EV CHARGING INFRASTRUCTURE

Installer Manual (EU version)
HVC-R 107/160 V2 E-Bus Charger
Depot Box GEN2
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Version control

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<th>Remarks</th>
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<td>06/02/2022</td>
<td>First draft</td>
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<td>05/12/2022</td>
<td>Updated ethernet connector/cable information, power size, max depot number</td>
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<td>20/12/2022</td>
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Glossary

AC
Alternating Current.

CAF
Customer Acceptance Form.

CCS (Combo)
Combined Charging System (also called Combo) is the charging protocol for North America and European OEMs.

Contractor
Entity hired by the owner / site operator to do engineering, civil and electrical installation work.

DC
Direct Current.

Grid provider
Company responsible for the transportation and distribution of electricity.

HMI
Human Machine Interface; the screen on the charger.

HVC
Heavy Vehicle Charger.

Power Cabinet
Intermediate unit that provides 160 kW of DC power to the Charge control set. Gets its power from a power distribution board.

Interlock
The Interlock is an isolated current loop and is a feature that makes the state of two mechanisms or functions mutually dependent.

LAN
A computer network that interconnects computers systems within a limited area.

NOC
ABB Network Operating Centre; remotely checks the correct functioning of the charger.

Owner
The legal owner of the charger.

PE
Protective Earth.

PPE
Personal Protective Equipment. Equipment such as safety shoes, helmet, glasses, gloves.

RCD
Residual-Current Device.

RFID
Radio-Frequency IDentification. RFID is a communication technology by means of radio waves to transfer data over a very short distance between a reader and an electronic tag or card.

Site operator
The entity is responsible for the day to day control of the charger. The site operator can be the owner, but not necessarily.

User
The owner of an electric vehicle, who uses the Charge Station to charge that vehicle.

WiFi
A technology that allows electronic devices to connect to a wireless LAN (WLAN) network.
1. Introduction

1.1. Preface

This guide describes the planning and physical installation of the HVC-R 107/160 V2 E-Bus Charger at its location.

The HVC-R 107/160 V2 E-Bus Charger is a DC fast charger system for hybrid or electrical buses that can be used for overnight charging which is based on the CCS Charging standard. It is not permitted to use the HVC-R 107/160 V2 E-Bus Charger to charge any other equipment, or to use the HVC-R 107/160 V2 E-Bus Charger for any other purposes. The HVC-R 107/160 V2 E-Bus Charger uses high-amperage electric currents. Therefore the installation must be planned carefully, and must be done by certified personnel only (according to local standards1).

Before installing the HVC-R 107/160 V2 E-Bus Charger, read this Installation Guide carefully and attentively. Follow the instructions in this Installation Guide. ABB is not responsible for any damage that has been caused by not or incorrectly following and executing the instruction described in this manual.

1.2. Intended document users

This document is intended to be used by:

- Customers who purchased a HVC-R 107/160 V2 E-Bus Charger, or are in the process of ordering and want to know in more detail how it has to be installed.
- Contractors who are responsible for site preparation and/or installation of the HVC-R 107/160 V2 E-Bus Charger.

1.3. Signs

The following signs are used on the equipment and in this manual:

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous voltage</td>
</tr>
<tr>
<td>Identifies a hazard that could result in severe injury or death through electrocution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various</td>
</tr>
<tr>
<td>Identifies a hazard that could result in severe injury or death.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotating parts</td>
</tr>
<tr>
<td>Identifies a hazard that could result in injury due to the presence of rotating or moving parts.</td>
</tr>
</tbody>
</table>

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1 Local regulations shall take precedence if they list different installation requirements than prescribed in this Installation Manual.
1.4. Safety regulations

1.4.1. Owner responsibilities

The owner and site operator are required:

- To operate the charge station with the protective devices installed and to make sure all protective devices are correctly installed after carrying out installation or maintenance.
- To write an emergency plan that instructs people what to do in case of emergency.
- To prepare the site where the charge station will be installed, according to the requirements described in this guide.
- To make sure that there is enough space around the charger to carry out maintenance work.
- To appoint a person responsible for the safe operation of the charge station and for the coordination of all work.
- All works must be carried out from qualified personnel. All qualified personnel have to estimate their transmitted works, identify and avoid. They must have experience and enough knowledge over: safety regulations and labor medical regulations, accident prevention regulations, guideline and approved safety regulations, and special instruction concerning occurrence of danger (especially remaining risk) possible dangers.
• You are not allowed to modify the charge system without the permission of ABB. The owner is cautioned that changes or modifications not expressly approved by ABB could void the owner’s authority to operate the equipment and ABB’s warranty policy.

• Neither ABB nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs or expenses incurred by purchaser or third parties as a result of: an accident, misuse or abuse of this product or unauthorized modifications, repairs or alterations to this product, or failure to strictly comply ABB operating and maintenance instructions.

1.4.2. Tilting and handling

**CAUTION**

Heavy equipment
Handling instructions:
1. Use crane or forklift truck when lifting or moving the Power Cabinet.
2. Do not drop parts of the HVC-R 107/160 V2 E-Bus Charger.
3. Do not exceed a tilting of 30° for the Power Cabinet.
4. Read and follow the ABB *Guidance on the requirements for safe operation of mobile cranes* (ML-03, 9Akk104941D0113).

**WARNING**

Personal safety (PPE)
Always wear a safety helmet, safety gloves and safety shoes when you do the lifting and tilting work.

**WARNING**

Make sure that personnel cannot be crushed or become trapped during lifting and tilting work.

**Lifting activities**

It is a legal requirement that all activities involving lifting equipment are planned and that they are conducted under effective supervision and managed based on the risk, complexity of the activity and the work environment (EU directive 2009/104/EEG, appendix II, chapter 3.2.5).

It is of great importance, regardless of location, that any lifting activity is performed safely, because the activity:

• Carry out within the framework of an effective management system;
• Properly planned;
• Risk has been assessed;
• Supervision is being held; and
• Performed by skilled personnel and with the appropriate means.

All lifting activities must be performed under the ABB *Guidance on the requirements for safe operation of mobile cranes* (ML-03, 9Akk104941D0113).

When applying this Standard, local laws and regulations must be taken into account at all times. In the event of conflicts, local laws and regulations prevail over this Standard.
### 1.4.3. Electric hazards

<table>
<thead>
<tr>
<th>Danger</th>
<th>Hazardous voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The HVC-R 107/160 V2 E-Bus Charger conductors under hazardous electrical voltages. The grid terminals on the internal DIN rail may carry hazardous voltages, even if all circuit breakers are switched off.</td>
<td></td>
</tr>
</tbody>
</table>

### 1.4.4. Installation safety

<table>
<thead>
<tr>
<th>Warning</th>
<th>Personal safety (PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always wear a safety helmet, safety gloves and safety shoes when you do the lifting and tilting work.</td>
<td></td>
</tr>
</tbody>
</table>

| Warning | Visually examine the package for damage. See section Before unpacking on Page 51 and section Before unpacking on Page 77. If there is damage, do not install the system. |

<table>
<thead>
<tr>
<th>Danger</th>
<th>Hazardous voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions:</td>
<td></td>
</tr>
<tr>
<td>1. Always switch off the external group switch and the main switch in the cabinet, before performing any installation, disassembly, repair or replacement of components.</td>
<td></td>
</tr>
<tr>
<td>2. Do a voltage check and make sure that the electrical power is disconnected from the system.</td>
<td></td>
</tr>
<tr>
<td>3. Only ABB certified technicians are permitted to commission the HVC-R 107/160 V2 E-Bus Charger.</td>
<td></td>
</tr>
<tr>
<td>4. When the system is in an open or dangerous condition, do not allow unqualified persons to go near it. Instruct and warn people about the potential harmful high voltages.</td>
<td></td>
</tr>
<tr>
<td>5. The installation and maintenance personnel must supply their own lighting equipment, since the HVC-R 107/160 V2 E-Bus Charger has no lights inside the cabinet.</td>
<td></td>
</tr>
<tr>
<td>6. Always connect the Protective Earth (PE) first, before connecting the neutral (N) and Phase (P) wiring.</td>
<td></td>
</tr>
<tr>
<td>7. Correctly lock the door after installation or service operations.</td>
<td></td>
</tr>
</tbody>
</table>

| Warning | |
|---------| |
| Make sure that there is a minimum free space of 1000 mm in front of the door of the Power Cabinet. The minimum space is necessary to allow service personnel to quickly move away from the Power Cabinet if there is an emergency when the door is open. |
### WARNING

Make sure that there is a minimum free space of 1000 mm in front of the door of the Depot Charge Box GEN2. The minimum space is necessary to allow service personnel to quickly move away from the Depot Charge Box GEN2 if there is an emergency when the door is open.

### CAUTION

**Warranty**

Installation and commissioning work must be carried out by certified personnel. The warranty will be void if any work carried out by non-certified personnel.

### 1.5. Environment and disposal of waste

**CAUTION**

Always observe the local rules and regulations with respect to processing (non-reusable) parts of the HVC-R 107/160 V2 E-Bus Charger.

### 1.6. Cyber Security Disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is customer's sole responsibility to provide and continuously ensure a secure connection between the product and customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
1.7. Contact information

**ABB in your country**
Please contact ABB in your country for delivery and service information.

**ABB EV Infrastructure global**
ABB EV Infrastructure

Address  
Heertjeslaan 6
2629 JG Delft
The Netherlands

Telephone  
+31 88 440 46 00

Mail  
info.evi@nl.abb.com

Write down here your local ABB contact details:
2. Description of the product

2.1. Overview of the system

Example of a complete installation

A Low voltage power distribution cabinet of the owner
B Power Cabinet – 107 kW or 160 kW (HVC 107 V2 or HVC 160 V2)
C Depot Charge Boxes GEN2 (up to 4 per Power Cabinet with sequential charging)
D Cables between Power Cabinet and Depot Charge Boxes GEN2 in cable conduits
E Electric hybrid and/or full electric Bus
F Bus stop space for charging

The HVC-R 107/160 V2 kW E-Bus Charger consists out of multiple components and it may require additional parts depending on the project and location of installation which dictates whether these parts are needed.

ABB offers four standard delivery system configurations:

1. Standard HVC-R 107 V2 E-Bus Charger with one Depot Charge Box GEN2.
2. Standard HVC-R 107 V2 E-Bus Charger with 2, 3 or 4 Depot Charge Boxes GEN2.
4. Standard HVC-R 160 V2 E-Bus Charger with 2, 3 or 4 Depot Charge Boxes GEN2.

Additional needed components can be ordered separately and are not part of the standard delivery. See section Accessories on Page 17.

2.1.1. Standard HVC-R 107 V2 with one Depot Charge Box

The following parts are provided for this system configuration:

- 1x HVC 107 V2 Power Cabinet (ABB6AGC102603)
- 1x Depot Charge Box GEN2 with 7m cable (ABB6AGC101616) or
- 1x Depot Charge Box GEN2 with 9.5m cable (ABB6AGC101617) or
2.1.2. Standard HVC-R 107 V2 with 2, 3 or 4 Depot Charge Boxes GEN2

The following parts are provided for this system configuration:

- 1x HVC 107 V2 Power Cabinet (ABB6AGC102603)
- 2x, 3x or 4x Depot Charge Boxes GEN2 (ABB6AGC101616 or ABB6AGC101617)
- HVC-R sequential charging package (ABB6AGC069251)

2.1.3. Standard HVC-R 160 V2 with one Depot Charge Box

The following parts are provided for this system configuration:

- 1x HVC 160 V2 Power Cabinet (ABB6AGC102602)
- 1x Depot Charge Box GEN2 (ABB6AGC101616 or ABB6AGC101617)

2.1.4. Standard HVC-R 160 V2 with 2, 3 or 4 Depot Charge Boxes GEN2

The following parts are provided for this system configuration:

- 1x HVC 160 V2 Power Cabinet (ABB6AGC102602)
- 2x, 3x or 4x Depot Charge Boxes GEN2 (ABB6AGC101616 or ABB6AGC101617)
- HVC-R sequential charging package (ABB6AGC069251)
2.1.5. HVC Power Cabinet

Outside view of the HVC 107/160 V2 Power Cabinet

![Outside view of HVC Power Cabinet]

A Base cover  
B Air outlet  
C Door  
D 3G Antenna  
E Air inlets (also on the left and back side)  
F Door handle / lock

Inside view of the HVC 107 V2/160 V2 Power Cabinet

![Inside view of HVC Power Cabinet]

A Main switch  
B AC Power connection  
C Guidance plate of the cables  
D Data/communication connection  
E Display  
F Power Modules (only two are installed in the HVC 107 V2).
2.1.6. Depot Charge Box GEN2

Outside view of the Depot Charge Box GEN 2

- A Door
- B Emergency stop button (EMO)
- C Stop button
- D Cable in-/output
- E Hanging bracket for charge cable
- F CCS DC plug and cable
- G Lock
- H Charge state indicator light (beacon)

Inside view of the Depot Charge Box GEN 2

- A Communication connection
- B Connection block
- C Protection cover for DC contactors
2.2. Accessories

The following parts can be ordered at the time of the initial order or afterwards. Contact ABB Sales department (see Contact information on Page 12 for contact details).

