BACANCY®
SYSTEMS PVT LTD

Troubleshooting Guide

CCS2 Controller

Please completely read this document and the contained safety instructions and note all given information before usage.

Please maintain this troubleshooting guide's confidentiality. It is intended solely for usage by people professionally associated with the product. If you are not the intended recipient, you may not disclose or use the information in this documentation. The information does not constitute an offer or solicitation to buy or sell any security.

This troubleshooting's text and illustrations have been meticulously crafted. However, we may not be held accountable for any discrepancies or failures.

Some company and label names are protected by a label, a patent, or a trade mark.

Address: Bacancy Systems PVT LTD,
15-16, Times Corporate Park,
Near Thaltej-Shilaj Road,
Opp. Copper Stone Flats,
Thaltej, Ahmedabad,
Gujarat, India, 380059
Website: www.bacancysystems.com
Email: systems@bacancysystems.com
Phone: +91 90160 28817

Liability

The given data is primarily for product description reasons and should not be considered a guaranteed characteristic unless specifically stated in the contract. All rights are retained with regard to the content of this documentation and the availability of the product.

DISCLAIMER

The product, product data, and any of its specifications are subject to change without notice. Bacancy Systems PVT LTD, its employees, and all persons acting on its behalf shall not be liable for any errors, inaccuracies, or incompleteness that occur if the methodology contained herein or in any other revelation of the product is not followed. The product specifications alter or amend neither the terms nor conditions of purchase nor the warranty expressed therein.

Bacancy Systems PVT LTD offers no warranty, representation, or guarantee other than as set forth in the terms and conditions of purchase. To the maximum extent permitted by applicable law.

Bacancy Systems PVT LTD, disclaims

(i). Any and all liability arising out of the application or use of any product.

(ii). Any and all liability, including, without limitation, special, consequential, or incidental damages.

(iii). Any and all implied warranties, including those of merchantability, fitness for a specific purpose, and non-infringement.

The information provided in manuals and/or specifications may differ from actual results in different circumstances, and efficiency may change over time. Statements on a product's appropriateness for a certain application are based on Bacancy Systems PVT LTD's understanding of standard demands that are frequently put on Bacancy Systems products. It is the customer's obligation to determine whether a given Bacancy Systems product with the features mentioned in the product specification is appropriate for use in a specific application.

The product shown herein is not designed for use in life-saving or life-sustaining applications unless otherwise expressly indicated. Customers that utilise or sell Bacancy Systems products that are not explicitly intended for such applications do so solely at their own risk.

This manual is intended to improve the operator's efficiency throughout the procedure and does not entirely absolve them of responsibility.

Change Record

Rev. No.	Date	Details	Revised By	Approved By
1	27/03/2024	Initial Release	Nikunj Bambhroliya	Kanji Viroja
2	06/06/2024	Contact Details	Nikunj Bambhroliya	Kanji Viroja
3	17/09/2024	Updated CDM Application Link	Nikunj Bambhroliya	Kanji Viroja
4	24/04/2025	Legal Entity Conversion: LLP to PVT LTD	Nikunj Bambhroliya	Kanji Viroja
5	05/05/2026	Revised Email Address	Rajkumar Patel	Kanji Viroja

Table of Contents

List of Figures

1 Intended Use

This troubleshooting guide will provide you with information on general challenges as well as approaches to diagnosing the CCS2 controller, identifying potential causes of problems, and ensuring that the solutions reinstate the controller or process's performance to a stable condition.

Furthermore, the user can contact our team to resolve their issue by using the contact information provided on the last page.

WARNING!	**Risk caused by inappropriate use!**
	Any unconventional use and/or different operation of the product can lead to hazardous situations. • Only use the product in a conventional manner.

1.1 Limitation

The product is intended for use in an operational environment. It should not be used in hostile or explosive conditions.

The operator should consult local safety authorities and safety representatives before performing tasks in hazardous areas or in similar circumstances.

1.2 Alteration and Restoration of the Product/System

To prevent risks and ensure optimal performance, no alterations, attachments, or restoration of the product are permitted without explicit authorisation of Bacancy Systems PVT LTD.

