ATESS | ENERCOLLEGE

EV Charger

Fault Analysis Handbook

Standard Operating Procedures-DC EV Charger

ATESS ENERCOLLEGE

Technical Support Document

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Contents

Introduction

A reliable EV charger is the cornerstone of confidence in electric vehicles. ATESS Enercollege understands this and has developed this Failure Analysis Handbook—a concise yet comprehensive reference covering the most common field events reported in our global DC charger product line.

Beyond immediate troubleshooting, each item distills the symptoms of a fault, its cause, and proven corrective actions into clear, step-by-step instructions that technicians, operators, and distributors can apply without specialized tools or extensive firmware knowledge. By translating complex power-electronics behavior into plain language and visual flow charts, we aim to shorten mean-time-to-repair, reduce unnecessary component returns and ultimately maximize charger uptime and revenue for site owners.

❶ Emergency Stop Pressed

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Emergency stop press'.

(2) Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: Emergency Stop Button is pressed.

(2)Design Principles: The emergency stop button is the highest level of safety protection device for equipment. When triggered, the system will immediately lock and throw a fault code to ensure the safety of personnel and equipment.

(3)Potential Cause:

a. Personnel proactively press to respond to emergency situations

b. The emergency stop button is accidentally hit or accidentally touched

c. Mechanical failure or short circuit of the emergency stop button itself.

3. Solution

(1)Safety Confirmation: Confirm whether the reason for pressing the emergency stop button has been resolved and whether the surrounding environment is safe.

(2)Release Emergency Stop Button: Find the emergency stop button, usually located on the front or side of the charger, and observe if it is pressed. If it is pressed, try rotating it clockwise to release it.

(3)Reset Charger: After resetting the emergency stop button, try to power off the device and wait for 30 seconds before restarting.

(4)Verification: The fault indicator light has returned to blue, and the device is running normally. If the fault persists, please check:

a. Check if the wiring of the emergency stop button is loose or detached.

b. Final solution: Replace the emergency stop button.

2 RFID Communication Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'RFID Communication Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: Abnormal communication between RFID board and motherboard.

(2)Design Principles: RFID board is a board used for interacting with cards, allowing users to initiate charging and conduct transactions through the card.

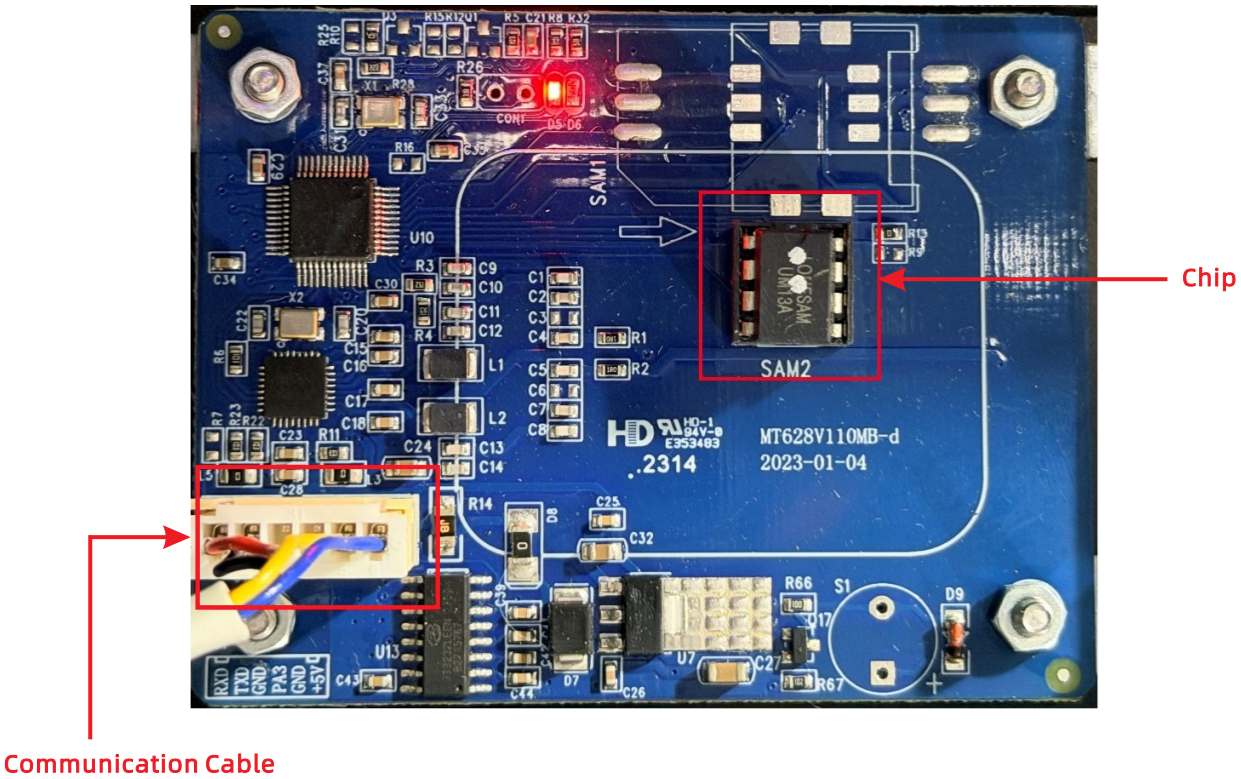
(3)Potential Cause:

a. Abnormal communication circuit between RFID board and motherboard

b. RFID board is broken

3. Solution

Check RFID board circuit: Check if the communication cable on the RFID board is loose and if the chip is abnormal. If it is abnormal, please consider replacing it.



3 SPD Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'SPD Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: Surge Protection Device(SPD) failure

(2)Design Principles: SPD is used to resist lightning strikes and operating overvoltages from power and signal lines in electrical and electronic equipment. Therefore, when SPD fails, it should be replaced immediately.

(3)Potential Cause:

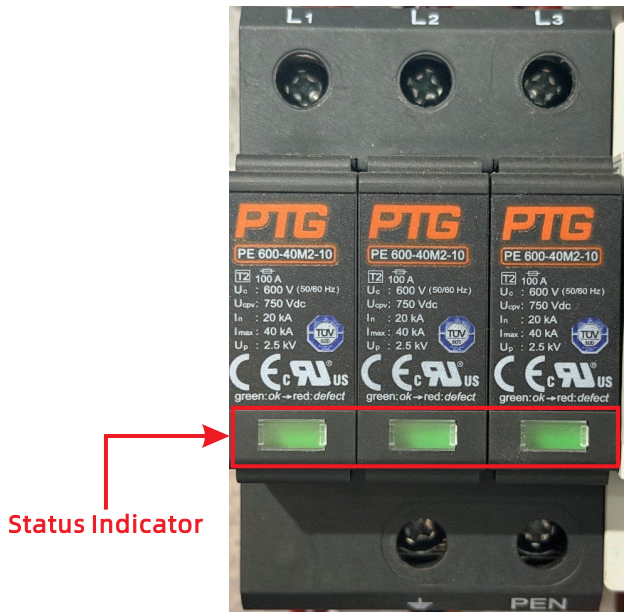
a. SPD damaged.

b. SPD alarm cable damaged.

3. Solution

(1)Check SPD status: SPD has a status indicator, with green indicating normal use and red indicating failure. If the SPD indicates a red status, please replace the SPD immediately.

