

Terra 53/23 Charging Station

User and Operator Guide version 1.0

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Glossary

AC
Alternating Current.

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

CHAdeMO
DC Quick charging method for electric vehicles.

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.

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
Person or company that has the charge station under its control. The site operator can be the owner, but not necessarily.

User
The driver of an EV that uses the charge station.

1. Introduction

1.1 Preface

ABB's Terra DC charging station of the 3rd generation is a multi-standard Electric Vehicle charging station supporting a variety of charging standards and power ratings.

This manual describes the general operation and daily operator instructions of the entire product family of chargers of the 3rd generation of ABB.

1.2 Intended use of this document

This document serves:

- As a reference to 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.
- As a reference for site operators who are responsible for the chargers 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.

1.3 Intended use of the charger

The Terra charger is a stand-alone DC and AC fast charger for EV's. 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.

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.

1.6 Safety regulations



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.

1. 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/AC connectors 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 locking mechanism in your car or damage the charger.

2. Description of the product

2.1 Overview of the system

The user operated components are indicated on Figure 1.

A. Touchscreen display
B. Emergency button
C. RFID reader
D. CCS charging connector and connector holder

The charger is equipped with at least one DC charging cable and CCS connector. Your charger can be equipped with multiple charging standard outlets (example below).



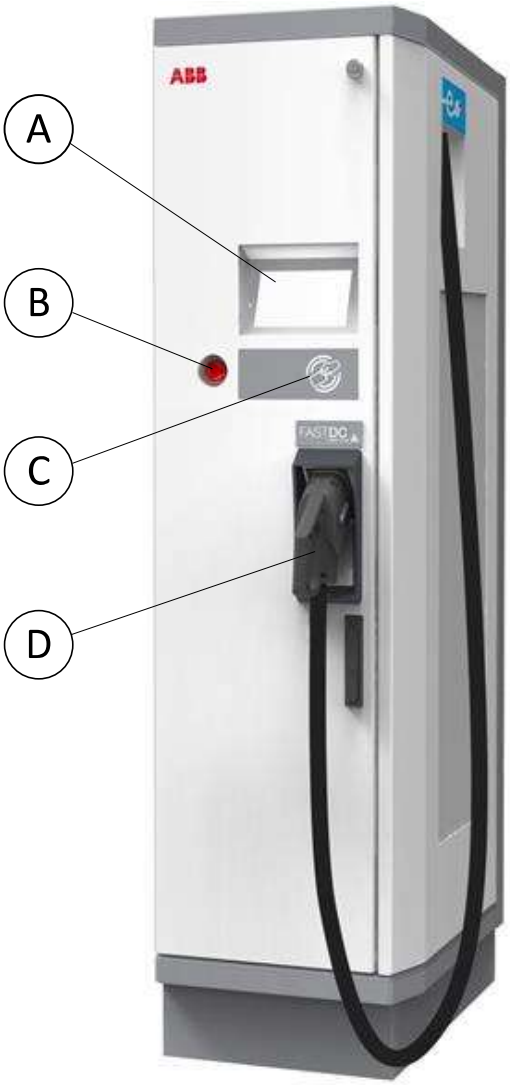


Figure 1 Charger view

2.2 Charger configurations

The charger is built up with a modular architecture

Supported charging standards in a charger configuration are described by a letter:

Indicator	Description
C	CCS up to 50kW DC output
J	CHAdeMO version 1.0 up to 50kW DC output
G	Type 2 AC power over a connected lead up to 41.4kW and 3 phases
T	Type 2 AC power over a socket up to 22kW and 3 phases

The maximum power each outlet can deliver depends on the charger type. This is indicated on the type sticker with the indication T23 respectively T53.

Charger type	CCS/CHAdeMO	AC lead (G)	AC socket (T)
T23	20 kW	22 kW	22 kW
T53	50 kW	41.4 kW	22 kW

Power ratings are configurable and are restricted by the available grid fuse. Depending on the fuse and the type of charger,7 the DC outlet (CCS/CHAdeMO) and AC outlet can or cannot be used at the same time. Simultaneous DC charging is not possible.

Example: T53 CJG is a Terra charge station with 3 outlets (CCS, CHAdeMO and AC 43kW lead) which, if connected on a 160A external fuse, can charge 50kW DC and 43kW AC simultaneously.

2.3 Authorization to charge

Operation of the charger is possible with or without authorization. The authorization to charge can be based on RFID, PIN or mobile authentication methods. Operating a charger with authorization requires a subscription to a backoffice. This can either be an ABB supplied standard solution, or an external company offering authorization solutions via OCPP.

2.4 MID certified Charger identification

The nameplate contains all information relating to the Deutsche Messe EV regulation for the measuring device calibration law. This is a field-installable upgrade.

To recognize if a charger is compliance to MID Directive, Check the charger label. The product compliance is indicated by the info showed in the Highlighted box



The Label reports all the necessary info to be compliance to 2014/32/EU MID directive.

2.5 Energy Meter Readout

A. Hour [hh:mm:ss]
B. Data [YY-MM-DD]
C. DC Energy delivered [kWh]
D. AC Energy delivered [KWh] (where available)



User requirements obligations of the charge point operator and service provider

Notes on measurement accuracy according to the type examination certificate

Requirements for the operator of the charging device, which he must meet as a prerequisite for proper operation of the charging device.

