EFAPower EV-QC45 Standalone Quick Charging Station

Installation and User Manual
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1 GENERAL PRODUCT DESCRIPTION

EFAPOWER EV-QC45 charging station is able to charge all electric vehicles compliant with CHAdeMO charging system and Combined Charging System (CCS) standards.

Depending on the battery capacity, EFAPOWER EV-QC45 can charge properly equipped electric vehicles from 0% to 80% in roughly 30 minutes.

The battery charging state is displayed on the HMI and the charging cycle finishes by itself or can be interrupted by user command.

Optional AC outputs are available: 43kVA, 22kVA, 7kVA and 3kVA (Not in USA market).

EFAPOWER EV-QC45 is user friendly and safe. After user identification, it only requires coupling the charger’s output plug in the EV for automatic starting if all safety features are accomplished.

Different configurations are available such as:
- Power Cabinet Standalone - which is represented in this installation and user manual - or
- Kiosk with Power Cabinet – for a more personalized and attractive user experience (for more information please contact our commercial department).

EFAPower EV-QC45 has a means of measuring the output energy that can be used for information and monitoring purposes. It uses remote IP communication via GPRS, ADSL, WIFI or any other to communicate business management data and technical data.

The Quick Charger power electronics unique design results in top tier specifications for conductive DC fast charging, such as high power output with an industry best power factor, THD and efficiency.

The Quick Charger is highly recommended for EV fleet bases, service stations, EV service workshops and public EV infrastructure for fast charging.

EFAPower EV-QC45 codification and configurations are presented in chapter 3.
2 GENERAL CHARACTERISTICS

2.1 TECHNICAL CHARACTERISTICS

EFAPOWER EV-QC45 technical characteristics are indicated in the Table 1. This unit is intended to have at least one DC output connection (CHAdeMO and/or CCS) and in addition can have one of the two AC output1 connections (AC43 or AC22).

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>CE</th>
<th>ETL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phases/Lines</td>
<td>3 phases + neutral + PE</td>
<td>3 phases + PE</td>
</tr>
<tr>
<td>Voltage</td>
<td>(400 ± 10%) V a.c.</td>
<td>(480 ± 10%) V a.c.</td>
</tr>
<tr>
<td>Current</td>
<td>73 A</td>
<td>64 A</td>
</tr>
<tr>
<td>Power</td>
<td>53kVA (@50kW peak power); 48kVA (@45kW)</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>(50 ± 10%) Hz</td>
<td>(60 ± 10%) Hz</td>
</tr>
<tr>
<td>Efficiency</td>
<td>&gt; 93%</td>
<td></td>
</tr>
<tr>
<td>Power Factor</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>THD Input Current</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>DC Output: CHAdeMO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>(50 to 500) V d.c.</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>120 A d.c.</td>
<td></td>
</tr>
<tr>
<td>Nominal Power</td>
<td>50kW at peak; 45kW at continuous</td>
<td></td>
</tr>
<tr>
<td>Communications with EV</td>
<td>JEVS G104 - CHAdeMO</td>
<td></td>
</tr>
<tr>
<td>Plug</td>
<td>JEVS G105 - CHAdeMO</td>
<td></td>
</tr>
<tr>
<td>DC Output: CCS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>(50 to 500) V d.c.</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>120 A d.c.</td>
<td></td>
</tr>
<tr>
<td>Nominal Power</td>
<td>50kW at peak; 45kW at continuous</td>
<td></td>
</tr>
<tr>
<td>Communications with EV</td>
<td>PLC</td>
<td></td>
</tr>
<tr>
<td>AC Output: AC43 (or AC22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>(400 ± 10%) V a.c.</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>63 A a.c. (or 32 A a.c.)</td>
<td></td>
</tr>
<tr>
<td>Nominal Power</td>
<td>43kVA (or 22kVA)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Plug (or Socket)</td>
<td>IEC62196 Type 2</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input / Output / Ground</td>
<td>1500 V a.c.</td>
<td>1500 V a.c.</td>
</tr>
<tr>
<td>Control Circuit / Ground</td>
<td>500 Vac</td>
<td></td>
</tr>
<tr>
<td>Cabinet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions(Wx Dx H)</td>
<td>600 x 600 x 1800 mm</td>
<td>24” x 24” x 74.5” high</td>
</tr>
<tr>
<td>Weight</td>
<td>600 kg</td>
<td>1,323 lbs.</td>
</tr>
<tr>
<td>Protection Degree</td>
<td>IPS4, IK10</td>
<td>IPS4, IK10, NEMA 3R</td>
</tr>
<tr>
<td>HMI and Command Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contactless card specification</td>
<td>Mifare Classic 1K&amp;4K</td>
<td>Mifare DesFire EV1</td>
</tr>
<tr>
<td>Local interface</td>
<td>TFT Color display 6.4”</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Web Services over IP; Router 3G (GSM or CDMA)</td>
<td></td>
</tr>
<tr>
<td>Protocol (others under request)</td>
<td>OCP; Efacec; others</td>
<td></td>
</tr>
<tr>
<td>Emergency STOP</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Environment Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>-25º to +50ºC</td>
<td>-13º to +122ºF</td>
</tr>
<tr>
<td>Cold option (under request)</td>
<td>-35º to +50ºC</td>
<td>-31º to +122ºF</td>
</tr>
<tr>
<td>Humidity</td>
<td>5% to 95%</td>
<td></td>
</tr>
<tr>
<td>Place of installation</td>
<td>Indoor / Outdoor</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 1000m</td>
<td>Up to 3280 feet</td>
</tr>
<tr>
<td>Sound Noise</td>
<td>&lt;55 dB in all directions</td>
<td></td>
</tr>
</tbody>
</table>

