

SKYWORTH **AUX** *MIYOTO* 


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Troubleshooting Guide & Error Codes AUX Brand 2021



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Wall mounted / Floor standing air conditioner

Many error codes may appear on this air conditioner, and this troubleshooting guide is prepared for the maintenance personnel to detect the error position and the parts to be replaced during the troubleshooting process. In this Guide, the Troubleshooting Method is guided by the Error Name, and the Reference Code under the General Index is the error code of the internal unit of the mainstream model supplied by the Company.

Example: “internal coil sensor error” is coded as E3 in the error code of the internal unit, but appears as flash-out via the trouble light of the external machine. However, their troubleshooting method is the same, and use the same table as well.

1、 General index

No.	Error Name	Reference Code
1	Overcurrent Protection of Indoor Unit	E0
2	Internal temperature sensor error	E1
3	External coil sensor error	E2
4	Internal coil sensor error	E3
5	Internal fan error of wall mounted A/C (PG motor)	E4
6	Internal fan error of wall mounted A/C (DC motor)	E4
7	Sliding door error of floor standing	E4
8	Internal and external communication error	E5 (SE)
9	Communication Failure between Display board and Main Control Panel	E8
10	External DC fan error (3-core terminal motor)	F0
11	Module protection error	F1
12	PFC protection error	F2
13	Compressor startup error	F3
14	Exhaust sensor error	F4
15	Pressing top head sensor error	F5
16	External temperature sensor error	F6
17	OVP or UVP error	F7
18	Main external control panel and module panel communication error	F8
19	Outdoor EE error	F9
20	Recirculated sensor error (four-way valve switch error)	FA

21	Cabinet internal fan error (see E4 for troubleshooting)	Fb
22	High-voltage Switch Protection	P2
23	Liquid Deficiency Protection	P3
24	Refrigeration Overload Protection	P4
25	Exhaust Protection	P5
26	Indoor High Temperature Protection	P6
27	Anti-freezing Protection in Refrigeration Room	P7
28	Overcurrent Protection	P8
29	Function protection prompt of frequency conversion external machine	See the Error List
30	Troubleshooting Guide on Category-L Failures (Subdivided Failures)	See the Error List

2、Troubleshooting Guide

Example:

Explanation of error	Cause: explain the principle of the specific error. Inspection path: The basic order of troubleshooting. Related key position
Tools required for inspection	Tools that should be carried for such troubleshooting, and replacing parts that may be necessary for such error.
Frequent problematic part	Any possibly broken part related to the error may be the parts that need to be replaced.
Inspection procedure and key points	All the troubleshooting procedures for the reference of maintenance staff are prepared from simple to complex, from surface to internal, and from test to replacement. Although these key points do not cover all the error, and difficult or special problems are not included as well, but they can cover most of the common error.
Special attention	Here are some often-overlooked problems for the reference of the maintenance personnel.

The problems in the market are always more than we think, so it is necessary for the maintenance personnel to understand the principle of air conditioning operation, and to make a flexible judgment of the fault in combination with the actual conditions. We welcome the maintenance personnel to constantly put forward new problems in the actual work, record the solutions and enrich our troubleshooting guide list.



(1) E0-Overcurrent Protection of Indoor Unit

<p>Explanation of error</p>	<p>Cause: The main control panel detects that the working current of the system exceeds the upper limit of protection, and will indicate "indoor unit overcurrent protection: The air conditioner stops running for protection and displays the failure code E0. Inspection path: current transformer → power line → compressor line → connector assembly</p>
<p>Tools required for inspection</p>	<p>Current clamp and multimeter</p>
<p>Frequent problematic part</p>	<p>Indoor unit panel, power line, compressor and complete machine</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. If it is a fixed-frequency model, observe whether the live line passes through the current transformer; if not, lay the line accordingly and reboot for inspection. 2. The current clamp is used to measure the working current and determine whether it is within the normal working current range of the nameplate. If normal working current is detected, it may be the fault of the current transformer and replace the main control panel of the indoor unit. 3. Measure whether the power supply voltage is within the normal operating voltage range; if the working voltage is not normal, it is necessary to consider whether the local grid voltage is stable. 4. If the working current exceeds the range and the working voltage is normal, the system may be blocked and the air-conditioning may be overloaded, which needs to be checked according to the actual situation.

(2) E1-internal temperature sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of internal temperature sensor during the inspection of main control panel in the internal machine, indicated by “internal temperature sensor error”. Inspection path: Sensor → Sensor wire → Connectors → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 15KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Internal temperature sensor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there’s resistance problem, short circuit or open circuit in the sensor; the resistance value shall be within a reasonable range (15KΩ under the temperature of 25°C for frequency conversion machine) 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose, and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. 5. In case no standard sensor is available at present, replace the internal temperature sensor by other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, check the main internal control panel and change if necessary.
<p>Special attention</p>	<p>Most internal temperature sensors of the frequency conversion machine have a resistance value of 15KΩ. Do not use improper sensor during repairing and maintenance, or it may lead to the wrong temperature sensing of the machine, the start error or shutdown error. You can switch the air conditioner to the “Blowing” mode, and judge the accuracy of sensor though environmental temperature displayed on the screen.</p> <p>In case a sensor with the resistance value over 15KΩ is used, the detected temperature will be much lower than the actual temperature, which may lead to the shutdown error under heating mode, or the startup error under cooling mode.</p> <p>In case a sensor with the resistance value below 15KΩ is used, the detected temperature will be much higher than the actual temperature, which may lead to the startup error under heating mode, or the shutdown error under cooling mode.</p>



(3) E2-external coil sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of external coil sensor during the inspection of main external control panel, indicated by “external coil sensor error”.</p> <p>Inspection path: Sensor → Sensor wire → Connectors → Main external control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 20KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>External coil sensor, main external control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there’s resistance problem, short circuit or open circuit in the sensor; the resistance value shall with a reasonable range (about 20KΩ for frequency conversion machine) 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose, and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. The coil sensor is quite easy to be affected with damp in case the lead of coil sensor is above the copper pipe. 5. In case no standard sensor is available at present, replace the temperature sensor of external coil by other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, check the main internal control panel and change if necessary.
<p>Special attention</p>	<p>Most internal temperature sensors of the frequency conversion machine have a resistance value of 20KΩ.</p> <p>Do not use improper sensor during repairing and maintenance, or it may lead to the start of protection mode due to wrong temperature sensing of the machine, or the protection error.</p> <p>In case a sensor with the resistance value over 20KΩ is used, the detected temperature will be much lower than the actual temperature, which may lead to the frequent entering of defrost mode, the illusory defrosting or the protection error during the cooling process.</p> <p>In case a sensor with the resistance value below 20KΩ is used, the detected temperature will be much higher than the actual temperature, which may lead to defrost error during the heating process, or the start of protection during the cooling process.</p>



(4) E3-internal coil sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of internal coil sensor during the inspection of main internal control panel, indicated by “internal coil sensor error”.</p> <p>Inspection path: Sensor → Sensor wire → Connectors → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 5KΩ or 20KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Internal temperature sensor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there’s resistance problem, short circuit or open circuit in the sensor; the resistance value shall with a reasonable range (about 20KΩ for frequency conversion machine) 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose., and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. The coil sensor is quite easy to be affected with damp in case the lead of coil sensor is above the copper pipe. 5. In case no standard sensor is available at present, replace the temperature sensor of internal coil by other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, check the main internal control panel and change if necessary.
<p>Special attention</p>	<p>Most internal temperature sensors of the frequency conversion machine have a resistance value of 20KΩ.</p> <p>Do not use improper sensor during repairing and maintenance, or it may lead to the start of anti-frosting or overheat protection mode due to wrong temperature sensing of the machine.</p> <p>In case a sensor with the resistance value over 20KΩ is used, the detected temperature will be much lower than the actual temperature, which may lead to the high pressure of cold-blast protection system during the heating process, or the frequent start of anti-freezing protection during the cooling process.</p> <p>In case a sensor with the resistance value below 20KΩ is used, the detected temperature will be much higher than the actual temperature, which may lead to the frequent start of overheat protection mode during the heating or the overload protection during the cooling process.</p>

