User Guide

Bharat AC Single Socket Charger Controller

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

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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
3	26/08/2025	Updated: Pin configuration and Mechanical Dimension	Rajkumar Patel	Samir Bhatt
4	04/05/2026	Revised Email Address	Rajkumar Patel	Samir Bhatt

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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:

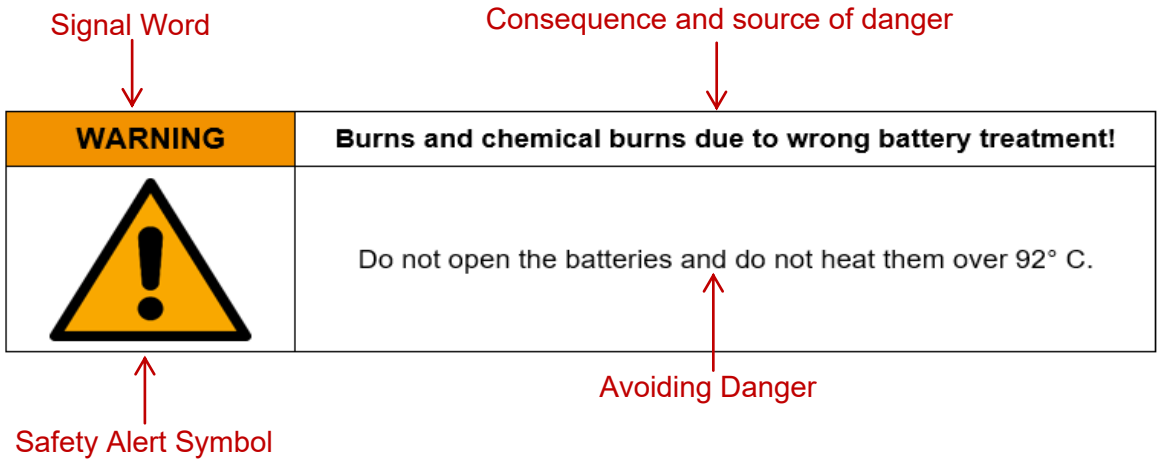


Figure 1 Safety Instruction

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. 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 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 an 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 single socket charger controller. This user guide is mainly focused on the technical aspects of the Bharat AC single 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 single socket charger controller, such as its functions, features, and applications, as well as its technical specifications, required prerequisites of components before commissioning the product on-site, and a block diagram for the described internal architecture of the Bharat AC single socket charger controller with communication protocol, interface, and its functions. Describe how to configure and integrate the Bharat AC single socket charger controller with additional components, and the mechanical dimensions are useful for installation and understanding it.

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. • 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

