BACANCY®
SYSTEMS PVT LTD

User Guide

CCS2 EV Simulator (120 kW)

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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	26/04/2024	Initial Release	Rajkumar Patel	Vivek Vasavada
1	06/06/2024	Contact Details	Rajkumar Patel	Vivek Vasavada
2	25/02/2025	Sections 5, 7, and 8 updated with image, interface diagram, EV simulator setup, and HMI operation and functionality.	Rajkumar Patel	Vivek Vasavada
3	04/05/2026	Revised Email Address	Rajkumar Patel	Vivek Vasavada

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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:

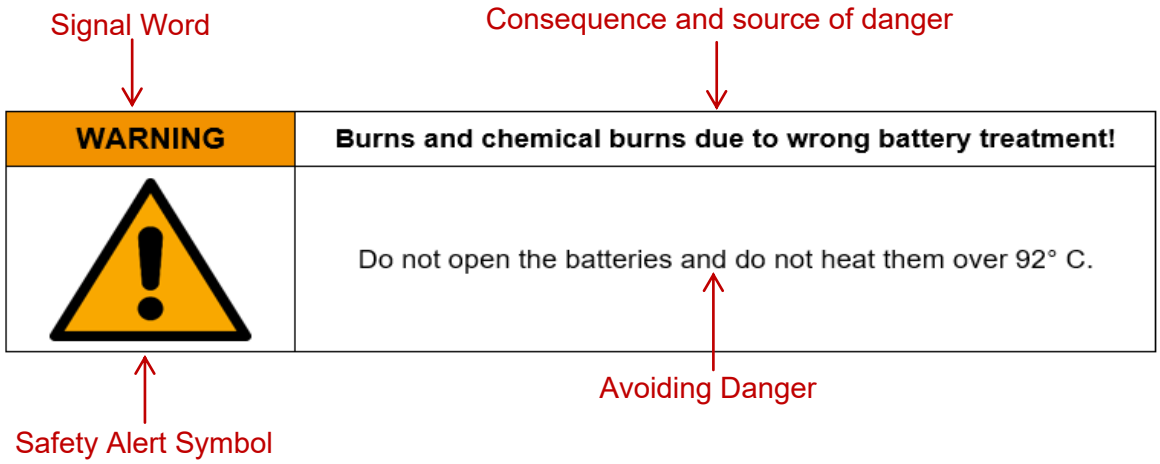


Figure 1 Safety Instruction

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 product's 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.

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

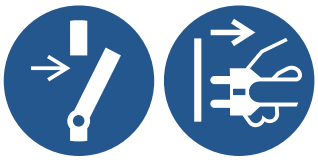
CAUTION!	Working With Machine Tools Near Battery
	To prevent the occurrence of sparks, short circuits, or explosions, the user shall take precautions near the operation of a machine tool with a battery.

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.

PROHIBITON	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.

NOTE	Working with Load Bank on the Bus Bar
	• Proper insulation should be ensured, and connections should be secured to prevent short circuits. • The recommended load capacity should not be exceeded.

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 lack of an adequate qualification!
	Inappropriate handling of the product can lead to severe personal injuries and material damages.

In this manual the following qualification 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 with basic information about the CCS2 EV Simulator (120 kW). This user guide is mainly focused on the technical aspects of the CCS2 EV Simulator (120 kW), which are covered in this user guide with 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 sections will help you know how to follow pre-conception practises that must be followed before, during, and after utilising the product.

Section five provides technical information on the EV simulator including its functions, features, applications, technical specifications, and interface with its descriptive functions.

Section six covers the configurable and measurement parameters.

Section seven provides a quick setup instruction for the EV simulator, including prerequisites, setup instructions, and process flow diagrams, all of which are useful to facilitate the EV simulator easier to use.

Section eight contains a description of the test case, as well as information on the presented test, such as its operations and functions on the EV simulator.

Section nine describes error code.

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 CCS2 EV Simulator (120 kW)

Bacancy's CCS2 EV Charger Simulator (120 kW) is a comprehensive toolkit designed to emulate the behaviour of an electric vehicle. Its primary function is to test and validate the functionality of real-world charging stations without the necessity for an actual electric vehicle. The simulator tests the communication protocol between an EV and the charging station, ensuring that the station responds correctly by locking the plug and providing power. It helps ensure compatibility, efficiency, and safety in the charging process.

The EV simulator plays a crucial role in validating that the charging station can deliver the required power. The use of the EV simulator reduces the need for preventive action and aids in the efficient commissioning of EV charging stations. It helps identify and rectify charging issues, optimise charging performance, and ensure seamless interaction between charging and supporting software systems. This simulator contributes significantly to the development and adoption of enhanced charging infrastructure, thereby improving the user experience.

5.1 Overview of CCS2 EV Simulator

5.1.1 Feature of CCS2 EV Simulator

List of Feature
• The device simulates conductive EV operation in full compliance with ISO 15118 and DIN 70121 standards.
• It offers fully automated EV simulation for seamless EVSE charging communication.
• EVSE safety testing is enhanced with an isolation fault detection capability.

List of Feature
• An intuitive touchscreen interface ensures effortless operation.
• The system provides accurate measurements of DC voltage and current output.
• Test results are displayed as either pass or fail.
• Test reports can be conveniently exported in CSV format via USB.
• A durable, rugged carrying case makes it ideal for mobile outdoor applications.
• The user-friendly, interactive interface requires no prior knowledge of standards.
• It features an emergency stop charging function and a CCS2 Inlet Lock mechanism for added safety.
• LED indicators provide real-time input power status and error notifications.
• EVSE safety testing is enhanced with an isolation fault detection capability.