2 Troubleshooting Connection Interface

2.1 CCS2 Master Controller

NOTE!	Continuity Test
	The continuity test applies to all connections stated below; the troubleshooter should check wire continuity at both ends of the line.

- **Power Supply Connector Test**

  Instruction:

  1. Check the +12V and GND wire connections.
  2. Check all test points (3.3V, 1.2V, -12V, and +12V) with respect to GND, as shown in the figure below.

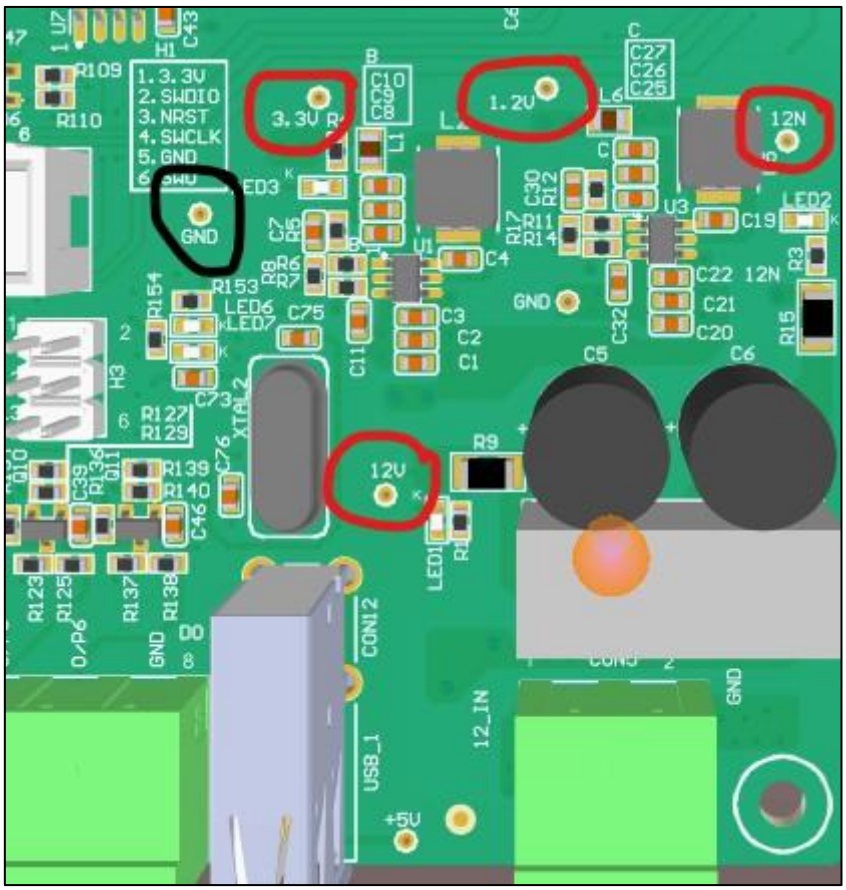


Figure 1 CCS2 Master Controller: Power Supply Connection Test

- **Digital Output Connector Test**

  Instruction:

  1. To operate the AC contactor, connect Pin 1 to the appropriate channel of the relay board (connecting to Pin 2 is optional as it serves the same purpose).
  2. To operate the Gun 1 DC contactor, connect Pin 3 to the appropriate channel of the relay board.
  3. To operate the Merger DC contactor, connect Pin 4 to the appropriate channel of the relay board.
  4. To operate the Gun 2 DC contactor, connect Pin 5 to the appropriate channel of the relay board.
  5. To perform the PLC reset operation, connect Pin 7 to the PLC board reset pin.

- **Digital Input Connector Test**

  Instruction:

  1. When you press the emergency button in the interface, Pin 1 is generally connected to GND and severed. The NC (normally closed) pin will have a GND connection, whereas the NO (normally open) pin will break the GND connection.
  2. Connect Pins 3 and 4 to the IMD module's outputs for Gun 1 and Gun 2 Isolation Module interfaces, respectively. If the IMD has not been installed, Pins 3 and 4 must be connected to GND.

