



ICE-66 and ICE-132 V2X Installation and Operation Manual



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InCharge Energy Inc.

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Failure to follow the installation and operation manual may void the EVSE warranty.

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Service Hotline: 818-697-GOEV

Contents

1.) IMPORTANT SAFETY INSTRUCTIONS.....	5
1.1) Electrical Safety	5
1.2) Tools	6
1.3) Thunderstorm	6
1.4) Static Electricity.....	6
1.5) Short Circuit	6
1.6) Sharp Corners of Objects	7
1.7) Power Cable	7
1.8) Signal Cables	7
2.) General Product Description.....	8
2.1) Main Features	8
3.) General Characteristics	9
3.1) Technical Characteristics	9
3.2) Model Description	11
3.3) Standards	11
4.) Product Parts Presentation	12
5.) Installation	13
5.1) Safety and Compliance	13
5.2) Grounding Instructions	13
5.3) Unboxing and Visual Inspection	13
5.4) Assembly/Placing Instructions.....	13
5.4.1) Preparation of Concrete Foundation	14
5.4.2) ICE-132 V2X Installation.....	16
5.4.3) V2X Off Grid Box Wall Mounting and Install.....	17
5.4.4) Power Cable Connections	19
5.4.5) Power Module Installation.....	22
6.) Start Up	24


6.1) Verification and Inspection	24
6.2) Switch On	24
7.) User Manual.....	27
7.1) Output Connector	27
7.1.1) CCS1 Connector	27
7.2) Operation Instructions.....	28
7.2.1) ICE-132 V2X Start of Operation	28
7.2.2) Charging/Discharging Steps	28
7.2.3) Setting the Discharge Cutoff Conditions.....	33
7.3) Ethernet and OCPP Setting	34
7.3.1) Connection Check	34
7.4) Network Setting	34
7.4.1) Router Set Up.....	34
7.4.2) Wireless Network Configuration.....	36
7.4.3) Wired Network Configuration.....	36
7.5) Charger Software Update.....	37
7.5.1) Upper Controller Update	37
7.5.2) Pilot Controller Update.....	39
Appendix 1) Engineering and Technical Parameters.....	40
Appendix 2) Schematic Diagram (Without Off Grid Box).....	41
Appendix 3) Maintenance.....	42
1.) Hardware Torque Table	42
2.) Maintenance Table	43
3.) Maintenance Operation.....	44
3.1) AC Input Main Breaker.....	44
3.2) Devices and Connection Points.....	44
3.3) AC SPD.....	45
3.4) Charging Plug	46

3.5) Cooling Fan and Filter Cotton	46
3.6) ESD	47
3.7) Alarm Information	48
Appendix 4) Error Codes and Possible Solutions	49


1.) IMPORTANT SAFETY INSTRUCTIONS

- Read the operating instructions and notes carefully before starting operation to prevent accidents. The "Caution, Attention, Warning, and Danger" statements in the products and product manual do not represent all safety matters to be observed and are intended to supplement various operational safety precautions.
- During the various operations of our products and equipment, it is necessary to comply with the relevant National Safety Regulations and strictly observe the precautions and special safety instructions for the relevant equipment provided by InCharge Energy
- Any usage of water on the charger during a charge session or during idling is a safety hazard and prohibited.


1.1) Electrical Safety

 Danger	<p>Since some parts of this power system are under high voltage during operation, direct or indirect contact can be fatal.</p>
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- It is necessary to comply with the relevant National Safety Regulations during the installation of the Portable DC Charger. Personnel who install and maintain this equipment must be qualified to work with high DC voltage up to 1000Vdc and 3-phase AC voltage up to 500Vac.
- It is strictly forbidden to wear watches, bracelets, bangles, rings and other conductive objects on the wrist during installation and maintenance.
- If there is water inside the DC Charger enclosure, AC power and DC connector must be disconnected immediately. During operation in a humid environment, water should be strictly prevented from entering the equipment.
- During installation, it is strictly forbidden to operate the DC Charger and an "Operation prohibited" signboard must be used.

 Danger	<p>Construction operation of high voltage lines may cause fire or electric shock. The wiring area and the area where the line passes through for AC cables must comply with national and local regulations and norms. As this device utilizes high voltages do not attempt to install this equipment if you are not a qualified electrician.</p>
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1.2) Tools


 Warning	<p>Special tools must be used during various operations involving high DC and AC voltages.</p>
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1.3) Thunderstorm


 Danger	<p>It is strictly forbidden to carry out live installation and maintenance work during thunderstorms.</p>
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- A strong electromagnetic field will be produced in the atmosphere during a thunderstorm. Therefore, the equipment should be well grounded to avoid damage to the equipment due to lightning strikes.

1.4) Static Electricity


 ESD Caution	<p>Static electricity generated by the human body may damage electrostatic sensitive components on the circuit boards, such as the large-scale integrated circuit (IC), etc. Before handling any patch boards, circuit boards and IC chips, it is necessary to wear an anti-static wrist strap with the anti-static wrist strap wire connected to Ground to avoid damage to sensitive components due to static electricity.</p>
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1.5) Short Circuit


 Danger	<p>During operation, it is strictly forbidden to short-circuit the positive and negative of the DC Charger DC distribution or short-circuit any DC distribution polarity to Ground. The DC Charger is a high voltage DC power supply, and short circuit may cause damage to the DC Charger and personal safety hazards.</p>
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- During work with High Voltage DC output, it is necessary to strictly check the polarity of cables and interface terminals.
- The space for DC power distribution work is compact and attention should be paid to planning cable routing etc. before starting any installation work.
- Insulated tools must be used.
- During live work, attention should be paid to keeping hands, arms tools etc. away from live high voltage parts to avoid accidents.


1.6) Sharp Corners of Objects

 Warning	During the handling of equipment by hand, it is necessary to wear protective gloves to prevent injuries caused by sharp objects.
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1.7) Power Cable

 Caution	Make sure that the cable label is correct before the connection of cables.
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1.8) Signal Cables

 Caution	Signal cables should be kept away from power cables, with a minimum distance of 3.94in (100mm).
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2.) General Product Description

2.1) Main Features

- The ICE-66/132 Integrated Electric Vehicle V2X System can rapidly charge all electric vehicles that comply with the CCS1 charging system standard and can be combined with local or remote energy management systems to use electric vehicle batteries as energy storage batteries, achieving power balance between the power grid and electric vehicle batteries.
- The IP55 Certification assures that the product will endure a severe environment using -22F- 122F (-30°C~50°C) as an ambient temperature full power charging.
- The ICE-66/132 Integrated Electric Vehicle V2X System can provide charging/discharging services for vehicles ranging from 150 to 1000Vdc, with a maximum charging/discharging power of 66/132kW.
- The battery charging/discharging state is displayed on the HMI and the charging/discharging cycle finishes by itself or can be interrupted by user command.
- The ICE-66/132 Electric Vehicle V2X system is user friendly and safe. After user identification, it only requires coupling the charger's output plug in the EV for automatic starting if all safety features are accomplished.
- Full safety function with dual insulation and redundancy protection for input and output and fuses, ESD, SPD, insulation detector software logic for multiple protection.
- The LTE wireless modem support, RFID authorization and Mobile App payment support.

3.) General Characteristics

3.1) Technical Characteristics

- V2X System technical characteristics are indicated in Table 3-1. This system is intended to have two DC output connections

Table 3-1: ICE-66/132V2X Technical Characteristics

Technical Data		Description	Remarks
Nominal Input	Phases/Lines	3 phases + N + PE	
	Voltage	480/277 Vac (+/-10%)	
	Frequency	60Hz	
	Current	ICE 132: Max 168A (for AC output) ICE 66: Max 84A (for AC output)	
	Max.AC Side Apparent Power	ICE 132: 146.4 kVA @Charging. ICE 132: 146.4 kVA @Discharging. ICE 66: 73.2 kVA @Charging. ICE 66: 73.2 kVA @Discharging. 66kVA @ Off Grid Discharging	
	Power Factor Range	≥0.99 @Charging. 0.8 Leading~0.8 Lagging Discharging 0.8 Leading~0.8 Lagging Off Grid Discharging	
	System Efficiency	≥ 95% (Full load)	
DC Output CCS1	Voltage	150~1000Vdc (CCS1/NACS) Charging 150~500Vdc (CHAdEMO) Charging 300~1000Vdc (CCS1/NACS) Discharging or Off Grid Discharging 300~500Vdc (CHAdEMO) Discharging or Off Grid Discharging	
	Current	200A @ Charging/Discharging/Off Grid Discharging (CCS1/NACS) 150A @ Charging/Discharging/Off Grid Discharging (CHAdEMO)	
	Nominal Power	ICE 132: 132kW (330V~1000V) @Charging. ICE 132: 132kW (330V~1000V) @Discharging. ICE 66: 66kW (300V) @Charging. ICE 66: 66kW (300V) @Discharging	
Cabinet	Dimensions(W*D*H)	27.56*29.53*68.90 in (700*750*1750 (mm))	
	Weight	451.95 lbs. (205 kg) (excluding power module, power module is (30.86lbs)14kg.)(66 V2X: 3 Modules)(132 V2X: 6 Modules)	
	Protection Degree	NEMA 3S/IP55, IK10 (Except for display screens)	
HMI and Command Unit	Local interface	TFT Color touch display 7"	
	Communication	Router 4G/5G (GSM, CDMA or LTE)	
	Protocol	Ocpp1.6 specification	
Environmental	Operating temperature ¹	-22 F -- +122 F (-30°C~+50°C)	
	Transportation/storage temperature	-40 F -- + 150 F (-40°C~+70°C)	
	humidity	5%RH~95%RH	
	Place of installation	Indoor / Outdoor ²	
	Altitude	6561.68 ft (2000m)	

conditions	Sound Noise	≤65dB (nominal input/output power, the environment temperature is 77 F (25°C.))	
	Atmospheric pressure	80KPa~110Kpa	
	Overvoltage category	III	
	Protection class	Class I	
Note 1: The DC Charger provides full output power up to 122F (50°C), output power derating 5% / °C above 122 F (50°C).			
Note 2: The protection level of the V2X charger is IP55.			

Table 3-2: ICE-66 V2X Off Grid Box Technical Characteristics

Technical Data		Description	Remarks
Main Input	Phases/Lines	3 phases + neutral + PE	
	Voltage	480 Vac (+/-10%)	
	Frequency	60Hz	
	Current	Max 250A	
Backup output	Phases/Lines	3 phases + neutral + PE	
	Voltage	480 Vac (+/-10%)	
	Frequency	60Hz	
	Current	Max 125A	
Charger output	Phases/Lines	3 phases + neutral + PE	
	Voltage	480 Vac (+/-10%)	
	Frequency	60Hz	
	Current	Max 125A	
Cabinet	Dimensions(W*D*H)	20*8.7*750 in (508*220*850 mm)	
	Weight	126.75 lbs (57.5kg)	
	Protection Degree	IP55, Cabinet IK10	
Environmental conditions	Operating temperature ¹	-13°F ~ 122°F (-25°C ~ +50°C)	
	Transportation/storage temperature	40°F ~ 158°F (-40°C ~ +70°C)	
	humidity	5% RH ~ 95% RH	
	Place of installation	Indoor / Outdoor ²	
	Altitude	6561.28 ft (2000 m)	
	Atmospheric pressure	80Kpa ~ 110Kpa	
	Overvoltage category	II	
Protection class	Class I		
Note 1: The protection level of the V2X Off-grid Box is IP55.			

3.2) Model Description

Model	Configuration	Remarks
I66-C1C1-R	CCS1 + CCS1	66 kW
I132-C1C1-R	CCS1 + CCS1	132 kW
IAU125ATS-AW-2	250 MCCB x 1;125A MCCB x 2	N/A

3.3) Standards

The System complies with the following standards:

Table 3-3 –Applicable Standards

Technical Data	Standards & Versions	Remarks
Applicable Standards	UL2202:2022 UL9741:2023 UL1741:2021 UL1741 SA/SB:2021 IEEE1547:2018 IEEE1547.1:2020 Rule 21 HECO Rule 14 PRC-024-1 BELCO	

- UL2202: 2022: DC Charging Equipment for Electric Vehicles
- UL9741: 2023: Electric Vehicle Power Export Equipment (EVPE)
- UL1741: 2021: inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- UL1741 SA/SB:2021: inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- IEEE1547:2018: IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
- IEEE1547.1:2020: IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces

4.) Product Parts Presentation

The system is composed of a DC charging cabinet and a DC charging connector. The System can be installed outdoors. However, when installed outdoors and used during inclement weather (snow/rain), caution should be used when performing a charging or discharge session as water can reach the charging connector.



		
<p>CCS1</p>	<p>CHAdeMO</p>	<p>NACS</p>
<p>CCS1</p>	<p>CHAdeMO</p>	<p>NACS</p>

5.) Installation

5.1) Safety and Compliance

The working voltage and current inside the charging system is very high. The following rules should always be observed to ensure personal safety:

- Only personnel who have received training for and fully mastered the knowledge of the charging system can complete installation. During installation, always observe the safety precautions mentioned in this document and all relevant National Safety Regulations.
- It is necessary to make sure that the charging system DC output is disconnected in case of operation inside the charging system. The main inputs of the charging system must also be disconnected.

5.2) Grounding Instructions

An equipment grounding conductor or a grounded metal as well as a permanent wiring system is required for the ICE-132 V2X charger connection. This runs with circuit conductors and connects to the equipment grounding bar or lead on the ICE-132 V2X charger.