5.1.2 Application of CCS2 EV Simulator

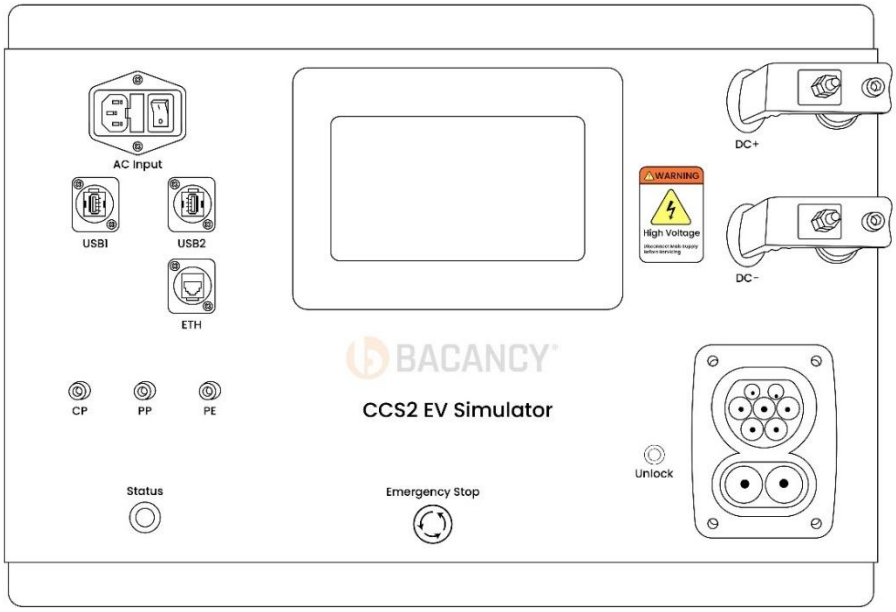
List of Applications
• **Testing and Validation of Electric Vehicle Supply Equipment (EVSE):** It is used to test the compatibility and performance of EVSE products, verifying that they fulfil CCS2 criteria and can effectively charge electric vehicles.
• **Electric Vehicle (EV) Development and Testing:** EV manufacturers can test and optimise their vehicles' charging capabilities to ensure efficient and reliable charging performance.
• **Interoperability Testing:** To implement interoperability testing to facilitate that various EV vehicles can charge properly across CCS2-compliant charging infrastructure.
• **Charging Infrastructure Development:** To help with the development and testing of charging infrastructure, including the design and optimisation of charging stations, controllers, and communication protocols.
• **Firmware and Software Development:** To facilitate the development, testing, and debugging of firmware and software for EVSE products, ensuring their functionality and efficiency.
• **Standards Compliance:** To ensure that EVSE products comply with CCS2 standards and specifications, particularly protocols and functions,
• **Research and Development:** It offers researchers and developers the opportunity to evaluate alternative charging technologies, algorithms, and protocols, contributing to the improvement of EV charging infrastructure.
• **System Integration Testing:** It is intended to perform system integration tests, which ensure that the EVSE product integrates effortlessly with larger energy management systems and smart grid installations.
• **Field Testing and Simulation:** It could be used in field testing parameters to try and emulate real charging situations and evaluate the performance and behaviour of EVSE devices in different conditions.

5.2 Function of CCS2 EV Simulator

5.2.1 Technical Specification

Product Properties	
Product Type	: CCS2 EV Simulator 120 kW
Electrical Properties	
Input Voltage	: 230 V AC
AC Input Connection	: P+N+PE
Frequency	: ~50 Hz
Connector	
Number of Connectors	: 1 (CCS2 DC-1)
Connector Type	: IEC 62196-3 Industrial Socket
Voltage Measurement	
Range	: 0 to 1000 V DC
Current Measurement	
Range	: 0 to 200 A
Interface	
HMI Display	: 7” TFT Resistive Type Touch Display
Communication	
Protocol	: ISO 15118
	: DIN 70121
Ambient Condition	
Degree of Protection	: IP66, Closed Lid
	: IP43, Open Lid
Operating Temperature	: 0°C to +70°C
Storage / Transport Temperature	: 0°C to +70°C
Permissible Humidity	: 5 to 95%
Mechanical Properties	
Dimension	: 610 (L) X 440 (B) X 326 (H) mm
Weight	: ~18.5 Kg (Approximate)

5.2.2 Interface of CCS2 EV Simulator



- **The Physical Interface**

Table 2 The Description of CCS2 EV Simulator's Physical Interface

No.	Interface Name	Description
1.	AC Input	To connect the AC input power supply.
2.	USB 1	Connect a USB pen drive with a USB port to get a test report.
3.	USB 2	To update the HMI Firmware
4.	ETH	For internal use only.
5.	CP, PP, and PE Test Sockets	Test sockets are used to verify the PWM signals for CP, PP, and PE.
6.	Status LED	To indicate the status of the CCS2 EV charger simulator.
7.	HMI Display	To operate and check the test results.
8.	Emergency Stop	To stop the test charging process immediately.
9.	DC+ and DC-	Terminal for connecting an external load.
10.	Charging Gun Socket	CCS2 industrial socket gun connector.
11.	Lock / Unlock	To lock or unlock the charging gun.

- **The LED Status**

Table 3 The LED Status Indication and Its Interpretation

No.	LED Colour	LED Status	Description
1	Green	Steady	All Functionality working properly
2	Red	Steady	Emergency Button Pressed
3	Green & Blue	Blink	Gun Reconnect again.

6. Configurable and Measurement Parameters

6.1 Configurable (Setting) Parameters

Before commencing the test operation, the user should configure the essential parameters as shown in the table below.