(5) E4-Internal fan error of wall mounted air conditioner (PG motor)

<p>Explanation of error</p>	<p>Cause: PG motor is equipped with speed feedback signal line. When the feedback signal of speed is not received by the main internal control panel, it has no way to recognize the rotating speed of motor, which will be indicated as “Internal fan error”. Main causes for the disappearance of speed feedback signal are as follows: 1. The fan is stuck; 2. The speed feedback component in the fan is broken; 3. Error of receiving circuit for the speed feedback signal from the main internal control panel.</p>
<p>Tools required for inspection</p>	<p>Multimeter, A PG motor in normal working condition</p>
<p>Frequent problematic part</p>	<p>Mechanical jam problem of internal fan, PG motor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether the fan can work for a period of time before the error occurs. If yes, the reason of mechanical jam can be excluded. 2. Disconnect the power supply and move the fan blade of internal machine by hand to see if there’s any resistance. Some occasional internal fan error may relate to bearing coordination. 3. Reconnect the drive wire and speed feedback wire, thus to exclude any fan error due to connector loosening. 4. Check whether the plug-in terminal of speed feedback on the control panel is loose, and pull the terminal slightly for inspection if necessary. 5. Replace the motor in the faulted air conditioner with other PG motor (do not fix it with the fan for the time being), if the main control panel still indicates “internal fan error”, then replace the main internal control panel; if the error disappears, replace the internal fan.
<p>Special attention</p>	<p>The main internal control panel will not indicate “internal fan error” when the internal fan is still rotating; sometimes such error will not be reported when obvious fan problems exist (such as the low-speed rotation due to damaged fan capacitors, or non-uniform rotating speed due to abnormal speed feedback).</p> <p>Therefore, patience of the maintenance staff is required for the troubleshooting of fan error. You shall compare it with the normal condition, and detect and solve the problem in a flexible way.</p>

(6) E4-Internal fan error of wall mounted air conditioner (DC motor)

<p>Explanation of error</p>	<p>Cause: The internal fan of some highly energy efficient models is DC motor using a green plug through which the main internal control panel can drive the motor and sense the current rotational speed feedback. When the main internal control panel cannot receive the rotational speed feedback signal of the motor, it will indicate “DC motor error”. Disappearance of the rotational speed feedback signal may be caused by: 1 The motor is stuck and cannot work; 2 The speed feedback element inside the fan is destroyed; 3 There’s something wrong with the speed feedback signal receiving circuit of the main internal control panel. Inspection path: Is DC motor stuck by foreign matter → motor destroyed → Motor terminal connectors → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, a DC motor in normal working condition</p>
<p>Frequent problematic part</p>	<p>Mechanical jam of internal fan, internal DC motor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether the fan accelerates to extremely high speed before the error occurs. If it can work for a period, the reason of mechanical jam can be excluded. 2. Plug and unplug the terminal of the DC motor again to exclude any fan error due to connector loosening, and pull the terminal slightly for inspection if necessary. 3. Replace the motor in the faulted air conditioner with other DC motor to plug in the main internal control panel (do not fix it with the fan for the time being), if the main control panel still indicates “DC motor error”, then replace the main internal control panel; if the error disappears, replace the DC motor. 4. Multimeter can be used to distinguish whether it is main control panel problem or motor problem by: connect the motor with the main control panel and pay attention to the second (yellow) and fourth (black) wire from the outermost side among four lines of the terminal of the DC motor. After the air conditioner powers on in the cooling mode for a while, the voltage between the yellow and black wires should rise gradually and the motor should accelerate slowly, if the DC motor still won’t rotate, then the DC motor is destroyed.

<p>Special attention</p>	<p>Five lead wires division: Count from the outermost side of the four wires of the DC motor terminal, the first blue wire is the speed feedback wire with a voltage of 0.5-5V when the fan rotates; the second yellow wire is the motor driving wire with a voltage of 2.0-7.5V when the fan rotates; the second white wire is 15V power cord with a voltage of 15V in normal condition; the fourth black wire is 0V DC earth wire which is the benchmark of all the voltage tests; the fifth (red) wire is 310V wire which is strong with a voltage of 310V in normal condition, so be careful of electric shock.</p>
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(7) E4-Sliding door error of floor standing

<p>Explanation of sliding door error</p>	<p>Cause: For the model with upper and lower sliding doors, the position of trap door is sensed via the upper and lower photoelectric switches. When the sliding door closes, it will move upward until the upper photoelectric switch senses the sliding door; when the sliding door opens, it will move downward until the lower photoelectric switch senses the sliding door. When the photoelectric switch cannot sense the position of the sliding door normally, it will indicate “sliding door error”.</p> <p>Inspection path: Mechanical jam of sliding plate → Synchronous motor → Can synchronous motor connect to 220V power → photoelectric switch connection wire → Photoelectric switch → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, photoelectric switch in normal condition</p>
<p>Frequent problematic part</p>	<p>Mechanical jam of sliding plate, photoelectric switch, reversible synchronous motor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Power on and observe whether there is mechanical jam in the sliding plate. Note that new machines may be fixed by tapes, remove them. 2. If the sliding door slides normally when the machine powers on and off but it still indicates “sliding door error”, then there’s something wrong with the photoelectric switch. 3. If the sliding door does not slide when the machine powers on and off, check the reversible synchronous motor to see whether the motor is connected to 220V power or the motor’s wire is damaged. 4. If there is something wrong with the photoelectric switch, replace it with another one in normal condition and repeat the above procedures. If the error disappears, then it’s photoelectric problem; if not, then it’s main internal control panel problem.
<p>Special attention</p>	<ol style="list-style-type: none"> 1. Please confirm that it is a new sealed one when replacing the photoelectric switch. 2. There are two photoelectric switches, so check the upper one when the error occurs when powering off and check the lower one when the error occurs when powering on. 3. Terminals connected to upper and lower photoelectric switches should be connected accordingly because they have different colors. Otherwise, it will lead to reverse switches for the sliding plate.



(8) E5(5E)-Internal and external communication error

<p>Explanation of error</p>	<p>Cause: The frequency converter needs internal and external communication. When the communication cannot be reached, the internal and external units will indicate “internal and external communication error”. Only “main internal control panel, connecting cable and main external control panel” are related to communication; but sometimes the communication error will be indicated when the external unit has no power and the internal unit cannot connect with the external unit due to other errors, then such situation shall be distinguished from “pure communication error” and treated in a different way.</p> <p>Inspection path: Check if the external unit can power on and work (normally, the indicator light will turn off after lighting for several seconds, relay picks up, and PTC won’t heat seriously)</p> <p>1. Can power on and work: Are the internal unit and external unit matched → is the phase sequence of connecting wires of internal and external units correct (the live wire of the internal unit connects with that of the external unit, the null wire of the internal unit connects with that of the external unit) → Connecting wires touched well → Main internal control panel replacement → Main external control panel replacement</p> <p>2. Cannot power on and work: Can AC 220V be delivered to the terminal block of the external unit → Can the bridge rectifier and module panel generate DC 310V → Can the main external control panel generate a low voltage power supply of DC 5V → Does the main external control panel show the status of periodical reset.</p>
<p>Tools required for inspection</p>	<p>Multimeter, main internal control panel in normal condition</p>
<p>Frequent problematic part</p>	<p>Connecting wire phase sequence and contact, main internal control panel, main external control panel, module panel</p>
<p>Inspection procedure and key points</p>	<p>1. Firstly, the IDU and the ODU should be matched and connected properly.</p> <p>2. Observe the main external control panel, turn on the air conditioner, three lights are all lighted up then off and the relay pulls in. If not, it is power supply problem.</p> <p>3. Connect the black signal line S to terminal N of ODU. Turn on the A/C, if "E5" is still reported, the main external control panel need to be replaced. If "E5" is still reported at this time, go to step 4.</p> <p>4. Change a new main internal control panel, if the error code E5 remains, then the problem should be on the main external control panel.</p>