2.2.1. Foundation for Power Cabinet

Concrete foundation
The concrete foundation can be used to install the Power Cabinet on soil.

![Concrete foundation diagram]

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABB6AGC069029</td>
<td>HxC power cabinet foundation &amp; front cover plate</td>
</tr>
<tr>
<td>1</td>
<td>ABB6AGC067780</td>
<td>HxC power cabinet foundation top cover plate</td>
</tr>
</tbody>
</table>

Metal frame foundation
The metal frame foundation can be used to install the Power Cabinet on a solid surface.

![Metal frame foundation diagram]

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4EPY420133R1</td>
<td>HxC power cabinet metal foundation</td>
</tr>
</tbody>
</table>
2.2.2. Pedestal for Depot Charge Box

The pedestal can be used to attach the Depot Charge Box GEN2 in an open space when the Depot Charge Box GEN2 is not being mount on a wall.

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABB6AGC069024</td>
<td>HVC-R pedestal charge box</td>
</tr>
</tbody>
</table>

2.2.3. Foundation for pedestal

Unimi-1Base™ pre-cast concrete foundation

The concrete foundation must be used to install the pedestal on soil.

A Beam  
B Conduit entry  
C Cover plate (only needed when the foundation is temporarily not used)

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABB6AGC069025</td>
<td>HVC-R concrete foundation depot charge box</td>
</tr>
</tbody>
</table>
2.2.4. Wall-mounting brackets for safe wall fixing

The Depot Charge Box GEN2 can be easily mounted at the installation site without any need for internal access.

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>AWS41-304</td>
<td>Wall-mounting brackets, SS304 (ELDON)</td>
</tr>
</tbody>
</table>

(*) pack quantity is 4

2.2.5. Communication glass fiber cable

The CAN/Ethernet communication between the Power Cabinet and Depot Charge Box GEN2 is done via an ethernet cable. However, in case of installations with length of the cable between Power Cabinet and Depot Charge Box GEN2 exceeding 100m, a Long Distance Kit is required. When using this kit, ethernet cable between Cabinet and Charger is no longer needed and it is replaced by glass fiber cable. This glass fiber cable must be prefabricated and can be ordered separately.

If glass fiber cable is not supplied by ABB, then gland dimensions listed in section Gland layout of the Depot Charge Box on Page 83 must be followed. Please note that special precautions should be taken, so that pre-fabricated fiber optic cable will pass through the gland (for example order cable with M32 gland assembled on it). Another alternative could be to crimp the fiber optic cable on the site after passing through the gland.

Cable length must be defined by the contractor performing installation during site survey.

A Protection tube for routing the cable through the conduit
B Metal finish tulle (clamping area: Ø 20 mm, length 50 – 80 mm)
C Individual optical fibers (length is 1500 mm)

<table>
<thead>
<tr>
<th>Amount</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contact ABB for details</td>
<td>CAN/Ethernet, OM3, PCF or fiberglass (multimode, 850 nm) optic cable with 4 fibers (2 for spare), with B-FCO(ST®) connectors. Example: Belden GOSN308 with prefabricated ST connectors.</td>
</tr>
</tbody>
</table>
3. **Preparation**

3.1. **Project planning**

Careful project planning is necessary before a HVC-R 107/160 V2 E-Bus Charger is purchased and put into operation. The different phases of the full project plan are shown in the figure below:

![Project Planning Diagram]

A. **Preparation**
   The owner / site operator has ordered a HVC-R 107/160 V2 E-Bus Charger. In this phase all preparation work must be done before the contractor can do the civil and electrical works. See *About preparation* on Page 20.

B. **Construction**
   The contractor does all civil and electrical works. See *About construction* on Page 32.

C. **Placement and Connection**
   The location is mechanically and electrically ready to receive the HVC-R 107/160 V2 E-Bus Charger. See *About placement and connection* on Page 49.

D. **Commissioning**
   The delivery department will bring the HVC-R 107/160 V2 E-Bus Charger into operation. See *Commissioning preparation* on Page 96.

E. **Service and Maintenance**
   The HVC-R 107/160 V2 E-Bus Charger is in operation. There are various options for service and maintenance. See *About Service and Maintenance* on Page 98.
3.2. About preparation

The planning steps for the preparation phase are shown in the figure below:

A1 **Ordering**
Order the HVC-R 107/160 V2 E-Bus Charger.

A2 **Engineering**
The owner / site operator selects a contractor to do the civil and electrical installation work. The contractor is responsible for all construction documentation of the site, among other things: drawings, calculations, certifications, licenses and test reports. The location of the HVC-R 107/160 V2 E-Bus Charger must be chosen. See section Location on Page 23 and section Geometry of infrastructure on Page 24.

A3 **Get permits**
Take care of all permits and local regulations. See section Permits on Page 22.

A4 **Upgrade grid**
If required, upgrade the electrical grid connection to 3-phase 400 VAC. See section Upgrade grid on Page 22.

A5 **Transport foundation(s) on request**
If it is necessary to order the foundation(s), the transport of the foundation(s) must be arranged with the ABB Delivery department. See Contact information on Page 12 for contact.

**NOTICE**
It can take a long time to get the necessary permits and to upgrade the electrical grid. Make sure the plan includes the possibility for these delays.
3.3. Permits

The installation of a HVC-R 107/160 V2 E-Bus Charger will require a number of permits, depending on national and local laws. This section lists several points of attention.

3.3.1. Power connection

The HVC Power Cabinet requires high current (400 V AC 177 A for 107 kW and 277 A for 160 kW) connections. A normal domestic or small business power connection is not sufficient. For each Depot Charge Box GEN2 a standard one phase AC connection (L-N + PE) is required if the power is not provided by Power Cabinet.

Measure, check and report the position of the cables between the power distribution board and the Power Cabinet and the cables between the Power Cabinet and the Depot Charge Box GEN2.

Contact your electricity retailer and/or grid owner if a grid upgrade is required. Ask about the work that is needed to upgrade the connection to meet the requirements described in section Electrical installation on Page 28.

3.3.2. Construction permit

The installation of the HVC-R 107/160 V2 E-Bus Charger requires the following construction work:

- A solid base.
- Work permit.
- Cable conduits for cables between the power distribution board and the Power Cabinet. Usually, these cable conduits are installed below ground.
- Cable conduits for cables between the Power Cabinet and Depot Charge Box GEN2.
- Parking spaces for the bus.
- Signs on the road or next to the road to position the bus.

Contact your local government to obtain information about the necessary permits.

3.3.3. Internet access

The HVC-R 107/160 V2 E-Bus Charger requires a connection to the internet. This connection is used for serviceability, remote access by ABB Service department.

There are two options for the internet connection:

- Wireless, which requires coverage to a 3G network at the location. This is the preferred connection. A 3G modem with active SIM card is included with the HVC-R 107/160 V2 E-Bus Charger (a customer SIM card is not required).
- Ethernet (RJ45). If there is no 3G signal available, a wired internet connection must be available at the location. For this option, contact ABB Sales department (see Contact information on Page 12 for contact details).
3.4. Upgrade grid

The HVC 107 or 160 V2 Power Cabinet can be connected directly to the electrical grid or to an existing customer low voltage power distribution cabinet. In both cases a 177 A (for the HVC 107 V2) or 277 A (for the HVC 160 V2), 400 V AC, 50 Hz, 3P+PE connection to the Power Cabinet is necessary that meets the following requirements:

- Fuse (gG type) 3 x 315 A AC or 3 phase 285 A circuit breaker.
- Main switch.
- PE connected to the main PE rail.
- The components used in the HVC 107 V2 and the HVC 160 V2 are suited for a short circuit capacity of 25 kA.
- A TN-C earthing system. Possibly an extra 0.9 Ω earth electrode is required, consult the grid owner.
- EMC filter is required to meet EMC conducted emission class B: Schaffner type FN 3359HV-400-99. When EMC conducted emission class A is required there is no filter required.
- Specifications of the following parts must be determined by your electrical engineer. They depend on local laws, safety and electrical regulations:
  - Adjustable RCD in the range of 30 mA up to 300 mA. The Power Cabinet has an integrated 300 mA RCD (Type A) for the power section.
  - Class 1 Surge Protection Device (SPD).

The Depot Charge Box GEN2 can be connected to the 230VAC output of the power cabinet or either directly to the electrical grid or to an existing customer low voltage power distribution cabinet. In cases not involving power cabinet a 2.17 A, 230 V AC, 50 Hz, 1P+PE connection is required. For each Depot Charger Box the following requirements apply:

- 1 phase 16 A type A (30 mA) residual current circuit breaker (only for electrical grid supply mode)
- Main switch (optional if not required in local regulations)
- PE connected to the main PE rail.
- A TN-S earthing system. Possibly an extra 0.9 Ω earth electrode or local GND is required, consult the grid owner.
- Specifications of the following parts must be determined by your electrical engineer. They depend on local laws, safety and electrical regulations:
  - Class 1 Surge Protection Device (SPD).
- If circuit breaker is used in distribution cabinet, then specification of Inrush current of Depot Charge Box GEN2 must be taken into account during sizing of protection. Maximum inrush current: 100 A < 5 ms.

3.5. Location

The location of the HVC-R 107/160 V2 E-Bus Charger must meet the following requirements:

- The height is not more than 2000 m above sea level.
- The HVC-R 107/160 V2 E-Bus Charger must not be immersed in water, or any other fluid.
- The operational temperature of the HVC-R 107/160 V2 E-Bus Charger is between -35 and 45 °C.
- For locations where the Power Cabinet will be exposed to direct sunlight and high ambient temperatures for most of the day, it is recommended to install protection from direct sunlight. Otherwise, the temperature inside the cabinet might exceed the maximum temperature.
• Do not install or use the HVC-R 107/160 V2 E-Bus Charger in areas where there is an explosion hazard. You must provide information about the HVC-R 107/160 V2 E-Bus Charger to the fire brigade.

• The protection rating of the housing of the Power Cabinet is IP54 and the Depot Charge Box GEN2 is IP65 (excluding charge cable) and designed for outdoor use.

• It is recommended to provide good lighting around the charge system to increase safety.

• Design and arrange the location around the HVC-R 107/160 V2 E-Bus Charger on a matter that the Depot Charge Box GEN2 and the Power Cabinet are hit by a vehicle is as small as possible. For example, there can be installed bollards (see picture below) around the Power Cabinet and crash protection elements can be fitted to the Unimi-1Base™ pre-cast concrete foundation (see section Workflow with concrete foundation on Page 38).

3.6. Geometry of infrastructure

3.6.1. Required space for the Power Cabinet

A single HVC 160 V2 Power Cabinet requires a minimum space of 1170 x 2070 mm (W x D) or 1370 x 1970 mm (W x D). This space is calculated as follows:

• A cabinet footprint of 1170 x 770 mm.

• The following free space around the cabinet:
  - 100 mm at the rear side or 0 mm at the rear side when both left and right side have a minimum free space of 100 mm.
  - 100 mm or 0 mm at the left side, if another Power Cabinet is placed next to it.
  - 100 mm or 0 mm at the right side, if another Power Cabinet is placed next to it.
  - 1200 mm at the front side in order to open the front door. If the cabinet is placed inside a room, consider extra free space in front of the open door (escape way for service people).

<table>
<thead>
<tr>
<th>CAUTION</th>
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<tbody>
<tr>
<td>The cabinet needs at least the opening area of the front and rear side with a minimum free distance of 100 mm. This means that cabinets can stand in a row with one or both side entries blocked (distance on left/right side is 0 mm). It is also possible that the cabinet can stand back to back (distance on the rear side is 0 mm). In this case both side entries must have a minimum free distance of 100 mm. If this is not the case, then the air supply is not sufficient.</td>
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</table>
The HVC 160 V2 has air inlets (A) on all sides and air outlet (B) on the front to control the temperature inside the cabinet. Do not install any objects near these air inlets and outlets (see also Caution above). If necessary, take precautions to prevent snow, sand or dust from blocking the inlets and outlets.

Specifications for inside installation of the Power Cabinet

- Airflow required for one cabinet = 1450 m³/h.
- Maximum allowed pressure drop = 300 pA. If the pressure drop of the room is higher than 300 pA an extra fan should be placed. Contact ABB Sales department (see Contact information on Page 12 for contact details).

