BACANCY®
SYSTEMS PVT LTD

# User Guide

## Bharat AC Three Socket Charger Controller

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This user guide 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 |
|---|---|---|---|---|
| **0** | 13/03/2024 | Initial Release | Rajkumar Patel | Samir Bhatt |
| **1** | 06/06/2024 | Contact Details | Rajkumar Patel | Samir Bhatt |
| **2** | 22/04/2025 | Legal Entity Conversion: LLP to PVT LTD | Rajkumar Patel | Samir Bhatt |
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# Table of Contents

# List of Figures

# List of Tables

# 1. About this Document

## 1.1 Information on the User Guide

This user guide contains basic information to be considered in the utilisation of the product. A precondition for safe working is the observance of all stated safety instructions and directions. Therefore, this user guide should be read and applied without fail by any person assigned to the installation and operating procedures of the product or system.

This user guide is part of the product, and the case may have to be passed to third parties or the following owners. It must be permanently kept at the usage site and be available for the operating personnel who are responsible for the installation of this product or system.

We are eager to ensure the comprehensiveness, relevance, and up-to-dateness of this user guide. It may become essential to make spontaneous changes to the product and its operation, which may not align with this manual, to maintain our technical advancement. In that case, Bacancy Systems PVT LTD will provide you with a new manual. We exclude liability for disturbances, failures, and resulting damages.

The illustrations in this user guide will provide a better understanding. It can occur that illustrations are not drawn to scale or deviate somewhat from the original.

## 1.2 Limitations of Liability

All statements and remarks in this user guide have been aggregated with consideration of current standards, laws, and regulations, the state of technology, as well as our extensive knowledge, long-time expertise, and experience. In special models, due to demands for additional order options or the latest technical alterations, the actual scope of delivery can differ from the explanations and elaborations described here.

The manufacturer excludes any liability for damages caused by:

- Inappropriate assembling and installation.
- Non-observance of the user manual.
- Non-intended and improper use.
- Use beyond operation limits.
- Deployment of insufficiently qualified and trained personnel.
- Use of unauthorised spare parts and accessories.

# 2. Safety

The safety directions, cautions, warnings, and notices are stated here. Moreover, in this user guide's section, the following sections have to be followed to reduce potential health risks and prevent hazardous situations as per the ISO 45001:2018 standard for occupational health and safety.

## 2.1 Safety Graphical Pictogram or Symbol

These prescribe safety signs for the purposes of accident prevention, fire protection, health hazard information, and emergency evacuation as per the ISO 7010:2019 standard for graphical symbols, safety colours, and registered safety signs.

The safety instructions are structured as follows:

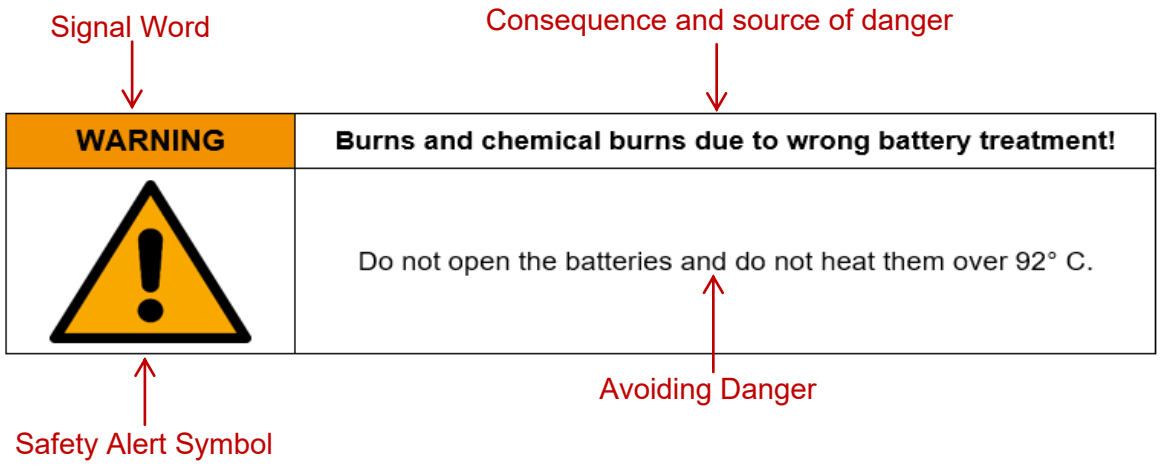



*Figure 1 Safety Instruction*

Table 1 Safety Graphical Pictogram or Symbol

| Pictogram / Symbol | Signal Word | Meaning |
|---|---|---|
|  | DANGER! | In case of non-compliance with this safety instruction, death or serious injury will occur. |
| | WARNING! | In case of non-compliance with this safety instruction, death or serious injury can occur. |
| | CAUTION! | In case of non-compliance with this safety instruction, a minor or moderate injury can occur. |
|  | NOTICE! | In case of non-compliance with this safety instruction, material damage can occur. |
|  | NOTE! | Useful notice or tip on the products or system's easy operation. |

## 2.2 Safety Instruction and Warnings

| MANDATORY | Read User Guide |
|---|---|
|  | To get an understanding of the product, the user should pay careful attention to the user guide. |

| PROHIBITION | Hot Works |
|---|---|
|  | Hot work shall be prohibited in close proximity to fully charged batteries. It will result in a battery explosion. |

| CAUTION! | Working with Machine Tools Near the Battery |
|---|---|
|  | To prevent the occurrence of sparks, short circuits, or explosions, the user shall take precautions near the operation of a machine tool with a battery. |

| PROHIBITION | Installation Environment Circumstance |
|---|---|
|  | High concentrations of oxidising or salted gases, wet or dusty surfaces, proximity to sources of extreme heat, open flames, or sparks, or high variation with temperature, proximity to storage of highly flammable materials or gas concentrations, and proximity to areas unprotected from water or high humidity are all prohibited. |

| MANDATORY | Installation and Maintenance |
|---|---|
|  | Installation and maintenance should be carried out under the supervision or advice of a qualified professional. |

| PROHIBITION | Assembly and Disassembly |
|---|---|
|  | The assembly or disassembly of an open, repaired, default parameter, or changed production should be prohibited. The warranty could be void and invalid, and the service can be discontinued without notice.<br>The use of a high-pressure washer to clean the product is prohibited. |

| MANDATORY | Disconnect Power Supply |
|---|---|
|  | The power source or plug should be disconnected in the event of an unanticipated event or when conducting maintenance and repair. |

| FIRE PROTECTION | Fire Extinguisher |
|---|---|
|  | In the event of a fire, the use of a dry powder fire extinguisher should be advised for fire control, and the use of water should be prohibited. |

## 2.3 The Responsibility of the Operator

The product is associated with industrial safety standards. However, the operator who is installing or operating the product is liable for the legal responsibilities for operational safety. In addition to the operational safety instructions in this manual, the safety, accident prevention, and environmental protection regulations valid for the operational area of the product shall be followed.