The operator of the charging facility is the user of the measuring device within the meaning of Section 31 of the Measurement and Calibration Act

1. The charging device is only considered to be used as intended and in compliance with calibration law if the meters built into it are not exposed to environmental conditions other than those for which their type examination certificate was issued.
2. When registering the charging points with the Federal Network Agency, the user of this product must also register the PK specified on the charging device for the charging points in its registration form! Without this registration, it is not possible to operate the charging device in compliance with calibration law.

   Weblink:
   https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/HandelundVertrieb/Ladesaeulen/Anzeige_Ladepunkte_node.html

3. The user of this product must ensure that the calibration validity periods for the components in the charging device and for the charging device itself are not exceeded.
4. The user must store the signed data packets read from the loading device - in accordance with the pagination, permanently (also) on hardware dedicated to this purpose in his possession ("dedicated memory"), - keep them available for authorized third parties (operational obligation of the memory.) . Permanent means that the data not only have to be stored until the business transaction is completed, but at least until the expiry of the legal deadlines for legal redress for the business transaction. No substitute values may be created for non-existent data for billing purposes.
5. The user of this product must provide users of measured values who receive measured values from this product from him and use them in business transactions with an electronic form of operating instructions approved by the conformity assessment body. The user of this product must in particular point out No. II "Requirements for the user of the measured values from the charging device"
6. The user of this product is obliged to notify according to § 32 MessEG (excerpt):
   Section 32 Obligation to notify (1) Anyone who uses new or renewed measuring devices must notify the competent authority under state law no later than six weeks after commissioning.
7. Insofar as it is considered necessary by the authorized authorities, the measuring device user must provide the complete content of the dedicated local memory or of the memory at the CPO with all data packets of the accounting period.

Requirements for the user of the measured values from the charging device (EMSP)
The user of the measured values must observe Section 33 of the MessEG

MessEG (quote)

§ 33 (Requirements for using measured values)

1. Values for measured variables may only be specified or used in business or official traffic or for measurements in the public interest if a measuring device was used as intended for their determination and the values can be traced back to the respective measurement result, as far as in the ordinance according to § 41 number 2 nothing else is determined. Other federal regulations that serve comparable protection purposes continue to apply.
2. Anyone who uses measured values must ensure, within the scope of their possibilities, that the measuring device fulfills the legal requirements and has to be confirmed by the person using the measuring device that they are fulfilling their obligations.