3.6.2. Placement of multiple cabinets

There two possible configurations for the placement of multiple HVC 160 V2 systems, see picture below.
3.6.3. **Required space for the Depot Charge Box**

The Depot Charge Box GEN2 requires a minimum space of 1200 x 1110 mm (W x D). This space is calculated as follows:

- A Depot Charge Box GEN2 footprint of 600 x 210 mm (W x D).
- The following free space:
  - 0 mm at the rear side when the Depot Charge Box GEN2 is directly mounted on a wall or minimum 100 mm at the rear side when the Depot Charge Box GEN2 is in front of a wall and mounted on the pedestal.
  - 100 mm at the left side.
  - 500 mm at the right side to take out the cable plug.
  - 900 mm at the front side to open the door.

3.6.4. **Parking space arrangement**

A site for EV charging can be designed in many different setups. This section is intended to give some useful information about the placement of a charger with respect to parking spaces and the different vehicle inlets for the charging cable.

3.6.5. **Cable reach**

The DC charge cable of the Depot Charge Box GEN2 is about 7 meters long (optional there is a 9.5 meter cable possible). The picture below shows an indication of the reach of the outlet cable with respect to the Depot Charge Box GEN2. Here in the center of the picture.
3.6.6. Different alignment possibilities

The charge inlets on a bus can be located at different positions. The most common busses have their inlets located either on the front or the back of the bus, or on the left or right front or back side.

This makes some positions of the charger with respect to the parking space more favorable than others. Please keep this in mind when designing a site. Some possible situations are shown in the picture that follows.

![Diagram showing different alignment possibilities for charging inlets on a bus](image-url)
3.7. Electrical engineering

3.7.1. Electrical installation

The electrical installation must be completed according to the local safety and electrical regulations and laws. See section Upgrade grid on Page 22 for the requirements of the electrical connection. A one line diagram for the electrical connection for the Power Cabinet is shown in the figure that follows. The diameter of the electrical conductor (maximum cross section is 240 mm²) in the AC power cable depends on the length and method of installation. This must be determined by your contractor.

There are two options to connect the AC auxiliary power supply for the Depot Charge Boxes GEN2 to the electrical grid.

First option is to supply the Depot Charge Boxes GEN2 by single phase output from Power Cabinet - see the one line diagram shown below
Second option is an individual electrical connection for the Depot Charge Box(es). The one line diagram is shown below.

The third option is to daisy-chain the electrical connection through each Depot Charge Boxes GEN2, see the one line diagram shown below.

Grounding of Depot Charge Box GEN2 can be connected from Power Cabinet or from locally available ground connection, such as buried ground electrode. This should be taken into consideration while preparing civil works.

3.8. Civil installation

<table>
<thead>
<tr>
<th>NOTICE</th>
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<tbody>
<tr>
<td>The instruction described in this section assumes that the cables between the Power Cabinet and the Depot Charge Box, and between the Depot Charge Boxes GEN2 are placed in to the ground. Depending on the location, for example the HVC-R 107/160 V2 E-Bus Charger is installed inside, the cables can installed above the ground. In this case there is needed cable trays to protect the cables. Check with your local contractor what the installation options are, because this is not described in this Installation Guide.</td>
</tr>
</tbody>
</table>
DC power cables, PE wire and data cables must be routed between the Power Cabinet and the Depot Charge Box GEN2. Therefore two flexible cable conduits with an outer diameter of maximum 120 mm must be installed between the foundation of the Power Cabinet and the foundation of the Depot Charge Box(es).

The DC power cables must be installed in separate cable conduit with respect to the PE wire, AC auxiliary power and data cables. The maximum length of the cables between the Power Cabinet and the Depot Charge Box GEN2 is 100 m. Both conduits must be at least 600 mm deep in the ground and must be in one-piece.

In the case of HVC-R 107/160 V2 E-Bus Charger with two, three or four Depot Charge Boxes GEN2; DC power cables, AC auxiliary power, PE wire and data cables must be routed between the Depot Charge Boxes GEN2. The DC power cables must be installed in separate cable conduit with respect to the AC auxiliary power, PE wire and data cables. The maximum length of the cables between the Depot Charge Boxes GEN2 is 30 m. Both conduits must be at least 600 mm deep in the ground and must be in one-piece.

The AC power cable from the distribution boards can also be installed in a cable conduit (is not mandatory).

**NOTICE**

It is recommended to place an extra flexible cable conduit with an outer diameter of 40 mm in the cable conduit intended for the AC utility power cable, PE wire and data cables. This extra cable conduit is meant for the glass fiber cable.

---

**Example of civil installation when Depot Charge Box(es) are mounted on the pedestal**

- **A** Foundation of Power Cabinet
- **B** Foundation of Depot Charge Box(es)
- **C** Flexible conduit for DC power cables
- **D** Flexible conduit for AC auxiliary power, PE wire and data cables
- **E** AC power cable for Power Cabinet
- **F** AC auxiliary power cable for Depot Charge Box
### Example of civil installation when Depot Charge Box GEN2 is mounted on a wall

A  Foundation of Power Cabinet  
B  Wall on which the Depot Charge Box GEN2 will be mounted  
C  Flexible conduit for DC power cables  
D  Flexible conduit for AC auxiliary power, PE wire and data cables  
E  AC power cable for Power Cabinet

### NOTICE

Document the location of all the cables in the ground between the Power Cabinet and the Depot Charge Box(es). The routing of the cables can be found easily in the future, for example, prevent damage by excavation work.

### 3.9. Lightning protection

One electrode (ground rod) of maximum 10 Ω must be placed in to the earth near the foundation of the Power Cabinet. In some cases also additional grounding is required at the Depot Charge Box GEN2 side. This is dependent on the local regulations and should be determined by the contractor.

If the grid is TT based, consult the grid owner. It is possible that an extra 0,9 Ω electrode will be required. This requirement must be determined by the contractor.

Consult a local specialist for the options of lightning protection. The charge system has to be within the protection angle of the lightning distraction. This requirement must be determined by the owner and a local specialist (according to NEN-EN-IEC 62305).

The implementation of the lightning protection depends on the local laws, safety and electrical regulations. This requirement must be determined by the contractor and owner of the site / HVC-R 107/160 V2 E-Bus Charger.
4. Construction

4.1. About construction

The construction phase includes all work required to prepare the location and make it ready for the placement and connection of the HVC-R 107/160 V2 E-Bus Charger. The construction phase can start when:

- All engineering work is done.
- All permits are granted.
- The grid connection is available.

The planning steps for the construction phase are shown in the figure below:

B1 Civil engineering works
Construction of the foundation. See section Construct foundation of the Power Cabinet on Page 33 and section Mounting preparation of the on Page 38.

B2 Electrical engineering works
See section Electrical engineering on Page 28 and section Upgrade grid on Page 22.

B3 Internet access (optional)
This step can be ignored if the location has sufficient 3G coverage. Otherwise an Ethernet (RJ45) connection has to be installed. See section Internet connection on Page 48.
4.2. Construct foundation of the Power Cabinet

4.2.1. Options

Use the correct foundation for the type of surface that the Power Cabinet will be installed on:

- **Soil**
  - Use a concrete foundation to get a firm fixation on soil. A concrete foundation can be ordered separately. See section *Accessories* on Page 17. For detail drawings see Appendix D *Dimensions concrete foundation Power Cabinet*.
- **Solid floor**
  1. Use a metal frame foundation to guide the cables from the cabinet to the cable duct. This foundation can be ordered separately. See section *Accessories* on Page 17. For detail drawings see Appendix E *Dimensions metal frame foundation Power Cabinet*.
  2. The Power Cabinet is installed directly on a solid floor, through which the floor is accessible from below (related to the feed through of the cables). For detail drawings see Appendix A *Dimensions Power Cabinet*.

The cables must be embedded in the ground within cable conduits. See section *Cabling* on Page 41 and section *Civil installation* on Page 29.

<table>
<thead>
<tr>
<th>NOTICE</th>
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<tr>
<td>It is advised to install traction wires into the conduits to install the electrical cabling afterwards.</td>
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<th>NOTICE</th>
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<tbody>
<tr>
<td>Be aware of the bending radius of the AC power input cables when using the metal frame foundation. This metal frame foundation has a height of 180 mm.</td>
</tr>
</tbody>
</table>
4.2.2. Workflow with concrete foundation

WARNING
Make sure that personnel cannot be crushed or become trapped while moving the foundation. Be aware that the weight of the concrete foundation is about 1300 kg.

CAUTION
Before you lower the foundation, remove sharp edges of the cable holes (B) in the foundation to protect the cables.

1. Make a hole in the ground with at least a minimum depth of 885 mm, shown in the figure above.
2. Fill the hole with (minimum) 200 mm lean concrete (C), see figure above.
3. Make sure that the conduits are routed to one of the indicated positions (B). The conduits must come out of the foundation with a length of about 250 mm.
4. Make sure that the AC power cable is routed to one of the indicated positions (B).
5. Lower the foundation (A) into the hole.
6. Make sure that the front top surface of the foundation is at least 15 mm above ground level (see figure above).
7. Make sure that the top surface of the foundation is leveled.
8. Route the conduits through one of the eight holes (B).

NOTICE
Make sure that the end of the cable conduits are 300 to 500 mm above the top of the foundation.

9. The conduits must be installed with a curve inside the foundation in order to prevent water from entering the conduits, and seal the space between the conduits and all open holes.
10. Route the AC power cable through one of the eight holes (B). Make sure that a cable length of 1000 mm is available above the surface of the foundation for internal routing in the cabinet.

**NOTICE**

This extra cable length is required to connect the AC power cable with the connectors in the Power Cabinet without problems.

11. Place both cover plates on the appropriate place on the foundation.

12. Secure the top cover plate with M16 bolts (4x) and the front cover plate with M12 bolts (4x).

**WARNING**

These cover plates are required to prevent people from falling into the foundation.

13. Fill the open space in the ground around the foundation and the channels for the conduits with filling material (e.g. sand). Filling material is packed 2 – 3 times with a packing machine until the desired ground level is obtained. Avoid having filling material inside the foundation.
4.2.3. Workflow with metal frame foundation

1. Place the frame (A) in the desired position and mark the position of the holes for drilling.

<table>
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<th>NOTICE</th>
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<tbody>
<tr>
<td>The hole distance of 655mm on either side of the metal frame foundation is not equal to the hole distance (680 mm) from the HVC 160 V2(S) cabinet. See also the mechanical drawing in Appendix D Dimensions Metal Foundation Power Cabinet on page 108.</td>
</tr>
</tbody>
</table>

2. Remove the frame.
3. Drill and tap holes at the marked positions. The holes must be suitable for bolt size M16.
4. Route the cables tray through one of the cable openings (B).
5. Align the frame (A) with the tapped holes.
6. Insert the bolts (C) fitted with the washers (D) into the holes (4x).
7. Tighten the bolts.
8. Route the AC power cable through the left cable opening (B). Make sure that a cable length of 1000 mm is available above the floor for internal routing in the cabinet.

<table>
<thead>
<tr>
<th>NOTICE</th>
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<tbody>
<tr>
<td>This extra cable length is required to connect the AC power cable with the connectors in the Power Cabinet without problems.</td>
</tr>
</tbody>
</table>
4.2.4. Workflow mounting Power Cabinet direct on a floor (footprint)

1. Drill and tap holes in the floor at the indicated positions (A). The holes must be suitable for bolt size M16.
2. Make rectangular holes on the indicated positions (B) and (C). For detail drawings bottom view of Power Cabinet see Appendix A Dimensions Power Cabinet.
3. Make sure that the AC power cable and other cables comes out of the floor within the marked area (B).
4. Make sure that the DC power cables come out of the floor within the marked areas (C).
5. For the AC and DC power cable, make sure that a cable length of 1 m is available above the floor for internal routing in the cabinet.
6. For the other cables, make sure that a cable length of 3 m is available above the floor for internal routing in the cabinet.

**NOTICE**

This extra cable length is required to connect the cables with the connectors in the Power Cabinet without problems.

**NOTICE**

To prevent dust from entering the tapped holes, it is recommended that you cover them until you are ready to do the placement.
4.3. Mounting preparation of the Depot Charge Box

4.3.1. Options

There are two options to install the Depot Charge Box:

- **Soil**
  
  Use the concrete foundation to get a firm fixation on soil in combination with the pedestal. The concrete foundation and pedestal can be ordered separately. See section **Accessories** on Page 17.

- **Wall mounting**
  
  The Depot Charge Box GEN2 can be mounted on a solid wall.

4.3.2. Workflow with concrete foundation

![Diagram](image)

**WARNING**

Make sure that personnel cannot be crushed or become trapped while moving the foundation. Be aware that the weight of the concrete foundation is about 100 kg.

**CAUTION**

Before you lower the foundation, remove sharp edges of the cable holes (B) in the foundation to protect the cables.