5.3) Unboxing and Visual Inspection

- Check if the exterior packaging has been damaged by mechanical impacts or any accidents during transportation.
- If applicable, check that the exterior panels of the ICE-132 V2X are without fault.
- Check if the interior of the EVSE is clean.
- Check if the door of the EVSE is working properly.
- Check for a proper EVSE protective ground connection point, which should be interconnected with the low voltage switchboard ground connection during the installation.

5.4) Assembly/Placing Instructions

- As shown in the figure below, the concrete foundation should be made, and the height of the base should not be less than 7.87 in (200 mm).
- It is recommended to have a Φ 90 plastic pipe at the cable entrance, and the height of the pipe extending out of the foundation horizontal plane should 3.14 in (80mm).
- As shown in the figure below, mark the installation holes of four M12 expansion bolts on the concrete foundation.

- Make 4 holes on the concrete foundation and select the percussion bit of Φ 0.63 inches (16mm) type. Drill the holes perpendicular to the ground at the above marked hole position, with the drilling depth of 2.36 in (60mm) ~ 3.14 in (80mm).
- Use four M12 \times 60 expansion bolts equipped with attached accessories and slightly tighten the bolts. Vertically put them into the hole and hammer them with a rubber hammer until all the expansion pipes enter the installation hole.
- Screw off the bolt, spring pad, and flat pad in a counterclockwise direction.

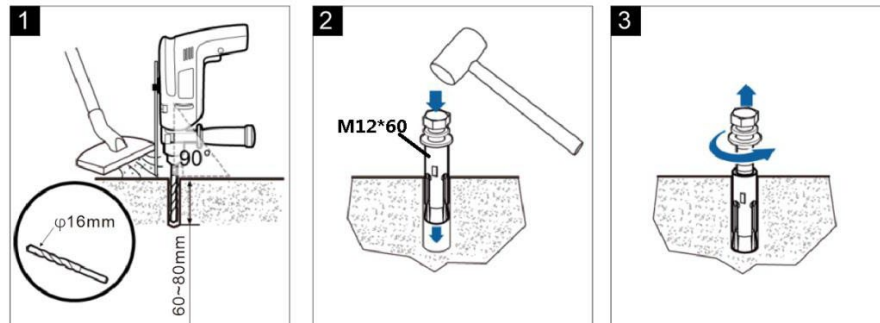
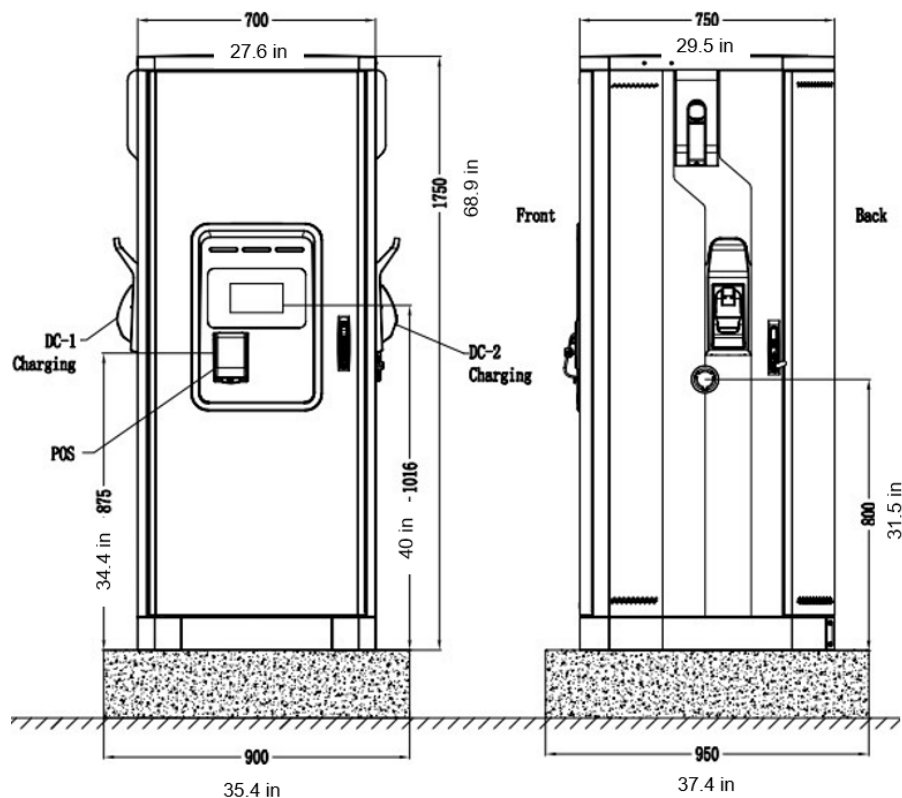


Figure 5.1: Expansion Bolt Fixing of Concrete Foundation

5.4.1) Preparation of Concrete Foundation



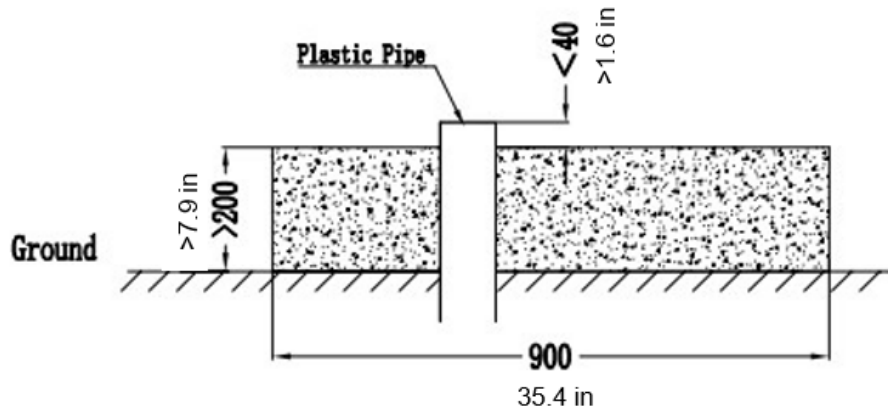
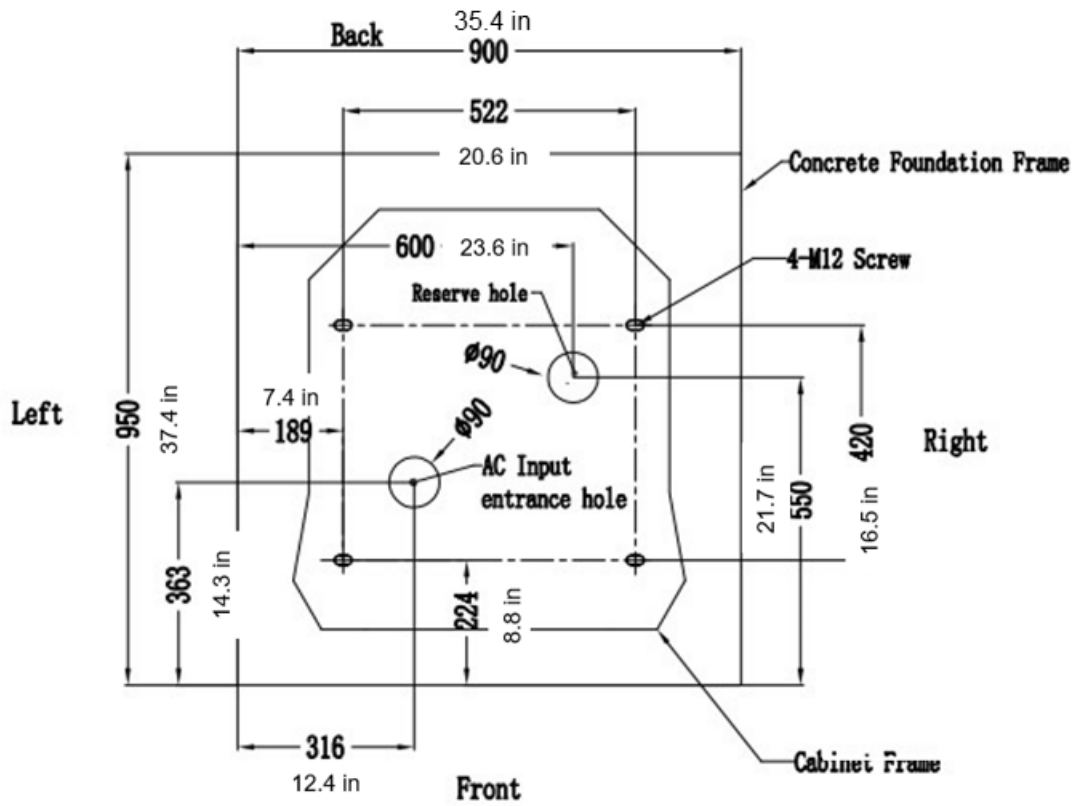


Figure 5.2: ICE-132 V2X Concrete Foundation View

5.4.2) ICE-132 V2X Installation

- As shown in the figure below, the protective covers on both sides of the steel base of the cabinet can be removed, and the cabinet can be transported to the concrete foundation by a forklift.
- Align the installation hole of the cabinet base and fix the cabinet on the concrete foundation with M12*60 expansion bolts at a torque value of 28 ft-lbs

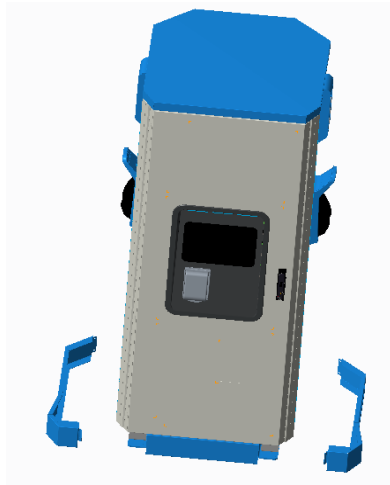


Figure 5.3: ICE-132 V2X Cabinet Installation View

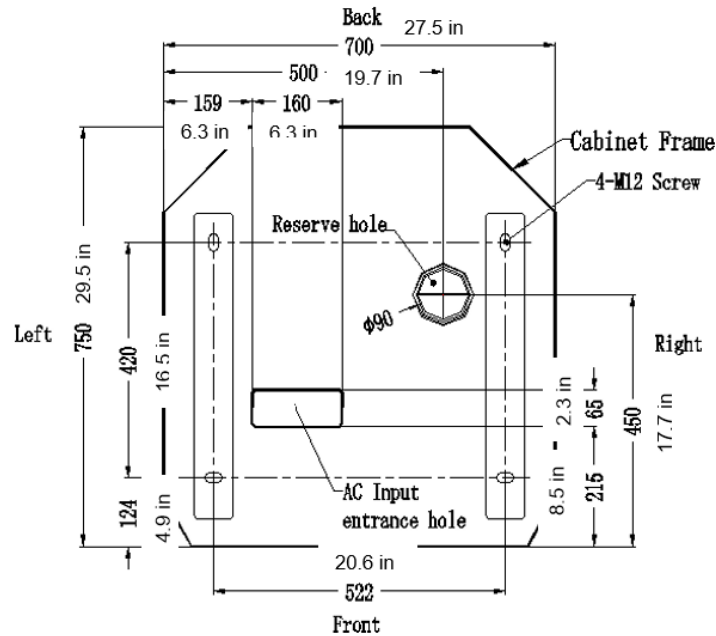


Figure 5.4: ICE-132 V2X Top View

5.4.3) V2X Off Grid Box Wall Mounting and Install

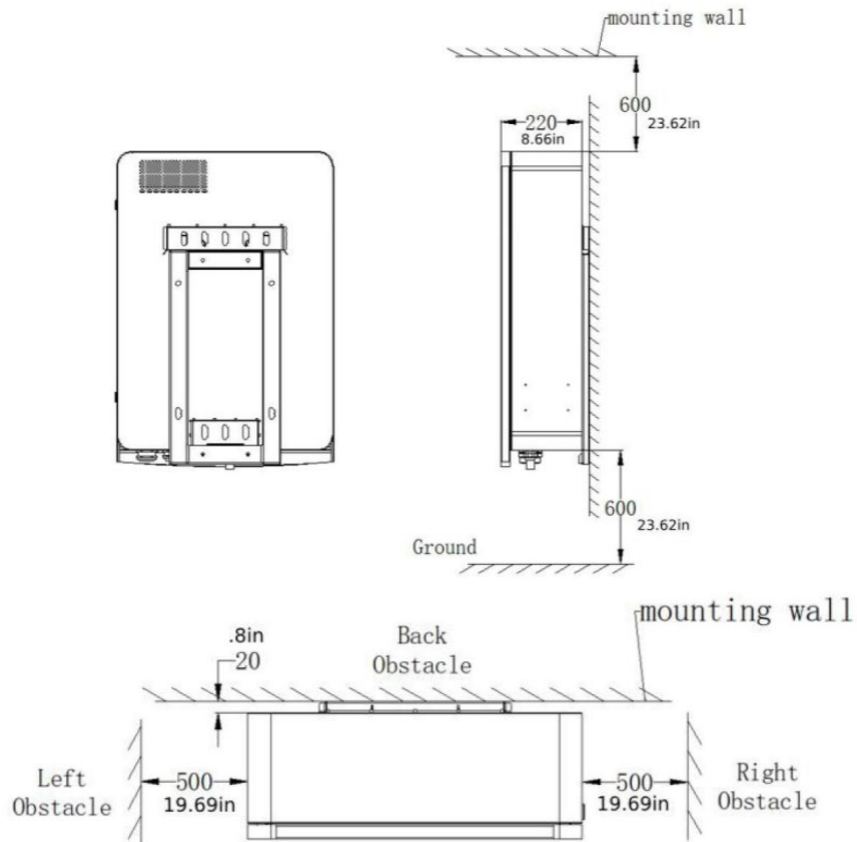


Figure 5.5: V2X Off Grid Box Space Requirements

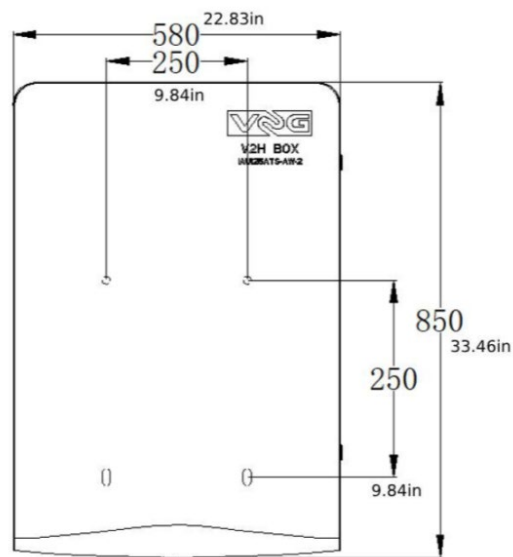
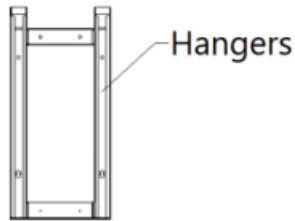
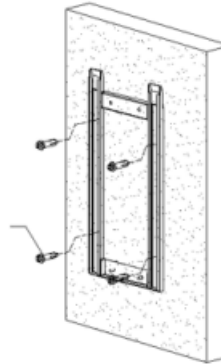


Figure 5.6: V2X Off Grid Box Back Hole Dimensions

- ① Fixed the hangers on the walls.

