ATESS | ENERCOLLEGE

EV Charger

Fault Analysis Handbook

Standard Operating Procedures-AC EV Charger

ATESS ENERCOLLEGE

Technical Support Document

ATESS EnerCollege

enercollege@atesspower.com

www.atesspower.com

Contents

1. Emergency Stop Pressed 01- 02
2. UnderVoltage and OverVoltage Fault 03- 04
3. OverCurrent Fault 05
4. OverTemperature Fault 06
5. RCD Leakage Protection Fault 07
6. 485 Communication Fault 08
7. Lighting Protection Fault 09
8. TypeA Switch Fault 10
9. Relay Fault 11
10. PE Fault 12
11. PEN Fault 13
12. Door Opened Fault 14

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 AC charger product line.

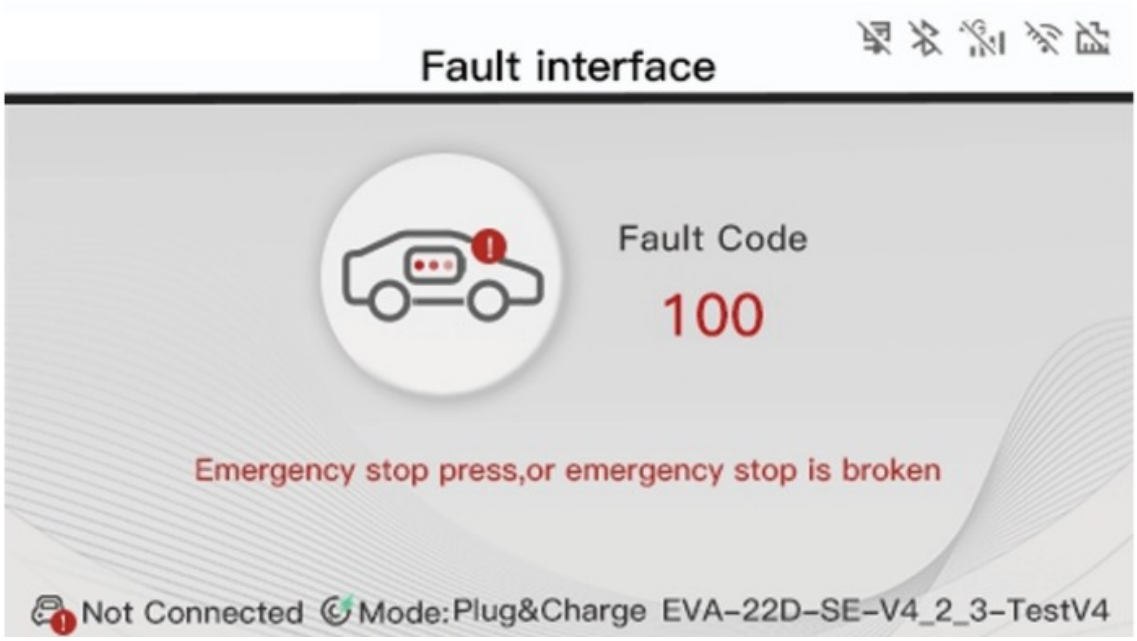
Beyond immediate troubleshooting, each item distills the symptoms of a fault, its cause, and proven corrective actions into clear, step-by-step instructions that technicians, operators, and distributors can apply without specialized tools or extensive firmware knowledge. By translating complex power-electronics 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 flashes 3 times.

(2) Human Machine Interface (HMI): The display screen(if exists) shows fault code 100 and the fault name is 'Emergency stop press'.



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

2. Fault Cause

(1) Direct Cause: Emergency stop button detected 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:

Personnel proactively press to respond to emergency situations.

The emergency stop button is accidentally hit or accidentally touched.

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) Remove the charging gun to eliminate the fault.