- **PLC CAN Connection Test (CAN 0 Connector)**

  Instruction:

  1. The CAN connector has two wires, CANH and CANL, which should be connected to the CAN connector of the PLC board without switching.

- **Rectifier CAN Connection Test (CAN1 Connector)**

  Instruction:

  1. The CAN connector has two wires, CANH and CANL, which should be connected to the CAN connector of the rectifier module without switching.
  2. The CAN bus should have a termination register. So, if there is a termination jumper option, include or exclude it on the rectifier module and proceed accordingly.

- **RS485_1 Connector**

  Instruction:

  1. Inspect the RS485_1 A and B wire connections with the meter, RFID, and LED board.

- **RS485_2 Connector**

  Instruction:

  1. Check the RS485_2 A and B wire connections with the HMI Display.

- **GUN1 Temperature Connector**

  Instruction:

  1. Check the T1, T2, T3, and T4 wire connections with the GUN1 wires.

- **GUN2 Temperature Connector**

  Instruction:

  1. Check the T1, T2, T3, and T4 wire connections with the GUN2 wires.

- **Type-2 AC Connector**

  Instruction:

  1. Check the CP and PE AC charger GUN wire connections.

2.2 PLC Add-on Board

- **Power Supply Connector**

  Instruction:

  1. Check the +12 V and GND wire connections.
  2. Examine all test points (3.3V, +12V, -12V, +15V, and -15V) with reference to GND, as shown in the figure below.

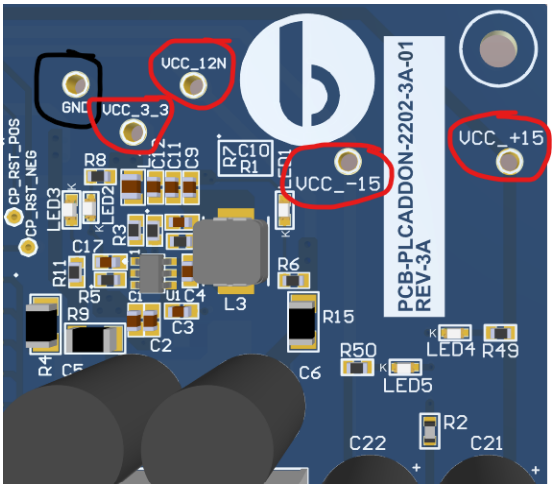


Figure 2 PLC Add-on Board: Power Supply Connector

- **CAN0 Connector**

  Instruction:

  1. Check the CAN0 High and CAN0 Low wire connections on the CCS2 Master Controller Board (both CAN0 connectors are similar).

- **DC Gun Connector**

  Instruction:

  1. Check the CP and PE wire connections with the DC charger GUN.

- **PLC Rest Connector**

  Instruction:

  1. Check the reset pin wire connection to the CCS2 Master Controller's Digital Output Pin 7.

2.3 RFID Add-on Board

- **Power Supply and RS-485 Connector**

  Instruction:

  1. Check the +12V and GND wire connections.
  2. Check the A and B wire connections on the CCS2 master controller using the RS-485_1 connector.

2.4 LED Add-on Board

- **Power Supply and RS-485 Connector**

  Instruction:

  1. Check the +12V and GND wire connections.
  2. Check the A and B wire connections on the CCS2 Master Controller using the RS-485_1 connector.

3 Input Supply and Current Test

- **Input AC Supply**

  Instruction:

  1. Check if the input supply voltage from L1, L2, and L3 to Neutral is 230V ± 10% AC.
  2. Check if the input supply voltage from L1 to L3 is 415V±10% AC.
  3. Check if the input supply voltage between earthing and neutral is less than 2.5 V AC.

- **SMPS Input Supply**

  Instruction:

  1. Check the SMPS input AC supply, which should have an input voltage of 230V ± 10% AC.
  2. Check the SMPS output DC supply, which should have an input supply voltage of +12V and GND.