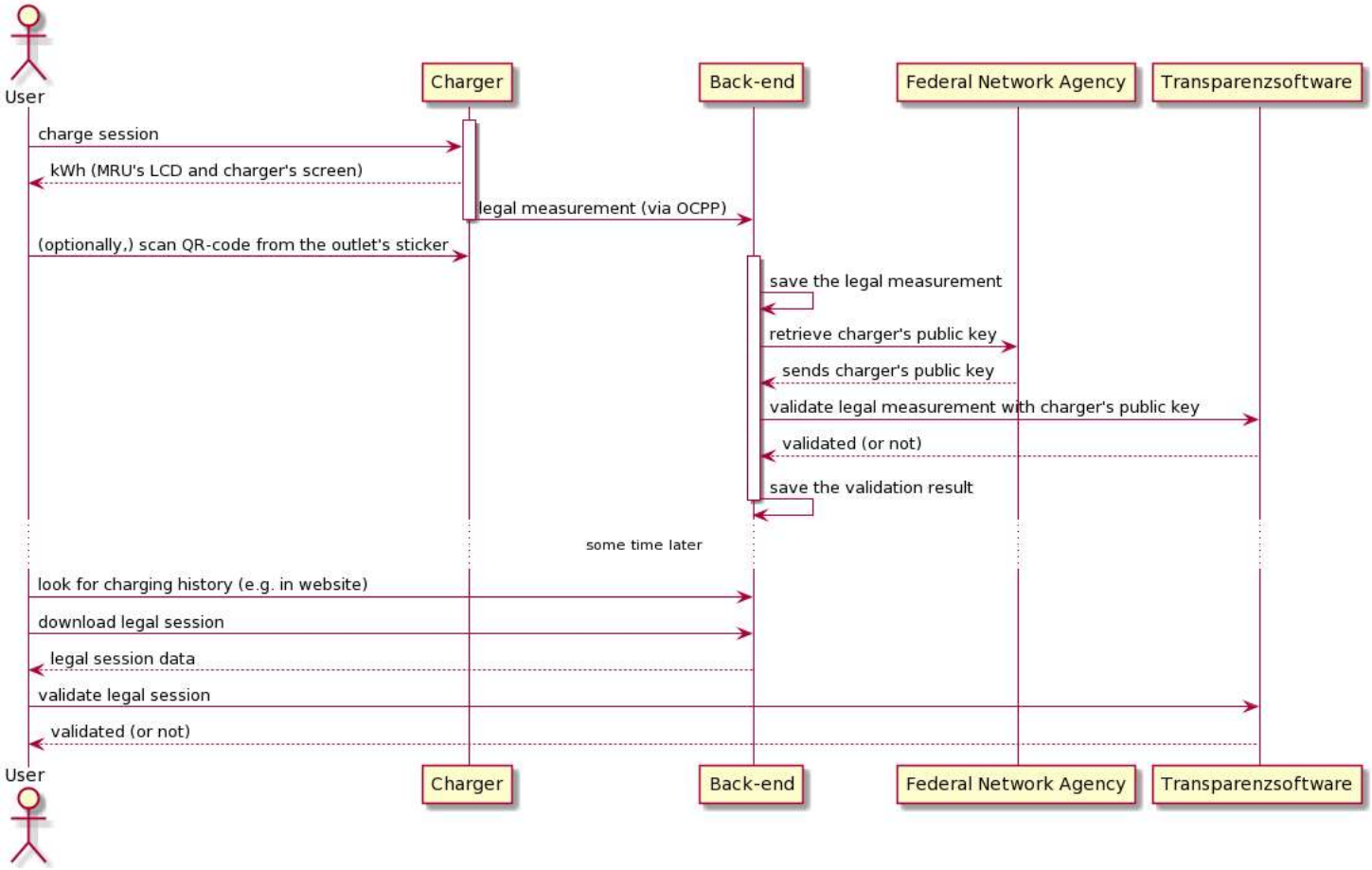
Anyone who uses measured values has

1. to ensure that invoices, insofar as they are based on measured values, can be easily understood by the person for whom the invoices are intended for checking the measured values given and)
2. If necessary, provide suitable aids for the purposes mentioned in number 1.

For the user of the measured values, this regulation gives rise to the following specific obligations for the use of measured values in accordance with calibration law:)

3. The contract between EMSP and the customer must clearly stipulate that only the delivery of electrical energy and not the duration of the charging service is the subject of the contract.
4. The time stamps on the measured values come from a clock in the charging device that is not certified in accordance with measurement and calibration law. They must therefore not be used to rate the measured values
5. EMSP must ensure that the e-mobility service is sold by means of charging devices that enable the ongoing charging process to be monitored if there is no corresponding local display on the charging device. At least at the beginning and end of a charging session, the measured values must be available to the customer in a trustworthy manner under calibration law.
6. The EMSP must provide the customer with the billing-relevant data packages including signature as a data file at the time of invoicing in such a way that they can be checked for authenticity using the transparency and display software. They can be made available via channels that have not been verified under calibration law.
7. The EMSP must make available to the customer the transparency and display software belonging to the charging device for checking the data packets for integrity.
8. The EMSP must be able to show in a verifiable manner which means of identification was used to initiate the charging process associated with a specific measured value. This means that he must be able to prove for every business transaction and measured value billed that he has correctly assigned the personal identification data. The EMSP has to inform its customers about this obligation in an appropriate form.
9. The EMSP may only use values for billing purposes that are available in any dedicated memory in the charging device and / or the memory of the operator of the charging device. Substitute values may not be created for billing purposes.

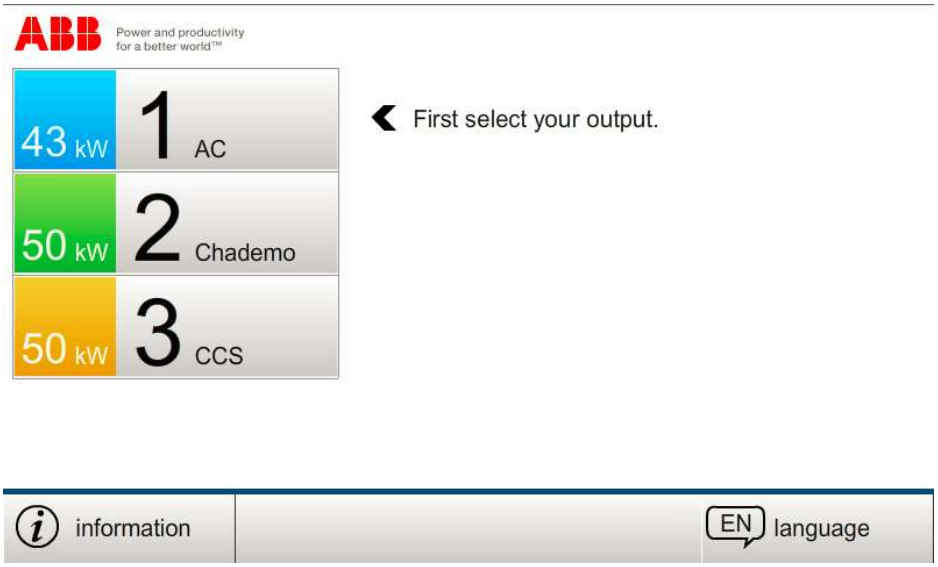
10. The EMSP must make appropriate agreements with the operator of the charging facility to ensure that the data packets used for billing purposes are stored for a sufficient length of time in order to be able to complete the associated business transactions.
11. In the event of a justified request for verification, the EMSP has to enable the authentication of the copies of the product belonging to these operating instructions by providing suitable identification means for the purpose of carrying out calibrations, diagnostic tests and usage monitoring measures.
12. All of the above obligations apply to the EMSP as the user of measured values in the sense of Section 33 MessEG even if it obtains the measured values from the charging facilities via a roaming service provider.
13.