Table 4 Configurable (Setting) Parameter

No.	Parameter	Description
1.	Demand Current	The electrical current requested by the EV for charging.
2.	Demand Voltage	The voltage level required by the EV during charging.
3.	Pre-charge Voltage	The initial voltage is requested by the EV before full charging begins.
4.	EV SoC	The current state of charge of the EV battery is expressed as a percentage (1% to 100%).
5.	Charge Protocol	The charging communication standard in use, such as ISO 15118 or DIN 70121.
6.	Charging Time	The total duration required to complete the charging process for the given test case.

6.2 Measurement Parameter

Measurement parameters will be displayed in HMI as mentioned in the below table.

Table 5 Measurement Parameter

No.	Parameter	Description	
1.	Attenuation (dB)	Attenuation in dB (N dB)	
2.	EVSE Present Voltage (V)	Present Voltage (N_pre V)	
3.	EVSE Present Current (A)	Present Current (N_pre A)	
4.	EVSE Max Voltage (V)	The charger provides a maximum voltage. (N_max V)	
5.	EVSE Max Current (A)	The charger provides a maximum current. (N_max A)	
6.	EVSE Min Voltage (V)	The charger provides a minimum voltage. (N_min V)	
7.	EVSE Min Current (A)	The charger provides a minimum current. (N_min A)	
8.	Compatible	This signal validates the compatibility of the EV and the EVSE. For example, if the EVSE can only charge at 400V but the EV requires 800V, compatibility is false. In addition, there are compatible standards. (0-false, 1-true, 2-invalid, 3-SNA).	
9.	Voltage Match	The voltage and pre-charge are the same (±20V). (0-False, 1-True, 2-Invalid, 3 SNA)	
10.	SLAC State	Disconnected-0, Matching-1, Matched-2,	Failed-3, SNA-7

7. EV Simulator Setup

7.1 Prerequisites

Table 6 Setup Prerequisites

No.	Requirement	Details
1.	**Power Supply**	230V AC
2.	**EV Simulator's HMI Interface**	Operational and accessible.
3.	**CCS2 EV Charger**	Properly installed and operational.
4.	**EV Charging Gun**	Properly connected to CCS2 EV charger and working.

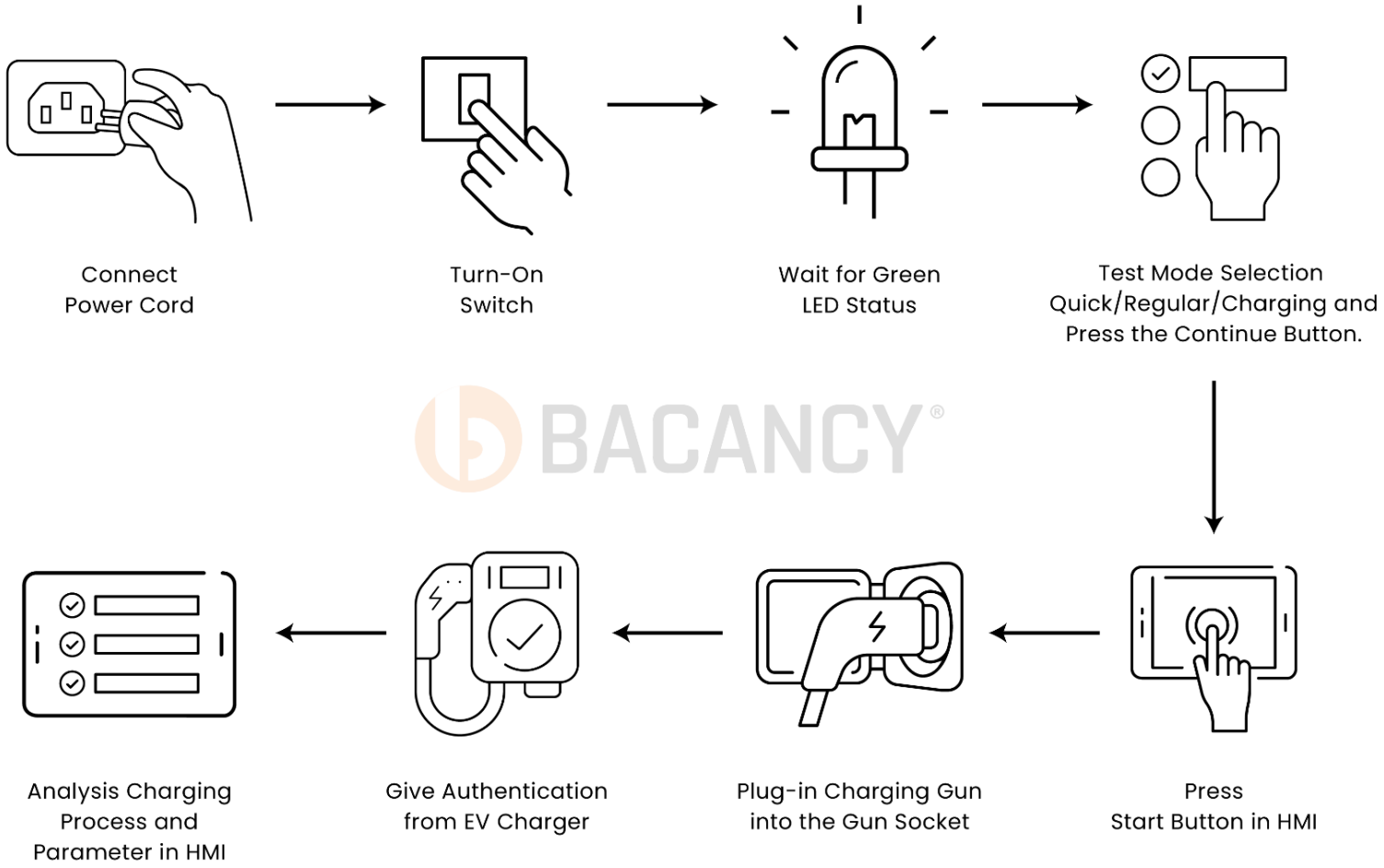
7.2 Setup Instructions

Follow the step-by-step instructions below to correctly set up and operate the EV simulator:

1. **Power Supply:**
   - Connect the power cord to the EV simulator with a 230V AC power supply.
2. **Power ON:**
   - Press the power button to start the EV simulator.
3. **LED Status:**
   - Wait a few seconds until the LED turns green.
4. **Test Mode:**
   - Select the preferred test mode (Quick, Regular, or Charging) and press the "Continue" button on the EV simulator's HMI.
   - In addition, for more details on HMI, the user may refer to Section 9, which gives a detailed overview of each HMI screen, as well as how to configure the test parameters and other things.
5. **Start Test Process:**
   - Press the "Start Test" button on the HMI.
6. **Plug-in the Charging Gun:**
   - Plug-in the charging gun firmly into the gun socket of the EV simulator.
7. **Authentication:**
   - Provide necessary authentication to the EVSE equipment to initiate a charging session on the connected gun.
8. **Monitor Charging Parameters:**
   - To ensure that the process is proceeding properly, observe the charging sequence and essential parameters on the HMI display.

7.3 Process Flow Diagram

The process flow diagram below provides a visual representation of the setup procedure.



8. HMI Display and its Operations and Functionality

8.1 Main Menu

This is the main screen. It will show the several information and functions of the buttons, which are described in the below table.

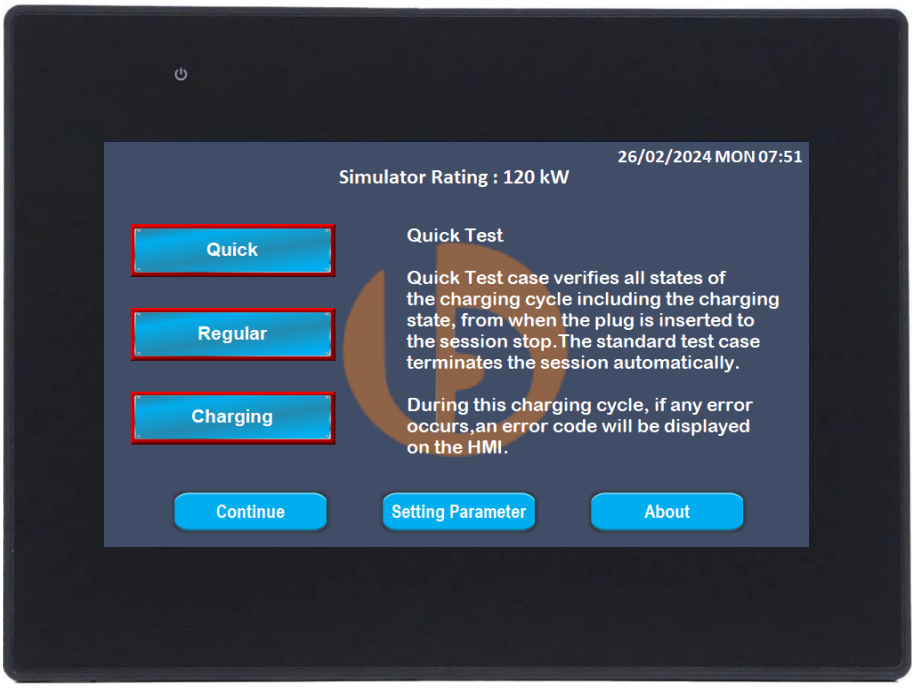


Figure 3 Main Menu Screen

Table 7 Main Menu Interface Description

No.	Interface	Description
1.	26/02/2024 MON 07:47	It shows the date (DD/MM/YYYY/DAY) and time (HH/MM).
2.	Simulator Rating : 120 kW	It shows the simulator rating per unit.
3.	Quick	It will start the “Quick Test” operation. It is the most basic option, simply verifying the charging cycle in one go.
4.	Regular	It will start the “Regular Test” operation. This mode will continue until the time limit is reached, which may be adjusted anywhere from one minute to thirty minutes.
5.	Charging	It will start the “Charging Test” operation. The charging test will run until the user stops it manually.
6.	Continue	This button can be used to alter the main screen for the selected test case.
7.	Setting Parameter	The user has the option to view, adjust, or set This screen will show the version of the hardware, software, and HMI “setting parameters.”
8.	About	This screen will show the version of the hardware, software, and HMI.

8.2 Setting Parameter

This is the main menu screen. To configure a setting parameter, choose “Setting Parameter.” It will lead you to the setting parameters screen.