Specifications are subject to change, without prior notice.

In case of an AC output connection one of the following scenarios can be supplied:

- AC and DC output connections can only charge one at a time:
  In this case only the nominal current input referred above in Table 1 is needed.

- AC and one DC output connections can charge simultaneous:
  - For AC43: the total nominal current input needed is 136 A.
  - For AC22: the total nominal current input needed is 105 A.

1 AC output not available for US market
2.2 STANDARDS

The EFAPOWER EV-QC45 Quick Charging Station complies with the following standards:

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>CE</th>
<th>ETL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal:</td>
<td>2006/95/CE(^2)</td>
<td>UL 2231-1(^6)</td>
</tr>
<tr>
<td></td>
<td>2004/108/CE(^3)</td>
<td>UL 2231-2(^7)</td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61851-1(^4)</td>
<td>UL 2202(^8)</td>
</tr>
<tr>
<td></td>
<td>IEC 62196(^5)</td>
<td>SAE J1772(^9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ADA(^10)</td>
</tr>
<tr>
<td>DC Charging System:</td>
<td>EN/IEC 61851-23(^11)</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61851-24(^12)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61000-6-2(^13)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61000-6-4(^14)</td>
<td></td>
</tr>
<tr>
<td>AC Charging System:</td>
<td>EN/IEC 61851-22(^15)</td>
<td>---- (not available)</td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61000-6-1(^16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN/IEC 61000-6-3(^17)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EV-READY</td>
<td></td>
</tr>
</tbody>
</table>

---

**CHAdeMO** Efacec is an official member of the CHAdeMO Association

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2. **2006/95/CE**: Low Voltage Directive  
3. **2004/108/CE**: EMC directive  
4. **EN/IEC 61851-1**: Electric vehicle conductive charging system. Part 1: General Requirements  
5. **IEC 62196**: Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles  
6. **UL 2231-1**: Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements  
7. **UL 2231-2**: Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection devices for Use in Charging Systems  
8. **UL 2202**: Electric Vehicle (EV) Charging System Equipment  
9. **SAE J1772**: SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler  
10. **ADA**: American with Disabilities Act  
11. **EN/IEC 61851-23**: Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station  
12. **EN/IEC 61851-24**: Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging  
13. **EN/IEC 61000-6-2**: Electromagnetic compatibility (EMC). Part 6-2: Generic standards - Immunity for industrial environments  
14. **EN/IEC 61000-6-4**: Electromagnetic compatibility (EMC). Part 6-4: Generic standards - Emission standard for industrial environments  
15. **EN/IEC 61851-22**: Electric vehicle conductive charging system. Part 22: AC Electric Vehicle Charging Station  
16. **EN/IEC 61000-6-1**: Electromagnetic compatibility (EMC). Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments  
17. **EN/IEC 61000-6-3**: Electromagnetic compatibility (EMC). Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
3 PRODUCT PARTS PRESENTATION

The mechanical structure is composed by a standalone Power Cabinet. Its codification is presented below.

<table>
<thead>
<tr>
<th>EV-QC45</th>
<th>YY</th>
<th>GCCB</th>
<th>ZZZZ</th>
<th>ZZZZ</th>
<th>ZZZZ</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE – European markets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL – USA &amp; Canada markets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- – without extras
C – Cold option
L – CHAdEMO Lock

DCA – CHAdEMO
DCC – CCS
AC43
AC22P
AC22S
AC11P
AC11S
AC7P
AC7S
AC3P
AC3S

At least one
One at most

EFAPower EV-QC45 has 9 possible output combinations as showed in the next figure:

1 Not available for USA market

Figure 3 - EV-QC45 Standalone Codes

Figure 4 - EFAPower EV-QC45 Parts
4 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS
This manual contains important instructions that must be followed during installation of the EFAPOWER EV QC45 Quick Charging Station.