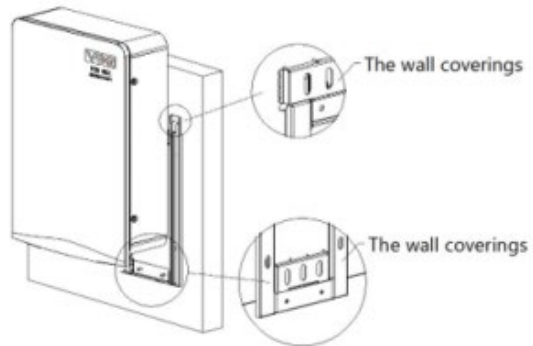
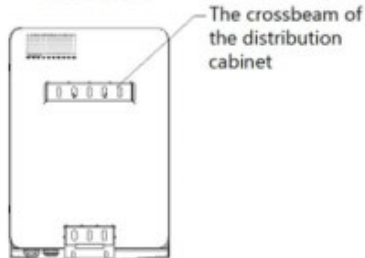


4-M10
(Expansion
screw)

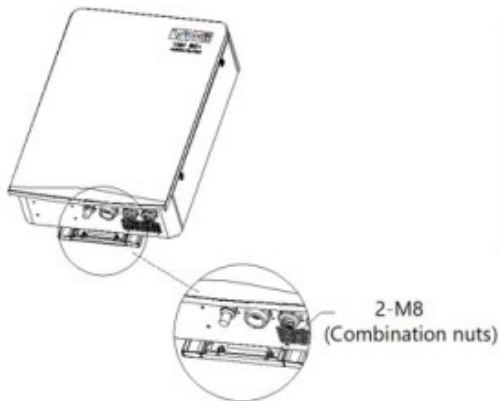


- ② Lift the distribution cabinet, and make sure the hangers slide in the crossbeam

Back view



- ③ Tighten the Combination nuts for hangers and crossbeam



5.4.4) Power Cable Connections

End terminal for input wiring: 5(five) end terminals up to 3phases+neutral+protective ground

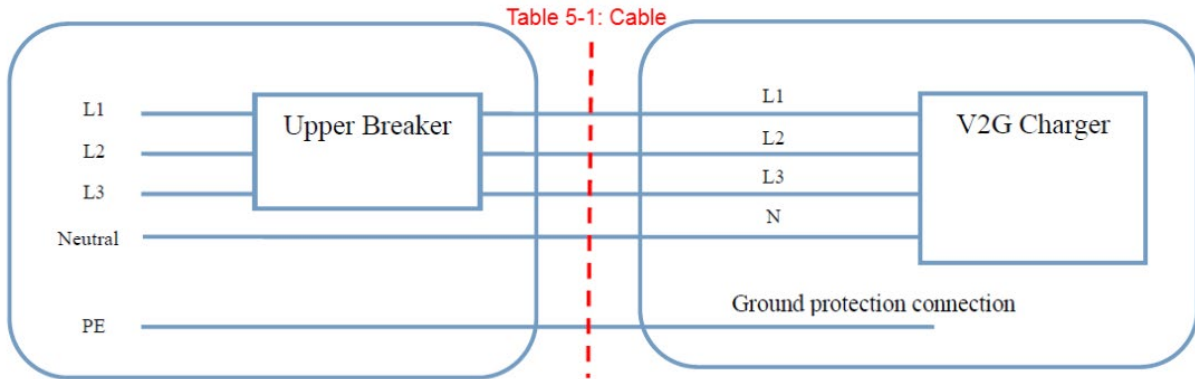


Table 5-1: AC Input Wiring Cable Selection

NO.	The section for AC feed cables	Amperage at 480Vac	Max. Power of charger	Specification of terminal screw	Reserved length inside cabinet
1	3*70+2*35mm ²	168A	132kW	L1/L2/L3/N is M8 PE is M8	19.68 in (0.5m)
2	3*70+2*35mm ²	140A	110kW	L1/L2/L3/N is M8 PE is M8	19.68 in (0.5m)
3	3*50+2*25mm ²	112A	88kW	L1/L2/L3/N is M8 PE is M8	19.68 in (0.5m)
4	3*50+2*25mm ²	84A	66kW	L1/L2/L3/N is M8 PE is M8	19.68 in (0.5m)

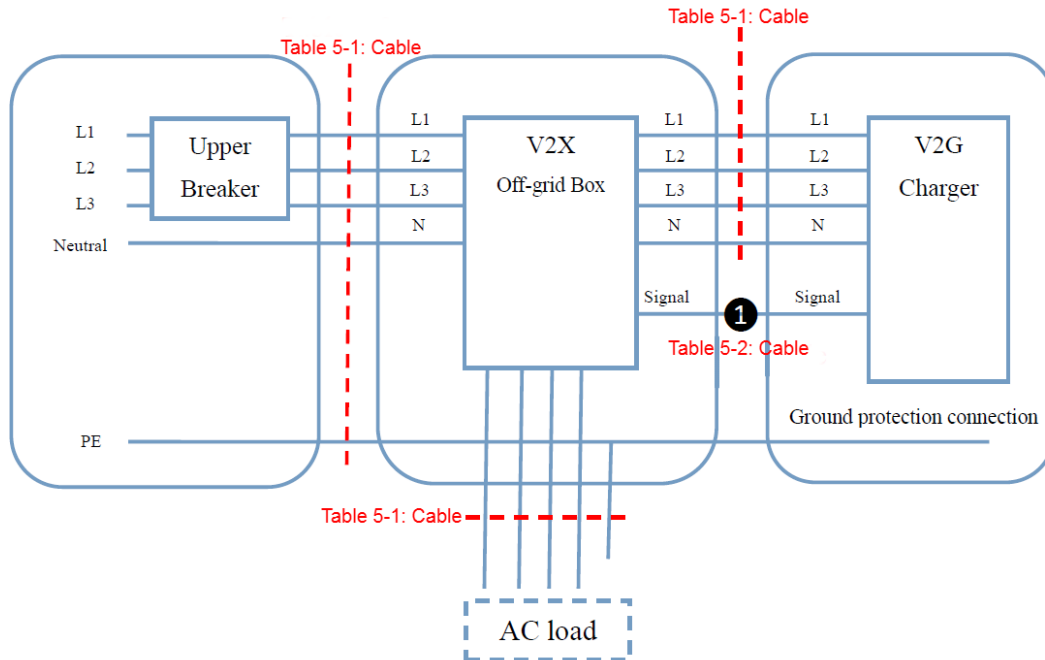
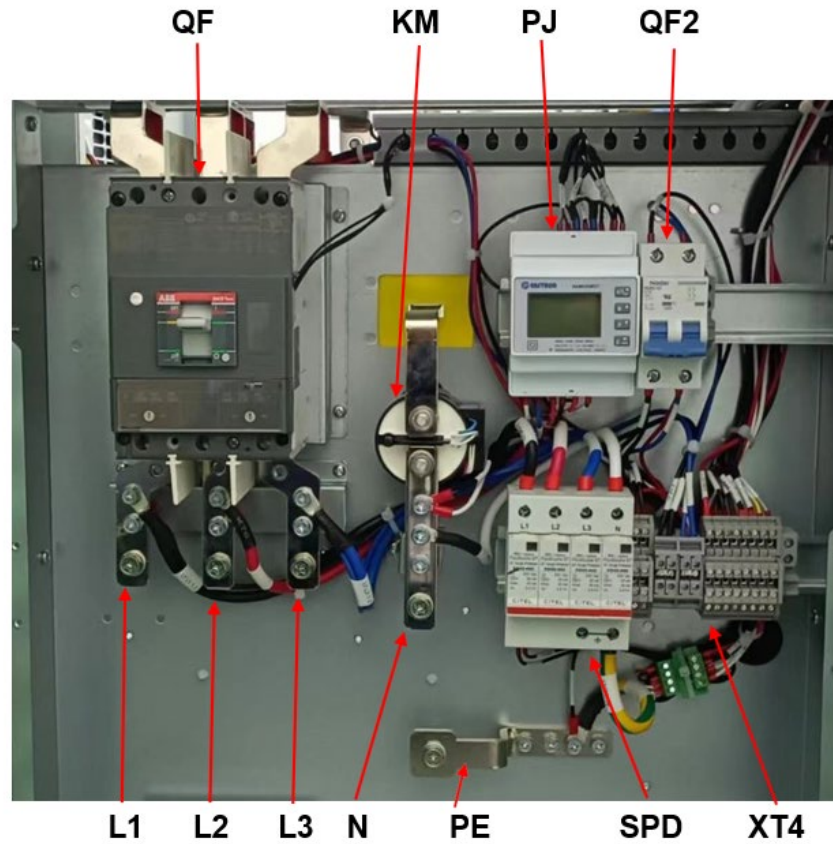


Table 5-2: Signal Cable Choice Between V2X Off Grid Box and V2X EVSE

NO.	The section for AC feed cables	Amperage at 480Vac	Max. Power of charger	Specification of terminal screw
1	12~14 Core 16 AWG	4A	-	L1/L2/L3/N is M8 PE is M8

Notes:

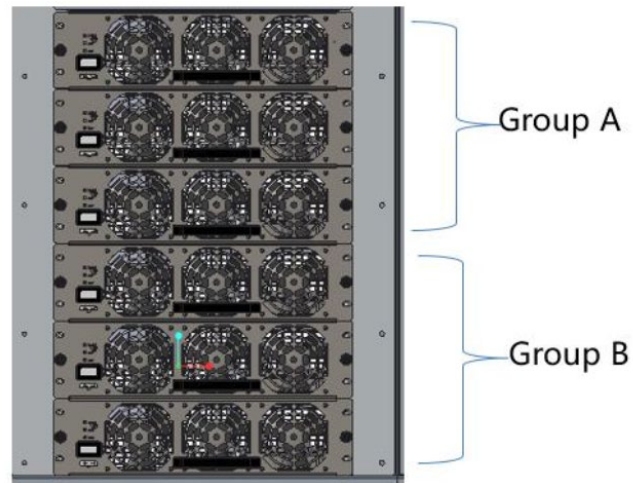
- The AC feed power cables to the charger are not included.
- The AC feed power cables should at least be 194 F (90°C) resistant.
- The protective MCCB must be installed on the distribution cabinet, and the upper MCCB capacity should be at most 1.25 times the input current.
- It is recommended that the upper MCCB should not be equipped with RCD function.
- This system is to be connected to a grounded metal permanent wiring system; or an equipment-grounding conductor is to be run with circuit conductors and connected to equipment-grounding terminal or lead on battery charger.



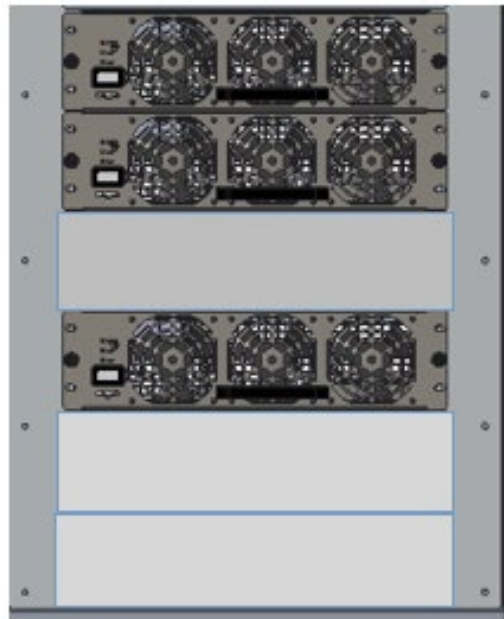
- PE: Earth Bus Bar
- Copper bar: Power main input: L1 L2 L3 N
- QF: AC Input MCCB For Rectifier Module
- QF2: AC Input MCB For Auxiliary Power
- PJ: AC meter
- KM: N-line contactor
- SPD: Surge protector
- XT4: External connection terminals (Reserved)

5.4.5) Power Module Installation

ICE-132 V2X:







ICE-66 V2X:



Open the front door and insert the power module into the module slot in the cabinet according to the position shown in the module location diagram. Before inserting the power module, pay attention to the installation position of the power module and secure in place with the proper hardware.