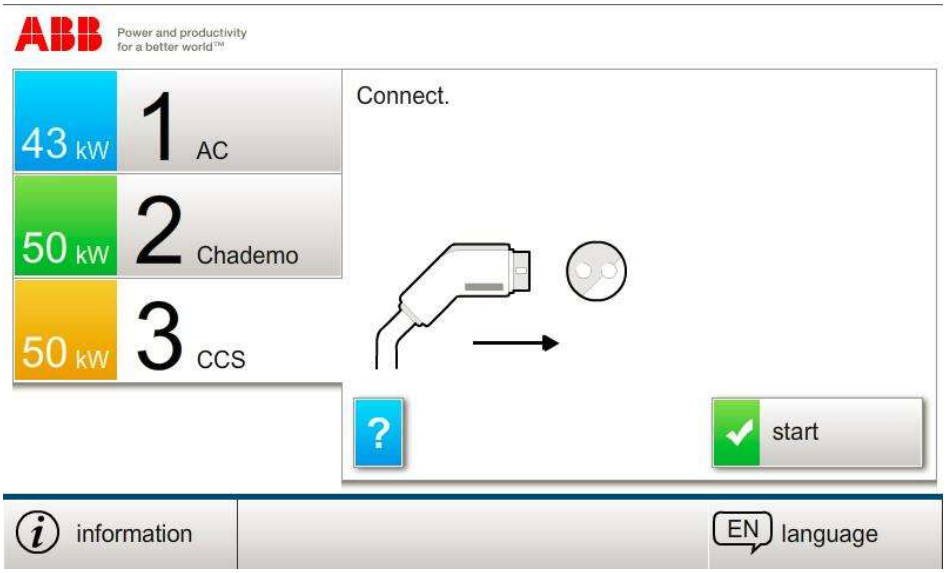
3. Quick instruction charging

To charge an electric vehicle:

1. Park the electric vehicle with the charge socket within reach of the connector.
2. Turn off the electric vehicle.
3. Select the charging protocol on the display and follow the instructions on the screen.



4. Connect the charge connector to the vehicles charge socket

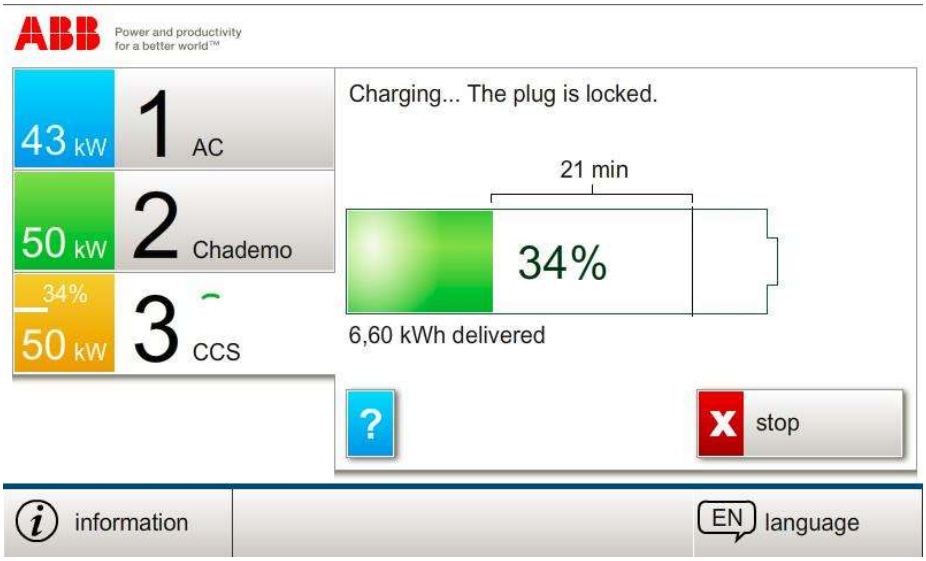


5. On the touchscreen, press start.
6. If applicable, scan the RFID card for authorization, use PIN or use a mobile payment method.
7. The charger charges the vehicle after the preparation phase and will indicate the progress on the screen.

NOTICE

Limited information during AC charging

When AC charging, there is limited information available on the display. Only charged kWh and elapsed time are shown.
Due to the nature of the AC charging protocol it is not possible to show more information.



Stop charging:

8. Select stop on the touchscreen.
9. Authorize using the same authentication method as was used to start.
    - Charging stops and the connector is unlocked by the car for Combo and AC charging or by the charger for CHAdeMO charging
10. Take the connector out of the car and put it back in the connector holder on the charger.

NOTICE

Locked connector

For AC and CCS charging the EV locks the connector. If the user wants to take the connector out of the car, it may be necessary to unlock all doors of the EV, or use the “unlock charge connector button” on the car key if present.

NOTICE

Session end

Charging will stop without user interaction:

- When the EV indicates to the charger charging is completed.
- When the maximum charge time set by the operator/owner has been reached.

If the battery is not full a new charge session can be started. In general, topping up the battery is slow-charging.



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!

3.1 Emergency stop

If there is an emergency:

1. Push the emergency stop button (B in Figure 1).

The Charger stops the operation and displays a message.

2. Contact the Site operator.



NOTICE

emergency button is pressed accidentally

If the emergency stop button is accidentally pushed:

1. Verify the situation is safe.
2. Turn the emergency button clockwise.
    - The emergency button is released and the charger is reactivated.
    - After a few seconds the message disappears from the screen and the charger returns to normal operation.

4. Operator Instructions

4.1 Cleaning of the cabinet



DANGER
Electrical components

- Do not apply high-pressure water jets. Water may leak into the Charge Station.
- 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 Charger cabinet 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 Service inspection of the cabinet

The following points must be checked regularly:

- Internal RCDs and RCBO's 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.
- Cable and connector

→ Check for cracks or ruptures on the connector or cable, check if no internal wires of the cable are visible.

- Display screen
  → Check for damage and cracks.
- Powder coating
  → Look for damage, cracks or ruptures

4.2.1 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 screen immediately indicates the emergency button is pressed.
2. Reset the emergency button by turning the knob clockwise.
   - After a few moments, the charger returns to its idle state.

4.2.2 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.

