Star Charge®
星星充电

Charging Infrastructure

Titan 180 Premium **Maintenance Manual**

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Legal Notice

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1 Scope

For the great operation and maintenance management of charger, there is a great management system and safety regulations to ensure the safe, stable, and efficient work of charger.

2 Range of Application

This document is for Titan 180 Premium.

3 Requirements for Maintenance

3.1 Safety

1) The engineer should master the knowledge of electrical safety, understand the principle and performance of charger, and know what to do if there is an electric shock or some emergencies. So that the engineer can find and deal with various hidden emergencies before the commissioning work.
2) When working, the engineer must be sober and concentrated. Do not work if you feel unwell.
3) Insulation shoes and gloves must be worn during work. Safety helmet and other protective articles should be worn if necessary. The insulation appliances, instruments and tools must be inspected in good condition and be reliable.
4) Any electrical equipment or line shall be deemed to have power and shall not be touched before the power inspection. When contact operation is needed, the equipment should be cut off and checked again. Put a “No closing, someone is working” sign on the power switch handle or take other measures to prevent false closing.
5) The power must be cut off before the work.
6) The power should be cut off as far as possible. If the engineer must work with the power on, there must be supervisor. The supervisor shall meet the requirements of the profession and shall not engage in operations or do anything unrelated to the monitoring.
7) The engineer must distinguish L, N, PE busbar and choose a good station to work. Do not touch the live part and the part connected to N or PE at the same time when working.
8) The original wiring and structure in the charger must not be changed without permission and approval.
9) After the work is completed, restore all components, check the tools and clean the site.
10) When there are some emergencies, immediately start the safety production emergency plan, and immediately report to the relevant person in charge according to the requirements of the plan. Carry out on-site emergency treatment according to the emergency plan within the first time to control the spread and expansion of the accident and rescue personnel and property.
11) If there is an electric shock, immediately cut off the power and perform rescue according to the emergency rescue method. At the same time, make emergency calls for professional help and report to

the superior leader, make a record.

12) The power transmission sequence is: high-voltage power supply, low-voltage input and output line side, load (box transformer → distribution cabinet → charger);

The power failure sequence is: load, low-voltage input and output line side, high-voltage power supply (charger → distribution cabinet → box transformer).

3.2 Normal Requirements

1) The engineer must receive safety production education and job skills training. The engineer can go to work after passing the assessment.
2) The engineer must operate in accordance with the operating process and job specifications.
3) The engineer must dress uniformly and wear work protective equipment.
4) The engineer must be responsible for the work they perform and fulfill their service commitments. When serving customers, use civilized and standardized terms.

3.3 Responsibility

1) The engineer is responsible for the operation and maintenance of the chargers.
2) The engineer is responsible for the safe operation of the charging station, improving the safety system of the charging station, conducting periodic safety inspections and supervising and reporting the safety situation of the charging station.

3.4 Skill Requirements

1) The engineer must be aware of the charging principle of EV, the working principle of charger, common trouble shooting methods, charger maintenance methods, emergency handling methods and safety knowledge.
2) The engineer must understand the relevant rules and regulations of national safety production, and have knowledge of charging safety and emergency treatment methods.

4 Preventive Maintenance

4.1 Site Inspection

Illustration:

The following inspection items are based on Chinese requirements, as well as the frequency and working hours are based on Chinese experience. The overseas regions can adjust according to local requirements and actual conditions.

Requirements:

It is necessary to identify the dangerous source of the charging station site, and report the hidden safety hazard to the place for treatment in time.

Working hours: 10min/site

Frequency: every quarter

Check Item	Content and specification	Check Method	Conclusion	Remark
Station Inspection	There is charging procedure information.	Visually	Pass □ Fail □	
	CCTV camera works normally.	Visually	Pass □ Fail □	
	Equipped with fire extinguishers and other safety facilities. Safety facilities are available.	Visually	Pass □ Fail □	
	Equipped with parking bars.	Visually	Pass □ Fail □	
	No flammable, explosive and something dangerous around.	Visually	Pass □ Fail □	
	The surrounding of the station is suitable (no dust, oil, humidity, weeds).	Visually	Pass □ Fail □	
	The canopy is not damaged.	Visually	Pass □ Fail □	
	Check that the terrain is leveled, not around flood discharge point.	Visually	Pass □ Fail □	
Power Distribution Cabinet Check	The surface of the charger is flat and smooth, without obvious mechanical damage or deformation.	Visually	Pass □ Fail □	
	Warning symbols and electrical hazard signs are complete and clear.	Visually	Pass □ Fail □	