<p>Special attention</p>	<p>When the external unit not power on: If the internal terminal board does not transmit 220V power, replace the main internal control panel; if the external terminal board has 220V power, first check if (fuse, reactor and bridge rectifier) are normal. There is still something wrong, replace the whole set of external control unit; for the control unit composed of several function boards, try disconnecting the weak-current data wires among several control boards and then power the external unit on, if the main control panel can be powered on and initialized successfully, then it's the module panel problems; if the main external control panel still cannot be powered on and initialized, replace the main external control panel.</p>
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(9) E8-Communication Failure between Display board and Main Control Panel

<p>Explanation of error</p>	<p>Cause: The floor standing unit needs communication between the display board and the indoor unit panel. When such connection between each other is cut off, the display board will indicate "Communication Failure between Display board and Main Control Panel". Only the three components of "internal main control panel, connection line and the display board" are related to the communication; Inspection path: connection line → display board → internal main control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, regular internal main control panel and regular display board</p>
<p>Frequent problematic part</p>	<p>Internal main control panel, display board and connection line</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether the connection line between the display board and the main control panel is loosened or damaged. If so, replace the connection line or re-connect to ensure the normal connection. 2. Replace the regular internal control panel, if it works normally after booting and does not display the failure code E8, it means the internal control panel is faulted, just replace the internal control panel; if it still displays the failure code E8, it means the display board is faulted, replace the display board; 3. If the main control panel or display is replaced separately and the current failure cannot be solved still, it is possible that the display board and the main control panel do not match each other, which shall be replaced both.
<p>Special attention</p>	<p>If it is necessary to replace the display board or the internal main control panel during maintenance, make sure the display board matches the main control panel. If it is not certain, it is suggested that they are replaced both to make sure the compatibility.</p>

(10) Eb-Indoor EE Failure

<p>Explanation of error</p>	<p>Cause: Many parameters need to be preset for the running of the indoor unit of the air conditioner and such parameters are placed in a data storage 8-foot chip, which is called "EEPROM" or "EE" for short. The motor on the internal main control panel can only work after reading the data stored in EE and if not read, the failure code "Outdoor EE Failure" will be indicated and raised in the indoor unit. Reasons for data not being read are as follows:</p> <ol style="list-style-type: none"> 1. wrong EE chip data format; 2. EE chip is broken; 3. bad contact of EE or fault of EE reading circuit; 4. backward installation of EE chip. <p>Inspection path: internal main control panel.</p>
<p>Tools required for inspection</p>	<p>/</p>
<p>Frequent problematic part</p>	<p>Bad contact of EE, internal main control panel.</p>
<p>Inspection procedure and key points</p>	<p>Replace the internal main control panel directly.</p>



(11) F0-External DC fan error (3-core terminal motor)

<p>Explanation of error</p>	<p>Cause: Our frequency changing external unit uses the 3-lead-wire DC motor, or “externally driven DC motor” for short, after 2012. It has no speed feedback circuit but 3 drive lead wires and its driving principle is similar to that of the compressor. The main control panel will indicate “external DC fan error” when it detects imbalanced current on the three lead wires of the driving motor. Inspection path: Is the DC fan stuck by foreign matters → Motor terminal connectors → Main external control panel → Motor</p>
<p>Tools required for inspection</p>	<p>Main external control panel in normal condition</p>
<p>Frequent problematic part</p>	<p>Mechanical jam of external fan, main external control panel, external DC motor</p>
<p>Inspection procedure and key points</p>	<p>1. First exclude the possibility of mechanical jam of external fan blades. 2. Observe if the terminal of the fan is not connected firmly or the order of lead wires is correct. If the external fan of the newly installed air conditioner rotates reversely, first observe if the color order of the three lead wires is correct, or change the order of any two of the three lead wires of the motor to see if the fan can rotate in the forward direction. 3. The DC motor of this scheme is relatively simple and reliable, so the problem is more likely to be caused by the drive part of the fan of the main external control panel. The maintenance personnel may as well prepare matched main external control panel before maintenance. If the fan returns to normal after replacing the main control panel, then it’s the main control panel problem; if it still indicates external DC motor error, then replace the external DC motor.</p>
<p>Special attention</p>	<p>Unlike the 5-core internal DC motor, there will be a process of fan blade position locking before the 3-core DC motor with external drive starts to rotate. The fan blades will shake mechanically for 3-5 seconds and then rotate slowly, which is normal phenomenon.</p>



(12) F1-Module protection error

<p>Explanation of error</p>	<p>Cause: The power module is the part to directly drive the compressor to work. It can protect the machine in time when overcurrent, overvoltage or overheat occurs and stops the compressor from working. It will, at the same time, send “shutdown request” to the module panel. The error triggered by the “shutdown request” is called “module protection error”.</p> <p>Inspection path: Supply voltage → Compressor wire, reactor wire → System blocked → Module panel damaged → Main external control panel destroyed → Compressor destroyed</p>
<p>Tools required for inspection</p>	<p>Multimeter, pressure gauge, megameter, module panel in normal condition</p>
<p>Frequent problematic part</p>	<p>Supply voltage, compressor wire, reactor, system pressure, module panel, main external control panel, compressor</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Is the order of compressor wires not correct, which makes the compressor rotate reversely? Try exchanging the compressor wires on U-V phase to see if the problem can be solved? 2. Check if the supply voltage is unstable and highly volatile, and test if the system pressure is normal. High system pressure will cause rotating problems to the compressor. 3. Is the module panel fixed to the radiator firmly? Will it cause pool cooling? Is the internal and external heat exchanger dirty, which lead to poor heat transfer and high system pressure? 4. If “module protection error” will be indicated immediately after starting up, it is almost certain that it’s substantial error, having nothing to do with supply voltage and system pressure, it is suggested to observe if there is any component destroyed by strike arc near the module panel; use the multimeter to test if the resistances between any two compressor wires are the same. The resistances between any two compressor wires in normal condition are tiny resistances at ohm level and are basically equal; then use the megameter to measure if the resistance insulation of the three compressor wires against the earth wire is good (normally at MΩ level), and check if the reactor wire is well connected or the reactor is destroyed. 5. Test if the 15V and 5V (3.3V) power supply on the module panel is stable and exclude the module panel error caused by power supply of the main external control panel. 6. Methods for judging whether the power module is damaged: use the “diode position” of the multimeter to measure the features of P of the module panel against U-V-W three phases respectively. Measure the power module P-U, P-

	<p>V and P-W, there is always infinite resistance at one side and fixed on-state voltage at the other side (generally 0.5V); measure the features between N-U, N-V and N-W in the same way, if short circuit occurs during any measurement, then the module is destroyed.</p>
	<p>7. Replace with the module panel in normal condition for test. If the test is normal after changing the module panel, then the original module panel is destroyed.</p> <p>8. After excluding problems of module, connecting wires, system and power supply, distinguish by ear. If there is only electromagnetic sound and the compressor does not work; or the sound of irregular running appears after the compressor works for a while and then it shuts down and indicates error; chances are that the compressor is blocked or destroyed, consider replacing the compressor.</p>



