

USER MANUAL

HVC 100C / HVC 150C with Depot Charge box

User and Operation Manual

Version 0.6



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Glossary

CCS

Combined Charging System. A universal AC and DC charging system, also referred to as 'Combo'.

DC

Direct Current.

EV

Electric Vehicle.

Owner The legal owner of the charger.

OCPP

Open Charge Point Protocol. Open standard for communication with charge stations.

PE

Protective Earth.

RCBO

Residual-current Circuit Breaker with Overload protection. Breaks the connection if a residual current or overload is detected.

RCD

Residual Current Device. Breaks the connection if a residual current is detected.

Site operator

Person or company that controls the charge station. The site operator can be the owner, but not necessarily.

User

The driver of an EV who uses the charge station.

1 Introduction

1.1 Preface

The HVC-C product line is the new ABB solution for Overnight Charging of Heavy Vehicles. The product line allows 100kW and 150kW charging with up to 3 charging outlets per one charger. The charging of the vehicles is done sequentially following the first come, first serve principle.



This manual describes the general usage and daily operation instructions of the HVC-C product family.

1.2 Intended use of this document

This document serves:

- As a reference for site operators who are responsible for the charger's operation on site, performing daily inspection and maintenance activities and who are able to perform simple trouble shooting activities, after instruction of a certified ABB technician.
- As a reference to the operator's customers, the EV drivers who will mainly use the pictograms and texts on the display of the charger. The user interface design was thoroughly evaluated with user groups to optimize understandability and to get the best user experience. Besides the screens needed for the charging process, the interface has help screens available to provide additional information.

1.3 Intended use of the charger

The HVC-C product is a stand-alone DC high power charger for electric buses and trucks. The outlets of the charger must not be used to charge any other equipment than electric vehicles compatible with the supported charging standards.

1.4 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. This person should be properly instructed by ABB or an ABB trained service partner.

The owner is cautioned that changes or modifications not expressly approved by ABB could void the owner's authority to operate the equipment or ABB's warranty. 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.

1.5 Signs

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



DANGER

Hazardous voltage Identifies a hazard that could result in severe injury or death through electrocution.



WARNING

Various Identifies a hazard that could result in severe injury or death.



WARNING Rotating parts Identifies a hazard that could result in injury due to the presence of rotating or moving parts.



WARNING Pinch Hazard

Identifies a hazard that could result in injuries, in which some body parts are pinched or crushed.



CAUTION Various

Identifies a hazard that could result in damage to the machine, other equipment, and/or environmental pollution



NOTICE

Contains remarks, suggestions or advice.



WARNING

If a charge outlet is damaged, take the following steps:

- 1. Do not use the damaged charge outlet.
- **2.** Contact the owner / site operator.



WARNING

If there is an emergency

- 1. Push the emergency stop.
- 2. Contact the owner / site operator.
- **3.** Act according to the emergency procedure of the owner / site operator.



WARNING

Operation after damage or accidents

- If there is a fire in or nearby the charger;
- If the charger was immersed in water, or any other fluid;
- If the charger is damaged in any way.

Do not use the charger. Contact the owner / site operator.



NOTICE

When connecting or disconnecting a connector

- 1. Handle cables and connectors with care. Do not drop the cables or connectors. Place them back in their respective holders.
- **2.** Only insert a connector into a suitable car inlet. Never use excessive force.



NOTICE

Connector locked

The DC connector will be locked during the charging process to prevent it from dropping or being pulled out. Do not apply a force on the cable during the charging process as it might damage the inlet and locking mechanism in your car or damage the charger.

2 Description of the product

2.1 Overview of the system



A. Charge cabinet 100-150kW

B. Depot charge boxes (up to 3 per charger with sequential charging)

2.2 Charge cabinet

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





CAUTION

The Power Cabinet has air inlets (D) and an air outlet (E) to control the temperature inside the cabinet. Do not install or place any objects near or against these air inlets and outlet. If necessary, take precautions to prevent snow or any other objects from blocking the air inlets and outlet.

2.3 Depot charge box

The user operated components are indicated on below:

- A. LED beacon
- B. Emergency button
- C. Stop button
- D. Door handle & lock
- E. Connector holder
- F. CCS charge cable
- G. External connections



Overview LED colors and state:



2.4 Charger configurations

The charger is built up with a modular architecture. Supported charging standards are:

Product	Description
HVC-100C CE	100kW charge cabinet configuration with 1-3 Depot charge boxes, supporting CCS-2 with CE certification
HVC-150C CE	150kW charge cabinet configuration with 1-3 Depot charge boxes, supporting CCS-2 with CE certification
HVC-100C UL	100kW charge cabinet configuration with 1-3 Depot charge boxes, supporting CCS-1 with UL certification
HVC-150C UL	150kW charge cabinet configuration with 1-3 Depot charge boxes, supporting CCS-1 with UL certification

For each product configuration (100 or 150kW, CE or UL) it is possible to connect 1 up to 3 Depot Charge boxes.