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

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

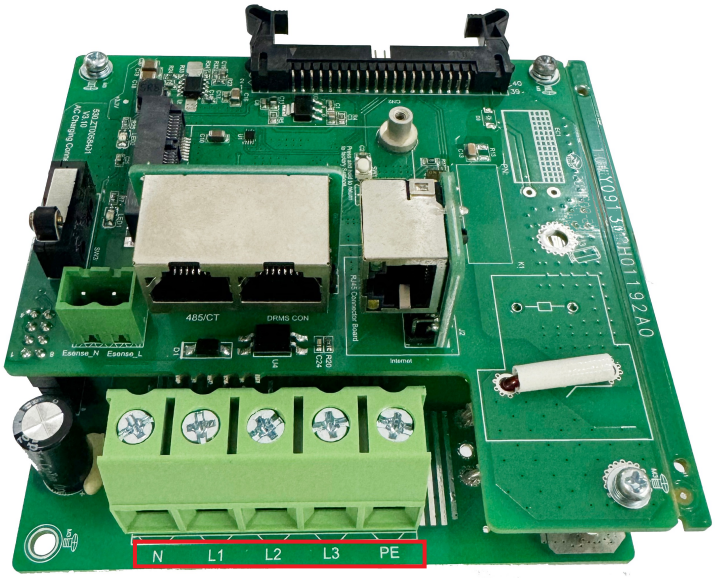
Final solution: Replace the emergency stop button.

2 UnderVoltage and OverVoltage Fault

1. Fault Phenomenon

There is a phase sequence at the charger inlet, and this fault can occur at each phase of the charger inlet.

The fault phenomena that occur in each phase are different to indicate the accurate fault point.



(1) Equipment Indication: The red indicator light flashes once during overvoltage and twice during undervoltage.

(2) Human Machine Interface (HMI): The display screen(if exists) shows fault code and fault name. When:

L3 OverVoltage, fault code is 101, fault name is 'L3 OverVoltage'.

L3 UnderVoltage, fault code is 102, fault name is 'L3 UnderVoltage'.

L2 OverVoltage, fault code is 103, fault name is 'L2 OverVoltage'.

L2 UnderVoltage, fault code is 104, fault name is 'L2 UnderVoltage'.

L1 OverVoltage, fault code is 105, fault name is 'L1 OverVoltage'.

L1 UnderVoltage, fault code is 106, fault name is 'L1 UnderVoltage'.

Three Phases UnderVoltage, fault code is 107, fault name is 'Three Phases UnderVoltage'.

(3) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: Abnormal detection of AC input voltage sampling on the charger motherboard triggers a fault.

(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:

Abnormal AC input voltage at charger, not a charger issue.

Abnormal sampling caused the charger to mistakenly believe that the voltage is abnormal, even though the voltage is normal.

3. Solution

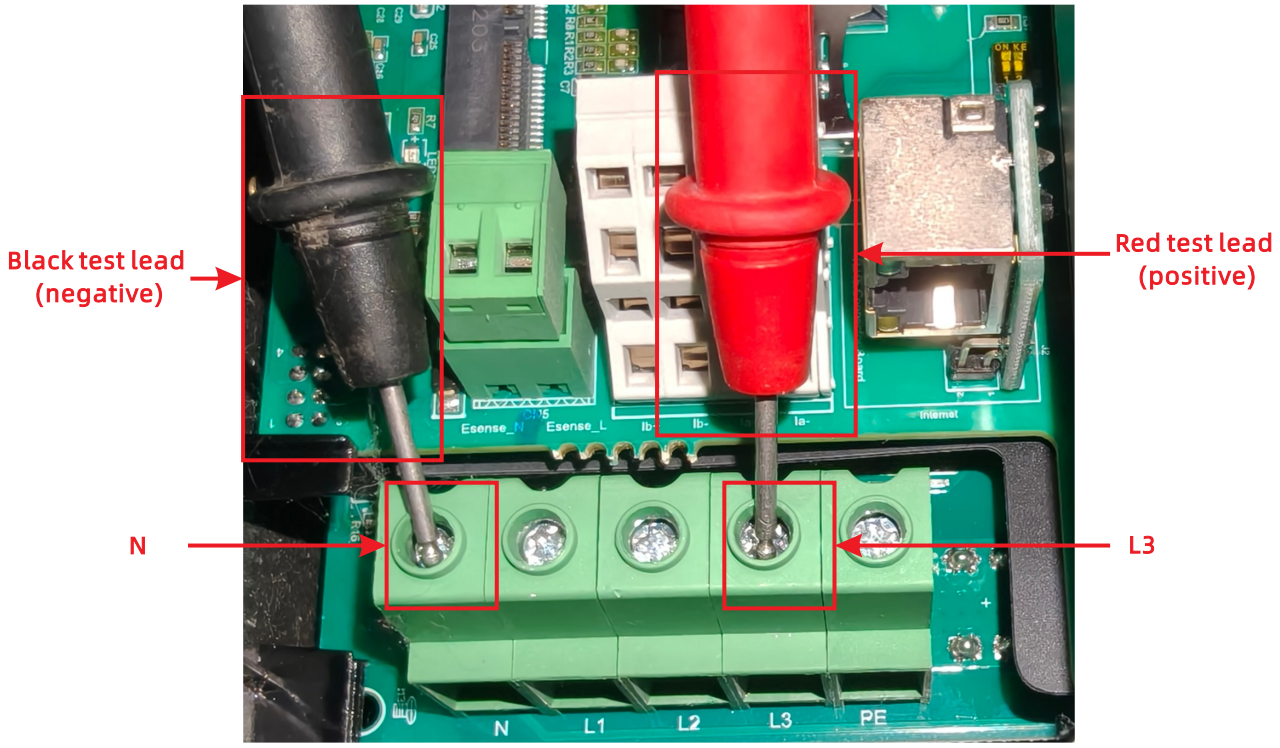
(1) Preliminary External Check:

Observe whether other devices under the same power supply network experience overvoltage and undervoltage phenomena.

Ensure that the power input is cut off, open the power supply terminal of the charger, and check whether the terminals of the L1, L2, L3, N, and PE wires are firm and whether there are any loose, burnt, or corroded traces.

(2) Accurate Voltage Measurement:

Under the condition of ensuring safety, measure whether the corresponding voltage is normal according to the fault prompt. Taking L3 as an example, measure the voltage of L3 to N and L3 to PE using the AC range of a multimeter, The voltage range is usually 190Vac-260Vac.



(3) Classification Based on Results:

Abnormal Voltage: The problem comes from the external power grid or the front-end power supply line of the charger, and it is not a fault of the charger itself. Please contact the power grid personnel to investigate.

Normal Voltage: The problem is likely to lie in the voltage sampling circuit or main control board inside the charger. If there is a sampling meter inside the charger, the sampling value can be observed through the display screen on the meter. If the value deviates from the actual value, consider replacing the meter. If there is no sampling meter inside the charger, consider replacing the motherboard.

3 OverCurrent Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 4 times. The display screen(if exists) shows fault code 108 and the fault name is 'OverCurrent Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

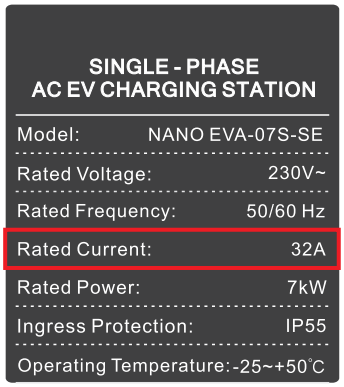
(1) Direct Cause: The charger has detected that the sampled output current exceeds the limit value.

(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: Usually is 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) Measure output current: Using a clamp current meter, measure the output current during charging and observe the magnitude of the maximum output current.

(3) Solution: If the actual output current is normal, it is caused by sampling abnormalities. Please consider replacing the CT and motherboard.

4 OverTemperature Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 5 times.

(2) Human Machine Interface (HMI): The display screen(if exists) shows fault code 109 and the fault name is 'OverTemperature Fault'.

(3) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: The temperature sensor detects that the temperature exceeds the protection value, triggering an over temperature fault.

(2) Design Principles: Over temperature protection is an absolute key line of defense for the safe operation of chargers, which can effectively prevent equipment from damaging core components or even causing fires due to heat accumulation.

(3) Potential Cause

The ambient temperature is too high.

Internal components generate heat, causing high temperature.

Protection value set too low.

3. Solution

(1) Actual Temperature Inspection

Check if the ambient temperature is too high and if it is in a ventilated position.

Check if the charger is overheated inside.

(2) Classification Based on Results

Excessive ambient temperature: The working environment temperature of the charger is -25℃ to 50℃, Please ensure that the ambient temperature is suitable and install a ventilated environment.

Internal overheating of charger: Find the internal overheating component and replace it, and investigate the cause (short circuit, component aging, etc.).

Low protection value: A too low protection value can easily trigger faults, and a higher protection value (up to 85℃) needs to be set.

Sensor damage: If none of the above phenomena exist, it may be a damaged temperature sensor. Please consider replacing the thermistor or motherboard.

5 RCD Leakage Protection Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 6 times. The display screen(if exists) shows fault code 110 and the fault name is 'RCD Leakage Protection Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: RCD detects that the leakage value is greater than the protection value.