(2)Check SPD alarm cable status: Please check if the cable is loose or damaged. If any abnormal situation occurs, please repair it immediately.



4 Meter Communication Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Meter Communication fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has detected an abnormality in communication with the electricity meter.

(2)Design Principles: The electric meter plays a crucial role in measuring voltage, current, and other parameters in charger equipment.

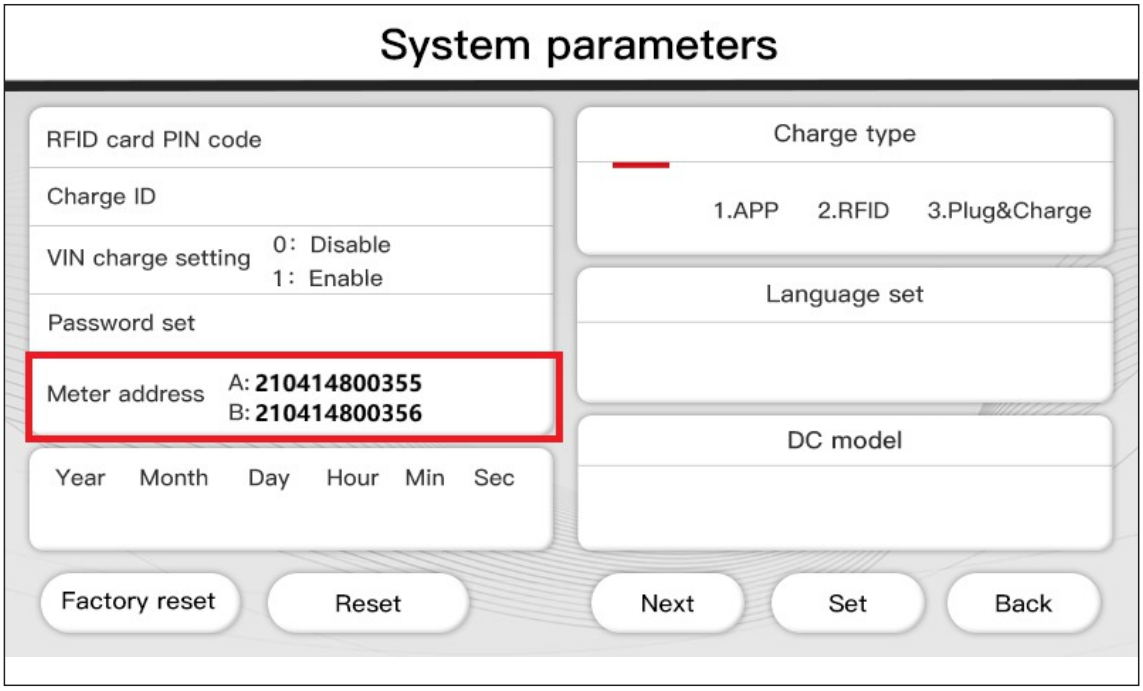
(3)Potential Cause:

a. Communication parameter setting error

b. Communication line is abnormal

3. Solution

(1)Check Parameters: The communication parameters of the electric meter include meter type, meter address, baud rate, check bit, stop bit, etc. Taking the meter inside a DC charger as an example, meter type is 'Yada', baud rate '9600', check bit 'o', stop bit '1'. Meter address is located below the meter, and it needs to be set into the charger parameters(For dual unit, B address is A address plus 1).



(2)Check communication cable: The communication between the electricity meter and the motherboard adopts 485 communication. The 485 communication line consists of two communication lines, namely A and B. The A and B lines between the electricity meter and the motherboard need to correspond one-to-one.

5 Contactor Open Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Contactor Open Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has detected abnormal contactor status.

(2)Design Principles: the contact or can be understood as a switch that controls power output. If the contactor is abnormal, it will cause abnormal output.

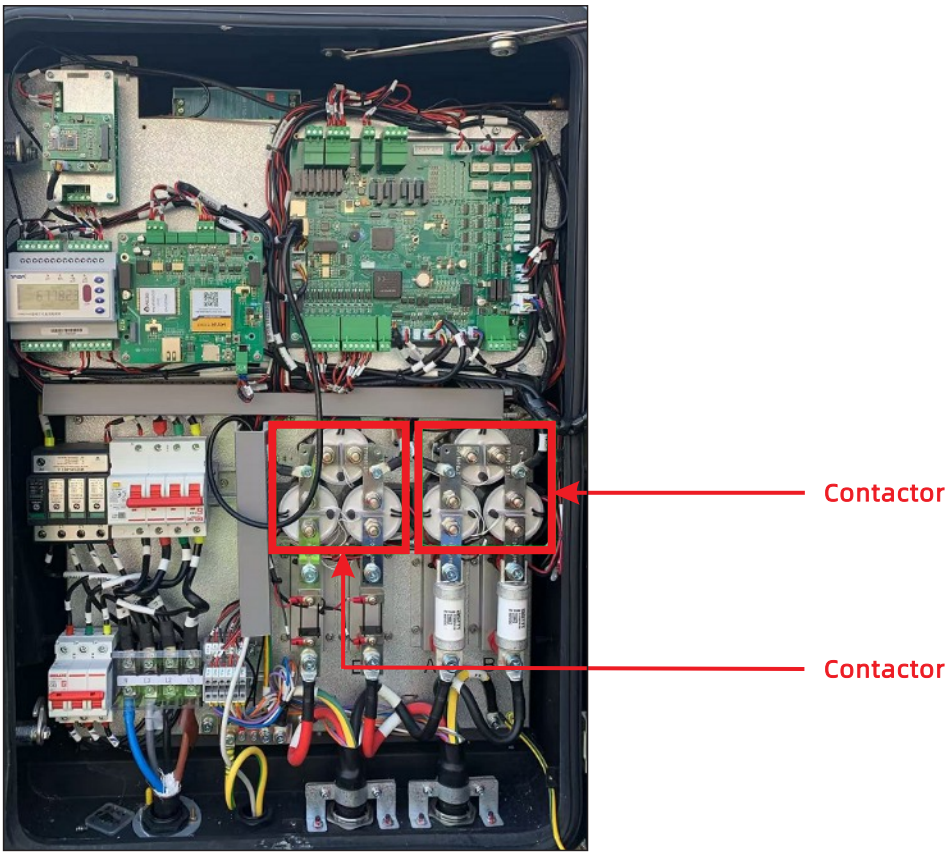
(3)Potential Cause:

a. Contactor damaged

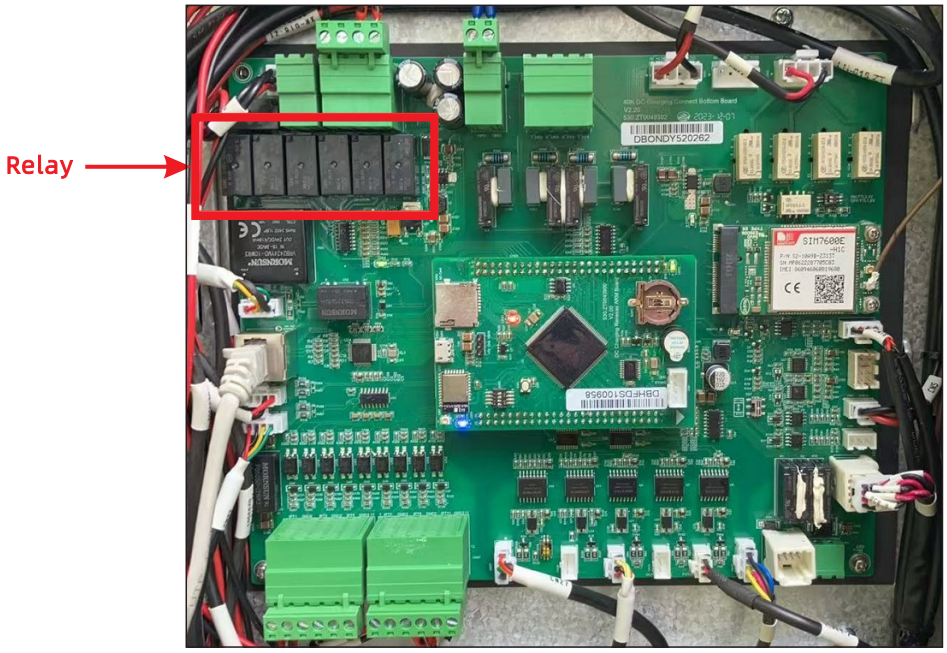
b. The contactor control component damaged