Grounding instructions
The EFAPOWER EV QC45 Quick Charging Station must be connected to a grounded, metal, permanent wiring system; or an equipment-grounding conductor is to be run with circuit conductors and connected to the equipment grounding terminal or lead on the Electric Vehicle Supply Equipment (EVSE). Connections to the EVSE shall comply with all local codes and ordinances.

Safety and compliance
This document provides instructions to install the EFAPOWER EV QC45 Quick Charging Station and should not be used for any other product. Before installing the EFAPOWER EV QC45 Charging Station, you should review this manual carefully and consult with a licensed contractor, licensed electrician and trained installation expert to ensure compliance with local building practices, climate conditions, safety standards, and state and local codes. The EFAPOWER EV QC45 Quick Charging Station should be installed only by a licensed contractor and a licensed electrician and in accordance with all local and national codes and standards. The EFAPOWER EV QC45 Quick Charging Station should be inspected by a qualified installer prior to the initial use. Under no circumstances will compliance with the information in this manual relieve the user of his/her responsibility to comply with all applicable codes or safety standards. This document describes the most commonly-used installation and mounting scenarios. If situations arise in which it is not possible to perform an installation following the procedures provided in this document, contact EFACEC. EFACEC is not responsible for any damages that may occur resulting from custom installations that are not described in this document.

No accuracy guarantee
Reasonable effort was made to ensure that the specifications and other information in this manual are accurate and complete at the time of its publication. However, the specifications and other information in this manual are subject to change at any time without prior notice.

Warranty information and disclaimer
Your use of, or modification to, the EFAPOWER EV QC45 Quick Charging Station in a manner in which the EFAPOWER EV QC45 Quick Charging Station is not intended to be used or modified will void the limited warranty. Other than any such limited warranty, the EFACEC products are provided “AS IS,” and EFACEC and its distributors expressly disclaim all implied warranties, including any warranty of design, merchantability, fitness for a particular purposes and non-infringement, to the maximum extent permitted by law.

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5 INSTALLATION

All matters for installing the EFAPOWER EV-QC45 are described in this chapter.

5.1 ENVIRONMENTAL REQUIREMENTS

EFAPOWER EV-QC45 reliability is dependent upon compliance of environmental specifications. The design of the environmental control system for your EFAPOWER EV-QC45, in case of extreme environmental conditions, must ensure that the Unit can operate reliably while remaining within the range of its operating specifications.

5.1.1 LOCAL CONDITIONS

The installation of EFAPOWER EV-QC45 shall not be made in a commercial garage (repair facility) or closer than 508mm (20 feet) of an outdoor motor fuel dispensing device.

EFAPOWER EV-QC45 is in an IP54, IK10 (NEMA 3R) enclosure. This Unit is intended to work below 50°C (122°F) ambient temperature.

Clearance around the cabinet
The air must circulate freely throughout the ventilation grids in order for the charger’s cooling system to be effective. The ventilation areas on the sides and back must not be blocked, assuring that the Quick Charger cooling system can be effective. Efacec recommends clearance of at least 1meter (40”) in the front (HMI interface) and on right side (output cables) and 500mm (20”) of clearance in the remaining sides of the cabinet.

Input Power Cables
AC input cables must be copper with appropriate power rating.

EFAPOWER EV-QC45 can be placed in 3 alternative positions as showed in Figure 5.

Figure 5 - EFAPOWER EV-QC45 alternative orientations
Even though, non-conductive dust does not influence the system’s operation, it may however, with excessive accumulation, not allow proper cooling, therefore limiting the equipment’s thermal capabilities. Consequently, dust accumulation must be avoided in order to guarantee a better thermal performance. Conductive dust and acid vapors must be kept away from the Quick Charger.

On locations with harsh weather conditions (high temperatures, heavy dust, snow and/or very low temperatures) it’s recommended to provide additional protection, either inside a building or a shelter, or providing a protection roof for the Unit. See example in Figure 6.

![Figure 6 - EFAPOWER EV-QC45 with shelter](image)

### 5.1.2 SITE VERIFICATION AND INSPECTION

- **Check** if the **installation** of the Quick Charger is **not** planned to be made in a **commercial garage** (repair facility) or closer than 508mm (20 feet) of an outdoor motor fuel dispensing device;
- **Check** if the access **passages** to the **Quick Charger Station layout site** are not blocked in order to **allow** its transportation;
- **Check** if **Quick Charger Station layout site** is **compliant** with the specified **clearance** around the **cabinet**.
5.2 SITE PREPARATION

Once the local conditions are verified, it is time to set up the site in order to be ready for the installation of the EFAPOWER EV-QC45.