(13) F2-PFC protection error

<p>Explanation of error</p>	<p>Cause: PFC board is a component of the inverter air conditioner for power factor correction and voltage boosting. When the PFC board cannot perform power calibration as normal because of overcurrent and overvoltage, it will indicate “PFC protection error” and its function may also be integrated with the module panel or main control panel.</p> <p>Inspection path: Supply voltage → AC and DC power path → PFC board data wire → PFC board → Main control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, PFC board in normal condition</p>
<p>Frequent problematic part</p>	<p>Supply voltage, reactor, PFC board, module panel, main external control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check if the supply voltage is unstable and highly volatile or the voltage is too low (below AC 135V) 2. The reactor is one of core parts of PFC. Check if the reactor itself is destroyed and the reactor connecting wire is in poor connection, which makes PFC functions not performed. Do not remove the reactor and replace with short circuit by no means. 3. If “PFC protection error” will be indicated immediately after starting up, it is almost certain that it’s substantial error, having nothing to do with supply voltage, it is suggested to observe if there is any component destroyed by strike arc near the module panel 4. Test if the 15V and 5V (3.3V) power supply on the PFC board is stable and exclude the PFC board error caused by power supply of the main external control panel. 5. Replace with the PFC board in normal condition for test. If the test is normal after changing the PFC board, then the original PFC board is destroyed. 6. The possibility that there is something wrong with 15V or 5V power of the module panel that causes the control power supply problem of the PFC board is not excluded. 7. Some module panels integrate PFC function and compressor drive function in one, so just replace with an integrated module panel. 8. For single-panel single-chip main control panels, if PFC protection error appears, and there is no problem in supply voltage, reactor connection or reactor, just replace the controller of the external unit.

(14) F3-Compressor out-of-step error

<p>Explanation of error</p>	<p>Cause: The module panel will constantly test the current of lead wires of the compressor and calculate the position of the rotator of the compressor when driving the compressor to work. When the compressor deviates far from the normal operating status, it will indicate “compressor out-of-step error” because the current of the compressor wires is too high or it cannot detect the position of the rotator. This error always follows “module protection error”, so they have similar inspection methods.</p> <p>Inspection path: supply voltage → Compressor wire, reactor wire → System blocked → Module panel damaged → Main external control panel destroyed → Compressor destroyed</p>
<p>Tools required for inspection</p>	<p>Multimeter, pressure gauge, module panel in normal condition</p>
<p>Frequent problematic part</p>	<p>Supply voltage, compressor wire, reactor, system pressure, module panel, main external control panel, compressor</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Is the order of compressor wires not correct, which makes the compressor rotate reversely? Try exchanging the compressor wires on U-V phase to see if the problem can be solved? 2. Check if the supply voltage is unstable and highly volatile, and test if the system pressure is normal. High system pressure will cause rotating problems to the compressor. 3. Is the module panel fixed to the radiator firmly? Will it cause pool cooling? Is the internal and external heat exchanger dirty, which lead to poor heat transfer and high system pressure? 4. If “compressor out-of-step error” will be indicated immediately after starting up, it is almost certain that it’s substantial error, having nothing to do with supply voltage and system pressure, it is suggested to observe if there is any component destroyed by strike arc near the module panel; use the multimeter to test if the resistances between any two compressor wires are the same. The resistances between any two compressor wires in normal condition are tiny resistances at ohm level and are basically equal; then use the megameter to measure if the resistance insulation of the three compressor wires against the earth wire is good (normally at MΩ level), and check if the reactor wire is well connected or the reactor is destroyed. Check if the DC voltage between P-N is too high (above 200V). 5. Test if the 15V and 5V (3.3V) power supply on the module panel is stable and exclude the module panel error caused by power supply of the main external control panel. 6. Replace with the module panel in normal condition for test. If the test is



	<p>normal after changing the module panel, then the original module panel is destroyed.</p> <p>7. After excluding problems of module, connecting wires, system and power supply, distinguish by ear. If there is only electromagnetic sound and the compressor does not work; or the sound of irregular running appears after the compressor works for a while and then it shuts down and indicates error; chances are that the compressor is blocked or destroyed, consider replacing the compressor.</p>
<p>Special attention</p>	<p>For the “compressor out-of-step error” and “module protection error”, the former is calculated by the main chip of the module panel and the latter is detected by the power module itself. They are abnormal operating phenomenon of the compressor essentially. If there is uncertainty about either error, analyze both together with similar method. For inverter air conditioners that are in poor electrical environment or are old, occasional occurrence of such errors is a normal protection.</p>



(15) F4-Exhaust sensor error

<p>Explanation of error</p>	<p>Cause: The main external control panel will indicate “exhaust sensor error” and send it to the main internal control panel when it detects short circuit or open circuit of the exhaust sensor. Inspection path: Exhaust sensor → Sensor wire → Connectors → Main external control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 50KΩ standard exhaust sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Exhaust sensor, main external control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check if there is any evident resistance problem in the sensor. Whether in short circuit or open circuit, the resistance should maintain in a reasonable range (about 50KΩ when the compressor is not working and between 3 KΩ and 30 KΩ after the compressor works for a while, the corresponding exhaust temperature should be 100°C-38°C). 2. Check if the sensor wire or the sensor connecting wire is damaged. 3. Check if the connecting terminal is connected firmly, the weld between the terminal and the main control panel is loose; pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. The coil sensor is quite easy to be affected with damp in case the lead wire of coil sensor is above the copper pipe. 5. If there is no standard sensor at hand, exchange the exhaust sensor with the one beside it to see if the error changes. If yes, there is something wrong with the sensor and it should be replaced; if it still indicates “external coil sensor error”, replace the main external control panel.
<p>Special attention</p>	<p>Most exhaust sensors have a standard resistance of 50KΩ (25°C). Do not use improper sensor during maintenance, or the machine will sense the exhaust temperature mistakenly and enters the protection state frequently. For example, in the case where replace the 20KΩ coil sensor for the exhaust sensor by mistake, the exhaust temperature that the main external control panel senses will be higher than the actual exhaust temperature, which will make normal air conditioners enter the high exhaust temperature protection state frequently, and the compressor frequency threshold will rise and lead to shutdown of the compressor.</p>



(16) F5-Compressor top head sensor error

<p>Explanation of error</p>	<p>Cause: The compressor top head sensor is a compressor top head temperature protection switch most of the time. It keeps closed (short circuit) when the compressor temperature is normal and switches off (open circuit) when the temperature is too high. The main external control panel will indicate “compressor top head sensor error” when it senses disconnection of the compressor top head protection switch.</p> <p>Inspection path: Compressor top head sensor (temperature protection switch) → Sensor wire → Connectors → Main external control panel</p>
<p>Tools required for inspection</p>	<p>Pressure gauge, multimeter</p>
<p>Frequent problematic part</p>	<p>System pressure, liquid deficiency, compressor top head sensor (temperature protection switch), main external control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. First check if the compressor top head temperature is too high (above 110°C) and causes action of the compressor top head sensor (temperature protection switch); reasons why the compressor top head temperature is too high may be: the system is deficient in liquid and the compressor idles; the system is blocked and the pressure of the compressor is too high. 2. After excluding the possibility of the system problem, please note that the temperature protection switch is closed normally. Test if the terminals of the sensor are in the short-circuit condition with the multimeter. In the case of open circuit, then there is something wrong with the sensor or lead wires. 3. Check if the sensor wire or the sensor connecting wire is damaged. 4. Check if the connecting terminal is connected firmly, the weld between the terminal and the main control panel is loose; pull the terminal slightly for inspection if necessary. 5. Disconnect the power supply and short circuit a metal with the compressor top head terminal of the main external control panel. If the compressor top head sensor error disappears after start up, then replace the sensor; if the error still occurs, it’s probably the main control panel problem, replace the main external control panel.
<p>Special attention</p>	<p>The compressor top head sensor is just a temperature switch which is highly reliable and is less likely to go wrong generally. Pay more attention to the system pressure and the compressor temperature.</p>