2.5 Authorization to charge

The standard setting is without authorization. This means that every vehicle supporting CCS is able and allowed to start a charge session. Operating a charger with authorization requires a subscription to a back office. Authorization can only be done based on the Vehicle ID and requires a subscription to a back office. This product does not support a RFID reader.

3 Charging instruction

3.1 Charging with 1 Depot Charge Box

Start charging:

- 1. Park the electric vehicle with the charge inlet within reach of the connector.
- 2. Turn off the electric vehicle.
- 3. Connect the charger's connector to the vehicle's charge inlet.
- 4. The charger will automatically start to charge the vehicle after the preparation phase, and will indicate the progress by the LED state (see 2.3).

Stop charging:

- 5. The charge session will continue to charge the bus until the charge session is stopped.
- 6. The charge session can be stopped manually by either pushing the stop button on the depot charge box or the stop button on the bus (not available on every bus).
- 7. Charging stops
- 8. The connector is unlocked by the vehicle for CCS when the Depot box beacon light changes color to green
- 9. Take the connector out of the vehicle and put it back in the connector holder on the depot charge box.

3.2 Charging with 2 or 3 Depot Charge Boxes

The main principle of the sequential charging is to complete the bulk charge for all the buses that are connected to the charger, before they leave the depot in the morning. The sequence will be based on the principle first come, first serve.

When the bulk charge is complete the charger will automatically continue with the preconditioning. The charger will follow the same sequence as during bulk charging (first come, first serve) in a continuous time loop of 20 minutes per bus.

Start charging:

- 1. Park the electric vehicle with the charge inlet within reach of the connector.
- 2. Turn off the electric vehicle.
- 3. Connect the charger's connector to the vehicle's charge inlet.
- 4. When there is no other bus already connected that requires bulk charging:
 - The charger will automatically start to charge the vehicle after the preparation phase, and will indicate the progress by the LED state (see 2.3).
- 5. When there is another bus already connected that is being charged:
 - The LED state will turn to green and start blinking until the other charge sessions are complete. After completing the other bulk charge session(s) the charger will automatically start to charge the vehicle after the preparation phase, and will indicate the progress by the LED state (see 2.3).
- 6. When all buses completed the bulk charge (SOC > 95% OR Bulkchargecomplet flag = true (initiated by the bus)) the preconditioning will start, following the same sequence as the bulk charge with a time interval of 20 min between each bus.

Stop charging:

- 7. If there is another bus connected to the charger that requires bulk charging the charger will stop the preconditioning and automatically switch to the bus that requires bulk charging.
- 8. The preconditioning will continue in a 20 min loop between all the connected bus until the charge session is stopped. This can be done manually by either pushing the stop button on the depot charge box or the stop button on the bus (not available on every bus).
- 9. If the stop button is pressed and there is another vehicle connected that requires bulk charge or preconditioning, the charging will automatically switch to the next bus in line and continue the charge session.
- 10. When the charging is stopped, the connector is unlocked by the vehicle for CCS.
- 11. Take the connector out of the vehicle and put it back in the connector holder on the depot charge box.



NOTICE

Session end

Charging will stop without user interaction:

- When the EV indicates to the charger that charging is completed.
- When the charger completed the bulk charge.

If the battery is not full, a new charge session can be started.



NOTICE

Stop by emergency button

The charger stops the charge session when the emergency stop is pushed. Only push the emergency stop if there is an emergency!

3.3 Emergency stop

If there is an emergency:

1. Push the emergency stop button.

The Charger stops the operation and the LED beacon from each connected Depot Charge Box will be red.

2. Contact the Site operator.



NOTICE

Emergency button is pressed accidentally

If the emergency stop button is accidentally pushed: 1. Verify that the situation is safe.

- 2. Pull the emergency out.
 - The emergency button is released.
 - The emergency button is released and the charger is reactivated.
 - After a few seconds the charger returns to normal operation.

4 **Operator Instructions**

4.1 Cleaning of the cabinet and Depot charge box



Electrical components

• Do not apply high-pressure water jets. Water may leak into the cabinet.

DANGER

- 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.

The cabinet of the Power Cabinet and Depot charge box is made from powder coated high quality stainless steel. The coating must be kept in good condition.