- **CCS2 Master Controller**

  Instruction:

  1. Check the input power supply connectors for +12V and GND.
  2. Check all test points (3.3V, 1.2V, -12V, and +12V) on the CCS2 Master Controller Board with GND as the reference.

- **PLC Add-On Board**

  Instruction:

  1. Check the input power supply connectors for +12V and GND.
  2. Check all the test points on the PLC add-on module (3.3V, +12V, -12V, +15V) with GND as the reference.

- **RFID Add-On Board**

  Instruction:

  1. Check the input power supply connectors for +12V and GND.
  2. Check all the test points (3.3V and +12V) on the RFID Add-On Module with a GND reference.

- **LED Add-On Board**

  Instruction:

1. Check the input power supply connectors for +12V and GND.
2. Check all the LED add-on module's test points (3.3V and +12V) with a reference to GND.

3.1 Fuse Test

Instruction:

1. The fuse will not function until the two terminals are connected. So, check its connection under ideal conditions.

3.2 Relay Test

- **Power Supply**

  Instruction:

  1. Check the input power supply connectors for +12V and GND.

- **Input Channel**

  Instruction:

  1. Check if the input channels are connected to their appropriate pins on the CCS2 Master Controller. The wire connections should be initiated in the following manner:
     - Input Channel 1 with Pin 1.
     - Input Channel 2 with Pin 3.
     - Input Channel 3 with Pin 4.
     - Input Channel 4 with Pin 5.

- **Output Channel**

  Instruction:

  1. Check if the output channel 1 COM's wire connection is connected to L1, and NO is connected to the AC contractor.
  2. Check if the output channel 2 COM wire connection is connected to +12V and NO is connected to the DC contactor for GUN1.
  3. Check if the output channel 3 COM's wire connection is connected to +12V and the NO is connected to the DC contractor for merging.
  4. Check if the output channel 4 COM wire connection is connected to +12V and NO is connected to the GUN2 DC contactor.

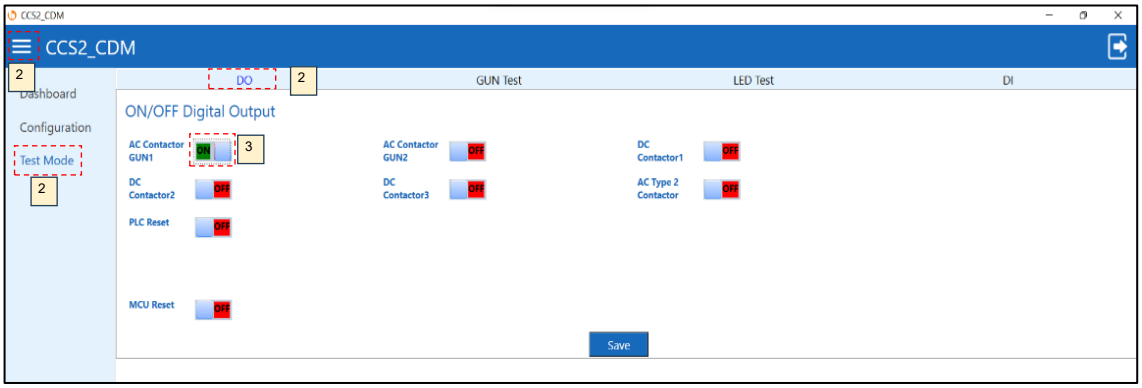
3.3 AC/DC Contactor Test

NOTE!	For Reference
	For AC/DC contactors, refer to Section 3.5.1 of the F-01-CP-CCS2_CDM_Application.