(17) F6-external temperature sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of external temperature sensor during the inspection of main external control panel, indicated by "external temperature sensor error". Inspection path: Sensor → Sensor wire → Connectors → Main external control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 15KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>External temperature sensor, main external control panel.</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there's resistance problem, short circuit or open circuit in the sensor; the resistance value shall be within a reasonable range (15KΩ under the temperature of 25°C). 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose, and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. 5. In case no standard sensor is available at present, replace the external temperature sensor with the other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, it's possible that the main control panel is faulted, change the main external control panel.
<p>Special attention</p>	<p>Most of the standard resistance values of the external temperature sensors are 15KΩ (hen temperature is at 25°C), and the higher the temperature is, the lower the resistance value is, and the lower the temperature is, the higher the resistance value is. Do not use improper sensor during repairing and maintenance, or it may lead to the wrong temperature sensing of the machine.</p>

(18) F7-OVP or UVP error

<p>Explanation of error</p>	<p>Cause: All the inverter air conditioners are equipped with voltage inspection circuits, but different models of machines have different locations for the voltage inspection (on the module panel or main external control panel). When the supply voltage is lower than 135V or higher than 275V, the inspection circuit would detect over or under voltage protection signal and send it to the main external control panel and the main external control panel would raise the alarm "OVP or UVP error" and indicate it through the internal motor. Inspection path: supply voltage → internal direct current voltage → reactor wiring → module panel → main external control panel.</p>
<p>Tools required for inspection</p>	<p>Multimeter</p>
<p>Frequent problematic part</p>	<p>Supply voltage, reactor, module panel and main external control panel.</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. First, check the supply environment of the user, especially shall check when the compressor of the air conditioner has been running for a while. The normal supply voltage shall be between 198V and 242V and the minimum work assurance range of the air conditioner shall be within 165V and 265V and it shall be especially noted that the voltage value shall not be decreased significantly after running of the compressor (voltage decreasing by over 25V), because if the supply voltage is decreased by a lot, it means the supply line capacity is insufficient and the user is usually suggested to replace the circuit or install a specialized air conditioner supply voltage stabilizer. 2. For the external machines with PFC panels (without separate rectifier bridges), the operator shall ensure if the PFC function is on with the direct current voltage grade of the multimeter. When the compressor is running, voltage between P and N ends detected on the test module panel or main external control panel shall be over 200V and if the voltage is below that range, it is possible that the reactor is faulted or the PFC is broken. 3. When the air conditioner is switched on, if the compressor is not running but there is an alarm of "OVP or UVP error" and the power voltage detected with the multimeter is not below 150V, it's probably the voltage inspection circuit is faulted. The operator shall check and confirm the voltage inspection circuit is on which control panel first and then replace it. The regular replacement: for the external machine of single panel single chip, replace the external controller directly; and for the machine of two panels, replace the module panel.



<p>Special attention</p>	<p>For some models, OVP or UVP error signal is delivered through the connector wires between the module panel and the main external control panel, thus it is possible the voltage signal is not delivered when the communication between the module panel and the main external control panel is not good. It is possible that the error is false raised but after some minutes that the error is finally confirmed as "Main external control panel and module panel communication error", which shall be specially noted.</p>
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(19) F8-main external control panel and module panel communication error (exclusive of external machine of single panel)

<p>Explanation of error</p>	<p>Cause: Only the models with the module panels separated with the main external control panels may have this error. When the machine is running normally, the module panel and the main external control panel would coordinate with each other on the communication to work and when the communication is off, the main external control panel would raise the alarm of "main control panel and module panel communication error". Only "module panel, data line and main external control panel" are related to such communication.</p> <p>Inspection path: data line connection → module panel power → module panel → main external control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter and regular module panel.</p>
<p>Frequent problematic part</p>	<p>Module panel and main control data line, module panel and main external control panel.</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. First check if the communication connection line (mostly 4 chips) between the module panel and main control panel gets loose and if the connection is faulted. 2. Measure and check with a multimeter if the power from the main external control panel is normal and especially note that if the 5V (3.3V) power is led to the module panel. Eliminate the possibility that it's not running normally because there is no 5V (3.3V) power at the module panel. 3. The maintenance personnel shall replace the module panel of the faulted air conditioner with a regular module panel taken with him and if the communication error disappears when the external machine is switched on, it means the original module panel is faulted and if the error is still there, maybe the main external control panel shall be replaced.



(20) F9-outdoor EE error

<p>Explanation of error</p>	<p>Cause: Many parameters need to be preset for the running of the external unit of the air conditioner and such parameters are placed in a data storage 8-foot chip, which is called "EEPROM" or "EE" for short. The motor on the main external control panel can only work after reading the data stored in EE and if not read, the alarm "outdoor EE error" would be reported and raised in the internal machine. Reasons for data not being read are as follows:</p> <ol style="list-style-type: none"> 1. wrong EE chip data format; 2. EE chip is broken; 3. bad contact of EE or fault of EE reading circuit; 4. backward installation of EE chip. <p>Inspection path: main external control panel.</p>
<p>Tools required for inspection</p>	<p>None.</p>
<p>Frequent problematic part</p>	<p>Bad contact of EE, main external control panel.</p>
<p>Inspection procedure and key points</p>	<p>Replace the main external control panel directly.</p>

(21) FA-recirculated sensor error (for models with electronic expansion valve)

<p>Explanation of error</p>	<p>Cause: The recirculated sensors are only used on machine models of electronic expansion valves and the back temperature value is considered as the basis for adjustment of the electronic expansion valve and determination if the four-way valve changes the position normally during heating. When the main control panel detects open circuit or short circuit of the recirculated sensor, it would raise an alarm of "recirculated sensor error" and send it to the main internal control panel to indicate it.</p> <p>Inspection path: four-way valve → recirculated sensor → sensor wire → connectors → main external control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, pressure meter, normal 20KΩ recirculated sensor</p>
<p>Frequent problematic part</p>	<p>Four-way valve, recirculated sensor, main external control panel.</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. If the error appears in heating but not in cooling, first check if the four-way valve failed to change the position or there is a back flow, which can be estimated by measuring the high and low pressures with the pressure meter; for the consideration of electricity control, we can use a multimeter. During heating, check if the four-way valve terminal can switch a circuit of 220V, if yes and the four-way valve still is faulted in the position changing, the four-way valve is faulted; and if there is no circuit over 220V in heating, it means the main external control valve is faulted. 2. If it is not the four-way valve that is faulted, check on the resistance value and short circuit problems and the resistance value shall be within a proper range (around 20KΩ at temperature of 25°C). 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose, and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. For the recirculated sensor, if the led is on the above and the copper pipe is below, it is possible to be damped. 5. The maintenance personnel can replace the possibly faulted recirculated sensor with a normal one and if the error disappears, it means the original recirculated sensor is faulty and needs to be replaced; and if the error is still there, consider to replace the main external control panel.



