Error code	Failure name	Failure description	Actions to be taken
F01	Outdoor ambient temp. sensor failure	When the outdoor main PCB detects a short circuit or disconnection of the ambient temp. sensor port, the unit **reports** a fault and shuts down;	1.1. Poor connect: find the connector of the ambient temp. sensor according to the wiring diagram, then check whether the sensor terminal and outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared, check according to steps as below. 1.2. Sensor fault: pull out the sensor from the outdoor main PCB, then measure the resistance value of the sensor with a multi-meter. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced according to the video. 1.3. Outdoor main PCB fault: pull the sensor out of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the control panel is cleared. If the fault is not cleared, it means that the outdoor main PCB is **damaged,** and the outdoor main PCB should be replaced according to the video. 2. Change the wiring of the sensor in PCB's ports: trade the wiring of the ambient temp. sensor and outdoor coil temp. sensor (or other sensors except the discharge temp. sensor) , and check whether the ambient temp. displayed on the controller is normal. If yes, then it can be confirmed that the sensor contact is poor. If the fault is still F01, then the outdoor main PCB may be faulty (need to replace it). If the fault becomes other sensor failure, it can be confirmed that the ambient temp. sensor is faulty (need to replace this faulty sensor). Note: after troubleshooting by this method, the sensor plug must be restored to its original position.

F02	Outdoor coil temp. sensor failure	When the outdoor main PCB detects a short circuit or disconnection of the outdoor coil temp. sensor port, the unit reports a fault and shuts down;	1.1. Poor connect: find the connector of the outdoor coil temp. sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal; if the fault is not cleared, check according to steps as below.1.2. Sensor fault: pull out the sensor from the outdoor main PCB, then measure the resistance value of the sensor by multi-meter. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced according to the video (video link);1.3. Outdoor main PCB fault: pull the sensor out of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the controller is cleared. If the fault is not cleared, it means that the outdoor main PCB is damaged, and the outdoor main PCB should be replaced according to the.2. Change the wiring of the sensor in PCB's ports: trade the wiring of the ambient temp. sensor and outdoor coil temp. sensor (or other sensors except the discharge temp. sensor), and check whether the outdoor coil temp. displayed on the controller is normal. If yes, then it can be confirmed that the sensor contact is poor. If the fault is still F02, then the outdoor main PCB may be faulty (need to replace it). If the fault becomes other sensor failure, it can be confirmed that the outdoor coil temp. sensor is faulty (need to replace this faulty sensor), Note: after troubleshooting by this method, the sensor plug must be restored to its original position;

F03	Compressor discharge temp. sensor failure	When the outdoor main PCB detects a short circuit of the discharge temp. sensor or after compressor switching on 10min, detect a broken of discharge temp. sensor, the unit reports a fault and shuts down;	1.Sensor fault: pull out the sensor from the outdoor main PCB, then measure the resistance value of the sensor by multimeter. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced according to the video. 2.Poor connect: find the connector of the discharge temp. sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the main PCB terminal; Then turn on the unit and count the 10mins running time. During the operation of the unit, check whether the display of the discharge temp. on the system diagram of the controller is normal or not. If the discharge temp. can rise normally and is higher than the water outlet temp., then the problem of the poor contact is solved. if the discharge temp. has been below 0℃ for 10 minutes, then it is necessary to check according to step 3.3. Outdoor main PCB fault: pull out the sensor from the outdoor main PCB and re-wire a spare sensor (50K), if the ambient temp. is less than 0℃ currently, please hold the spare sensor in hand until the temp. is raised to more than 30℃. Then observe whether the discharge temp. displayed on the system diagram of the controller is higher than 0℃. if so, it means that there is no problem with the outdoor main PCB. if not, it means that the outdoor main PCB is damaged and should be replaced. 4. Loosening or falling off the sensor probe: according to the video of replacing the discharge temp. sensor, disassemble the unit and check whether the discharge temp. sensor is loose from the sensor install pipe and falls off, if so, retighten it;

F04	Compressor suction temp. sensor failure	When the outdoor main PCB detects a short circuit or disconnection of the suction temp. sensor port, the unit reports a fault and shuts down;	1.1. Poor connect: find the connector of the suction temp. sensor according to the wiring diagram, then check whether the sensor terminal and PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal; if the fault is not cleared, check according to steps as below.1.2. Sensor fault: pull out the sensor from the outdoor main PCB, then measure the resistance value of the sensor by multi meter. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced according to the video (video link);1.3. outdoor main PCB fault: pull the sensor out of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the controller is cleared. If the fault is not cleared, it means that outdoor main PCB is damaged and should be replaced according to the vide.2. Change the wiring of the sensor in PCB's ports: trade the wiring of the ambient temp. sensor and suction temp. sensor (or other sensors except the discharge temp. sensor), and check whether the suction temp. displayed on the controller is normal. If so, then it can be confirmed that the sensor contact is poor. If the fault code is still display F04, then outdoor main PCB may be faulty (need to replace it). If the fault becomes other sensor failure, it can be confirmed that the suction temp. sensor is faulty (need to replace this faulty sensor), Note: after troubleshooting by this method, the sensor plug must be restored to its original position;

F05	Low pressure sensor failure	When the outdoor main PCB detects that the low-pressure sensor is disconnected, the unit reports a fault and shuts down;	1. If the unit reports the fault codes both of F05 and F06 at the same time, measure the voltage of pressure sensor port by multimeter(DC gear, in the case of normal connection between the sensor and the outdoor main PCB), and measure the voltage between GND and +5V. if the measure voltage is 0 or less than 4V, it means that the outdoor main PCB is damaged and should be replaced.2. When the unit is in standby, if the delta pressure value between low pressure and high pressure shows more than 10%, then can be checked according to steps 3.1,3.2 or 4;If there is no obvious difference between the display of low-pressure value and high pressure value, startup the unit and observe its running. If the low pressure drops to 0 bar quickly (within 90 seconds) after the compressor is started, then refer to the troubleshooting of electronic expansion valve.If only report the fault code of F05, there are two ways to troubleshoot the fault as below.3.1 Poor connect: find the connector of the low pressure sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared, check according to step 3.2.3.2. Sensor or connecting line fault: in the case of the unit is powered on but not switched on, measure the voltage of pressor sensor port by multimeter (DC gear, in the case that sensor and PCB is connected normally) ,and measure the voltage between GND and PS, if there is no PS voltage, either the sensor or the sensor connecting line is damaged. Therefore, please replace the sensor connecting line firstly. If the fault code is not cleared after the replacement, the sensor also needs to be replaced.4. outdoor main PCB problem: pull the pressure sensor out of the outdoor main PCB and re-wire a spare pressure sensor (no need to install in the pipe), observe whether the fault code on the controller is cleared or not. If the fault is not cleared, it means that the outdoor main PCB is damaged and need to be replaced.

F06	High pressure sensor failure	When the outdoor main PCB detects that the high pressure sensor is disconnected, the unit reports a fault and shuts down;	1. If the unit reports the fault codes both of F05 and F06 at the same time, measure the voltage of pressure sensor port by multimeter(DC gear, in the case of normal connection between the sensor and the outdoor main PCB), and measure the voltage between GND and +5V. if the measure voltage is 0 or less than 4V, it means that the outdoor main PCB is damaged and should be replaced.2. When the unit is in standby, if the delta pressure value between low pressure and high pressure shows more than 10%, then can be checked according to steps 3.1,3.2 or 4;If there is no obvious difference between the display of low pressure value and high pressure value, startup the unit and observe its running. If the low pressure drops to 0 bar quickly (within 90 seconds) after the compressor is started, then refer to the troubleshooting of electronic expansion valve.If only report the fault code of F06, there are two ways to troubleshoot the fault as below.3.1 Poor connect: find the connector of the high pressure sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared, check according to step 3.2.3.2. Sensor or connecting line fault: in the case of the unit is powered on but not switched on, measure the voltage of pressor sensor port by multimeter (DC gear, in the case that sensor and PCB is connected normally) ,and measure the voltage between GND and PS, if there is no PS voltage, either the sensor or the sensor connecting line is damaged. Therefore, please replace the sensor connecting line firstly. If the fault code is not cleared after the replacement, the sensor also needs to be replaced.4. outdoor main PCB problem: pull the pressure sensor out of the outdoor main PCB and re-wire a spare pressure sensor (no need to install in the pipe), observe whether the fault code on the controller are cleared or not. If the fault is not cleared, it means that the outdoor main PCB is damaged and need to be replaced.

F07	High pressure switch failure	When the unit has 3 consecutive high pressure switch protections (P05) within 30 minutes, F07 will be reported and the unit will shut down, and the unit cannot be startup unless re-power.	1. When the unit is in standby, if the delta pressure value between the low pressure and the high pressure shows more than 10% in control panel, then measure the gas pressure by pressure gauge (connect the compressor discharge side via high-pressure needle valve, if there are no high-pressure needle valve, connect to the low-pressure needle valve), if there have obvious deviation between the high-pressure sensor detection value and gauge's measurement value, the high pressure sensor need to be replaced.2. If there is no obvious difference between the value of the low pressure and high pressure, replace the high-pressure switch.Note: Replace the high-pressure switch, set the maximum water temperature that the system is allowed to run the unit. Then observe the change of high-pressure value during the operation, and observe whether there is still report F08 because of the high-pressure protection not timely, and check whether the refrigerant system and the hydro system is abnormal;
F08	Reserved		
F09	DC fan motor A failure	The unit with only one fan (Capacity ≤ 12kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will shutdown.The unit with 2 fan (Capacity ≥ 15kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will keep running but compressor frequency will be limited.	Only one fan unit:1. Confirm that the fan blade are not jammed by something.2. Power off the unit, then confirm that the fan blade can turn or not, if not, replace the fan motor.3. Power off the unit, check whether the terminal are loose or poor contact on the PCB or transfer joint, pull out the terminal out and install it back in again.4. Power on and startup the unit, measure the voltage supplied to the DC fan port via multimeter (DC voltage)4.1. Check the voltage between Vcc and GND is 15VDC or not, if the measure value is bigger than 18VDC, replace the outdoor PCD and fan motor.4.2. If the voltage of VCC is normal, wire the spare fan motor with outdoor main PCB, and standup the heat pump to check whether the motor can run normally, if normal, power off the unit and install the motor; if abnormal, replace the outdoor main PCB.Two-fan unit:1. Check base on the same 4 steps as above.2. If one of the two fan is running normally, power off the unit, and wire the two fan ports inversely (fan motor A connect fan B port, fan motor B connect fan A port), then re-power and startup the unit, observe the fan's operation. If the failed fan is still failure, replace its motor. If the otherwise normal fan is not running, replace the fan motor driver board.3. If both two fans do not run, check the voltage of VCC is normal by step 4.1, remove the two failed motor and wire the spare motor to fan A port of the fan motor driver board, power on and startup the unit, observe whether the motor can run normally; then power off again, and wire the spare motor to fan B port, re-power and startup the unit, observe whether the motor can run normally. If the spare motor does not operate on either port, replace the fan motor driver board. If the spare motor operate normally on both ports, re-install the fan motor A, and startup the unit, if the fan A does not operate, fan motor A is damaged; Then remove the fan motor A, and re-install the fan motor B, startup the unit, if the fan B

			does not operate, fan motor B is damaged, the damaged fan motor should be replaced.

F10	DC fan motor B failure	The unit with only one fan (Capacity ≤ 12kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will shutdown.The unit with 2 fan (Capacity ≥ 15kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will keep running but compressor frequency will be limited.	Only one fan unit:1. Confirm that the fan blade is not jammed by something.2. Power off the unit, then confirm that the fan blade can turn or not, if not, replace the fan motor.3. Power off the unit, check whether the terminal is loose or poor contact on the PCB or transfer joint, pull out the terminal out and install it back in again.4. Power on and startup the unit, measure the voltage supplied to the DC fan port via multimeter (DC voltage)4.1. Check the voltage between Vcc and GND is 15VDC or not, if the measure value is bigger than 18VDC, replace the outdoor PCD and fan motor.4.2. If the voltage of VCC is normal, wire the spare fan motor with outdoor main PCB, and standup the heat pump to check whether the motor can run normally, if normal, power off the unit and install the motor; if abnormal, replace the outdoor main PCB.Two-fan unit:1. Check base on the same 4 steps as above.2. If one of the two fan is running normally, power off the unit, and wire the two fan ports inversely (fan motor A connect fan B port, fan motor B connect fan A port), then re-power and startup the unit, observe the fan's operation. If the failed fan is still failure, replace its motor. If the otherwise normal fan is not running, replace the fan motor driver board.3. If both two fans do not run, check the voltage of VCC is normal by step 4.1, remove the two failed motor and wire the spare motor to fan A port of the fan motor driver board, power on and startup the unit, observe whether the motor can run normally; then power off again, and wire the spare motor to fan B port, re-power and startup the unit, observe whether the motor can run normally. If the spare motor does not operate on either port, replace the fan motor driver board. If the spare motor operate normally on both ports, re-install the fan motor A, and startup the unit, if the fan A does not operate, fan motor A is damaged; Then remove the fan motor A, and re-install the fan motor B, startup the unit, if the fan B does not operate, fan motor B is damaged, the damaged fan motor should be replaced.

