

Hybrid Charger Controller Manual



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Revision History

Date	Version	Name	Description of Changes	Reviewer	Approver
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Preface

General Information

This document intends to enable users to understand and install Bacancy's Hybrid Charger Controller. It aims to give a broad overview of the main features and applications of the AC Charge Controller, the connection sequence, and the functionality of the AC Controller and provide the user with all the necessary information required to execute the connection procedure.

Purpose

After reading this user manual you will understand the following;

- Broad Introduction (including specifications and features)
- Functionality
- Visual Indication

of Bacancy's Hybrid Charger Controller

Support

• Feel free to contact Bacancy's Technical Support Team if you need help or have queries regarding Bacnacy's AC Charge Controller.



Safety Instructions & Warnings

⚠ Before using Bacancy's AC Charge Controller read all instructions and cautionary markings on all appropriate sections of this manual carefully.



DANGER

Hazard of Arc Flash, Explosion, or Electric Shock:

- 1. Never use a flame or any kind of device that may pose a risk of producing a spark near fully charged batteries; as it will result in an explosion of the batteries and a serious fire hazard.
- 2. Be cautious while working with metal tools on and around batteries. There is a potential risk of the metal tool instigating a spark, short circuit, or explosion.
- 3. In an event of abnormal machine behavior; please disconnect the battery breaker and power source input and output wires.
- 4. If the machine catches fire by any chance, please use a dry powder extinguisher and disconnect all switches immediately.



WARNING

Hazard of Arc Flash, Explosion, or Electric Shock:

- 1. Ensure the power supply is off before wiring, due to the risk of fire or electric shock.
- 2. Maintenance and overhaul should be conducted by professional maintenance personnel, users should not disassemble the machine by themselves, as it will cause electric shock and damage to the product.
- 3. No attempt should be made to open, repair, or modify the AC Controller. Doing so may damage the controller and will void its warranty.



CAUTION

- 1. Installing must strictly be conducted according to the installation steps illustrated in the following chapters. Otherwise, it will cause damage to products.
- 2. Never use a high-pressure washer to clean the controller.





CAUTION

3. Never attempt to change the default settings of the device without technical advice to avoid the risk of hazard or malfunction.



Installation Environment

Never install AC Charge Controller in an environment where;

- 1. There is a constantly high concentration of oxidizing or salted gases.
- 2. It is wet or dusty.
- 3. It is close to sources of extreme heat, open flames, or sparks, or has a high variation in temperature.
- 4. There are highly flammable materials or gas concentrations.
- 5. It is unprotected from water or high humidity.
- 6. It is prone to physical vibrations.
- 7. There is a high gas concentration or flammable materials.



Intended Use

Installation Requirements

- This manual is meant to be referred by qualified personnel who understand the AC Charge Controller's operation, servicing, and maintenance.
- During the installation, it is advised that a service technician should be present to monitor the AC Charge Controller.



Important Notes

- Before operating the AC Charge Controller users must read the entire document with utmost attention to get familiar with the product.
- Do not make 'assumptions' and move forward. If you find it difficult to execute the installation process, contact Bacancy's Technical team for assistance.



• Qualified Personnel: Qualified personnel has the edge and skills related to the construction, installation, and operation of AC Charge Controllers and has obtained safety training to identify and avoid safety hazards.





1. Chapter: Introduction

Bacancy's AC Charge Controller is compliant with industrial standards and safe for usage. With this AC Controller users can build their charger hassle-free!

Bacancy's AC Charge Controller is used for an electric vehicle's AC charging via scanning the RFID card. The RFID card is a key component in starting or stopping the charging session. To add, this AC Charge controller is supported with 20X4 LCD to get the connector's data & charging summary and it comes with internal metering for charger usage calculation. The LED indicator on the front panel helps users understand the charger's status through various color indications.

With WiFi and GSM, users can monitor and manage the charger operation from the CMS. Users can perform charging (start/stop) operations remotely as the AC Controller supports the OCPP 1.6 protocol. The best part is users that users are provided with an 'Emergency Stop' feature to stop charging without needing authentication.