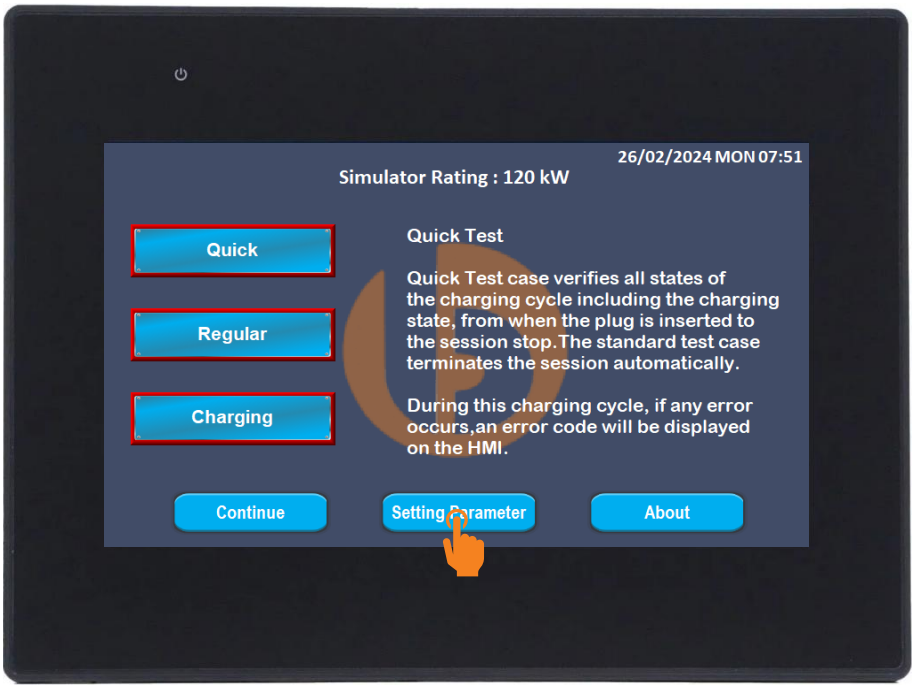


Figure 4 Press the “Setting Parameter” Button

Here, the user can view or alter the configuration as desired. Furthermore, all the configuration parameters are described in the table below. However, to get to the main menu, use the back button.

Figure 5 Setting Parameter Screen

Table 8 Setting Parameter Interface Description

No.	Interface name	Symbol	Description
1.	Charging Time	5 Min	To set charging time in minute (Min)
2.	EV SoC	70 %	To set EV SoC in percentage (%)
3.	Charge Protocol	DIN70121	To set charge protocol ISO 15118 or DIN 70121
4.	Demand Current	50 A	To set demand current (A)
5.	Demand Voltage	800 V	To set demand voltage (V)
6.	PreCharge Voltage	250 V	To set precharge voltage (V)
7.	Voltage on Terminal	No	To get the DC voltage on the terminal, choose “Yes”; however, select “NO” if you do not want the DC voltage on the terminal.
8.	Save	Save	To save all setting parameter
9.	Load Default	Load Default	To load default all setting parameter

NOTE!	To Save Parameter
	After altering the setting parameters, the user should press the “Save” button. For each test case, the user should check or change the setting parameter, otherwise it will not operate as desired parameter one.

8.2.1 Setting Parameter: Rating Limit Exceed!

The CCS2 simulator is designed to support 120 kW. However, if the demand voltage and current exceed the CCS2 simulator's appropriate limit, the message “Rating Limit Exceed” will appear on the screen.

Figure 6 Setting Parameter: Rating Limit Exceed!

8.2.2 Setting Parameter: High Voltage Warning

CAUTION!	Risk caused by high voltage
	When working with the product, the user should adhere to the safety precautions.

If the CCS2 simulator passes over the safety voltage limit, a high voltage warning will flash on the screen, as seen in the image. Therefore, when operating the CCS2 simulator, the user should follow safety regulations and proceed with caution.

Figure 7 High Voltage Warning on Screen

8.3 Emergency Stop

The Emergency Screen is activated when the user presses the physical emergency button to immediately stop the test in case of unforeseen issues.

This feature ensures safety and quick intervention in case of system malfunctions or hazards.

Table 9 Emergency Screen Procedure

No.	Details	Images
1.	**Press the Emergency Button** • This will immediately halt the ongoing test. • A flashing emergency notification will appear on the screen.	
2.	**Reset the Emergency Button** • Rotate or pull the emergency button back to its regular position.	
3.	**System Recovery** • Once reset, the display automatically returns to the main menu screen. • The user should restart the test.	

8.4 Test Case Detail

NOTE!	Suggestion to verify parameter and connection
	Please verify the configuration parameters and connection before commencing any test case.

8.4.1 Quick Test Mode

The Quick Test Mode is a 30-second diagnostic process that validates EVSE functionality, ensuring proper charging states and detecting communication or power transfer issues.

8.4.1.1 Objective

- Rapid EVSE validation
- Automatic test termination after 30 seconds unless manually stopped.
- Error detection for communication, power transfer, or termination issues.
- Exportable test report via USB.

8.4.1.2 Charging States Covered

- **Plug-in Detection**: Confirms a secure connection and checks control (CP) and proximity pilot (PP) signals.
- **Communication Establishment**: Verifies connection via ISO 15118/DIN 70121 and checks charger capabilities.
- **Pre-Charge Phase**: Aligns voltage levels and ensures insulation and safety before charging.
- **Charging State**: Monitors voltage, current, and power transfer performance.
- **Charging Termination**: Ends session after 30 seconds or upon issue detection, generates a summary report.

8.4.1.3 Key Features

- **Fast Execution**: Completes in 30 seconds.
- **Comprehensive Verification**: Covers all charging phases.
- **Error Detection**: Displays error codes for troubleshooting.
- **User-Friendly Interface**: Simple HMI navigation.
- **Report Generation**: USB-exportable test results.

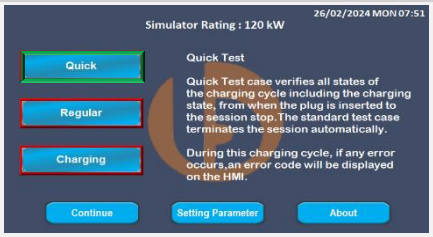
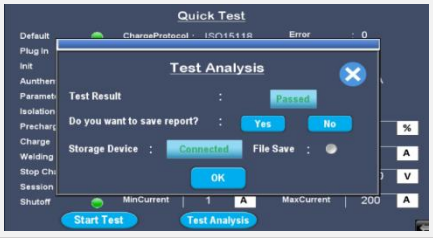
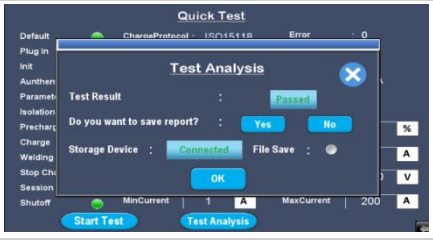
8.4.1.4 Quick Test Instructions

1. **Select Quick Test Mode:** Navigate to the HMI menu, press “Quick” (border turns green), then “Continue.”
2. **Initiate Test:** Plug the charging gun into the CCS2 EV Simulator, and press “Start Test.”
3. **Monitor Test:** Real-time display of charging states, power levels, and error messages.
4. **End Session:** Automatically stops after 30 seconds or manually via “Stop Test.”
5. **Access Report:** Click “Test Analysis” to view the test summary.
6. **Download Report:** Insert USB, confirm the connection and press “Yes” to save the report.