F11	Low pressure failure	Low pressure protection happens three times within 30min (Unit recovers automatically in first two times and no failure displayed). Unit stops and failure can only be cleared by repowering.	1. When unit is off, read refrigerant pressure value from display (unit should stay standby >30min) for first judgement if serious leakage happens. If saturation temperature corresponding to the displayed refrigerant pressure is at same level of ambient temperature, it is fine. If it is lower than ambient temperature for more than 5℃, leakage could happen.2. For split units, check whether the refrigerant piping exceeds 15 meters, and the refrigerant has not been replenished; if so, replenish the refrigerant according to the length of the piping;3. Start the unit and observe the change of low pressure. If the low pressure is too low (i.e., the evaporating temperature is lower than the ambient temperature by more than 10 degrees), and the running time is more than 5 minutes, it can be preliminarily judged as a potential leakage. Fill about 100 to 200g to see whether the low pressure of the system is increased. If yes, proceed leakage test on the system. After finding out leakage point and fixing it, vacuum the heat pump system. Then recharge the unit with correct amount of refrigerant based on info from nameplate.

F12	High pressure failure	High pressure protection (P06) happens three times within 30min. Unit stops, and failure can only be cleared by repowering.	Note: On the display, check data records of the last three reports of high-pressure protection in the failure history. Confirm the temperature difference between the inlet and outlet water temperature and the outlet water temperature value at the time of failure happened. Then restart the unit by powering to have it run again and make the following judgments during the operation process:1.High pressure too high problem in heating mode:1.11. Insufficient water flow: Check whether the temperature difference between the inlet and outlet water temperature of the unit is between 3 and 5 degrees. If it is far more than 5 degrees (e.g., more than 8 degrees) and the system operated normally before, check the filters in the water system to see if there is any dirty blockage and clean them. If it is a newly installed system, check whether the pump is set to run at low speed, and try to run the pump at a medium or high speed to ensure that the water flow is in a normal range. Ensure that system is done with air purge properly. Check whether the water pressure of the system is far below 2.0 bar and whether there is any abnormality in the water system that leads to excessive water resistance of the system;1.2. Sensor reading deviation: Check the temperature difference between the unit's water outlet temperature and the TC temperature or TW temperature. Under normal circumstances, the water outlet temperature will be 3 to 5 degrees higher than the TC or TW. If it exceeds 5 degrees, please check whether the TC and TW sensors are not well in position, or the installation position is not suitable. TC or TW should be installed in the upper part of the tank;1.3. Heat exchanger scaling: In the process of unit operation, observe whether the temperature of the indoor coil is more than 5 degrees higher than the water outlet temperature. If so, there can be scaling in the plate exchange, cleaning will be needed to remove the scale if so;2. Cooling mode with high pressure problem: Check whether the evaporator of the outdoor unit is dirty and blocked or there is poor heat dissipation around the external unit. If so, consider adding a wind guide ring to the unit, so that the hot air can be discharged in a timely manner;3. If the above solution fails to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal. Please refer to "Electronic Expansion Valve detection".

F13	Room temp. sensor failure	When the line controller is set to room temperature control mode or the room temperature curve fine-tuning function is active, and the room temperature sensor is detected to be disconnected or shorted, the unit will report a fault and be shut down;	1.Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, first test the intermediate connecting wire whether there is a short circuit or a broken circuit. If yes, replace the intermediate connecting wire. If no, replace the room temperature sensor;
F14	Hot water temp. sensor failure	When the hot water mode is active, if a disconnected or shorted hot water temperature sensor is detected, the unit will report a fault and be shut down;	1. Check if sensor is in place. If not, put sensor back and insulate it.2.Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 3;3.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, first test the intermediate connecting wire whether there is a short circuit or a broken circuit. If yes, replace the intermediate connecting wire. If no, replace the hot water temperature sensor;

F15	TC (heating/cooling) water temp. sensor failure	When heating/cooling mode is active, if a disconnected or shorted TC sensor is detected, the unit will report a fault and be shut down;	1.Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2; 2.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, first test the intermediate connecting wire whether there is a short circuit or a broken circuit. If yes, replace the intermediate connecting wire. If no, replace the TC temperature sensor;
F16	Water outlet temp. sensor failure	When display detects that the water outlet temperature sensor is disconnected or shorted, it will report a failure, but unit will not be shut down. Unit keeps working with water inlet temperature + stop delta T as target temperature. If both the water inlet and outlet water temperature fail, it will be shut down;	Note: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit.1.Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3 ; 3. Sensor problem : 3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor.3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside unit), the status of the intermediate connection cable should also be checked;

F17	Water inlet temp. sensor failure	When display detects that the water inlet temperature sensor is disconnected or shorted, it will report a failure, but unit will not be shut down. Unit keeps working with water inlet temperature + stop delta T as target temperature. If both the water inlet and outlet water temperature fail, it will be shut down;	Note: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit.1.Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3 ; 3. Sensor problem : 3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor.3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside unit), the status of the intermediate connection cable should also be checked;

F18	Indoor coil temp. sensor failure	When cooling mode is active, if the indoor coil temperature sensor is detected to be disconnected or shorted, the unit will report a fault and be shut down. When heating mode or hot water mode is active, failure remains but unit will continue to run for heating or hot water;	Note: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit.1. Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2.Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3 ; 3. Sensor problem : 3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor.3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside unit), the status of the intermediate connection cable should also be checked;How to measure sensor resistance: refer to the video of Sensor Resistance Measurement.How to replace the sensor: refer to the video of Ambient Temp. Sensor ReplacementHow to replace the outdoor PCB: refer to the video of Outdoor PCB Replacement
F19	Water flow sensor failure	When the water flow sensor is installed on the outdoor main PCB, if there is no feedback signal is detected from the water flow sensor, it means the water flow sensor is failure, the unit will report a fault and be shut down.	1.Check whether the water flow sensor connecting cable of the outdoor unit is loose or disconnected, find out the water flow sensor terminal according to the wiring diagram, pull it out and then plug it back in again, if the failure can't be cleared, carry to step 2.2.When the P0 water pump is running, use a multimeter (DC voltage gear), test the voltage of the water flow port, whether the voltage between GND port and 12V port is 12V, and whether the voltage between GND port and PS3 port is ＞0. If the voltage is ＞0, replace the outdoor main PCB, if the voltage is =0, replace the water flow sensor;1. When the pump is running, check if the value of water flow is close to or less than the minimum allowable flow rate of the unit. If so, refer to failure code S02: water flow switch protection, to find out the reason of insufficient of water flow in the system and then solve the problem.

F20	Refrigerant leakage failure	When equipped with refrigerant leakage detection function, if refrigerant leakage is detected, after 3 times reported the P16, F20 will then be reported, at this time, the unit will be locked up and cannot be recovered until repower;	1.When unit is in Off state, check the refrigerant pressure value in standby state through operation panel(standby time should more than 30 minutes),to confirm whether there is a serious leakage of refrigerant firs. The judgment: whether the saturation temperature that corresponding to the current displayed refrigerant pressure value is the same as the ambient temperature, and if the refrigerant pressure value is lower than the ambient temperature by more than 5 ℃, then can judge that there is a leakage of refrigerant basically;2.Check whether the refrigerant system have leakage problem, use refrigerant leakage detector, check inside the compressor cabinet, check if the refrigerant detection box have leakage alarming, if so, can double check where the leakage point is, if not, carry out the check in step 3; 3. Replace the refrigerant detector(sensor), and then repower the unit, to analyse the way according to step 4;4. Observe the change of low pressure, if the low pressure is too low (i.e. the evaporating temperature is lower than the ambient temperature by more than 10 ℃), and the operation time of the unit is more than 5 minutes, it can judge there is a leakage point. Can temporarily supplemented with 100-200g refrigerant to see if the low pressure will have rebound, if so, re-vacuum the unit and re-inject the refrigerant according to the refrigerant amount on the nameplate;
F21	Three-way valve mixing temp. sensor 1 failure	When the mixing valve function is valid, if the mixing water temperature sensor 1 is detected to be disconnected or short circuit, F21 is reported, but the unit does not stop.	1.Poor contact: find the interface of the temperature sensor according to the wiring diagram , check if the sensor terminals and PCB terminals is poor contact, pull it out and then plug it back in again, if the failure is cleared, then pull longer the sensor toward the electrical box to ensure here is no tension between the sensor terminals and PCB terminals; if the failure is not cleared, then check according to step 2;2.Main PCB problem: pull the sensor out of the circuit board and plug in a temporary sensor, observe whether the failure on the operation panel is cleared or not, if the failure is not cleared, it means that the main PCB is damaged, replace the main PCB ； if the failure is cleared, first check if the intermediate connecting wire is in short circuit or in broken circuit, if there is, replace the intermediate connecting wire, if there is not, replace the room temperature sensor;

F22	Three-way valve mixing temp. sensor 2 failure	When the mixing valve function is valid, if the mixing temperature sensor 2 is detected to be disconnected or short circuit, F21 is reported, but the unit does not stop.	1.Poor contact: find the interface of the temperature sensor according to the wiring diagram , check if the sensor terminals and PCB terminals is poor contact, pull it out and then plug it back in again, if the failure is cleared, then pull longer the sensor toward the electrical box to ensure here is no tension between the sensor terminals and PCB terminals; if the failure is not cleared, then check according to step 2; 2.Main PCB problem: pull the sensor out of the circuit board and plug in a temporary sensor, observe whether the failure on the operation panel is cleared or not, if the failure is not cleared, it means that the main PCB is damaged, replace the main PCB ; if the failure is cleared, first check if the intermediate connecting wire is in short circuit or in broken circuit, if there is, replace the intermediate connecting wire, if there is not, replace the room temperature sensor;
F23	/	/	/
F24	/	/	/
F25	/	/	/
F26	/	/	/
F27	Indoor EEPROM failure	When the EEPROM data of the indoor main PCB cannot be read, F27 is reported, and the unit is shut down.	1.Replace the indoor PCB;
F28	Water pump PWM signal failure	When the P0 water pump is set to be controlled by PWM pump, if without feedback signal is detected after the water pump runs for 120 seconds, F28 is reported, and the unit is shut down.	1. Check whether the water pump PWM signal cable is loose or poor contact, when unit is in Off state, pull it out and then plug it back in again, and then repowered and run the unit, observe whether the failure is cleared after the water pump runs for 2 minutes. At the same time, within 2 minutes, use DC voltage gear of the multimeter to measure if the feedback voltage of the water pump PWM terminal on the indoor main PCB is ＞0V, if so, replace the indoor main PCB, if not, replace the PWM signal cable, if still cannot clear the failure, replace the water pump;

F29	Mixing valve 1 failure	When the mixing valve function is valid, in the heating mode, the mixing water temperature 1-set temperature is in system 1 > 4℃; or in the cooling mode, the mixing water temperature 1-set temperature in system 1 < 4℃, and the mixing valve is adjusted to 0V and keep for 10 minutes, then three-way-valve 1 failure is reported, the secondary water pump is shut down, but the heat pump will keep operating.	1.Check whether the actual TC temperature for heating is lower than the mixing water temperature in the water system diagram of the operation panel, if so, check the installation position of the mixing water temperature sensor; or check if the floor of the room is exposed to direct sunlight so resulting in a high mixing water temperature, if so, can ignore this failure, because when there is no direct sunlight exposed, after the mixing water temperature drops the failure will be cleared automatically;2.Check whether the actual TC temperature for heating is higher than the mixing water temperature in the water system diagram of the operation panel, if so, keeping checking as following: 2.1. According to the wiring diagram, use a multimeter (DC voltage gear) to measure whether the 24V power supply of the mixing valve is normal or not, if not normal, check whether the connecting cables between the mixing valve and the main PCB is loose or disconnected; 2.2. Power off and restart the unit, according to the wiring diagram, use a multimeter (DC voltage gear) to measure if the control signal of water mixing valve decrease from 5V down to 0V in the way about every 20 seconds decrease 0.5V, if so, higher the setting temperature of the mixing temperature (5℃ higher than the current mixing temperature). Then test if the mixing valve control signal increase in about every 20 seconds increase 0.5V, at the same time, observe if the mixing water temperature have tendency to increase, if not, either the mixing valve coil is abnormal, or the mixing valve is stuck. 3. Replace the valve coil. When unit is in Off state, replace the cables and coil. If there is an extension cable in the middle, can first check if the extension cable is poor contact: disconnect both ends of the extension cable, in one end of the cable connect 0V and 10V together, and connect 0V with 24V together, then use the on and off gear of multimeter to measure the other end of the cable between 0V and 10V, 0V and 24V to see whether it is conducting, if it is conducting, replace the valve coil, if it not conduct, replace the intermediate connecting cable first then repeat the operation in step 2.2;