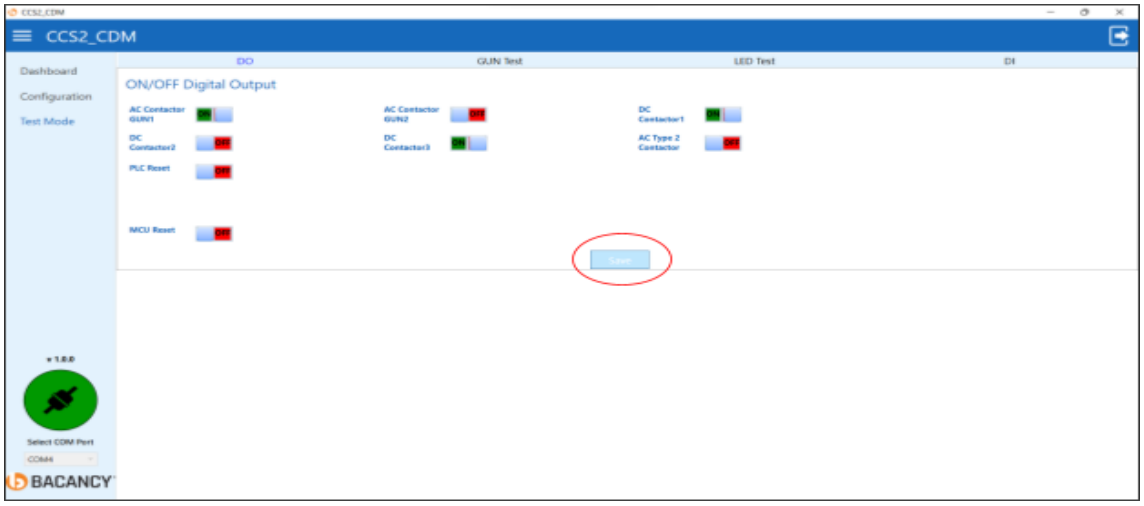
Step 1. Open the CCS CDM application and log in using your valid credentials.

Step 2. Open the menu and click the “Test Mode” option, then the "DO" tab.

Step 3. To validate the AC contactor, turn on "AC Contactor GUN1."



Step 4. To validate the DC contactor, turn on the DC Contactor 1, DC Contactor 2, and DC Contactor 3 buttons in the sequence shown in the figure below, then check with the multimeter and press the "Save" button.



3.4 Rectifier Test

NOTE!	For Reference
	For the Rectifier Test, refer to Section 3.5.2 of the F-01-CP-CCS2_CDM_Application.

Step 1. Open the CCS CDM application and log in using your valid credentials.

Step 2. Open the menu and click on the “Test Mode” option, then open the “GUN Test” tab.

Step 3. To validate the regulator, switch on the “GUN1 Rectifier ON/OFF” and verify the voltage with the multimeter.

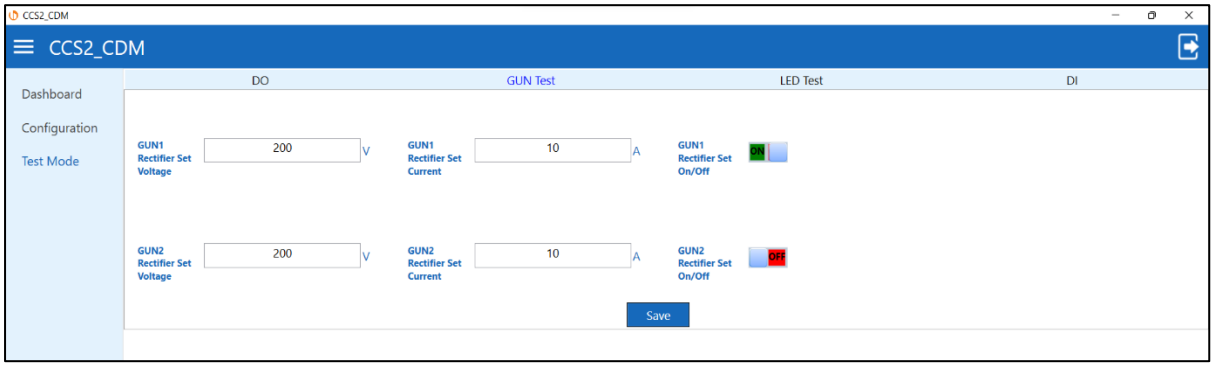


Figure 3 Rectifier Test in CDM Application

NOTE!	Tip for GUN2 Rectifier
	Follow the same instructions with the GUN2 Rectifier.