	The name plate is complete, correct and firm.	Visually	Pass □ Fail □	
	Cannot open the door after the door is closed and locked.	Visually	Pass □ Fail □	
	The cabinet body is placed properly on the foundation, and there are no bolts lost or loose.	Visually	Pass □ Fail □	
	Electrical schematic diagram, qualification certificate, factory inspection report, key.	Visually	Pass □ Fail □	
	Every breaker's label represents its respective charger	Visually	Pass □ Fail □	
	The breakers work normally.	Visually	Pass □ Fail □	
	The power cable is not damaged.	Visually	Pass □ Fail □	
	The wiring is not loose.	Visually	Pass □ Fail □	
	Verification of meter data.	Visually	Pass □ Fail □	
	Check the internal exposed three-phase copper bar protection.	Visually	Pass □ Fail □	
	Not soaked in water after heavy rain or typhoon.	Visually	Pass □ Fail □	

4.2 Appearance Inspection

Requirements: Cut input power. Measure the voltage and confirm there is no input.

Working hours: 10min/unit

Frequency: every quarter

Check Item	Content and specification	Check Method	Conclusion	Remark
Appearance checks	All components of the equipment are free from stains, scratches, deformations	Visual	Pass □ Fail □	
	Name plate and other signages including safety warning signs are accurate, clear and complete	Visual	Pass □ Fail □	

	Charging cable is complete without damage. No water or dust in the charging connector. The insulation cap is complete	Visual	Pass □ Fail □	
	LED indicators work normally	Visual	Pass □ Fail □	
	Emergency stop button should not be pressed	Visual/ Manual	Pass □ Fail □	

4.3 Internal Inspection

Working time: 20min/unit

Frequency: every six month

Check Item	Content and specification	Check Method	Conclusion	Remark
Internal Check	Charging cabinet, hinge and locks of are functioning normally. The inner components of the cabinet should be free of liquid stains and leakages (from coolants or condensation), rust as well as no signs of physical damages.	Visual/ Manual	Pass □ Fail □	
	Input and communication terminals are tightened and free from signs of burns.	Visual/ Manual	Pass □ Fail □	
	PE wire of the cabinet is reliable with no signs of damage and rust	Visual/ Manual	Pass □ Fail □	
	L1, L2, L3, N, and PE are clearly marked, and the wiring is reliable and in good contact	Visual/ Manual	Pass □ Fail □	
	Measure three-phase input voltage	Measurement	Pass □ Fail □	
	No short circuit is present between the DC+ and DC- of the input of charging cable No short circuit is present between the DC+ and DC- of the output of charging cable	Measurement	Pass □ Fail □	
	No short circuit is present between the DC+ of the input of charging cable and DC+ of the input of charging cable No short circuit is present between the DC- of	Measurement	Pass □ Fail □	

	the input of charging cable and DC- of the input of charging cable			
	There should be no reverse connection in DC+/DC- of the input/output of charging cable	Measurement/ Visual	Pass □ Fail □	
	Ensure fireproof material at the bottom is sealed and intact	Visual	Pass □ Fail □	
	Ensure the wiring connections of the AC input main circuit and their screws are tightened properly (such as AC input terminal connector, MCCB, AC contactor, leakage circuit breaker, junction box or terminal, PE wiring and its screws, etc.). If any screw or connection is found loose, a screwdriver must be used to tighten it.	Visual/ Manual/Measurement	Pass □ Fail □	
	Ensure screw and wire connections for DC output circuit, and circuit contact points of various components are tight and in contact (such as power module, PDU output copper wire, DC circuit relay, fuse, charging gun DC terminal, PE wiring, copper plate screw, etc.). If any screw or connection is found loose, a screwdriver must be used to tighten it.	Visual/ Manual/Measurement	Pass □ Fail □	
	Ensure the cotton filter is free of accumulation of particulates and foreign material, and not damaged. Else, replace it.	Visual	Pass □ Fail □	
	Ensure the power module fans are clean and firmly screwed on.	Visual	Pass □ Fail □	

4.4 Insulation Inspection

Requirements: Cut input power, remove the power modules, remove PE line of surge protector, remove DC+ and DC- of insulation detection module.

Working time: 20min/unit

Frequency: every six month

Check Item	Content and specification	Check Method	Conclusion	Remark
Insulation Performance Check	Ensure resistance of output of DC+ relay to PE is not less than 1 MΩ (GB/T 10MΩ) and record this value.	Measurement	Pass □ Fail □	
	Ensure resistance of output of DC- relay to PE is not less than 1 MΩ (GB/T 10MΩ) and record this value.	Measurement	Pass □ Fail □	
	Ensure resistance of L1/L2/L3 to PE is not less than 10 MΩ and record this value.	Measurement	Pass □ Fail □	

4.5 Functional Check

Requirements: Check when the charger is on.