F30	Mixing valve 2 failure	When the mixing valve function is valid, in the heating mode, the mixing water temperature 2-set temperature is in system 2 > 4℃; or in the cooling mode, the mixing water temperature 2-set temperature in system 2 < 4℃, and the mixing valve is adjusted to 0V and keep for 10 minutes, then three-way-valve 2 failure is reported, the secondary water pump is shut down, but the heat pump will keep operating.	1.Check whether the actual TC temperature for heating is lower than the mixing water temperature in the water system diagram of the operation panel, if so, check the installation position of the mixing water temperature sensor; or check if the floor of the room is exposed to direct sunlight so resulting in a high mixing water temperature, if so, can ignore this failure, because when there is no direct sunlight exposed, after the mixing water temperature drops the failure will be cleared automatically;2.Check whether the actual TC temperature for heating is higher than the mixing water temperature in the water system diagram of the operation panel, if so, keeping checking as following: 2.1. According to the wiring diagram, use a multimeter (DC voltage gear) to measure whether the 24V power supply of the mixing valve is normal or not, if not normal, check whether the connecting cables between the mixing valve and the main PCB is loose or disconnected; 2.2. Power off and restart the unit, according to the wiring diagram, use a multimeter (DC voltage gear) to measure if the control signal of water mixing valve decrease from 5V down to 0V in the way about every 20 seconds decrease 0.5V, if so, higher the setting temperature of the mixing temperature (5℃ higher than the current mixing temperature). Then test if the water mixing valve control signal increase in about every 20 seconds increase 0.5V, at the same time, observe if the mixing water temperature have tendency to increase, if not, either the mixing valve coil is abnormal, or the mixing valve is stuck. 3. Replace the valve coil. When unit is in Off state, replace the cables and coil. If there is an extension cable in the middle, can first check if the extension cable is poor contact: disconnect both ends of the extension cable, in one end of the cable connect 0V and 10V together, and connect 0V with 24V together, then use the on and off gear of multimeter to measure the other end of the cable between 0V and 10V, 0V and 24V to see whether it is conducting, if it is conducting, replace the valve coil, if it not conduct, replace the intermediate connecting cable first then repeat the operation in step 2.2;
E01	/		

E02	Outdoor main PCB and comp driver PCB communication failure	When there is no communication between the outdoor main PCB and comp driver PCB for 30s, the outdoor main PCB will report a failure, and unit will be shut down while the driver PCB will also stop working.	There is different PCB in single phase and three-phase units.1.Cut the power of unit and open the outdoor unit's electrical box.Check if the unit has separate PCB s (Main PCB and compressor driver PCB)If so whether the communication cable between the outdoor main PCB and compressor driver PCB is loose.Reinsert the communication cable and ensure that it is correctly inserted into the communication ports.2.Restart the unit and observe if there are indicator lights blinking on the compressor driver PCB.On single phase unit, use a multimeter (set to AC voltage mode) to measure the input voltage of the driver PCB between phases. Should be constant between (220-240V AC)For three-phase units, use a multimeter (set to AC voltage mode) to measure the input voltage of the driver PCB between phases. Should be constant between (380-415V AC) to verify its consistency with the power supply.If the power supply is normal for each phase, replace the compressor driver PCB.3.If the communication failure persists even after replacing the compressor driver PCB, replace the outdoor main PCB.
E03	Compressor phase current reading failure	Hardware Damage of driver PCB Compressor Phase Current Sampling Component	Replace the compressor driver PCB with a new one.
E04	Compressor phase current overload protection	When compressor is operating, if the current of the compressor is higher than the protection value of the driver, unit will report a failure and be shut shown;	1. If the compressor is not working at all after unit is ON, the problem can be caused by defective compressor driver Cyberplace the compressor driver PCB. 3.If the compressor starts but shakes unusually with speed below 60Hz while this failure occurs, compressor can be defective with a locked rotor. Replace the compressor (before doing so, if unit has separate compressor driver, replace the compressor driver PCB for check)
E05		When the driver PCB fails to activate compressor, unit will report a failure and be shut shown.	Check if the wires from the compressor driver PCB to the compressor are securely connected. If the connection is loose, fasten the cables and restart the unit. If compressor is still not functioning, unplug the wires on the compressor and measure the resistance between the different terminals of compressor (between U&V / V&W / U&W) to verify if resistance between different terminals are same or if any circuit is open:1.If resistance values between different compressor terminals are tested almost equal, try to replace the driver PCB. 2. If the compressor still cannot start or shakes unusually after startup with speed below 60Hz while E05 failure happens, compressor can be defective with a locked rotor. Replace the compressor.3. If resistance values between different compressor terminals are tested unequal or there is any open circuit, compressor is damaged. Replace the compressor.

E06	Driver PCB VDC too high/low voltage failure	When the driver PCB detects an excessively high or low rectified DC voltage, drive PCB will stop working and the unit will be shutdown.	1.Use a multimeter to check if the voltage of the power terminal (L1/L2/L3 for three-phase models) is within normal range: 160V-260V for single-phase and 340V-420V for three-phase. 2.Power off the unit and disconnect the DC fan motor from outdoor main PCB. Repower the unit to check whether the abnormal voltage detection is caused by defective fan motor. If the failure is cleared, replace the DC fan motor. If the issue persists, replace the compressor driver PCB
E07	AC current failure	If input current is over 4A when compressor is not working or input current is less than 1A when compressor is running at F4 or higher step, unit will report a failure and be shut shown.	1.Restart the unit. After compressor starts, check if the evaporating temperature is much lower than normal range (more than 10℃ below ambient) or if the discharge temperature rises obviously higher than normal range (more than 35℃ above water temperature). If yes, it may indicate refrigerant leakage. Try to charge the system with certain amount of refrigerant and observe if it works better.2.For split unit, check whether the refrigerant pipe is over 15 meters and additional refrigerant is charged. If not, charge refrigerant according to the length of piping.3.Use a multimeter to test the live wire of the power input cable of the outdoor unit and check whether the running current is less than 4A when the unit is standby. If it exceeds 4A, or if running current is less than 1A when the unit starts and runs at above 50Hz, the Main PCB can be defective. Try to replace it.R410A Series R32(6/9/12) R32(6/9/12), R290(6/8) R290(12)
E08	EEPROM failure	When the outdoor main PCB chip cannot read the parameters or there is a parameter verification error, unit will report a failure and be shut shown.	Power off and restart, if the fault still cannot be cleared after restarting, then replace the Outdoor main PCB;

S01	Cooling anti-freezing protection	In Cooling mode, if the evaporating temperature is detected less than 1℃ after the compressor runs for 3 minutes, unit will report a failure and be shut shown;	1.Check the temperature difference between the inlet and outlet water of the unit. If it exceeds 8 ℃, check and clean the filter of the water system. Try to adjust the water pump speed to high-speed operation if possible.2.Check if the outlet water temperature is 7℃ or lower. If yes, check and confirm Tc sensor is installed correctly.3.When unit is off, check the refrigerant pressure value (standby time should be more than 30 minutes) to determine if there is any refrigerant leak. Check if the saturation temperature corresponding to the current pressure value is consistent with the current ambient temperature. If it is lower than the outdoor ambient temperature by more than 5℃, there can be a refrigerant leak.4.For split unit, check whether the refrigerant pipe is over 15 meters and additional refrigerant is charged. If not, charge refrigerant according to the length of piping.5.Restart the unit and observe the changes of low-pressure value. If the corresponding refrigerant evaporating temperature falls within the range of 4-6℃, the unit will work with limited compressor speed. If the low-pressure value becomes too low (evaporating temperature below 1℃) and the running time exceeds 3 minutes, while EEV fully open in this period, there is most likely a refrigerant leak. In this case, please charge 100 to 200g of refrigerant and check if the low-pressure of the system rises. If yes, check and fix the leakage of system and then vacuum the unit and recharge the refrigerant according to the product label.6.If the above troubleshooting is not functioning, the failure can be caused by EEV. Please refer to the "electronic expansion valve troubleshooting section".

S02	Water flow switch protection	When the system pump (P0) starts to run for ≥ 20 seconds, and the water flow switch is open ≥ 10 seconds, unit will report a failure and be shut shown;	1.Check whether system is well done with air purge, whether the water pressure is above 2 bar, whether all valves are open, and whether the filter is blocked or not.2.Check whether the water pump is running correctly and the water flows in the correct direction after the unit is turned on.3.Disconnect the water flow switch from the wiring and replace the water flow switch with a jumper on control board. Then turn the unit on. If the failure still happened, replace the indoor main PCB.4.1 If the unit can run normally after replacing the water flow switch with a jumper on board, observe whether the inlet and outlet water temperature it is within a reasonable range (if the compressor running below 50Hz, the inlet and outlet water temperature it should not be more than 5 degrees; if it is above 65Hz, the inlet and outlet water temperature it should not be more than 8 degrees. Otherwise, the water flow in the system is insufficient. In order to protect the unit, check the condition of air purging, water resistance, water pressure, etc).4.2 If the inlet and outlet water temperature it is within a reasonable range, take down the water flow switch and reinstall it after cleaning. If the problem still cannot be solved, replace the water flow switch and restart the unit.
S03	Water flow switch failure	After the system pump (P0) stops running and the water flow switch is detected to be closed for 5 minutes, unit will report a failure and be shut shown;	1.Check if the water flow switch port is closed by jumper instead of cables of flow switch. If so, restore water flow switch wiring. If not, follow point 2;2. Water flow switch checking: When unit is off or stops, pull the water flow switch cable out from the indoor PCB and use a multimeter (on/off) to check the water flow switch. If it's open, replace the indoor PCB, if it's closed, check the water flow switch further (Close the water pipe valve outside the unit, take out the water flow switch and check whether the water flow switch is stuck or damaged. If it cannot be repaired, then replace it.)3. External factors: Whether there is an external water pump working in the same water system. If so, the system water pump should be adjusted to synchronize it with the external water pump. (if the external water pump is running all the time);

S04	Indoor unit communication failure	Whenever there is no communication between the operation panel and the indoor main PCB for 2 minutes, unit will report a failure and be shut shown;	1.Confirm the situation of communication failure: If there is no communication as soon as the power is on, check according to 2.3.4; if the communication is normal after the power is on, but become abnormal after the outdoor unit starts, check whether there is a G cable with the A/B communication terminal of the outdoor unit. If yes, please connect the G line of the outdoor unit to the G port at the communication port of the indoor PCB and then restart the unit. If the communication failure still exists, check whether the communication wire between the indoor and outdoor is separated from the strong power.2. Wiring problem: According to the wiring diagram, check whether the A/B port of the communication line has been reversed or has poor contact. Use a multimeter (on/off gear) to test the communication line between the operation controller and the indoor PCB when unit is off;3. Power supply problem: Check whether the power supply of the indoor PCB is normal (24VDC and the motherboard has a blinking light);4.Hardware problem: Replace with a new one;

S05	Outdoor unit communication failure	Whenever there is no communication between the operation panel and the outdoor main PCB for 2 minutes, unit will report a failure and be shut shown;	1.Confirm the situation of communication failure, if there is no communication as soon as the power is on, check according to 2.3.4; if the communication is normal after the power is on, but become abnormal after the outdoor unit is running, then confirm whether there is a G on the A/B communication terminal of the outdoor unit, if yes, please connect the G line of the outdoor unit to the G port at the communication port of the indoor main PCB, and then restart the unit, if the communication failure still exists, check whether the communication wire in the indoor and outdoor is separated from the strong power, please contact the manufacturer.2.Wiring problems: check whether the A/B port of the indoor and outdoor unit communication line has not been connected to the reverse or poor contact, use a multimeter (on and off gear), in the case of the unit power-off, short-circuit the A/B on one end and measure the connection on the other end, if the disconnection, then replace the communication line;3.Power supply problem: Check whether the power supply of the outdoor board is normal (230VAC and the main board has a blinking light;4.Disconnect the power, unplug the DC fan from the main PCB, and reapply the power to verify that the communication failure is not caused by a damaged motor.5.Hardware problem with the operation panel itself, replace with a new one;
S06	Cooling outlet water temp. too low protection	In cooling mode, if TUO < 5 degrees, unit will report a failure and be shut shown.	1.Restart operation, before displaying S06,confirm the inlet and outlet water temperature it through the system diagram on the operation panel. If it is greater than 8 degrees, check whether the pump speed is setting to high speed(if it is low, adjust it to medium or high speed), and also check whether the filters in the water system are clogged or not;2.Whether the set temperature is low (whether less than 10 degrees), during operation, observe the difference between the TC temperature and the outlet water temperature, if the outlet water temperature is more than 2 degrees lower than the TC, it is recommended that the set temperature be increased to more than 12 degrees to ensure that the outlet water temperature won't drop too low;

S07	Heating/DHW outlet water temp. too high protection	When compressor is working in heating or hot water mode, if the outlet water temperature is detected to be higher than the maximum permissible outlet water temperature of the heat pump, unit will report a failure and be shut shown., but the electrical heater can continue to work;	In hot water mode: 1. Restart the unit, when S07 happens, check the inlet and outlet water temperature and water tank TW sensor value. If the inlet water temperature of the heat pump is higher than the TW value (normally, the TW is always higher than the inlet water temperature of the heat pump), the coil of the water tank can be too small which leads to the low heat exchanging capacity and causes S07. For temporary solution, the hot water ECO mode can be turned on to see if it is possible to alleviate the heat exchange problem of the water tank. If the problem can not be solved, it is necessary to replace the coil of water tank with a larger area as recommended; Coexistence of heating and hot water modes. 1.Observe the inlet and outlet water temperature it of heat pump, if it is more than 8 degrees, please check whether the speed setting of the water pump is high speed . If it is low speed, please adjust it to medium or high speed. And at the same time, please check whether the filter in the water system is clogged; 2.Check the difference between the TC temperature and the outlet water temperature. If the temperature difference is more than 5 degrees (the outlet water temperature is higher than the TC), check whether the TC temperature sensor is installed in the middle or upper part of the buffer tank;
S08	Defrost three-time failure	When S09 (Defrost outlet water temp. too low protection) is triggered 3 times, unit will report a failure and be shut shown. This failure can not be recovered until repower;	1.If the ambient temperature is below 0℃ and the water temperature is below 10℃, when the unit starts up and runs for the first time with defrost, water outlet temp can be too low can result in this protection.2.Restart heating mode and observe the inlet and outlet water temperature it during the heating operation. If it's more than 8 ℃ and the set temperature is low (below 30 ℃), check whether the water pump speed is high speed (if it is low, please adjust to medium or high speed). Also check whether the filter is clogged in the water system. It is better to increase the set temperature to more than 32 degrees;3.Check whether the unit is with heavy frost (evaporator frost thickness greater than 8mm or ice fully covers), resulting in defrost time too long which cause the water temperature too low. In this case, manually remove the frost on the evaporator with hot water, and then check the cause of serious frost;4. If the unit is newly installed, the distribution system is floor heating and fully open, it's recommended to close 2/3 of the water pipes of the floor heating to let the heat pump raise the water temperature as soon as possible. After the water temperature goes above 30 degrees, then open some more water loops. Keep this cycle constantly to raise the water temperature of heat pump to medium temperature.