Table 5-3: Module Address Setting

CASE	Define (Connector Type)	Group A Rectifier (Panel switch)	Group B Rectifier (Panel switch)
1	CCS1+CCS1 CCS1+NACS CCS1+CHAdeMO NACS+CHAdeMO		
2	CCS1 or NACS		

For different power system configuration, it is necessary to divide the number of modules as equally as possible. The grouping of group A and group B modules can't be wrong; otherwise, although the system can charge normally, the output current may be out of control and lead to abnormal charging. The position of the missing module must be blocked by adding a false panel, otherwise it will lead to abnormal thermal management in the system. In serious cases, it will lead to high temperature damage of the module.

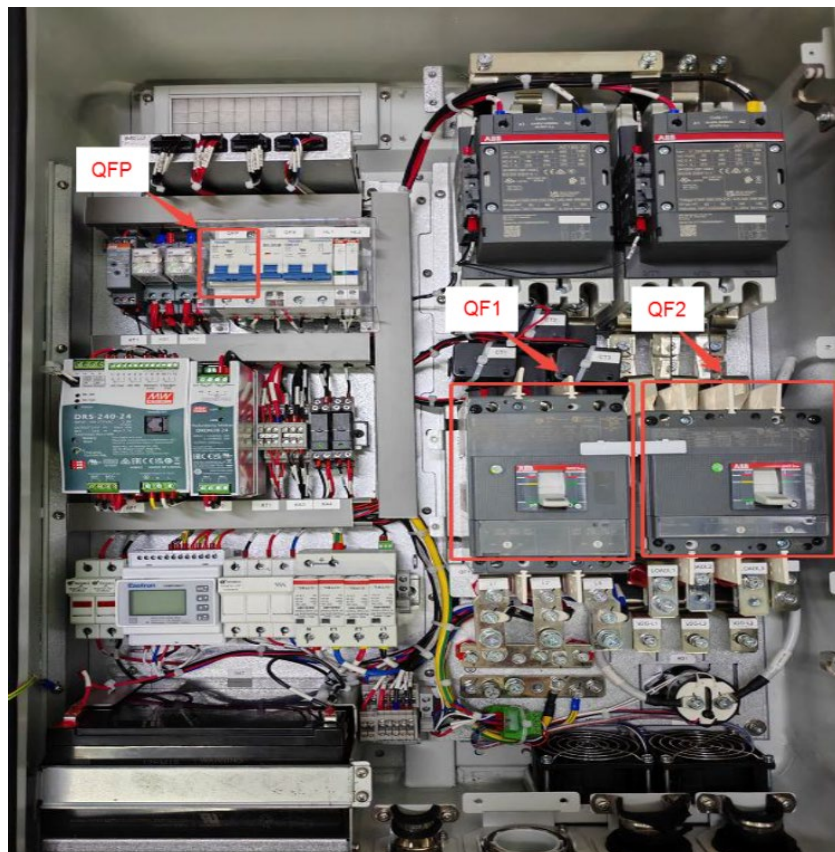
6.) Start Up

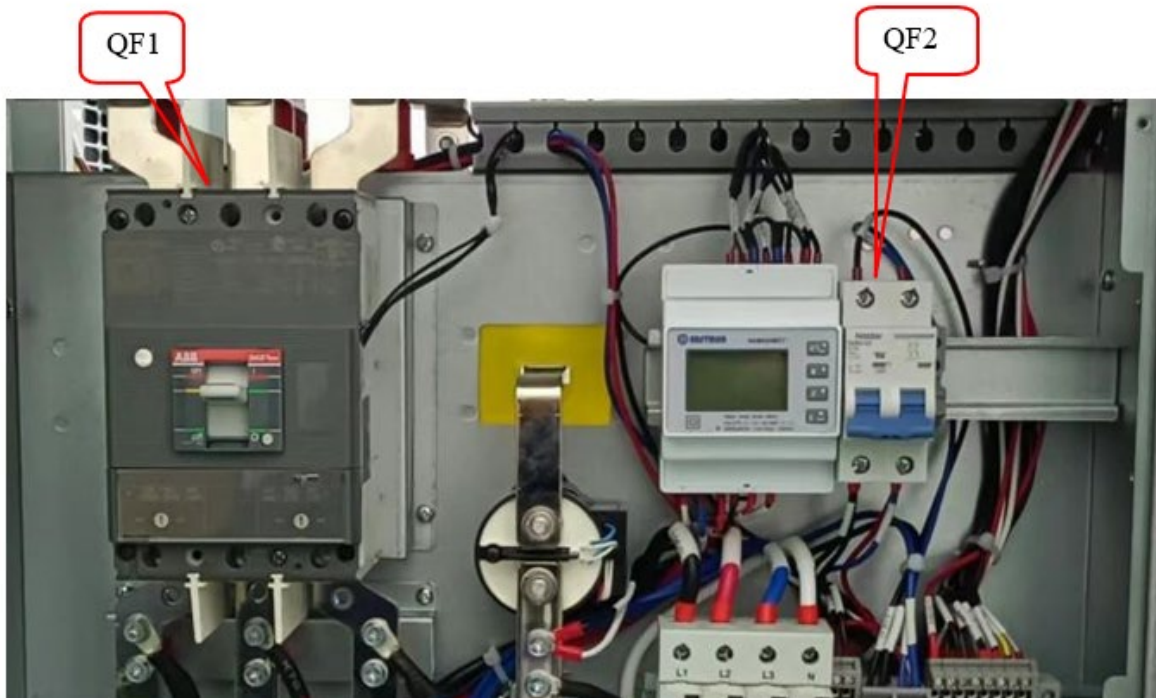
6.1) Verification and Inspection

- Check if the bolts of the AC and protective ground cables of the ICE-132 are correctly tightened to the specified torque
- Check the resistance between the ICE-132 protective ground and the low voltage switchboard ground connection; the value must be according to local codes.
- Grid AC with L1/L2/L3/N/PE wiring or DC+/DC-/PE wiring for DC input. Power modules panel address setting is correct.
- Before switching ON all the fuses and circuit breakers, check the supply voltage between lines: it must be $480V \pm 10\%$ 60Hz.

6.2) Switch On

Switch on QF1, QF2, QFP in the V2X Off Grid Box Enclosure and QF, QF2 in the V2X Enclosure.

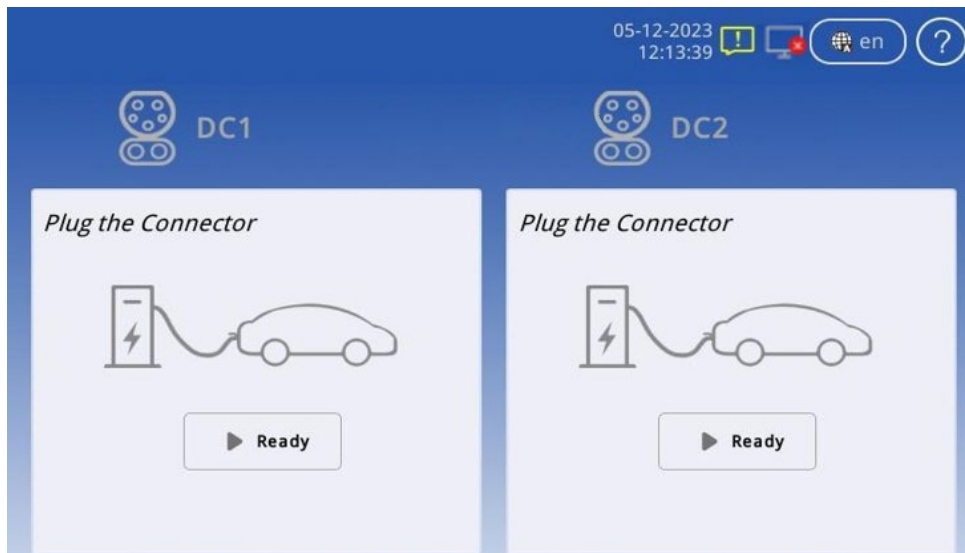




- Wait for a few seconds. Then the display will present a picture as below:



- Finally, the display will present the following screen.
- **CCS1 Units:**



7.) User Manual

The V2X charger is equipped with CCS1 connector(s), which can achieve charging and discharging operations for one or two vehicles. The Human Machine Interface (HMI) will give instructions and signal different stages. These sequences are shown in this chapter.

7.1) Output Connector

The ICE-132 V2X is prepared to charge electric vehicles according to the charging systems mentioned.

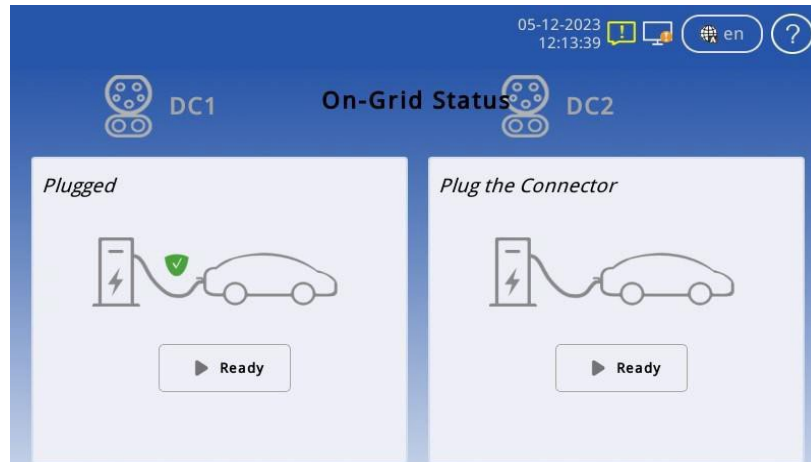
7.1.1) CCS1 Connector



7.2) Operation Instructions

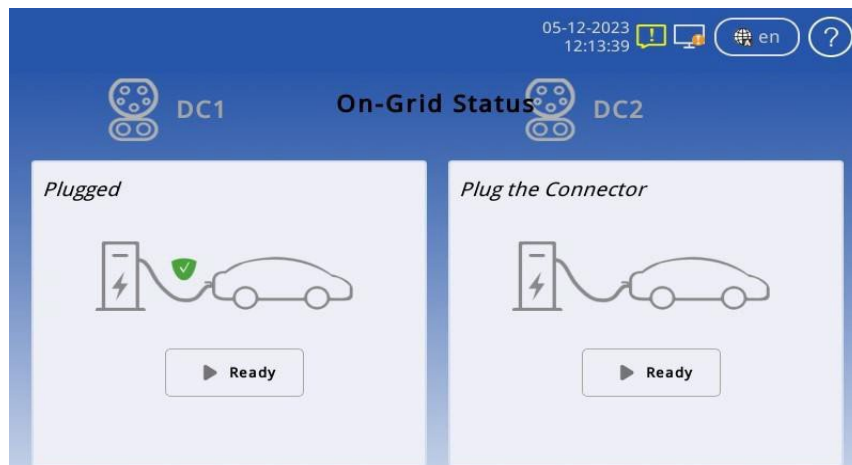
7.2.1) ICE-132 V2X Start of Operation

- When a user starts a session with an ICE-132 V2X, the HMI will display the following screen.

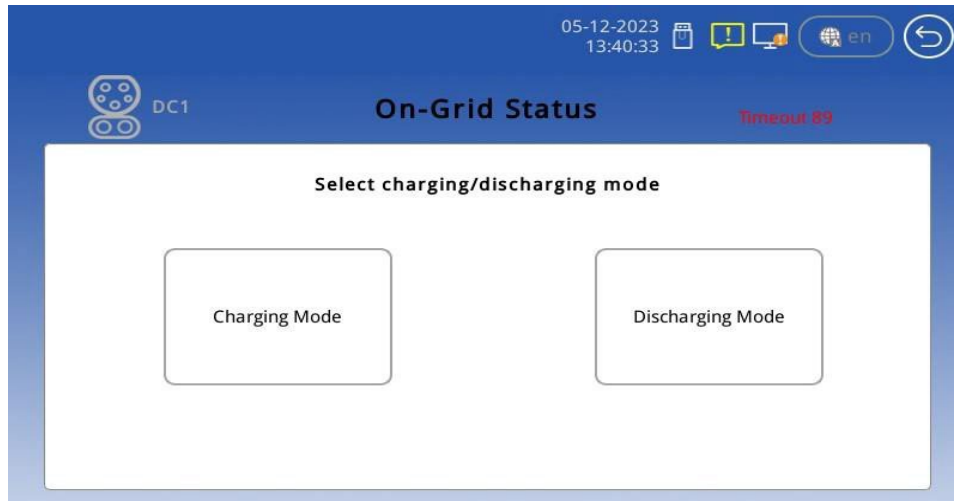


7.2.2) Charging/Discharging Steps

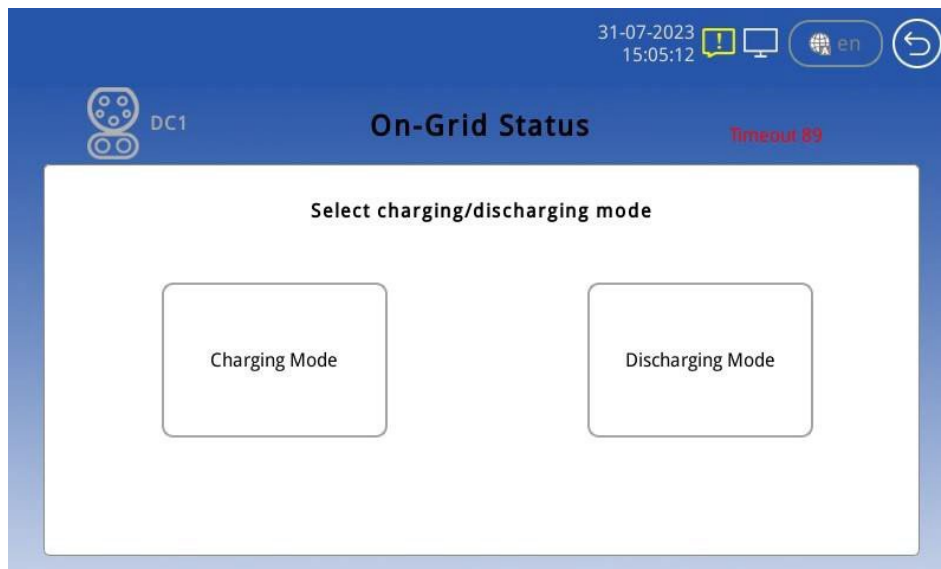
- Plug the charging connector into the vehicle's charging inlet.