1. Make a hole in the ground with at least a minimum depth of 800 mm, shown in the figure above.
2. Fill the hole with (minimum) 200 mm lean concrete (C), see figure above.
3. Make sure that the conduits are routed to one of the indicated positions (B).
4. Use the provided VP-covers for those holes on the foundation sides that will not be in use.
5. Additional crash protection element can be fitted to the foundation by drilling holes.

**NOTICE**

Two of four holes is enough to fix the protection.

6. Lower the foundation (A) into the hole. Use the metal beam inside the foundation to attach lifting devices.

7. **IMPORTANT**: Place the foundation (A) in the correct position, which means that the beam (D) must be at right angles to the Depot Charge Box, see picture above.

8. Make sure that the front top surface of the foundation is at least 15 mm above ground level (see figure above).

9. Make sure that the top surface of the foundation is leveled.

10. Route the conduits through one of the four holes (B).

11. The conduits must be installed with a curve inside the foundation in order to prevent water from entering the conduits.

12. Place the cover plates on the foundation (only needed when the foundation is temporarily not used).

13. Fill the open space in the ground around the foundation and the channels for the conduits with filling material (e.g. sand). Filling material is packed 2 – 3 times with a packing machine until the desired ground level is obtained. Avoid having filling material inside the foundation.
4.3.3. Workflow for wall mounting

Preconditions:

- Tools: mark tools, level tool, drilling machine, drill bit (Ø10 mm or Ø7.5 mm), 4x wall plugs (Ø10 mm, L = 50 mm)

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<th>NOTICE</th>
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<tbody>
<tr>
<td>For a correct operation of the Depot Charge Box, it is important that the cabinet is mounted level.</td>
</tr>
</tbody>
</table>

There are two options to mount the Depot Charge Box GEN2 on a wall:

- Using the internal holes of the box itself on the back side.

- Using external wall-mounting brackets, see section Wall-mounting brackets for safe wall fixing on Page 19.

1. Drill holes in the wall at the indicated positions (A) of one of the chosen mounting options (see pictures above). For a concrete or stony wall, the holes must be suitable for a wall plug with a diameter of 10 mm. For a wooden wall, the holes must be suitable for woodwire-bolt size M8.
2. In case of a concrete or stony wall, insert wall-plugs (4x) in to the holes.

**NOTICE**

The activities of installing cable ducts, for the supply of cables for the Depot Charge Box, are entirely dependent of the location, and may differ per location. Due to this reason, the installation of those cable ducts our out of the scope of this Installation Guide. It is the responsibility of the contractor to setup a routing plan for the cable ducts, and installing this cable ducts on location.

### 4.4. Cabling

#### 4.4.1. Charge system configurations

There are various cabling solutions, depending on the installation situation.

*Overview electrical connections of a charge system with one Depot Charge Box GEN2 connected with single phase outlet from Power Cabinet distribution board*

*Overview electrical connections of a charge system with one Depot Charge Box GEN2 connected with single phase outlet from auxiliary distribution board*
Overview electrical connections of a charge system with four Depot Charge Boxes GEN2 which are daisy-chained, connected with single phase outlet from Power Cabinet distribution board
Overview electrical connections of a charge system with four Depot Charge Boxes GEN2 which are daisy-chained connected with single phase outlet from auxiliary distribution board.
Overview electrical connections of a charge system with four Depot Charge Boxes GEN2 which are daisy-chained and individually connected with single phase outlet from auxiliary distribution board.
4.4.2. AC power cable

For Power Cabinet:
- Cable type: 3P+PE (optional shielded).
- The cable shielding (if present) must be attached to the PE Rail at both ends of the cable.
- The cross section of the cable conductor must be determined by your contractor.
- The maximum cross section is 240 mm².
- The PE conductor of the power cable must have the same cross section as the phase conductors.

For Depot Charge Box:
- Cable type: 1P+N+PE.
- The PE conductor of the power cable must have the same cross section as the phase conductors.
- 1x GND cable (optional, local GND or lighting protection, see section Grounding of Depot Charge Boxes GEN2 on Page 46).
- This cable can be connected directly from AC distribution to each Depot Charge Box GEN2 or can be routed in daisy-chain mode.

4.4.3. Cables between the Power Cabinet and the Depot Charge Box

- 1x AC auxiliary power cable
- 2x DC power cables,
- 0 – 3x PE cable (refer to section Grounding of Depot Charge Boxes GEN2 on Page 46),
- 1x Interlock cable,
- 1x communication cable:
  - up to 100m - 1x STP Cat6 cable in case of distance
  - above 100m using Long Distance Kit - 4x glass fiber (2 fibers are required, 2 are for spare).

Use local regulations and datasheet of the manufacturer to determine the cross section for the DC power cables:

- The maximum cross section of the cable conductor is 185 mm².
- Recommended cable for a 160 kW system is 120 mm² for a distance of 50 m, and 185 mm² for a distance of 150 m (both with a reinforced isolation > 5400 V DC).

4.4.4. Cables between the Depot Charge Boxes GEN2

- 1x or 2x AC auxiliary power cable (in case daisy-chain mode is used),
- 2x DC power cables,
- 1x Interlock cable,
- 1x STP Cat6 cable

**NOTICE**

For detailed information about type of glass fiber cable which are needed, see Communication glass fiber cable on Page 19.
4.4.5. Grounding of Depot Charge Boxes GEN2

- PE must be connected to each of the Depot Charge Boxes GEN2 by 35 mm² cable as described in the IEC 61851-23.
- Grounding scheme is dependent on layout of specific installation site and contracted electrical company should define detailed design of grounding installation. Local legal requirements must be followed. Following options of providing PE to Depot Charge Box GEN2 are proposed.
  - PE may be connected from locally available ground connection next to the Depot Charge Box
  - PE may be routed from Power Cabinet or distribution board via cable conduits. In that scenario each Depot Charge Box GEN2 should have dedicated PE cable.
- There is one 35 mm² gland in Depot Charge Box GEN2 used for guiding PE cable to PE connection point inside the box. Daisy-chaining of ground signal via Depot Charge Box GEN2 is not allowed.
- If Depot Charge Box GEN2 is installed on the pedestal or any other metal construction which must be grounded, there are two 16 mm² glands available to connect PE of Depot Charge Box GEN2 enclosure to the metal frame.

**NOTICE**

For the overview of the grounding of the system, see Appendix G *Ground overview of the system* on Page 111.

4.4.6. Optional external interface cables

There is the possibility to connect an external Beacon light, Stop button and/or Emergency stop button (EMO) to the Depot Charge Box GEN2.

<table>
<thead>
<tr>
<th>Optional external interface</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beacon light</td>
<td>24VDC</td>
</tr>
<tr>
<td></td>
<td>Three colors</td>
</tr>
<tr>
<td></td>
<td>Common plus (NPN control)</td>
</tr>
<tr>
<td></td>
<td>Max 300mA per one color</td>
</tr>
<tr>
<td>Stop button</td>
<td>1x NO (normally open)</td>
</tr>
<tr>
<td></td>
<td>Contacts &lt;1A, 24VDC is sufficient (just control)</td>
</tr>
<tr>
<td></td>
<td>Momentary action</td>
</tr>
<tr>
<td></td>
<td>Can be equipped with background light 24VDC</td>
</tr>
<tr>
<td>Emergency stop button (EMO)</td>
<td>2x NC (normally closed)</td>
</tr>
</tbody>
</table>

- 1x Ext. Beacon cable,
- 1x Ext. Stop button cable,
- 1x Ext. EMO cable.
### 4.4.7. Cable specification list

Tables below provide general specifications for the needed cables. Use these tables to select cables, taking into account local installation conditions, cable length, cable temperature rating, losses and local regulations.

#### AC and DC power cables

<table>
<thead>
<tr>
<th>Functional description</th>
<th>DC Power cable</th>
<th>PE cable</th>
<th>AC auxiliary power cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cores</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Cross section</td>
<td>95 – 185 mm²</td>
<td>35 mm²</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td>Min – Max external diameter to fit through gland</td>
<td>22 – 32 mm</td>
<td>6 – 12 mm</td>
<td>6 – 12 mm</td>
</tr>
</tbody>
</table>

- **Shielding**: No
- **Conductor**: Tinned copper or aluminum conductor, fine wire stranded acc. to VDE 0295 Cl.5/IEC Cl.5
- **Insulation**: Special rubber or PVC (outdoor use, UV-protected, oil resistant)
- **Minimum Nominal Voltage Uo/U**: 600/1000 Vac 900/1500 Vdc
- **Minimum Test Voltage [AC]**: 6 kV
- **Ambient Temperature range**: -40°C to 80°C, permissible conductor operating temperature +90°C
- **Core identification**: gn/ye

#### Data cables

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Interlock cable</th>
<th>Ethernet (S/FTP, CAT6)</th>
<th>Ext. Beacon cable</th>
<th>Ext. Stop button cable</th>
<th>Ext. EMO cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cores</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Twisted pairs</td>
<td>Yes (2 x 2)</td>
<td>Yes (4 x 2)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cross section</td>
<td>0.75 – 2.5 mm²</td>
<td>N/A</td>
<td>0.5 – 0.75 mm²</td>
<td>0.5 – 0.75 mm²</td>
<td>0.5 – 0.75 mm²</td>
</tr>
<tr>
<td>Min – Max external diameter to fit through gland</td>
<td>8 – 9 mm</td>
<td>5 – 7 mm</td>
<td>5 – 6 mm</td>
<td>5 – 6 mm</td>
<td>5 – 6 mm</td>
</tr>
</tbody>
</table>

- **Shielding**: Yes (tinned copper braid)
- **Conductor**: Fine strand copper wire
- **Insulation**: PVC or other material that can be used outdoor and are UV-protected
- **Characteristic impedance**: 120 Ω ± 10%
- **Minimum Test Voltage [AC]**: 1.5 kV
- **Ambient Temperature range**: -40°C to 70°C
- **Core identification**: Acc. to DIN 47100
• Important: all cables must be resistant to being placed in the ground, submerged in conduit.
• All cables must have and isolation that are self-extinguishing and flame retardant according to DIN VDE 0482-332-1-2, DIN EN 60332-1-2, IEC 60332-1-2.
• All cables must be corresponds to the VDE, CE and EAC Low Voltage Directive and must meet the RoHS compliance.
• The identity and/or function of the cable must be marked on every 2000 mm of the cable and on both ends.

4.5. Internet connection

In most cases the integrated 3G/4G modem is used for wireless internet access. A customer SIM card is not required. If there is no 3G/4G signal available, a standard wired internet connection is required. For this option, contact ABB Sales department (see Contact information on Page 12 for contact details).
5. **Placement and Connection**

5.1. **About placement and connection**

When the construction phase is finished, the HVC-R 107/160 V2 E-Bus Charger can be placed and connected. The planning steps for the placement and connection phase are shown in the figure below. Usually the procedure can be done within one day.

| C1 | Route the cables on Page 50. |
| C2 | Unpack on Page 51. |
| C3 | Move Power Cabinet to position on Page 53 and Install Power Cabinet onto the foundation on Page 56. |
| C4 | Connect the AC power cable on Page 63, Connect the DC power cables on Page 68 and Connect the communication cable on Page Error! Bookmark not defined. |
| C5 | Unpack the Depot Charge on Page 77. |
| C6 | Install Depot Charge Box GEN2 onto on Page 78 or Install Depot Charge Box GEN2 onto wall on Page 81. |
| C7 | Connect cables - Depot Charge Box on Page 83. |
5.2. Route the cables

1. Unpack the cables. See Cabling on Page 41 for details on which cables are needed.

2. Remove the top cover plate (B) and the front cover plate (C) from the foundation (A) by loosen the bolts (D).
3. Put the front cover plate (C) and its bolts (D) in a safe location as it will be installed again later on.

**NOTICE**

Step 2 and 3 are only applicable when the Power Cabinet is placed on a concrete foundation. The top cover plate is not needed any more after the cabinet is placed on the foundation.

4. Remove the cover plate (E) from the foundation (F).

**NOTICE**

Step 4 is only applicable when the Depot Charge Box GEN2 is installed on the pedestal.
5. Route the DC power cables through the cable conduit.
6. Route the AC auxiliary power, PE wire, Interlock cable and Ethernet cable (if required) through the other cable conduit.
7. Route the communication glass fiber cable through the extra 40 mm cable conduit.

**CAUTION**

To prevent damage to the glass fiber optic cable, a minimum of two persons is required to route the glass fiber cable through the conduit. One person for pulling, the other person to guide the glass fiber cable. Ensure that the glass fiber cable is carefully rolled out before it is pulled through the conduit, and do not use large traction forces, this can damage the glass fiber cable.