S09	Defrost outlet water temp. too low protection	During defrost, if TUO < 15 degrees, unit will report a failure and stop defrosting;	1.If the ambient temperature is below 0℃ and the water temperature is below 10℃, when the unit starts up and runs for the first time with defrost, water outlet temp can be too low can result in this protection.2.Restart heating mode and observe the inlet and outlet water temperature it during the heating operation. If it's more than 8 ℃ and the set temperature is low (below 30 ℃), check whether the water pump speed is high speed (if it is low, please adjust to medium or high speed). Also check whether the filter is clogged in the water system. It is better to increase the set temperature to more than 32 degrees;3.Check whether the unit is with heavy frost (evaporator frost thickness greater than 8mm or ice fully covers), resulting in defrost time too long which cause the water temperature too low. In this case, manually remove the frost on the evaporator with hot water, and then check the cause of serious frost;4. If the unit is newly installed, the distribution system is floor heating and fully open, it's recommended to close 2/3 of the water pipes of the floor heating to let the heat pump raise the water temperature as soon as possible. After the water temperature goes above 30 degrees, then open some more water loops. Keep this cycle constantly to raise the water temperature of heat pump to medium temperature.
S10	Water flow switch failure	When the unit has 3 consecutive S02 protection within 30 minutes, S10 will be reported.	Refer to the troubleshooting of water flow switch protection (S02).
S11	Cooling anti-freeze failure	When the unit has 3 consecutive S01 protection within 30 minutes, S11 will be reported.	Refer to the troubleshooting of cooling anti-freeze protection (S01).
S12	Floor preheating failure	During the operation of floor preheating , the running time of a certain stage exceeds the specified time, S12 will be reported and unit will exit preheating operation, while the unit can still operate in normal modes;	1. Check the recorded data of floor preheating to figure out where the anomaly is. Depending on the conditions of floor drying at site, choose if unit should run floor preheating again;2. Tc (Heating/cooling Temp. Sensor) installation position is not suitable which results in temperature reading deviation. Check whether the temperature difference between Tc (Heating/cooling Temp. Sensor) and the actual temperature is too much (over 2℃);

S13	Four-way valve failure	When the four-way valve detection function is turned on, in heating or hot water mode, after the unit is running for 10 minutes, unit will detect temperature difference between ambient temperature and outdoor coil temperature for 2 minutes. When the ambient temperature value is lower than outdoor coil temperature, the unit will be locked up with failure reported and cannot be recovered until repower;	1.When unit is off, check the value of ambient temperature and the outdoor coil temperature through the operation panel and confirm if they are of same value. If yes, follow the next steps. If not, use a hot wet towel or wet paper napkin wrapped around the ambient temperature sensor and check the change of ambient temperature through operation panel. If the ambient temperature remains without change while outdoor coil temperature changes, these two sensors can be connected oppositely. Please correct them according to the wiring diagram; 2.Wiring Problems: According to the wiring diagram, check whether the wiring of four-way valve coil is fine on PCB; 3.When the unit is running for heating and the air blowing outdoor unit is hot, four-way valve coil can be defective. Alternatively, by switching back and forth between the heating and the cooling modes (running for about 3 minutes in each mode), listen to the four-way valve if there is a sound of "Da". If not, replace the four-way valve coil. If yes, check the surface of four-way valve whether it is uneven which may result in that pin of valve does not work. If so, the four-way valve needs to be replaced.
S14	Three-way valve failure	When the three-way valve detection function is turned on, in heating or hot water mode, when Tc (Heating/cooling Temp. Sensor) or Tw (DHW Temp. Sensor) temperature value is higher than water inlet temperature for over 12℃, the unit will report a fault and be shut down;	1.Check and confirm if water connections of the heating and DHW are wrongly connected. Try to reverse the control signal lines of the three-way valve which are for heating and DHW, then observe whether the unit will operate normally;2.Check and confirm if Tc (heating/cooling temp. sensor) and Tw (DHW temp. sensor) are connected oppositely. Pull out the Tw sensor from water tank and then hold it in hand and observe whether the hot water temperature sensor value follows the change. If the change is on Tc value instead of Tw, reverse the Tc and Tw sensor connections according to the wiring diagram.3.Check if the Tc or Tw sensors has fallen off, causing the inaccurate temperature reading. If yes, install the Tc or Tw sensor correctly;
S15	/	/	/
S16	/	/	/
S17	/	/	/
S18	/	/	/
S19	/	/	/
S20	/	/	/

S21	Water flow failure	When the unit has 3 consecutive insufficient water flow protection (P23) within 30 minutes, S21 is reported and unit is shut down and cannot be startup unless re-power.	Refer to the troubleshooting of insufficient water flow protection (P23).
P01	Over current Protection	When the unit detects that the input current is higher than the value set by the Eero of the external machine, the unit will report a fault and shutdown for protection.	This protection is generally caused by excessive system load. You can power on again and observe the operation of the unit:1. If the temperature difference between the inlet and outlet water is greater than 8 degrees during operation, check whether the water pump speed is set to high speed (if it is low speed, please adjust to medium speed or high speed), and also check whether the filter in the water system is blocked;2. If it is triggered in the hot water mode, you can confirm whether the domestic water tank coil is too small (the minimum heat exchange area is 3㎡). If it is too small, it may lead to low heat exchange capacity, so heat will continue to accumulate, and eventually due to The water temperature rises too fast and the current is too large. You can temporarily turn on the hot water ECO mode to see if it can alleviate the heat exchange problem of the water tank. If the hot water ECO mode cannot solve the problem, you need to replace the coil water tank with a larger coil area (at least 3㎡);3. During operation, you can observe the difference between the inner coil temperature (TUP) and the outlet water temperature (TUO). Normally, the inner coil temperature is 1 to 2 degrees lower than the outlet water temperature. If TUP is higher than TUO, it may because the heat pump is unable to exchange heat, due to fouling of the plate changer. So the current rises and causes a fault, so as long as the plate changer is descaled and cleaned, the problem can be solved;4. When triggered in cooling mode, you can check whether the evaporator is dirty or blocked or the heat island effect is caused by the installation position, resulting in high current. You can clean the evaporator, adjust the installation location, or install an discharge duct to eliminate the heat island effect;5. The electronic control parameters are set incorrectly, resulting in false alarms of the unit. At this point you can try to upgrade the main PCB EEPROM settings.6. Check whether the input voltage is normal. If it is lower than the rated voltage by more than 10%, the overcurrent protection may be triggered. Please contact the power supplier to adjust the power supply voltage.

P02	Compressor phase current overload protection	When the driver PCB detects that the compressor phase current exceeds the compressor phase protection current value, the unit will report a fault and shutdown.	This protection is generally caused by excessive system load. You can power on again and observe the operation of the unit:1. If the temperature difference between the inlet and outlet water is greater than 8 degrees during operation, check whether the water pump speed is set to high speed (if it is low speed, please adjust to medium speed or high speed), and also check whether the filter in the water system is blocked;2. If it is triggered in the hot water mode, you can confirm whether the domestic water tank coil is too small (the minimum heat exchange area is 3㎡). If it is too small, it may lead to low heat exchange capacity, so heat will continue to accumulate, and eventually due to The water temperature rises too fast and the current is too large. You can temporarily turn on the hot water ECO mode to see if it can alleviate the heat exchange problem of the water tank. If the hot water ECO mode cannot solve the problem, you need to replace the coil water tank with a larger coil area (at least 3㎡);3. During operation, you can observe the difference between the inner coil temperature (TUP) and the outlet water temperature (TUO). Normally, the inner coil temperature is 1 to 2 degrees lower than the outlet water temperature. If TUP is higher than TUO, it may because the heat pump is unable to exchange heat, due to fouling of the plate changer. So the current rises and causes a fault, so as long as the plate changer is descaled and cleaned, the problem can be solved;4. When triggered in cooling mode, you can check whether the evaporator is dirty or blocked or the heat island effect is caused by the installation position, resulting in high current. You can clean the evaporator, adjust the installation location, or install an discharge duct to eliminate the heat island effect;5. The electronic control parameters are set incorrectly, resulting in false alarms of the unit. At this point you can try to upgrade the main PCB EEPROM settings.6. Check whether the input voltage is normal. If it is lower than the rated voltage by more than 10%, the overcurrent protection may be triggered. Please contact the power supplier to adjust the power supply voltage.

P03	IPM module protection	During compressor operation, the IPM module is detected to be over-temperature protected (the protection value is generally 95-100 degrees) or over-current protected, and the unit reports a fault and shutdown;	1. Refer to the P02 troubleshooting method2. In cooling mode, please check whether the fan is running normally (whether the speed is low, such as below 500 rpm) or only one fan is running in the dual fan system, if yes please refer to the handling of fan failure, check and replace the motor if needed. If the speed is low, contact the manufacturer for further investigation;3. In cooling mode, you can check whether the evaporator is dirty or blocked or the heat island effect is caused by the installation position, resulting in high current. You can clean the evaporator, adjust the installation location, or install an discharge duct to eliminate the heat island effect;4. Change for drive PCB
P04	/	/	/
P05	High pressure switch protection	Fault shutdown is reported when a high pressure switch port disconnection is detected for 5 seconds after the compressor has been started for 1 minute;	1. Please check error history to see if the high pressure value is higher than 42 Bar when unit report this error; if so, please check the value of high pressure sensor (please refer to High Pressure Sensor Failure section for description). If the most recent HV protection was less than 41 bar, the HV pressure sensor may be faulty, try replacing the HV switch.2. Check if there is insufficient heat dissipation on the high-pressure side (condensing side)Data recording, after confirming the temperature difference between the inlet and outlet water, shut down and repower the unit. Then the following judgments are made:-2.1. Confirm that the temperature difference between the water inlet and outlet is within 5 degrees, if it exceeds 8 degrees, please check whether the water pump is set to low speed, if yes please try to let the water pump run at medium or high speed, to ensure that the water flow is within the normal range; Also please check the filters in the water system, whether there is a dirty blockage, and then clean it;-2.2. Confirm the temperature difference between the outlet water temperature and the TC temperature or TW temperature. Normally, the outlet water temperature will be 3 to 5 degrees higher than the TC or TW, if it is more than 5 degrees, please check whether the installation position of the TC and TW sensors is installed in an inappropriate position, the TC or TW should be installed in the middle and upper part of the water tank as far as possible;-2.3. During the operation of the unit, observe whether the temperature of the inner coil is higher than the temperature of the outlet water. If the temperature of the inner coil is higher than the temperature of the outlet water by more than 3 degrees, check if there is fouling of the plate changer. As long as the plate changer is descaled and cleaned, the problem can

			be solved;there is scaling in the plate exchange, and it is necessary to clean the water side of the plate exchange to remove the scale;-2.4. If it occurs in cooling mode, please check for poor ventilation around the unit, you can compare the value between ambient temp. Sensor and real ambient temp, if the difference between the two values is more than 5 degrees, there may be poor ventilation, and you can consider adding an air guide to the unit. So that hot air can F172be vented in a timely manner;Please check if evaporator is blocked by dirt, clean the evaporator.3. If all of above solutions can not solve the problem, the EEV may be abnormal, please refer to the "Electronic Expansion Valve Investigation Part".How to Replace High pressure switch: please refer to video of high pressure switch replacement.