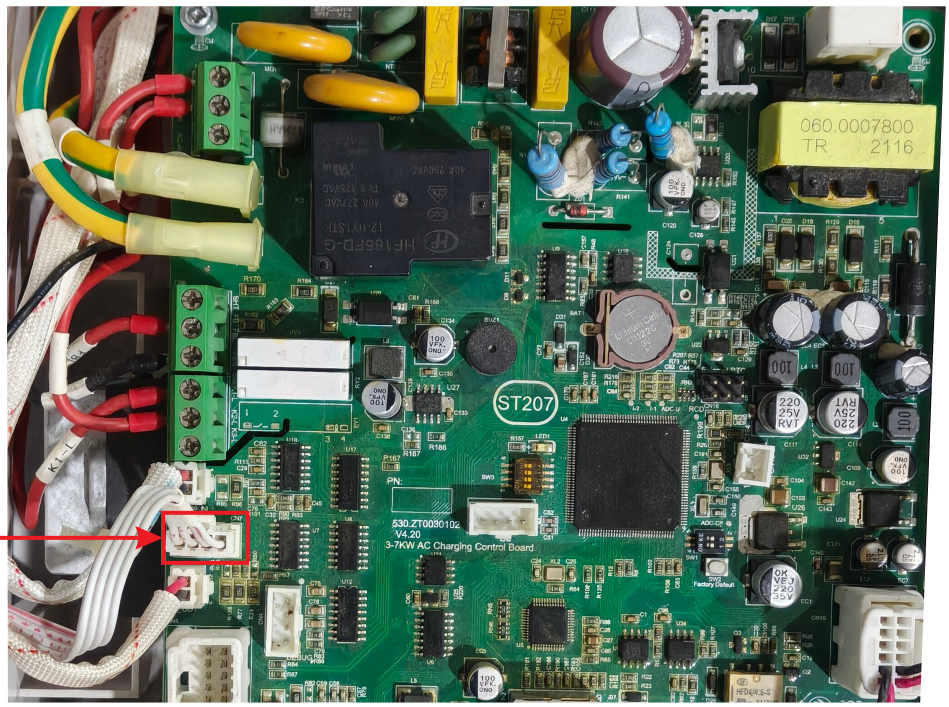
(2) Design Principles: Prevent fatal electric shock accidents and electrical fires, and ensure personal and property safety.

(3) Potential Cause: Sensor failure or cable damage and leakage.

3. Solution

(1) Check the leakage value: Please access the web parameter page and check the parameter 'TypeB RCD'(leakage value), the default protection value is 6mA(level 3).

(2) Remove sampling CT: After removing the sampling CT, observe whether the leakage value changes. If there is no change, it is a problem with the motherboard. If there is a change, it is a failure of the sampling device (CT).



6 485 Communication Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 7 times. The display screen(if exists) shows fault code 111 and the fault name is '485 Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: Charger motherboard detects abnormal 485 communication.

(2) Design Principles: The only 485 communication inside the charger is the communication of the electric meter, and the role of the electric meter in the charger is self-evident(collect voltage, current, etc). Therefore, this fault is also known as the Meter Communication Fault.

(3) Potential Cause:

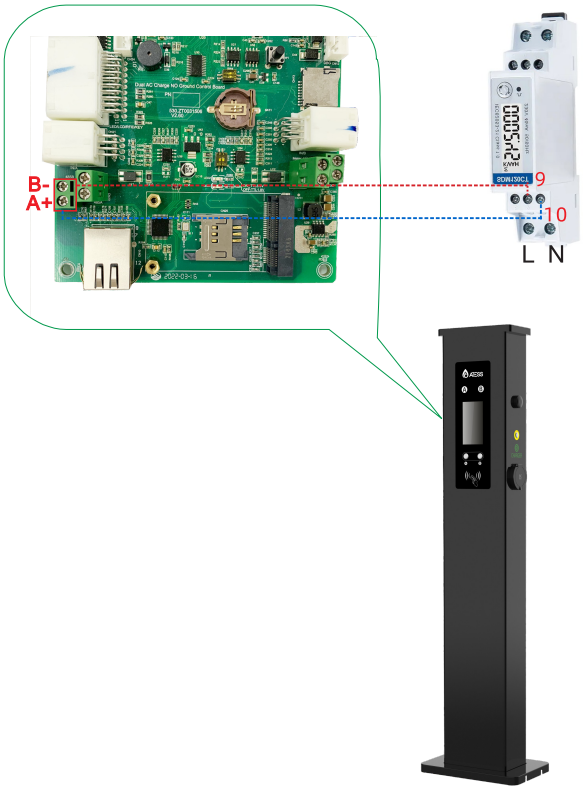
Communication parameter setting error

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. Different types of electric meters require different parameters to be set.