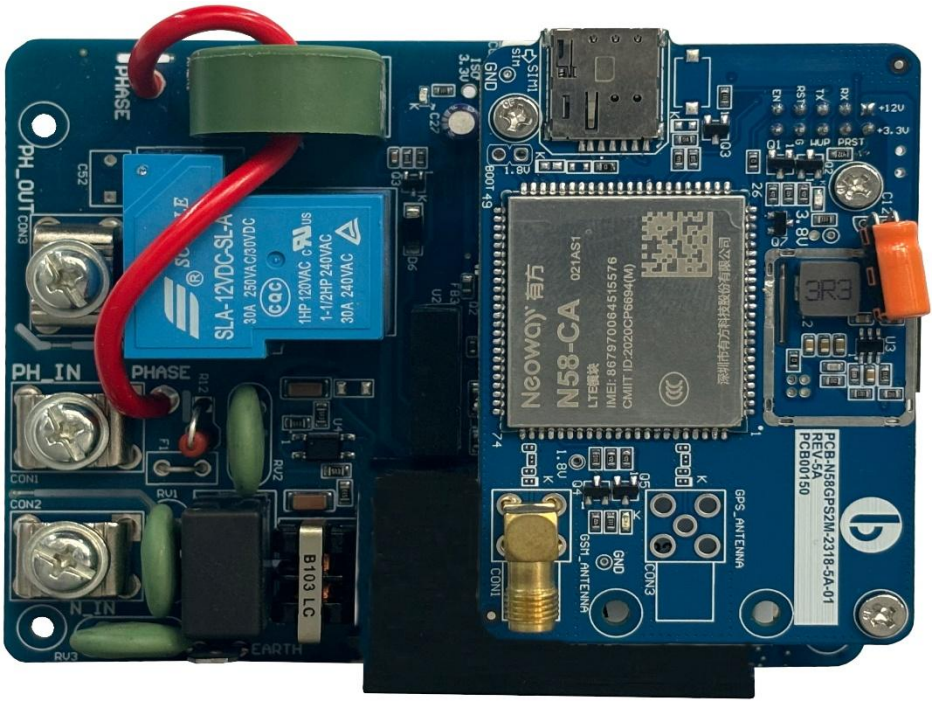


Figure 2 Bharat AC Single Socket Charger Controller

Bacancy's Bharat AC single socket charger controller provides a customised solution that helps in the development of a comprehensive AC charger ecosystem, with IEC 60309 industrial connectors. It is a "all-in-one" device that has developed functions for integrating AC charging components such as a display, 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 functioning from the CMS using wireless communication by using Wi-Fi or a standalone GSM modem connectivity. It has supported with the OCPP 1.6j protocol, users can execute charging (start/stop) operations remotely. To improve safety and operation management, the Bharat AC single socket charger controller has a physical 'Emergency Stop Button' option that allows users to stop charging without requiring authentication.

5.1 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
Onboard class-1 metering

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 Single Socket Charger Controller
Product Family	AC Charger Controller
Application	• Design and develop the compact and reliable AC charger ecosystem. • Residential and Commercial EV Charging Stations. • Public Parking Charging.
Electrical Properties	
Input Voltage	230 VAC ± 10% Single Phase
AC Input Connection	P+N+PE
Frequency	50 or 60 Hz
AC Output current	16 Amp
Maximum Output Power	3.3kW Output Power
Connection	
Communication Protocol	OCPP 1.6j
Communication Network	GSM Modem (4G LTE fall back to 2G) and Wi-Fi
Interface	
Display	OLED Display
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 Connector	1
Additional Integration Borad	
RFID Module, TFT 4.3” LCD Module	
Mechanical Properties	
Dimension	116.74 (L) X 87 (B) X 30 (H) mm
Weight	148 grams

Support
RFID, OTA, CMS Portal, On Board 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:

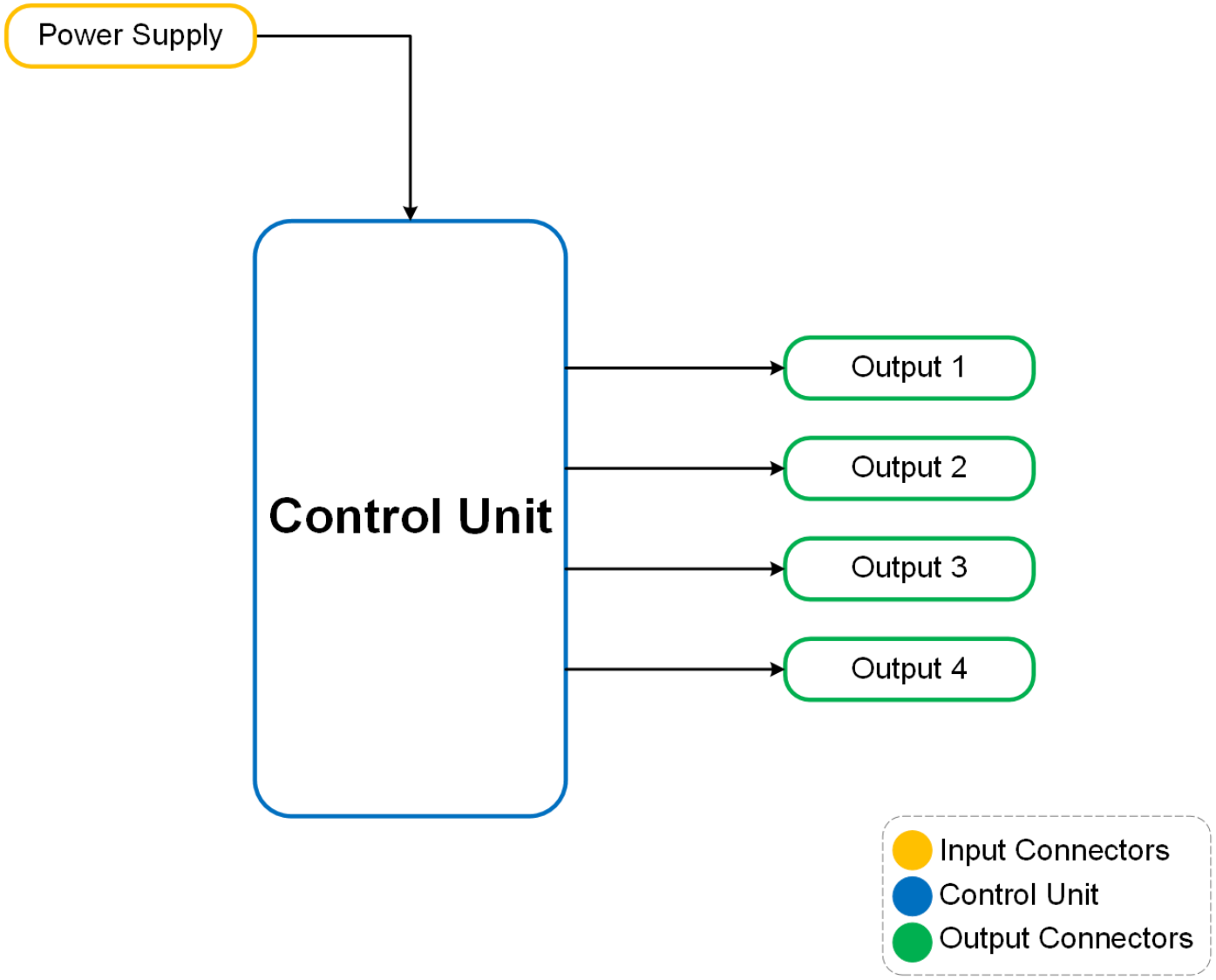
No.	Components
1	Main Controller's Hardware
2	GSM External Board
3	GSM and Wi-Fi Paper Antenna