5.2.1 UPSTREAM WIRING INFORMATION

Depending on the configuration of the EFAPOWER EV-QC45 we can have two wiring schemes as represented in Figure 7:

- **Only DC output** connections:
  - Requires dedicated **80A circuit breaker 3P C curve** for DC output(s)
  
  or

- **AC and one DC output** connections (not available for USA market):
  - Requires dedicated **80A circuit breaker 3P C curve** for DC output(s)

  + Depending on the AC output connection:
    - Requires dedicated **80A circuit breaker 3P C curve** for AC output and its wiring
    
  or

    - Requires dedicated **40A circuit breaker 3P C curve** for AC output and its wiring

![Figure 7 - EFAPOWER EV-QC45 Wiring Information](image)

**NOTES:**

In areas with frequent thunder storms, Efacec recommends adding transient voltage surge suppression (TVSS) at the service panel for all circuits.

Unless required by local codes it is not necessary to install a residual-current device (RCD) for the circuit breaker. The EFAPOWER EV-QC45 already has this protection.
5.2.2 SURFACE PREPARATION
Efacec recommends a concrete pad of at least 800mm (31.5") square, by 254mm (10") deep. Check local codes to ensure compliance.

Flatness
To avoid warping of the doors, the Quick Charger Station power cabinet must be mounted on a surface with a maximum slope of 2mm/m (¼ inch rise per 10 feet of run).

5.2.3 RESOURCES FOR INSTALLATION
The following resources will be needed for installation of the EFAPower EV-QC45:

Fasteners:
- 4 (four) chemical anchors, M8 (5/16''), 10mm thread diameter – length must comply with local codes, but must have at least 120mm (5")
- 4 (four) galvanized bolts M8 (5/16''), with matching nuts and washers (must extend at least 30.5mm (1.2") above the concrete and 89.5mm (3.52") into the concrete)
- 4 (four) sealing screws: Socket head button cap screws M12x25 (metric), with matching flat rubber washers (supplied with the Quick Charging Station)

End terminals for input wiring:
- Depending on the EFAPower EV-QC45 configuration:
  - Only DC outputs: 5 (five) end terminals up to 35mm² (3phases + neutral + protective ground), in USA only 4 (four) end terminals (3 phases + protective ground), or
  - DC and AC outputs (not available for US market): 5 (five) end terminals up to 35mm² + 5 (five) end terminals up to 16mm² (3phases + neutral+ protective ground)

Tools:
- 13mm (1/2'') wrench - for anchoring the Unit on the pad
- 10mm Hex key/bit - for Sealing Screws
- Crimping tool - for power and earth cables
- Torque screwdriver with flat blade - for input terminal blocks

5.2.4 SITE VERIFICATION AND INSPECTION
- Check if Quick Charger has the appropriate upstream protection depending on the configuration of it
- Check if the surface where the Quick Charging Station will be placed is leveled as specified
5.3 HANDLING AND PLACING

IMPORTANT: Before installing stations

The instructions provided in this manual assume that the appropriate wiring, circuit protection, and metering are in place at the installation location.

To assist in the process of preparing the installation site, it is recommended that before you begin installing Quick Charging Station, you thoroughly review the contents of this document to familiarize yourself with the required installation steps.

In case of any doubt regarding items described in this guide, please contact us at:

5.3.1 PACKAGING

EFAPOWER EV-QC45 is shipped in a package with the following dimensions (WxDxH):

- 1150x850x2150mm (45.3x33.5x84.6 inches)

5.3.2 VISUAL INSPECTION

- Check if the exterior packaging has been damaged by mechanical impacts or any accidents during transportation
- If applicable, check if the exterior panels of the EFAPOWER EV-QC45 are in perfect condition
- Check if the interior of the Quick Charger Station is clean
- Check if the door of the Quick Charger Station is working properly
- Check for proper Quick Charger Station protective ground connection point, which should be interconnected with the low voltage switchboard ground connection during the installation
5.3.3 HANDLING

Due to its heavy weight, 4 (four) lifting hooks are provided on the top of the Power Cabinet as indicated on Figure 8.

⚠️ IMPORTANT:

Never try to move the power cabinets by using tools under panels; this will create a risk of deformation.

![Figure 8 - EFAPOWER EV-QC45 lifting hooks](image)

After the power cabinet is placed, the lifting hooks must be removed, and the M12 sealing screws must be inserted in their holes in order to guarantee the IP54, IK10 (NEMA 3R) protection degree.