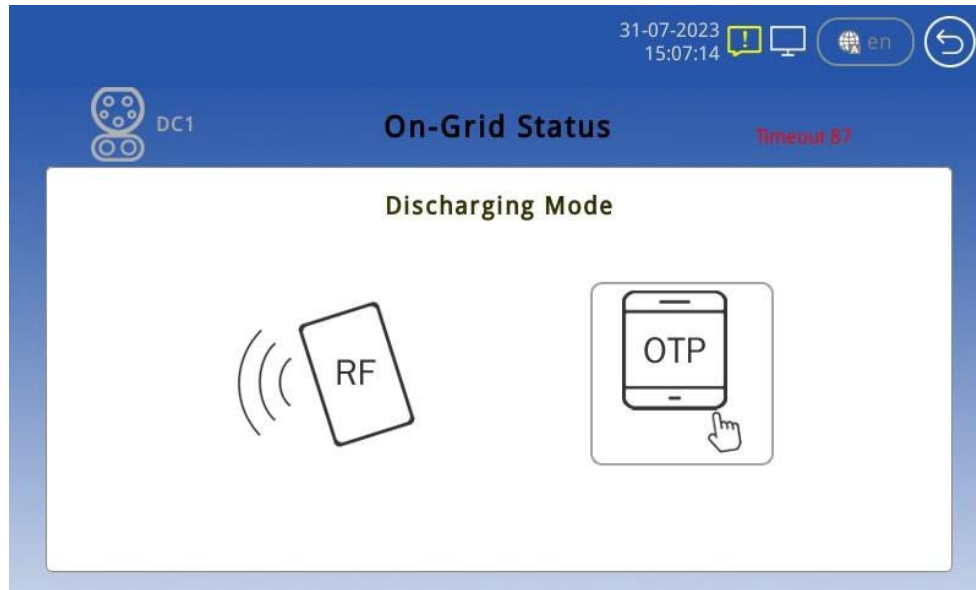


- Start charging/discharging on the screen

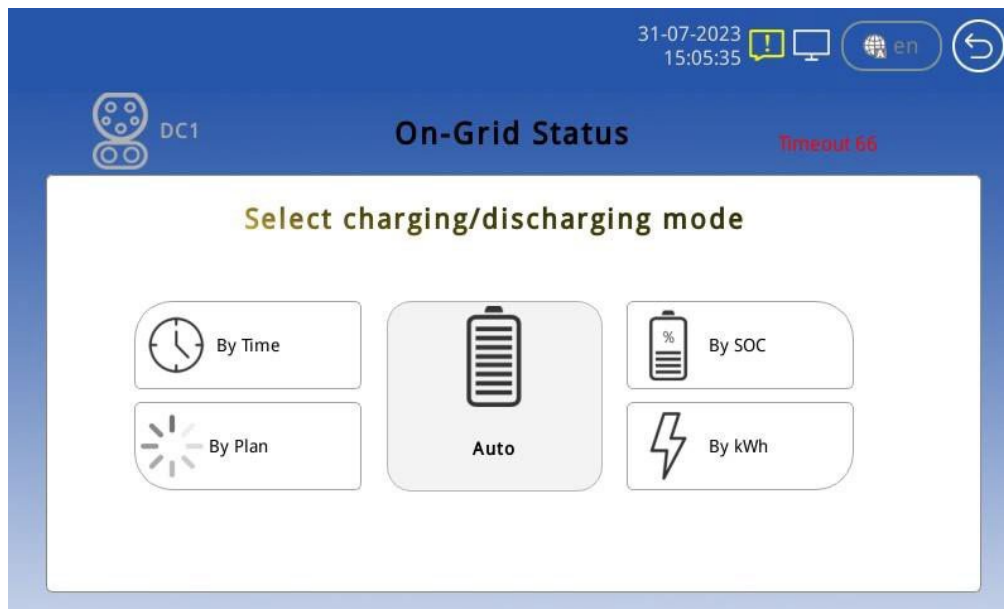


- Waiting for charging/discharging

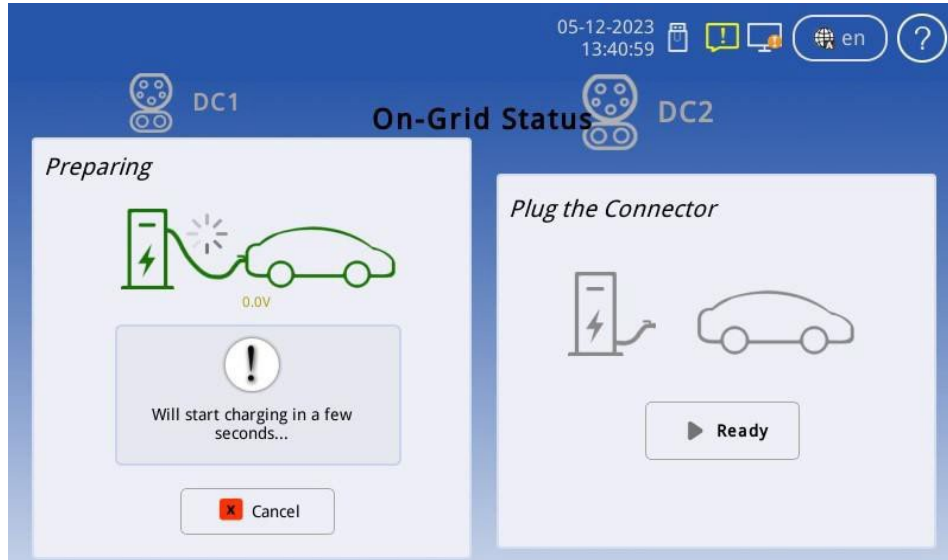




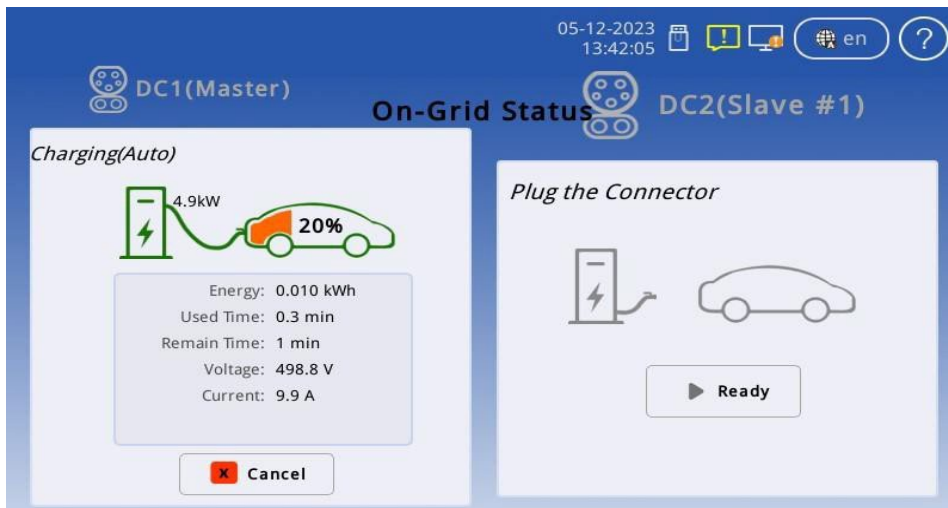
- After passing verification, enter the “starting up” page and select a charging mode to begin.



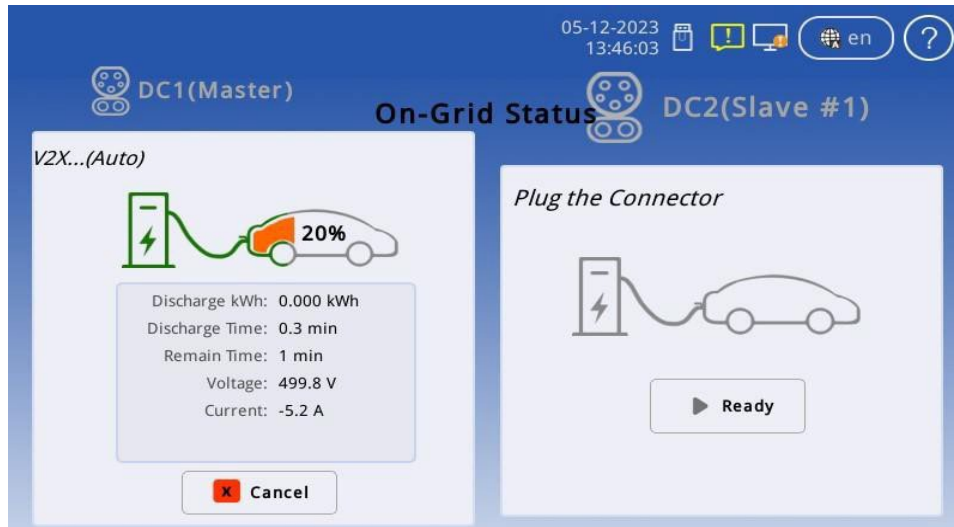
- Starting up successfully, now “Charging”



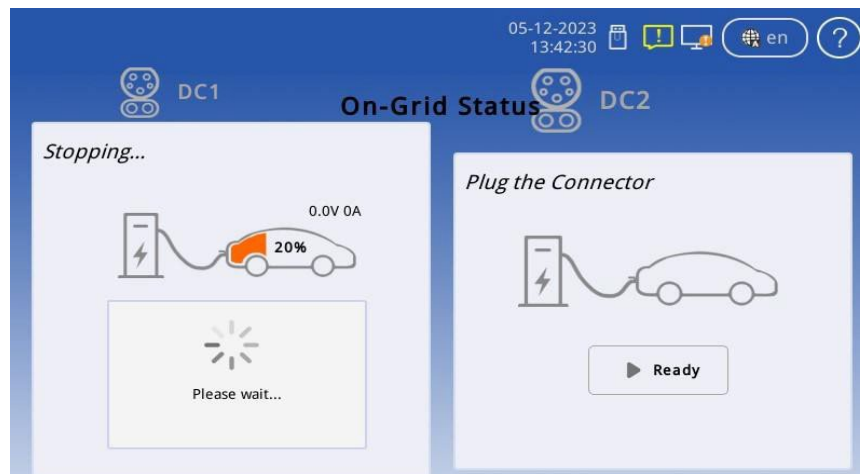
- After the vehicle is fully charged or reaches the SOC discharge cut off condition, stop the charging/discharging session and unplug the connector from the vehicle.
- Charging interface, current display positive value.



- Discharging interface, current display negative value

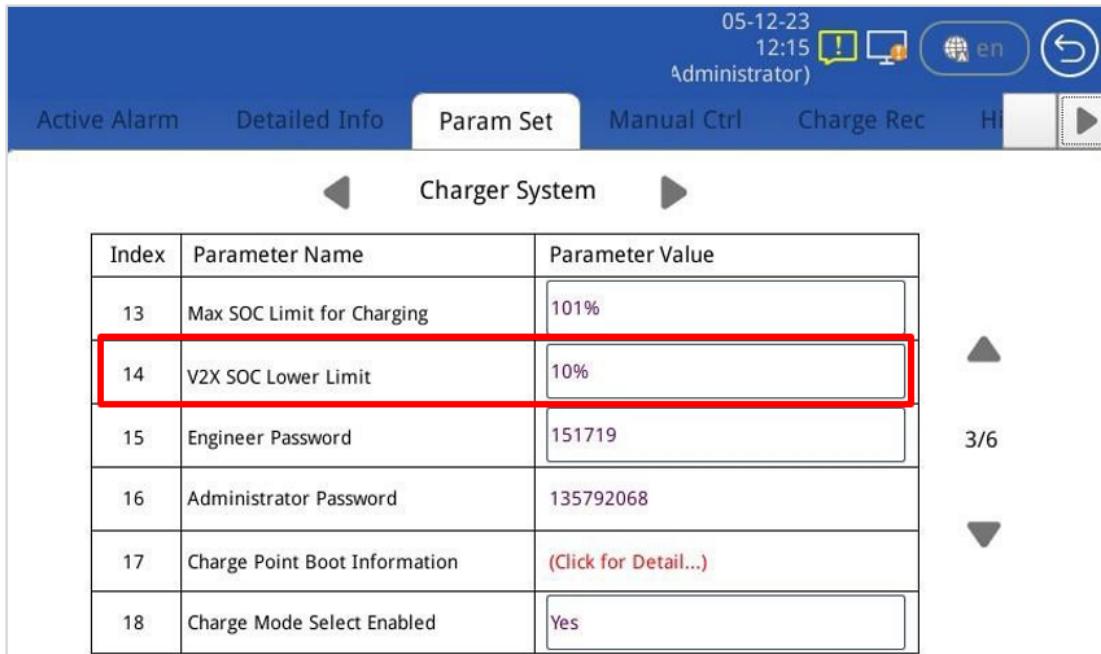


- Stop Interface



7.2.3) Setting the Discharge Cutoff Conditions

- Contact InCharge Energy to set proper discharge cutoff settings. The value of "V2X SOC Lower Limit" would be changed to a percentage, such as 30%. The V2X charger will stop discharging when the vehicle battery SOC reaches 30% in this example.