Working hours: 15min/unit

Frequency: every quarter

Check Item	Content and specification	Check Method	Conclusion	Remark
Functional Check Functional Check	Start the charging and ensure charging data is properly reflected on the interface	Visual	Pass □ Fail □	
	During charging, ensure the LED indicators work normally.	Visual	Pass □ Fail □	
	Charging details such as SOC, charging voltage and current, etc displayed on the charger screen is consistent with the App.	Visual	Pass □ Fail □	
	Ensure display on the charger screen is easily readable with no signs of cloudiness. The operations and interface should also be smooth and friendly.	Visual	Pass □ Fail □	
	During charging, opening the charging cabinet should immediately stop the charge automatically and display a warning at the screen.	Visual	Pass □ Fail □	

	During charging, pressing the emergency stop button should immediately stop the charge automatically and display a warning at the screen.	Visual	Pass □ Fail □	
	Setting the upper temperature threshold to below the ambient temperature will result in the charging process to not initiate at all.	Visual	Pass □ Fail □	
	Ensure that all power modules are working properly where the status and temperature are reflected accordingly.	Visual	Pass □ Fail □	

4.6 Cleaning

Working hours: 20min/unit

Frequency: every year

Check Item	Content and specification	Check Method	Conclusion	Remark
Cleaning and maintenance	Dustproof cotton / filter	replace		

4.7 Charging Test

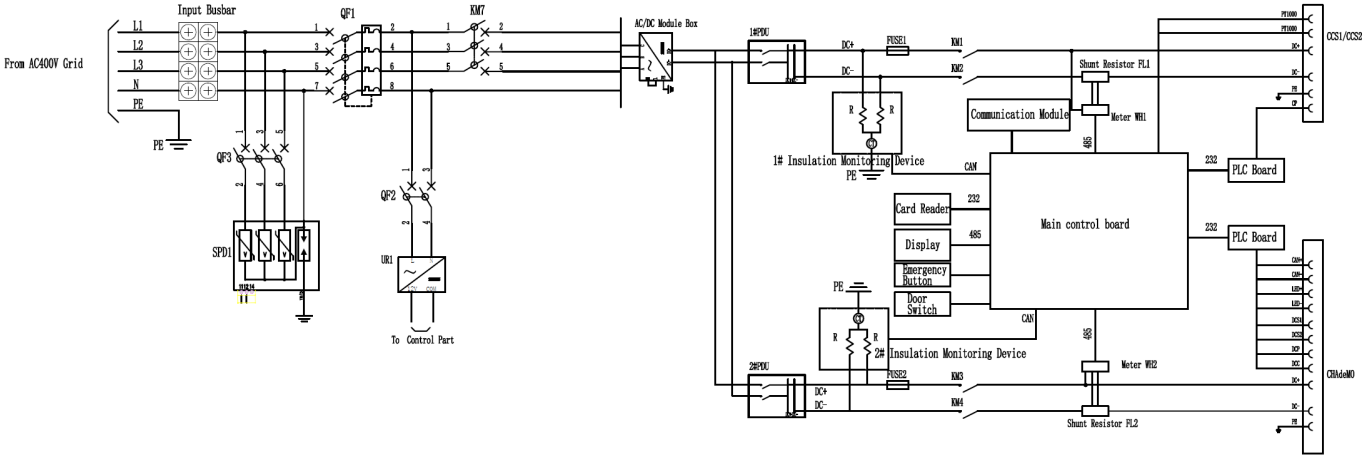
When all the check items have been tested, use the APP to scan the code or swipe the card to start, and the charging time for each charging gun is not less than 10 minutes. and record the data：

Vehicle Model	ID	Required Voltage (V)	Required Voltage (A)	Output voltage (V)	Output current (A)	Output meets the requirements
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □
						Pass □ Fail □

						Pass □ Fail □
						Pass □ Fail □

5 Corrective Maintenance

5.1 Hardware Principle



5.2 Common Problem

5.2.1 Switch open circuit

Fault phenomenon: The indicator light of charger is not on, and the whole charger has no power.

