INFINITY 3D INVERTER SERIES

2018 SERVICE MANUAL



R32

Table of Contents

Page

1. Safety Precautions 1

1. Precautions
2. Information servicing

2. Specifications 7

1. Model Reference
2. Electrical Wiring Diagrams

3. Product Features 12

1. Operation Modes and Functions

4. Maintenance and Disassembly 19

1. Maintenance
2. Disassembly
3. Refrigerant Cycle Diagram

5. Troubleshooting 49

1. Safety Caution
2. General Troubleshooting
3. Error Diagnosis and Troubleshooting Without Error Code
4. Quick Maintenance by Error Code
5. Troubleshooting by Error Code

Appendix 75

i) Temperature Sensor Resistance Value Table for T1,T2,T3 and T4 (°C – K)

ii) Temperature Sensor Resistance Value Table for TP (°C – K)

iii) Pressure On Service Port



Caution: Risk of fire/flammable material

Safety Precautions

Contents

1. Precautions.....2
2. Information servicing.....3

1. Precautions

To prevent personal injury, or property or unit damage, adhere to all precautionary measures and instructions outlined in this manual. Before servicing a unit, refer to this service manual and its relevant sections.

Failure to adhere to all precautionary measures listed in this section may result in personal injury, damage to the unit or to property, or in extreme cases, death.

WARNING indicates a potentially hazardous situation which if not avoided could result in serious personal injury, or death.

CAUTION indicates a potentially hazardous situation which if not avoided could result in minor or moderate personal injury, or unit damage.

1.1 In case of Accidents or Emergency

WARNING

- If a gas leak is suspected, immediately turn off the gas and ventilate the area if a gas leak is suspected before turning the unit on.
- If strange sounds or smoke is detected from the unit, turn the breaker off and disconnect the power supply cable.
- If the unit comes into contact with liquid, contact an authorized service center.
- If liquid from the batteries makes contact with skin or clothing, immediately rinse or wash the area well with clean water.
- Do not insert hands or other objects into the air inlet or outlet while the unit is plugged in.
- Do not operate the unit with wet hands.
- Do not use a remote controller that has previously been exposed to battery damage or battery leakage.

CAUTION

- Clean and ventilate the unit at regular intervals when operating it near a stove or near similar devices.
- Do not use the unit during severe weather conditions. If possible, remove the product from the window before such occurrences.

1.2 Pre-Installation and Installation

WARNING

- Use this unit only on a dedicated circuit.
- Damage to the installation area could cause the unit to fall, potentially resulting in personal injury, property damage, or product failure.
- Only qualified personnel should disassemble, install, remove, or repair the unit.
- Only a qualified electrician should perform electrical work. For more information, contact your dealer, seller, or an authorized Midea service center.

CAUTION

- While unpacking be careful of sharp edges around the unit as well as the edges of the fins on the condenser and evaporator.

1.3 Operation and Maintenance

WARNING

- Do not use defective or under-rated circuit breakers.
- Ensure the unit is properly grounded and that a dedicated circuit and breaker are installed.
- Do not modify or extend the power cable. Ensure the power cable is secure and not damaged during operation.
- Do not unplug the power supply plug during operation.
- Do not store or use flammable materials near the unit.
- Do not open the inlet grill of the unit during operation.
- Do not touch the electrostatic filter if the unit is equipped with one.
- Do not block the inlet or outlet of air flow to the unit.
- Do not use harsh detergents, solvents, or similar items to clean the unit. Use a soft cloth for cleaning.
- Do not touch the metal parts of the unit when removing the air filter as they are very sharp.
- Do not step on or place anything on the unit or outdoor units.
- Do not drink water drained from the unit
- Avoid direct skin contact with water drained from the unit.
- Use a firm stool or step ladder according to manufacturer procedures when cleaning or maintaining the unit.

CAUTION

- Do not install or operate the unit for an extended period of time in areas of high humidity or in an environment directly exposing it to sea wind or salt spray.
- Do not install the unit on a defective or damaged installation stand, or in an unsecure location.
- Ensure the unit is installed at a level position
- Do not install the unit where noise or air discharge created by the outdoor unit will negatively impact the environment or nearby residences.
- Do not expose skin directly to the air discharged by the unit for prolonged periods of time.
- Ensure the unit operates in areas water or other liquids.
- Ensure the drain hose is installed correctly to ensure proper water drainage.
- When lifting or transporting the unit, it is recommended that two or more people are used for this task.
- When the unit is not to be used for an extended time, disconnect the power supply or turn off the breaker.

2. Information servicing

2.1 Checks to the area

- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.
- For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

2.2 Work procedure

- Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.

2.3 Work procedure

- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
- Work in confined spaces shall be avoided.
- The area around the work space shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

2.4 Checking for presence of refrigerant

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. no sparking, adequately sealed or intrinsically safe.

2.5 Presence of fire extinguisher

- If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
- Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

2.6 No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.
- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.
- NO SMOKING signs shall be displayed.

2.7 Ventilated area

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the
- system or conducting any hot work. A degree of ventilation shall continue during the period
- that the work is carried out. The ventilation should safely disperse any released refrigerant
- and preferably expel it externally into the atmosphere.