3. Solution

(1)Check contactor: Observe whether there are obvious damage or burnt marks on the surface of the contactor. If obvious damage marks are found, please replace the contactor immediately.



(2)Check pcb: There are small relays on the PCB that control the contactors. If they are damaged, it can also cause the fault, please try replacing the motherboard to solve the problem.



6 Plug Head Connect Over Temperature Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Plug Head Connect Over Temp Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has detected that the temperature sensor value of the gun head is too high.

(2)Design Principles: Overheating of the gun head is a dangerous signal that may indicate poor equipment operation.

(3)Potential Cause:

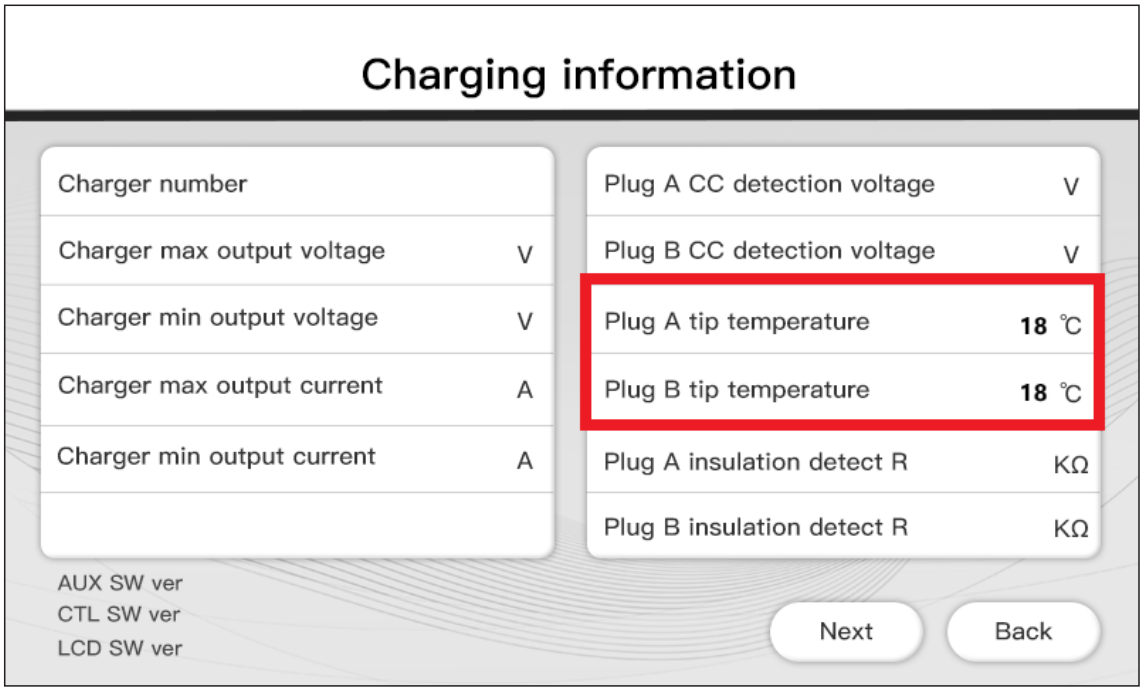
a. The temperature of the gun head is too high

b. Abnormal gun temperature sensor

c. Parameter settings issue

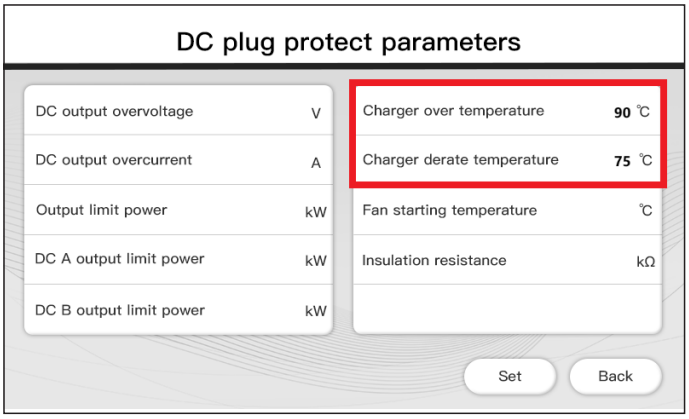
3. Solution

(1)Check the sensor values: The first step is to check the temperature sensor value to preliminarily determine whether it is overheating or false alarm. Usually in idle, the temperature of the gun head is close to the ambient temperature.



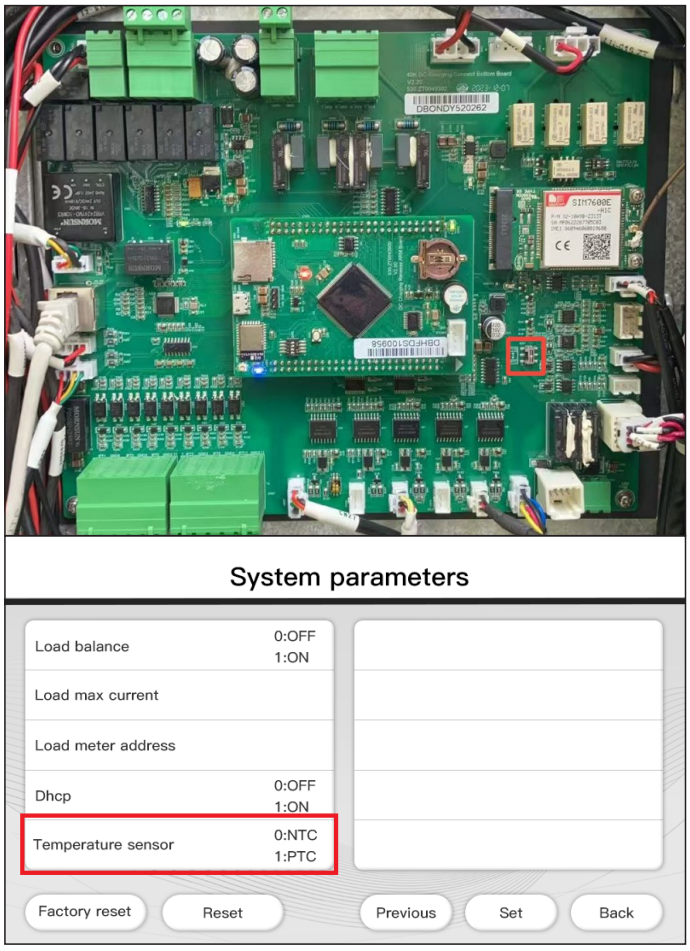
(2)Classification Based on Results

a. The gun temperature is close to the ambient temperature: This situation is usually due to the over temperature alarm value being set too low. The over temperature value can be set in the protection parameter page, usually defaulting to 90 ℃.



b.Gun temperature too high: This situation may indicate that there is overheating inside the gun head. Please suspend the use of the charger and further investigate.

c. The temperature sensor value is significantly abnormal: This situation is usually caused by an incorrect selection of temperature sensor type, and the correct temperature sensor can be selected in the motherboard/screen settings(Depending on different models).