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

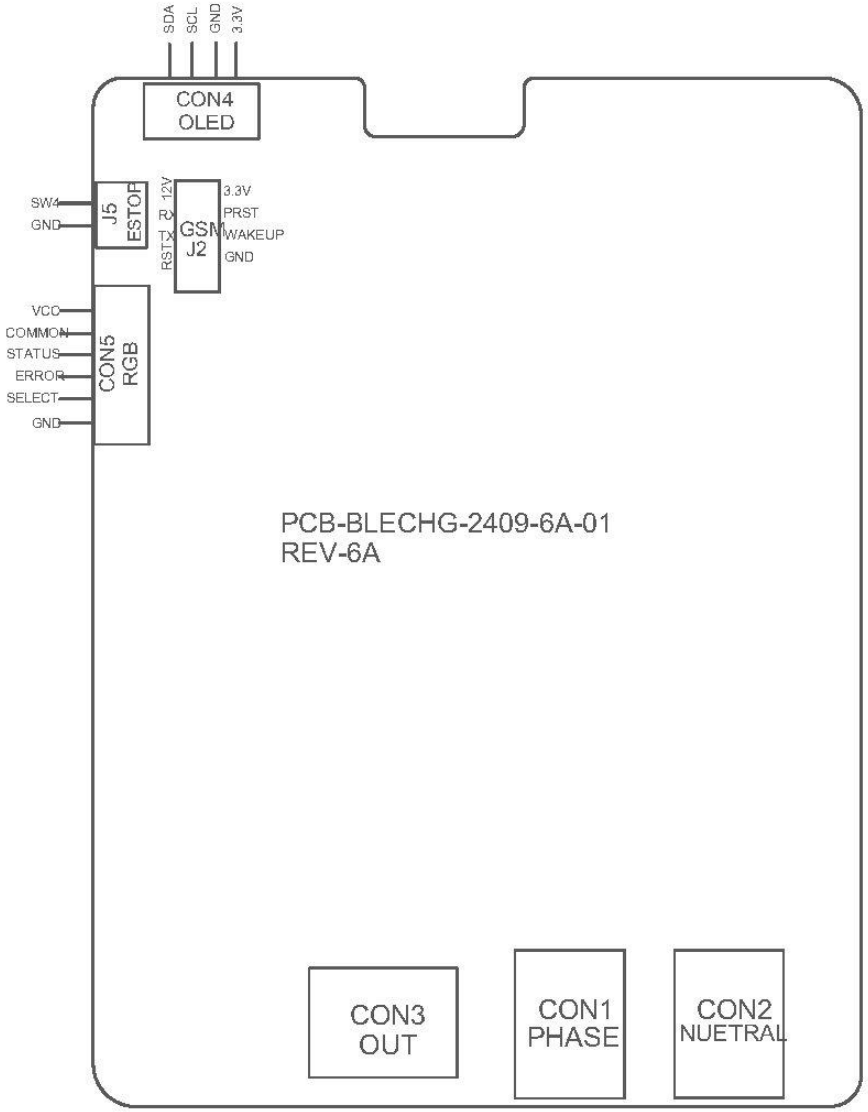
It can depend on specific functions and operations.