Troubleshooting ideas:

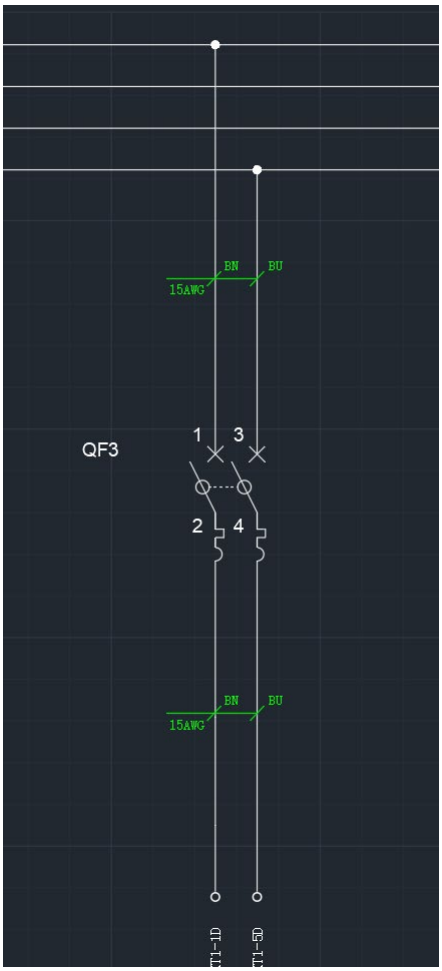
1） In the case of power failure, use a multimeter to measure whether the 2P circuit breaker L/N is short-circuited to PE respectively, and whether the line is wrong, if there is an error, correct the line.

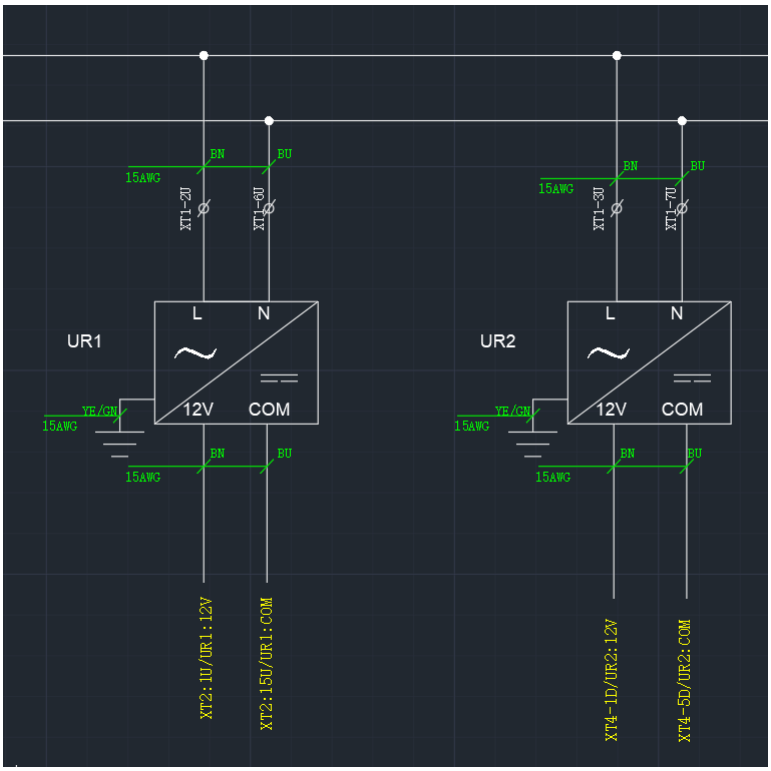
2） Maybe the leakage current in the charger is greater than the limit of the leakage switch, so you can try to replace the leakage switch and restart the charger.

5.2.2 The indicator light is not on

Fault phenomenon: The power indicator light of charger is not on

Working principle: As shown in the figure, from the site state grid 400V AC, through the distribution cabinet into the charger, take 230V to switch power supply UR1, through the switching power supply UR1 to DC12V, supply the components inside the charger that need DC12V.

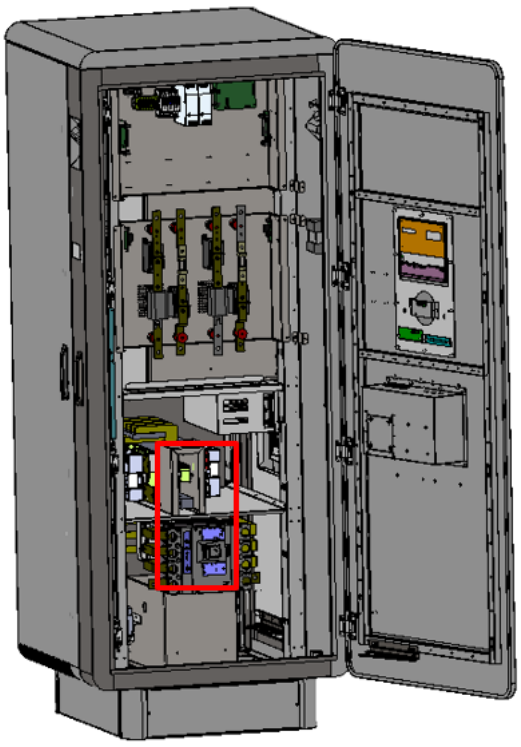




Troubleshooting ideas:

1） Check whether air switch in the charger has tripped. If it trips, turn it on. If not, check whether the

moulded case circuit breaker in the distribution cabinet has tripped. If it trips, turn it on, and finally check whether the indicator light is on.