## 2.4 Person in Charge of Operations

| WARNING! | Risk of injury caused by a lack of adequate qualification! |
|---|---|
|  | Inappropriate handling of the product can lead to severe personal injuries and material damage. |

In this manual, the following qualifications are specified:

| | |
|---|---|
| **Instructed Person** | An instructed person is someone who has been instructed by the operator or manufacturer on the given tasks and potential hazards in the event of incorrect behaviour, as well as being semi-skilled and knowledgeable about the necessary safety procedures and safeguards. |
| **Qualified Specialised Professional** | Qualified specialised professionals are individuals who are knowledgeable with the assembly, commissioning, and operation of the product and process qualifications related to their work. The specialised individual is able to recognise hazards and prevent potential hazards because of their professional training, knowledge, and experience, as well as their understanding of the appropriate regulations. |

## 2.5 In an occurrence of Danger or an Accident

Preventive Measures:

- Always be prepared for accidents or fires!
- Keep first-aid equipment (ambulance boxes, blankets, etc.) within easy reach.
- Inform personnel with accident alerting, first-aid, and emergency services.
- Keep clear access routes for emergency vehicles.

If the occurrence happens, follow these steps:

- Turn off the product immediately.
- Implement first-aid procedures.
- Get people out of hazardous areas.
- Inform the appropriate person at the usage spot.
- Contact a doctor and/or the fire department.

# 3. Packaging, Transport and Storage

## 3.1 Inspection, Packaging and Transport

The products have been properly secured to ensure sufficient safeguarding during shipment. Please scrutinise the delivered products for overall quality and transportation problems as soon as possible.

**In the instance of external shipment damage, proceed as follows:**

- Do not accept delivery or accept it only on reserve.
- Issue a complaint.
- Do not use items that are obviously defective.

## 3.2 Transport

Always ensure that your equipment is transported in safe and appropriate containers while transporting it to the usage location or in the field.

Never transfer everything in an unplanned way in the vehicle. Hits and thrusts might seriously impair the product's functionality.

Always use the original packaging, transport containers, transport boxes, or equivalent packaging, whether transporting by train, aircraft, or ship. The container shields the goods from impacts and vibrations.

## 3.3 Storage

Strictly store the product in well-ventilated, dry spaces. During storage, keep it dry and leverage the original packaging if possible.

Avoid extreme heat fluctuations during storage. The initiation of water condensation can impair the product's operation.

When storing, keep in mind the temperature restrictions of the product. Please refer to the product's technical data for valid storage temperatures.

# 4. Intended Use

The purpose of this user guide is to give you basic information about the Bharat AC three socket charger controller. This user guide is mainly focused on the technical aspects of the Bharat AC three socket charger controller, which are covered in this user guide in graphical and tabular formats in various sections, as listed below:

Sections 1–3 featured information concerning the document and product's liability, safety, packing, transportation, and storage constraints. These first three parts will help you know how to follow pre-conception practises that must be followed before, during, and after utilising the product.

Section five contains technical information about the Bharat AC three socket charger controller such as its functions, features, and applications, as well as their technical specifications, required prerequisites of component before commissioning product on-site, block diagram for described internal architecture of Bharat AC three socket charger controller with communication protocol, interface and its functions describe how to configure and integrate Bharat AC three socket charger controller with additional components, and mechanical dimension is useful for installation understanding it.

Section six describes the interpretation of visual indications on chargers, including LED status and meaning, as well as information about the status on display during Bharat AC three socket charger controller usage.

Section seven describes how to commission a mobile application. It includes information to configure various modes of operation, OTA updates, and charging transaction history.

Finally, the appendix section included an abbreviation and glossary as well as the company's help desk and contact information.

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

## 4.1 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.

## 4.2 Alteration and Restoration of the Product/System

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

# 5. Structure and Function

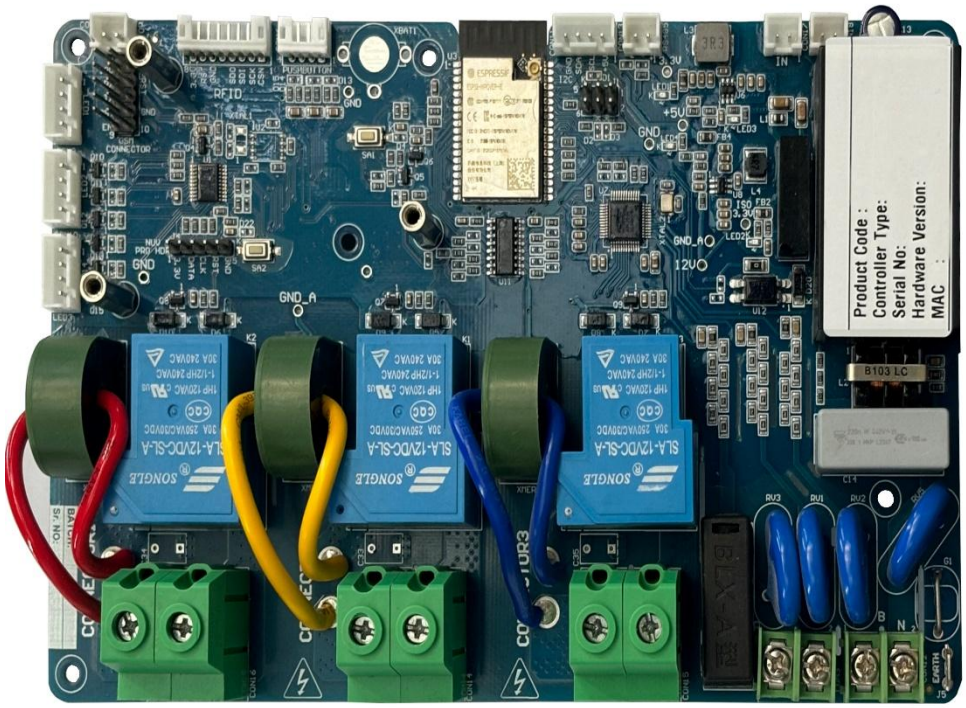



*Figure 2 Bharat AC Three Socket Charger Controller*

Bacancy's Bharat AC three socket charger controller provides a customised solution that helps in the development of a comprehensive AC charger ecosystem, with IEC 60309 standard support. This controller comes with three sockets. It is an "all-in-one" device that has developed functions for integrating AC charging components such as a display, an energy meter, and RFID-based authentication. The front panel LED indicator clearly shows the controller's state by reflecting various colours to provide a more flawless experience in the development of AC chargers.