2.8 Checks to the refrigeration equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants:
  - the charge size is in accordance with the room size within which the refrigerant containing parts are installed;
  - the ventilation machinery and outlets are operating adequately and are not obstructed;
  - if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant; marking to the equipment continues to be visible and legible.
  - markings and signs that are illegible shall be corrected;
  - refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

2.9 Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include:

- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- that there no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

2.10 Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
  - Ensure that apparatus is mounted securely.
  - Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE: The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

2.11 Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use. Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

2.12 Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

2.13 Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

2.14 Leak detection methods

- The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
  - If a leak is suspected, all naked flames shall be removed or extinguished.
  - If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

2.15 Removal and evacuation

- When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration.
- The following procedure shall be adhered to:
  - remove refrigerant;
  - purge the circuit with inert gas;
  - evacuate;
  - purge again with inert gas;
  - open the circuit by cutting or brazing.

- The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be flushed with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task. Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

2.16 Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed:
  - Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
  - Label the system when charging is complete (if not already).
  - Extreme care shall be taken not to overfill the refrigeration system.
  - Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

2.17 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken.

In case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

- Become familiar with the equipment and its operation.
- Isolate system electrically.
- Before attempting the procedure ensure that:
  - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  - all personal protective equipment is available and being used correctly;
  - the recovery process is supervised at all times by a competent person;
  - recovery equipment and cylinders conform to the appropriate standards.
- Pump down refrigerant system, if possible.
- If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- Make sure that cylinder is situated on the scales before recovery takes place.
- Start the recovery machine and operate in accordance with manufacturer's instructions.
- Do not overfill cylinders. (No more than 80 % volume liquid charge).
- Do not exceed the maximum working pressure of the cylinder, even temporarily.
- When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

2.18 Labelling

- Equipment shall be labelled stating that it has been de-commissioned and emptied of
- refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

2.19 Recovery

- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct numbers of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order.

- Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order.
- Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Specifications

Contents

1. Model Reference 8

2. Electrical Wiring Diagrams 9

2.1 Indoor Unit 9

2.2 Outdoor Unit 11

1. Model Reference

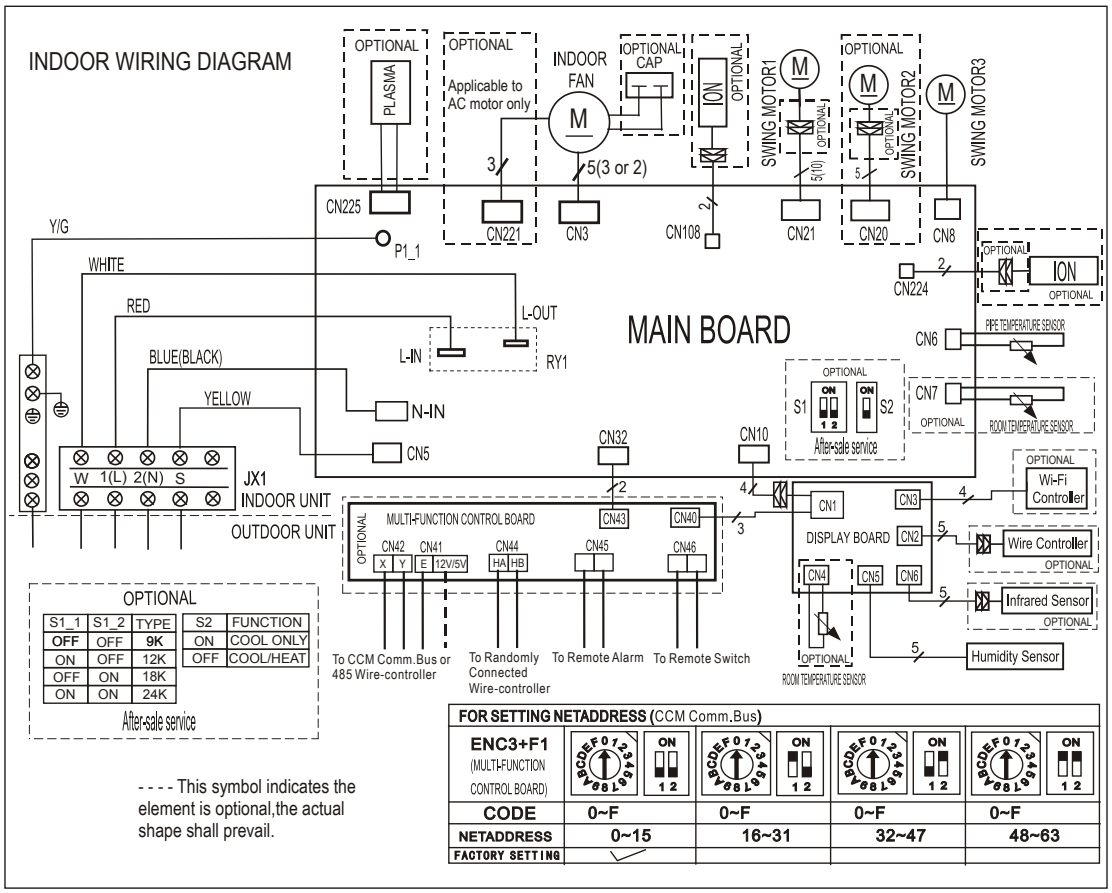
Refer to the following table to determine the specific indoor and outdoor unit model number of your purchased equipment.