(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.



7 Lighting Protection Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 8 times. The display screen(if exists) shows fault code 112 and the fault name is 'Lightning Protection Fault'.

(2) Equipment Status: Fault status and can not charging.

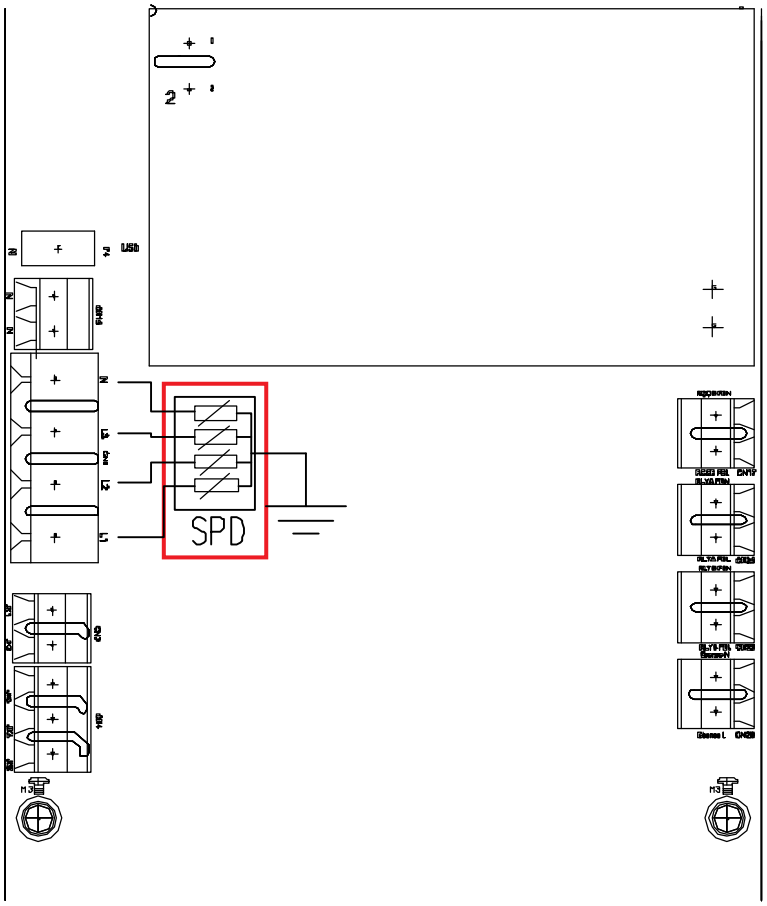
2. Fault Cause

(1) Direct Cause: The lightning protection device is damaged.

(2) Design Principles: Lightning protection device is crucial for chargers. Chargers are usually installed in open areas. When struck by lightning, lightning protection device can protect the internal components of the charger and prevent physical destruction of the equipment.

3. Solution

(1) Replace the PCB: The lightning protection device of the AC charger is located on the motherboard, so replacing the motherboard directly can solve the issue.



8 TypeA Switch Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 9 times. The display screen(if exists) shows fault code 113 and the fault name is 'Lightning Protection Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: Detected that the Type A switch is disconnected.

(2) Design Principles: Type A switches provide leakage protection, and a warning should be issued when the leakage protection of Type A switches is not available.