The users can monitor and manage the controller's functioning from the CMS using wireless communication by using Wi-Fi or standalone GSM modem connectivity. It is supported by the OCPP 1.6j protocol, and users can execute charging (start/stop) operations remotely. To improve safety and operation management, the Bharat AC three socket charger controller has a physical 'Emergency Stop Button' option that allows users to stop charging without requiring authentication.

## 5.1 Bharat AC Three Socket Charger Controller Overview

### 5.1.1 Feature

| List of Feature |
|---|
| Earth fault detection |
| Emergency stop button |
| LED indication for the presence of input supply, error indicator, and state of charge |
| Solenoid lock support |

| |
|---|
| RFID Support Internal |
| Onboard class-1 metering |
| Surge protection |

### 5.1.2 Application

| List of Applications |
|---|
| Helps to build a compact and rugged AC charging ecosystem. |
| Commercial AC charging ecosystem |
| Residential AC charging ecosystem |
| Parking AC charging ecosystem |

## 5.2 Function

### 5.2.1 Technical Specification

| | |
|---|---|
| **Product Properties** | |
| Product Type | Bharat AC Three Socket Charger Controller |
| Product Family | AC Charger Controller |
| Application | • Design and develop the compact and reliable AC charger ecosystem.<br>• Residential and Commercial EV Charging Stations.<br>• Public Parking Charging. |
| **Electrical Properties** | |
| Input Voltage | 415 VAC ± 10% Three Phase |
| AC Input Connection | 3P+N+PE |
| Frequency | 50 or 60 Hz |
| AC Output current | 16 A for each Phase |
| Maximum Output Power | 3.3kW in Each Output |
| **Connection** | |
| Communication Protocol | OCPP 1.6j |
| Communication Network | GSM Modem (4G LTE fall back to 2G) and Wi-Fi |
| **Interface** | |
| Display | 4.3” Graphical LCD Display; 20X4 Character |
| **Ambient Condition** | |
| Degree of Protection | IP00 |
| Operating Temperature | 0°C to +70°C |
| Storage / Transport Temperature | 0°C to +70°C |
| Permissible Humidity | 5 to 95% |
| **Connector** | |
| Connector Type | IEC 60309 industrial Socket |
| Number of Connectors | 3 |
| **Additional Integration Borad** | |
| RFID Module, TFT 4.3” LCD Module | |

| Mechanical Properties | |
|---|---|
| Dimension | 185 (L) X 117.15 (B) X 27.5 (H) mm |
| Weight | 370 grams |
| **Support** | |
| RFID, OTA, CMS Portal, Onboard Class-1 energy metering | |
| **Standards** | |
| IS17017, IEC/EN 61000, IEC61851 | |
| **Safety** | |
| Configurable over current, overvoltage, undervoltage, and short circuit protection | |

### 5.2.2 Prerequisites for Connection

A. The Components included with Bacancy's AC Charger Controller Kit:

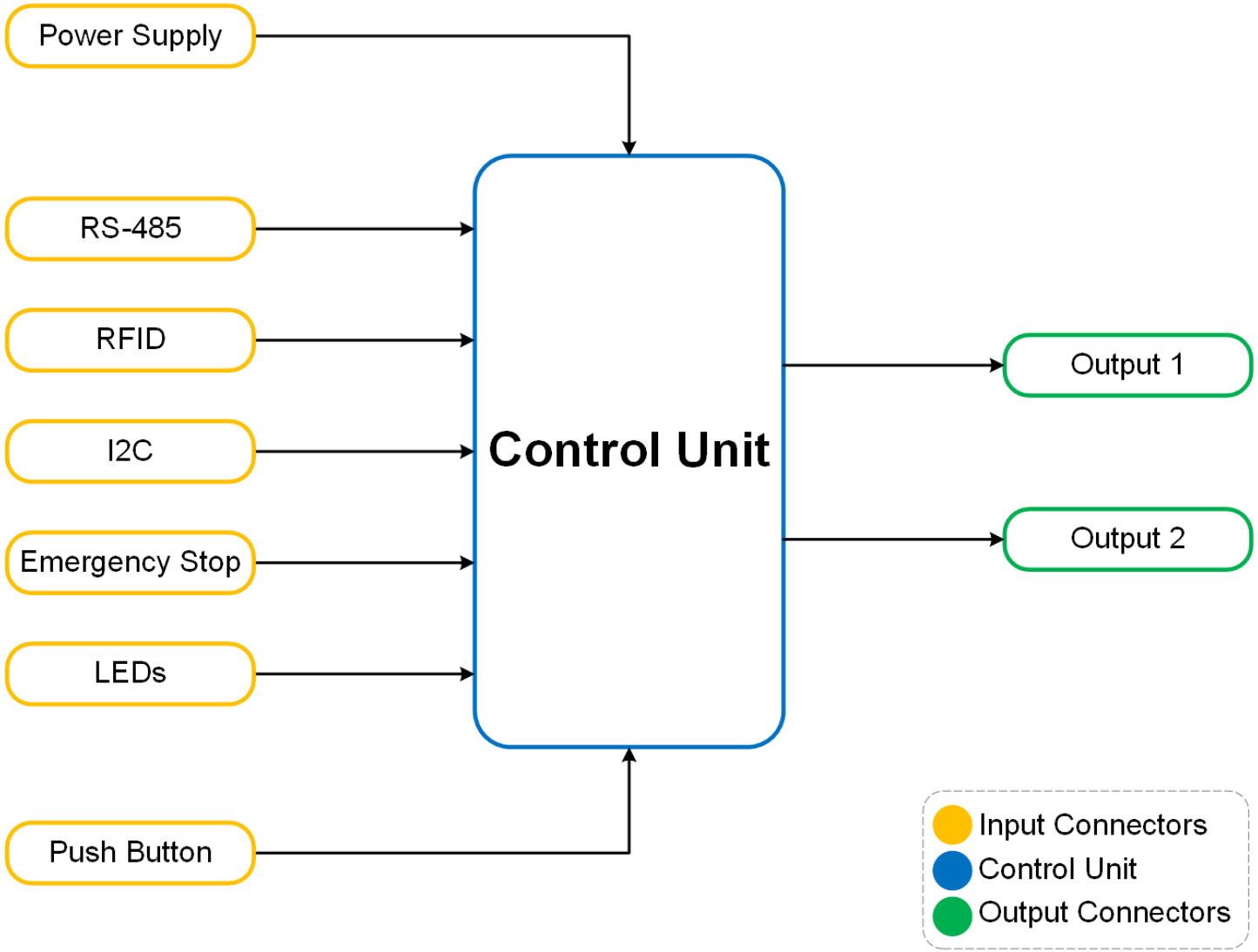
| No. | Components |
|---|---|
| 1 | Main Controller's Hardware |
| 2 | GSM External Board |
| 3 | GSM and Wi-Fi Paper Antenna |
| 4 | LCD Cable |
| 5 | LED Cable |
| 6 | Push Button Cable |
| 7 | RFID Cable |
| 8 | Emergency Stop Cable |