7 Power Module Communication Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Power Module Communication Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has detected an error in communication data with the power module.

(2)Design Principles: The power module is a critical component of the charger, used for AC-DC conversion to output power. Communication between the motherboard and the power module is crucial.

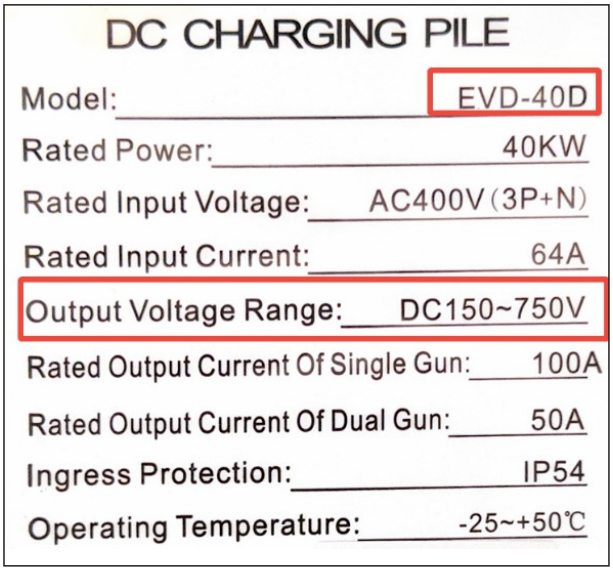
(3)Potential Cause:

a. Power module parameter settings error

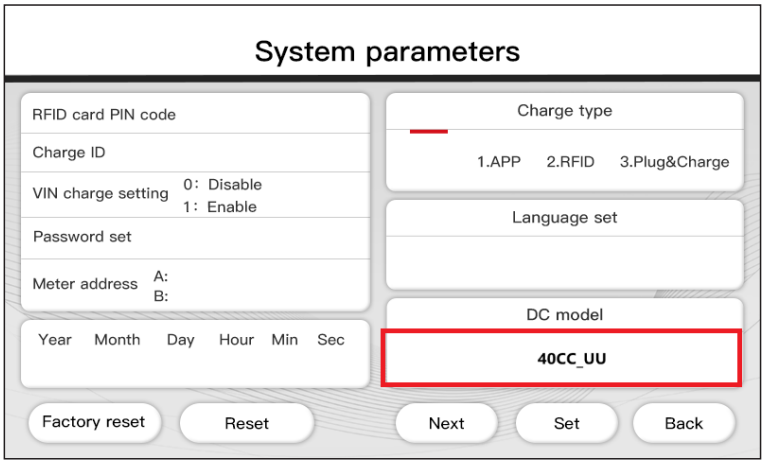
b. Power module damaged

3. Solution

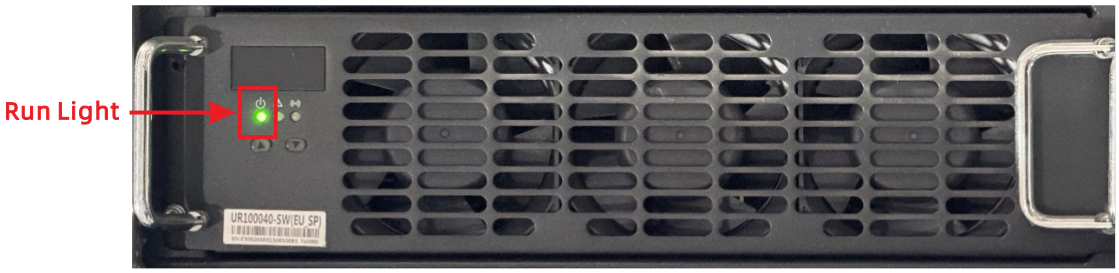
(1)Confirm the type of power module and machine type: The power module type and machine type can be confirmed through the nameplate. The DC charger adopts two types of power modules, IFY and UU, and the machine types are divided into single gun and dual gun, which are also divided into many different powers. From the figure, it can be seen that the charger model is EVD-40D, which represents a power size of 40kW and has dual gun. The output voltage of 150-1000 indicates that the power module is of the UU type. If the output voltage is 150-750V, it indicates that it is of the IFY type.



(2)Check parameter settings: Access the system parameters page and select the correct machine type. According to the above example, '40CC_UU' should be selected here.



(3)Check power module: Open the power module compartment door, usually located on the side/below/inside of the charger (depending on different models). Firstly, the module address should be checked. The IFY module address is set in binary form and increases sequentially from 0 and the UU module adopts a display screen for direct display. Next, observe the module operation indicator light. When the module is running normally, only the Run light (green color) should be running.



(4)Meaning of power module indicator light: The power module has indicator lights, and further troubleshooting of power module issues can be carried out according to the following instructions.

Power Module Fault Instruction

Instrution Light	Normal Status	Abnormal Status	Reason
Green Light	On	Off	No power input
		Blinking	The background monitoring module is being operated
Yellow Light	Off	On	Ac input over/under voltage, internal over temperature, bus voltage abnormal
		Blinking	Communication Outage
Red Light	Off	On	Output overvoltage, output short circuit, internal address conflict, internal bus fault
		Blinking	Fan Fault

NOTE: WE'RE NOT RESPONSIBLE IF YOU DISASSEMBLED POWER MODULE.
So please don't replace any parts inside the power module, please keep the broken module and report to Atess team

8 Power Module Communication Timeout

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Power Module Communication Timeout'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has lost communication with the power module.

(2)Design Principles: The power module is a critical component of the charger, used for AC-DC conversion to output power. Therefore, communication between the motherboard and the power module is crucial.

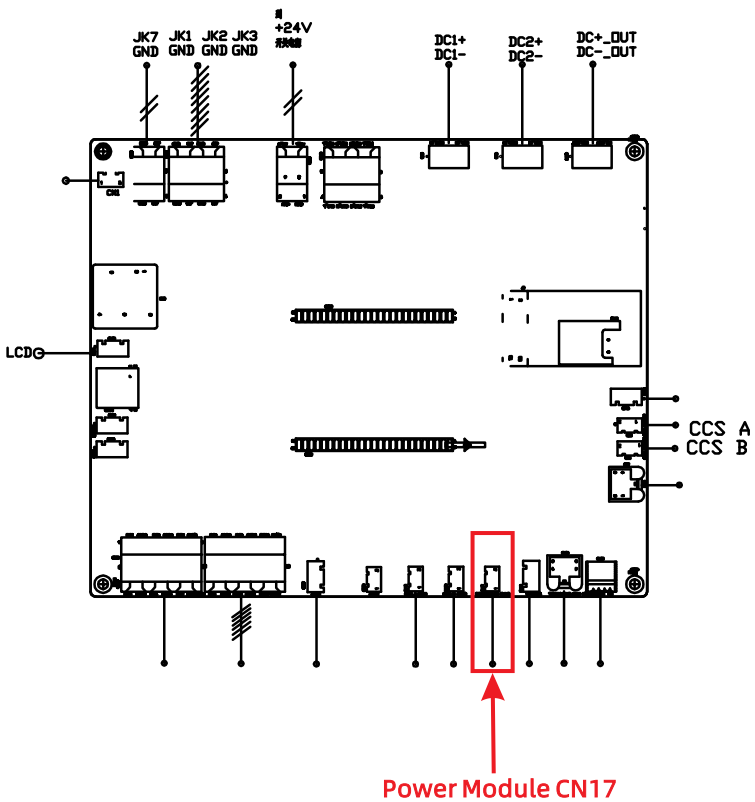
(3)Potential Cause:

a. Communication cable abnormality

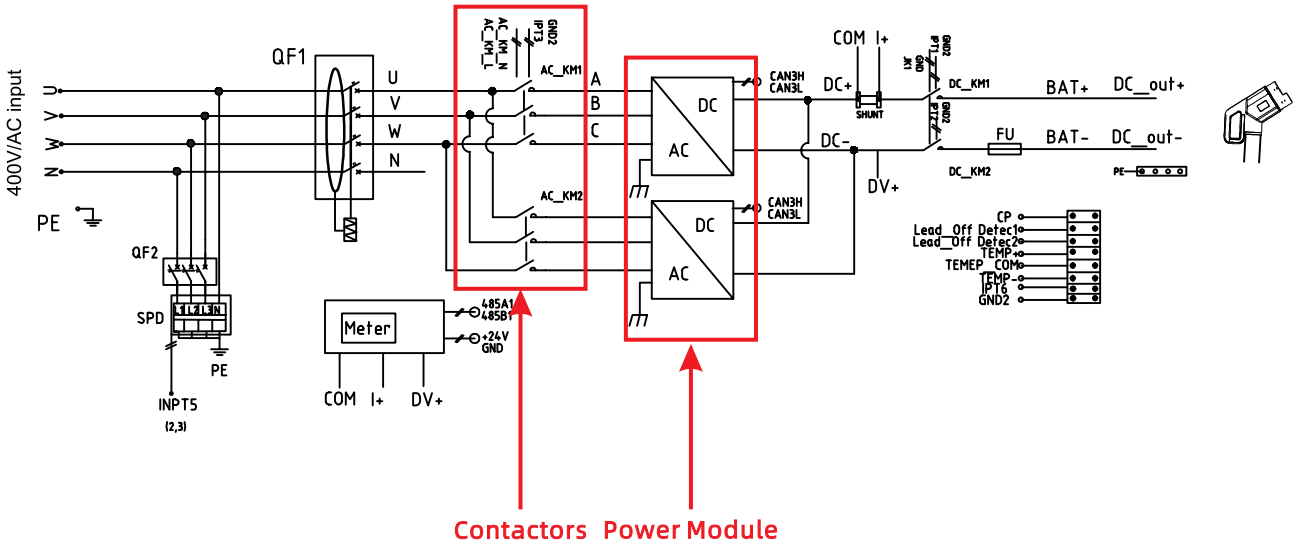
b. The power module is power off

3. Solution

(1)Check power module communication cable: The motherboard and power module use CAN communication, and the port is CN17. Should check if the cable at this port is loose.



(2)Check power module runing light: When the fault occurs, please check the power module operation indicator light. If the operation indicator light goes out, it means that the power module is not powered and further investigation is needed to check the contactors between the power supply and the power module.



9 DC Output Over Current Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'DC Output Over Current Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The charger has detected that the sampled output current exceeds the limit value.

(2)Design Principles: To prevent excessive current from causing rapid heating beyond the design limit, which could lead to fire or permanent damage to the equipment.

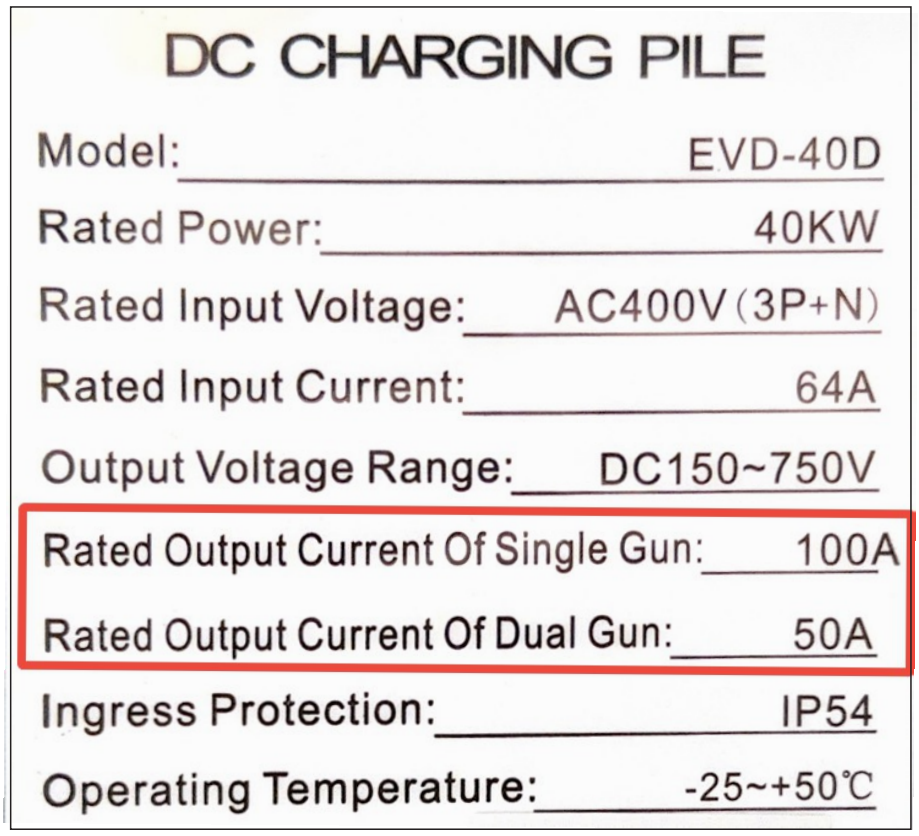
(3)Potential Cause:

a. Output current exceeds the protection value

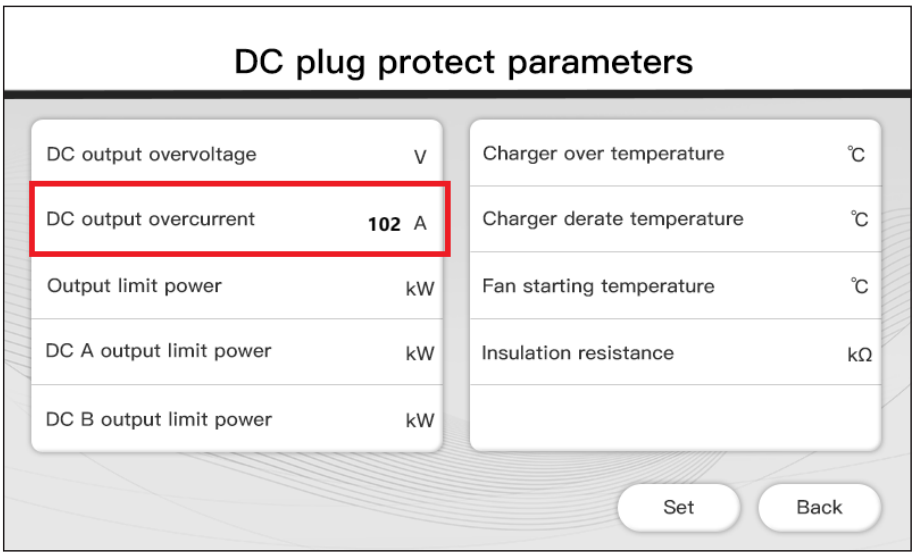
b. Current sampling error

3. Solution

(1)Observe the rated output current on the nameplate: Check the nameplate parameter 'Rated Current' to clarify the maximum output current of the charger.