5.3.4 PLACING

5.3.4.1 ANCHORING TO THE CONCRETE PAD

The Quick Charging Station must be anchored on the surface compliant with the specifications mentioned in chapter 5.2.2.

The power cabinet must be installed on a concrete pad using 4 (four) chemical anchors, M8 (5/16”), 10mm thread diameter – length must comply with local codes, but must have at least 120mm (5”).

In the following figure some details are shown regarding the drilling layout for the Power Cabinet. Only 4 (four) points are needed to anchor the Unit on the concrete pad (marked with a red circle).
For the power cabinet, the conduits must extend 160mm (6.3") above the concrete, or according to local codes. The cable entrance shall only be located as shown in the image below (marked in green).

The access to all the controls and commands including the buttons and the card reader, must comply with local codes and ADA requirements. That includes being under 1200mm (48") off the ground.

**IMPORTANT:**

- The use of chemical anchors must be in compliance with the manufacturer’s instructions
- For the Power Cabinet it's advised to have a concrete block of at least 800mm (31.5") square, by 254mm (10") deep. Check local codes to ensure compliance
- The bolts must extend at least 30.5mm (1.2") above the concrete and 89.5mm (3.52") into the concrete

All servicing must be performed only by qualified personnel. Do not attempt to service the EFAPOWER EV QC45 Quick Charging Station yourself. By opening the door or removing the EFAPOWER EV QC45 Quick Charging Station side panels you run the risk of exposure to dangerous voltages!
5.3.4.2 POWER CABLES CONNECTION

The connection to the AC input terminals of each Quick Charger Station is accessed through the bottom of the cabinet:

- **X1** – **MUST BE CONNECTED** regardless of the EFAPower EV-QC45 configuration (35mm² terminal blocks)
- **X11** – **Must be connected** if AC OUTPUT is available (16mm² terminal blocks)

Strip wires 24 mm (0.94”), crimp the end terminal and insert into the terminal block as shown, and tighten screws between 3.2 N.m (28.3 inch-lbs) and 3.7 N.m (32.7 inch-lbs).

**IMPORTANT:**

- **Always requires dedicated 80A circuit breaker 3P C curve**
- **If AC output available, additional circuit breaker is needed:**
  - 80A circuit breaker 3P C curve, or
  - 40A circuit breaker 3P C curve
- Use copper conductors only
- Before starting to work on the Quick Charger Station, connect the ground wire to the ground terminals of the Quick Charger Station
- In areas with frequent thunder storms, we advise to add transient voltage surge suppression (TVSS) at the service panel for all circuits
- All bolts/nuts must be sealed

Figure 10 - EFAPower EV-QC45 Input Terminals
5.3.4.3 PROTECTIVE GROUND

The metallic structure of the rectifier system is connected to the protective ground connection, which should be interconnected with the low voltage switchboard ground connection.

The protective earth cable must have a section, at least of 16 mm² (#6AWG) or according to local codes.

Figure 11 - EFAPOWER EV-QC45 Earth Terminal
6 START-UP

6.1 VERIFICATION AND INSPECTION

- Check if the bolts of the AC and protective ground cables of the Quick Charging Station are correctly tightened to the specified torque.
- Check the resistance between the Quick Charger protective ground and the low voltage switchboard ground connection; the value must be according to local codes.
- Before switching ON all the fuses and circuit breakers, check the supply voltage between lines: it must be 400V ± 10% 50Hz, for CE marked Units (and 480V ± 10% 60Hz for ETL marked Units).
- At this stage, whenever the Unit shall be integrated with a Network Management System, Efacec shall already have the following information:
  - For Unit configuration: Station(s) ID and Central Management Endpoint
  - For Router configuration: APN and PIN, Username and Password (if applicable)

6.2 SWITCH ON

BEFORE ATTEMPTING TO INSTALL OR START UP THE EFAPOWER EV QC45 QUICK CHARGING STATION THE USER MUST ENSURE THAT THE SAFETY INSTRUCTIONS IN THIS MANUAL ARE CAREFULLY READ AND OBSERVED BY TECHNICALLY COMPETENT PERSONNEL.

KEEP THIS MANUAL WITH THE EFAPOWER EV QC45 QUICK CHARGING STATION FOR FUTURE REFERENCE.

THIS EFAPOWER EV QC45 QUICK CHARGING STATION MUST NOT BE STARTED OR PUT INTO USE WITHOUT HAVING BEEN COMMISSIONED BY A FULLY TRAINED AND AUTHORIZED PERSON.