Indoor Unit Model	Outdoor Unit Model	Capacity (Btu)	Power Supply
42QHP09E8S	38QHP09E8S	9k	220-240V~, 50Hz, 1Phase
42QHP12E8S	38QHP12E8S	12k	

2. Electrical Wiring Diagrams

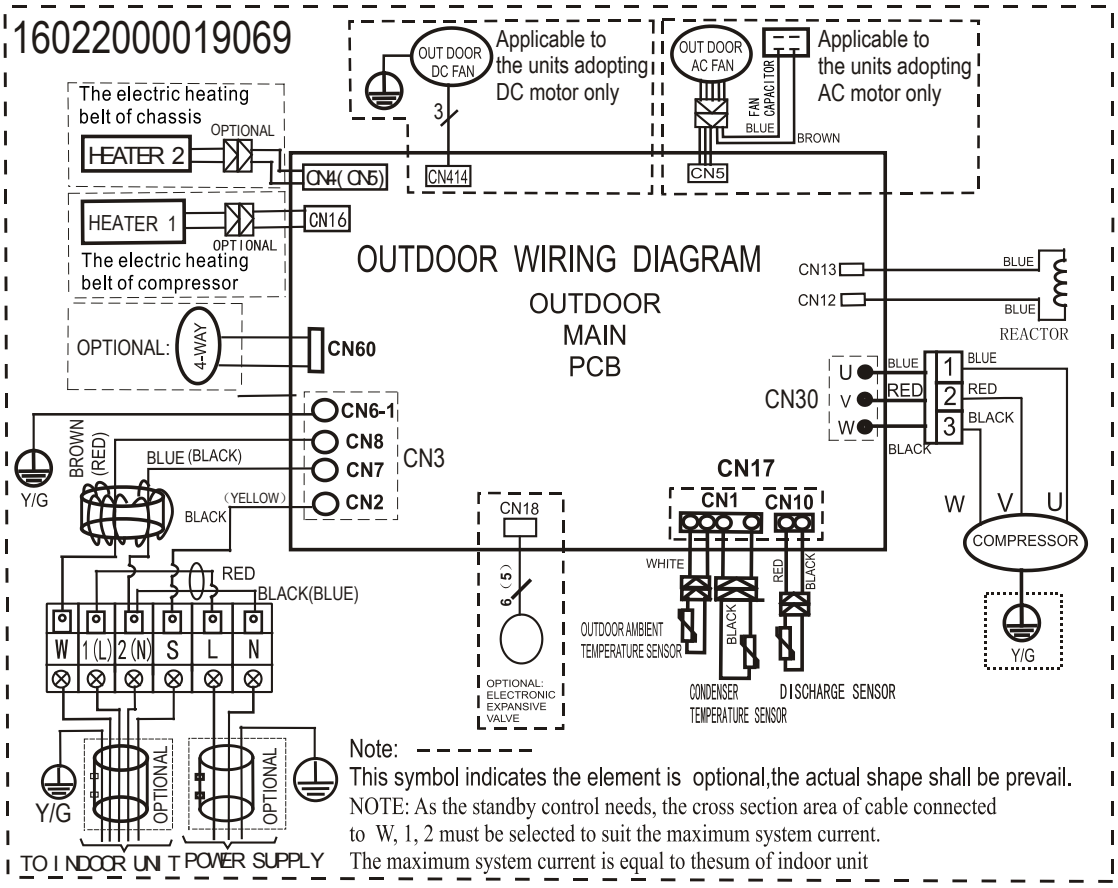
2.1 Indoor unit

Abbreviation	Paraphrase
Y/G	Yellow-Green Conductor
ION	Positive and Negative Ion Generator
CAP	Capacitor
PLASMA	Electronic Dust Collector
L	LIVE
N	NEUTRAL
Heater	The Electric Heating Belt of Indoor Unit
T1	Indoor Room Temperature
T2	Coil Temperature of Indoor Heat Exchanger



2.2 Outdoor Unit

Abbreviation	Paraphrase
4-WAY	Gas Valve Assembly/4-WAY VALVE
AC-FAN	Alternating Current FAN
DC-FAN	Direct Current FAN
CT1	AC Current Detector
COMP	Compressor
T3	Coil Temperature of Condenser
T4	Outdoor Ambient Temperature
TH	Compressor Suction Temperature
TP	Compressor Discharge Temperature
EEV	Electric Expansive Valve
L-PRO	Low Pressure Switch
H-PRO	High Pressure Switch


16022000019069
OUT DOOR DC FAN
Applicable to the units adopting DC motor only
OUT DOOR AC FAN
FAN CAPACITOR
Applicable to the units adopting AC motor only
The electric heating belt of chassis
OPTIONAL
HEATER 2
CN4(CN5)
CN414
CN5
HEATER 1
CN16
OPTIONAL
The electric heating belt of compressor
OUTDOOR WIRING DIAGRAM
OUTDOOR MAIN PCB
OPTIONAL:
4-WAY
CN60
CN13
CN12
BLUE
REACTOR
CN30
U
V
W
RED
BLACK
CN6-1
CN8
CN7
CN2
CN3
BROWN (RED)
BLUE (BLACK)
(YELLOW)
Y/G
CN17
CN1
CN10
CN18
WHITE
OUTDOOR AMBIENT TEMPERATURE SENSOR
CONDENSER TEMPERATURE SENSOR
DISCHARGE SENSOR
COMPRESSOR
W 1 (L) 2 (N) S L N
OPTIONAL
OPTIONAL: ELECTRONIC EXPANSIVE VALVE
TO INDOOR UNIT
POWER SUPPLY
Note:
This symbol indicates the element is optional,the actual shape shall be prevail.
NOTE: As the standby control needs, the cross section area of cable connected to W, 1, 2 must be selected to suit the maximum system current.
The maximum system current is equal to thesum of indoor unit