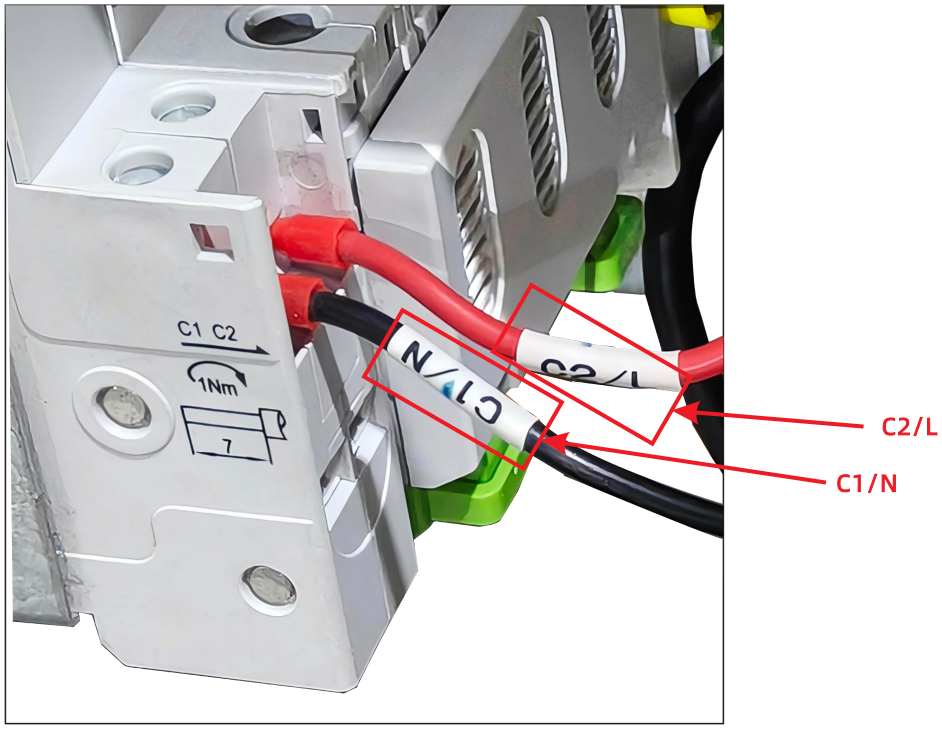
(3) Potential Cause:

Type A switch is off

Type A switch feedback signal is abnormal

3. Solution

(1) Check circuit: Check if the circuit is secure and if there is a short circuit. If there is an abnormal situation, please try to tighten the circuit or replace the switch.



(2) Open the switch: If the switch is off, then try to open it. If can not open it, please try to replace it.

9 Relay Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 10 times. The display screen(if exists) shows fault code 114 and the fault name is 'Relay Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: Abnormal relay feedback signal.

(2) Design Principles: The relay inside the charger is a key component that controls the output of the charger.

(3) Potential Cause:

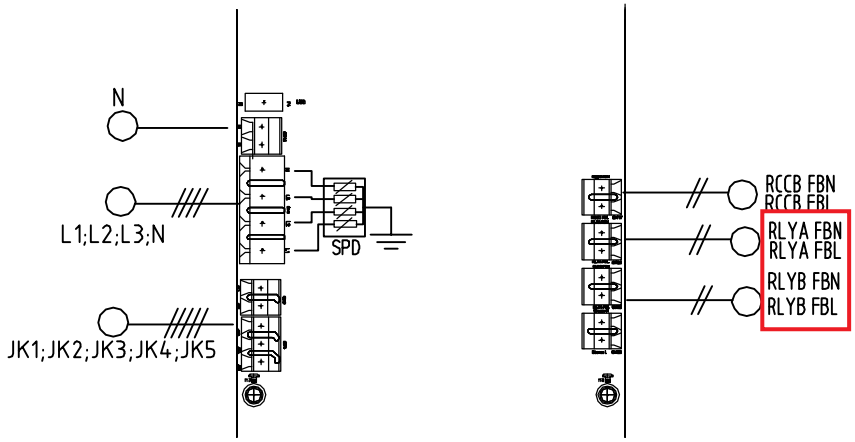
The relay control component is damaged

The relay itself is damaged

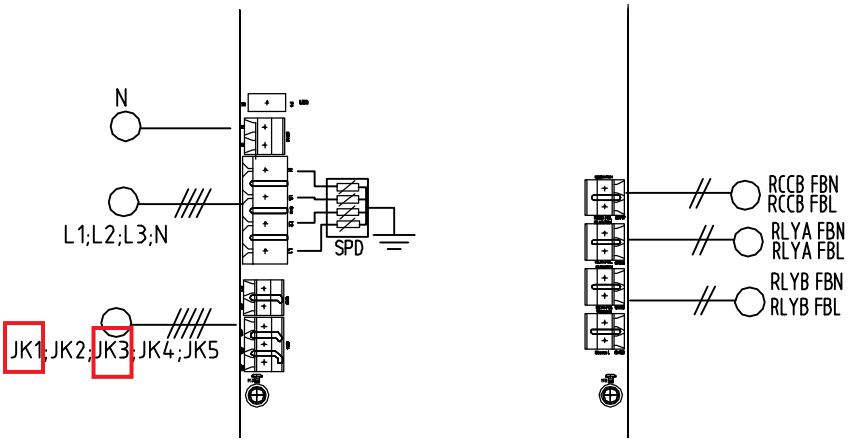
The relay feedback circuit is abnormal

3. Solution

(1) Check relay feedback circuit: Check if the relay feedback signal cables are loose.