ALL SERVICING MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL. DO NOT ATTEMPT TO SERVICE THE EFAPOWER EV QC45 QUICK CHARGING STATION YOURSELF.

BY OPENING THE DOOR OR REMOVING THE EFAPOWER EV QC45 QUICK CHARGING STATION SIDE PANELS YOU RUN THE RISK OF EXPOSURE TO DANGEROUS VOLTAGES!

IN CASE OF ANY KIND OF DOUBT REGARDING THIS, PLEASE CONTACT:

EFACEC WILL ASSUME NEITHER RESPONSIBILITY NOR LIABILITY DUE TO INCORRECT OPERATION OR MANIPULATION OF THE EFAPOWER EV QC45 QUICK CHARGING STATION.

EFACEC HAS TAKEN EVERY PRECAUTION TO PRODUCE AN ACCURATE, COMPLETE AND EASY TO UNDERSTAND MANUAL AND WILL THEREFORE ASSUME NO RESPONSIBILITY NOR LIABILITY FOR DIRECT, INDIRECT OR ACCIDENTAL PERSONAL OR MATERIAL DAMAGE DUE TO ANY MISINTERPRETATION OR UNDESIRED MISTAKES IN THIS MANUAL.
Switch on all the fuses and circuit breakers in the Quick Charging Station power cabinet:

- Fuses: F2, F7, F3, F4
- Circuit Breakers: Q1, Q2, Q7, Q3, Q4, Q10, Q11 (only if cold option), Q6, Q12 (auxiliary supply for maintenance), Q14 (only if AC43 or AC22 outputs), Q20 (only if AC43 output), Q15 (only if AC22S output)

**EV-QC45 CE components layout**

![Diagram of EV-QC45 CE components layout](image)

Figure 12 – CE Input Plate

If AC output connections:

- Figure 13 – AC43 Plate
- Figure 15 – AC22S Plate
- Figure 17 – AC22S Plate

---

**Note:**

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NOTE: if any of the following events do not happen, please consult Section 8.1 Power up errors.

- The display will show the following image during the boot-up process of the operating software:
Wait for around 2-3 minutes. The display will present a picture as below:

![Initialization](image1)

Finally the display will present the following screen saver:

![Screen Saver](image2)

The EV-QC45 shall be ready to charge any car that has a charging system according to the EFAPOWER EV-QC45 configuration. Although, it is highly recommended to test the charger station with a car or a simulator. See how to operate the charger station in chapter 7.

At this point the Commissioning Check List Report, which was provided with this manual, shall be filled in and sent afterwards to EFACEC for the e-mail: APV-SA@EFACEC.COM or SUPPORT.EEM.USA@EFACEC.COM (for USA market).
7 USER MANUAL

The EFAPOWER EV-QC45 operation depends on its output connections: CHAdeMO, CCS, AC43 or AC22. During the charging process, the Human Machine Interface (HMI), presented in chapter 3, will give instructions and will signal different stages. These sequences are shown in this chapter.

7.1 OUTPUT CONNECTORS AND OUTLETS

EFAPower EV-QC45 is prepared to charge electric vehicles according to the mentioned charging systems.

7.1.1 CHAdeMO CONNECTOR

CHAdeMO connectors have a lock button.

7.1.2 CCS CONNECTOR

Combo T2
7.1.3 AC CONNECTOR
Type 2

7.1.4 AC OUTLET
Mode 3
7.2 OPERATION

When a user starts an operation on the EFAPOWER EV-QC45, the HMI display will show one of the following screen savers if:

- All output connections are idle or,
- The unit allows the charging of DC and AC simultaneously and one is already charging
- The unit only allows one vehicle to charge at a time, and a vehicle is currently charging

Below the display are the LEDs which signal the charging status. As explained in chapter 3:

- the ribbon on the TOP refers to the stage of the AC output connection (if the unit does not have output connection in this position, this ribbon does not exists)
- the ribbon on the BOTTOM refers to the stage of the DC output connections

Definition of the three LED colors is represented in the image below:
7.2.1 OPTIONS INTERFACES

Figure 40 - Options interfaces
7.2.2 CHADEMO CHARGING SYSTEM INTERFACES

Figure 41 - CHAdeMO interfaces
7.2.3 COMBINED CHARGING SYSTEM (CCS) INTERFACES

![Figure 42 - CCS interfaces](image-url)
7.2.4 AC43 CHARGING SYSTEM INTERFACES

Figure 43 - AC43 interfaces
7.2.5 AC22 CHARGING SYSTEM INTERFACES

Figure 44 - AC22 interfaces
8 MAINTENANCE MANUAL

ALL SERVICING MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL. DO NOT ATTEMPT TO SERVICE THE EFAPOWER EV QC45 QUICK CHARGING STATION YOURSELF.