Product Features

Contents

1. Operation Modes and Functions 13

1.1 Abbreviation 13

1.2 Safety Features 13

1.3 Display Function 13

1.4 Fan Mode 14

1.5 Cooling Mode 14

1.6 Heating mode 14

1.7 Auto-mode 15

1.8 Drying Mode 15

1.9 Forced Operation Function 16

1.10 Timer Function 16

1.11 Sleep Function 16

1.12 Auto-Restart Function 16

1.13 8°C Heating 16

1.14 ECO Function 16

1.15 Self Clean(Optional) 17

1.16 Follow Me(Optional) 17

1.17 Silence （Optional) 17

1.18 Intelligent Eye (Optional) 17

1.19 Information Inquiry 17

1. Operation Modes and Functions

1.1 Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
Tsc	Adjusted setting temperature
TP	Compressor discharge temperature

1.2 Safety Features

Compressor three-minute delay at restart

Compressor functions are delayed for up to ten seconds upon the first startup of the unit, and are delayed for up to three minutes upon subsequent unit restarts.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds 108°C for nine seconds, the compressor ceases operation.

Automatic shutoff based on fan speed

If the indoor fan speed registers below 300RPM or over 1500RPM for an extended period of time, the unit ceases operation and the corresponding error code is displayed on the indoor unit.

Inverter module protection

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code is displayed on the indoor unit and the unit ceases operation.

Indoor fan delayed operation

- When the unit starts, the louver is automatically activated and the indoor fan will operate after a period of setting time or the louver is in place.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold wind function.

Compressor preheating

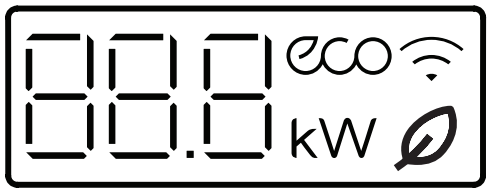
Preheating is automatically activated when T4 sensor is lower than setting temperature.

Sensor redundancy and automatic shutoff

- If one temperature sensor malfunctions, the air conditioner continues operation and displays the corresponding error code, allowing for emergency use.
- When more than one temperature sensor is malfunctioning, the air conditioner ceases operation.

1.3 Display Function

Unit display functions



Function	Display
Temperature	Set temperature value
Temperature (fan and Drying mode)	Room temperature
Activation of Timer ON, Fresh, Swing, Turbo, or Silent	On (3s)
Cancellation of Timer OFF, Fresh, Swing, Turbo, or Silent	OF (3s)
Defrost	dF
Warming in heating mode	cF
Self-clean (available on select units only)	SC
Heating in room temperature under 8°C or 12°C	FP
Fresh(available on select units only)	
ECO function (available on select units only)	eco
WiFi control (available on select units only)	
The current operation power(available on select units only)	kW

1.4 Fan Mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and indoor room temperature is displayed.
- The indoor fan speed can be set to 1%~100%, or auto.
- The louver operations are identical to those in cooling mode.
- Auto fan: In fan-only mode, AC operates the same as auto fan in cooling mode with the temperature set at 24°C.(Tsc =24°C)

1.5 Cooling Mode

1.5.1 Compressor Control

Reach the configured temperature:

1) When the compressor runs continuously for less than 120 minutes.

- If the following conditions are satisfied, the compressor ceases operation.
  - While calculated frequency(fb) is less than minimum limit frequency(FminC).
  - While protective time is more than or equal to ten minutes.
  - While T1 is lower than or equal to (Tsc-CDIFTEMP-0.5°C)

Note: CDIFTEMP is EEPROM setting parameter. It is 2°C usually.

2) When the compressor runs continuously for more than 120 minutes.

- If the following conditions are satisfied, the compressor ceases operation.
  - When calculated frequency(fb) is less than minimum limit frequency(FminC).
  - When protective time is more than or equal to ten minutes.
  - When T1 is lower than or equal to (Tsc-CDIFTEMP).

Note: CDIFTEMP is EEPROM setting parameter. It is 2°C usually.

3) If one of the following conditions is satisfied, not judge protective time.

  - Compressor running frequency is more than test frequency.
  - When compressor running frequency is equal to test frequency, T4 is more than 15°C or no T4 or T4 fault.
  - Change setting temperature.
  - Turbo or sleep function on/off
  - Various frequency limit shutdown occurs.

Note: CDIFTEMP is EEPROM setting parameter. It is 2°C usually.

1.5.2 Indoor Fan Control

1) In cooling mode, the indoor fan operates continuously. The fan speed can be set to 1%-100%, or auto.