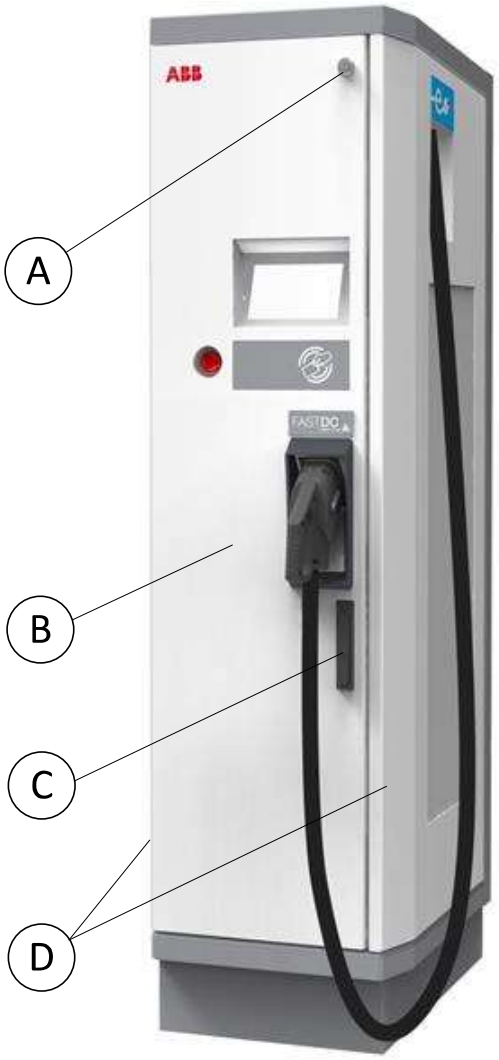
4.3 Problem resolving

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 cabinet

E. Upper lock (key EK333 or square key)
F. Front door
G. Lower lock (Per charger unique system key)
H. Side doors, AC (left) and DC (right) side



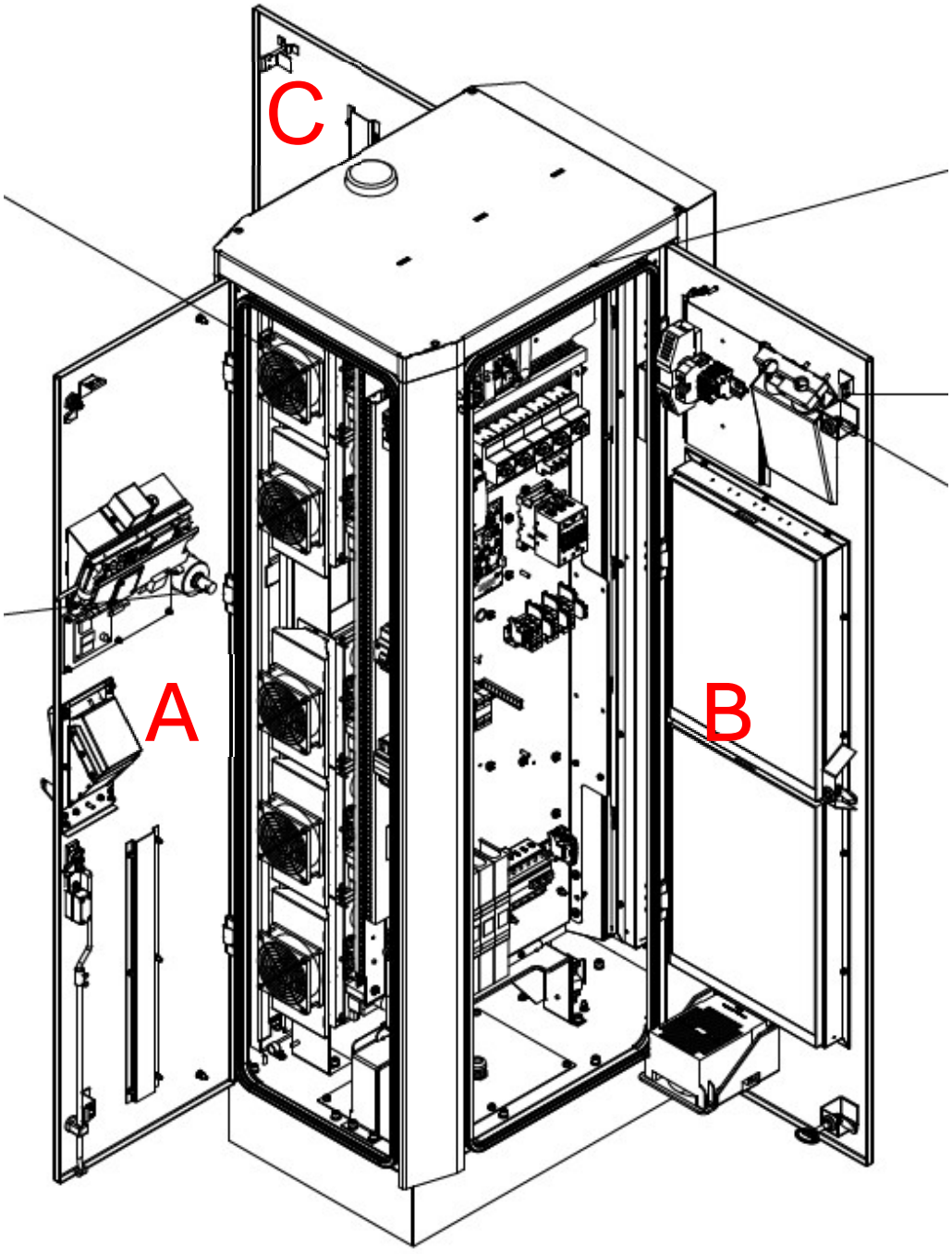
The front door can be opened by opening the upper and main lock. The upper lock can be opened using a general cabinet key (EK333 key). The lower main lock is a half cylinder lock, opened by a numbered system key, unique per charger. The side doors (D) can be opened by unlocking from the inside after the front door is opened.
The main lock is covered to prevent it from weather and dirt. To open the cover a Philips nbr1 screw has to be removed.