The screenshot shows the 'Param Set' tab for the 'Charger System'. The table below lists the parameters and their current values. The row for 'V2X SOC Lower Limit' (Index 14) is highlighted with a red border.

Index	Parameter Name	Parameter Value
13	Max SOC Limit for Charging	101%
14	V2X SOC Lower Limit	10%
15	Engineer Password	151719
16	Administrator Password	135792068
17	Charge Point Boot Information	(Click for Detail...)
18	Charge Mode Select Enabled	Yes

7.3) Ethernet and OCPP Setting

- There are 2 standard parameters for back-end setting. Receive them from the back-end supplier.
 - Charger ID
 - OCPP Server End URL


Example 1: for a charge point with identity “CP001” connecting to a Central System with OCPP-J endpoint URL "ws://centralsystem.example.com/ocpp" this would give the following connection URL:

ws://centralsystem.example.com/ocpp/CP001

Figure 7.1: Example of OCPP-J 1.6 Spec

- **Notes:** The protocol upper controller supports OCPP-J 1.6 and 2.0.1. Refer to the OCPP official documents if you have any questions about the above 2 parameters or the protocol itself.

7.3.1) Connection Check

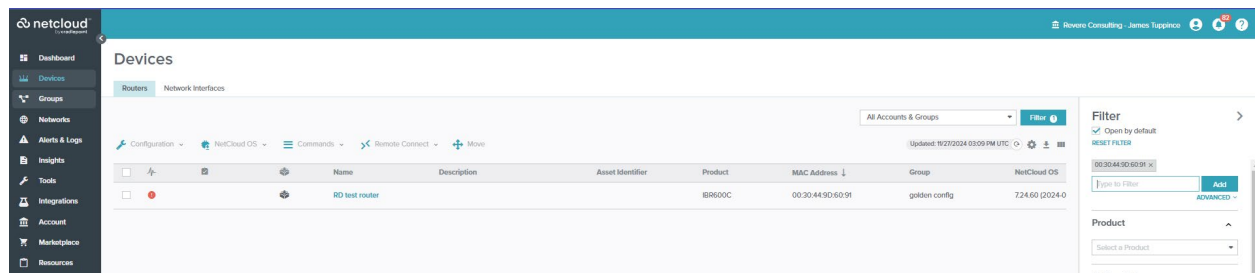
- If the above settings are done properly, you should see the  icon on screen (without reboot).
- Check the OCPP Platform for proper communication of the charger. Seeing the icon on the display screen only shows the charger is connected to the system but does not show the system sees the charger properly.

7.4) Network Setting

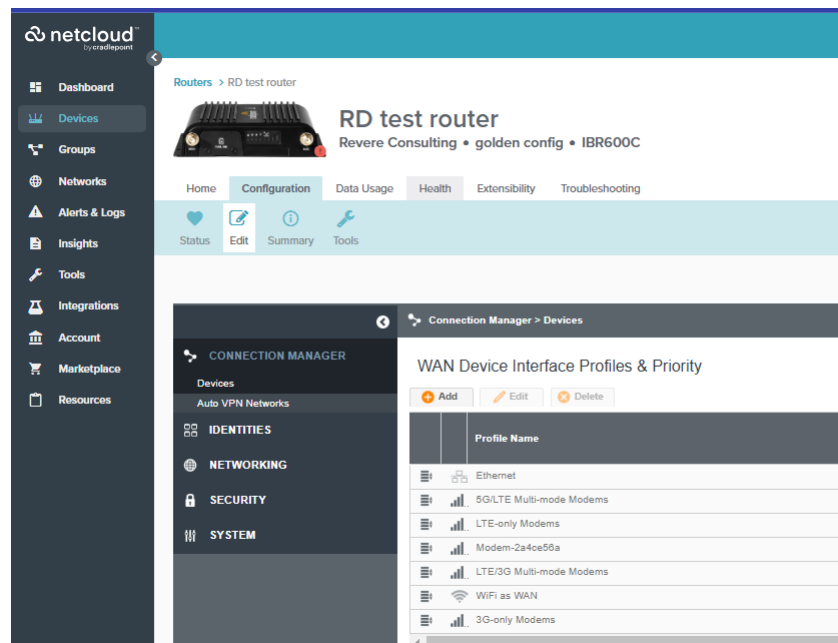
7.4.1) Router Set Up

This guide is intended to help configure the main Cellular Router inside the Power Cabinet for external communication. Log into the SSID of the router via the web browser.

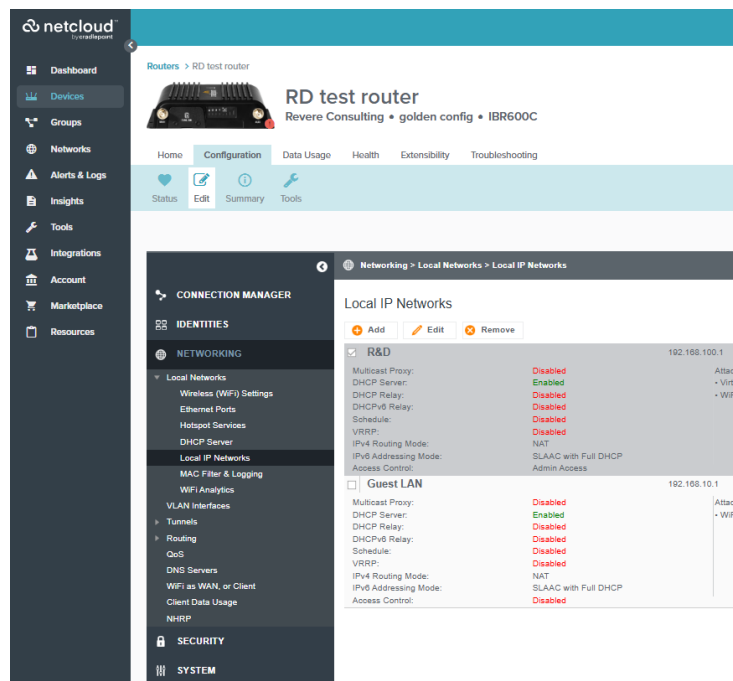
- Click on “Devices” enter in the MAC address of the router that needs to be configured. Click on the device and it will bring you to the device page. If logging in via SSID you can skip this step.



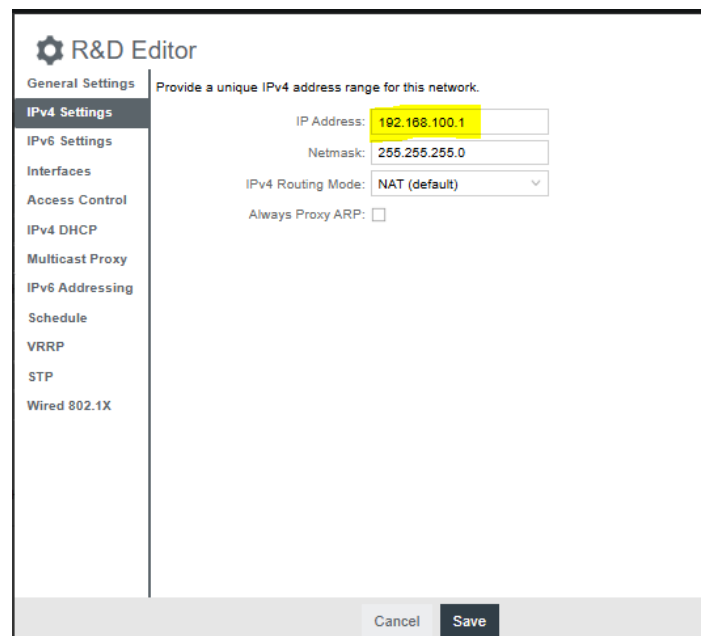
- On the Device page click on “Configuration” then “Edit”. Drag Ethernet to the top of the list of “WAN Device Interface Profiles & Priority”.



- Once “Ethernet” is at the top of the list, under Connection Manager click on “Networking” and in the sub tab click “Local IP Networks”. Click on the first option check box and hit “Edit.”



- Click on “IPv4 settings” and make sure the IP address is the correct scheme needed for the Ice cube. This will ensure that all dispensers can properly communicate locally and externally to InControl. The IP address should be changed to 192.168.1.1.



The screenshot shows the 'R&D Editor' interface with the 'IPv4 Settings' tab selected. The configuration fields are as follows:

Field	Value
IP Address	192.168.100.1
Netmask	255.255.255.0
IPv4 Routing Mode	NAT (default)
Always Proxy ARP	<input type="checkbox"/>

- Hit “save” then hit “Commit” at the bottom of the screen to update the router configurations.

7.4.2) Wireless Network Configuration

- First, check if your system is equipped with an external wireless router.
- This router is installed inside the Power Cabinet and is interconnected with the Network Switch with a RJ45 network cable. The router is usually pre-installed along with the charger before leaving the factory, therefore the only thing needed to ensure it is operating properly.

7.4.3) Wired Network Configuration

- First, check if your system is equipped with an external wireless router.
- Connect the customer ethernet cable from their router LAN port to the WAN port of the Cradlepoint.

7.5 Charger Software Update

- The charger can update the firmware through OCPP or OEM backend remotely, or local update through USB drive to update the firmware of the upper controller and pilot controller.
- The following figure 7.2 software version is for reference only, the actual situation shall prevail.

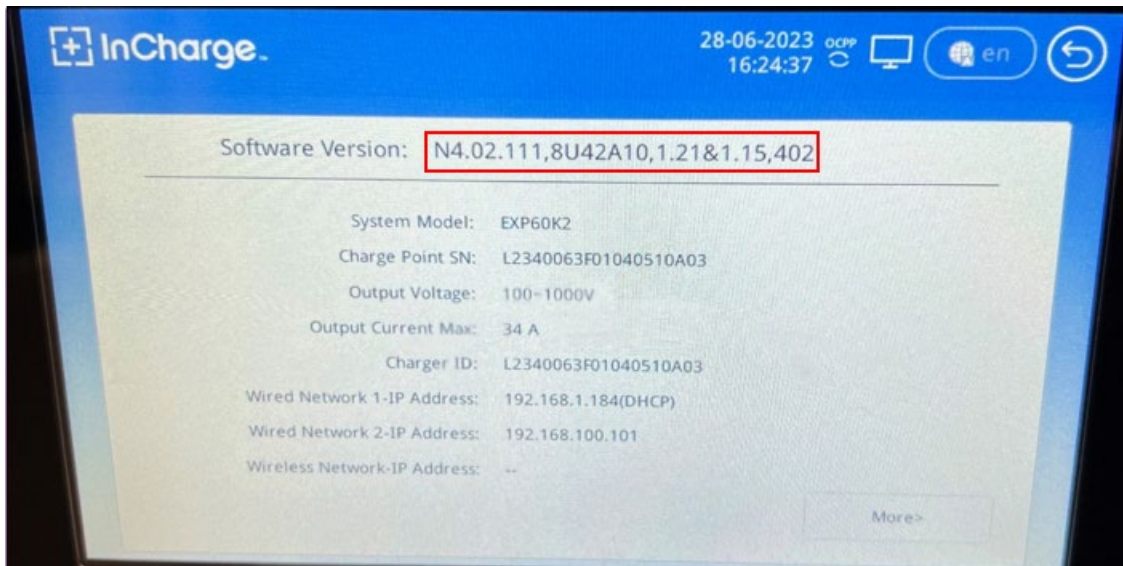


Figure 7.2: Software Version

- **CAUTION:** It is imperative that the correct firmware be installed into each component. If the incorrect firmware for a component is installed, the component may require replacement and full reprogramming prior to operating properly. Please contact InCharge Support for assistance.

7.5.1) Upper Controller Update

- For upper controller's update, firstly power on the controller, and then plug the USB drive into the controller's USB inlet and then go into the setting in "Manual Ctrl" --> "Charger System" --> "Reboot System", need to input "Soft Reset", and waiting the automatic update finish, and then take off the USB disk. Check the software version as shown in Figure 7.3.