2) Auto fan

- Descent curve
  - When T1-Tsc is lower than or equal to 3.5°C, fan speed reduces to 80%;
  - -When T1-Tsc is lower than or equal to 1°C, fan speed reduces to 60%;
  - -When T1-Tsc is lower than or equal to 0.5°C, fan speed reduces to 40%;
  - -When T1-Tsc is lower than or equal to 0°C, fan speed reduces to 20%;
  - -When T1-Tsc is lower than or equal to -0.5°C, fan speed reduces to 1%.
- Rise curve
  - When T1-Tsc is higher than 0°C, fan speed increases to 20%;
  - -When T1-Tsc is higher than 0.5°C, fan speed increases to 40%;
  - -When T1-Tsc is higher than 1°C, fan speed increases to 60%;
  - -When T1-Tsc is higher than 1.5°C, fan speed increases to 80%;
  - -When T1-Tsc is higher than 4°C, fan speed increases to 100%.

1.5.3 Outdoor Fan Control

- The outdoor unit will be run at different fan speed according to T4 and compressor running frequency..
- For different outdoor units, the fan speeds are different.

1.5.4 Condenser Temperature Protection

When the condenser temperature exceeds a configured value, the compressor ceases operations.

1.5.5 Evaporator Temperature Protection

When evaporator temperature drops below a configured value, the compressor and outdoor fan ceases operations.

1.6 Heating Mode

1.6.1 Compressor Control

1) Reach the configured temperature

- If the following conditions are satisfied, the compressor ceases operation.
  - While calculated frequency(fb) is less than minimum limit frequency(FminC).
  - When protective time is more than or equal to ten minutes.
  - When T1 is higher than or equal to Tsc+ HDIFTEMP2.

Note: HDIFTEMP2 is EEPROM setting parameter. It is 2°C usually.

- If one of the following conditions is satisfied, not judge protective time.
  - Compressor running frequency is more than test frequency.
  - When compressor running frequency is equal to test frequency, T4 is more than 15°C or no T4 or T4 fault.
  - Change setting temperature.
  - Turbo or sleep function on/off.

2) When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

1.6.2 Indoor Fan Control:

1) In heating mode, the indoor fan operates continuously. The fan speed can be set to 1%-100%, or mute.

2) Auto fan

- Rise curve
  - When T1-Tsc is higher than -1.5°C, fan speed reduces to 80%;
  - -When T1-Tsc is higher than 0°C, fan speed reduces to 60%;
  - -When T1-Tsc is higher than 0.5°C, fan speed reduces to 40%;
  - -When T1-Tsc is higher than 1°C, fan speed reduces to 20%.
- Descent curve
  - When T1-Tsc is lower than or equal to 0.5°C, fan speed increases to 20%;
  - -When T1-Tsc is lower than or equal to 0°C, fan speed increases to 60%;
  - -When T1-Tsc is lower than or equal to -1.5°C, fan speed increases to 80%;
  - -When T1-Tsc is lower than or equal to -3°C, fan speed increases to 100%.

1.6.3 Outdoor Fan Control:

- The outdoor unit will be run at different fan speed according to T4 and compressor running frequency.
- For different outdoor units, the fan speeds are different.

1.6.4 Defrosting mode

- The unit enters defrosting mode according to changes in the temperature value of T3, T4 as well as the compressor running time.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will cease operation, the defrost light of the indoor unit will turn on, and the "" symbol is displayed.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1°C.
  - T3 maintained above TCDE2°C for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.

1.6.5 Evaporator Temperature Protection

- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 20 seconds.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

1.7 Auto-mode

- This mode can be selected with the remote controller and the setting temperature can be changed between 16°C~30°C.
- In auto mode, the machine selects cooling, heating, auto-drying or fan-only mode on the basis of T1,Ts, T4 and relative humidity.
- If the setting temperature is modified, the machine selects a new running function.

1.8 Drying mode

In drying mode, AC operates the same as auto fan in cooling mode.

1) Mute function is active.

- All protections are activated and operate the same as they do that in cooling mode.

2) Low Room Temperature Protection

- If the room temperature is lower than 10°C, the compressor ceases operations and does not resume

until room temperature exceeds 12°C.

1.9 Forced operation function

- Forced cooling mode:

The compressor and outdoor fan continue to run and the indoor fan runs at rated speed. After running for 30 minutes, the AC will switch to auto mode with a preset temperature of 24°C.

- Forced auto mode:

Forced auto mode operates the same as normal auto mode with a preset temperature of 24°C.

- The unit exits forced operation when it receives the following signals:
  - Switch on
  - Switch off
  - Timer on
  - Timer off
  - Changes in:
    - mode
    - fan speed
    - setting temperature

1.10 Timer function

- Timing range is 24 hours.
- Timer on. The machine will turn on automatically when reaching the setting time.
- Timer off. The machine will turn off automatically when reaching the setting time.
- Timer on/off. The machine will turn on automatically when reaching the setting "on" time, and then turn off automatically when reaching the setting "off" time.
- Timer off/on. The machine will turn off automatically when reaching the setting "off" time, and then turn on automatically when reaching the setting "on" time.
- The timer function will not change the AC current operation mode. Suppose AC is off now, it will not start up firstly after setting the "timer off" function. And when reaching the setting time, the timer LED will be off and the AC running mode has not been changed.
- The setting time is relative time.
- The AC will quit the timer function when it has malfunction

1.11 Sleep function

- The sleep function is available in cooling, heating, or auto mode.
- The operational process for sleep mode is as follows:
  - When cooling, the temperature rises 1°C (to not higher than 30°C) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
  - When heating, the temperature decreases 1°C(to not lower than 16°C) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits this mode and switches off.
- The timer setting is available in this mode.