3.5 PLC Test

Instruction:

1. Inspect the voltage between CP and PE.
2. In ideal conditions, you will get +12V when the gun is plugged in. You will get +9.0V.

3.6 RFID Test

NOTE!	For Reference
	For the RFID Test, read Section 3.4.1 (Step 6) of the F-01-CP-CCS2_CDM_Application.

Instruction:

1. After that, tap the RFID card on the reader and verify with the CDM utility tool. You will get data in the format specified in the dialogue box below.

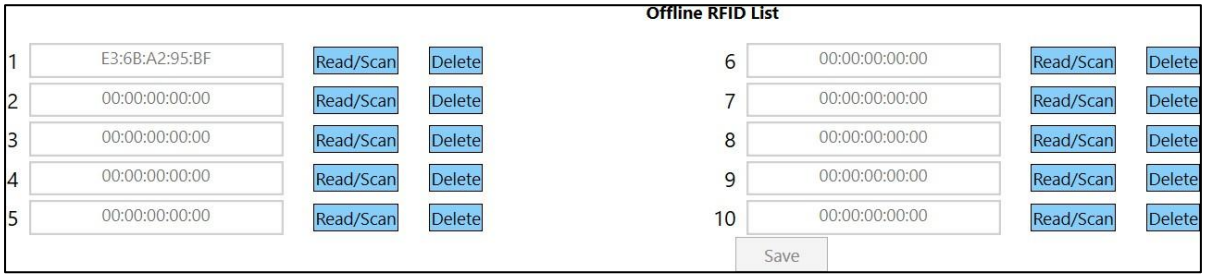


Figure 4 RFID List in CDM Application

3.7 LED Test

NOTE!	For Reference
	For the LED Test, refer to Section 3.5.3 of the F-01-CP-CCS2_CDM_Application.

Figure 5 LED Test in CDM Application

3.8 CAN Communication Test

Instruction:

1. Check the wire connection between CAN High and CAN Low.

3.9 RS-485 Communication Test

Instruction:

1. Check the CCS2 Master Controller's communication with the meter, RFID, LED, and HMI.

3.10 Digital Output Test

NOTE!	For Reference
	For the Digital Output Test, refer to Section 3.5.1 of the F-01-CP-CCS2_CDM_Application.