B. The components excluded from Bacancy's AC Charger Controller Kit:

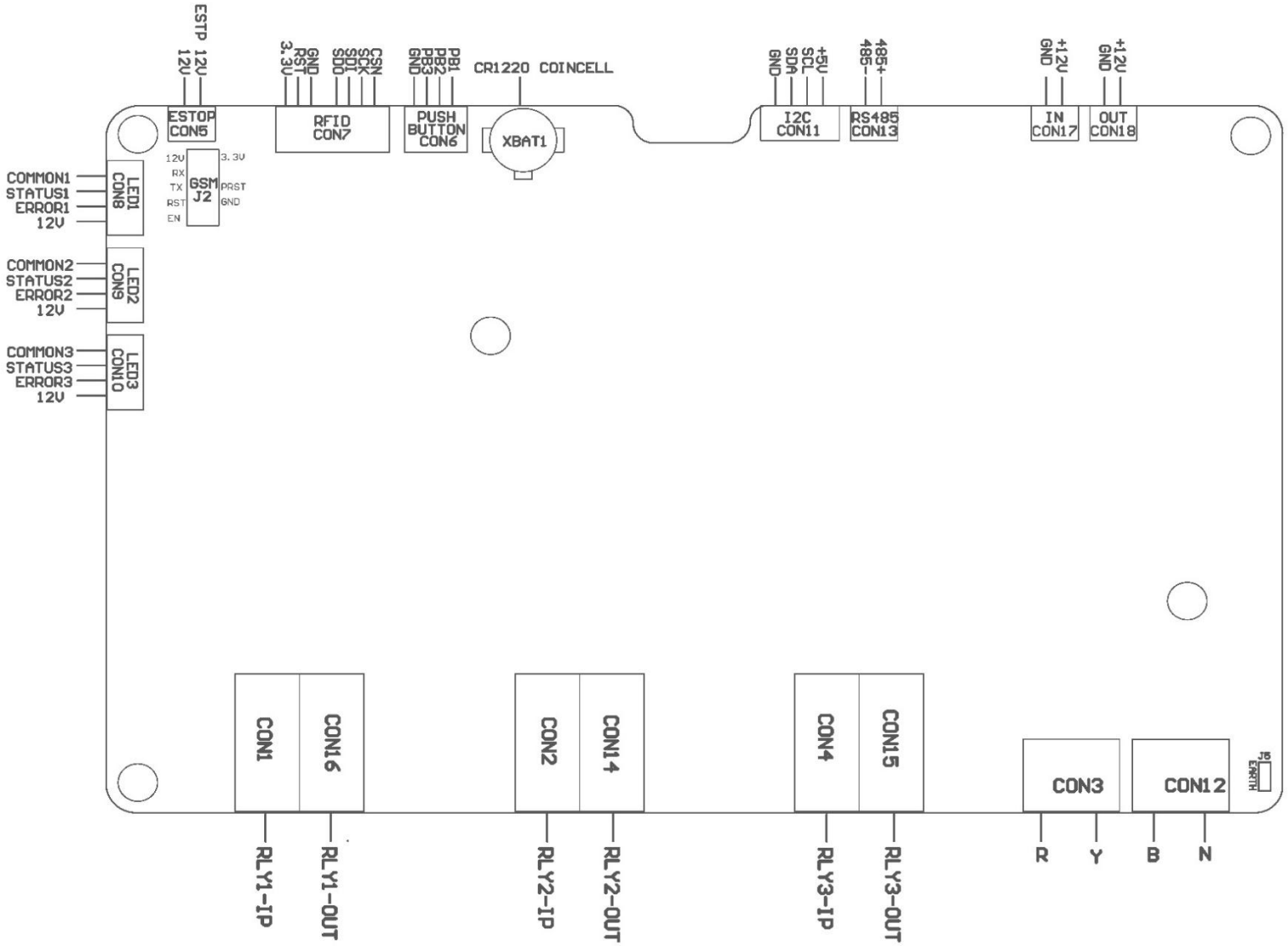
It can depend on specific functions and operations.

| No. | Components |
|---|---|
| 1 | RFID Reader with Tag |
| 2 | RGB LED for Status indication |
| 3 | LCD Display 20 X4 Character, 4.3" Graphical LCD Display |
| 4 | Push Button |
| 5 | Emergency Stop Button |
| 6 | GLCD Add on Board |

### 5.2.3 Block Diagram



### 5.2.4 Interface



### 5.2.5 Pin Configuration

Table 2 Relay Input Section

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 1 | 1 | RLY1-IP | Relay 1 Input Phase 1 |
| 2 | CON 2 | 1 | RLY2-IP | Relay 2 Input Phase 2 |
| 3 | CON 4 | 1 | RLY3-IP | Relay 3 Input Phase 3 |

Table 3 Power Supply

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 3 | 1 | R | R-Phase Input Power Supply |
| 2 | | 2 | Y | Y-Phase Input Power Supply |
| 3 | CON 12 | 1 | B | B-Phase Input Power Supply |
| 4 | | 2 | N | Input Neutral |