WARNING

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

4.3.2 Cabinet with open doors



A. Front view
B. Side view, DC charging side
C. Side view, AC charging

4.3.3 Component view open front door

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

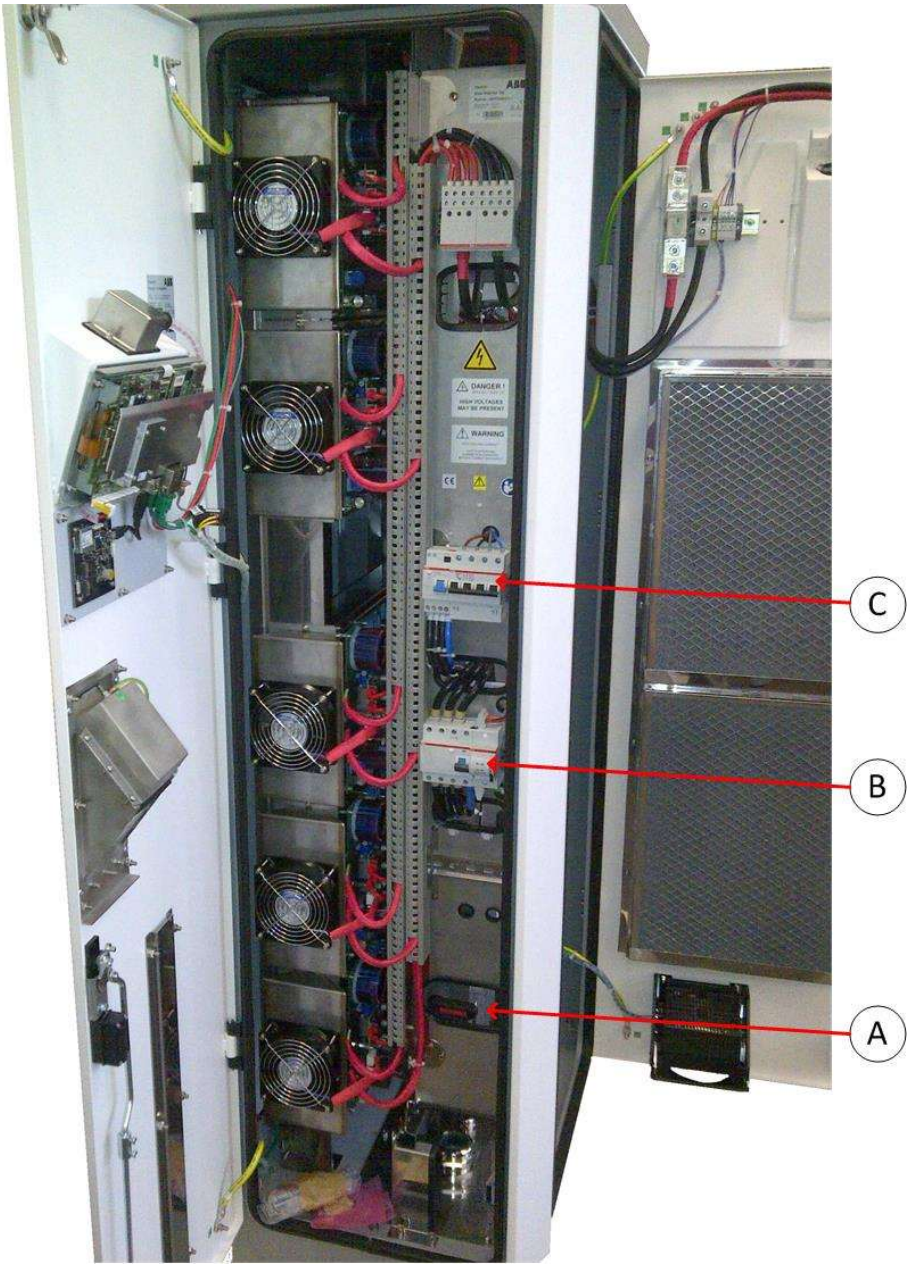


Figure 2 Front side component view

A. Mains isolator, Main switch
B. RCD DC power modules group
C. RCBO Control group

4.3.4 Component view right side door, DC side

The side doors can only be opened from the inside. Access to the three locks of the side door is via the front side.