P06	High pressure overpressure protection	If the high pressure is higher than the system pressure protection value after the compressor has been started for 1 minute, the unit will report faulty shutdown protection;	1 Determine if there is insufficient heat dissipation on the high-pressure side (condensing side).After recording the data and confirming the temperature difference between the inlet and outlet water and the outlet water temperature at the time of the unit's protection shutdown, power down and restart the unit to allow the unit to run again, and make the following judgments during the operation process:1.1. Confirm that the temperature difference between the inlet and outlet water of the unit is within 5 degrees, if it exceeds 8 degrees, please check whether the running gear of the water pump is set to low speed, and try to let the water pump run at medium or high speed to ensure that the water flow is within the normal range; check the filters in the water system, whether there is a dirty blockage, and then clean it;1.2. Confirm the temperature difference between the outlet water temperature of the unit and the TC temperature or TW temperature, under normal circumstances, the outlet water temperature will be 3 to 5 degrees higher than the TC or TW, if it is more than 5 degrees, please check whether the installation position of the TC and TW sensors is checked off or installed in an inappropriate position, the TC or TW should be installed in the middle and upper part of the water tank as far as possible;1.3. During the operation of the unit, observe whether the temperature of the inner coil is higher than the temperature of the outlet water. If the temperature of the inner coil is higher than the temperature of the outlet water by more than 3 degrees, there is scaling in the plate exchange, and it is necessary to clean the water side of the plate exchange to remove the scale;1.4. If it occurs in cooling mode, check for poor ventilation around the unit, check the evaporator of the outdoor unit for dirt and blockage, and clean debris from the outdoor heat exchanger; Check for poor ventilation around the outside unit, compare the outdoor temperature sensor display and the measured outdoor temperature on site to see if there is a big difference, if the difference between the two is more than 5 degrees, there may be poor ventilation, and you can consider adding an air guide to the unit. Circle so that hot air can be vented in a timely manner;2. If the above troubleshooting is unable to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal, please refer to the "Electronic Expansion Valve Investigation Part".
P07	Initial power-up preheat protection	When the unit is powered on, if the ambient temperature is lower than -5 degrees, the unit will warm up for 30 minutes, report the protection, system will turn on the compressor electric heat tape, and the	There is no need to deal with it, just leave the unit to warm up for 30 minutes, but with the current version of the program, the line controller will not report a P07 fault;

		unit will not be allowed to turn on.	
P08	High discharge temperature protection	When the discharge temperature is higher than value of protection shutdown point (generally between 110 degrees and 115 degrees) during unit operation, the unit will report a malfunction shutdown;	Accessories and special tools: discharge temperature sensor, refrigerant, refrigerant leak detector, pressure gauges. electronic scale, multimeter1. Examine the factors of insufficient refrigerant:1.1. Under the standby mode which longer than 30 mins, check the refrigerant pressure value, and confirm whether there is serious leakage of refrigerant quantity initially. The judgment way is: whether the saturation temperature corresponding to the pressure value currently displayed, is the same as the ambient temperature, and if it is lower than the ambient temperature by more than 5 degrees, it can be judged that there is a leakage of refrigerant basically;1.2. For split units, check whether the refrigerant piping exceeds 15 meters and the refrigerant is not replenished; if so, replenish the refrigerant according to the length of the piping;1.3. You can try to start the machine, and observe the change of low pressure, if the low pressure is too low (i.e. the evaporating temperature is lower than the ambient temperature by more than 10 degrees), and the running time is more than 5 minutes, you can initially judge that it is suspected that the refrigerant is leaking, and you can temporarily add approx. 100-200g of refrigerant to see whether the low pressure of the system is rising or not. And whether the discharge temperature is dropping. If so, you can find the leakage point in the unit, and make up for the leakage. Re-evacuate the unit and refill the refrigerant according to the refrigerant quantity on the nameplate;2. Examine the factors of insufficient heat transfer Please check the error history, if there is no high pressure protection, the effect of poor heat exchange can be ruled out.3. Sensor problem: Pull out the sensor from the PCB, and use a multimeter to test the function of the resistance, measure the resistance of the sensor, and compare with the table of 50K temperature - resistance table, if there is a large deviation, then replace the discharge temperature sensor;4. If the above troubleshooting fails to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal, please refer to "Electronic Expansion Valve Troubleshooting Part".

P09	external coil over-temperature protection	In the cooling mode, the external coil temperature is higher than the external coil over-temperature protection value (usually around 62 degrees), then the unit reports a fault and shutdown;	1. In cooling mode, please confirm whether the fan motor is running normally (whether the speed is low, such as less than 500 rpm) or only one fan is running in the dual fan system. If yes, please refer to the solution of fan motor failure, investigate and replace the motor. If the speed is low, please contact the manufacturer for further investigation;2. In cooling mode, you can check whether the evaporator is dirty or blocked or the heat island effect is caused by the installation position, resulting in high current. You can clean the evaporator, adjust the installation location, or install an discharge duct to eliminate the heat island effect;
P10	Input voltage over-under-voltage protection (only for single-phase units)	When the unit is energized (either running or standby) and the input voltage is detected to be lower than 140V or higher than 270V, the unit will report a fault and shutdown;	1. Using a multimeter, measure whether the voltage between LN line is normal nor not, and the voltage range of the single phase unit should be in the range of 140V-270V. 2. Disconnect the power, unplug the DC fan from the PCB, and then re-power to confirm whether the voltage detection abnormality is caused by the damage of the motor. If the fault is cleared, then replace the DC fan, if the fault is not cleared, then replace the main PCB; How to measure the unit's power supply: please refer to the power supply test video
P11	Ambient temperature over range shutdown protection	Heating mode: when the ambient temperature is lower than -25 degrees, or the ambient temperature is higher than 45 degrees, the unit will report a fault and shutdown; Cooling mode: when the ambient temperature is lower than 8 degrees, or the ambient temperature is higher than 65 degrees, the unit will report a fault and shutdown;	1. Through the multimeter, test if the ambient temperature sensor resistance value corresponding to temperature resistance table, if there is a deviation, then replace the sensor2. Confirm whether the current actual ambient temperature reaches the limitation point of heat pump ambient temperature. If so, please wait for the ambient temperature reach to a normal range, and the unit will back to normal;3. Check whether the installation position of the ambient sensor is blocked by ice or exposed to direct sunlight, if so, please protect the ambient temperature sensor, to prevent icing or exposure to direct sunlight;4. Check whether there is any heat island effect (cold island effect) in the installation position of the unit, and adjust the installation position or install an discharge duct to eliminate the heat island or cold island effect;
P12	environmental frequency limiting protection (EFLP)	When the unit detects that the heat pump is not allowed to run the highest frequency at the current ambient temperature, the outdoor unit will feedback the	This error will not show in display, but if target water temperature have a big difference with real water temperature, and unit could not running in high speed, you can consider if it because the ambient temperature is too high, so frequency is limited. You can confirm the accuracy of the ambient temperature check according to the troubleshooting of P11;

		ambient frequency limit flag bit, but the unit will still run normally, and the unit will not display this error code.	
P13	Low pressure switch protection	When the unit has been up and running for 3 minutes, if a low voltage switch disconnection is detected, a fault is reported;	According to F11 low pressure checking this error, since the unit does not have low pressure switch, this protection does not normally occur. If it does, follow the wiring diagram to check whether the reserved input port has not been shorted, resulting in a false alarm;
P14	/	/	/
P15	/	/	/
P16	/	/	/
P17	/	/	/
P18	/	/	/
P19	/	/	/
P20	/	/	/
P21	/	/	/
P22	/	/	/

P23	Insufficient water flow protection	When the water flow is detected to be less than the minimum flow rate (1080L/h for 15KW), the unit will report a fault and shutdown.	1. Check if the system displays a water flow value that is near or less than the minimum allowable water flow while the pump is running, if yes please check the reasons of insufficient water flow, and find the relative solution.1.1. Check that the water system is completely emptied, if the water pressure is above 2 bar, if all valves are opened, if the filter is clogged.1.2. Check that the water pump operates normally, and water flow is in the correct direction after switching on.1.3. In running condition, wait for the compressor run for 5 minutes, if the water inlet and outlet temperature difference is in a reasonable range, then remove the water flow sensor, clean it and reinstall it, then restart the unit to exclude the possibility of foreign objects interfering with the detection of the water flow sensor. If the problem still cannot be solved, replace the water flow sensor and restart the unit.2. If the water flow display value is 0, then check whether the water flow sensor is not contact well; If it is ok, and find the terminal of water flow sensor according to the wiring diagram. Under the condition of uninterrupted the power supply, then use a multimeter (DC level), measuring the water flow sensor power supply is 24V or not. When the water pump is running, the water flow sensor feedback voltage is higher than 0. If yes, then if the supply of water flow is not 24V, if yes then replace the indoor PCB. If the water flow sensor feedback voltage is equal to 0, pull out the water flow sensor cable from the water flow sensor body, and measure whether the terminals at both ends of the connecting wire are on or not. If not, replace the cable; If yes, change the body.
E01	Communication failure between indoor and outdoor units	When the main PCB detects that there is no communication with the master unit (indoor unit) and continues for 120 seconds, the main PCB will report a failure and the compressor will also stop.	1. Check if the outdoor unit communication connection is normal. 2. Replace the communication cable for outdoor unit. (Maybe the communication cable is broken.) If communication cable is broken the indoor unit should report a S05 alarm

E02	Outdoor main PCB and comp driver PCB communication failure	When there is no communication between the outdoor main PCB and compressor driver PCB for 30s, the outdoor main PCB will report a failure and unit will be shut down while the driver PCB will also stop working.	There is different PCB in single phase and three-phase units.1.Cut the power of unit and open the outdoor unit's electrical box.Check if the unit has separate PCB s (Main PCB and compressor driver PCB)If so whether the communication cable between the outdoor main PCB and compressor driver PCB is loose.Reinsert the communication cable and ensure that it is correctly inserted into the communication ports.2.Restart the unit and observe if there are indicator lights blinking on the compressor driver PCB.On single phase unit, use a multimeter (set to AC voltage mode) to measure the input voltage of the driver PCB between phases. Should be constant between (220-240V AC)For three-phase units, use a multimeter (set to AC voltage mode) to measure the input voltage of the driver PCB between phases. Should be constant between (380-415V AC) to verify its consistency with the power supply.If the power supply is normal for each phase, replace the compressor driver PCB.3.If the communication failure persists even after replacing the compressor driver PCB, replace the outdoor main PCB.
E03	Compressor phase current reading failure	Hardware Damage of compressor driver PCB-Compressor Phase Current Sampling Component	Replace the compressor driver PCB with a new one.
E04	Compressor phase current overload protection	When compressor is operating, if the current of the compressor is higher than the protection value of the driver, unit will report a failure and be shut shown;	1. If the compressor is not working at all after unit is ON, the problem can be caused by defective compressor driver Cyberplace the compressor driver PCB. 3.If the compressor starts but shakes unusually with speed below 60Hz while this failure occurs, compressor can be defective with a locked rotor. Replace the compressor (before doing so, if unit has separate compressor driver, replace the compressor driver PCB for check)
E05	Compressor driver PCB failure	When the compressor driver PCB fails to activate compressor, unit will report a failure and stop.	Check if the wires from the compressor driver PCB to the compressor are securely connected. If the connection is loose, fasten the cables and restart the unit. If compressor is still not functioning, unplug the wires on the compressor and measure the resistance between the different terminals of compressor (between U&V / V&W / U&W) to verify if resistance between different terminals are same or if any circuit is open:1.If resistance values between different compressor terminals are tested almost equal, try to replace the driver PCB. 2. If the compressor still can not start or shakes unusually after startup with speed below 60Hz while E05 failure happens, compressor can be defective with a locked rotor. Replace the compressor.3. If resistance values between different compressor terminals are tested unequal or there is any open circuit, compressor is damaged. Replace the compressor.

E06	Compressor driver PCB VDC too high/low voltage failure	When the driver PCB detects an excessively high or low rectified DC voltage, drive PCB will stop working and the unit will stop.	Accessories and tools: drive board. DC fan motor. Multimeter 1. Use a multimeter to check if the voltage of the power terminal (L1/L2/L3 for three-phase models) is within normal range: 160V-260V for single-phase and 340V-420V for three-phase. 2. Power off the unit and disconnect the DC fan motor from outdoor main PCB. Repower the unit to check whether the abnormal voltage detection is caused by defective fan motor. If the failure is cleared, replace the DC fan motor. If the issue persists, replace the compressor driver PCB
E07	AC current failure	If input current is over 4A when compressor is not working or input current is less than 1A when compressor is running at F4 or higher step, unit will report a failure and stop.	Accessories and tools: refrigerant, Refrigerant leak detector, Pressure gauge, Vacuum pump, electronic scale, Main outdoor control board PCB, Multimeter. 1. Restart the unit. After compressor starts, check if the evaporating temperature is much lower than normal range (more than 10℃ below ambient) or if the discharge temperature rises obviously higher than normal range (more than 35℃ above water temperature). If yes, it may indicate refrigerant leakage. Try to charge the system with a certain amount of refrigerant and observe if it works better. 2. For split unit, check whether the refrigerant amount is correct. 3. Use a multimeter to test the live wire of the power input cable of the outdoor unit and check whether the running current is less than 4A when the unit is on standby. If it exceeds 4A, or if running current is less than 1A when the unit starts and runs at above 50Hz, the Main outdoor control board PCB can be defective. Try to replace it.
E08	EEPROM failure	When the outdoor main PCB chip cannot read the parameters or there is a parameter verification error, unit will report a failure and stop.	Accessories and tools: Outdoor main PCB. Multimeter Power off and restart, if the fault still cannot be cleared after restarting, then replace the Outdoor main PCB;
E10	Communication failure between fan motor driver PCB and outdoor main PCB	When the Main outdoor PCB detects that there is no communication with the fan motor driver PCB and continues for 30 seconds, the main PCB will report a failure and the unit will stop.	1. Turn off the power, open the electrical box of the outdoor unit, check whether the communication cable between the Main outdoor PCB and the Fan motor driver PCB is loose or not according to the wiring diagram. Disconnect and connect again the communication cable. At the same time, check whether the communication port is inserted in the wrong position or backwards according to the wiring diagram.2. Power on again and measure whether the input voltage of the fan motor driver PCB is consistent with the power supply. If the power supply is normal, replace the fan motor driver PCB.3. If the communication failure still exists after replacing the fan motor driver PCB, replace the main PCB.