Table 4 Emergency Stop

| No. | Connector | Pin | Signal Name |
|---|---|---|---|
| 1 | CON 5 | 1 | ESTP 12 V |
| 2 | | 2 | 12 V |

Table 5 Push Button

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 6 | 1 | PB1 | Push Button 1 |
| 2 | | 2 | PB2 | Push Button 2 |
| 3 | | 3 | PB3 | Push Button 3 |
| 4 | | 4 | GND | GND |

Table 6 RFID Reader

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 7 | 1 | CSN | I2C-bus Serial Dataline input/output |
| 2 | | 2 | SCK | SPI Serial Lock input |
| 3 | | 3 | SDI | SPI Master OUT, Slave IN |
| 4 | | 4 | SDO | SPI Master IN, Slave OUT |
| 5 | | 5 | - | - |
| 6 | | 6 | GND | Ground |
| 7 | | 7 | RFID Reset | Rest and Power Down Input |
| 8 | | 8 | VCC | 3.3 V Power Supply Output |

Table 7 1st Connector LED Indication

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 8 | 1 | Common 1 | Blue LED |
| 2 | | 2 | Status 1 | Green LED |
| 3 | | 3 | Error 1 | RED LED |
| 4 | | 4 | 12V | 12 V Output Supply |

Table 8 2nd Connector LED Indication

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 9 | 1 | Common 2 | Blue LED |
| 2 | | 2 | Status 2 | Green LED |
| 3 | | 3 | Error 2 | RED LED |
| 4 | | 4 | 12V | 12 V Output Supply |

Table 9 3rd Connector LED Indication

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 10 | 1 | Common 3 | Blue LED |
| 2 | | 2 | Status 3 | Green LED |
| 3 | | 3 | Error 3 | RED LED |
| 4 | | 4 | 12V | 12 V Output Supply |

Table 10 I2C Based LCD Support

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON11 | 1 | 5V | 5V Output Supply |
| 2 | | 2 | SCL | I2C Clock |
| 3 | | 3 | SDA | I2C Data Line |
| 4 | | 4 | GND | Ground |

Table 11 RS-485 Serial Communication

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON13 | 1 | 485+ | Data (B)+ |
| 2 | | 2 | 485- | Data (A)- |

Table 12 Relay Output Section

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 16 | 1 | RLY1-OUT | Relay 1 Output Phase 1 |
| 2 | CON 14 | 1 | RLY2-OUT | Relay 2 Output Phase 2 |
| 3 | CON 15 | 1 | RLY3-OUT | Relay 3 Output Phase 3 |

Table 13 Battery Input

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 17 | 1 | +12V | 12 V Input Power Supply |
| 2 | | 2 | GND | Ground |

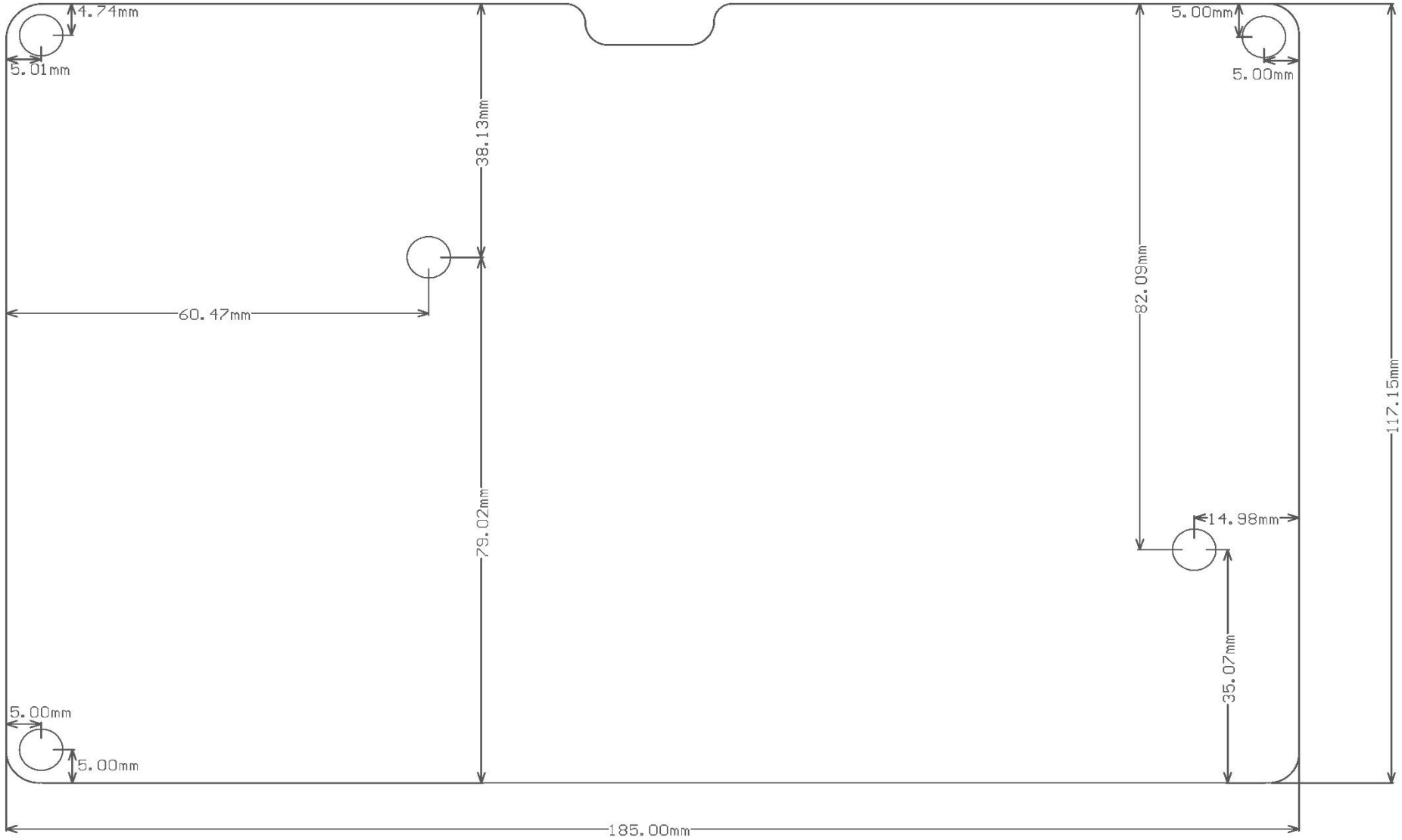
Table 14 Battery Output

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | CON 18 | 1 | +12V | 12 V Output Power Supply |
| 2 | | 2 | GND | Ground |