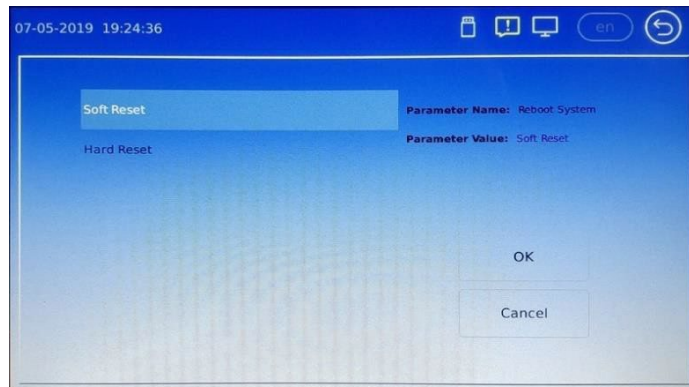
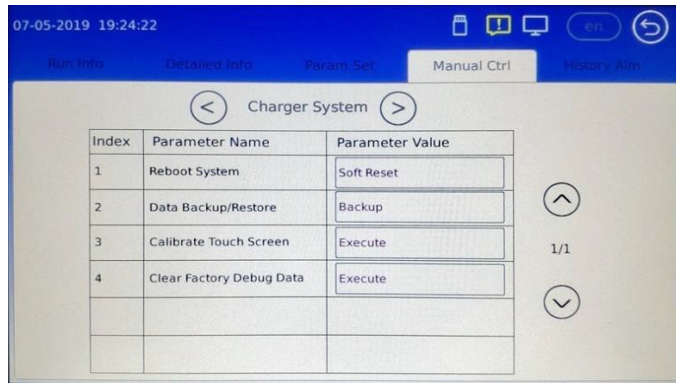


Figure 7.3: Software Version

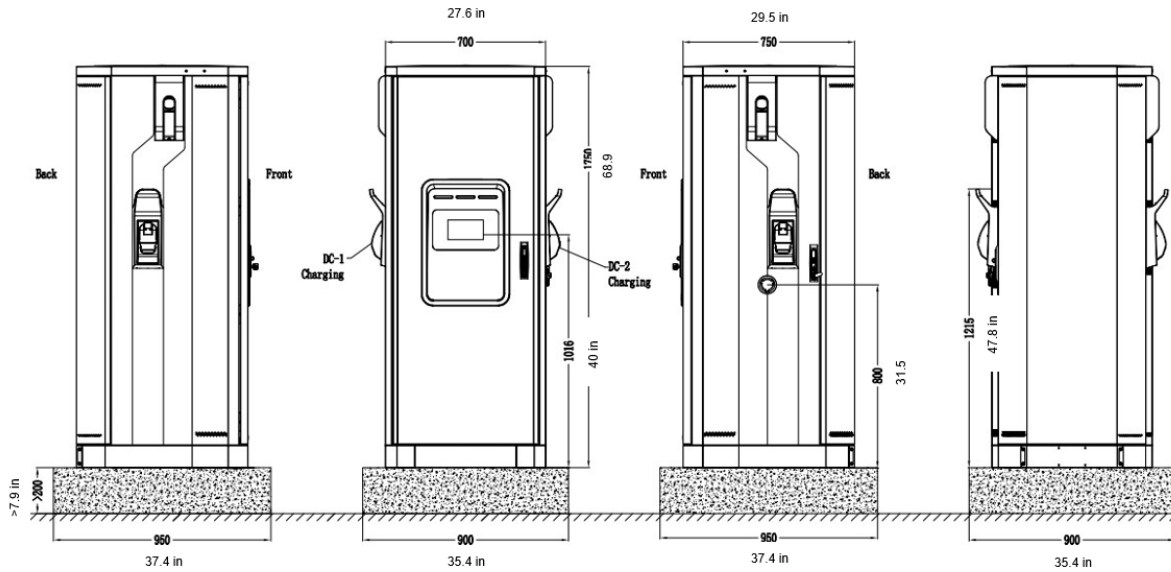
7.5.2) Pilot Controller Update

- For pilot controller's update, firstly power on the controller, and then plug the USB disk into the controller's USB inlet. Then restart the system (disconnect the auxiliary switch, then close it again). Pay attention to the sound. After hearing three beeps, it means the upgrade is complete. You can pull out the USB drive. Check the software version as shown in Figure 7.4.

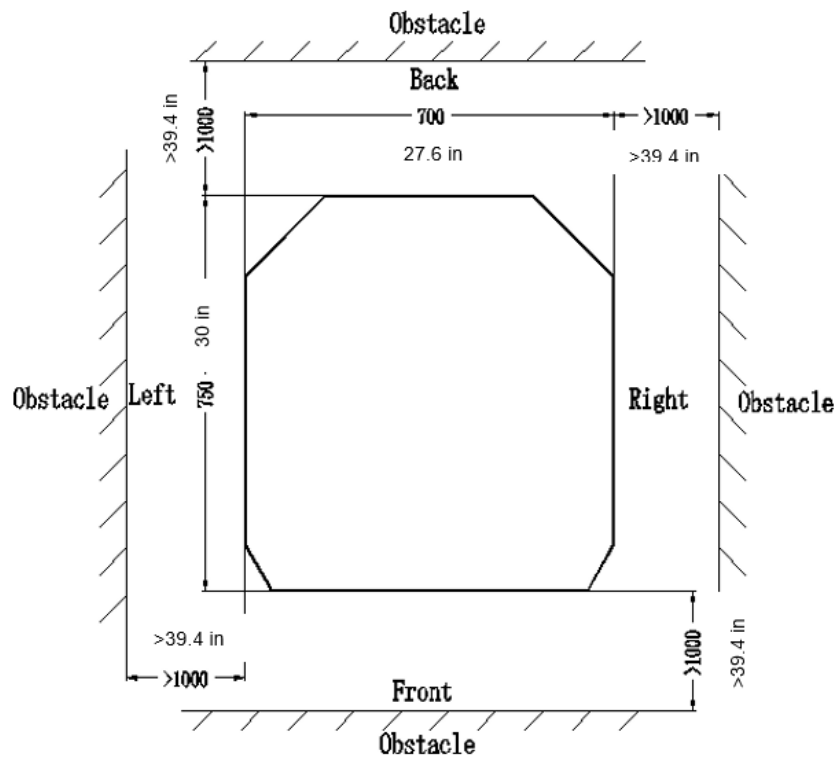


Figure 7.4: Software Version

Appendix 1) Engineering and Technical Parameters

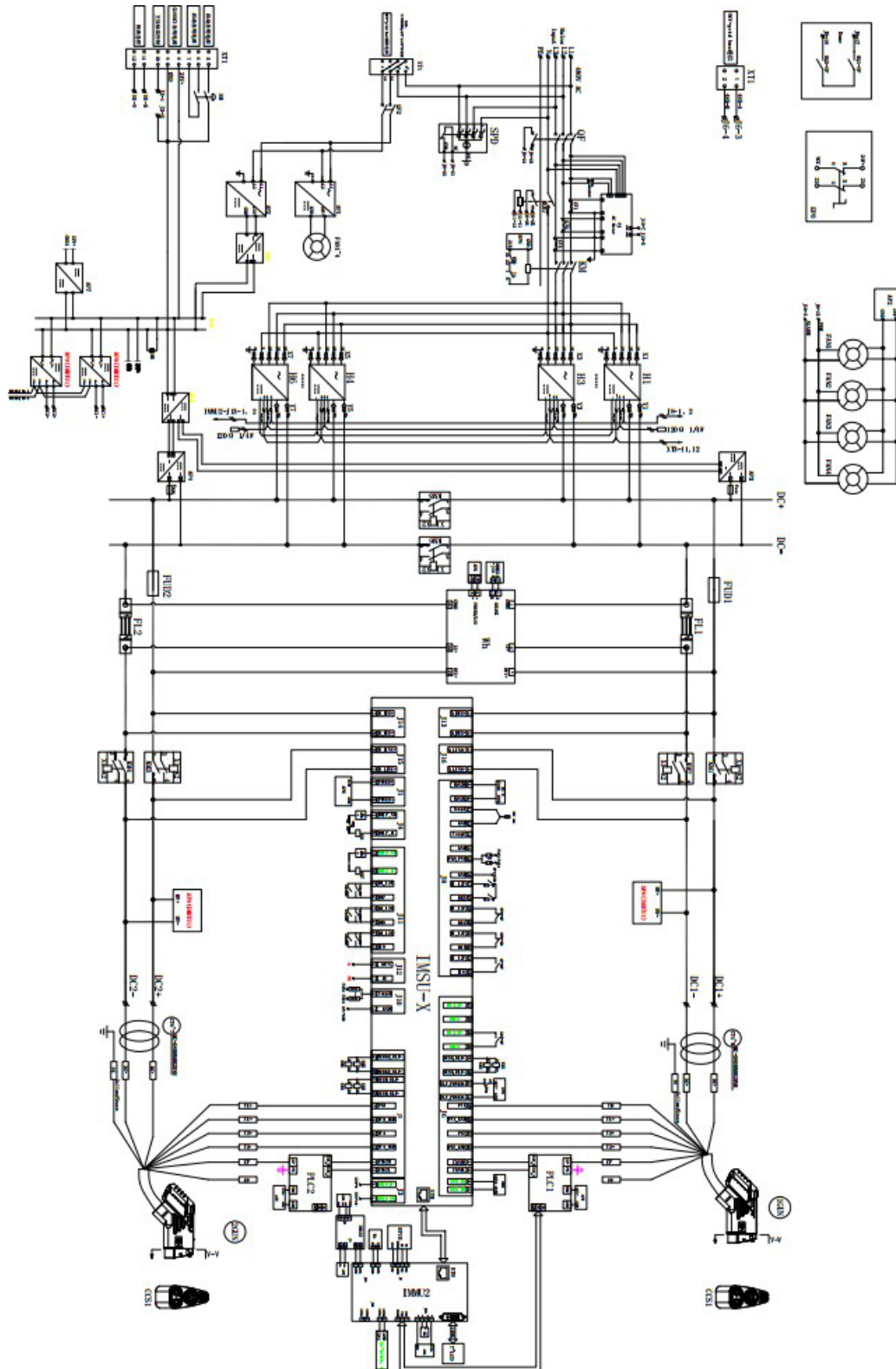


ICE-132 V2X: Four Views



ICE-132 V2X: Space Requirement View

Appendix 2) Schematic Diagram (Without Off Grid Box)



Appendix 3) Maintenance

1.) Hardware Torque Table

Hardware Torque Values

Screw specification (applicable scenario)	Normal torque (kgf.cm)	Normal torque (in-lbs)	Primary tightening tool	Secondary tightening tool
M4 (connection between DC contactor and copper bar)	12±10%	10.4±10%	Electric screwdriver	torque screwdriver
M5 (connection between air switch/lightning arrester and cable)	18--20	15.6±10%	Electric screwdriver	torque screwdriver
M5 (connection between copper bars and between cable and terminal)	30±10%	26±10%	Electric screwdriver	Cross screwdriver or torque screwdriver
M6 (connection between copper bars and between cable terminals)	45±10%	39.1±10%	Electric screwdriver	Cross screwdriver, torque screwdriver or wrench
M6 (connection between AC contactor and cable)	45±10%	39.1±10%	Electric screwdriver	Slot-type screwdriver and torque screwdriver
M6 (connection between DC contactor and copper bar)	45±10%	39.1±10%	Electric screwdriver	Torque screwdriver or wrench
M8 (connection between copper bars and between shunt and copper bar)	110±10%	95.4±10%	Electric screwdriver	Wrench, rocker arm or torque wrench
M8 (connection between DC contactor and copper bar)	100±10%	86.7±10%	Electric screwdriver	Wrench, rocker arm or torque wrench
M10 (connection between copper bars and between shunt and copper bar)	220±10%	191±10%	Electric screwdriver	Wrench, rocker arm or torque wrench
M12 (connection between copper bars)	390±10%	338.5±10%	Electric screwdriver	Wrench, rocker arm or torque wrench
Screw specification (applicable scenario)	Normal torque (kgf.cm)	Normal torque (in-lbs)	Primary tightening tool	Secondary tightening tool
M4 (connection between DC contactor and copper bar)	12±10%	10.4±10%	Electric screwdriver	torque screwdriver

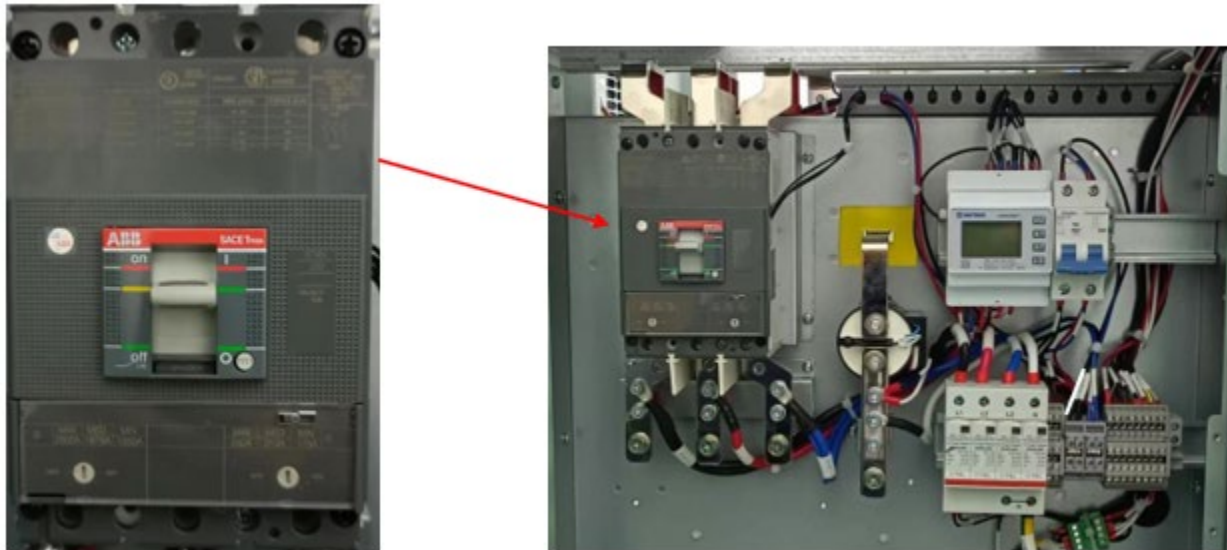
2.) Maintenance Table

NO.	Position	Method	Tool	Maintenance cycle
1	AC input main breaker	Visual Check	/	2 months
2	Devices and connection points Main circuit devices (circuit breaker, AC contactor, DC contactor, DC fuse), copper bar, power module connector	Visual Check	Torque wrench	2 months
3	AC SPD	Visual Check	/	3 months
4	Charging plug	Visual Check	Brush	Daily
5	Cooling Fan and Filter cotton	Visual Check	Blower, Screwdriver Soft Brush Vacuum Cleaner	3~6 months
6	ESD	Visual Check	/	Daily
7	Alarm information check	Visual Check	/	Daily

3.) Maintenance Operation



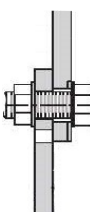
3.1) AC Input Main Breaker

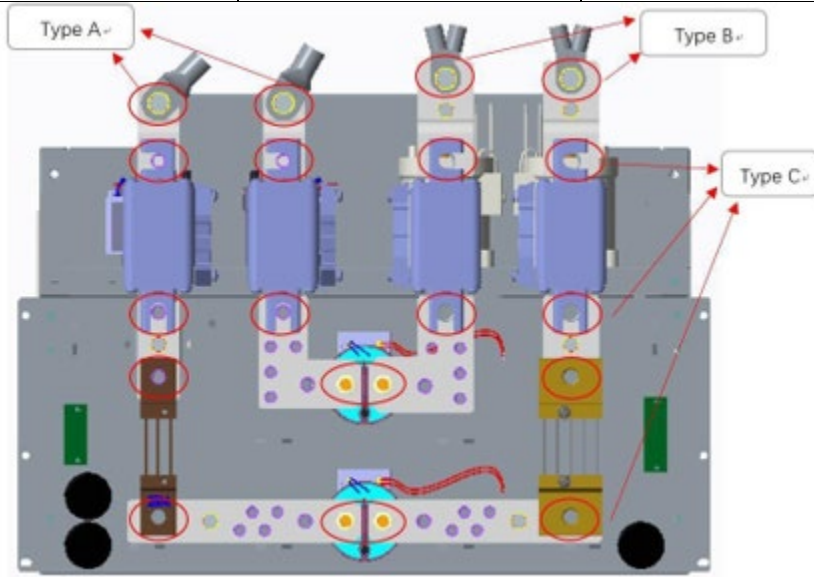
- When the circuit breaker is in the closing state, press the insulation test knob or trip the test button to test the insulation or trip function of the circuit breaker.
- After the circuit breaker is released, the recovery method is as follows: first, turn the circuit breaker to the switch on state; then, turn it to the switch on state.