8. For the DC power cables, make sure that a cable length of 1000 mm and 1500 mm is available above the surface for internal routing respectively in the Power Cabinet and in the Depot Charge Box GEN2.
9. For the other cables, make sure that a cable length of 3000 mm is available above the surface for internal routing in the Power Cabinet and Depot Charge Box GEN2.

**NOTICE**

This extra cable length is required to connect the cables with the connectors in the Power Cabinet and Depot Charge Box GEN2 without problems.

### 5.3. Unpack Power Cabinet

#### 5.3.1. Before unpacking

**NOTICE**

**Unloading** Power Cabinet
The delivery truck only unloads the pallet carrying the Power Cabinet. The delivery truck will not move the Power Cabinet to its final location. The placement of the Power Cabinet to its final location is the responsibility of the contractor. Upon request it is possible to order a truck with a crane.

**CAUTION**

Do not pollute the environment with plastic and cardboard packing. Depollute these things according the regional applicable regulations as well as environment-friendly.

**Preconditions:**
- All construction work is completed.
- The product is delivered by a transport company at the confirmed date of delivery.
1. Make sure that the Power Cabinet has not been shaken or tilted over 30°.

5.3.2. Remove packaging

Preconditions
- Tools: spanner (size 24).

1. Remove the packaging material from the Power Cabinet.
2. Remove the bag which contain the keys, cover caps and mounting material that are attached with tape on one of the lifting eyebolt at the top of the cabinet.
3. Keep this bag with parts in a safe place.
4. Remove the nuts (A) at the four corners.

5.4. Move Power Cabinet to position

There are two options to move the Power Cabinet from the delivery truck to the location.

- Use a hoist to lift the cabinet from the top. See Move cabinet with a hoist on Page 54.
- Use a forklift truck to lift the cabinet from the bottom. See Move cabinet with a forklift truck on Page 55.

Preconditions:
- All packaging material is removed from the Power Cabinet.
- The two cover plates are removed from the foundation.
- The tapped holes of the foundation are free from dust. If necessary, clean the holes with a vacuum cleaner. Use a thread tap to make sure that the bolts will go in smoothly.

**DANGER**

Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.

**WARNING**

Make sure that personnel cannot be crushed or become trapped while moving the Power Cabinet.

**CAUTION**

Warranty
Damage due to moving the Power Cabinet to its position is not covered by the warranty.

**CAUTION**

Do not use a compressor to clean the Power Cabinet. Use a vacuum cleaner.
1. Use one of the two options to move the Power Cabinet to the foundation.
2. When the Power Cabinet is about 500 mm above its location, continue the installation procedure with Install Power Cabinet onto the foundation on Page 56.

5.4.1. Move cabinet with a hoist

A  Swivel eye bolts (standard delivered with the cabinet)
B  Lifting loops
C  Hoisting equipment

Preconditions:
- A minimum of two persons is required: one person to operate the hoisting equipment, the other person to guide the Power Cabinet to its location.
- Use M16 swivel eye bolts (A) or M16 bolts with lifting loops (B).

1. Insert the bolts (A) or (B) into the holes at the opposite corners of the cabinet, if not placed upon delivery.
2. Tighten the bolts.
3. Connect the hoisting equipment (C).

**CAUTION**

Keep the hoisting angle below 60°.

4. Move the Power Cabinet to the foundation.
5.4.2. Move cabinet with a forklift truck

Preconditions:

- A minimum of two persons is required: one person to operate the forklift truck, the other person to guide the Power Cabinet to its location.

1. Place wooden slats with a thickness of about 10 to 15 mm and a width equal to the width of the fork of the forklift truck on both forks.
2. Move the forks of the forklift truck next the gaps at the rear of the Power Cabinet.
3. Move the Power Cabinet to the foundation.

NOTICE

The use of the fork slides is mandatory. The distance between the outer side of the forks need to be 930 mm, lifting the cabinet outside the fork slides is NOT allowed and will damage the cabinet.
5.5. Install Power Cabinet onto the foundation

5.5.1. Connect Power Cabinet to foundation

**Preconditions:**
- Tools: spanner (size 24).
- Cover caps (4x) that were removed from the Power Cabinet (bag with parts).
- The Power Cabinet is about 500 mm above its location.

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that personnel cannot be crushed or become trapped while moving the Power Cabinet.</td>
</tr>
</tbody>
</table>

**Placement on concrete foundation**

A  Foundation  
B  Power Cabinet  
C  Cables  
D  Tapped holes
Placement on metal frame foundation

A  Foundation  
B  Power Cabinet  
C  Cables  
D  Tapped holes  

1. Carefully lower the Power Cabinet (B) onto the foundation (A).
2. Make sure that you do not trap the cables (C).
3. Make sure that the cabinet is aligned with the tapped holes (D).

4. Insert the M16 bolts (A) fitted with the washers into the holes in the corners (4x).

NOTICE

A minimum of three M16 bolts are need to applied to securely mount the Power Cabinet onto the foundation. In case of placing two Power Cabinets next to each other and (100 mm distance) against the wall, then one Power Cabinet can be secured by three M16 bolts on to the foundation.
5. Tighten the bolts with a tightening torque of 200 N·m.

6. Remove the swivel eye bolts or lifting loops (A).
7. Place the cover caps (B) in the holes (4x).

5.5.2. **Open the door of the Power Cabinet**

*Preconditions:*
- Key that were removed from the Power Cabinet (bag with parts).

1. Unlock the handle (B)
2. Use the handle (B) to open the door (A).
5.5.3. Move the sliding plate of the guidance plates of the cabinet

Preconditions:
- Tools: spanner (size 13).

1. Loosen the bolts (A).
2. Move the sliding plate (B) of the 2 guidance plates.

5.5.4. Route cables through guidance plates

1. Route the cables (A) through the right guidance plates (B).
2. Make sure that there is sufficient cable length to reach the connectors at the top of the cabinet.
NOTICE

A length of 3000 mm is required, because the connection of the cables with the connectors in the Power Cabinet is at the middle of the cabinet.

5.5.5. Move sliding plates of the guidance plates of the cabinet

Preconditions:
- Tools: spanner (size 13).

1. Move the sliding plates (B).
2. Tighten the bolts (A).
5.5.6. Install border covers of the Power Cabinet

**Preconditions:**
- Tools: torx screwdriver (size 2163TX-T30).
- M5 bolts (8x) that were removed from the Power Cabinet (bag with parts).

1. Put the front cover (A) against the bottom front of the Power Cabinet by aligning the four bolts at the back side of the front cover (A) with the holes in the bottom front.
2. Put the rear cover (B) against the rear front of the Power Cabinet.
3. Insert the M5 bolts (C) into the holes (8x).
4. Tighten the bolts.

5.5.7. Install border covers of metal frame foundation

**NOTICE**

Only applicable when the Power Cabinet is placed on a metal frame foundation. The supplied front and rear cover on the Power Cabinet are not used in this case.

**Preconditions:**
- Tools: torx screwdriver (size 2163TX-T30).
1. Put the front border cover (A) against the bottom front of the Power Cabinet.
2. Put the rear border cover (B) against the rear front of the Power Cabinet.
3. Insert the M5 bolts (C) into the holes (8x).
4. Tighten the bolts.

5.8. Install front cover plate on foundation

**NOTICE**

Only applicable when the Power Cabinet is placed on a concrete foundation.

**Preconditions:**
- Tools: spanner (size 19)

1. Place the front cover plate (B) on the foundation (A).
2. Make sure that the front cover plate (B) is aligned with the tapped holes within the foundation.
3. Insert the M12 bolts (C) into the holes (4x).
4. Tighten the bolts.

5.6. Connect AC power cable and PE wires – Power Cabinet

5.6.1. Remove the protection covers

**Preconditions:**
- Tools: cross-head screwdriver

1. Remove the protection plate (A) by loosening the screws (B).
2. Put the protection plate and screws in a safe location as it will be installed again later on.

3. Remove the 3 protection covers (D) from the connector blocks (C).
4. Put the protection covers in a safe location as it will be installed again later on.
5.6.2. Connect the PE wire of the AC power cable

Preconditions:
- Tools: wire cutter, wire stripper pliers, wire-end ring, spanner (size 19), torque wrench (size 19).

DANGER
Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.

1. Make a loop in the PE wire.

NOTICE
For safety, it is recommended to make a loop in the PE wire so it is longer than the phase wires. This loop makes sure that the PE wire is not the first wire that is disconnected if the Power Cabinet is moved by a collision.

2. Cut the PE wire of the AC power cable to the correct length to reach the PE rail. Do not make the wire routing too tight, or too loose.
3. Strip 20 mm of the insulation from the end of the PE wire.
4. Attach a wire end ring (A) to the end of the PE wire (B).
5. Remove the M12 bolt, nut and washers from the PE rail.
6. Fit the bolt (C) with toothed washer (D), the PE wire (B) and the contact washer (E).
7. Insert the bolt fitted with the PE wire into the PE rail.
8. Screw from the bottom of the PE rail a toothed washer (D) and a nut (F) on the bolt (C)
9. Tighten the bolt/nut connection with a tightening torque of 30 N·m.
5.6.3. Connect the AC power cable

Preconditions:
- Tools: wire cutter, wire stripper pliers, spanner (size 19), torque wrench (size 19).

**DANGER**

Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.

1. Cut the wires of the AC power cable to the correct lengths to reach the connectors. Do not make the wire routing too tight, or too loose.
2. Strip 20 mm of the insulation from the ends of the wires (B).
3. Attach wire end rings (A) at the end of the wires.
4. Remove the nuts and washers (C) from the bolts (M12) of connector block (D).
5. Insert the 3 wires (B) with the nuts and washers onto the bolts of connector block (D).
   - From left to right:
     - L1 (brown),
     - L2 (black),
     - L3 (grey or black).
6. Tighten the nuts (C) with a tightening torque of 30 N·m.
5.6.4. Install the protection covers

Preconditions:
- Tools: cross-head screwdriver

1. Take the 3 protection covers that was removed in *Remove the protection covers* on Page 63.
2. Place the protection covers (D) back on the connector blocks (C).

3. Take the protection plate and the screws that were removed in *Remove the protection covers* on Page 63.
4. Place the protection plate (A) back over the main switch and connector blocks and secure the plate by the screws (B).
5.6.5. Install lightning protection (optional)

Preconditions:
- Tools: wire cutter, wire stripper pliers, wire-end ring, spanner (size 19), torque wrench (size 19).

1. Cut the wire of the lightning protection cable to the correct length to reach the PE rail. Do not make the wire routing too tight, or too loose.
2. Strip 20 mm of the insulation from the end of the wire.
3. Attach a wire end ring (A) to the end of the lightning protection wire (B).
4. Remove the M12 bolt, nut and washers from the PE rail.
5. Fit the bolt (C) with toothed washer (D), the lightning protection wire (B) and the contact washer (E).
6. Insert the bolt fitted with washers and the lightning protection wire into the PE rail.
7. Screw from the bottom of the PE rail a toothed washer (D) and a nut (F) on the bolt (C)
8. Tighten the bolt/nut connection with a tightening torque of 30 N·m.
5.6.6. Connect the PE wire(s) to the Depot Charge Box(s)

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, wire-end ring, spanner (size 19), torque wrench (size 19).

1. Cut the PE wire of the power cable to the correct length to reach the PE rail. Do not make the wire routing too tight, or too loose.
2. Strip 20 mm of the insulation from the end of the PE wire.
3. Attach a wire end ring (A) to the end of the PE wire (B).
4. Remove the M12 bolt, nut and washers from the PE rail.
5. Fit the bolt (C) with toothed washer (D), the PE wire (B) and the contact washer (E).
6. Insert the bolt fitted with the PE wire into the PE rail.
7. Screw from the bottom of the PE rail a toothed washer (D) and a nut (F) on the bolt (C)
8. Tighten the bolt/nut connection with a tightening torque of 30 N·m.

5.7. Connect the DC power cables – Power Cabinet

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, cable lugs (6x), spanner (size 19), torque wrench (size 19), cross-head screwdriver.

---

**DANGER**

Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.
5.7.1. Remove the protection cover

1. Remove the protection plate (A) by loosening the screws (B) (4x).
2. Put the protection plate and screws in a safe location as it will be installed again later on.

5.7.2. Connect the DC power cables

1. Cut the wires of the DC power cable to the correct lengths to reach the connectors. Do not make the wire routing too tight, or too loose.
2. Strip the insulation on the required length specified by the used lug from the end of the wire (B).
3. Attach cable lug (A) at the end of the wires.
4. Remove the nuts and washers (C) from the bolts (M12) of connector block (D) and (E).
5. Insert the DC+ wire (marked by red heat-shrink) with the nuts and washers onto the bolts of pin 1 of the connector block (D).
6. Insert the DC- wire with the nuts and washers onto the bolts of pin 1 of the connector block (E).
7. Tighten the nuts (C) with a tightening torque of 30 N·m.
5.7.3. Install the protection cover

1. Take the protection plate that was removed in *Remove the protection cover* on Page 69.
2. Place the protection plate (A) back over the DC connector blocks and secure the plate by the screws (B) (4x).