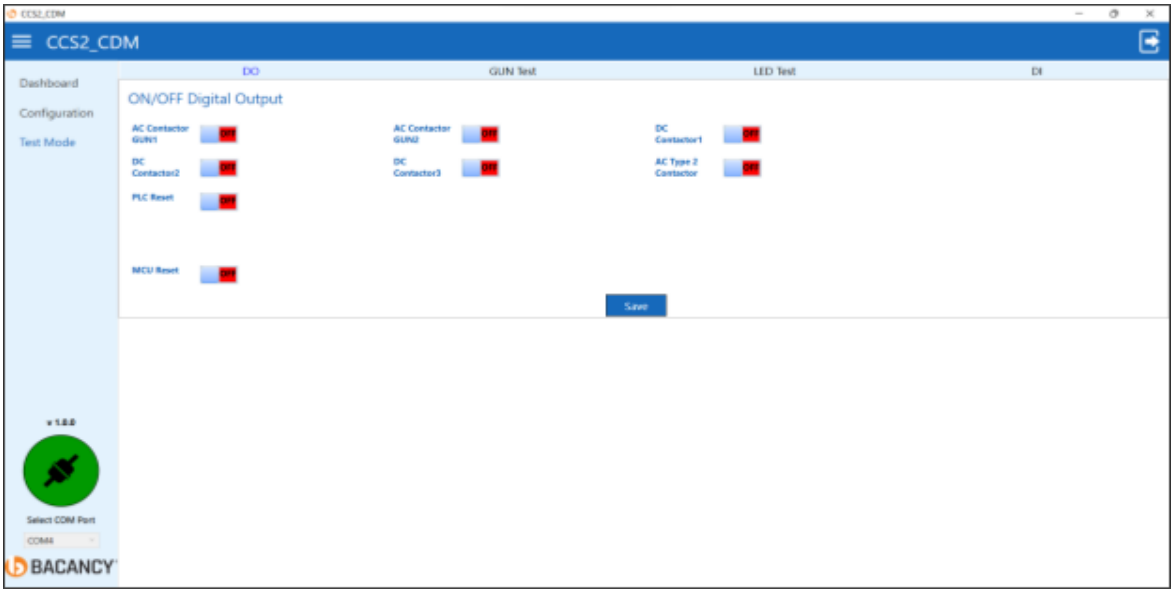


Figure 6 Digital Output (DO) Test

3.11 HMI Test

NOTE!	For Reference
	To validate the HMI test, connect the RS-485 dongle to the CCS2 Master Controller's RS 485_2 connector and refer to Section 3.1 of the F-01-CP-CCS2_CDM_Application.

3.12 Emergency Button Test

Instruction:

1. To validate the emergency test, press the emergency button and verify the voltage on pins 1 and 6 of the CCS2 master controller.
2. Pressing the emergency button will give you +12V and releasing it will give you 0V.

4 Firmware FAQs:

1. **Why is there no Internet access? Even if a SIM card is already inserted or a Wi-Fi credential is entered during charger commissioning / Ethernet cable connection?**

   If the internet plan has expired or there are issues with Wi-Fi and GSM signal strength, it can result in connectivity problems, especially if the respective icons indicating these connections are not visible on the HMI.

2. **Why isn't the OCPP Server connected?**

   The OCPP server might not be connected due to several reasons, primarily related to connectivity issues. Some of the potential problems with the OCPP server connection include:

   - Problem with the Ethernet cable
   - Signal strength issues with the Wi-Fi and GSM
   - Expired internet plan

3. **Why does the charge not start after authentication?**

   There are a few reasons why the charge won’t begin even after authentication, including:

   - Isolation failures
   - Precharge failures
   - EV communication failures
   - Invalid CP state

4. **Why isn't the gun released when the charging session is over?**

   The gun may not release after charging if the vehicle malfunctions when the charger stops the session after the vehicle self-terminates. If this happens, manually release the gun from the vehicle's side.

5. **When should I use the emergency button?**

   You should use the emergency button in case of a fire or smoke.

6. **What if the mobile app shows charging, but the charger shows completion?**

   A server disconnection can lead to the charger going offline, causing data transmission issues until it reconnects. If the charger disconnects from the server after charging, it cannot send data, resulting in a data mismatch between the mobile app and the charger display.

7. **Why didn’t the charging cycle start when I tapped the RFID card?**

   This situation may occur because of RFID rejection, which can be caused by either an invalid or unregistered tag on the server. It can also result from a server-side failure to validate the transaction's start or if the charger is not connected to the server. Furthermore, the charging cycle won't commence even after tapping the RFID card if the charging gun is not plugged into a vehicle. Additionally, errors such as isolation failure, pre-charge failure, EV communication failure, or invalidation of the CP state could also contribute to this issue.

8. **What is the cause of the discrepancy between the HMI that shows energy consumption and the mobile application that displays energy consumption values?**

   The charging system periodically sends meter data to the server at specific intervals, and the HMI, in turn, displays the real-time actual energy usage value based on this transmitted data. Consequently, due to this intermittent data transmission process, there can be a slight discrepancy between the energy consumption value displayed on the HMI and the value shown on the mobile application.

9. **Why does the charging cycle terminate automatically even when I haven’t initiated a halt session?**

   An EV request to stop, power failure (3-phase AC input) or bad supply, communication failure between PLC, rectifier, and AC/DC meter, and several other faults like increased temperature, SPD, smoke, temper, voltage, current, and rectifier faults can be a few reasons why the charging cycle terminates automatically.

10. **Why does the HMI display an "unplugged" status while the gun is already hooked into the EV vehicle?**

    If this happens, please check the wire connection between the CCS2 controller and HMI.