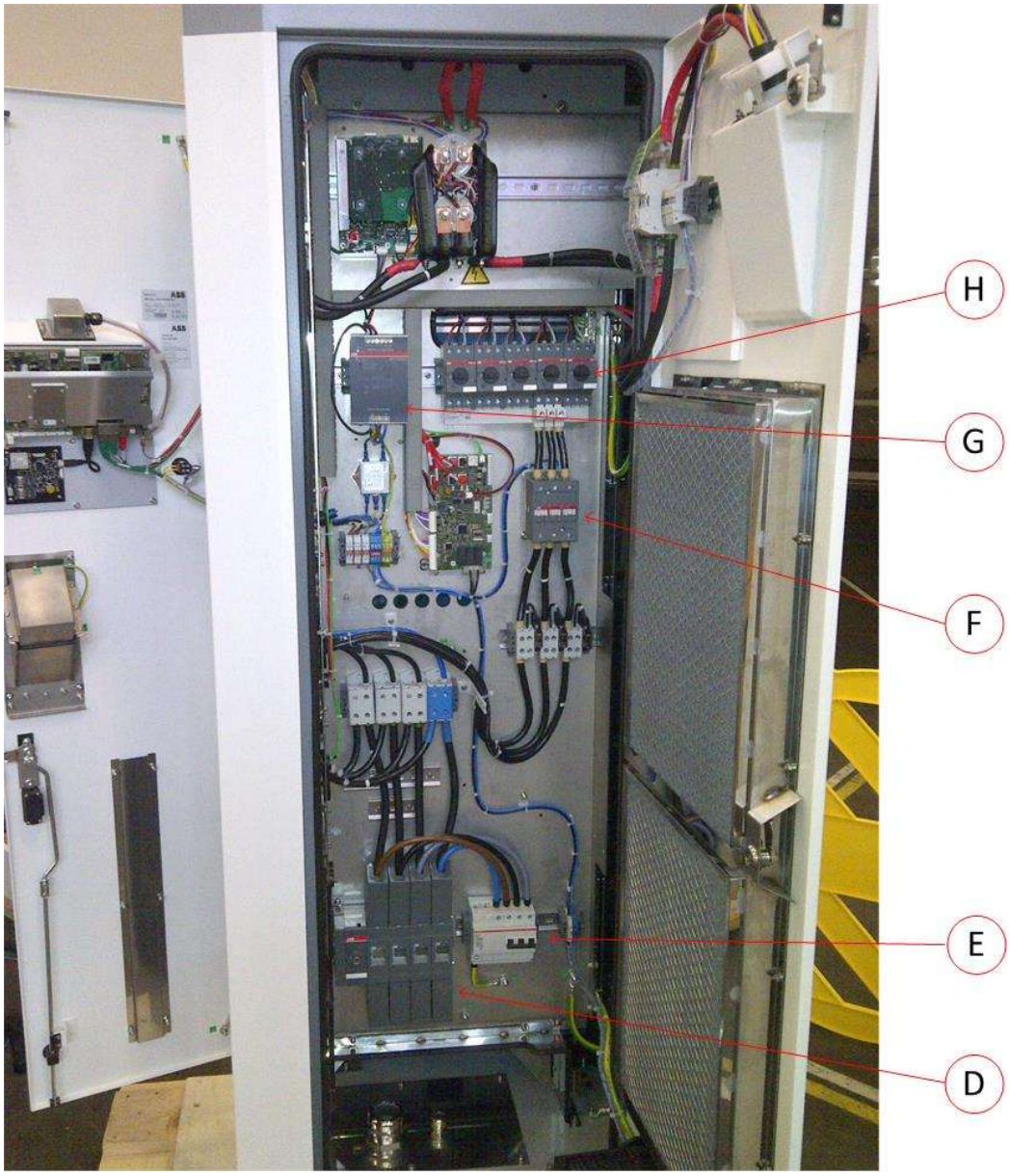


Figure 3 Right side component view

D. Mains isolator, cable connection
E. Overvoltage protection
F. AC relay
G. 24V power supply
H. Circuit breakers power modules (5x)

4.3.5 Component view open side door, AC side

The side doors can only be opened from the inside. Access to the lever of the left side door is via the front side.