(2)Check protection value: Check the output current protection parameter value on the screen, which should match the rated output current on the nameplate. For example, this should be 102A (slightly higher than the rated output current).



(3)Check the actual output current: Observe the actual output current value on the screen and use a clamp current meter to measure the actual output current. If there is a significant difference, it is a problem with the current sampling device. DC chargers usually use an electric meter to sample the current, which can check the shunt ratio of the electric meter parameters. For example, if two splitters are installed at the output end, the ratio parameter is set to 200.

10 BMS Communication Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'BMS Communication Fault'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard detects abnormal communication data with BMS(Battery Management System).

(2)Design Principles: DC chargers require frequent communication with BMS throughout the entire process, so in case of communication errors, a fault should be reported and charging should be stopped to ensure charging safety.

(3)Potential Cause

a. The firmware adaptation issue of the SECC board, a component for communication between the motherboard and BMS.

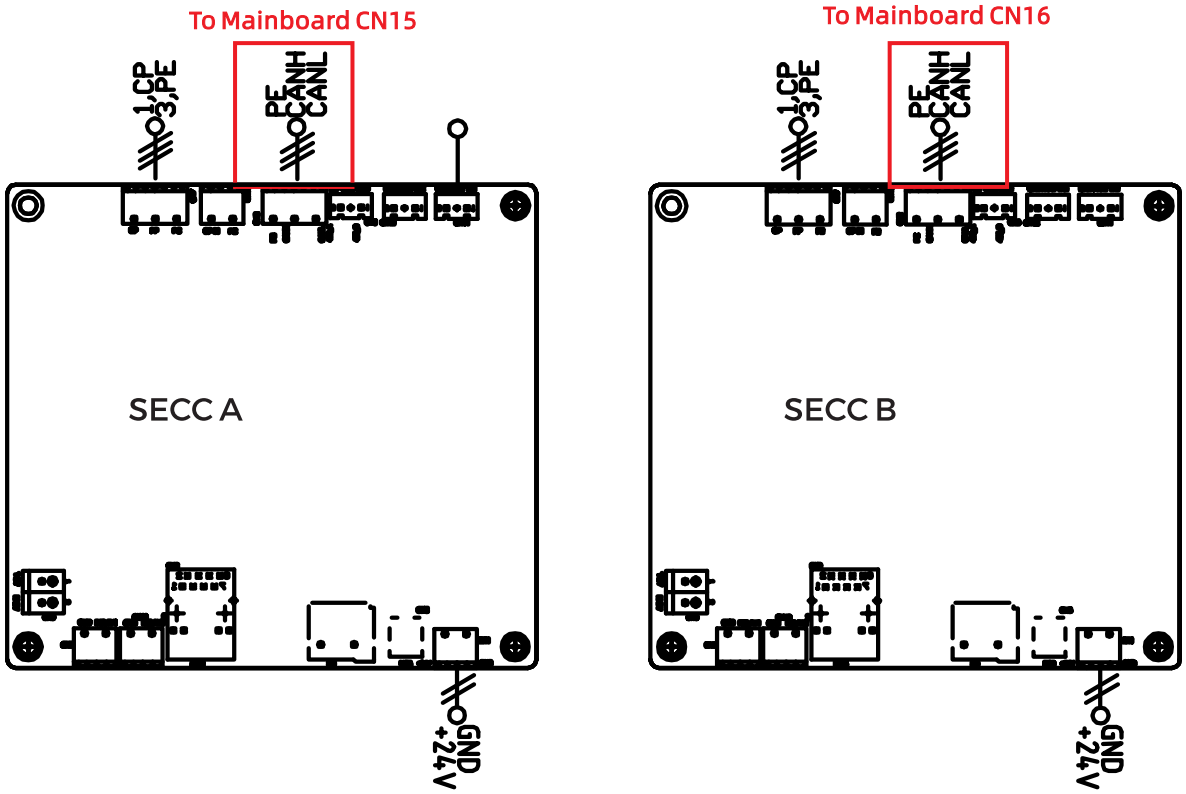
b. The communication cable between motherboard and SECC is abnormal

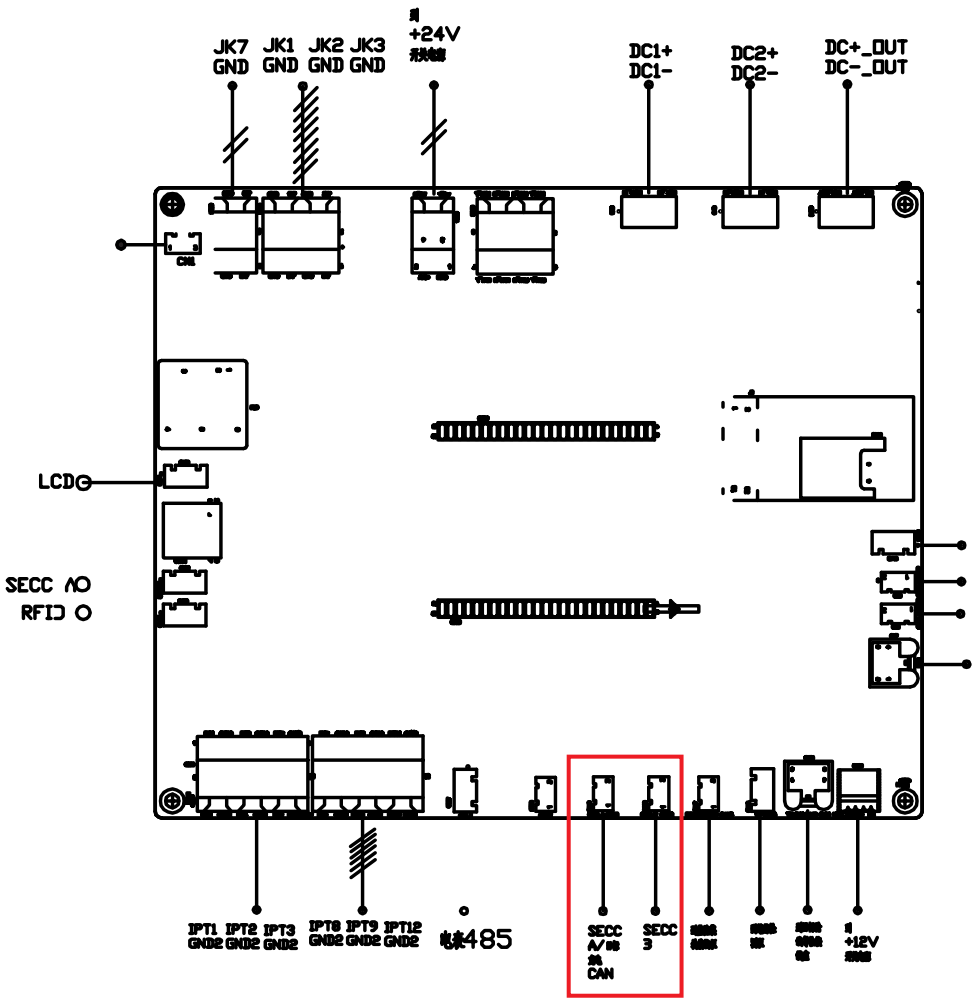
c. SECC board not working

3. Solution

(1)Check SECC firmware: The SECC firmware will be continuously updated to adapt to the BMS of new vehicle models, so please ensure that the SECC firmware is at the latest version to eliminate adaptation issues.