1.1. Specification of AC Charge Controller

Basis	Specifications
Software Specification	OCPP 1.6 Protocol Support
	Auto network switching mechanism
	OTA Support
	3 Connector Bharat AC supported
	Type-2 Single Gun and Type-2 Dual Gun supported
Safety Specification	Configurable Over Current and Under Current limit
	Over Voltage and Under Voltage cut-off supported



Frequency	50HZ	
Energy Measurement	Internal (Inbuild CT) Internal Metering supported	
Network Interface	GSM Modem(4G LTE fall-back to 2G) and Wi-Fi	
Display	20 * 4 Character LCD Display and Optional - TFT 4.3" LCD supported (with external Add-on board)	
Operating Temperature	0°C to +70°C	
Storage Temperature	0°C to +70°C	
Humidity	5 to 95%	

1.2. Features of AC Charge Controller

List of Features			
Earth Fault Detection			
Emergency Stop Charging			
LED indication for Presence of Input Supply, Errors Indicator, State of Charge			
RTC Support			
Solenoid Lock support			
RFID Support Internal			
Onboard Class-1 metering			
Surge protection			



1.3. Applications of AC Charge Controller

Sr. No.	List of Applications		
1	Helps to build a compact and rugged AC Charger Ecosystem		
2	Commercial AC Charging Ecosystem		
3	Residential AC Charging Ecosystem		
4	Parking AC Charging Ecosystem		









Help to build a compact and rugged AC charger ecosystem Commercial AC Charging Ecosystem

Residential AC
Charging Ecosystem

Parking AC Charging Ecosystem



2. Chapter: Functionality of AC Charge Controller

2.1. Technical Specifications of Hybrid Charger Controller

Basis	Specifications
Input Voltage	415VAC+/-10% (Three Phase)
AC Input Connection	3P + N + PE
AC Output Current	16A X2 (IEC 60309) & 32A X 1(IEC 62196-2)
Maximum Output Power	3.3 kW X2 (IEC 60309) & 7.4kW X 1(IEC 62196-2)
Connector Type	IEC 60309 Industrial Socket & Type2 AC
Number of Connector	3
Dimension	L=188.50mm, B=150.60mm, h=30mm



2.2. Requirements prior to Connection

a. Included Components in Bacancy's AC Charge Controller's Kit:

Sr. No.	Items
1.	Main Controller's Hardware
2.	GSM External Board
3.	GSM and WiFi Paper Antenna
4.	LCD Cable
5.	LED Cable
6.	Push Button Cable
7.	RFID Cable
8.	Emergency Stop Cable

b. Components not included in Bacancy's AC Charge Controller's Kit but necessary for a specific feature:

Sr. No.	Items	
1.	RFID Reader with Tag	
2.	RGB LED for Status Indication	
3.	20X4 LCD Or 4.3" Graphical LCD	
4.	Push Button	
5.	Emergency Stop Button	



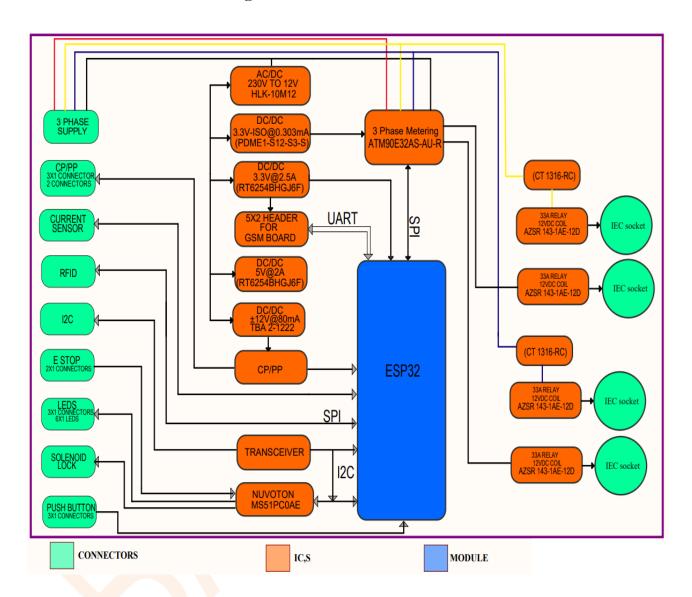
2.3. Hybrid Charger Controller



Bacancy's AC Hybrid charger controller offers a customized solution that helps to build a complete AC charger ecosystem wo IEC 60309 sockets and one Type-2 connector. It is an "All in One" product with built-in features to integrate AC charging components like a Display, Energy Meter, RFID-based authentication, and OCPP. The LED indicator on the front panel helps to understand the charger's status by indicating various colors to give a smooth experience in the development of AC chargers.