5.8. Interlock cable – Power Cabinet

*Preconditions:*
- Tools: wire cutter, wire stripper pliers, screwdriver, ferrules, crimp pliers.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.</td>
</tr>
</tbody>
</table>
5.8.1. Route the cable to the terminal blocks

Preferred cable route

Route the Interlock cable to the terminal block (A). Refer to the figure for the preferred cable route inside the cabinet.

5.8.2. Connect the Interlock cable

A Terminal block
B Interlock cable

1. Move the cable towards the terminal block (A).
2. Strip 11 mm of the insulation from the ends of only the White and Brown wire!
3. Crimp a ferrule onto the end of the White and Brown wire.
4. Ensure that the unused wires, the Green and Yellow wire, are protected so that they cannot touch metal parts.
5. Loosen the connector screws.
6. Insert the wires into the connectors, see table below:

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Connector</th>
<th>Wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interlock In</td>
<td>X8-14</td>
<td>Brown</td>
</tr>
<tr>
<td>Interlock Out</td>
<td>X8-7</td>
<td>White</td>
</tr>
<tr>
<td>Interlock GND</td>
<td>X8-Shield (refer to the picture above)</td>
<td>Shield</td>
</tr>
</tbody>
</table>

See also Appendix F Signal connection diagram.

7. Tighten the connector screws with a tightening torque of 1.3 N·m.

5.9. Connect the communication cable - Power Cabinet

Preconditions:
- Tools: network cable pliers, 2x RJ45 connectors.

5.9.1. Connecting the Ethernet cable - Power Cabinet

**NOTICE**
In case of using Long Distance Kit, instead of ethernet cables, please connect fiber optic cables according to instructions in point 5.9.2

1. Route the Ethernet communication cable (A) to the CAN2ETH board (B) located at the top of the control panel.
2. Connect the RJ45 plug to the terminal J1 (C).
5.9.2. Connecting the communication fiber optic cable in the Power Cabinet (optional)

**NOTICE**

This point should be followed only in case of using Long distance kit. Otherwise please follow point 5.9.1

1. Make sure that the RJ45 slot of the ETH2FIBER converter and J1 (C) or J3 (D) CAN2ETH (B) converter’s slot are connected with an Ethernet cable. If not, use an Ethernet cable (A) to connect them.
2. Connect the communication fiber cables.

2.1. Remove the protection covers from the optical connectors.
2.2. Connect the two Ethernet fiber cables (B) onto the module D2 (A):
   - Rx (Optical 2) with Td D2;
   - Tx (Optical 1) with Rd D2.
2.3. Bind the cables together and secure the loops loosely with a piece of tak-ty or ty-rap.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make the loop bend radius of the fiber cables not smaller than 64 mm, otherwise the core of the fiber cable may break.</td>
</tr>
</tbody>
</table>
5.10. Connect the AC auxiliary power cable (optional) – Power Cabinet

NOTICE

The AC utility power cable for the Depot Charge Boxes GEN2 is optional AC connection within the HVC 160 V2 Power Cabinet, see for more details section Cabling on Page 44.

A Terminal block  
B AC utility power cable

1. Move the cable towards the terminal block (A).  
2. Strip 11 mm of the insulation from the ends of the wires.  
3. Crimp a ferrule onto the end of the wire.  
4. Loosen the connector screws.  
5. Insert the wires into the connectors, see table below:

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Connector</th>
<th>Wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>X341-1</td>
<td>Green/yellow</td>
</tr>
<tr>
<td>L1</td>
<td>X341-2</td>
<td>Brown</td>
</tr>
<tr>
<td>L2</td>
<td>X341-3</td>
<td>Black</td>
</tr>
</tbody>
</table>

6. Tighten the connector screws with a tightening torque of 1.3 N·m.
5.11. Close the door of the Power Cabinet

Preconditions:
- Key that were removed from the Power Cabinet

1. Close the door (A).
2. Lock the handle (B).
5.12. Unpack the Depot Charge Box

5.12.1. Before unpacking

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not pollute the environment with plastic and cardboard packing. Depollute these things according the regional applicable regulations as well as environment-friendly.</td>
</tr>
</tbody>
</table>

**Preconditions:**
- All construction work is completed.
- The product is delivered by a transport company at the confirmed date of delivery.

1. Check the box for damages.

5.12.2. Remove packaging

**Preconditions:**
- The installation work must be carried out by at least two persons.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that personnel cannot be crushed or become trapped while moving the Depot Charge Box GEN2 (and pedestal) out of the box.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty</td>
</tr>
<tr>
<td>Damage due to moving the Depot Charge Box GEN2 and pedestal out of the box is not covered by the warranty.</td>
</tr>
</tbody>
</table>

1. Unpack Depot Charge Box GEN2.
2. Remove the bag (B) which contain the keys, cover caps and mounting material. The bag is attached with tape to one of the cable holders (A).
3. Lift the Depot Charge Box GEN2 out of the box.
4. Place the Depot Charge Box GEN2 on the ground with its top facing up.
5. Remove all protective foam from the Depot Charge Box GEN2.
Next steps are only applicable when the Depot Charge Box GEN2 will be installed on a pedestal.

6. Unpack pedestal.
7. Remove the cover (E) from the wooden box.
8. Lift the pedestal out of the box.
9. Place the pedestal on the ground on a protective surface with its top facing up.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To prevent damage to the paint layer of the pedestal, always place the pedestal on a protective surface that provides sufficient protection against scratches and other damage. ABB is not responsible for causing damage to the pedestal during unpacking of the pedestal.</td>
</tr>
</tbody>
</table>

10. Remove all protective foam from the pedestal.

5.13. Install Depot Charge Box GEN2 onto Pedestal

5.13.1. Connect Pedestal to foundation

Preconditions:
- All packaging material is removed from the Pedestal.
- A minimum of two persons is required.
- Tools: torx screwdriver (size TT20), spanner (size 19).
1. Remove the front cover plate (A) from the Pedestal (B) by loosen the bolts (C) (8x).
2. Put the front cover plate (A) and the bolts (C) in a safe location as it will be installed again later on.

3. Carefully position the Pedestal (B) next to the foundation (D).
4. Pull the cables (E) through the opening (F).

5. Erect the Pedestal (B).

NOTICE
This must be carried out by two persons, who tilt the pedestal at one side.

6. Make sure that the pedestal’s bow (G) is aligned with the tapped holes in the beam (H).
7. Insert M12 x 90 mm bolts (I) fitted with washers (J) into the holes (3x).
8. Tighten the bolts with a tightening torque of 18 N·m.

5.13.2. Mounting Depot Charge Box GEN2 onto Pedestal

Preconditions:
- All packaging material is removed from the Pedestal.
- A minimum of two persons is required.
- Tools: torx screwdriver (size TT20), spanner (size 13).

**WARNING**

Make sure that personnel cannot be crushed or become trapped while moving the Depot Charge Box GEN2.

**CAUTION**

**Warranty**

Damage due to moving the Depot Charge Box GEN2 to its position is not covered by the warranty.

**CAUTION**

Do not use a compressor to clean the Depot Charge Box GEN2. Use a vacuum cleaner.

1. Open the door of the Depot Charge Box GEN2.
2. Carefully place the Depot Charge Box GEN2 against the Pedestal.
3. Make sure that the Depot Charge Box GEN2 is aligned with the holes in the metal plate of the Pedestal.
4. Insert the M8 bolts (D) and washers (B) into the holes at the back side of the Pedestal (4x).
5. Insert the M8 nuts (A), washer (B) and sealing washer (C) from the inside of the box onto the bolts (D) (4x).
6. Tighten the bolts/nuts with a tightening torque of 10 – 15 N·m.

5.14. Install Depot Charge Box GEN2 onto wall

Preconditions:
- All packaging material is removed from the Depot Charge Box GEN2.
- A minimum of two persons is required.
- Tools: spanner (size 13).

**WARNING**
Make sure that personnel cannot be crushed or become trapped while moving the Depot Charge Box GEN2.

**CAUTION**

**Warranty**
Damage due to moving the Depot Charge Box GEN2 to its position is not covered by the warranty.

**CAUTION**

Do not use a compressor to clean the Depot Charge Box GEN2. Use a vacuum cleaner.

5.14.1. Using the wall-mounting brackets

The Depot Charge Box GEN2 can be easily mounted by using the wall-mounting brackets, see Wall-mounting brackets for safe wall fixing on Page 19.
1. Determine whether the wall-mounting brackets (D) should be mounted horizontally or vertically, see also section Workflow for wall mounting on Page 40.
2. Open the door of the Depot Charge Box GEN2.
3. Put the wall-mounting brackets (D) (4x) against the back side of the Depot Charge Box GEN2.
4. Insert the M8 bolt (A), washer (B) and sealing washer (C) from the inside of the box into the holes of the back side into the wall-mounting brackets (D) (4x).
5. Tighten the bolts with a tightening torque of 10 – 15 N·m.
6. Close the door of the Depot Charge Box GEN2.

7. Carefully place the Depot Charge Box GEN2 against the wall.
8. Make sure that the Depot Charge Box GEN2 is aligned with the drilled holes (G) in the wall.
9. Insert the M8 wood-wire-bolts (E) fitted with the washers (F) into the holes of the wall-mounting brackets (D) (4x).
10. Tighten the wood-wire-bolts with a tightening torque of 10 – 15 N·m.

5.14.2. Direct wall mounting
1. Open the door of the Depot Charge Box GEN2.
2. Carefully place the Depot Charge Box GEN2 against the wall.
3. Make sure that the Depot Charge Box GEN2 is aligned with the drilled holes (D) in the wall.
4. Insert the M8 wood-wire-bolts (A) fitted with the washers (B) and sealing washers (C) into the holes (4x).
5. Tighten the wood-wire-bolts with a tightening torque of 10 – 15 N·m.
6. Close the door of the Depot Charge Box GEN2.

5.15. Connect cables - Depot Charge Box GEN2

DANGER
Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.

5.15.1. Gland layout of the Depot Charge Box

<table>
<thead>
<tr>
<th>Gland #</th>
<th>Clamping range ØF</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>22 – 32 mm</td>
<td>DC- Out</td>
</tr>
<tr>
<td>02</td>
<td>22 – 32 mm</td>
<td>DC- In</td>
</tr>
<tr>
<td>03</td>
<td>22 – 32 mm</td>
<td>DC+ In</td>
</tr>
<tr>
<td>04</td>
<td>22 – 32 mm</td>
<td>DC+ Out</td>
</tr>
<tr>
<td>05</td>
<td>18 – 25 mm</td>
<td>Spare</td>
</tr>
<tr>
<td>06</td>
<td>18 – 25 mm</td>
<td>Fiber optic cable Input (when using Long Distance Kit)</td>
</tr>
<tr>
<td>07</td>
<td>5 – 10 mm</td>
<td>Ethernet In</td>
</tr>
<tr>
<td>08</td>
<td>5 – 10 mm</td>
<td>Ethernet Out</td>
</tr>
<tr>
<td>09</td>
<td>5 – 6 mm</td>
<td>External EMO, Beacon, Stop button</td>
</tr>
<tr>
<td>10</td>
<td>8 – 9 mm</td>
<td>Interlock In and Interlock Out</td>
</tr>
<tr>
<td>11</td>
<td>6 – 12 mm</td>
<td>PE</td>
</tr>
<tr>
<td>12</td>
<td>6 – 12 mm</td>
<td>AC auxiliary power Input</td>
</tr>
<tr>
<td>13</td>
<td>6 – 12 mm</td>
<td>AC auxiliary power Output</td>
</tr>
</tbody>
</table>
5.15.2. Open the door of the Depot Charge Box

Preconditions
• Key that was removed from the Depot Charge Box GEN2.

1. Unlock the handle (B).
2. Use the handle (B) to open the door (A).

5.15.3. Remove the protection cover

Preconditions:
• Tools: cross-head screwdriver

1. Disconnect 4-pin connector of the fan (A)
2. Remove the protection plate (B) by loosening the four screws (C).
3. Put the protection plate (B), the screws and the washers (C) in a safe location as it will be installed again later on.
5.15.4. Connect the PE wire from the Power Cabinet

**WARNING**

In case the Pedestal is used, the PE wire from the Power Cabinet must first connected to the GND point of the Pedestal. See *Connect the PE or lighting protection wire onto Pedestal (when used)* on Page 86.