(2)Check the communication cable between motherboard and SECC: CAN communication is used between the motherboard and SECC, and the motherboard ports are CN15 (A gun) and CN16 (B gun), the SECCs port is CN2.





(3)Replace the SECC: If all steps do not solve the problem, please try replacing the entire SECC to troubleshoot the hardware issue.

11 Wait For BMS Communication Timeout

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Wait For BMS Communication Timeout'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: The motherboard has not received communication data with BMS within the specified time.

(2)Design Principles: DC chargers require frequent communication with BMS throughout the entire process, so in case of communication errors, a fault should be reported and charging should be stopped to ensure charging safety.

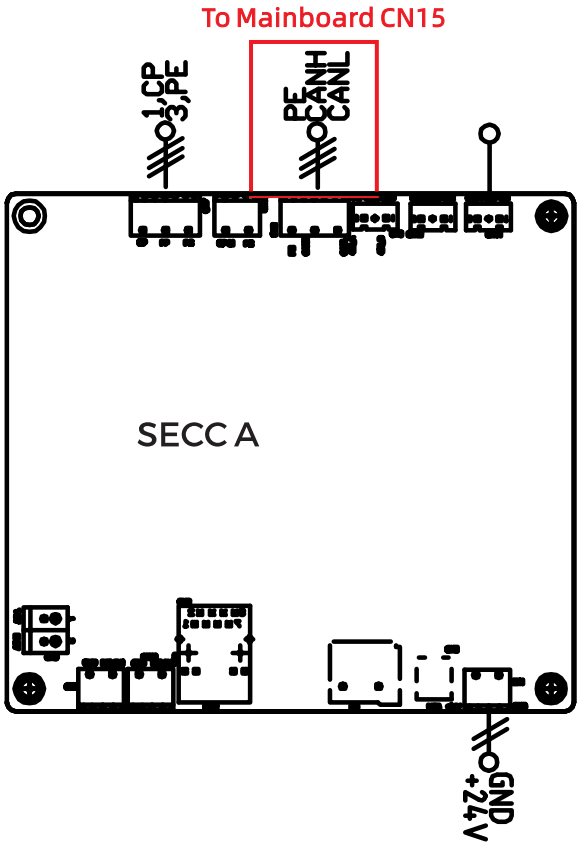
(3)Potential Cause:

a. BMS has not established a physical connection with the charger.

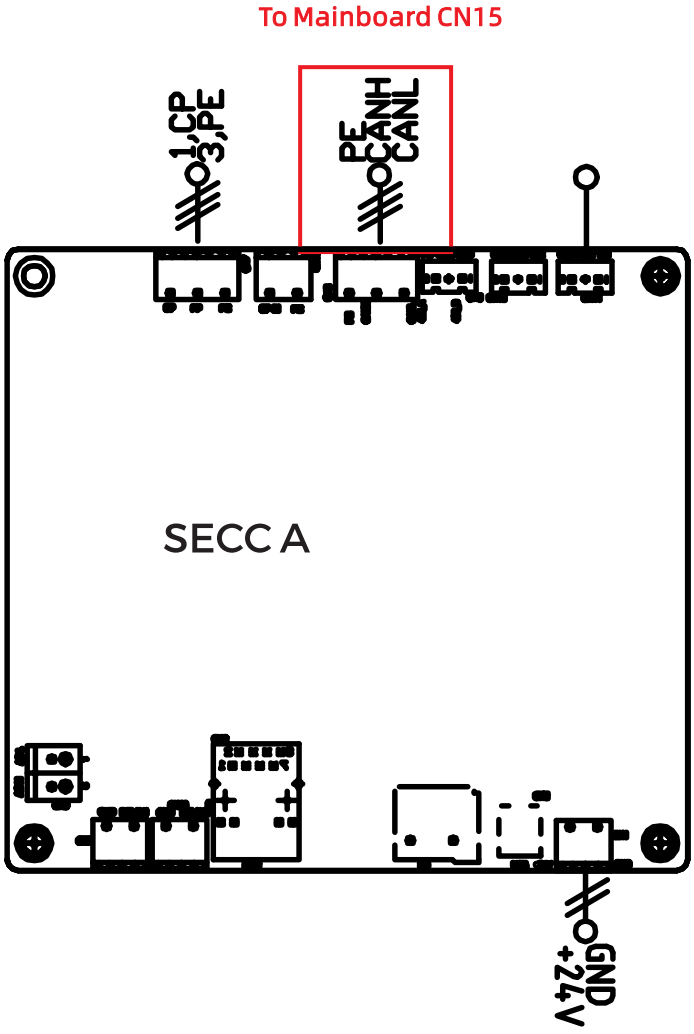
b. BMS has not established a software connection with the charger.

3. Solution

(1)Check the physical connection between charger and vehicle: Firstly, check if the charging gun is tightly connected to the vehicle charging port. Secondly, check if the CN7 port cable on the SECC board is tightly connected.



(2)Check SECC status: When SECC is working normally, there should be two lights, one constant and the other flashing. If there is no indicator light working, it indicates that SECC is not wkring. You can try to check if the power supply(CN1, 24V) is normal or replace the SECC board.



12 Insulation Detection Fault

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Insulation Detection Fault'.

(2)Equipment Status: Can not start charging and into fault status.

2. Fault Cause

(1)Direct Cause: Diagnosed as insulation test failure.

(2)Design Principles: Chargers belong to high-voltage equipment, and it is necessary to ensure good insulation of the charging circuit during operation, otherwise there may be a risk of electric shock and leakage.