2） If there is no trip, use a multimeter to measure whether there is 230V supply in the charger. If there is no voltage or there is a voltage difference between the upper and lower stages, the air switch is broken and should be replaced. If there is voltage at the upper and lower stages, use a multimeter to measure whether the moulded case circuit breaker in the distribution cabinet is 400V ± 10% voltage. If not, contact the relevant staff of the local State Grid.

3） Check if there is any external factor, the relevant components may be faulty. Use a multimeter to measure the L and N of the 12V switching power supply UR2 in the charger, if there is 220V input, measure whether there is 12V output. If there is no voltage, the switching power supply is faulty. Replace it. If the voltage is normal, measure whether the indicator light has 12V input. If there is no 12V input, use the multimeter to check there a wiring problem. If there is no wiring problem, the indicator light is faulty replace it.

5.2.3 Emergency stop button is pressed

Fault phenomenon: The indicator light is red and the screen shows that “Emergency button fault”.

Working principle: The emergency stop button is controlled by the mainboard. The indicator light gets 12V, the com signal is connected to the mainboard, and there is no signal normally. When the emergency stop button is pressed, the normally open contact is closed, giving a signal to the mainboard. The mainboard

receives the signal. The relay at the terminal is closed. The com signal is given to the failure indicator light. The indicator light will be red after getting 12V.

Troubleshooting ideas: Check whether the emergency stop button is pressed, turn the emergency stop button clockwise to reset it, and the fault indicator light will be normal.

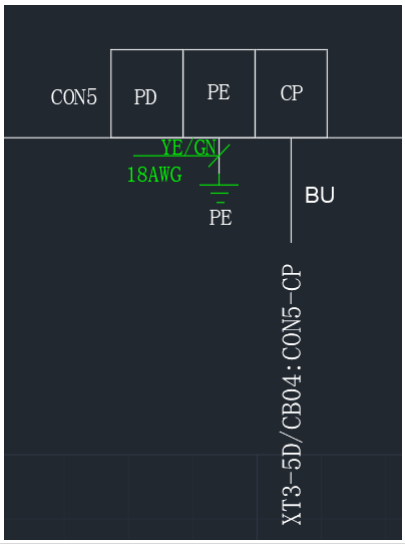
5.2.4 Abnormal connection of charging cable

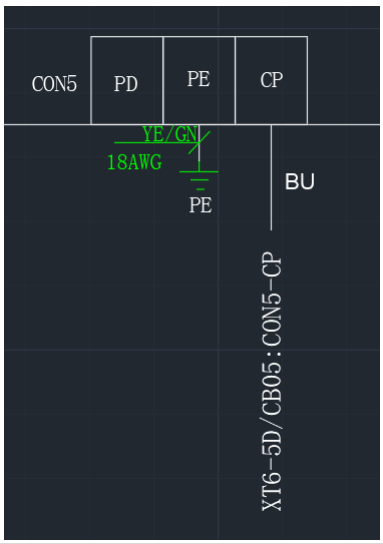
Failure phenomenon: After the charging cable is inserted, the connection between EV and charger is abnormal.

Troubleshooting ideas:

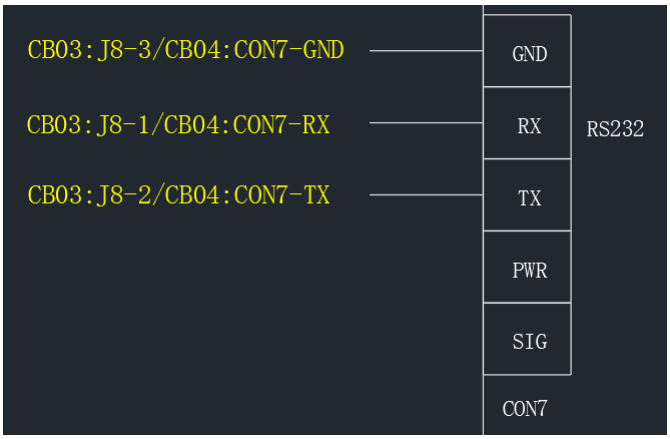
1） Check if there is anything in the charging cable. If there is, clean it up in time to ensure the connection.