1.12 Auto-Restart function

- The indoor unit has an auto-restart module that allows the unit to restart automatically. The module automatically stores the current settings and, in the case of a sudden power failure, will restore those setting automatically within 3 minutes after power returns.
- If there is a power failure while the unit is running, the compressor starts 3 minutes after the unit restarts. If the unit was already off before the power failure, the unit stands by.

1.13 8℃ Heating

In heating mode, the temperature can be set to as low as 8°C, preventing the indoor area from freezing if unoccupied during severe cold weather.

1.14 ECO function

- Used to enter the energy efficient mode.
  - Under cooling mode, press ECO button, the remote controller will adjust the temperature automatically to 24°C, fan speed of Auto to save energy (but only if the set temperature is less than 24°C). If the set temperature is more than 24°C and 30°C, press the ECO button, the fan speed will change to Auto, the set temperature will remain unchanged.
- When AC receives signals, such as switch off, Turbo operation , Silence operation , Self clean operation , Forced cooling operation, mode setting, Sleeping mode, or adjusting the set temperature to less than 24°C,it will quit the ECO operation.
- Operation time in ECO mode is 8 hours. After 8 hours the AC quits this mode.

- When there's any one temperature sensor in malfunction, the AC will quit ECO mode .
- Indoor fan will run at auto fan when enter into the ECO mode .The setting temperature and setting fan speed can be changed through remote controller signal.

1.15 Self clean(Optional)

- The indoor unit will run at low fan for 16 minutes, then turn off, if you press "Self Clean" when the unit is in cooling or drying mode.
- Self Clean keeps the indoor unit dry and prevents mold growth.

1.16 Follow me(Optional)

- If you press "Follow Me" on the remote, the indoor unit will beep. This indicates the follow me function is active.
- Once active, the remote control will send a signal every 3 minutes, with no beeps. The unit automatically sets the temperature according to the measurements from the remote control.
- The unit will only change modes if the information from the remote control makes it necessary, not from the unit's temperature setting.
- If the unit does not receive a signal for 7 minutes or you press "Follow Me," the function turns off. The unit regulates temperature based on its own sensor and settings.

1.17 Silence (Optional)

Press "Silence" on the remote control to enable the SILENCE function. While this function is active, the indoor unit will run at faint breeze(1% fan speed), which reduces noise to the lowest possible level.

1.18 Intelligent Eye (Optional)

With the built-in infrared sensor, the indoor unit detects human movement. The compressor will operate in low frequency if you leave the room for 30 minutes. The compressor will operate in lower frequency if you leave the room for 120 minutes, and resume automatically when you come back, which helps saving more energy.

1.19 Information Inquiry

- To enter information inquiry status, complete the following procedure within ten seconds:
  - Press LED 3 times.
  - Press SWING 3 times.
- If you are successful, you will hear beeps for two seconds.
- Use the LED and SWING buttons to cycle through information displayed.
- Pressing LED will display the next code in the sequence. Pressing SWING will show the previous.
- The table shows information codes. The screen will display this code for two seconds, then the information for 25 seconds.

Displayed code	Explanation	Additional Notes
T1	T1	T1 temperature
T2	T2	T2 temperature
T3	T3	T3 temperature
T4	T4	T4 temperature
TP	TP	TP temperature
Targeted frequency	FT	Targeted Frequency
Actual frequency	TR	Actual Frequency
Compressor current	DL	N/A
Outdoor AC voltage	UO	N/A
Indoor capacity test	SN	N/A
Reserve	--	Running mode
Outdoor fan speed	PR	Outdoor fan speed
EXV opening angle	LR	EXV opening angle
Indoor fan speed	IR	Indoor fan speed
Indoor humidity	HU	N/A
Adjusted setting temperature	TT	N/A
Indoor dust concentrations	DT	N/A
WIFI signal strength	IF	N/A
GA algorithm frequency	OT	N/A

Maintenance and Disassembly

Contents

1. Maintenance 20

1.1 First Time Installation Check 20

1.2 Refrigerant Recharge 22

1.3 Re-Installation 23

1.3.1 Indoor Unit 23

1.3.2 Outdoor Unit 25

2. Disassembly 27

2.1 Indoor Unit 27

2.2 Outdoor Unit 38

3. Refrigerant Cycle Diagram 48

1. Maintenance

1.1 First Time Installation Check

Air and moisture trapped in the refrigerant system affects the performance of the air conditioner by:

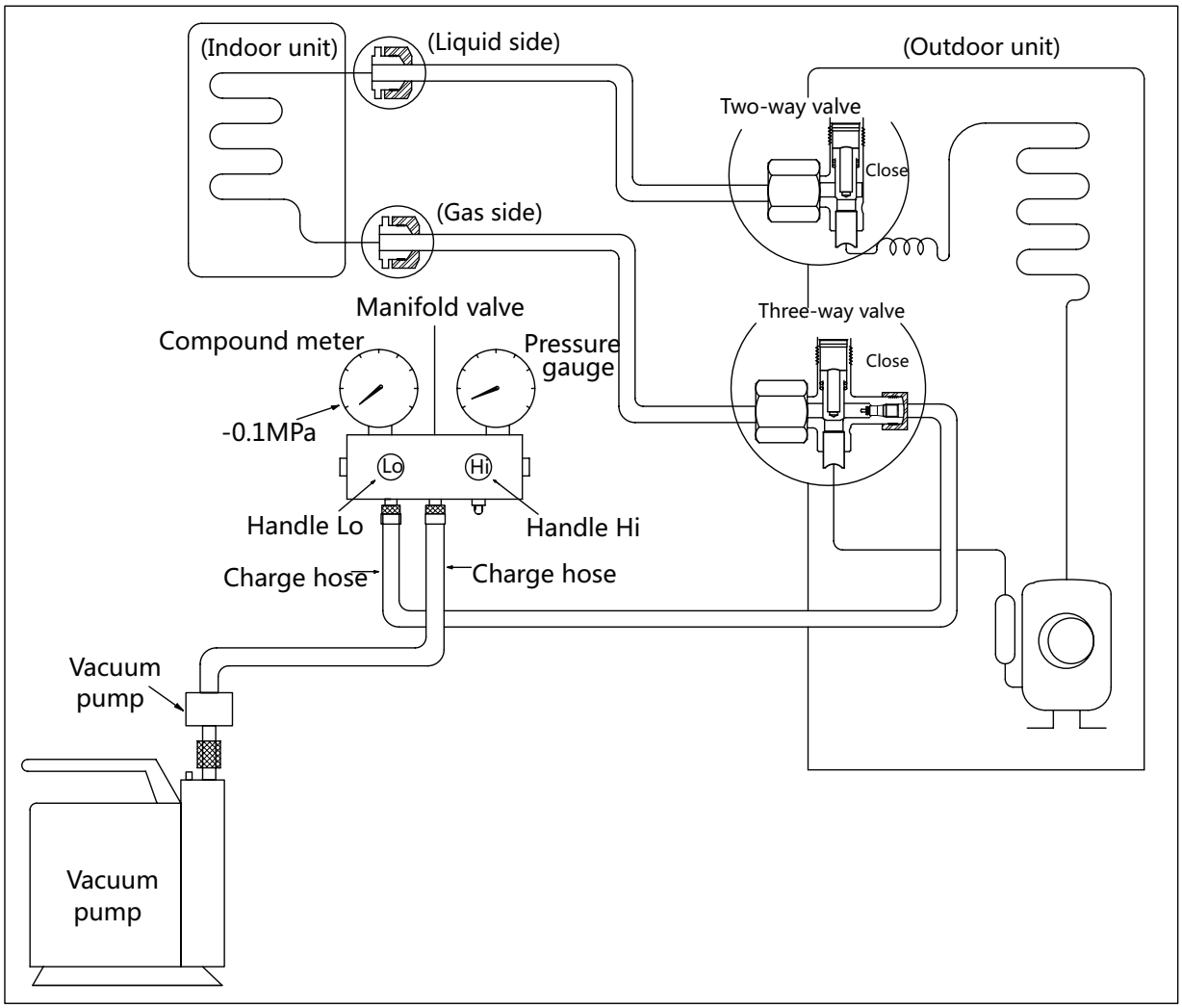
- Increasing pressure in the system.
- Increasing the operating current.
- Decreasing the cooling or heating efficiency.
- Congesting the capillary tubing due to ice build-up in the refrigerant circuit.
- Corroding the refrigerant system.

To prevent air and moisture from affecting the air conditioner's performance, the indoor unit, as well as the pipes between the indoor and outdoor unit, must be be leak tested and evacuated.

Leak test (soap water method)

Use a soft brush to apply soapy water or a neutral liquid detergent onto the indoor unit connections and outdoor unit connections. If there is gas leakage, bubbles will form on the connection.