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, ferrule, crimp pliers, screwdriver

1. Loosen and remove the cable gland’s (#11) nut for the PE wire.
2. Slide the cable gland’s nut over the PE wire.
3. Route the PE wire (B) through gland #11 to the PE terminal X5-1. Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the PE wire to the correct length to reach the PE connector block X5-1. Do not make the wire routing too tight, or too loose.
5. Tighten the nut of the gland to secure the PE wire.
6. Strip 17 mm of the insulation from the end of the PE wire (B).
7. Crimp a ferrule (A) to the end of the PE wire (B).
8. Loosen the connector screw of the PE connector block X5-1.
9. Insert the PE wire (B) into the PE connector block X5-1.
10. Tighten the screw of the connector block with a tightening torque of 2.65 Nm.
5.15.5. Install lighting protection (optional)

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case the Pedestal is used, the lighting protection wire must first connected to the GND point of the Pedestal. See section <em>Connect the PE or lighting protection wire onto Pedestal (when used)</em> on Page 86.</td>
</tr>
</tbody>
</table>

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, ferrule, crimp pliers, screwdriver

1. Loosen and remove the nut of spare cable gland for the PE wire.
2. Slide the cable gland’s nut over the PE wire.
3. Route the PE wire (B) through gland to the PE terminal X5-2. Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the PE wire to the correct length to reach the PE connector block X5-2. Do not make the wire routing too tight, or too loose.
5. Tighten the nut of the gland to secure the PE wire.
6. Strip 17 mm of the insulation from the end of the PE wire (B).
7. Crimp a ferrule (A) to the end of the PE wire (B).
8. Loosen the connector screw of the PE connector block X5-2.
9. Insert the PE wire (B) into the PE connector block X5-2.
10. Tighten the screw of the connector block with a tightening torque of 2.65 Nm.
5.15.6. Connect the PE or lighting protection wire onto Pedestal (when used)

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, cable lugs (2x), spanner (size 13), torque wrench (size 13).

1. Make a loop in the PE wire that is coming from the Power Cabinet or ground electrode.

### NOTICE

For safety, it is recommended to make a loop in the PE wire. This loop makes sure that the PE wire is not the first wire that is disconnected if the Pedestal is moved by a collision.

2. Cut the PE wire from the Power Cabinet or ground electrode to the correct length to reach the GND point (F).
3. Route the PE wire from the GND point (F) to the X5 terminal block within the Depot Charge Box GEN2. See also section *Connect the PE wire from the Power Cabinet* on Page 85 or *Install lightning protection (optional)* on Page 86. Do not make the wire routing too tight, or too loose.
4. Cut the PE wire to the Depot Charge Box GEN2 to the correct length to reach the GND point (F).
5. Strip 20 mm of the insulation from the end of the PE wires.
6. Attach a wire end ring (A) to the end of the PE wires (B).
7. Fit onto the GND point (F) the contact washer (E), both PE wires (B) and the toothed washer (D).
8. Screw onto the GND point (F) the M8 nut (D).
9. Tighten the nut with a tightening torque of 15 N·m.
5.15.7. Connect the DC power in- and output cables

**Preconditions:**
- Tools: wire cutter, wire stripper pliers, cable lugs, spanner (size 17), torque wrench (size 17).

1. Loosen and remove the cable gland’s (#02 and #03) nuts for the DC power input cables. In case of sequential charging with two, three or four Depot Charge Boxes GEN2, loosen and remove also the cable gland’s (#01 and #04) nuts for the DC power output cables.
2. Slide the cable gland’s nuts over the DC power cables.
3. Strip the insulation on the required length specified by the used lug from the end of the wire (B).
4. Insert the DC power cables into the cable gland (#01 - #04).
5. Attach cable lug (A) at the end of the wires.
6. Fit a M10 bolt (C) with washer (D) and the DC cable (A).
7. Insert the bolt fitted with the DC cable into the right connection hole of the copper rail (see picture above).
8. Screw from the bottom side of the copper rail a washer (E) and a nut (F) on the bolt (C).
9. Tighten the bolt/nut connection with a tightening torque of 20 N·m.
10. Tighten the cable gland’s nut to secure the DC power cables.
5.15.8. Connect the AC auxiliary power cable(s)

Preconditions:
- Tools: wire cutter, wire stripper pliers, ferrule, crimp pliers, screwdriver

1. Loosen and remove the cable gland’s (#12) nut for the AC auxiliary power Input cable (C). In case of daisy-chained connection of the AC auxiliary supply (see section Charge system configurations on Page 41), loosen and remove also the cable gland’s (#13) nut for the AC auxiliary power output cable (D).
2. Slide the cable gland’s nut over the AC auxiliary power cable.
3. Route the AC auxiliary power cable(s) through gland #12 (and #13) to terminal block (E). Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the AC auxiliary power cable to the correct length to reach the terminal block (E). Do not make the cable routing too tight, or too loose.
5. Tighten the nut of the gland to secure the AC auxiliary power cable(s).
6. Strip 11 mm of the insulation from the end of the wires (B).
7. Crimp a ferrule (A) to the end of the wire (B).
8. Loosen the connector screws.
9. Insert the wires of the AC auxiliary power cable(s) into the connectors of the terminal block (E):

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Connector</th>
<th>Wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC aux Line Input</td>
<td>X3-1</td>
<td>Brown</td>
</tr>
<tr>
<td>AC aux Line Output (to next Depot Charge Box, optional)</td>
<td>X3-2</td>
<td>Brown</td>
</tr>
<tr>
<td>AC aux Neutral Input</td>
<td>X3-3</td>
<td>Blue</td>
</tr>
<tr>
<td>AC aux Neutral Output (to next Depot Charge Box, optional)</td>
<td>X3-4</td>
<td>Blue</td>
</tr>
<tr>
<td>AC aux PE Input</td>
<td>X3-5</td>
<td>Green/yellow</td>
</tr>
<tr>
<td>AC aux PE Output (to next Depot Charge Box, optional)</td>
<td>X3-6</td>
<td>Green/yellow</td>
</tr>
</tbody>
</table>

10. Tighten the connector screw of the terminal blocks with a tightening torque of 1.3 N·m.
5.15.9. Connect the Interlock cable(s)

Preconditions:
- Tools: wire cutter, wire stripper pliers, screwdriver, ferrules, crimp pliers

1. Loosen and remove the cable gland’s (#10) nut for the Interlock cables (B) and (C). In case of sequential charging with two, three or four Depot Charge Boxes GEN2, Interlock cable (C) is used for the Interlock connection between the Depot Charge Boxes GEN2.
2. Slide the cable gland’s nut over the Interlock cable(s).
3. Route the Interlock cable(s) through gland #10 to the terminal blocks (A). Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the Interlock cable(s) to the correct length to reach the terminal block (A). Do not make the cable routing too tight, or too loose.
5. Tighten the nut of the gland to secure the Interlock cable(s).
6. Strip 11 mm of the insulation from the end of the wires.
7. Tighten the shield of the Interlock cable(s) into a thread and slide a shrink tubing over the shield that has been twisted together.
8. Crimp a ferrule to the end of the wires.
9. Loosen the connector screws.
10. Connector between pin X2-3 and X2-4 must not be present if the Interlock cable (C) is routed to the next Depot Charge Box GEN2. Connector between pin X2-3 and X2-4 must be present if this is the last Depot Charge Box GEN2.
11. Insert the wires of the Interlock cable(s) into the connectors of the terminal block (A):

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Connector</th>
<th>Wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interlock In (from Power Cabinet or previous Depot Charge Box)</td>
<td>X2-1</td>
<td>White</td>
</tr>
<tr>
<td>Interlock Out (from Power Cabinet or previous Depot Charge Box)</td>
<td>X2-2</td>
<td>Brown</td>
</tr>
<tr>
<td>DC Guard A (from Power Cabinet or previous Depot Charge Box, optional)</td>
<td>X2-5</td>
<td>Green</td>
</tr>
<tr>
<td>DC Guard A GND (from Power Cabinet or previous Depot Charge Box, optional)</td>
<td>X2-6</td>
<td>Yellow</td>
</tr>
<tr>
<td>Interlock GND</td>
<td>X1-1</td>
<td>Shield</td>
</tr>
<tr>
<td>Interlock In (to next Depot Charge Box, optional)</td>
<td>X2-3</td>
<td>Brown</td>
</tr>
<tr>
<td>Interlock Out (to next Depot Charge Box, optional)</td>
<td>X2-4</td>
<td>White</td>
</tr>
<tr>
<td>DC Guard A (to next Depot Charge Box, optional)</td>
<td>X2-7</td>
<td>Green</td>
</tr>
<tr>
<td>DC Guard A GND (to next Depot Charge Box, optional)</td>
<td>X2-8</td>
<td>Yellow</td>
</tr>
<tr>
<td>Interlock GND</td>
<td>X1-2</td>
<td>Shield</td>
</tr>
</tbody>
</table>

See also Appendix F Signal connection diagram.

12. Tighten the connector screw of the terminal blocks with a tightening torque of 1.3 N-m.
5.15.10. Connect the Ethernet cable(s)

**NOTICE**

In case of using Long Distance Kit, instead of ethernet cables, please connect fiber optic cables according to instructions in point 5.15.11

Preconditions:
- **Tools:** network cable pliers, 2x or 4x RJ45 connectors.

1. Loosen and remove the cable gland’s #07 (and #08 in case of multiple Depot Charge Boxes GEN2 configuration) nut for the Ethernet cable(s).
2. Slide the cable gland’s nut over the Ethernet cable(s).
3. Route the Ethernet cable(s) through gland #7 (and #08) to the terminal X11 and X12 on the main terminal block. Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the Ethernet cable(s) to the correct length to reach the module (A). Do not make the cable routing too tight, or too loose.
5. Tighten the nut of the gland to secure the Ethernet cable(s).
6. Fit an RJ45 connector to the Ethernet cable (B). Use network cable pliers.
7. Insert the RJ45 connector of the cable coming from the Power Cabinet / previous Depot Charge Box GEN2 into the terminal X11.
8. (Optional) Insert the RJ45 connector of the cable going to the next Depot Charge Box GEN2 into the terminal X12.

**NOTE:** Use Ethernet S/FTP CAT6.
- The max diameter of ethernet cable must be 7 mm.
- The max length of ethernet connector must be 40 mm.
5.15.11. Connect the communication fiber optic cable (optional)

**NOTICE**

This point should be followed only in case of using Long distance kit. Otherwise please follow point 5.15.10

1. Loosen and remove the cable gland’s (#6) nut for the communication fiber cable.
2. Insert the communication cable into the cable gland (#6) and tighten the cable gland’s nut to secure the cable(s).
3. Route the communication fiber cables to module U6 (A). Refer to the figure above for the preferred cable route inside the cabinet.
4. Remove the protection covers from the optical connectors.
5. Connect the two fiber cables (B) onto module (A):
   - Rx (Optical 1) with Td U6;
   - Tx (Optical 2) with Rd U6.

**CAUTION**

Make the loop bend radius of the fiber cables not smaller than 64 mm, otherwise the core of the fiber cable may break.
5.15.12. Connect external EMO, Beacon and Stop button cables (optional)

**NOTICE**

There is the possibility to connect an external Beacon light, Stop button and/or Emergency stop button (EMO) to the Depot Charge Box, see for more details section *Optional external interface cables* on Page 46.

**Preconditions:**
- **Tools:** wire cutter, wire stripper pliers, screwdriver, ferrules, crimp pliers

1. Loosen and remove the cable gland’s (#9) nut for the Ext. Beacon cable (B), the Ext. Stop button cable (C) and the Ext. EMO cable (D).
2. Slide the cable gland’s nut over the cables.
3. Route the cables through gland #9 to the terminal blocks (A). Refer to the figure above for the preferred cable route through the cable duct inside the cabinet.
4. Cut the cables to the correct length to reach the terminal block (A). Do not make the cable routing too tight, or too loose.
5. Tighten the nut of the gland to secure the cables.
6. Strip 11 mm of the insulation from the end of the wires.
7. Crimp a ferrule to the end of the wires.
8. Loosen the connector screws.
9. Connectors between pin X2-21 and X2-22 and between pin X2-23 and X2-24 must be removed if the Ext. EMO button is applied.
10. Insert the wires of the cables into the connectors of the terminal block (A):

<table>
<thead>
<tr>
<th>Functional description</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>External stop button +</td>
<td>X2-9</td>
</tr>
<tr>
<td>External stop button -</td>
<td>X2-10</td>
</tr>
<tr>
<td>External stop button + 24 V</td>
<td>X2-13</td>
</tr>
<tr>
<td>External stop button 0 V</td>
<td>X2-14</td>
</tr>
<tr>
<td>External emergency button S1-1</td>
<td>X2-21</td>
</tr>
<tr>
<td>External emergency button S1-2</td>
<td>X2-22</td>
</tr>
<tr>
<td>External emergency button S2-1</td>
<td>X2-23</td>
</tr>
<tr>
<td>External emergency button S2-2</td>
<td>X2-24</td>
</tr>
<tr>
<td>External beacon light Red</td>
<td>X2-25</td>
</tr>
<tr>
<td>External beacon light Green</td>
<td>X2-26</td>
</tr>
<tr>
<td>External beacon light Blue</td>
<td>X2-29</td>
</tr>
<tr>
<td>External beacon light + 24 V</td>
<td>X2-30</td>
</tr>
</tbody>
</table>

See also Appendix F Signal connection diagram.