F01	Outdoor temp. sensor failure - Ta	When the outdoor main PCB detects a short circuit or disconnection of the outdoor temp. sensor port, the unit report a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multi-meter 1.1. Poor connect: find the connector of the outdoor temp. sensor according to the wiring diagram, then check whether the sensor terminal and outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared, check according to steps as below. 1.2. Sensor fault: disconnect the temperature sensor from the outdoor main PCB, then measure the resistance value of the sensor. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced.. 1.3. Outdoor main PCB fault: disconnect the temperature sensor of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the control panel is cleared. If the fault is not cleared, it means that the outdoor main PCB is damaged and the outdoor main PCB should be replaced.
F02	Outdoor coil temp. sensor failure - Tp	When the outdoor main PCB detects a short circuit or disconnection of the outdoor coil temp. sensor - Tp, the unit reports a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multi-meter 1.1. Poor connect: find the connector of the outdoor coil temp. sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal; if the fault is not cleared,check according to steps as below. 1.2. Sensor fault: disconnect the sensor from the outdoor main PCB, then measure the resistance value of the sensor by multi-meter. If there is no resistance value or the resistance value is infinite,it means that the sensor is damaged. Therefore, the sensor should be replaced (video link); 1.3. Outdoor main PCB fault: pull the sensor out of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the controller is cleared. If the fault is not cleared, it means that the outdoor main PCB is damaged and the outdoor main PCB should be replaced according to the.

F03	Compressor discharge temp. sensor failure - Td	When the outdoor main PCB detects a short circuit of the discharge temp. sensor or after compressor switching on 10min, detect a broken of discharge temp. sensor, the unit reports a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multimeter1. Sensor fault: disconnect the sensor from the outdoor main PCB, then measure the resistance value of the sensor. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced. 2. Poor connect: find the connector of the discharge temp. sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, disconnect the sensor again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the main PCB terminal; Then turn on the unit and count the 10mins running time. During the operation of the unit, check whether the display of the discharge Tempe. on the system diagram of the controller is normal or not. If the discharge temp. can rise normally and is higher than the water outlet temp. (TUO), then the problem of the poor contact is solved. if the discharge temp. has been below 0℃ for 10 minutes, then it is necessary to check according to step 3.3. Outdoor main PCB fault: disconnect the sensor from the outdoor main PCB and re-wire a spare sensor (50K), if the outdoor temp. is less than 0℃ at this time, please hold the spare sensor in hand until the temp. is raised to more than 30℃. Then observe whether the discharge temp. displayed on the system diagram of the controller is higher than 0℃. if so, it means that there is no problem with the outdoor main PCB. if not, it means that the outdoor main PCB is damaged and should be replaced. 4. Loosening or falling off of the sensor probe: of replacing the discharge temp. sensor, disassemble the unit and check whether the discharge temp. sensor is loose from the sensor install pipe and falls off, if so, retighten it;
F04	Compressor suction temp. sensor failure - Ts	When the outdoor main PCB detects a short circuit or disconnection of the suction temp. sensor port, the unit reports a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multimeter 1.1. Poor connect: find the connector of the suction temp. sensor according to the wiring diagram, then check whether the sensor terminal and PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal; if the fault is not cleared,check according to steps as below. 1.2. Sensor fault: disconnect the sensor from the outdoor main PCB, then measure the resistance value of the sensor by multi meter. If there is no resistance value or the resistance value is infinite, it means that the sensor is damaged. Therefore, the sensor should be replaced (video link); 1.3. Outdoor main PCB fault: pull the sensor out of the outdoor main PCB and re-wire a spare sensor, then observe whether the fault on the controller is cleared. If the fault is not cleared, it means that

			outdoor main PCB is damaged and should be replaced.
F05	Low pressure sensor failure - Ps	When the outdoor main PCB detects that the low pressure sensor is disconnected or out of range, the unit reports a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multimeter1. If the unit reports the fault codes both of F05 and F06 at the same time, measure the voltage of pressure sensor port (DC gear, in the case of normal connection between the sensor and the outdoor main PCB), and measure the voltage between GND and +5V. if the measure voltage is 0 or less than 4V, it means that the outdoor main PCB is damaged and should be replaced.2. When the unit is in standby, if the delta pressure value between low pressure and high pressure shows more than 10%, then can be checked according to steps 3.1, 3.2 or 4;If there is no obvious difference between the display of low pressure value and high pressure value, startup the unit and observe its running. If the low pressure drops to 0 bar quickly (within 90 seconds) after the compressor is started, then check the refrigerant amount and if OK, refer to the troubleshooting of electronic expansion valve.If only report the fault code of F05, there are two ways to troubleshoot the fault as below.3.1 . Poor connection: find the connector of the low pressure sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, disconnect the sensor and install it back in after checking. If the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared,check according to step 3.2.3.2. Sensor or connecting line fault: in the case of the unit is powered on but not switched on, measure the voltage of pressor sensor port by multimeter (DC gear, in the case that sensor and PCB is connected normally) ,and measure the voltage between GND and PS, if there is no PS voltage, either the sensor or the sensor connecting line is damaged. Therefore, please replace the sensor connecting line firstly. If the fault code is not cleared after the replacement, the sensor also need to be replaced.4. Outdoor main PCB problem: pull the pressure sensor out of the outdoor main PCB and re-wire a spare pressure sensor (no need to install in the pipe), observe whether the fault code on the controller are cleared or not. If the fault is not cleared, it means that the outdoor main PCB is damaged and need to be replaced.

F06	High pressure sensor failure - Pd	When the outdoor main PCB detects that the high pressure sensor is disconnected, the unit reports a fault and shuts down;	Accessories and tools: temp. sensor, outdoor main PCB, Multimeter 1. If the unit reports the fault codes both of F05 and F06 at the same time, measure the voltage of pressure sensor port by multimeter(DC gear, in the case of normal connection between the sensor and the outdoor main PCB), and measure the voltage between GND and +5V. if the measure voltage is 0 or less than 4V, it means that the outdoor main PCB is damaged and should be replaced. 2. When the unit is in standby, if the delta pressure value between low pressure and high pressure shows more than 10%, then can be checked according to steps 3.1,3.2 or 4; If there is no obvious difference between the display of low pressure value and high pressure value, startup the unit and observe its running. If the low pressure drops to 0 bar quickly (within 90 seconds) after the compressor is started, then refer to the troubleshooting of electronic expansion valve. If only report the fault code of F06, there are two ways to troubleshoot the fault as below. 3.1. Poor connect: find the connector of the high pressure sensor according to the wiring diagram, then check whether the sensor terminal and the outdoor main PCB terminal have poor connect, pull the sensor out again and install it back in after checking, if the fault code is cleared, then pull the sensor lead towards the electrical box to ensure that there is no pulling influence between the sensor terminal and the PCB terminal. If the fault is not cleared,check according to step 3.2. 3.2. Sensor or connecting line fault: in the case of the unit is powered on but not switched on, measure the voltage of pressor sensor port (DC gear, in the case that sensor and PCB is connected normally) ,and measure the voltage between GND and PS, if there is no voltage on PS, either the sensor or the sensor connecting line is damaged. Therefore, please replace the sensor connecting line firstly. If the fault code is not cleared after the replacement, the sensor also need to be replaced. 4. Outdoor main PCB problem: disconnect the pressure sensor from the outdoor main PCB and re-wire a spare pressure sensor (no need to install in the pipe), observe whether the fault code on the controller clears or not. If the fault is not cleared, it means that the outdoor main PCB is damaged and need to be replaced.

F07	High pressure switch cut-out	When the unit has 3 consecutive high pressure switch protections (P05) within 30 minutes, F07 will be reported and the unit will shut down, and the unit cannot be startup unless re-power.	Accessories and tools: temp. sensor, outdoor main PCB, Multimeter1. When the unit is in standby, if the delta pressure value between the low pressure and the high pressure shows more than 10% in control panel, then measure the gas pressure by pressure gauge (connect the compressor discharge side via high-pressure service valve, if there are no high-pressure service valve, connect to the low-pressure service valve), if there have obvious deviation between the high-pressure sensor detection value and gauge's measurement value, the high pressure sensor need to be replaced.2. If there is no obvious difference between the value of the low pressure and high pressure , replace the high pressure switch.Note: Replace the high-pressure switch, set the maximum water temperature that the system is allowed to run the unit. Then observe the change of high pressure value during the operation, and observe whether there is still report F08 because of the high pressure protection not timely, and check whether the refrigerant system and the hydro system is abnormal;
F08	Low pressure side pressure switch failure	Within 30 minutes, when low-pressure switch protection is reported for three times, then during the third protection, if the indoor unit is not in the second-level antifreeze, the fault is a locked and cannot be restored unless the power is cut off. If the indoor unit is in the second-level antifreeze, without shutdown the unit, the outdoor unit will run at the gear set by the indoor unit, and a failure will be reported.	Accessories and special tools: short wires and main PCB Check if the low pressure is too low according to F11. Since the current unit does not contain a low-pressure switch, this protection generally does not appear. If it does, you can check whether the reserved switch input port is not short-circuited according to the wiring diagram, which causing false alarm;

F09	DC fan motor A failure	The unit with only one fan (Capacity ≤ 12kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will shutdown.The unit with 2 fan (Capacity ≥ 15kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will keep running but compressor frequency will be limited.	Replacement parts and tools: spare fan motor, outdoor main PCB, MultimeterOnly single fan units:1. Confirm that the fan blade is not jammed.2. Power off the unit, then confirm that the fan blade can turn freely, if not, replace the fan motor.3. Power off the unit, check whether the terminal is loose or poor contact on the PCB or transfer joint, disconnect the terminal out and install it back in again.4. Power on and startup the unit, measure the voltage supplied to the DC fan port via multimeter (DC voltage)4.1. Check the voltage between VCC and GND is 15VDC or not, if the measure value is bigger than 18VDC, replace the outdoor PCB responsible for the fan motor and the fan motor.4.2. If the voltage of VCC is normal, wire the spare fan motor with the PCB, and start the heat pump to check whether the motor can run normally, if normal, power off the unit and install the motor; if abnormal, replace the PCB.Dual-fan units:1. Check base on the same 4 steps as above.2. If one of the two fan is running normally, power off the unit, and wire the two fan ports inversely (fan motor A connect fan B port, fan motor B connect fan A port), then re-power and startup the unit, observe the fan's operation. If the failed fan is still failure, replace its motor. If the otherwise normal fan is not running, replace the PCB.3. If both two fans do not run, check the voltage of VCC is normal by step 4.1, remove the two failed motor and wire the spare motor to fan A port of the fan motor driver board, power on and startup the unit, observe whether the motor can run normally; then power off again, and wire the spare motor to fan B port, re-power and startup the unit, observe whether the motor can run normally. If the spare motor does not operate on either port, replace the PCB responsible for the Fan motor.If the spare motor operate normally on both ports, re-install the fan motor A, and startup the unit, if the fan A does not operate, fan motor A is damaged; Then remove the fan motor A, and re-install the fan motor B, startup the unit, if the fan B does not operate, fan motor B is damaged, the damaged fan motor should be replaced.