(2) Check relay drive circuit: Check if the relay drive signal voltage is normal at the beginning of charging. If the voltage are 0V, then it's a PCB issue, please replace.



(3) Check relay: If the relay does not make a suction sound when starting to charge, or makes a sound during the charging process, it is considered that the relay itself is damaged and should be replaced.

10 PE Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 11 times. The display screen(if exists) shows fault code 115 and the fault name is 'PE Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

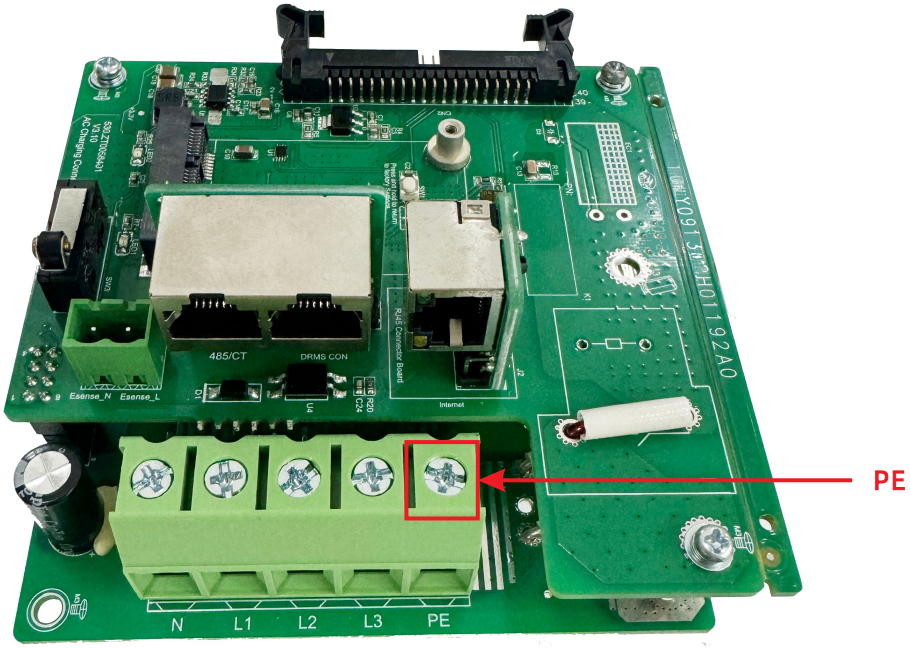
(1) Direct Cause: PE grounding feedback signal is at a constant high level, detected as PE fault.

(2) Design Principles: The charger needs to be well grounded to avoid the risk of fatal electric shock.

(3) Potential Cause: The device is not properly grounded.

3. Solution

(1) Check charger input terminal: Check if the PE wire is tightly connected while the power is off. If it is loose, try to tighten it.



(2) Check the power supply: If the PE cable is tight but still give a PE fault, please search for relevant personnel to investigate the cause of external wiring.

11 PEN Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 12 times. The display screen(if exists) shows fault code 116 and the fault name is 'PEN Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: Triggered the conditions for PEN fault.