(22) P2-High-voltage Switch Protection

<p>Explanation of error</p>	<p>Cause: In standby state or when the equipment is running, the high-voltage switch is disconnected three times (within 20 minutes) and reported as "high-voltage switch protection"; Inspection path: high-voltage switch cable → connector → high-voltage switch → main control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, connection line and high-voltage switch</p>
<p>Frequent problematic part</p>	<p>High-voltage switch connection line, fluorine deficiency of unit and high-voltage switch</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether the plug-in terminals are firmly connected and whether the terminals and the main control panel are welded loosely. If necessary, gently pull them to check; 2. Use a multimeter to measure whether it is disconnected; 3. Use the multimeter to check the state of the high-voltage switch and check whether it is in the OFF state (normally OFF, unusual disconnection); 4. If the pressure is normal and the high-voltage switch is kept open, it is positive that the pressure voltage is faulted; 5. If the pressure switch is normal and the connection line is tact and the failure is still reported, replace the corresponding main control panel.
<p>Special attention</p>	<p>The reason why high-voltage switches are often disconnected is the leakage of equipment. When the high voltage switch is off, first check whether the air conditioner's pressure is normal. If it is normal but the failure is still displayed after replacing the external main control panel, it is possible that the connecting pipe may be too long or the external ambient temperature is too low</p>

(23) P3-Liquid Deficiency Protection

<p>Explanation of error</p>	<p>Cause: The liquid volume of the system is less than 30%, which leads to non-refrigeration and liquid shortage protection. Inspection path: whether the valves of the outdoor unit are opened → whether the evaporator, condenser, connection pipe are damaged or cracked → whether the environmental temperature sensor and the coil temperature sensor are damaged at the same time</p>
<p>Tools required for inspection</p>	<p>Hex nut, multimeter, pressure gauge</p>
<p>Frequent problematic part</p>	<p>Stop valve, evaporator, condenser and connection pipe</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check the stop valve and turn it counterclockwise with hexagons to see if the valve is not open and the opening is not enough; 2. Check whether the evaporator, condenser and connection pipe are damaged or cracked, and focus on checking whether there is refrigerant leakage in the welding part and connection pipe joint; 3. Measure the temperature sensor with the multimeter at ambient temperature, and whether the coil temperature sensor has abnormal resistance at the same time.



(24) P4-Refrigeration Overload Protection

<p>Explanation of error</p>	<p>Cause: Outdoor coil sensor senses excessive temperature, prevents compressor from overloading, and reduces frequency. Inspection path: the system is dirty or blocked → the condenser is dirty → external coil sensor is faulted → AC fan not running → failure of divider resistance of controller</p>
<p>Tools required for inspection</p>	<p>Multimeter and pressure gauge</p>
<p>Frequent problematic part</p>	<p>Coil sensor, condenser and outdoor unit controller</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check the coil sensor with a multimeter to see if the resistance value is normal (20KΩ standard sensor, 25°C) 2. Use a pressure gauge to detect system pressure. If the system pressure is high, it may cause internal dirty blockage or poor external heat transfer, which may lead to high coil temperature. 3. Observe whether the speed of AC fan is too low, which leads to poor heat transfer and high coil temperature. 4. Use a multimeter to check whether the voltage dividing resistance of temperature sensor circuit of external controller coil is abnormal. If you don't know how to measure it, try to replace the external controller to check whether it returns to normal state.

(25) P5-Exhaust Protection

<p>Explanation of error</p>	<p>Cause: the exhaust sensor detects that the exhaust temperature is too high and triggers the exhaust protection shutdown. Inspection path: system pressure → indoor / outdoor air inlet → exhaust sensor → external panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, pressure gauge, regular 50KΩ exhaust sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Indoor coil sensor</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check if the system pressure is low, if is, usually it the shortage of liquid that leads to excessive exhaust temperature protection; 2. Check whether the indoor/outdoor air inlet is blocked, such as whether the evaporator or condenser is dirty or whether the filter is dirty or blocked and if inlet is affected, remove the shield. 3. Check whether the air volume at the tuyere is too small, observe whether the internal fan blades are dirty blocked, and if dirty blocked blades are found, clean the blades. 4. Measure the resistance drift of the exhaust sensor with a multimeter at ambient temperature.



(26) P6-Indoor High Temperature Protection

Explanation of error	Cause: Protection shutdown due to temperature of indoor coil. Inspection path: indoor air inlet → indoor unit filter → indoor fan → indoor coil sensor
Tools required for inspection	Multimeter, pressure gauge, regular 20KΩ exhaust sensor (25°C)
Frequent problematic part	<ol style="list-style-type: none"> 1. Check whether the indoor air inlet is blocked or not, if it affects the wind, remove the shield; 2. Check whether the filter is dirty or not. If dirty blockage is found in the filter, clean the filter. 3. Check if the air volume at the tuyere is too small and if the indoor unit fan is blocked, if is, clean the fan. 4. Measure the drift of the inner disk sensor with a multimeter at ambient temperature.
Inspection procedure and key points	P6 usually refers to the high temperature protection of the internal heating coil due to poor air inlet.



(27) P7-Anti-freezing Protection in Refrigeration Room

Explanation of error	Cause: Protection shutdown due to temperature of indoor coil. Inspection path: indoor air inlet → indoor unit filter → indoor fan → indoor coil sensor
Tools required for inspection	Multimeter, pressure gauge, regular 20KΩ exhaust sensor (25°C)
Frequent problematic part	Indoor coil sensor
Inspection procedure and key points	<ol style="list-style-type: none"> 1. Check whether the indoor air inlet is blocked or not, if it affects the wind, remove the shield; 2. Check whether the filter is dirty or not. If dirty blockage is found in the filter, clean the filter. 3. Check if the air volume at the tuyere is too small and if the indoor unit fan is blocked, if is, clean the fan. 4. Measure the drift of the inner disk sensor with a multimeter at ambient temperature.
Special attention	P7 usually refers to the anti-freezing protection of the refrigeration room due to poor air inlet.



(28) P8-Overcurrent Protection

<p>Explanation of error</p>	<p>Cause: Controller detects AC bus current exceeding the set protection value, then limits and reduces the frequency. Inspection path: system blockage → grid voltage → outdoor unit controller</p>
<p>Tools required for inspection</p>	<p>Multimeter, pressure gauge</p>
<p>Frequent problematic part</p>	<p>Grid voltage and outdoor unit controller</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Use a multimeter to detect and check if the bus voltage is too low, causing the overcurrent protection. 2. Use a pressure gauge to check whether the pressure of the system exceeds the standard. If the pressure exceeds the standard, it may lead to dirty blockage of the system. 3. Replace the outdoor unit controller and if the unit returns to normal, it is the problem of the controller.
<p>Special attention</p>	<p>Generally, such protection occurs at high load, but should not occur at low load and low temperature, and the priority of this protection is after the protection of refrigeration against overload and exhaust.</p>

(29) Function protection prompt of frequency conversion external machine

<p>Explanation of error</p>	<p>Cause: In the regular running of the air conditioner, for some nonfaulted status, it may need the compressor to shut down or limit or lower the frequency so as to protect the normal operating of the entire cooling system (eg. defrosting, slight undercooling, over pressure, overcurrent, etc.). These problems are not considered as errors and would not be reflected in the internal machine, however as to make sure the maintenance personnel is familiar with the running status of the air conditioner, three indicator lights are used on the main external control panel for reference of the maintenance personnel.</p> <p>Including: over current protection, cooling overload protection, indoor heating high temperature protection, indoor cooling freezing protection, over pressure and under pressure protection.</p>
<p>Tools required for inspection</p>	<p>Multimeter.</p>
<p>Frequent problematic part</p>	<p>Regular protection, system blockage, power supply not as usual, resistance value of sensor drifts or is used wrong.</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Defrosting: with a defrosting signal, meaning the air conditioner is under defrosting procedure and it is normal, but if there is frequent defrosting, it shall be specifically noted if heat exchange of the external unit is faulted, if the fan revolving speed is low and if the resistance value of the coil sensor is drifted or the temperature is inaccurately measured or it is damaged. 2. Over current protection: it is more possible to appear under high temperature cooling status and the over current of compressor is usually reflected by over high load of the compressor. It is normal if such protection appears under a very high temperature cooling status but not under low temperature low load status. 3. Cooling overload protection: it is more possible when the frequency conversion machine is under a high temperature cooling status. When the outdoor coil sensor senses the temperature is too high, as to prevent the compressor from overload, it would positively lower the frequency and it is normal for the protection under the high temperature cooling status. 4. Indoor high temperature heating protection: it is more possible when the frequency conversion machine is under a high temperature heating status. When the indoor coil sensor senses the temperature is too high, as to prevent the compressor from overload, it would positively lower the frequency and it is normal for the protection in a warm room. 5. Indoor cooling freezing protection: it is more possible to appear under a low temperature cooling status. When the indoor coil sensor senses the