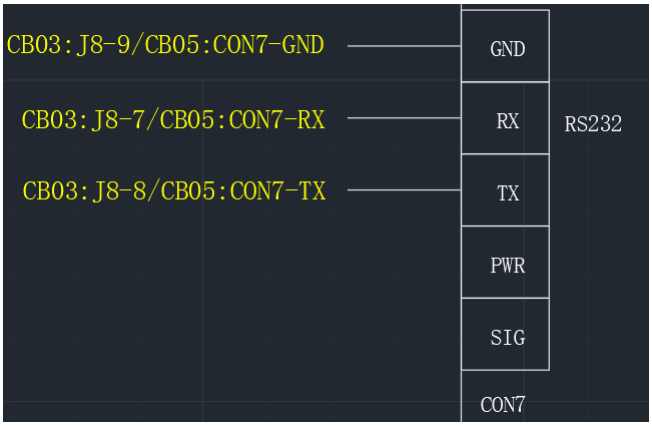
2） Check whether the connection between PLC board and CP and PE of charging cable.





3） Check whether the 232 communication between PLC board and main board is normal.



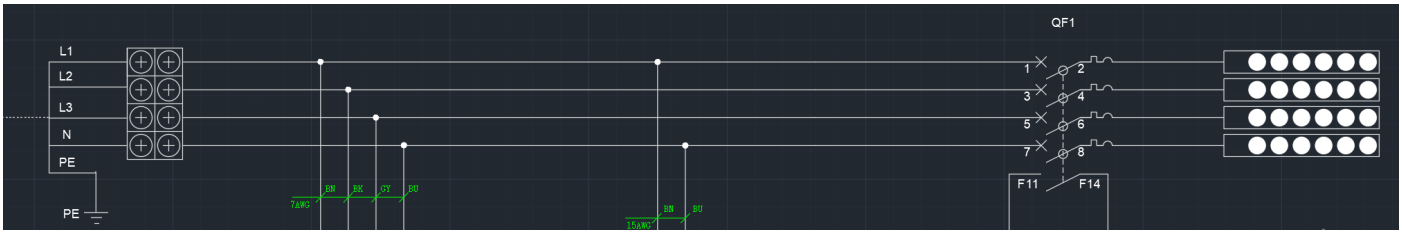


4） The PLC of the EV is sleepy, contact with the engineer of the EV.

5.2.5 Module failure

Failure phenomenon: The screen shows “Power module fault”.

Working principle: After connecting 400V AC power from the local state grid to the switch, and then connect the three-phase wire of the power module from the switch to the power module.



Troubleshooting ideas:

1) Check the status of the switch If it trips, power it on.
2) Check whether the temperature at the socket of the power module and the tail pin of the power module are normal, and whether there is any breakage, damage, or deformation. If there is something abnormal, replace the socket or the power module.
3) Check the status of the power module indicator. If the indicator is abnormal, please re-plug the power module. If the AC power light of the power module is off after re-plugging, it is a module failure, you can replace it; if the COM light of the power module turns red, there is a communication problem between the module and the mainboard. Use a multimeter to check the module CAN communication line HL (2 is CAN low, 3 is CAN high on the module) to the CAN line terminal port of the mainboard, if there is an open circuit or poor contact, correct the wiring.
4) Check whether the CAN communication-related resistance of the module is abnormal: Unplug the module CAN communication interface on the mainboard. Use a multimeter to check whether the resistance between the CAN line of the module and the HL is about 120Ω. If there is an abnormality,

correct the line or replace the fault resistance. Check whether the resistance between CAN terminal port HL is about 120Ω. If there is any abnormality, replace the mainboard.

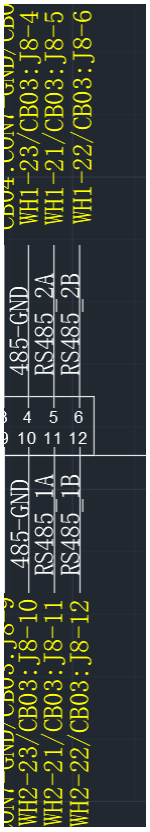
5) Restart the charger or re-program the mainboard and set the parameters.

5.2.6 Meter communication failure

Failure phenomenon:

1) "Meter link fault" is displayed on the screen.
2) The communication light on the meter is off.
3) The indicator light is always red.

Working principle: The mainboard 485 communication port AB is connected to the corresponding AB communication port on the meter for interactive message transmission.



Troubleshooting ideas:

1) Use the multimeter to check the circuit of the mainboard 485 communication port AB corresponding to the meter AB interface. If there is anything abnormal, replace the communication line or correct the wiring.
2) Intercept the meter communication message to find the problem, and replace the faulty components.