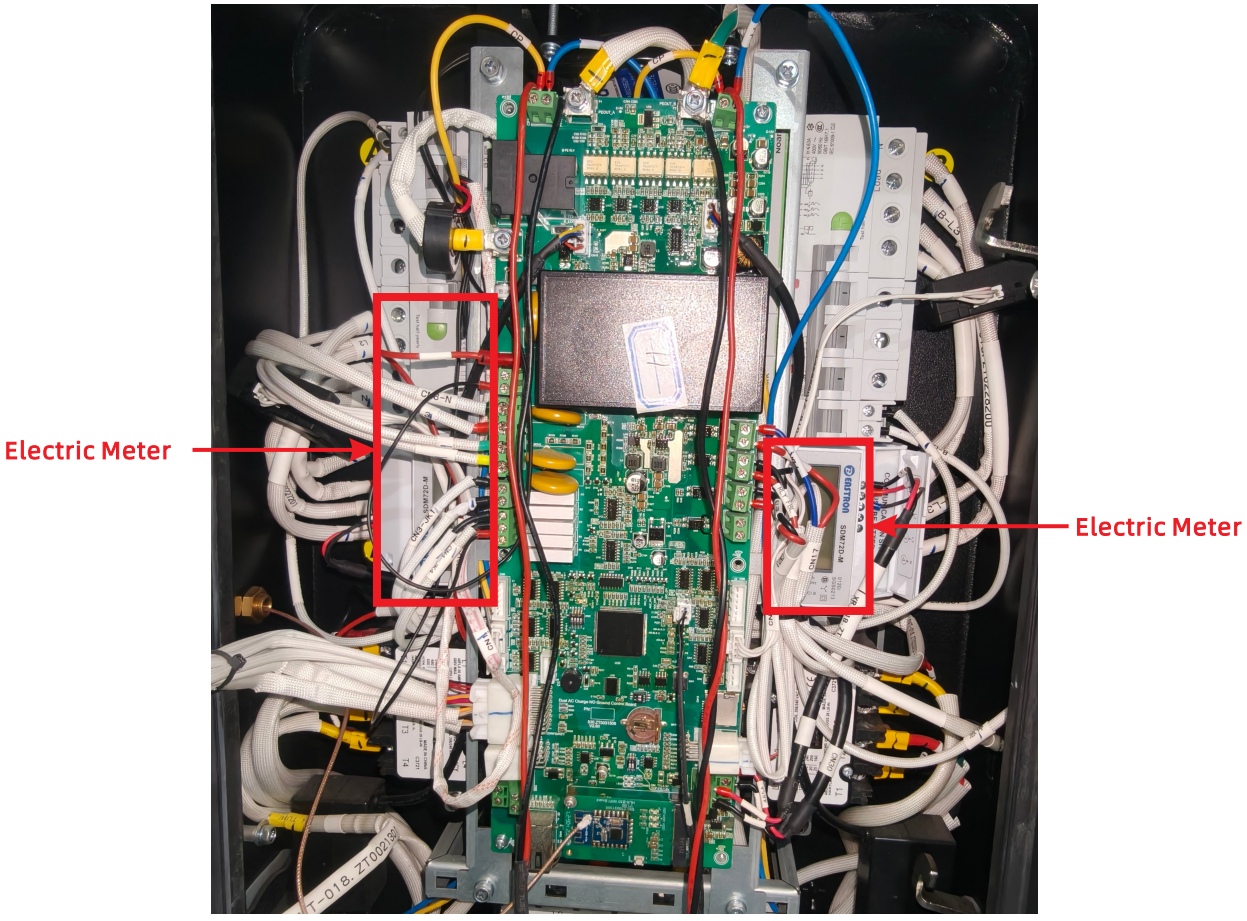
(2) Design Principles: PEN detection is very important for TN-C-S grid systems. If the PEN wire breaks, it may cause the shell to have fire line voltage, which poses a risk of electric shock.

(3) Potential Cause: Abnormal voltage.

3. Solution

(1) Check input terminal: Check if the input voltage and wiring are normal. If the power supply voltage is abnormal, please seek professional assistance to troubleshoot.

(2) Check the sampling sensor: Please check if the voltage sampling is normal, which can be observed through an electric meter(if have) or printed logs. If abnormal sampling is found, please replace the sampling equipment, usually is meter or PCB.



12 Door Opened Fault

1. Fault Phenomenon

(1) Equipment Indication: The device malfunction indicator red light flashes 14 times. The display screen(if exists) shows fault code 118 and the fault name is 'Door Opened Fault'.

(2) Equipment Status: Fault status and can not charging.

2. Fault Cause

(1) Direct Cause: The door sensor detects a low level.

(2) Design Principles: The door sensor is used to detect whether the charger maintenance door has been opened, which can ensure the personal safety of maintenance personnel and also has anti-theft function.

(3) Potential Cause:

Door is opened

Door sensor is broken

3. Solution

(1) Check door status: Make sure the door is closed.

(2) Check door sensor: If the door is closed but still give a fault, please check the sensor circuit. If the sensor wiring is normal, please consider replacing the sensor.