3.2) Devices and Connection Points

- Check the connection points (circle in the picture) between the main circuit components (circuit breaker, AC contactor, DC contactor, fuse) and copper bar or cable, the connection points between copper bar and copper bar, and the connector of power module for burns or serious discoloration. If any are seen, please check the torque and connection according to point 2) and replace the damaged cable.
- Check whether the screw fixing torque mark is normal. If there is any deviation, please retorque with a torque wrench and mark with a marker.

Types of connection points and similar structures		
Type A	Type B	Type C
		



3.3) AC SPD

- Check the status window of SPD. If the window color changes from green to red, it indicates that SPD has been damaged. In this event, the manufacturer will need to be contacted for replacement.

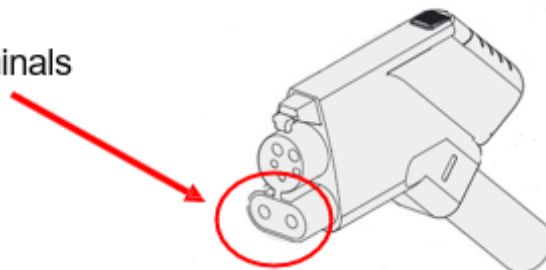


3.4) Charging Plug

- Check whether the charging plug is cracked or damaged. If so, please contact the manufacturer.
- Check whether the DC + and - terminals of the charging plug have obvious burning marks. If so, please contact the manufacturer for treatment.
- Use a brush to remove the dust on the surface of DC + and - terminals.

CCS1

DC+ and DC- terminals



3.5) Cooling Fan and Filter Cotton

- Check the dust screen on both sides of the heat exchanger for dust.
- Use the fan to clean the dust on the dustproof net.
- According to the site environment, the dust net shall be effectively removed at least once every three to six months, and it shall be replaced once a year at most.
- Remove the dust screen with a screwdriver, and use a soft brush, blower and vacuum cleaner to remove the dust effectively.
- Use vacuum cleaner and soft brush cloth to effectively remove the sundries and dust in the cabinet.



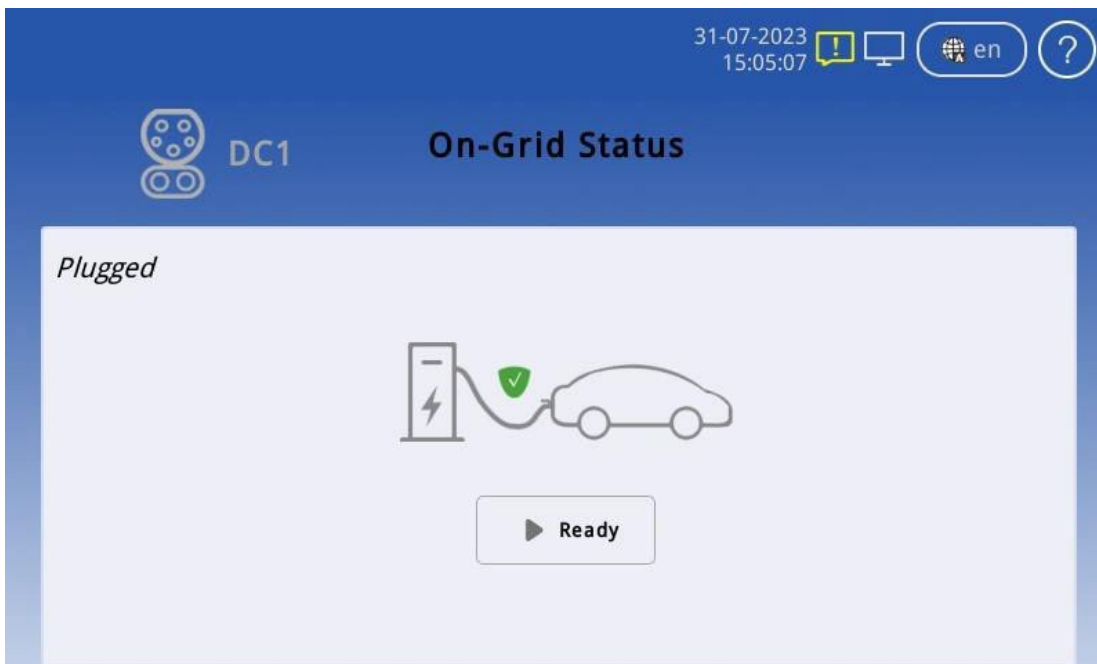
3.6) ESD

- Check the emergency stop cover plate. If the cover plate is damaged, please contact the manufacturer for replacement.



3.7) Alarm Information

- Click “?” In the upper right corner of the screen to view the alarm information.
- If there is alarm information, it should be handled immediately. If it cannot be handled, contact the manufacturer to handle it.



Appendix 4) Error Codes and Possible Solutions

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Active Alarm Detailed Info Param Set Manual Ctrl Charge Rec

Index	Level	Alarm Name	Source	Begin Time	Status
1	MA	Server Comm Fail	Charger System	2021/03/10 15:10:39	Started
2	CA	Communication Failed	Heat Exchange	2021/03/26 15:00:17	Started

◀ 1/1 ▶

- Reason for end of charging
- In case of abnormal shutdown, the charging interface will display the code reason for the end of charging, such as (401) in the following figure

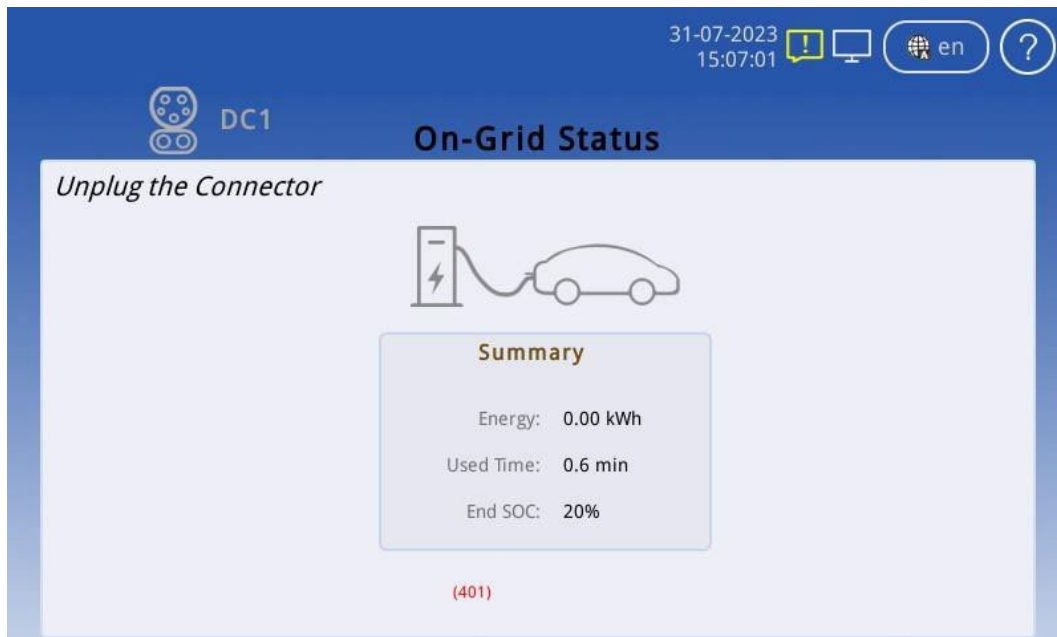


Table: Charger Alarms

NO.	Alarm ID	Alarm Name	Alarm Level	Description	Remark
1	1	System Not Available	CA	System is out of service and charge is not allowed. This usually comes after another critical alarm (e.g. EPO pressed).	
2	2	System Disabled	MA	System is out of service and charge is not allowed. This happens after system is set to 'In-operative' by service guy or backend.	
3	3	All CCU Comm Fail(Not used right now)	CA	Note used any longer.	
4	4	Server Comm Fail	MA	Whether the network is not accessible or the connection between server and charger is broken.	
5	5	All kWhMeter Not Installed	MA	All kWh meters are set to 'Not installed'. This means system not available.	
6	6	CCU Comm Fail	CA	The communication between IMM2 and IMSU-D has failed. This means the system not available.	
7	7	EPO is pressed	CA	This means the system is not available.	
8	8	Door is opened	CA	This means the system is not available.	
9	9	SPD alarm	CA	This means the system is not available.	
10	10	Mains Fail Alarm	CA	This means the system is not available.	
11	11	Gun is disabled	MA	The specified gun is out of service and not allowed to charge. This happens after the gun is set to 'In-operative' by service guy or backend.	Gun A/B/C shall be specified
12	12	System over temp	MA	The temperature measurement from sensor is over the high limit Point (default is 167F or 75 'C).	Note that this alarm does not stop/prohibit charge function
13	13	All Rectifier Failure	CA	This means the system is not available.	
14	14	All Rectifier Comm Fail	CA	This means the system is not available.	

15	15	Rectifiers Failure	CA	This means the specified gun will not be available.	Rectifier group 1/2 shall be specified
16	16	Rectifiers Comm Fail	CA	This means the specified gun will not be available.	Rectifier group 1/2 be specified
17	17	Insulation Comm Fail	CA	This means the specified gun will not be available.	
18	18	Output Shorted	CA	This is from Rectifiers after detecting the internal circuit shorted.	
19	19	Insulation Alarm	CA	This is from IMSU-D after detecting abnormal insulation.	
20	20	PLC ComFail Alarm	CA	This is from IMSU-D when the PLC communication is lost.	
21	21	Ground Fault	CA	This is from IMSU-D after detected ground fault.	
22	22	AC Fail Alarm(for AC only)	CA	This is from IMSU-D after detected AC gun input fails (DI).	
23	301	CR CommFail	CA	The communication between IMM2 and Card Reader has failed. This usually means the authentication with RFID card loses efficacy and user must take other method instead (e.g. OTP).	
24	401	kWhMeterCommFail	CA	The communication between IMM2 and specified kWh meter has failed. This means the specified gun will be out of service and forbid to charge.	
25	402	Sampled Invalid Current	CA	The measurement from the specified kWh meter is invalid. This usually happens with a reversed wiring for the current shunt.	
<p>1. <i>CA</i> - Critical alarm <i>MA</i> - Major alarm <i>OA</i> - Observative Alarm</p>					

Stop Reason Classification	Code	Description	Remark
Normal Stop	1	Normal Stop	Condition satisfied
	2	EV Request Stop	EV Request Stop
Charger Error	201	Parameter configuration failed	
	202	Charging Enable timeout	
	203	Abnormal volt of outside bus	
	204	Unable lock charging gun	
	205	Insulation inspection abnormaly	
	206	Insulation inspection timeout	
	207	EV Relay pull-In timeout	
	208	Require Curr Timeout	
	209	Remain time over stop	
	210	Ring fail alarm (reserved)	
	211	Communication with EV failed	
	212	Plugged gun timeout	
	213	Pre Charging fault	
	214	DoorOpen	
	215	EPO	
	216	SPD	
	217	AllRectFail	
	218	MainsFailAlm	
	219	AlRectCommFail	
220	E_LockFail		

	221	GunOverTemp	
	222	OutputShortCircuit	
	223	PWM Failure	
	224	Ground Fault Detected	
	250	CR Comm Fail	
	251	kWhMeterComm Fail	
	252	CCU Comm Fail	
EV Error	301	Battery overvoltage	
	302	Battery undervoltage	
	303	Battery current deviation error	
	304	High battery temperature	
	305	Battery voltage deviation error	
	306	Charger Connector Lock Fault	
	307	Vehicle shift position	
	308	Error Status Noticed by EV	
	309	PLC Low Level Comm Fail	
	310	PLC High Level Comm Fail	
	311	PLC Authentication Timeout	
	312	PLC ParamDiscovery Timeout	
Canceled	401	Local Stop	
	402	Server Stop	
	403	Network fault	
	404	Reboot	
	405	DeAuthorized	
	406	One-Click Stop	
	407	Hard Reset	
	408	Soft Reset	
Other	501	Other	