	<p>temperature is too low, as to prevent the heat exchanger of the internal machine from frosting, it would positively lower the frequency and it is normal for the protection in a low temperature room.</p>
	<p>6. Over or under pressure protection: this protection is a pilot protection for the "over or under pressure error". When the power pressure is too high or too low but not so high or so low to reach limit for shutting down (within 165V-265V), it would limit and lower the frequency first to reduce the air conditioner's needs for the power to keep the air conditioner running. This protection is for the adaption to a unstable power environment and when there is such protection prompt, it usually means it is possible for "OVP and UVP error" and the maintenance personnel shall especially note.</p> <p>7. Cooling overload protection, indoor high temperature heating protection and indoor cooling freezing protection are also possible related to the drift of the resistance value of the sensor.</p>



(30) Troubleshooting Guide on Category-L Failures (Subdivided Failures)

Category-L failures are actually the subdivided failures of F1. For the convenience of fast troubleshooting in the after-sales service, the actual troubleshooting methods are consistent with F1.

No.	Failure Code	Failure Name	Primary Troubleshooting Parts
1	L0	DC Over/Under-voltage Failure	Outdoor unit controller / power grid
2	L1	Overcurrent Protection on Phase Current of Compressor	Outdoor unit controller / power grid / compressor / compressor wire
3	L2	Out-of Step Failure of Compressor	Outdoor unit controller / power grid / compressor / system pressure
4	L3	Phase Failure of Compressor	Outdoor unit controller / power grid / compressor / compressor wire
5	L4	Driver Module IPM Failure of Compressor	Outdoor unit controller / power grid / compressor
6	L5	PFC Overcurrent Hardware Protection	Outdoor unit controller / power grid
7	L6	PFC Overcurrent Software Protection	Outdoor unit controller / power grid
8	L7	AD Abnormal Protection in Current Detection	Outdoor unit controller
9	L8	Shunt Resistance Imbalance Failure	Outdoor unit controller
10	L9	IPM Temperature Sensor Failure	Outdoor unit controller
11	LA	Compressor Startup Failure	Outdoor unit controller / power grid / compressor / compressor wire
12	LC	AD Abnormal Protection in PFC Current Detection	Outdoor unit controller

3、 Common Parameters

(1) Display error code of indoor unit: fix speed A/C & E1, E2, E3 and E4 Errors

No.	Error Code	Error Name	Probable Trouble Location
1	E1	Internal room temperature sensor error	Internal room temperature sensor, main internal control panel
2	E2	External coil sensor error	External coil sensor error, main external control panel
3	E3	Internal coil sensor error	Internal coil sensor error, main internal control panel
4	E4	Indoor fan error	Mechanical jam of internal fan blade, internal fan, main internal control panel
5	E5(5E)	Indoor and outdoor unit communication error	Bridge cable, main internal control panel, main external control panel, module panel
6	F0	Outdoor DC fan error	Mechanical jam of external fan, external DC fan, main external control panel
7	F1	Module protection error	Power voltage, compressor cable, reactor, module panel, main external control panel, compressor
8	F2	PFC protection error	Power voltage, reactor, module panel, main external control panel
9	F3	Compressor out-of-step error	System pressure, compressor cable, module panel, main external control panel, compressor
10	F4	Exhaust air sensor error	Exhaust air sensor, main external control panel
11	F5	Compressor cap sensor error	System pressure, compressor cap sensor (protection switch), main external control panel
12	F6	External room temperature sensor error	External room temperature sensor, main external control panel
13	F7	OVP or UVP error	Power voltage, reactor, module panel, main external control panel
14	F8	Main external control panel and module panel communication error	Connection wire of module and main control data, module panel, main external control panel
15	F9	Outdoor EE error	Main external control panel
16	FA	Recirculated sensor error	Recirculated sensor, four-way valve, main external control panel

(2) Display error code of outdoor unit's indicator lights:

Display by the 3 LED indicator lights on the control panel of the outdoor unit:

○ for off; ● for on; ★ for flashing.

No.	LED1	LED2	LED3	Error Name	Probable Trouble Location
1	○	○	○	Normal (outdoor unit standby)	Normal, all three lights off for standby status.
2	★	★	★	Normal (compressor running)	Normal, all three lights flash while compressor running.
3	●	●	●	Forced service (test mode)	Normal
4	★	★	●	Module protection error	Power voltage, compressor cable, reactor, module panel, main external control panel, compressor.
5	★	★	○	PFC protection error	Power voltage, reactor, module panel, main external control panel.
6	★	●	★	Compressor out-of-step error	Power voltage, compressor cable, module panel, main external control panel, compressor.
7	★	○	★	Exhaust air sensor error	System pressure, exhaust air sensor, main external control panel.
8	●	★	★	External coil sensor error	External coil sensor, main external control panel.
9	○	★	★	External room temperature sensor error	External room temperature sensor, main external control panel.
10	★	●	●	Indoor and outdoor unit communication error	Connection wire, main internal control panel, main external control panel, EE reverse connection, module panel.
11	★	●	○	Main external control panel and module panel communication error	Connection wire of module and main control data, module panel, main external control panel
12	★	○	●	Outdoor EE error	Main external control panel

13	★	○	○	Outdoor DC fan error	Mechanical jam of external fan, external DC fan, main external control panel.
14	●	★	●	Internal room temperature sensor error	Internal room temperature sensor, main internal control panel.
15	●	★	○	Internal coil sensor error	Internal coil sensor, main internal control panel.
16	○	★	●	Indoor fan error	Mechanical jam of fan, internal fan, main internal control panel.
17	○	★	○	Refer to tooling display for other errors	Entire set of external controller.
18	●	●	★	Compressor cap sensor error	System pressure, compressor cap sensor (protection switch), main external control panel.
19	●	○	★	Recirculated sensor error	Recirculated sensor, four-way valve switch error, main external control panel.
20	○	●	★	※ Compressor overpower protection	Power voltage, module panel, main external control panel.
21	○	○	★	※ Over current protection	Power voltage, system pressure, module panel, main external control panel.
22	●	●	○	Exhaust sensor error	System pressure, exhaust sensor, main external control panel.
23	●	○	●	※ Cooling overload protection	Condenser, external fan, capillary, external coil sensor, main external control panel.
24	○	●	●	※ Indoor high temperature heating protection	Evaporator, internal fan, thin unit connection pipe, internal coil sensor, main internal control panel.
25	●	○	○	※ Indoor cooling freezing protection	Evaporator, internal fan, capillary, internal coil sensor, main internal control panel.
26	○	●	○	Compressor shell temperature protection	Same as "18 Compressor cap sensor error".
27	○	○	●	※ OVP or UPV error	Power voltage, reactor, module panel, main external control panel.

Portable A/C

1. General index

No.	Error Name	Reference Code (AUX)	Reference Code (ELECTROLUX)
1	Internal temperature sensor error	E1	AS
2	Internal coil sensor error	E3	ES
3	Lower DC motor error	E4	L3
4	Communication Failure between Display board and Main Control Panel	E8	E4
5	Water Full Alarm	P1	P1



2. Troubleshooting Guide

1) Internal temperature sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of internal temperature sensor during the inspection of main control panel in the internal machine, indicated by “internal temperature sensor error”.</p> <p>Inspection path: Sensor → Sensor wire → Connectors → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 15KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Internal temperature sensor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there’s resistance problem, short circuit or open circuit in the sensor; the resistance value shall be within a reasonable range (15KΩ under the temperature of 25°C for frequency conversion machine) 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose, and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. 5. In case no standard sensor is available at present, replace the internal temperature sensor by other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, check the main internal control panel and change if necessary.