Table 15 Earth Lug

| No. | Connector | Pin | Signal Name | Description |
|---|---|---|---|---|
| 1 | J5 | 1 | GND | Ground |
| 2 | | 2 | Earth | Input Earthing |

### 5.2.6 Mechanical Dimension



# 6. Interpretation of Visual Indication on Charger

## 6.1 LED

| NOTE! | Customise the colour of the LEDs. |
|---|---|
|  | The user can customise the colours of the LDEs via the commissioning process as required. |

| No. | LED Colour | LED Status | Prompt | Action |
|---|---|---|---|---|
| 1 | Blue | Blink | Ex BAC_223ce6 | It is turned ON, and you connect to the EV charger's Wi-Fi. |
| 2 | RBG | Blink | You didn't connect to the EV charger's Wi-Fi. | It has remained ON and in decommissioning mode. |
| 3 | Blue | Blink | The EV charger is in an available state. | It is connected to the server, and the vehicle is disconnected. |
| 4 | Blue | Steady | The EV charger is in a preparation state. | It is connected to the server, and the vehicle is connected. |
| 5 | Green | Steady | The EV charger is charging. | It is connected to the server, and the vehicle is charging. |
| 6 | Red | Steady | The EV charger is in a faulted state. | It is connected to the server, and a fault occurs due to an emergency stop, undervoltage, overvoltage, and so on. |
| 7 | RBG | Blink | - | It is disconnected from the server. |

## 6.2 Display Status

The Bharat AC three socket charger controller has a 20 x 4 character display supported. However, the user can also integrate a 4.3" graphical display if required. Furthermore, in this subsection, the user can better understand the display's message while using the Bharat AC three socket charger controller.

| NOTE! | Tip: Customisation of Vendor's Name |
|---|---|
|  | The user can change the vendor's name when commissioning by filling out the vendor's name. It will be reflected on the display's top left side. |

1. When users turn on the Bharat AC three socket charger controller, it will display the "Initialising" message along with the vendor and charger name.

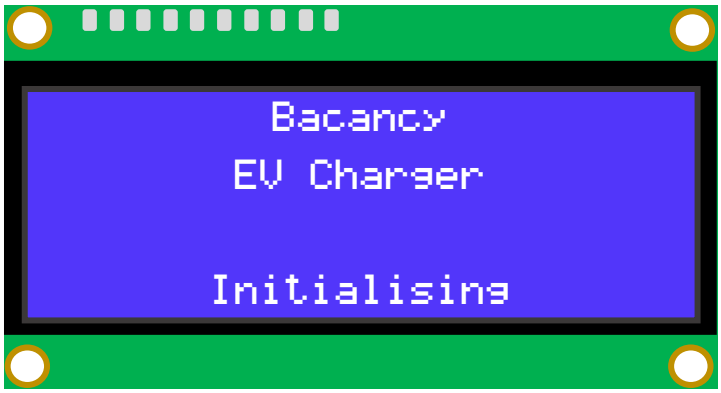



*Figure 3 Initialising Controller in Commissioning Mode.*

2. After the Bharat AC three socket charger controller has properly booted up, it will connect to the OCPP server.
3. The quantity of the connector connected to the controller will be shown on the right-hand side of the display. If the charger has three connections, the screen will refresh and show 1 [conn], 2 [conn], and 3 [conn], in that order. (*Figure 4*)
4. To start charging, take the following steps:
    a. Connect the charger to your vehicle and tap RFID on the reader. (*Figure 4*)
    b. Once successful, the display will show "Vehicle Plugged In". (*Figure 5*)


*Figure 4 To Start Charging, Plug-in Vehicle and Tap the RFID.*

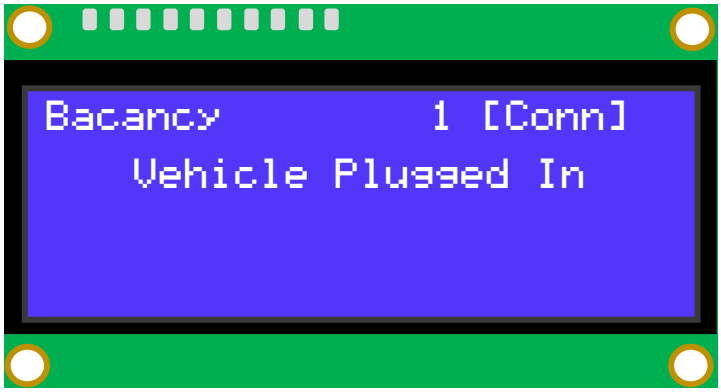



*Figure 5 Vehicle Plugged In.*

c. Once RFID is successfully authenticated, the screen will display the status "charging." *(Figure 5)*

- kWh indicates total energy consumption while charging.
- The duration indicates the charging session time.

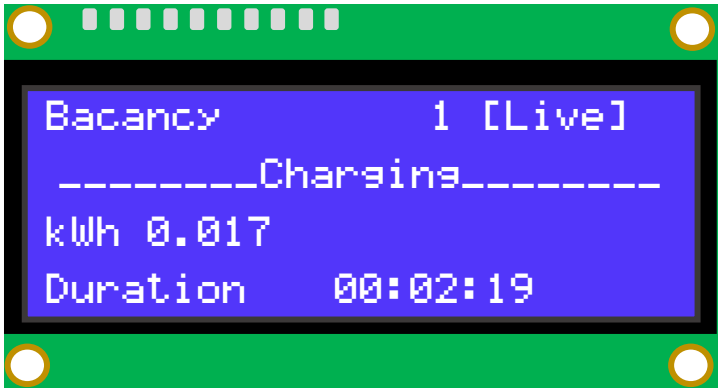



*Figure 6 Energy Consumption and Time Duration in Charging Mode.*

**5.** To stop transactions while in charging mode, tap RFID again. The display will show the charging session's "summary" status on the screen. (*Figure 7*)

- kWh indicates total energy consumption while charging.
- The duration indicates the charging session time.