BY OPENING THE DOOR OR REMOVING THE EFAPOWER EV QC45 QUICK CHARGING STATION SIDE PANELS YOU RUN THE RISK OF EXPOSURE TO DANGEROUS VOLTAGES!

IN CASE OF ANY KIND OF DOUBT REGARDING THIS CONTACT:

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EFACEC HAS TAKEN EVERY PRECAUTION TO PRODUCE AN ACCURATE, COMPLETE AND EASY TO UNDERSTAND MANUAL AND WILL THEREFORE ASSUME NO RESPONSIBILITY NOR LIABILITY FOR DIRECT, INDIRECT OR ACCIDENTAL PERSONAL OR MATERIAL DAMAGE DUE TO ANY MISINTERPRETATION OR UNDESIRED MISTAKES IN THIS MANUAL.

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8.1 POWER UP ERRORS

The following errors / messages can occur when the Quick Charging Station powers up.

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The display does not start</td>
<td>Circuit breakers Q3 and/or Q7 are OFF</td>
<td>Switch circuit breakers Q3 and/or Q7 ON</td>
</tr>
<tr>
<td></td>
<td>Unit A6 (auxiliary power supply) failure</td>
<td>Check and replace unit A6 if necessary</td>
</tr>
<tr>
<td></td>
<td>Display failure</td>
<td>Check and replace unit if necessary</td>
</tr>
<tr>
<td>Earth Leakage Fault</td>
<td>Current higher than expected</td>
<td>Disconnect and reconnect power (by turning the power to the charging station off then back on again. If the message continues to be displayed, call Efacec Customer Support.</td>
</tr>
<tr>
<td>The charger does not start charging</td>
<td>The card is not accepted</td>
<td>Use a valid and authorized card</td>
</tr>
<tr>
<td></td>
<td>Emergency Stop Button pressed</td>
<td>Turn the Emergency Stop Button to allow the charge</td>
</tr>
</tbody>
</table>
8.2 PREVENTIVE MAINTENANCE

ALL SERVICING MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL. DO NOT ATTEMPT TO SERVICE THE EFAPOWER EV QC45 QUICK CHARGER STATION YOURSELF.

BY OPENING THE DOOR OR REMOVING THE EFAPOWER EV QC45 QUICK CHARGING STATION SIDE PANELS YOU RUN THE RISK OF EXPOSURE TO DANGEROUS VOLTAGES!

We advise compliance with the specified maintenance plans which provide cleaning procedures for the terminals, microswitches, capacitors, interface buttons and ventilation filters.

Cleaning should be performed every 12 (twelve) months and more often if in harsh environmental conditions such as excessive snow or dust accumulation.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Periodicity</th>
<th>Estimated time(min)</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual checking of the installation</td>
<td>Each 12 months</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Cleaning dust</td>
<td>Each 12 months</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>AC input cables: Check the tightening torque of the cable connections.</td>
<td>Each 12 months</td>
<td>15</td>
<td>Standard Tools Torque wrench</td>
</tr>
<tr>
<td>Output cables: check if the connectors, cables and its connections are in perfect condition.</td>
<td>Each 12 months</td>
<td>15</td>
<td>Standard Tools Torque wrench</td>
</tr>
<tr>
<td>Check if microswitches from the circuit breakers, fuses are working correctly.</td>
<td>Each 12 months</td>
<td>15</td>
<td>Multimeter</td>
</tr>
<tr>
<td>Check the correct work of the cabinet fans, actuating the thermostat E2</td>
<td>Each 12 months</td>
<td>2</td>
<td>Standard tools</td>
</tr>
<tr>
<td>Check the correct work of the Heater (if exists), actuating the thermostat E4 and the Hygrostat E3</td>
<td>Each 12 months</td>
<td>5</td>
<td>Standard tools</td>
</tr>
<tr>
<td>Check the Emergency Stop Button correct work</td>
<td>Each 12 months</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clean/Replace the fan filters</td>
<td>Each 12 months</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Panels cleaning – with fresh water and a detergent, then rinsed with fresh water</td>
<td>Each 12 months</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

8.3 CHARGER / VEHICLE PROBLEMS

ALL SERVICING MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL. DO NOT ATTEMPT TO SERVICE THE EFAPOWER EV QC45 QUICK CHARGER STATION YOURSELF.

BY OPENING THE DOOR OR REMOVING THE EFAPOWER EV QC45 QUICK CHARGING STATION SIDE PANELS YOU RUN THE RISK OF EXPOSURE TO DANGEROUS VOLTAGES!
The following errors / messages can occur when attempting to charge a vehicle. In case of a Quick Charger Station problem, you should receive the message “Charger Problem” otherwise should appear “Charger/Vehicle Problem”.