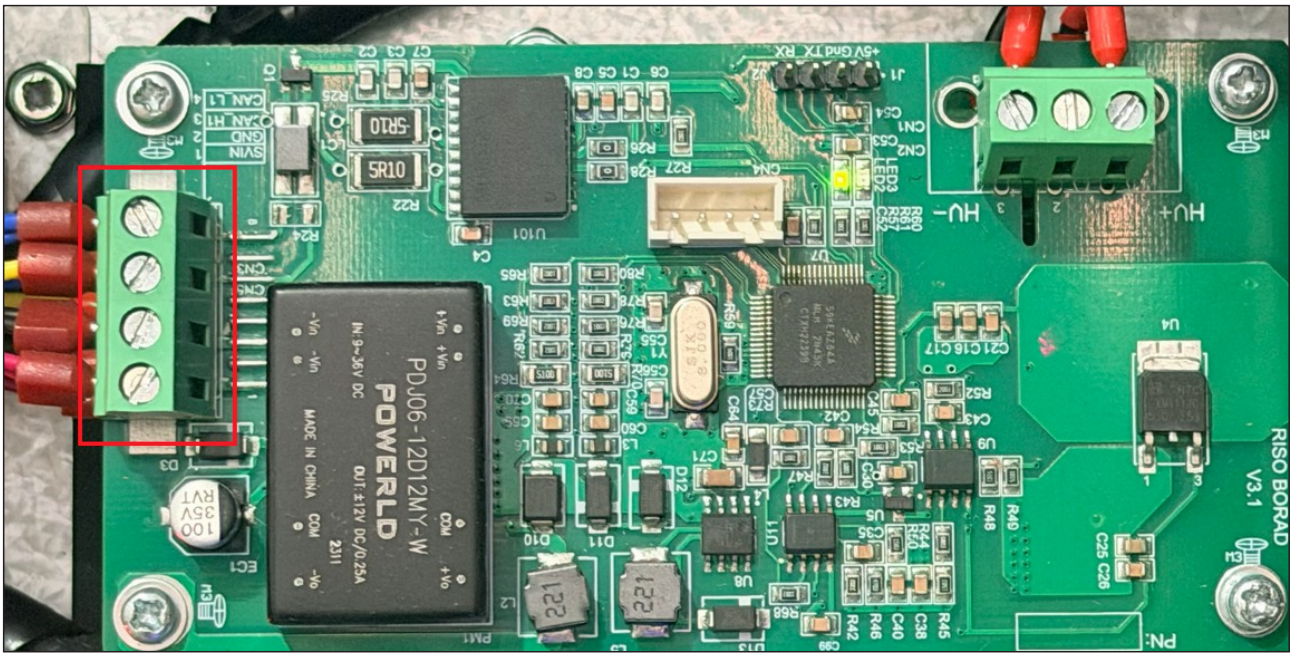
(3)Potential Cause:

a. Insulation module issues.

b. Circuit issues.

3. Solution

(1)Check the insulation detection board: Check if the communication cables between the insulation detection board and the motherboard is normal, and if the power supply of the insulation detection board is normal. If all the above are normal, please consider replacing the insulation detection board.



(2)If the charger still in fault after replacing the insulation detection board, it is necessary to consider the insulation of the entire charging circuit. First, check whether the gun cable is damaged, and then change a different vehicle for testing.

13 Insulation Detection Timeout

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'Insulation Detection Timeout'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: Insulation test waiting timeout.

(2)Design Principles: The insulation test requires the module to output high voltage to verify the insulation of the charging circuit. If the insulation board fails to detect the voltage input, a timeout fault will be given.

(3)Potential Cause:

a. Power module output abnormal

b. Insulation board did not detect module output

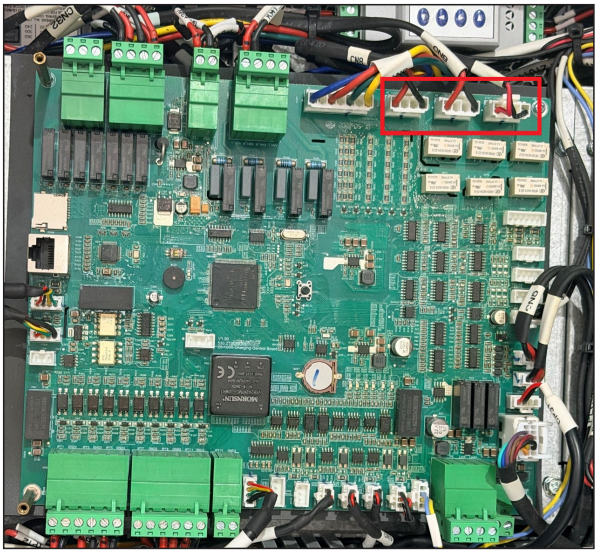
3. Solution

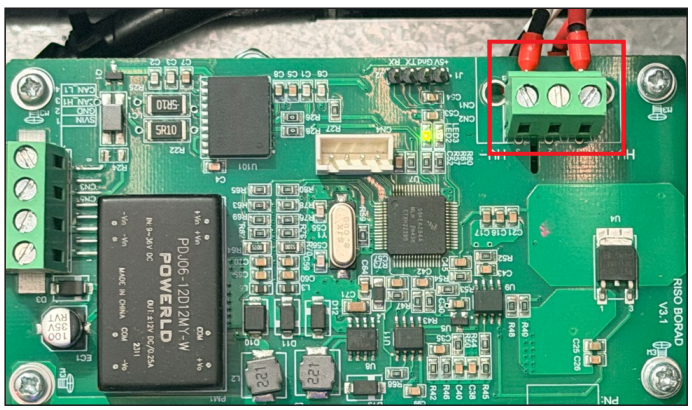
(1)Observe the insulation testing process: During the insulation test, the screen should have voltage output, which can be used to determine the direction of troubleshooting.

(2)Classification Based on Results:

a. Screen without voltage display: In this situation, further use a multimeter to measure the output voltage of the module in DC mode and check if there is actual voltage output. If there is no voltage output, it is necessary to further investigate the cause of abnormal module output. If the module output is normal, it can be considered as abnormal voltage sampling, and need to check the meter.

b. Screen with voltage display: In this situation, it should be considered whether the insulation detection board has received the module output voltage. After a series of circuits from the module output to the insulation detection board, the following detection points can be checked to see if they are normal.





14 AC Input OverVoltage/UnderVoltage

1. Fault Phenomenon

(1)Equipment Indication: The device malfunction indicator red light flashing. The display screen shows that the fault name is 'AC Input OverVoltage/UnderVoltage'.

(2)Equipment Status: Charging stop and into fault status.

2. Fault Cause

(1)Direct Cause: Abnormal motherboard voltage sampling.

(2)Design Principles: Abnormal input voltage of chargers can cause equipment failure and charging interruption in mild cases, and even burn core components or cause fires in severe cases, endangering safety. Therefore, it is necessary to detect the voltage range.

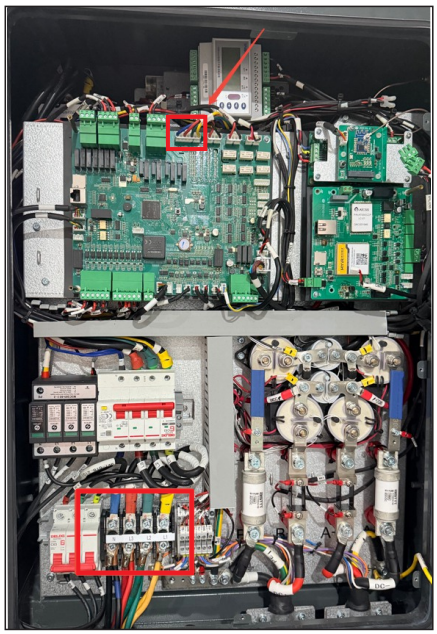
(3)Potential Cause:

a. Abnormal power supply

b. Abnormal motherboard voltage sampling

3. Solution

(1)Voltage Measurement: Measure the voltage at the input terminal and the sampling point on the motherboard.



(2)Classification Based on Results:

a. Input Normal&Sampling Point Normal: Due to hardware issues with the motherboard, sampling is inaccurate. Consider replacing the motherboard.

b. Input Normal&Sampling Point Abnormal: The cable from the input to the sampling point is abnormal and needs to be further checked for continuity after turn off power supply.

c. Input Abnormal: Need to seek professional electricians to troubleshoot power supply issues.