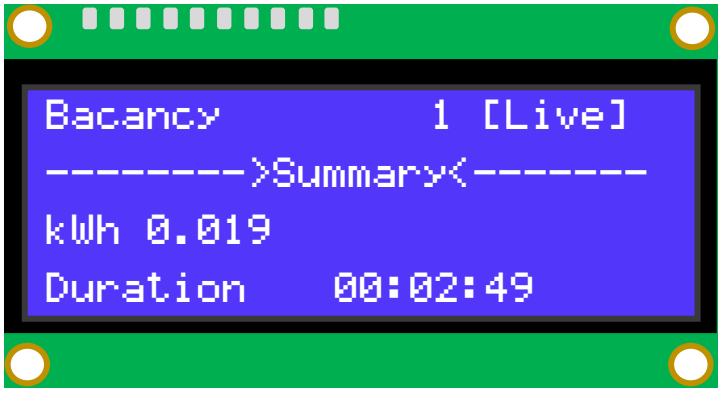



*Figure 7 Charging Summary on RFID stop conditions.*

6. In the case of a problem, the display will indicate "Fault Occurred" along with the fault name status *(Figure 8)*. Refer *to section 6.2.1* for further information about the fault.

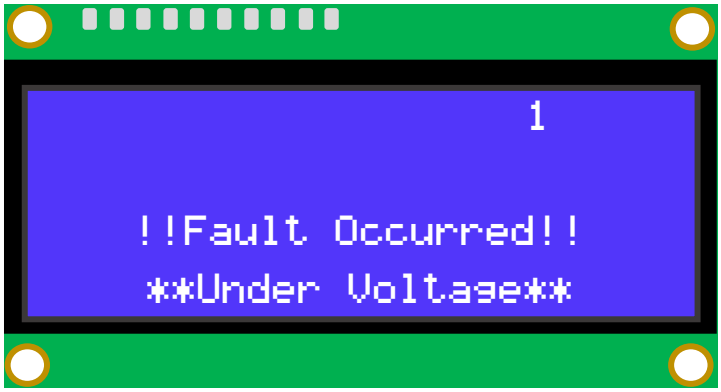



*Figure 8 Fault Occurred with the Fault Name.*

7. In the case of a server failure or loss of internet connection, the display will show the status "Connecting to server." (*Figure 9*)

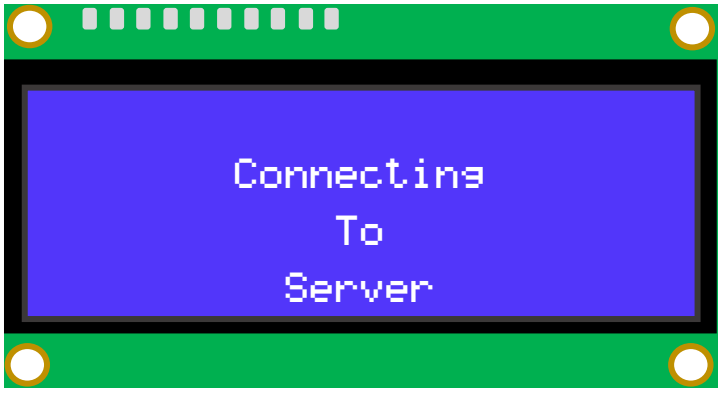



*Figure 9 Loss of Internet Connection.*

8. When the charger gets an OTA software update. It will show the status "Unavailable" on the screen. (*Figure 10*)


*Figure 10 Unavailable Due to OTA Software Updates*

### 6.2.1 Fault Occurred

In the event of a fault, the display will show "Fault Occurred" along with the fault name. However, the AC charger controller provides customisable safety protection features such as overcurrent, overvoltage, undervoltage, and short circuit, and it can display the fault as a set configurable intended level limit. In addition, the user may contact the help desk to resolve the issue.

1. **Over Current**

   If the controller exceeds the configured overcurrent limit as intended, the display will indicate "Fault Occurred" along with "Overcurrent". (*Figure 11*)

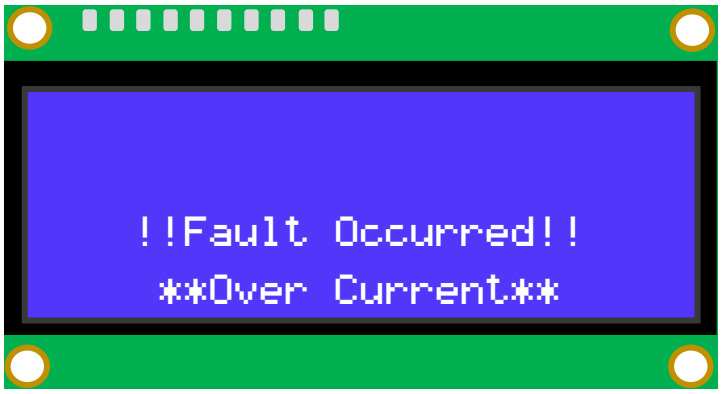



*Figure 11 Fault Occurred along with Overcurrent Message*

2. **Under Voltage**

If the controller drops the configured under-voltage limit as intended, the display will indicate "Fault Occurred" along with "Under Voltage". (*Figure 12*)

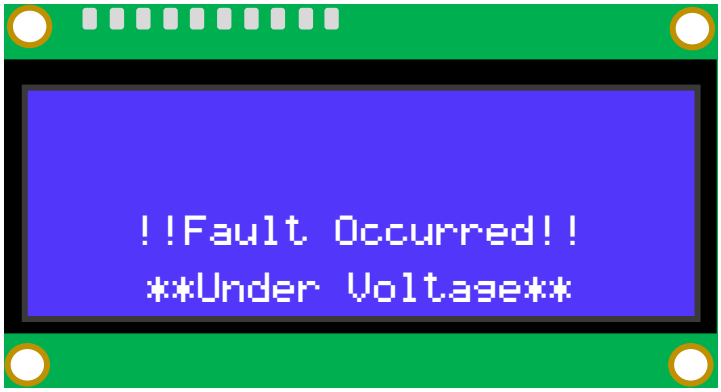



*Figure 12 Fault Occurred along with the Under Voltage Message.*

3. **Over Voltage**

If the controller exceeds the configured overvoltage limit as intended, the display will indicate "Fault Occurred" along with "Over Voltage". (*Figure 13*)