F10	DC fan motor B failure	The unit with only one fan (Capacity ≤ 12kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will shut down.The unit with 2 fan (Capacity ≥ 15kW): If the fan motor startup failed when the outdoor main PCB send fan's running command, the unit will report DC fan A failure, then the unit will keep running but compressor frequency will be limited.	Replacement parts and tools: spare fan motor, outdoor main PCB, MultimeterOnly single fan units:1. Confirm that the fan blade is not jammed.2. Power off the unit, then confirm that the fan blade can turn freely, if not, replace the fan motor.3. Power off the unit, check whether the terminal is loose or poor contact on the PCB or transfer joint, disconnect the terminal out and install it back in again.4. Power on and startup the unit, measure the voltage supplied to the DC fan port via multimeter (DC voltage)4.1. Check the voltage between VCC and GND is 15VDC or not, if the measure value is bigger than 18VDC, replace the outdoor PCB responsible for the fan motor and the fan motor.4.2. If the voltage of VCC is normal, wire the spare fan motor with the PCB, and start the heat pump to check whether the motor can run normally, if normal, power off the unit and install the motor; if abnormal, replace the PCB.Dual-fan units:1. Check base on the same 4 steps as above.2. If one of the two fan is running normally, power off the unit, and wire the two fan ports inversely (fan motor A connect fan B port, fan motor B connect fan A port), then re-power and startup the unit, observe the fan's operation. If the failed fan is still failure, replace its motor. If the otherwise normal fan is not running, replace the PCB.3. If both two fans do not run, check the voltage of VCC is normal by step 4.1, remove the two failed motor and wire the spare motor to fan A port of the fan motor driver board, power on and startup the unit, observe whether the motor can run normally; then power off again, and wire the spare motor to fan B port, re-power and startup the unit, observe whether the motor can run normally. If the spare motor does not operate on either port, replace the PCB responsible for the Fan motor.If the spare motor operate normally on both ports, re-install the fan motor A, and startup the unit, if the fan A does not operate, fan motor A is damaged; Then remove the fan motor A, and re-install the fan motor B, startup the unit, if the fan B does not operate, fan motor B is damaged, the damaged fan motor should be replaced.
F11	Low pressure failure (detected by Ps)	Low pressure protection happens three times within 30min (Unit recovers automatically in first two times and no failure displayed). Unit stops and failure can only be cleared by repowering.	Accessories and tools: refrigerant, leakage detector, pressure gauge, vacuum pump1. When unit is off, read refrigerant pressure value from display (unit standby >30min) for first judgement if serious leakage happens. If saturation temperature corresponding to the displayed refrigerant pressure is at same level of outdoor temperature, it is OK. If it is lower than outdoor temperature for more than 5℃, could be an indicator for refrigerant leakage.2. For split units, check whether the refrigerant piping exceeds specified length, and the refrigerant has not been replenished; if so, replenish the refrigerant according to the length of the piping;3. Start the unit and observe the change of low pressure. If the low pressure is too low (i.e., the evaporating temperature is lower than the outdoor temperature by more than 10 degrees), and the running time is more than 5 minutes, it can be preliminarily judged as a potential leakage. Fill about 100 to 200g to see whether the low pressure of the system is increased. If yes,

			proceed leakage test on the system. After finding leakage point and fixing it, vacuum the heat pump system. Then recharge the unit with correct amount of refrigerant based on info from nameplate.
F12	High pressure failure (detected by Pd)	If High pressure protection P06 happens three times within 30min, unit stops, and failure can only be cleared by repowering.	Accessories and tools: descaling equipment Note: On the display, check data records of the last three reports of high-pressure protection in the failure history. Confirm the temperature difference between the inlet and outlet water temperature (TUO and TUI) and the outlet water temperature (TUO) value at the time of failure happened. Then restart the unit by powering to have it run again and make the following judgments during the operation process: 1. High pressure too high problem in heating mode: 1.1. Insufficient water flow: Check whether the temperature difference between the inlet and outlet water temperature (TUO and TUI) of the unit is between 3 and 5°C. If it is far more than 5 degrees (e.g., more than 8 degrees) and the system operated normally before, check the filters in the water system to see if there is any dirty blockage and clean them. If it is a newly installed system, check whether the pump is set to run at low speed, and try to run the pump at a medium or high speed to ensure that the water flow is in a normal range. Ensure that system is done with air purge properly. Check whether the water pressure of the system is below 2.0 bar and whether there is any abnormality in the water system that leads to excessive water resistance of the system: 1.2. Sensor reading deviation: Check the temperature difference between the unit's water outlet temperature (TUO) and the TC temperature or TW temperature. Under normal circumstances, the water outlet temperature (TUO) will be 3 to 5 degrees higher than the TC or TW. If it exceeds 5 degrees, please check whether the TC and TW sensors are not well in position, or the installation position is not suitable. TC or TW should be installed in the upper part of the tank; 1.3. Plate heat exchanger scaling: In the process of unit operation, observe whether the temperature of the indoor coil (TUP) is more than 5 degrees higher than the water outlet temperature (TUO). If so, there can be scaling in the plate exchange, cleaning will be needed to remove the scale if so; 2. Cooling mode with high pressure problem: Check whether the evaporator of the outdoor unit is dirty and blocked or there is poor heat dissipation around the external unit. If so, consider adding a wind guide ring to the unit, so that the hot air can be discharged

			in a timely manner; 3. If the above solution fails to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal. Please refer to "Electronic Expansion Valve detection".
F16	Water outlet temp. sensor failure TUO	When display detects that the water outlet temperature sensor is disconnected or shorted, it will report a failure, but unit will not be shut down. Unit keeps working with water inlet temperature + stop delta T as target temperature. If both the water inlet and outlet water temperature fail, it will be shut down;	Accessories and tools: sensors. electronic control board. multimeterNote: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit.1. Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2. Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3；3. Sensor problem：3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor.3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside unit), the status of the intermediate connection cable should also be checked;

F17	Water inlet temp. sensor failure TUI	When display detects that the water inlet temperature sensor is disconnected or shorted, it will report a failure, but unit will not be shut down. Unit keeps working with water inlet temperature + stop delta T as target temperature. If both the water inlet and outlet water temperature fail, it will be shut down;	Accessories and tools: sensors. electronic control board. multimeter Note: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit. 1. Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2; 2. Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3 ; 3. Sensor problem ： 3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor. 3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside unit), the status of the intermediate connection cable should also be checked;
F18	Indoor coil temp. sensor failure	When cooling mode is active, if the indoor coil temperature sensor is detected to be disconnected or shorted, the unit will report a fault and be shut down. When heating mode or hot water mode is active, failure remains but unit will continue to run for heating or hot water;	Accessories and tools: sensors. electronic control board. multimeterNote: For split unit, indoor control board and water outlet temperature sensor are in indoor unit For Monoblock unit, indoor control board is in indoor unit and water outlet temperature sensor is in outdoor unit.1. Poor contact: Based on unit wiring diagram, find the connection of the temperature sensor. Check contact between sensor terminals and PCB terminals if it is poor. If yes, pull the sensor out and plug it back in. If the fault is cleared, pull the sensor leads toward the electrical box to ensure that there is no tension between the sensor terminals and PCB terminals. If the fault is not cleared, then check according to point 2;2. Main control board problem: Pull the sensor out from control board and reinsert a new sensor to see whether the failure on display is cleared or not. If the fault is not cleared, it means that the main control board is damaged. Please replace the main control board. If it is cleared, then check according to point 3 ; 3. Sensor problem ： 3.1. For split unit, pull sensor out from control board and use multimeter to detect resistance of sensor. If the resistance value is infinite or no resistance value, then replace the sensor.3.2. For Monoblock unit, check according to 3.1. While for unit with an intermediate connection cable (and the indoor panel is not inside the outside

			unit), the status of the intermediate connection cable should also be checked;
F19	Water flow sensor failure Not applicable for AIRA.	When the water flow sensor is installed on the outdoor main PCB, if there is no feedback signal is detected from the water flow sensor, it means the water flow sensor is failure, the unit will report a fault and be shut down.	Accessories and special tools: water flow sensor. main PCB. multimeter 1. Check whether the water flow sensor connection cable of the outdoor unit is loose or disconnected, find out the water flow sensor terminal according to the wiring diagram, pull it out and then plug it back in again, if the failure can't be cleared, carry to step 2. 2. When the P0 water pump is running, use a multimeter (DC voltage gear), test the voltage of the water flow port, whether the voltage between GND port and 12V port is 12V, and whether the voltage between GND port and PS3 port is ＞0. If the voltage is ＞0, replace the outdoor main PCB, if the voltage is =0, replace the water flow sensor; 3. When the pump is running, check if the value of water flow is close to or less than the minimum allowable flow rate of the unit. If so, refer to failure code S02: water flow switch protection, to find out the reason of insufficient of water flow in the system and then solve the problem.
F20	Refrigerant leakage failure Not applicable for AIRA.	When equipped with refrigerant leakage detection function, if refrigerant leakage is detected, after 3 times reported the P16 , F20 will then be reported, at this time, the unit will be locked up and cannot be recovered until repower;	Accessories and tools: refrigerant leakage detector. main PCB. multimeter. USB disk 1. When unit is in Off state, check the refrigerant pressure value in standby state through operation panel(standby time should more than 30 minutes),to confirm whether there is a serious leakage of refrigerant firs. The judgment: whether the saturation temperature that corresponding to the current displayed refrigerant pressure value is the same as the outdoor temperature, and if the refrigerant pressure value is lower than the outdoor temperature by more than 5 ℃, then can judge that there is a leakage of refrigerant basically; 2. Check whether the refrigerant system have leakage problem, use refrigerant leakage detector, check inside the compressor cabinet, check if the refrigerant detection box have leakage alarming, if so, can double check where the leakage point is, if not, carry out the check in step 3;

			3. Replace the refrigerant detector(sensor), and then repower the unit, to analyse the way according to step 4; 4. Observe the change of low pressure, if the low pressure is too low (i.e. the evaporating temperature is lower than the outdoor temperature by more than 10 ℃), and the operation time of the unit is more than 5 minutes, it can judge there is a leakage point. Can temporarily supplemented with 100-200g refrigerant to see if the low pressure will have rebound, if so, re-vacuum the unit and re-inject the refrigerant according to the refrigerant amount on the nameplate;
F28	Water pump PWM signal failureNot applicable for AIRA.	When the P0 water pump is set to be controlled by PWM pump, if without feedback signal is detected after the water pump runs for 120 seconds, F28 is reported and the unit is shut down.	Accessories and tools: water pump. Main PCB. multimeterCheck whether the water pump PWM signal cable is loose or poor contact, when unit is in Off state, pull it out and then plug it back in again, and then repowered and run the unit, observe whether the failure is cleared after the water pump runs for 2 minutes. At the same time, within 2 minutes, use DC voltage gear of the multimeter to measure if the feedback voltage of the water pump PWM terminal on the indoor main PCB is ＞0V, if so, replace the indoor main PCB, if not, replace the PWM signal cable, if still cannot clear the failure, replace the water pump;
N/A	Preserve	Preserve	Preserve
N/A	Preserve	Preserve	Preserve
N/A	Preserve	Preserve	Preserve
N/A	Preserve	Preserve	Preserve
N/A	Preserve	Preserve	Preserve
N/A	Preserve	Preserve	Preserve
Not displayed	Low pressure protection	Three minutes after compressor start, if the low-pressure value is less than EEPROM protection value for 20 seconds continuously, then the low pressure protection will be reported and unit will STOP. When entering defrost or within 2 minutes after defrosting, low pressure protection will be detected.	1. Check whether the outdoor temperature is too low. 2. Check the refrigerant pressure value during standby (min standby time must be 30 min), and initially confirm whether there is a serious leakage of the refrigerant amount. The judgment method is: Check whether the saturation temperature corresponding to the currently displayed pressure value is the same as the outdoor temperature. If it is more than 5 degrees lower than the outdoor temperature, it can be a sign that the refrigerant is leaking. 3. Power on the unit and observe the changes in low-pressure. If the low-pressure is too low (that is, the evaporating temperature is more than 10 degrees lower than the outdoor temperature), and the running time is more than 5 minutes, it can be sign that there is a refrigerant leakage. 100 to 200g of refrigerant can be temporarily added, and see if the system low pressure rises. If so, vacuum the unit again and refill the refrigerant according to the refrigerant amount on the nameplate; 4. If there was severe frosting or unclean defrosting before the unit failure, you can refer to the defrosting failure troubleshooting method. 5. If the above troubleshooting fails to solve the

			problem, it may be caused by an abnormality in the electronic expansion valve of the refrigerant system. Please refer to the "Troubleshooting - EEV"
P01	Over current Protection	When the unit detects that the input current is higher than the value set by the Eeprom of the outdoor unit, the unit will report a fault and shutdown for protection.	Accessories and special tools: MultimeterThis protection is generally caused by excessive system load. You can power on again and observe the operation of the unit:1. If the temperature difference between the inlet and outlet water is greater than 8 degrees during operation, check whether the water pump speed is set to high speed (if it is low speed, please adjust to medium speed or high speed), and also check whether the filter in the water system is blocked;2. If it is triggered in the sanitary hot water mode (DHW), check whether the domestic water tank coil is too small (the minimum heat exchange area is 0,125㎡ / KW nominal). If it is too small, it may lead to low heat exchange capacity, so heat will continue to accumulate, and eventually due to the water temperature rising too fast also the current rises.3. During operation, observe the difference between the condenser coil temperature (TUP) and the outlet water temperature (TUO). Normally, the condenser coil temperature (TUP) is 1 to 2 degrees lower than the outlet water temperature (TUO). If TUP is higher than TUO, it may because the heat pump is unable to exchange heat, due to fouling of the plate heat changer (condenser). So the current rises and causes a fault, so as long as the plate changer is descaled and cleaned, the problem can be solved; Clean the plate heat exchanger (condenser).4.I n cooling mode this fault can be caused by reduced air flow on the evaporator - dirty evaporator, obstacles in front or behind evaporator, faulty fan motor, broken fan blades...5. False EEPROM settings - upload new EEPROM for the outdoor unit.6. Check whether the input voltage is normal. If it is lower than the rated voltage by more than 10%, the overcurrent protection may be triggered. Fix the power supplier to adjust the power supply voltage.