<p>Special attention</p>	<p>Most internal temperature sensors of the frequency conversion machine have a resistance value of 15KΩ. Do not use improper sensor during repairing and maintenance, or it may lead to the wrong temperature sensing of the machine, the start error or shutdown error. You can switch the air conditioner to the “Blowing” mode, and judge the accuracy of sensor though environmental temperature displayed on the screen.</p> <p>In case a sensor with the resistance value over 15KΩ is used, the detected temperature will be much lower than the actual temperature, which may lead to the shutdown error under heating mode, or the startup error under cooling mode.</p> <p>In case a sensor with the resistance value below 15KΩ is used, the detected temperature will be much higher than the actual temperature, which may lead to the startup error under heating mode, or the shutdown error under cooling mode.</p>
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2) Internal coil sensor error

<p>Explanation of error</p>	<p>Cause: The detection of short circuit or open circuit of internal coil sensor during the inspection of main internal control panel, indicated by “internal coil sensor error”.</p> <p>Inspection path: Sensor → Sensor wire → Connectors → Main internal control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, 5KΩ or 20KΩ standard sensor (25°C)</p>
<p>Frequent problematic part</p>	<p>Internal temperature sensor, main internal control panel</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether there’s resistance problem, short circuit or open circuit in the sensor; the resistance value shall with a reasonable range (about 20KΩ for frequency conversion machine) 2. Check whether the sensor wire is broken. 3. Check whether the terminal connectors are well fixed; check whether the weld between the terminal and the main control panel is loose., and pull the terminal slightly for inspection if necessary. 4. Check whether the sensor is affected with damp. The coil sensor is quite easy to be affected with damp in case the lead of coil sensor is above the copper pipe. 5. In case no standard sensor is available at present, replace the temperature sensor of internal coil by other sensor asides, and then check whether the error still exists; if the error disappears, replace the sensor; if the error still exists, check the main internal control panel and change if necessary.
<p>Special attention</p>	<p>Most internal temperature sensors of the frequency conversion machine have a resistance value of 20KΩ.</p> <p>Do not use improper sensor during repairing and maintenance, or it may lead to the start of anti-frosting or overheat protection mode due to wrong temperature sensing of the machine.</p> <p>In case a sensor with the resistance value over 20KΩ is used, the detected temperature will be much lower than the actual temperature, which may lead to the high pressure of cold-blast protection system during the heating process, or the frequent start of anti-freezing protection during the cooling process.</p> <p>In case a sensor with the resistance value below 20KΩ is used, the detected temperature will be much higher than the actual temperature, which may lead to the frequent start of overheat protection mode during the heating or the overload protection during the cooling process.</p>

3) DC motor error

Explanation of error	<p>Cause: The internal fan of some highly energy efficient models is DC motor using a green plug through which the main internal control panel can drive the motor and sense the current rotational speed feedback. When the main internal control panel cannot receive the rotational speed feedback signal of the motor, it will indicate "DC motor error". Disappearance of the rotational speed feedback signal may be caused by:</p> <p>1 The motor is stuck and cannot work; 2 The speed feedback element inside the fan is destroyed; 3 There's something wrong with the speed feedback signal receiving circuit of the main internal control panel.</p> <p>Inspection path: Is DC motor stuck by foreign matter → motor destroyed → Motor terminal connectors → Main internal control panel</p>
Tools required for inspection	<p>Multimeter, a DC motor in normal working condition</p>
Frequent problematic part	<p>Mechanical jam of internal fan, internal DC motor, main internal control panel</p>
Inspection procedure and key points	<ol style="list-style-type: none"> 1. Check whether the fan accelerates to extremely high speed before the error occurs. If it can work for a period, the reason of mechanical jam can be excluded. 2. Plug and unplug the terminal of the DC motor again to exclude any fan error due to connector loosening, and pull the terminal slightly for inspection if necessary. 3. Replace the motor in the faulted air conditioner with other DC motor to plug in the main internal control panel (do not fix it with the fan for the time being), if the main control panel still indicates "DC motor error", then replace the main internal control panel; if the error disappears, replace the DC motor. 4. Multimeter can be used to distinguish whether it is main control panel problem or motor problem by: connect the motor with the main control panel and pay attention to the second (yellow) and fourth (black) wire from the outermost side among four lines of the terminal of the DC motor. After the air conditioner powers on in the cooling mode for a while, the voltage between the yellow and black wires should rise gradually and the motor should accelerate slowly, if the DC motor still won't rotate, then the DC motor is destroyed.

<p>Special attention</p>	<p>Five lead wires division: Count from the outermost side of the four wires of the DC motor terminal, the first blue wire is the speed feedback wire with a voltage of 0.5-5V when the fan rotates; the second yellow wire is the motor driving wire with a voltage of 2.0-7.5V when the fan rotates; the second white wire is 15V power cord with a voltage of 15V in normal condition; the fourth black wire is 0V DC earth wire which is the benchmark of all the voltage tests; the fifth (red) wire is 310V wire which is strong with a voltage of 310V in normal condition, so be careful of electric shock.</p>
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4) Communication Failure between Display board and Main Control Panel

<p>Explanation of error</p>	<p>Cause: The floor standing unit needs communication between the display board and the indoor unit panel. When such connection between each other is cut off, the display board will indicate "Communication Failure between Display board and Main Control Panel". Only the three components of "internal main control panel, connection line and the display board" are related to the communication; Inspection path: connection line → display board → internal main control panel</p>
<p>Tools required for inspection</p>	<p>Multimeter, regular internal main control panel and regular display board</p>
<p>Frequent problematic part</p>	<p>Internal main control panel, display board and connection line</p>
<p>Inspection procedure and key points</p>	<ol style="list-style-type: none"> 1. Check whether the connection line between the display board and the main control panel is loosened or damaged. If so, replace the connection line or re-connect to ensure the normal connection. 2. Replace the regular internal control panel, if it works normally after booting and does not display the failure code E8, it means the internal control panel is faulted, just replace the internal control panel; if it still displays the failure code E8, it means the display board is faulted, replace the display board; 3. If the main control panel or display is replaced separately and the current failure cannot be solved still, it is possible that the display board and the main control panel do not match each other, which shall be replaced both.
<p>Special attention</p>	<p>If it is necessary to replace the display board or the internal main control panel during maintenance, make sure the display board matches the main control panel. If it is not certain, it is suggested that they are replaced both to make sure the compatibility.</p>

5) Full Water Alarm

<p>Explanation of error</p>	<p>Cause: 1. the water storage tank is full; 2. the float switch is off unusually; 3. the main control panel is abnormal. All of the above three conditions will cause the unit to report the full alarm code. Inspection path: 1. Check the water level of the storage tank of the portable air conditioner; 2. Check whether the working state of the float switch is normal or not; 3. Replace the main control panel.</p>
<p>Tools required for inspection</p>	<p>Multimeter</p>
<p>Frequent problematic part</p>	<p>Main control panel, float switch</p>
<p>Inspection procedure and key points</p>	<p>1. Check the water storage tank of the mobile air conditioner, open the water plug, locate behind the mobile air conditioner, release the water completely, switch off and then on again to observe whether the unit is normal; 2. If the water level is normal, observe whether the float switch of the unit is in abnormal state, for example, if the float can return to the normal state, suspend in the air, and use a multimeter to detect whether the float switch is on or not in normal state. If it is disconnected, replace the float switch; 3. If it is still normal after checking steps 1 and 2, replace the main control panel.</p>
<p>Special attention</p>	<p>Usually it is the full of the storage tank that has caused the alarm and shutdown of the air conditioner, which will restore automatically when the water is exhausted.</p>