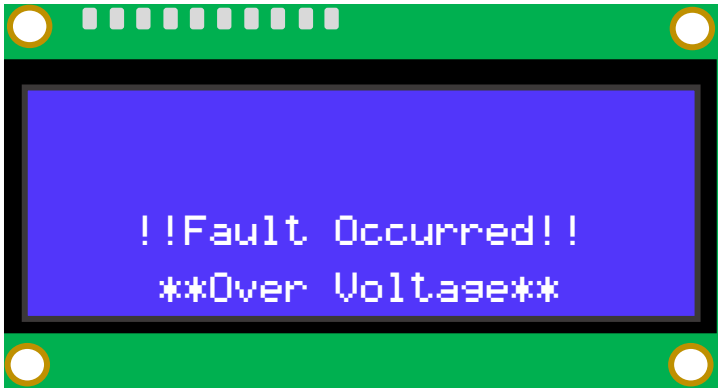



*Figure 13 Fault Occurred along with the Over Voltage Message.*

4. **Emergency Stop**

In the event of the use of the emergency stop button, the display will indicate “Fault Occurred” along with the “Emergency Stop”. The user should return the emergency stop button to its normal position. (*Figure 14*)

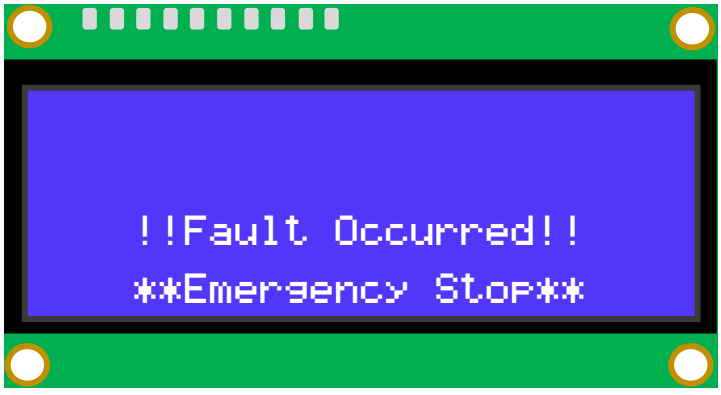



*Figure 14 Fault Occurred along with the Emergency Stop Message.*

5. **Earth Fault**

In the event of an insulation fault, the current is flowing to the earth, and the display will indicate “Fault Occurred” along with the “Earth Fault”. (*Figure 15*)


*Figure 15 Fault Occurred along with the Earth Fault Message.*

# 7. Appendix

## 7.1 Abbreviations and Glossary

| | |
|---|---|
| *3P+N+PE* | *A 3-phase 4-wire + PE system is an electrical power distribution system that consists of three conductors carrying alternating current (AC) power, a neutral conductor, and a protective earth conductor.* |
| *AC* | *Alternating current, is a type of electrical current in which the current repeatedly changes direction.* |
| *CMS* | *A CMS, or Charging Management System, is a software platform that is designed to manage electric vehicle (EV) charging stations.* |
| *CON* | *Connector* |
| *DC* | *Direct current (DC) is one-directional flow of electric charge.* |
| *EV* | *An EV is defined as a vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source.* |
| *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.* |
| *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.* |
| *Hz* | *hertz, the SI unit of frequency, is equal to one cycle per second.* |
| *I2C* | *I2C stands for inter-integrated circuit. It is a bus interface connection protocol incorporated into devices for serial communication.* |
| *IC* | *An integrated circuit (IC), sometimes called a chip, microchip, or microelectronic circuit, is a semiconductor wafer on which thousands or millions of tiny resistors, capacitors, diodes, and transistors are fabricated.* |
| *IEC 60309* | *IEC 60309 is a series of international standards from the International Electrotechnical Commission (IEC) for "plugs, socket-outlets, and couplers for industrial purposes."* |
| *IEC 61851* | *IEC 61851 is an international standard for electric vehicle conductive charging systems.* |

| | |
|---|---|
| *IEC/EN 61000* | *IEC/EN 61000 IEC/EN 61000-3-2 deals with the limitation of harmonic currents that are supplied from the mains network with a voltage not less than 220V and a current up to and including 16A per phase.* |
| *IEC62196-2* | *IEC 62196 Plugs, socket-outlets, vehicle connectors, and vehicle inlets: Conductive charging of electric vehicles is a series of international standards that define requirements and tests for plugs, socket-outlets, vehicle connectors, and vehicle inlets for conductive charging of electric vehicles and are maintained by the technical subcommittee SC 23H, "Plugs, socket-outlets, and Couplers for Industrial and Similar Applications, and for Electric Vehicles," of the International Electrotechnical Commission (IEC).* |
| *IP* | *Ingress Protection (IP) ratings, which grade the resistance of an enclosure against the intrusion of dust or liquids.* |
| *IS17017* | *IS 17017 is the key electric vehicle charging standard in India.* |
| *ISO* | *The International Organization for Standardization* |
| *LCD* | *A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers.* |
| *LED* | *A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it.* |
| *OCPP 1.6* | *The OCPP 1.6 (Open Charge Point Protocol) enables the integration of equipment from different manufacturers.* |
| *OTA* | *An over-the-air update is a firmware or operating system update that is downloaded by the device over the internet.* |
| *RFID* | *Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify, and track tags attached to objects.* |
| *RGB* | *Red, Green, Blue* |
| *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.* |

| | |
|---|---|
| *RYB* | *Conventionally, the three phases are designated as the red-R, yellow-Y, and blue-B phases.* |
| *SPI* | *Serial Peripheral Interface (SPI) is a de facto standard for synchronous serial communication, used primarily in embedded systems for short distance wired communication between integrated circuits.* |
| *TFT* | *A Thin Film Transistor is a display screen technique used in LCD (liquid crystal display).* |
| *Type-2 Connector* | *The IEC 62196 Type 2 connector is used for charging electric vehicles, mainly within Europe, as it was declared standard by the EU.* |
| *UART* | *A Universal Asynchronous Receiver-Transmitter is a protocol for asynchronous serial communication in which the data format and transmission speeds are configurable.* |
| *VAC* | *VAC (Volts Alternating Current) is a measure of the strength of the alternating electric field that drives the flow of electrons in AC electrical systems.* |
| *VDC* | *VDC refers to volts of direct current, and it can come from either a battery or a power supply that converts AC (alternating current) into DC.* |
| *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.* |

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