5.2.7 Charger is offline

Failure phenomenon: The platform shows that the charger is offline or the charger is not connected to the

Internet.

Troubleshooting ideas:

1） Check whether the switch trips. If so, turn it on.

2） Check whether the ID code is set right. If it's wrong, reset the ID code and restart the charger.

3） Check whether the indicator light of the communication module is on. Re-program the communication module first. If it fails to be online, replace the communication module

4） Confirm whether the SIM card is in arrears, you can renew it or replace the SIM card directly.

5.2.8 Input overvoltage

Failure phenomenon: The screen shows "Overvoltage fault".

Working principle: The input voltage is AC400V ± 10%

Troubleshooting ideas:

1） Use a multimeter to measure the input voltage. If it is higher than 440V, please contact the customer or the related staff.

2） Check the power module and the CAN communication line. Maybe there is something wrong when uploading data. If there is something abnormal, rectify it. If the overvoltage fault is still reported after the measuring, check and replace the power module.

5.2.9 Input undervoltage

Failure phenomenon: The screen shows "Undervoltage fault".

Working principle: According to the product technical indicators, the input working voltage of the charger is three-phase five-wire AC400V ± 10%.

Troubleshooting ideas:

1） Check the status of switch.

2） Use a multimeter to measure the input voltage. If it is under 360V, please contact the customer or the related staff.

3） Check the power module and the CAN communication line. Maybe there is something wrong when uploading data. If there is something abnormal, rectify it. If the overvoltage fault is still reported after the measuring, check and replace the power module.

5.2.10 Insulation fault

Failure phenomenon: The screen shows "Insulation fault"

Working principle: The main idea of insulation detection --- by opening or closing K1, K2, three circuit states

are obtained, and AD values are collected under these three states. List the equations and get the DC +, DC- insulation resistance to ground. Then according to the insulation testing standards required by IEC, to determine whether the insulation is OK.

Troubleshooting ideas:

1） Check whether there is moisture or water in the charging cable. Dry it and try to charge again.

2） Update the insulation testing board program to the latest version and try again.

3） Check whether each port of the insulation testing board is normal. Use a multimeter to test it. If the wiring is faulty, rectify the line. If there is a hardware problem, replace the insulation testing board and test.

4） Control the relay on the main circuit of the output of the charger to cut off the power. Then start the charger and use the multimeter's DC voltage to measure the voltage at the lower end of the DC + and DC- relays. Alarm charger message, view and feedback, if it is due to the program, contact with the R&D to make corresponding changes. If it is due to the vehicle, contact with the OEM to make corresponding changes.

5.2.11 Door is open

Failure phenomenon: The screen shows that "Door lock fault".

Troubleshooting ideas:

1） Check whether the doors are open.

2） Check whether the circuit of door travel switches is normal, whether there is a false connection, and whether the terminal port is abnormal. If the circuit is not correct, rectify the wiring or the replace mainboard.

3） Measure whether the travel switches can normally close. If it is abnormal, replace the travel switch.

5.2.12 Relay fault

Failure phenomenon: The screen displays "Relay fault"

Troubleshooting ideas: The voltage on the outside of the charger K1 and K2 relays is over 10V. This voltage is from the vehicle. Intercept the message, flash into a compatible program or contact the OEM to solve.

5.2.13 Output capability mismatch

Failure phenomenon: Fail to charge.

Troubleshooting ideas: The voltage required by the vehicle is higher than the maximum output voltage of the charger. Check whether the maximum output voltage of the module meets the requirements of the vehicle. Replace the power module if the specification is not available.

5.2.14 No effective current output

Failure phenomenon: There is required voltage and current but no output current.

Troubleshooting ideas:

1) Check whether the DC contactor circuit is correct. Check whether there is signal in the contactor coil control line after starting. If there is no signal, please change the circuit to the correct one.
2) Use a multimeter to measure whether the two sides of the DC contactor are conducting after receiving the pull-in signal. If it is not available, replace the DC contactor.

3) The multimeter measures whether the fuse is conducting, if not, please replace the fuse.

5.2.15 Abnormal order data

Failure phenomenon: The charge settlement power does not match the actual situation.

Troubleshooting ideas:

1) Check whether the meter is normal. Observe whether the meter measurement is normal. If it is abnormal, replace the meter.
2) Check whether the communication line between the meter and the mainboard is loose or abnormal. If so, tighten or replace it.
3) Use the 485 tool to intercept the communication message between the mainboard and the meter to check if the communication is normal. Replace the abnormal part.
4) Check whether there is an error in the process of sending power to the platform, or an error occurs when the platform accepts the data. If so update the program.