P02	Compressor phase current overload protection	When the compressor driver PCB detects that the compressor phase current exceeds the compressor phase protection current value, the unit will report a fault and shutdown.	Accessories and special tools: Multimeter This protection is generally caused by excessive system load. You can power on again and observe the operation of the unit: 1. If the temperature difference between the inlet and outlet water is greater than 8 degrees during operation, check whether the water pump speed is set to high speed (if it is low speed, please adjust to medium speed or high speed), and also check whether the filter in the water system is blocked; 2. If it is triggered in the sanitary hot water mode (DHW), check whether the domestic water tank coil is too small (the minimum heat exchange area is 0,125㎡ / KW nominal). If it is too small, it may lead to low heat exchange capacity, so heat will continue to accumulate, and eventually due to the water temperature rising too fast also the current rises. 3. During operation, observe the difference between the condenser coil temperature (TUP) and the outlet water temperature (TUO). Normally, the condenser coil temperature (TUP) is 1 to 2 degrees lower than the outlet water temperature (TUO). If TUP is higher than TUO, it may because the heat pump is unable to exchange heat, due to fouling of the plate heat changer (condenser). So the current rises and causes a fault, so as long as the plate changer is descaled and cleaned, the problem can be solved; Clean the plate heat exchanger (condenser). 4. In cooling mode this fault can be caused by reduced air flow on the evaporator - dirty evaporator, obstacles in front or behind evaporator, faulty fan motor, broken fan blades... 5. False EEPROM settings - upload new EEPROM for the outdoor unit. 6. Check whether the input voltage is normal. If it is lower than the rated voltage by more than 10%, the overcurrent protection may be triggered. Fix the power supplier to adjust the power supply voltage.
P03	IPM module protection	During compressor operation, the compressor driver PCB is detected to be overheating (the protection value is generally 95-100 degrees) or over-current protected, and the unit reports a fault and shutdown;	Accessories and special tools: clamp flow meter. Multimeter1. Refer to the P02 troubleshooting method2. *In cooling mode, please check whether the fan is running normally (whether the speed is low, such as below 500 rpm) or only one fan is running in the dual fan system, if yes please refer to the handling of fan failure, check and replace the motor if needed.3. In cooling mode this fault can be caused by reduced air flow on the evaporator - dirty evaporator, obstacles in front or behind evaporator, faulty fan motor, broken fan blades...*4. Exchange for compressor driver PCB

P04	Compressor oil return protection	Running low frequency below F3 for more than 20 minutes will trigger the Oil return function which will speed up the compressor speed for a short period to make sure the oil circulates back to the compressor. When function finished, the compressor speed will be adjusted accordingly to the normal state. This is normal protection and does not require any treatment.	This is normal protection function and does not require any treatment.
P05	High pressure switch protection	Fault shutdown is reported when a high pressure switch port disconnection is detected for 5 seconds after the compressor has been started for 1 minute	Accessories and specialized tools:/1. Please check error history to see if the high pressure value is higher than 42 Bar when unit report this error; if so, please check the value of high pressure sensor (please refer to High Pressure Sensor Failure section for description). If the latest high pressure protection value was less than 41 bar, then the high pressure switch may failed, pls replace high pressure switch.2. Check if there is insufficient heat dissipation on the high-pressure side (condensing side)Data recording, after confirming the temperature difference between the inlet and outlet water, shut down and repower the unit. Then the following judgments are made:2.1. Confirm that the temperature difference between the water inlet and outlet is within 5 degrees, if it exceeds 8 degrees, please check whether the water pump is set to low speed, if yes please try to let the water pump run at medium or high speed, to ensure that the water flow is within the normal range; Also check the filters in the water system, whether there is a dirty blockage, and if needed, clean it;2.2. Confirm the temperature difference between the outlet water temperature and the TC temperature or TW temperature. Normally, the outlet water temperature will be 3 to 5 degrees higher than the TC or TW, if it is more than 5 degrees, please check whether the installation position of the TC and TW sensors is installed in an inappropriate position, the TC or TW should be installed in the middle and upper part of the water tank;2.3. During the operation of the unit, observe whether the temperature of the condenser coil (TUP) is higher than the temperature of the outlet water (TUO). If the temperature of the condenser coil (TUP) is higher than the temperature of the outlet water by more than 3 degrees, check if there is fouling of the plate heat exchanger (condenser). As long as the plate heat exchanger (condenser) is descaled and cleaned, the problem can be solved;2.4. In cooling mode this fault can be caused by reduced air flow on the evaporator - dirty evaporator, obstacles in front

			or behind evaporator, faulty fan motor, broken fan blades...3. If all of above solutions can not solve the problem, the EEV may be abnormal, please refer to the "Electronic Expansion Valve Investigation Part".
P06	High pressure overpressure protection	If the high pressure detected by the high pressure sensor Pd is higher than the system pressure protection value after the compressor has been running for 1 minute, the unit will report faulty shutdown protection;	Accessories and specialized tools:/1. Determine if there is insufficient heat dissipation on the high-pressure side (condensing side).After recording the data and confirming the temperature difference between the inlet and outlet water (TUO and TUI) and the outlet water temperature at the time of the unit's protection shutdown, power down and restart the unit to allow the unit to run again, and make the following judgments during the operation process:1.1. Confirm that the temperature difference between the inlet and outlet water (TUO and TUI) of the unit is within 5 degrees, if it exceeds 8 degrees, please check whether the water pump (P0) is set to low speed, and try to let the water pump run at medium or high speed to ensure that the water flow is within the normal range; check the filters in the water system, whether there is a dirty blockage, and if needed clean it;1.2. Confirm the temperature difference between the outlet water temperature (TUO) of the unit and the TC temperature or TW temperature, under normal circumstances, the outlet water temperature (TUO) will be 3 to 5 degrees higher than the TC or TW, if it is more than 5 degrees, please check whether the installation position of the TC and TW sensors is checked off or installed in an inappropriate position, the TC or TW should be installed in the middle and upper part of the water tank as far as possible;1.3. During the operation of the unit, observe whether the temperature of the condenser coil (TUP) is higher than the temperature of the outlet water (TUO). If the temperature of the condenser coil (TUP) is higher than the temperature of the outlet water (TUO) by more than 3 degrees, there is scaling in the plate exchange, and it is necessary to clean the water side of the plate exchange to remove the scale;1.4. If it occurs in cooling mode, check for poor ventilation around the unit, check the evaporator of the outdoor unit for dirt and blockage, and clean debris from the outdoor heat exchanger (evaporator);Check for poor

			ventilation around the outside unit, compare the outdoor temperature sensor display and the measured outdoor temperature on site to see if there is a big difference, if the difference between the two is big, check the Outdoor temperature sensor.2. If the above troubleshooting is unable to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal, please refer to the "Electronic Expansion Valve Investigation Part".
P07	Compressor oil preheat function. Initial power-up preheat protection	When the unit is powered on, if the outdoor temperature is lower than -5 degrees, the unit will warm up the compressor oil for 30 minutes before start of the compressor. System will use a electric heater (crankcase heater) on the bottom part of the compressor, to heat up the compressor oil.	This is normal protection function and does not require any treatment.

P08	High discharge temperature protectionDetected by temp. sensor Td	When the discharge temperature (Td) is higher than the value of protection shutdown point during unit operation, compressor stop.	Accessories and special tools: discharge temperature sensor (Td), refrigerant, refrigerant leak detector, pressure gauges. electronic scale, multimeter1. Examine the factors of insufficient refrigerant:1.1. Under the standby mode (in stand-by for min 30 mins), check the refrigerant pressure value, and confirm whether there is serious leakage of refrigerant quantity initially. The judgment way is: whether the saturation temperature corresponding to the pressure value currently displayed, is the same as the outdoor temperature, and if it is lower than the outdoor temperature by more than 5 degrees, it can be judged that there is a leakage of refrigerant basically;1.2. For split units, check whether the refrigerant piping exceeds the max refrigerant piping lengths or if refrigerant was not added based on the longer piping as factory prefiling; if so, add refrigerant according to the length of the piping;1.3. Start the heat pump, make sure that the evaporator is clean, and observe the change of low pressure, if the low pressure is too low (i.e. the evaporating temperature is lower than the outdoor temperature by more than 10K), and the running time is more than 5 minutes, you can initially judge that it is suspected that the refrigerant is leaking, and you can temporarily add approx. 100-200g of refrigerant to see whether the low pressure of the system is rising or not. And whether the discharge temperature is dropping. If so, there is a leakage point in the unit, repair the leakage and fill the unit with new refrigerant. Re-evacuate the unit and refill the refrigerant according to the refrigerant quantity on the nameplate;2. Examine the factors of insufficient heat transferPlease check the error history, if there is no high pressure protection, the effect of poor heat exchange can be ruled out.3. Sensor problem: Disconnect the temp. sensor (Td) from the Main outdoor PCB, and use a multimeter to measure the resistance of the Td temp. sensor, and compare it with the NTC50kOhm temp. sensor resistance table. If there is a large deviation, then replace the discharge temperature sensor;4. If the above troubleshooting fails to solve the problem, the electronic expansion valve of the refrigerant system may be abnormal, please refer to "Electronic Expansion Valve Troubleshooting Part".
P09	Evaporator coil over-temperature protection Detected by temp. sensor Tp	In the cooling mode, the evaporator coil temperature (Tp) is higher than the evaporator coil over-temperature protection value (62 degrees), then the unit reports a fault and shutdown;	Accessories and Specialized Tools: Motors 1. In cooling mode, please confirm whether the fan motor is running normally (whether the speed is low, such as less than 500 rpm) or only one fan is running in the dual fan system. If yes, please refer to the solution of fan motor failure, investigate and replace the motor. 2. In cooling mode, you can check whether the evaporator is dirty or blocked or the heat island effect is caused by the installation position, resulting in high current. You can clean the evaporator, adjust the installation location, or install an discharge duct to eliminate the heat island effect;

P10	Input voltage over-under-voltage protection (only for single-phase units)	When the unit is with power supply (either running or standby) and the input voltage is detected to be lower than 140V or higher than 270V, the unit will report a fault and shutdown;	Accessories and special tools: main PCB, fan motor, multimeter 1.1. Using a multimeter, measure whether the voltage between L and N line is normal nor not, and the voltage range of the single phase unit should be in the range of 140V-270V. 2. Disconnect the power, unplug the DC fan from the PCB, and then re-power to confirm whether the voltage detection abnormality is caused by the damage of the motor. If the fault is cleared, then replace the DC fan, if the fault is not cleared, then replace the main PCB;
P11	Outdoor temperature out of range shutdown protection.Detected by temp. sensor Ta	Heating mode: when the outdoor temperature is lower than -25°C, or the outdoor temperature is higher than 45°C, the unit will stop the compressor; Cooling mode: when the outdoor temperature is lower than 8 degrees, or the outdoor temperature is higher than 65 degrees, the unit will report a fault and shutdown;	If the temperature sensor would make false reading:Accessories and special tools: outdoor temperature sensor, multimeter1. Through the multimeter, test if the outdoor temperature sensor resistance value corresponding to temperature resistance table, if there is a deviation, then replace the sensor2. Confirm whether the current actual outdoor temperature reaches the limitation point of heat pump outdoor temperature. If so, please wait for the outdoor temperature reach to a normal range, and the unit will back to normal;3. Check whether the installation position of the ambient sensor is blocked by ice or exposed to direct sunlight, if so, please protect the outdoor temperature sensor, to prevent icing or exposure to direct sunlight;4. Check whether there is any heat island effect (cold island effect) in the installation position of the unit, and adjust the installation position or install an discharge duct to eliminate the heat island or cold island effect;
P12	Outdoor temperature compressor limitation	The unit is following the envelope of the compressor running conditions. At certain outdoor temperatures the max compressor speed is automatically limited. This is a normal protection function, which is signalled form the OU to the IU controller as Info.	This error will not show in display, but if target water temperature have a big difference with real water temperature, and unit could not run in high speed, you can consider if it because the outdoor temperature is too high, so frequency is limited. You can confirm the accuracy of the outdoor temperature check according to the troubleshooting of P11;
P13	Low pressure switch protection	When the unit has been up and running for 3 minutes, if a low voltage switch disconnection is detected, a fault is reported;	Accessories and specialized tools: short cables, main PCB According to F11 low pressure checking this error, since the unit does not have low pressure switch, this protection does not normally occur. If it does, follow the wiring diagram to check whether the reserved input port has not been shorted, resulting in a false alarm;
P16	Refrigerant leaking protection Only if unit have a refrigerant detector!	NOTE: For units with propane sensor only. When refrigerant leakage is detected, this fault will be reported.	1. Verify whether antifreeze is added to the water pipes (antifreeze will cause false alarms for this protection) 2. Drain water and check whether there is oil 3. In the shutdown state, use the wired controller to check the refrigerant pressure value during standby (the standby time is greater than 30 minutes), and

			initially confirm whether there is a serious amount leakage of the refrigerant. The judgment method is: Check whether the saturation temperature corresponding to the currently displayed pressure value is the same as the outdoor temperature. If it is more than 5 degrees lower than the outdoor temperature, it can basically be determined that the refrigerant is leaking. 4. It is found out that the refrigerant is leaking from the plate heat exchanger. It is recommended to replace the unit (there may be water in the refrigerant circuit)