11. Tighten the connector screw of the terminal blocks with a tightening torque of 1.3 N·m.

5.15.13. Install the protection cover

Preconditions:
- Tools: cross-head screwdriver

1. Take the protection cover, the screws and the washers that was removed in Remove the protection cover on Page 84.
2. Place the protection cover (B) back over the DC contactors and secure the protection cover by the screws in combination with the washers (C).
3. Connect 4-pin connector of the fan (A) that was disconnected in Remove the protection cover on Page 84.
5.15.14. Close the door of the Depot Charge Box GEN2

**Preconditions**
- Key that was removed from the Depot Charge Box GEN2

1. Close the door (A).
2. Lock the handle (B).

5.15.15. Install front cover plate on Pedestal (when used)

**Preconditions:**
- Tools: torx screwdriver (size TT20).

1. Put the front cover plate (A) against the front side of the Pedestal (B).
2. Insert the M8 bolts (C) into the holes (8x).
3. Tighten the bolts.
6. **Commissioning**

6.1. **Commissioning preparation**

Commissioning is the last phase necessary to get the HVC-R 107/160 V2 E-Bus Charger into operation. The planning steps for the commissioning phase are shown in the figure below.

---

**CAUTION**

**Warranty**

It is not permitted to move the whole or parts of the HVC-R 107/160 V2 E-Bus Charger after the commissioning. If the whole or parts of the HVC-R 107/160 V2 E-Bus Charger is moved without contacting the ABB Service department, the warranty will be considered void.
6.2. Customer Acceptance Form (CAF)

After the commissioning is completed, the owner / site operator will sign the Customer Acceptance Form (CAF). In certain circumstances ABB will be represented by a project engineer.

The CAF contains information about:
- the project (number, location, charger type),
- a checklist about the delivery,
- the commissioning SAT checklist,
- list of remaining items.

After the CAF has been signed, the customer support will be handled by the ABB Service department.
If there are any remaining items, they can be noted on the CAF document, together with the agreed solution and the expected date of completion.
7. Service and Maintenance

7.1. About Service and Maintenance

Maintenance is done according the maintenance schedule. This is outside of the scope of this document.

DANGER

Any service and maintenance work on the charger system has to be only executed on powered-off device. Make sure that the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure that the electrical power is disconnected from the system. Secure against resetting.

7.2. Cleaning of the cabinet

The Power Cabinet and Depot Charge Box GEN2 is powder coated. This coating must be kept in good condition. Clean the Power Cabinet and Depot Charge Box GEN2 three times a year in the following way:

- Remove rough dirt by spraying with low-pressure tap water.
- Apply a neutral or weak alkaline cleaning solution and let it soak.
- Remove dirt by hand with a non-woven nylon hand pad.
- Rinse thoroughly with tap water.
- Optionally, apply wax on the front for extra protection and gloss.
- Do a check on the coating for damage.
NOTICE

When the HVC-R 107/160 V2 E-Bus Charger is exposed to rain, it is sufficient to clean it twice a year.

CAUTION

Do not apply high-pressure water jets. Water may leak into the Power Cabinet. If a high-pressure water jet has been used, make sure that the inside of the Power Cabinet is dry.
- Only use cleaning agents with a pH value between 6 and 8.
- Do not use cleaning agents with abrasive components.
- Do not use abrasive tools.
8. Technical Specification

8.1. Electrical specification complete 107 kW system

<table>
<thead>
<tr>
<th>AC Input Power Cabinet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>3-phase, 400 V AC: PE, L1, L2, L3</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>400 V AC ± 10%</td>
</tr>
<tr>
<td>Input frequency range</td>
<td>50 Hz ± 4%</td>
</tr>
<tr>
<td>Maximum power dissipation</td>
<td>117 kVA</td>
</tr>
<tr>
<td>Power factor (cos φ)</td>
<td>≥ 0.95</td>
</tr>
<tr>
<td>Standby power consumption</td>
<td>&lt; 60 W</td>
</tr>
<tr>
<td>Efficiency</td>
<td>94% and 96% in power spectrum between 20% and 100% of full power</td>
</tr>
<tr>
<td>Maximum input current</td>
<td>174 A AC</td>
</tr>
<tr>
<td>Nominal input current</td>
<td>170 A AC</td>
</tr>
<tr>
<td>Earth Leakage Current Protection</td>
<td>AC 100 mA (RCD integrated in HVC107(S))</td>
</tr>
<tr>
<td></td>
<td>AC 30 mA (RCD integrated in HVC107(S))</td>
</tr>
<tr>
<td>Short Circuit Capacity</td>
<td>25 kA</td>
</tr>
<tr>
<td>AC power connection</td>
<td>240 mm² (max)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC Input Depot Charge Box GEN2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>1-phase: GND, L, N</td>
</tr>
<tr>
<td>Input voltage</td>
<td>230 V AC ± 10%</td>
</tr>
<tr>
<td>Input frequency range</td>
<td>47 - 63 Hz ± 1%</td>
</tr>
<tr>
<td>Nominal input current</td>
<td>2.17 A AC</td>
</tr>
<tr>
<td>Earth Leakage Current protection</td>
<td>AC 30 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum output power</td>
<td>107 kW</td>
</tr>
<tr>
<td>Output voltage range</td>
<td>150 – 850 V DC</td>
</tr>
<tr>
<td>Maximum output current</td>
<td>166 A DC</td>
</tr>
</tbody>
</table>
### 8.1. Electrical specification complete 160 kW system

<table>
<thead>
<tr>
<th>AC Input Power Cabinet</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>3-phase, 400 V AC: PE, L1, L2, L3</td>
<td></td>
</tr>
<tr>
<td>Input voltage range</td>
<td>400 V AC ± 10%</td>
<td></td>
</tr>
<tr>
<td>Input frequency range</td>
<td>50 Hz ± 4%</td>
<td></td>
</tr>
<tr>
<td>Maximum power dissipation</td>
<td>175 kVA</td>
<td></td>
</tr>
<tr>
<td>Power factor (cos φ)</td>
<td>≥ 0.95</td>
<td></td>
</tr>
<tr>
<td>Standby power consumption</td>
<td>&lt; 60 W</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>94% and 96% in power spectrum between 20% and 100% of full power</td>
<td></td>
</tr>
<tr>
<td>Maximum input current</td>
<td>277 A AC</td>
<td></td>
</tr>
<tr>
<td>Nominal input current</td>
<td>254 A AC</td>
<td></td>
</tr>
<tr>
<td>Earth Leakage Current Protection AC 100 mA (RCD integrated in HVC160(S))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth Leakage Current Protection AC 30 mA (RCD integrated in HVC160(S))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Circuit Capacity</td>
<td>25 kA</td>
<td></td>
</tr>
<tr>
<td>AC power connection</td>
<td>240 mm² (max)</td>
<td></td>
</tr>
</tbody>
</table>

### AC Input Dual Depot Charge Box GEN2

<table>
<thead>
<tr>
<th>DC output</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>1-phase: GND, L, N</td>
<td></td>
</tr>
<tr>
<td>Input voltage</td>
<td>230 V AC ± 10%</td>
<td></td>
</tr>
<tr>
<td>Input frequency range</td>
<td>47 - 63 Hz ± 1%</td>
<td></td>
</tr>
<tr>
<td>Nominal input current</td>
<td>2.17 A AC</td>
<td></td>
</tr>
<tr>
<td>Earth Leakage Current protection</td>
<td>AC 30 mA</td>
<td></td>
</tr>
<tr>
<td>Maximum output power</td>
<td>160 kW</td>
<td></td>
</tr>
<tr>
<td>Output voltage range</td>
<td>150 – 850 V DC</td>
<td></td>
</tr>
<tr>
<td>Maximum output current</td>
<td>200 A DC (limited by CCS cable)</td>
<td></td>
</tr>
</tbody>
</table>

### 8.2. Mechanical data

#### Mechanical specification Power Cabinet

<table>
<thead>
<tr>
<th>Dimensions (H x W x D)</th>
<th>2092 x 1170 x 770 mm (including swivel eye bolts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1340 kg</td>
</tr>
<tr>
<td>Volume</td>
<td>1.87 m³</td>
</tr>
<tr>
<td>Dimensions including packaging (H x W x D)</td>
<td>2250 x 1200 x 800 mm</td>
</tr>
<tr>
<td>Weight including packing</td>
<td>1400 kg</td>
</tr>
<tr>
<td>Weight concrete foundation</td>
<td>1300 kg</td>
</tr>
<tr>
<td>Mechanical impact protection</td>
<td>IK10</td>
</tr>
<tr>
<td>Housing</td>
<td>Stainless steel 430</td>
</tr>
</tbody>
</table>

### Mechanical specification Depot Charge Box GEN2

<table>
<thead>
<tr>
<th>Dimensions (H x W x D)</th>
<th>169 x 699 x 240 mm (exclusive charge cable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>45 kg (exclusive with charge cable)</td>
</tr>
<tr>
<td>Weight including packing</td>
<td>61 kg (with 7.0 m charge cable)</td>
</tr>
<tr>
<td>Weight including packing</td>
<td>66 kg (with 9.5 m charge cable)</td>
</tr>
<tr>
<td>Volume</td>
<td>0.10 m³</td>
</tr>
<tr>
<td>Dimensions including packaging (H x W x D)</td>
<td>1250 x 900 x 530 mm (including pallet)</td>
</tr>
<tr>
<td>Mechanical impact packing</td>
<td>102 kg</td>
</tr>
<tr>
<td>Housing</td>
<td>Stainless steel 304</td>
</tr>
</tbody>
</table>
8.3. Environment

Environment specification Power Cabinet

<table>
<thead>
<tr>
<th>Specification</th>
<th>Power Cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingression protection</td>
<td>IP54</td>
</tr>
<tr>
<td>Temperature range – Operation</td>
<td>-35 °C to +45 °C</td>
</tr>
<tr>
<td>Temperature range – Storage</td>
<td>-10 °C to +70 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 % to 95 %, RH – non-condensing</td>
</tr>
<tr>
<td>Airflow</td>
<td>1450 m³/h</td>
</tr>
<tr>
<td>Pressure drop</td>
<td>300 pA</td>
</tr>
<tr>
<td>Altitude</td>
<td>2000 m (max.)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>Indoors, dry</td>
</tr>
</tbody>
</table>

Environment specification Depot Charge Box GEN2

<table>
<thead>
<tr>
<th>Specification</th>
<th>Depot Charge Box GEN2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingression protection</td>
<td>IP65 (exclusive charge cable)</td>
</tr>
<tr>
<td>Temperature range – Operation</td>
<td>-35 °C to +55 °C</td>
</tr>
<tr>
<td>Temperature range – Storage</td>
<td>-10 °C to +70 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 % to 95 %, RH – non-condensing</td>
</tr>
<tr>
<td>Altitude</td>
<td>2000 m (max.)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>Indoors, dry</td>
</tr>
</tbody>
</table>

**CAUTION**

**Warranty**

Warranty will be considered void when the HVC-R 107/160 V2 E-Bus Charger is damaged while badly stored at the customer's location.

8.4. Certifications

Certifications for complete system

<table>
<thead>
<tr>
<th>Certification</th>
<th>Declaration of Conformity HVC150: 20160609</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of protection</td>
<td>1 with PE connection</td>
</tr>
</tbody>
</table>
9. Appendix

A. Dimensions Power Cabinet

[Diagram showing dimensions of a power cabinet]

- LIFTING POINTS FOR M16 EYEBOLTS
- Dimensions for top view, side view, and front view are provided.
- Measurements for various parts of the cabinet are given in millimeters.
B. Dimensions Depot Charge Box

![Diagram of Depot Charge Box Dimensions]
C. Dimensions Concrete Foundation Power Cabinet

[Diagram showing dimensions and details of the foundation power cabinet]
D. Dimensions Metal Foundation Power Cabinet
E. Power Cabinet – Outline with Foundation

- **FRONT VIEW**
  - construct on shallow foundation

- **SIDE VIEW**
  - construct on shallow foundation

Excavated earth
- Stabilized sand / Intensify in layers of 200 mm

- **FRONT VIEW**
  - foundation on soil improvement

- **SIDE VIEW**
  - foundation on soil improvement
F. Signal connection diagram
G. Ground overview of the system