5.2.16 No response after swiping a card

Failure phenomenon: No response after swiping a card

Working principle: After swiping the card, the mainboard will give the order to start.

Troubleshooting ideas:

1) Try to swipe the card again. Do not swipe the card too fast. Put the IC card before the card reader for about 3s and then remove it.
2) Check whether you use the wrong IC card. Change the card and try again. It is recommended to mark the right IC card.
3) Check whether the type of the IC card is what the customer requires. Replace the IC card and try again.
4) Check the local signal and check whether the status of the charger is uploading late due to the poor signal. If the on-site signal is poor, enhance the on-site signal transformation.

5.2.17 Cannot reach the maximum output capacity

Failure phenomenon: The output current of the charger is small.

Troubleshooting ideas:

1) During the charging process, check the module details and whether the indicator lights of the power modules are abnormal. If a power module is found to be faulty, find the faulty module and replace it.
2) Parameter setting, whether the maximum output voltage and current are set abnormally. If they are set incorrectly, correct them.

5.2.18 The cooling fan does not work during charging

Failure phenomenon: During charging, the cooling fan of the charger does not work, abnormal heat dissipation and current drops occur during charging.

Troubleshooting ideas:

1) Check if the fan power line is loose, short-circuited, or open circuit. If there is any abnormality, rectify the wiring.
2) Check whether the power supply of the fan is normal. If it is normal, replace the fan.
3) If the power supply of the fan is abnormal, check whether the mainboard port or related control relays are properly sucked. If it is abnormal, replace the mainboard.

5.2.19 Power supply is normal, PCB boards are not on

Failure phenomenon: The PCB boards in the charger are not on.

Troubleshooting ideas:

1) Check whether related power lines are loose, short-circuited, open circuit, and rectify.
2) Check whether the output of the corresponding switching power supply is normal. If it is abnormal, check whether the switching power supply is broken or other components on the output circuit are broken. Replace the broken components.

5.2.20 Power supply is normal, the touch screen is not on

Failure phenomenon: The touch screen is off.

Troubleshooting ideas:

1) Check whether the voltage of the breaker is normal. If the voltage is 230V input, but no output, replace the breaker.
2) Check whether the wiring is correct, whether it is loose, short-circuited or open circuit. If the circuit is found abnormal, rectify it.
3) Check whether the switching power supply for the screen is normal.
4) Check if there is 24V supplied to the screen. If there is, the screen is broken and replace the touch screen.

5.2.21 Reverse connection failure

Failure phenomenon: Fail to charge, the charger shows "reverse connection failure"

Troubleshooting ideas: The common reason is that the DC + and DC- terminals of the output of the charger

are connected in reverse, and the DC output lines DC + and DC- are removed and rewired and tightened in the correct way.

5.2.22 Touch screen cannot read and set parameters

Failure phenomenon: The touch screen cannot read and set parameters, and there is no response after tapping.

Troubleshooting ideas:

1) Check if the communication line between the screen and the mainboard is loose, check the internal continuity of the line, if it is abnormal, rectify the line and replace it
2) Check if the mainboard's heartbeat indicator is blinking normally. If it is abnormal and the indicator is always on, then the mainboard freezes. Update the latest stable version of the program first. If the problem persists, replace the mainboard.
3) Use the 485 tool to intercept the communication message between the screen and the mainboard to determine which side is abnormal. If the mainboard does not respond, replace it.

5.2.23 Output overcurrent

Failure phenomenon: The output current is greater than the set current. The screen shows “Overcurrent fault”.

Troubleshooting ideas:

1) Check if the output of the power module is abnormal, replace the abnormal power module.
2) Contact with R&D to update the program.

5.2.24 Unable to boost

Failure phenomenon: The output voltage cannot increase during charging

Troubleshooting ideas:

1) It may be that the module fails to increase the voltage. If the power module is faulty, replace it.
2) The maximum output voltage is set incorrectly which is lower than the vehicle battery voltage.

5.2.25 With voltage but no current

Failure phenomenon: After starting charging, the output has voltage and no current

Troubleshooting ideas:

1) Replace the faulty power module.
2) The vehicle high-voltage switch relay is not attracted or the charger DC output relay is not attracted.

Measure the voltage of the charger DC output relay from left to right. If the measured voltage is the set voltage transmitted by the vehicle, the vehicle relay is not sucked. If the module output voltage and the actual battery voltage of the vehicle can be measured, the charger relay is not sucked. By measuring whether the relay has 12V power supply, determine whether the mainboard or the relay is faulty. If the relay gets 12V, the relay is faulty. If not, the mainboard is faulty. Replace the faulty part.

3) If the hardware is normal, intercept the communication message between the charger and the EV and send it to R & D.