8.4.1.5 Quick Test Screen

The Quick Test Screen serves as the main menu for initiating a rapid EVSE test.

Table 10 Quick Test Screen Procedure

No.	Detail	Screen
1.	**Select Quick Test Mode** • Press the “Quick” button (border changes from red to green). • Press “Continue” to proceed to the open test screen.	
2.	**Start the Quick Test** • This screen provides essential information about the Quick Test. • Plug the charging gun into the CCS2 EV Simulator. • Press “Start Test” to begin. • During the test, the screen displays real-time process updates.	
3.	**End the Session** • The test automatically stops after 30 seconds. • Alternatively, the user can manually press “Stop Test” to terminate the test.	
4.	**Access Test Analysis** • After the test ends, the “Test Analysis” button appears. • Press it to view the test summary and results.	
5.	**Download Test Report** • Insert a USB device into the CCS2 EV Simulator. • Once detected, a “Connected” label appears. • Press “Yes” to download the test report.	
6.	**Confirm Report Download** • A “File Save” notification confirms the report has been successfully saved. • Press “OK” to close the test analysis screen.	

8.4.2 Regular Test Mode

Regular Test Mode provides an in-depth evaluation of EVSE functionality by maintaining a configurable charging session (1–30 minutes). Unlike Quick Test Mode, it enables extended charging stability, performance, and error detection monitoring.

8.4.2.1 Objective

- **Thorough EVSE validation** over a prolonged session.
- **Configurable duration** (1 to 30 minutes).
- **Live monitoring** of voltage, current, and SoC progression.
- **Error detection** for communication failures, power mismatches, or interruptions.
- **Report generation** for analysis and compliance.

8.4.2.2 Charging States Covered

1. **Plug-in Detection:** Confirms secure EVSE connection and checks CP and PP signals.
2. **Communication Establishment:** Ensures secure data exchange via ISO 15118 / DIN 70121.
3. **Pre-Charge Phase:** Aligns voltage and conducts insulation and safety tests.
4. **Charging State:** Maintains charging for the set duration, tracks SoC progression, and verifies stability.
5. **Charging Termination:** When all conditions are satisfied, the test will stop automatically, or it can be ended manually by pressing the “Stop Test” button.

8.4.2.3 Key Features

- **Customizable Test Duration:** 1 to 30 minutes.
- **Extended Charging Simulation:** Evaluates long-term stability.
- **Live Monitoring:** Displays real-time power and SoC data.
- **Error Detection:** Logs faults for troubleshooting.
- **User-Friendly Interface:** Simple HMI navigation.
- **Report Generation:** USB-exportable test results.

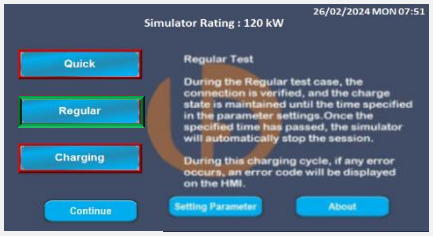
8.4.2.4 Test Instructions

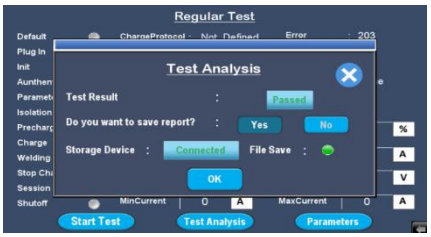
1. **Select Regular Test Mode:** In HMI, press “Regular” (border turns green), then “Continue.”
2. **Configure Parameters:** Set charging time (1–30 min), initial SoC, charge protocol, demand current/voltage, and pre-charge voltage. Press “Update.”
3. **Start Test:** Connect the charging gun to the CCS2 EV Simulator, and press “Start Test.”
4. **Monitor Test:** View real-time voltage, current, SoC, and error messages.
5. **End Session:** Stops automatically at set duration or manually via “Stop Test.”
6. **View Results:** Press “Test Analysis” for the session summary.
7. **Download Report:** Insert USB, confirm the connection, and press “Yes” to save report.

8.4.2.5 Regular Test Screen

The Regular Test Screen allows users to conduct a detailed EVSE evaluation for a configurable duration.

Table 11 Regular Test Screen Procedure

No.	Details	Images
1.	**Select Regular Test Mode** • On the main menu screen, press the "Regular" button (border changes from red to green). • Press "Continue" to open the Regular Test Screen.	
2.	**Configure Test Parameters** 1. To adjust parameters, press the "Parameter" button. 2. The Parameter Configuration Screen appears, allowing users to modify: • **Charging Time** (1 to 30 minutes). • **EV SoC (State of Charge)**. • **Charge Protocol** (ISO 15118 or DIN 70121). • **Voltage & Current Settings**. 3. Press "Update" to save changes and return to the Regular Test Screen.	 
3.	**Start the Regular Test** 1. Plug in the charging gun into the CCS2 EV Simulator. 2. Press "Start Test" to initiate charging. 3. Real-time voltage, current, SoC, and other test data will be displayed.	
4.	**End the Test Session** • The test will automatically stop when the configured test duration is completed. • Alternatively, users can manually press "Stop" to end the test.	
5.	**Access Test Analysis** 1. After the session ends, the "Test Analysis" button appears. 2. Click it to view a summary of the test results.	