Clean the Charger three times a year in the following way:

- Remove rough dirt by rinsing 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.
- Check the coating on damage.

NOTICE



Rust forming

When the charger is placed in a corrosion sensitive environment, the forming of superficial rust is possible on the welding points on the side grills. This rust is merely visual, there is no possibility this will form a risk on the cabinets integrity. The rust can be removed with the cleaning procedure above. To prevent the rust from reappearing; prime the areas with a transparent or color-like priming finish.

4.2 Preventive maintenance

Maintenance is done according the maintenance schedule. The charger must be inspected and serviced yearly by a certified technician.

4.2.1 Service inspection of the cabinets

The following points must be checked regularly:

- Internal RCDs and RCBOs need to be tested on correct functioning on a regular basis. During the yearly maintenance round that is advised to be executed by a certified ABB technician, this will be checked.
- Powder coating: look for damage, cracks or ruptures.

4.2.2 Emergency stop inspection

It is advised to test the emergency button every time someone of the operator or service organization visits the location of the charger. This test needs to be done at least once a year e.g. during a preventive maintenance round.

Test only when the charger is in idle mode and ready to charge:

- 1. Press the emergency button.
 - The indicator light (beacon) will turn red.
- 2. Reset the emergency button by turning the knob clockwise.
 - After a few moments, the charger returns to its idle state.

4.2.3 Special inspections

In the following cases the charger must be checked by ABB service personnel before further use:

- If it was struck by lightning.
- If it is damaged due to an accident or fire.
- If its location has been flooded.

4.3 Problem resolving

The site operator or helpdesk is the first response to a customer call. The helpdesk can remotely solve simple problems for the customer.

In special cases the site operator with knowledge of the charger can be asked by ABB support to report about the status of some internal components of the charger. Therefore a brief description of the position and function of these components is described on the next pages.

4.3.1 Overview of the Power Cabinet

- A Door
- B Door handle / lock (per Power Cabinet Unique system key)





WARNING

Do not open the Power Cabinet door if you are not familiar with working with high voltage and high current.

4.3.2 Overview of the Depot charge box



- A Front door Depot charge box
- B Door handle / lock (per depot box Unique system key)



WARNING

Do not open the Depot charge box door if you are not familiar with working with high voltage and high current.

4.3.3 Component overview Power Cabinet

The main components as can be seen with an open front door:



- A Main switch
- B MCB (Q17) AC power supply for ACM
- C RCD (Q13) control
- D RCD (Q12) redundant control
- E Display

4.3.4 Component overview Depot Charge Box

The main components as can be seen with an open front door:

- A SPD (F2) AC Power Supply
- B MCB (F1) AC Power Supply
- C Fuse (F3,F4) DC Circuit
- D SPD (F5) DC Power Circuit



4.4 Technical functioning

4.4.1 Normal operation

Normal positions of the different switches and breakers when the charger is in operation (idle; not charging):

Power Cabinet

- Main switch (A): Vertical ("1")
- MCB (Q17) AC power supply for ACM (B): up
- RCD (Q13) control (C): up
- RCD (Q12) redundant control (D): up

Depot Charge Box

- SPD (F2) AC Power Supply: green
- MCB (F1) AC Power Supply: up
- Fuse (F3,F4) DC Precharge Circuit: not blown
- SPD (F5) DC Power Circuit: green

4.4.2 Switch the charger system on/off

In case it is necessary to switch off the charger system, this can be done by turning off the main switch (A in Power Cabinet, see section *Component overview Power Cabinet* on page 18):

- 1. Open the front door.
- 2. Locate the main switch (A).
- 3. Turn the handle counterclockwise to the horizontal position, marked with "0".



Switching off the charger does not switch off Depot Box. Each box has its own power supply. To turn off the Depot Box see chapter 4.4.3

WARNING

To switch the charger back on, turn the handle clockwise to the vertical position, marked with "1". After about a minute the indicator light (beacon) will turn green.



Operating the main switch is quite arduous. Use both hands if needed and be careful not to injure yourself.

NOTICE

4.4.3 Switch the depot box

In case it is necessary to switch off the depot box, this can be done by turning off the main switch:

- 1. Open the front door.
- 2. Locate the main switch (B).
- 3. Move the MCB switch down (OFF position). Green painting on the switch should be visible



NOTICE

Every box has its own power supply line.

Following procedure should be performed for every box which should be powered off.

5 Contact information



In case of problems Contact the site operator. NOTICE

ABB Service department

- PLEASE INSERT YOU CONTACT DETAILS-



Appendix: A. WEEE disposal – 2012-19/EU

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NOTES

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