In this case you should return the charging connector to its holder and call Efacec Customer Support at:

These errors/messages are identified by a code, which is needed to be decoded. To do so, user must follow the procedure represented in Figure 40 into chapter Options Interfaces 7.2.1.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>Main controller board reset – The charger was powered up</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Message on Display / Indication for user</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
<td>Charger problem</td>
<td>Short circuit in output</td>
</tr>
<tr>
<td>10002</td>
<td>Charger problem</td>
<td>Ground fault</td>
</tr>
<tr>
<td>10003</td>
<td>Charger problem</td>
<td>Over voltage in output</td>
</tr>
<tr>
<td>10004/ 10014</td>
<td>Charger problem</td>
<td>Over current in output</td>
</tr>
<tr>
<td>10005</td>
<td>Charger problem</td>
<td>Heatsink overheat</td>
</tr>
<tr>
<td>10006</td>
<td>Charger problem</td>
<td>Connector lock status maintenance</td>
</tr>
<tr>
<td>10007</td>
<td>Charger problem</td>
<td>Connector unlocked</td>
</tr>
<tr>
<td>10008</td>
<td>Charger problem</td>
<td>HMI ↔ charger communication problem</td>
</tr>
<tr>
<td>10009</td>
<td>Charger problem</td>
<td>Power controller communication problem</td>
</tr>
<tr>
<td>10010</td>
<td>Charger problem</td>
<td>Low mains voltage</td>
</tr>
<tr>
<td>10011</td>
<td>Charger problem</td>
<td>Tilt fault activated</td>
</tr>
<tr>
<td>15000</td>
<td>Charger problem</td>
<td>Input contactor failed or door opened</td>
</tr>
<tr>
<td>15001</td>
<td>Charger problem</td>
<td>mains breaker opened</td>
</tr>
<tr>
<td>15002</td>
<td>Charger problem</td>
<td>Fuses blown</td>
</tr>
<tr>
<td>15003</td>
<td>Charger problem</td>
<td>Auxiliaries breaker opened</td>
</tr>
<tr>
<td>15004</td>
<td>Charger problem</td>
<td>Inrush current contactor problem</td>
</tr>
<tr>
<td>19999</td>
<td>Charger problem</td>
<td>No communication between controller and HMI</td>
</tr>
<tr>
<td>30xxx</td>
<td>Charger problem</td>
<td>High voltage in the output</td>
</tr>
</tbody>
</table>
### Charger/Vehicle problems

Table 7 - EFAPOWER EV-QC45 Charger/Vehicle Problems

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Message on Display / Indication for user</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>20000</td>
<td>Charger/Vehicle problem</td>
<td>Car contactors closed before they should</td>
</tr>
<tr>
<td>20001</td>
<td>Charger/Vehicle problem</td>
<td>Car contactors insulation failure</td>
</tr>
<tr>
<td>20002</td>
<td>Charger/Vehicle problem</td>
<td>Battery not sensed</td>
</tr>
<tr>
<td>20003</td>
<td>Charger/Vehicle problem</td>
<td>Car requested a higher current than charger can supply</td>
</tr>
<tr>
<td>20004</td>
<td>Charger/Vehicle problem</td>
<td>CAN communications timeout</td>
</tr>
<tr>
<td>20005</td>
<td>Charger/Vehicle problem</td>
<td>Car didn’t sent a Current request</td>
</tr>
<tr>
<td>20006</td>
<td>Charger/Vehicle problem</td>
<td>Car detected an overvoltage in the battery</td>
</tr>
<tr>
<td>20007</td>
<td>Charger/Vehicle problem</td>
<td>Car detected an under voltage in the battery</td>
</tr>
<tr>
<td>20008</td>
<td>Charger/Vehicle problem</td>
<td>Car detected a difference in its current measure and the measure provided by charger</td>
</tr>
<tr>
<td>20009</td>
<td>Charger/Vehicle problem</td>
<td>Car detected an high battery temperature</td>
</tr>
<tr>
<td>20010</td>
<td>Charger/Vehicle problem</td>
<td>eCar detected a difference in its voltage measure and the measure provided by charger</td>
</tr>
<tr>
<td>25007</td>
<td>Charger/Vehicle problem</td>
<td>Someone force removed the connector</td>
</tr>
<tr>
<td>25008</td>
<td>Charger/Vehicle problem</td>
<td>Vehicle made an emergency stop</td>
</tr>
</tbody>
</table>
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