11. **Why does the HMI display a different actual voltage and current than the EV demand voltage and current?**

    When the electric demand exceeds the charger's capacity (in kW) or the charger is limited to a specific capacity (in kW), the actual current and the demand current differ. The demand voltage and actual voltage also differ when charging takes place to meet the vehicle's current demand, which depends on rectifier characteristics.

12. **What does the LED indication blue, green, or red mean?**

    When the LED is blue and blinking, it indicates that the DC charger is switched on, but the EVSE is disconnected from the server. A stable blue light, on the other hand, indicates that the power is on and the EVSE is connected to the server. A green

blinking light signals that the EV is currently charging, while a steady green light means that the charging gun is connected to the vehicle but not actively charging. Finally, a steady red LED light indicates an error or fault in the DC charger.

No.	LED Colour	LED Status	Action
1	Blue	Blink	Power ON and EVSE disconnected from the server.
	Blue	Steady	Power ON and EVSE connected from the server.
2	Green	Blink	EV Charging.
	Green	Steady	The gun is connected to the vehicle but is not charging.
3	Red	Steady	Error or Fault.

13. What if the blue LED started blinking while the charger was still charging?

When the blue LED light blinks, the EVSE is disconnected from the server.

14. What happens if all red, green, and blue LEDs blink sequentially?

The red, green, and blue LEDs blink sequentially when a disconnection occurs with the CCS2 Controller unit. Please verify the wiring connections between the RS485+ and RS485- on the LED board and the RS485-1 on the CCS2 Controller unit.

15. Which bandwidth is supported by the CCS2 Master Controller?

The CCS2 Master Controller is compatible with a 2.4 GHz bandwidth but lacks support for 5.0 GHz.

5 Appendix

5.1 Abbreviations and Glossary

AC	*Alternating current, a type of electrical current in which the current repeatedly changes direction.*
DC	*Direct current (DC) is one-directional flow of electric charge.*
CCS2	*The Combined Charging System (CCS) is a standard for charging electric vehicles.*
GND	*GND stands for Ground. A common or shared return route of electrical current to the power source that enables the completion of the circuit refers to the ground in both electrical and electronic circuits.*
PLC	*Programmable Logic Controllers (PLCs) are industrial computers, with various inputs and outputs, used to control and monitor industrial equipment based on custom programming*
CAN	*A controller area network (CAN) bus is a high-integrity serial bus system for networking intelligent devices. CAN busses and devices are common components in automotive and industrial systems.*
RS-485	*RS-485 is an industrial specification that defines the electrical interface and physical layer for point-to-point communication of electrical devices. The RS-485 standard allows for long cabling distances in electrically noisy environments and can support multiple devices on the same bus.*
RFID	*Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify, and track tags attached to objects.*
HMI	*HMI stands for Human Machine Interface. Generally, it refers to a screen or dashboard that communicates information, data, and metrics using graphics or visual representations of numbers. The screen is controlled by an operator who monitors and controls equipment and processes.*
CP	*Control Pilot is a communication line used to negotiate charging level between the car and the EVSE, and it can be manipulated by the vehicle to initiate charging and can carry other information.*
PE	*A Protective Earth connection, earth ground or safety ground uses a protective conductor to direct a fault current safely into the earth and away from a human being in contact.*
COM	*COM (communication port) is the original, yet still common, name of the serial port interface on PC-compatible computers.*

EVSE	*Electric vehicle supply equipment (EVSE) supplies electricity to an electric vehicle (EV). Commonly called charging stations or charging docks, they provide electric power to the vehicle and use that to recharge the vehicle's batteries*
GSM	*GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world.*
LED	*A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it.*
RFID	*Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify, and track tags attached to objects.*
Wi-Fi	*Wi-Fi is a family of wireless network protocols based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access, allowing nearby digital devices to exchange data by radio waves.*

Bacancy Systems PVT LTD,
15-16, Times Corporate Park,
Near Thaltej-Shilaj Road,
Opp. Copper Stone Flats,
Thaltej, Ahmedabad,
Gujarat, India, 380059

www.bacancysystems.com

systems@bacancysystems.com

+91 90160 28817

Helpdesk: https://bacancy.freshdesk.com/a/dashboard/default