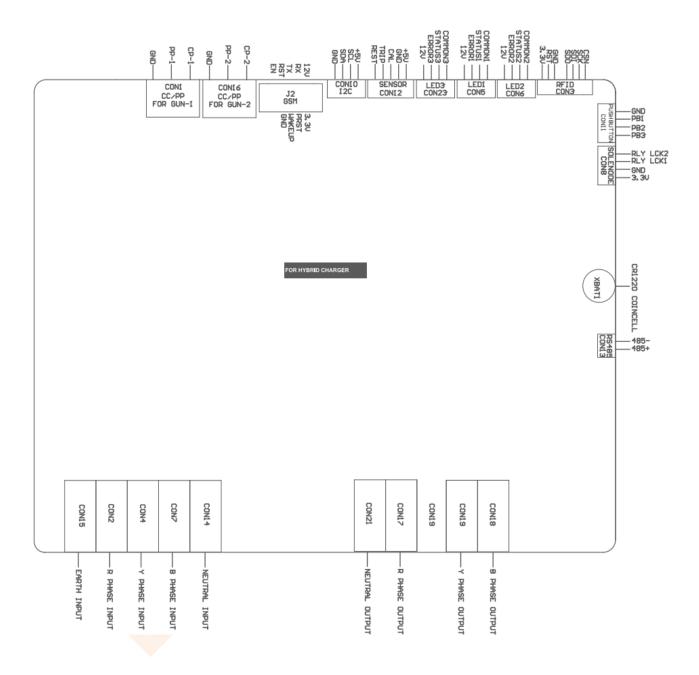


2.3.1. Block Diagram





2.3.2. Controller Interface





2.3.3. I/O Details

Table 1,2, 3, 4, and 5: Power Supply

CON2		
PIN	Signal Name	Description
1	R Phase	230V Input Supply

Table 2:

CON4		
PIN	Signal Name	Description
1	Y Phase	230V Input Supply

Table 3:

CON7			
PIN	Signal Name	Description	
1	B Phase	230V Input Supply	

Table 4:

CON14		
PIN	Signal Name	Description
1	Neutral	Input Neutral



Table 5:

CON15		
PIN	Signal Name	Description
1	Earth	Input Earthing

Table 6: Vehicle Connection

CON16		
PIN	Signal Name	Description
1	СР	Control Pilot
2	PP	Proximity Pilot
3	GND	Ground / PE

Table 7: LED Indication

CON5 (1st Connector), CON6 (2nd Connector), CON23 (3rd Connector)		
PIN Signal Name Description		
1	В	Blue LED
2	G	Green LED
3	R	Red LED
4	VCC	12V output supply

Table 8: Push Button

CON11		
PIN	Signal Name	Description
1	BB3	Push button 3



2	BB2	Push button 2
3	BB1	Push button 1
4	GND	GND

Table 9: 1212C-based CD Support

CON10		
PIN	Signal Name	Description
1	5V	5V Output Supply
2	SCL	I2C Clock
3	SDA	I2C Data Line
4	GND	Ground

Table 10: Emergency Stop

CON9		
PIN	Signal Name	Description
1	12V In	
2	12V	

Table 11: RFID Reader

CON3		
PIN	Signal Name	Description
1	Csn	I2C-bus serial data line input/output
2	Sck	SPI serial clock input
3	Sdi	SPI master out, slave in



4	Sdo	SPI master in, slave out
5	-	-
6	GND	Ground
7	RFID reset	Reset and Power-Down Input
8	VCC	3.3V Power Supply Output

Table 12, 13, 14, and 15: Relay Output Section

CON19		
PIN	Signal Name	Description
1	no_y	Y Phase Output

Table 13:

CON18		
PIN	Signal Name	Description
1	no_b	B Phase Output

Table 14:

CON21				
PIN	Signal Name	Description		
1	no_n1	Neutral Output		

Table 15:

CON17			
PIN	Signal Name	Description	



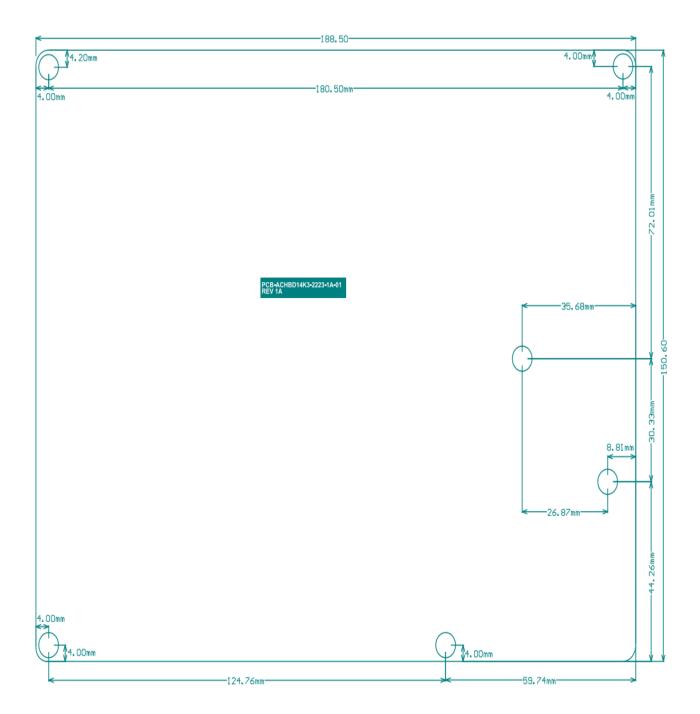


1	no_r	R Phase Output





2.3.4. Mechanical Details (Dimensions)





3. Chapter: Visual Indication in Bacancy's EV Chargers

3.1. LED with EV Charger

Action	Prompt	LED Status	LED Color
The EV Charger is turned on and you connect to the EV charger's WiFi	Ex BAC_223ce6	LED will Blink	Blue
The EV Charger is on and not in commissioning mode	You didn't connect to the EV charger's WiFi	All LEDs will Blink	RBG (Red, Blue, Green)
EV Charger is connected to the server and a car is not connected	The EV charger is in an available state	LED will Blink	Blue
EV Charger is connected to the server and a car is connected	The EV charger is in preparing state	LED will be Steady	Blue
EV Charger is connected to the server and a car is charging	The EV charger is in a charging state	LED will be Steady	Green
EV Charger is connected to the server and a fault occurs (Ex. emergency stop, Undervoltage, overvoltage, etc.)	The EV charger is in a faulted state	LED will be Steady	Red
EV Charger disconnected from the server.		All LEDs will Blink	RBG (Red, Blue, Green)



3.2. 20X4 Display with EV Charger

1. Figure 3.2.1. shows the EV charger in booting/commissioning mode.



Figure 3.2.1. EV Charger is in Available State

2. EV charger is successfully booted and connected to the OCPP server.

Note: At the time of commissioning, the vendor name is filled in by a user and that user name will be displayed on the top left side. Ex Bacancy.

- 3. 1[conn] shows 1st connector's state. If the charger has 3 connectors, the screen will refresh and 2[conn] and 3[conn] will be displayed.
- 4. Following are the steps to start charging:
 - **a.** Plug in the vehicle. (refer to Figure 3.2.3.)
 - **b.** tap RFID to start. (refer to Figure 3.2.4.)





Figure 3.2.2. EV Charger in Preparing State

5. Figure 3.2.3 shows the user has completed step (a.) of plugging the Connector into the car.



Figure 3.2.3. EV Charger in Preparing State



6. Figure 3.2.4 shows the user has completed step (**b.**) of tapping the RFID to start a transaction.

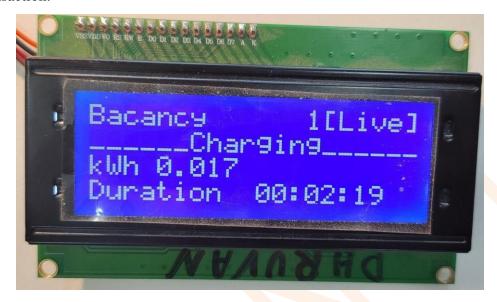


Figure 3.2.4. EV Charger is in Charging State

7. In figure 3.2.4 the charging is started.

Here,

- Kwh will show total energy consumption and
- **Duration** will show the charging session time.



Figure 3.2.5. EV Charger is in Finishing State



- 8. In figure 3.2.5 the user tapped RFID again to stop a transaction. Here, the charging is stopped.
 - a. Summary will be displayed.
 - b. **Kwh** will show the total energy used
 - c. **Duration** will show the total time of the charging session.



Figure 3.2.6. EV Charger is in the Fault State

9. As shown in figure 3.2.6; if a fault occurs: !!Fault Occurred!! will be displayed on the screen with the fault name displayed below it.





Figure 3.2.7. EV Charger Disconnected

10. Figure 3.2.7 shows that the EV charger is: disconnected from the server or didn't receive an internet connection.



Figure 3.2.8. EV Charger receiving OTA

11. Figure 3.2.8 shows that the EV charger is receiving OTA.