No.	Components
1	1.3" OLED Display
2	Push Button

5.2.3 Block Diagram



5.2.4 Interface



5.2.5 Pin Configuration

Table 2 Power Supply

No.	Connector	Pin	Signal Name	Description
1	CON 1	1	Phase Input	230 V Input Supply
2	CON 2	1	Neutral	Input Neutral
3	CON 3	1	Phase Output	Phase Output

Table 3 OLED Interface

No.	Connector	Pin	Signal Name	Description
1	CON4	1	3.3V	V Output
2		2	GND	Ground
3		3	SCL	I2C Clock
4		4	SDA	I2C Data

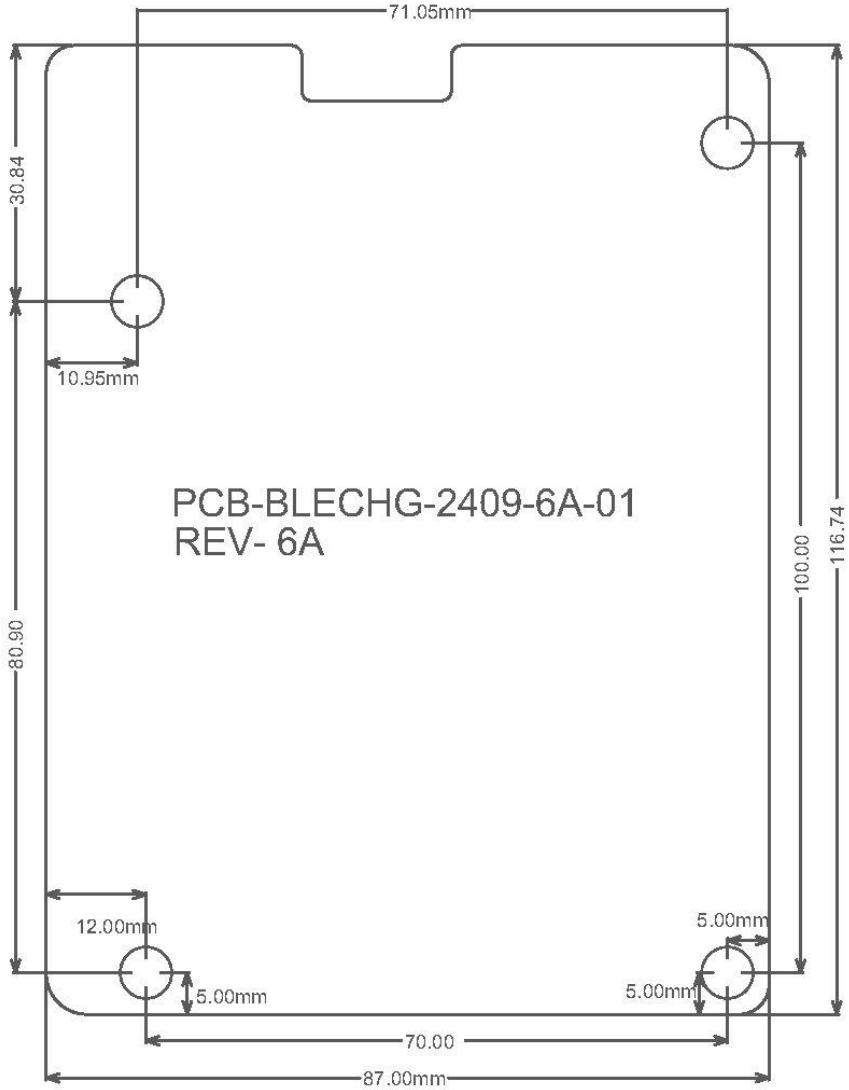
Table 4 RGB Interface

No.	Connector	Pin	Signal Name	LED Board Connection	Description
1	CON5	1	VCC	12 V	12 V Supply
2		2	COMMN	B	Blue LED
3		3	STATUS	G	Green LED
4		4	ERROR	R	Red LED
5		5	SELECT	-	Pushbutton
6		6	GND	-	Ground

Table 5 Emergency Stop

No.	Connector	Pin	Signal Name	Signal Description
1	J5	1	SW4	Emergency Switch 12V Supply
2		2	GND	Ground

5.2.6 Mechanical Dimension



6. Appendix

6.1 Abbreviations and Glossary

P+N+PE	*A single-phase system is an electrical power distribution system that consists of one conductor 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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