


Figure 43: Residual Current Devices

Task 3.10 Test the stop button

- Test all states of the Stop button by creating the right conditions. An EV is required.

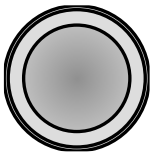


Figure 44: Stop Button

10.4. Mandatory Checks

10.4.1. Examine External Area

Task 1

- Examine the external area of the cabinet for corrosion and / or scratches. Rework external side if necessary. Contact Heliox if significant corrosion is present.
- Instructions for repairing damaged powder coat.
  1. Use a wire brush to remove the rust, and any loose or flaking coatings from the damaged area.
  2. Use sandpaper to smoothen the surface.
  3. Apply solvent cleaning to remove grease and other contaminant residues.
  4. Once the surface has been cleaned, use a touch-up brush or spray system to apply colour match paint.

Important notes:

- Repainting should be done as soon as possible after cleaning.
- Ensure that the selected touch-up brush or spray system is applicable for your application.
- Ensure that you follow each painting product's technical specifications and operating instructions.

10.4.2. Examine Door Seal and Lock

Task 2

- Examine the door seal. Use Acid-free Vaseline on the door seal if necessary.
- Examine the operation of the door lock if needed.

10.4.3. Test the Emergency Button

Task 3

- Press emergency button.
- The LED ring shall turn red or the color as defined in the system configuration, default and recommended setting is red.
- Release emergency button by rotating it clockwise, the button automatically returns to the original raised position (do not pull).
- Check if the LED ring goes over to green or to the color as defined in the system configuration, the default and recommended setting is green.
- Repeat the same if multiple emergency buttons are present for the system.

Figure 45: Emergency Button

10.4.4. Test a Charge Session

Task 4

- Follow the procedure which is stated in the Instructions for Use to test the charge session. An EV is required.

10.5. Maintenance Schedule and List of Spare Parts

The following table lists the maintenance tasks, and estimate time required to perform the individual tasks:

Sl. No.	Maintenance Item	Maintenance Schedule	Maintenance Time	Description of Maintenance and List of Spare Parts			
				Maintenance to be Performed	Time Spend	Spare Parts	Qty
1	Examine & Clean External Side	Twice per year recommended	45 Minutes	Examine & Clean External Side Power Cabinet & Kiosk	30 Minutes	Cloth and mild soap	1
2	Examine & Clean Internal Side	Twice per year recommended	2.2 Hours	Examine & Clean inside cabinet	30 Minutes	Cloth and mild soap	1
				Replace inlet and outlet filters yearly or more frequently as needed depending on site conditions. Clean demister filters as needed, replacement should not be needed.	10 Minutes	Outlet filter Wire Frame G3 676x676x6mm (HE1722317)	1
					10 Minutes	Moisture filter (Demister) (HN200172)	2
					10 Minutes	Inlet filter Wire Frame G3 660x163x6mm (HE1722317)	3
				Examine all the fans	15 Minutes	Fan 305mm_FD241225EB-EAG(2BD)	2
3	Examine Electrical Connections and Components	Twice per year	1.16 Hours	Examine electrical connections	15 Minutes	Torque Tool	
				Verify torque settings	30 Minutes	Torque Tool (1 to 31Nm)	1
				Measure Input Power	5 Minutes	Multimeter	1
				Measure Insulation Resistance	5 Minutes	Insulation Tester	1
				Test RCD trip	1 Minute	N/A	
				Examine electrical components	15 Minutes	Torque Tool	1

Sl. No.	Maintenance Item	Maintenance Schedule	Maintenance Time	Description of Maintenance and List of Spare Parts			
				Maintenance to be Performed	Time Spend	Spare Parts	Qty
4	Examine & Test Electrical Components	Twice per year	1 Hour	Verify all the steps of a charging process	1 Hour	HPC analyser	1
				FANs PWM		Laptop	1
				Emergency System		Multimeter	1
				Output Contactors		Laptop	1
5	Examine & Test Power Module	Twice per year	35 Minutes	Verify communication with all power converters	5 Minutes	HPC analyser	1
				Verification	15 Minutes	Laptop	1
				Apply Voltage in the Output	15 Minutes	Multimeter	1
6	Charging Test	Twice per year	15 Minutes	As a last test verify the charging process and communication with EV at each outlet	5 Minutes each (15 Minutes)	EV (if possible one capable of doing HV)	2

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