No.	Details	Images
6.	**Download Test Report** 1. Insert a USB device into the CCS2 EV Simulator. 2. Once detected, a “Connected” label appears. 3. Press “Yes” to download the report. 4. A “File Save” notification confirms the download. 5. Press “OK” to close the analysis screen.	

8.4.3 Charging Test Mode

Charging Test Mode evaluates the full charging cycle of an EVSE with no time limit, unlike Quick Test Mode (30s) and Regular Test Mode (1–30 min). It runs until manually stopped or an error occurs, assessing long-term charging stability, power delivery, and communication reliability.

8.4.3.1 Objective

- **Comprehensive full-cycle validation** of EVSE operation.
- **Continuous charging** until manually stopped or interrupted by a fault.
- **Live monitoring** of voltage, current, power, and SoC progression.
- **Fault detection** for power fluctuations, communication errors, and safety issues.
- **Detailed test reports** for troubleshooting and performance analysis.

8.4.3.2 Charging States Covered

1. **Plug-in Detection:** Verifies connection, cable lock, and CP/PP signals.
2. **Communication Establishment:** Confirms compatibility using ISO 15118/DIN 70121.
3. **Pre-Charge Phase:** Aligns voltage and performs insulation resistance tests.
4. **Continuous Charging:**
   - Maintains charging with real-time monitoring of:
     - Voltage, current, and power levels.
     - SoC progression toward 100%.
     - EVSE compatibility status.
   - Observe long-term charging stability.
5. **Charging Termination** Stops when**:**
   - Manually stopped.
   - A safety-related error occurs (overvoltage, overcurrent, emergency stop).
   - Communication failure is detected.
   - Voltage/current mismatches exceed safety limits.
   - SoC reaches 100%.
   - Generates a summary report upon completion.

8.4.3.3 Key Features

- **Unlimited Test Duration:** Runs indefinitely for extended evaluation.
- **Full Charging Cycle Simulation:** Assesses long-term performance.
- **Live Parameter Monitoring:** Displays voltage, current, power, and SoC.
- **Error Detection & Logging:** Records faults for easy troubleshooting.
- **User-Friendly HMI:** Simplified navigation for setup and execution.
- **Report Generation:** USB-exportable test results for analysis.

8.4.3.4 Instructions for Running a Charging Test

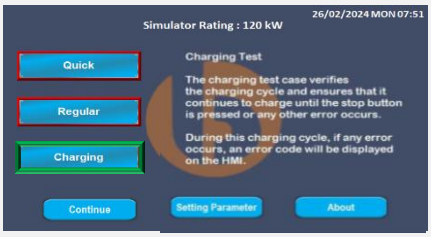
1. **Select Charging Test Mode**
   - In the HMI Main Menu, press “Charging” (border turns green).
   - Press “Continue” to enter the test screen.
2. **Configure Parameters**
   - Press “Parameter”, then set:
     - EV SoC (initial battery level %).
     - Charge Protocol (ISO 15118 or DIN 70121).
     - Demand Current (A).
     - Demand Voltage (V).
     - Pre-charge voltage (initial voltage before full charging).
   - Press “Update” to save settings.
3. **Start the Test**
   - Plug the charging gun into the CCS2 EV Simulator.
   - Press “Start Test” to initiate charging.
   - Real-time test data appears on the screen.
4. **Monitor the Session**
   - HMI displays:
     - Voltage, current, power levels, and SoC progression.
     - Errors, warnings, or status updates.
   - Observe power delivery consistency over time.

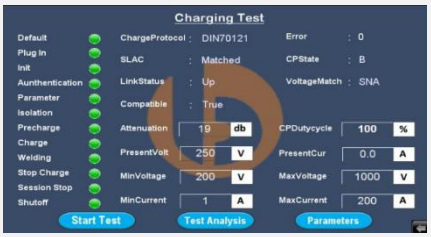
5. **End the Session**
    - The test continues indefinitely until:
        - The user presses “Stop Test”.
        - An error occurs, triggering an automatic stop.
        - SoC reaches 100% (full charge complete).
6. **View Test Results**
    - Press “Test Analysis” to review:
        - Total charging duration.
        - Max/min voltage and current levels.
        - Final SoC achieved.
        - Error codes and warnings.
7. **Download Report**
    - Insert the USB into the simulator’s port.
    - Wait for the “Connected” label.
    - Press “Yes” to download the report.
    - A “File Save” notification confirms a successful download.

8.4.3.5 Charging Test Screen

The Charging Test Screen allows users to conduct a continuous charging evaluation to monitor long-term performance and stability.

Table 12 Charging Test Screen Procedure

No.	Details	Images
1.	**Select Regular Test Mode** • On the main menu screen, press the "Charging" button (border changes from red to green). • Press "Continue" to open the Charging Test Screen.	
2.	**Configure Test Parameters** 1. Press the "Parameter" button to access the Parameter Configuration Screen. 2. Configure the following parameters: • **State of Charge (SoC)**: Define the starting battery percentage. • **Demand Voltage & Current**: Set the voltage (V) and current (A) levels. • **Pre-Charge Voltage**: Specify the initial voltage before full charging starts. 3. Press "Update" to save the settings and return to the Charging Test Screen.	 
4.	**Start the Regular Test** 1. Plug in the charging gun into the CCS2 EV Simulator. 2. Press "Start Test" to begin the charging session. 3. The system continuously monitors and displays real-time data: • Voltage, current, and power levels. • SoC progression in real time. • Error messages or system warnings.	
4.	**End the Charging Session** • The session remains active indefinitely unless: – The user presses "Stop". – A system error occurs, automatically terminating the test.	