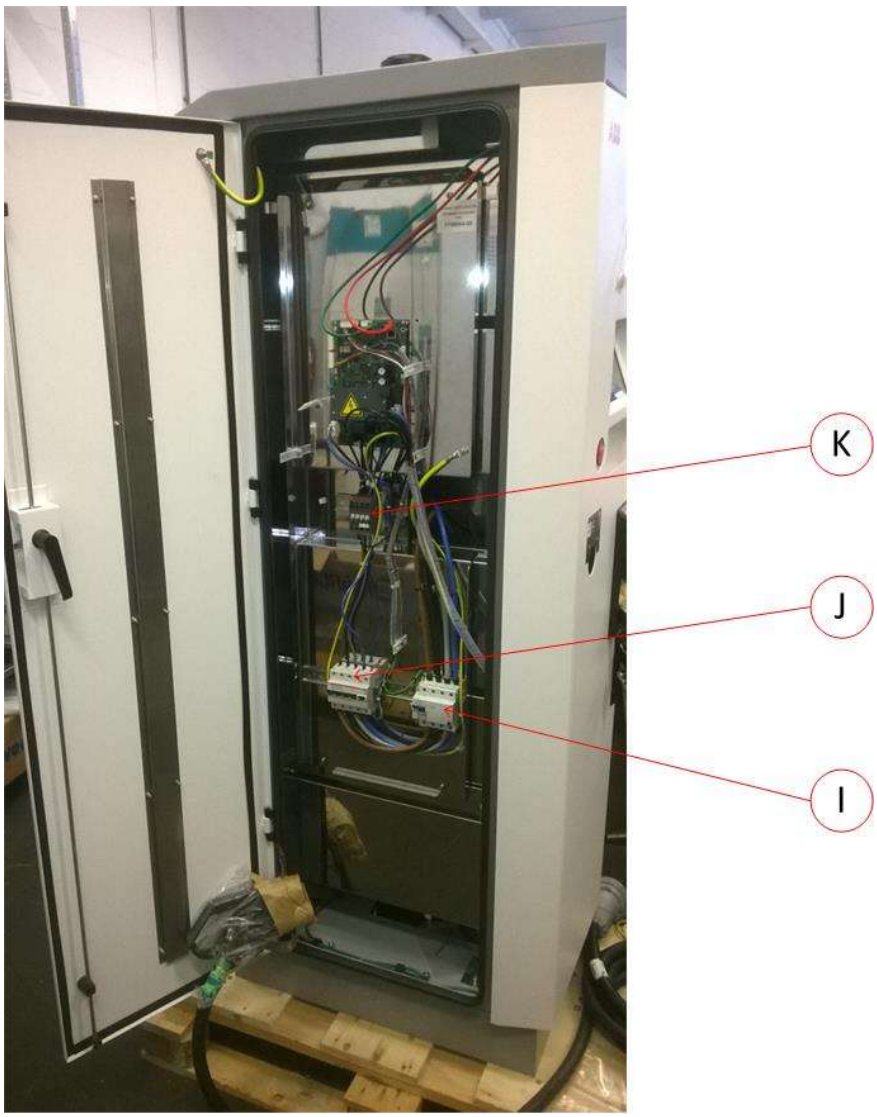


Figure 4 Left side component view

I. RCD B-type AC charging
J. MCB 32/63A
K. AC relay

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):

Front panel

- Main switch (A): Vertical (“1”)
- RCD DC Charge power group (B): up.
- RCBO Control group (C): up.

Right side panel (Controls and DC charging):

- Overvoltage protection (E): up
- Circuit breakers power modules (H, 5x): vertical (“1”)

Left side panel (AC charging):

- RCD (I): up
- MCB (J): up

4.4.2 Power distribution

The main power can be switched off using the main switch (A). This switch is accessible when opening the front door. If the main switch is off, the grid voltage is removed from all components in the charger except the bottom side of the main switch where the grid cable is connected (D).

From the main switch the power is divided into groups. The Charger has two (only DC charging) or three (DC and AC charging) power groups:

- Control power group; feeds power to all electronic components in the cabinet
- DC charge power group; feeds power the power modules needed for DC charging.
- AC charge power group; feeds the AC charging.

The control group is protected by an RCBO (C). This is a combined earth leakage and over current detection device.

The DC charge power group is protected for earth faults by a high immunity RCD (B).
An AC relay (F) switches the power to the individual circuit breaker (H, 5x) of each power modules. This relay is controlled via a safety circuit by:

- Emergency stop button
- Earth leakage detection
- Door switch
- Software

The AC charge power group is protected for earth faults by a type B RCD (I). The maximum current which can be used by the car is protected by an MCB (J).
An AC relay (K) switches the power to the car. This relay is controlled via a safety circuit by:

- Emergency stop button
- Earth leakage detection
- Door switch
- Software

4.5 Switch the charger on/off

In case it is necessary to switch off the charger this can be done by turning off the main switch (A in Figure 2):

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

To switch the charger back on, turn the handle clockwise to the vertical position, marked with “1”. After about a minute the charger should be showing the normal screen (“Connect your car”).



NOTICE

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

4.6 Climate control precautions

Condensation inside the cabinet can cause damage to the charger, especially when charging. For this reason the cabinet has a climate control. The climate control is out of function when the power is off.

When the charger has been without power for several hours (switched off or external power outage) it is important to activate the climate control before a car is charged to prevent damage to the charger. This can be ensured by following the next procedure:

1. Do not charge a car!
2. Open the front door of the cabinet
3. Open the left side door if the charger has AC charging capability (G/T type)
4. Switch off the RCD for AC charging (J) by pushing the switch down.
5. Switch off the RCD for DC charging (B) by pushing the switch down.
6. Verify if the Utility group RCBO (C) is switched on (upper position).
7. Switch on the Main switch (A)
8. Close the door
9. Let the climate control function for at least 4 hours
10. Open the doors
11. Switch on the RCD’s (B, J).
12. Close the door

The Charger is now ready to charge an EV.

In idle mode and switched on, the charger consumes around 70-80 watts of power.

A 1000 Watt heater is built into the charger for climate control inside the cabinet. This keeps the components functioning within temperature and humidity specifications and prevents condensation. This heater will switch on to full power when:

- The temperature inside the cabinet is below -20°C
- The humidity is above 90% relative humidity.

The heater switches off when:

- The inside of the charger is heated to -12°C
- The humidity is below 80%.

4.7 Preventive maintenance

The charger must be inspected and serviced yearly by a certified technician.

5. Compliance

Conformity with the relevant community harmonization legislation

EMC Directive - No. 2014/30/EU
Low Voltage - 2014/35/EU
RED Directive - No. 2014/53/EU
MID Directive – No. 2014/32/EU

Conformity with the following harmonized standards

Emission:	EN 61000-6-3 (2007) + A1 ; EN 61000-6-4 (2007) + A1
Immunity:	EN 61000-6-1 (2007) ; EN 61000-6-2 (2005)
LVD:	EN 61851-1 (2011) + EN 61851-23 (2014) EN 62196-1 (2012)
RED:	EN 301 908-2 V11.1.2 (2017) ; EN 301 511 V12.5.1 (2017) EN 300 330 V2.1.1 (2017) ; EN 50364 (2001)
MID:	EN 50470-1 (2006); EN 50470-3 (2006)

Conformity to the metrology directives:

MessEG
MessEV
Product compliant to the REA DOCUMENT 6A

6. Contact information



NOTICE
In case of problems
Contact the site operator. The number of the site operator is usually shown on the Charger.

ABB Service department

- PLEASE INSERT YOU CONTACT DETAILS