No.	Details	Images
5.	**Access Test Analysis** 1. After the session ends, the “Test Analysis” button appears. 2. Click it to view a summary of the test results, including: • Total test duration. • Voltage and current fluctuations. • SoC progression and error logs.	
6.	**Download Test Report** 1. Insert a USB device into the CCS2 EV Simulator. 2. Once detected, a “Connected” label appears. 3. Press “Yes” to download the report. 4. A “File Save” notification confirms the download. 5. Press “OK” to return to the home screen.	

8.5 Test Case Failed

If a test fails due to unexpected errors or unforeseen circumstances, the user must verify the test result status on the summary screen.

This feature allows users to analyse test failures and troubleshoot errors effectively.

Table 13 Test Case Failed Screen Procedure

No.	Detail	Screen
1.	**Check the Test Summary Screen** • The summary screen will indicate whether the test passed or failed. • If the test failed, error messages or codes will be displayed for troubleshooting.	
2.	**Obtain the Test Report** • To download the test report, connect a USB device to the USB1 port. • Once the USB is detected, press “Yes” to begin the report download.	
3.	**Verify Report Transaction Status** • The summary screen will show the transaction status of the test report download. • A “File Save” notification confirms the successful report transfer.	

9. Error Code

Table 14 Error Code Interpretation

Error Code	Description
0	It indicates the default state. The EV and EVSE are both unpaired.
1	It indicates the plugged-in state without error.
2	It occurs when the ADC output voltage is 0V.
3	It occurs when the PWM output is zero.
11	It occurs when the SLAC and CNF time out in a state machine.
58	It occurs if the ISO is incompatible.
139-151	It occurs if the DIN response fails.
152-158	It occurs when the EVSE emergency shuts down and malfunctions.
159	It occurs when you go to session stop with an error.
160	It occurs when communication stops due to an error.
161	It occurs when the EVSE emergency shuts down.
163	It occurs when a message is missed for 1000 milliseconds (10 messages in a sequence).
215	It occurs when there is a continuing 60-second timeout during the authentication phase.
216	It occurs when there is a continuing timeout of 60 seconds during the change parameter discovery phase.
217	It occurs when the Cable Check timeout of 40 seconds is reached.
218	It occurs if the PreCharge timeout of 15 seconds is reached.
219	It occurs when the Ready to Charge timeout reaches 150 seconds from the plugin to the first power delivery.
249	It occurs when the EV triggers E-Stop.

NOTE!	Contact the Technical Support Team
	If you receive an error code that is not listed above, please contact our technical support team via the helpdesk. The last page of the user guide provides further contact information.

10. Appendix

10.1 Abbreviations and Glossary

AC	*Alternating current is a type of electrical current in which the current repeatedly changes direction.*
CCS2	*The Combined Charging System (CCS) is a standard for charging electric vehicles. It can use Combo 1 (CCS1) or Combo 2 (CCS2) connectors to provide power at up to 350 kilowatts (kW) (maximum 500 A).*
CP	*Control Pilot is a communication line used to negotiate charging levels between the car and the EVSE, and it can be manipulated by the vehicle to initiate charging and carry other information.*
CSV	*A CSV (comma-separated values) file is a text file that has a specific format that allows data to be saved in a table-structured format.*
dB	*Decibel (dB), a unit for expressing the ratio between two physical quantities, usually amounts of acoustic or electric power, or for measuring the relative loudness of sounds. One decibel (0.1 bel) equals 10 times the common logarithm of the power ratio.*
DC	*Direct current (DC) is a one-directional flow of electric charge.*
DIN 70121	*This standard defines the communication between a DC charging station and an electric vehicle. It is the German predecessor of ISO 15118-2. This standard specifies the requirements for the communication protocol for DC charging and communication with the supply system.*
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.*
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.*
HLC	*High-Level Communication (HLC) is used as a bidirectional communication link between the EVCC (Electric Vehicle Communication Controller) and the SECC (Supply Equipment Communication Controller).*
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.*
Hz	*hertz, the SI unit of frequency, is equal to one cycle per second.*
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."*

IP	*Ingress Protection (IP) ratings, which grade the resistance of an enclosure against the intrusion of dust or liquids.*
ISO	*The International Organization for Standardization*
ISO 15118	*The protocol enables plug-and-charge, where the EV driver simply plugs the vehicle into the charge point.*
kW	*KW is a kilowatt. KW is used to represent the actual power that carries out the work.*
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.*
PE	*A protective earth connection, earth ground, or safety ground uses a protective conductor to safely direct a fault current into the earth and away from a human being in contact.*
PP	*Proximity Pilot, aka "plug present," provides a signal to the vehicle's control system so it can prevent movement while connected to the electric vehicle supply equipment (EVSE, i.e., the charging station) and signals the latch release button to the vehicle.*
PWM Signalling	*Pulse width modulation (PWM) is a modulation technique that generates variable-width pulses to represent the amplitude of an analog input signal.*
SLAC	*The SLAC mechanism (signal level attenuation characterization) of the Home Plug Green PHY ensures a correct and reliable process for identifying the physically connected charging station.*
SoC	*The state of charge (SOC) is a measurement of the amount of energy available in a battery at a specific point in time, expressed as a percentage.*
TFT	*Thin Film Transistor It is a display screen technique used in LCD (liquid crystal display).*
USB	*The Universal Serial Bus (USB) is an industry standard that allows data exchange and the delivery of power between many different types of electronics.*
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.*

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