Air purging with vacuum pump

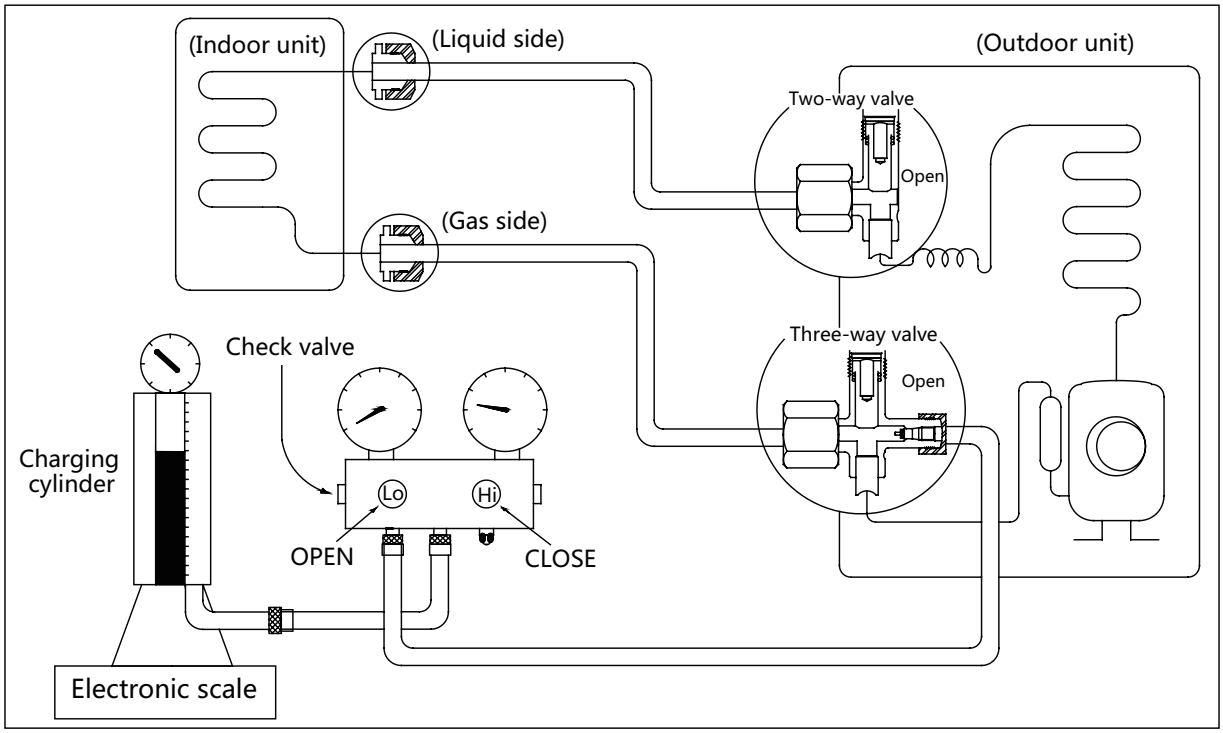


Procedure:

1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
3. Connect another charge hose to the vacuum pump.
4. Fully open the Handle Lo manifold valve.
5. Using the vacuum pump, evacuate the system for 30 minutes.
   a. Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
      - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
      - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.
      - If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.

   b. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backwards, check whether there is gas leakage.
6. Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
   a. Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
   b. Remove the charge hose from the 3-way valve.
7. Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valve.

1.2 Refrigerant Recharge



Prior to recharging the refrigerant, confirm the additional amount of refrigerant required using the following table:

Models	Standard length	Max. elevation	Max. length	Additional refrigerant
9k&12k	5m (16.4ft)	10m (32.8ft)	25m (82.0ft)	12g/m (0.13oz/ft)

Procedure:

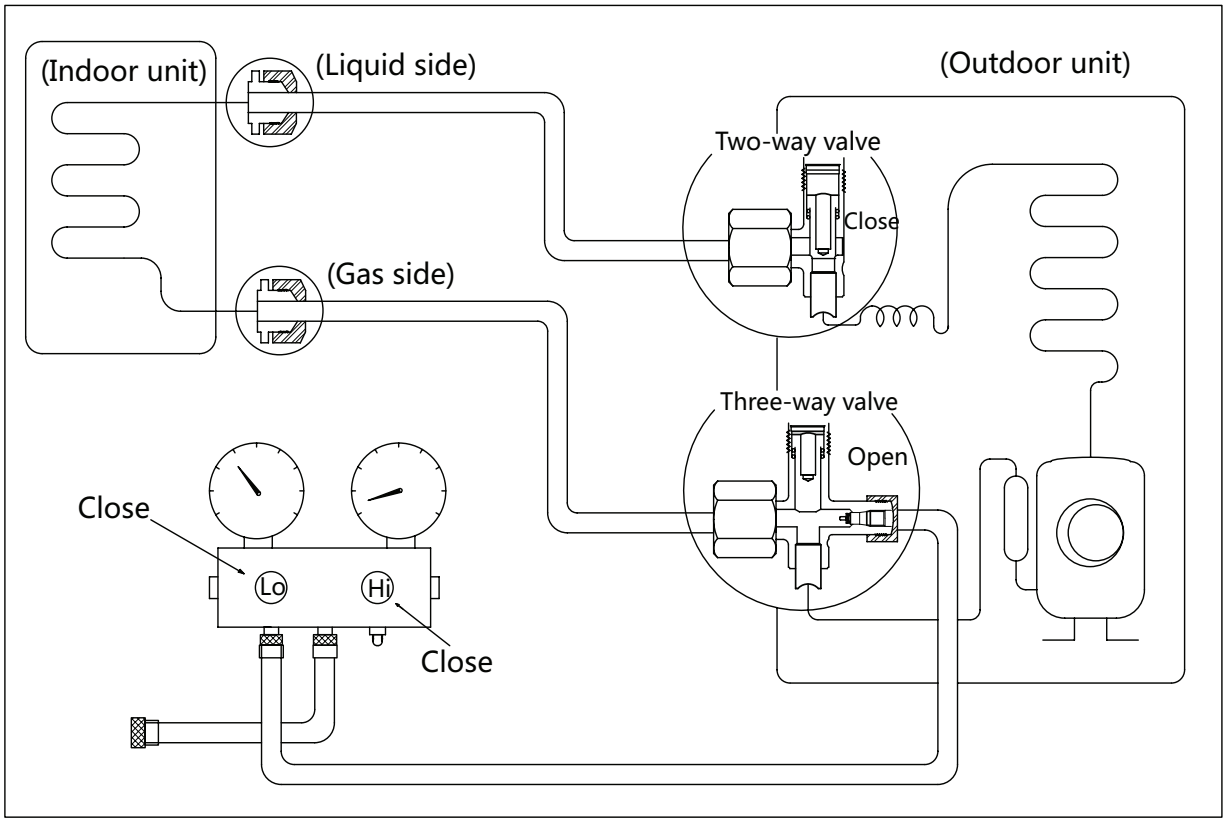
1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.

   If the refrigerant is R410A, invert the cylinder to ensure a complete liquid charge.
4. Partially open the Handle Lo manifold valve.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode and charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18N.m.
12. Check for gas leakage.

1.3 Re-Installation

1.3.1 Indoor Unit

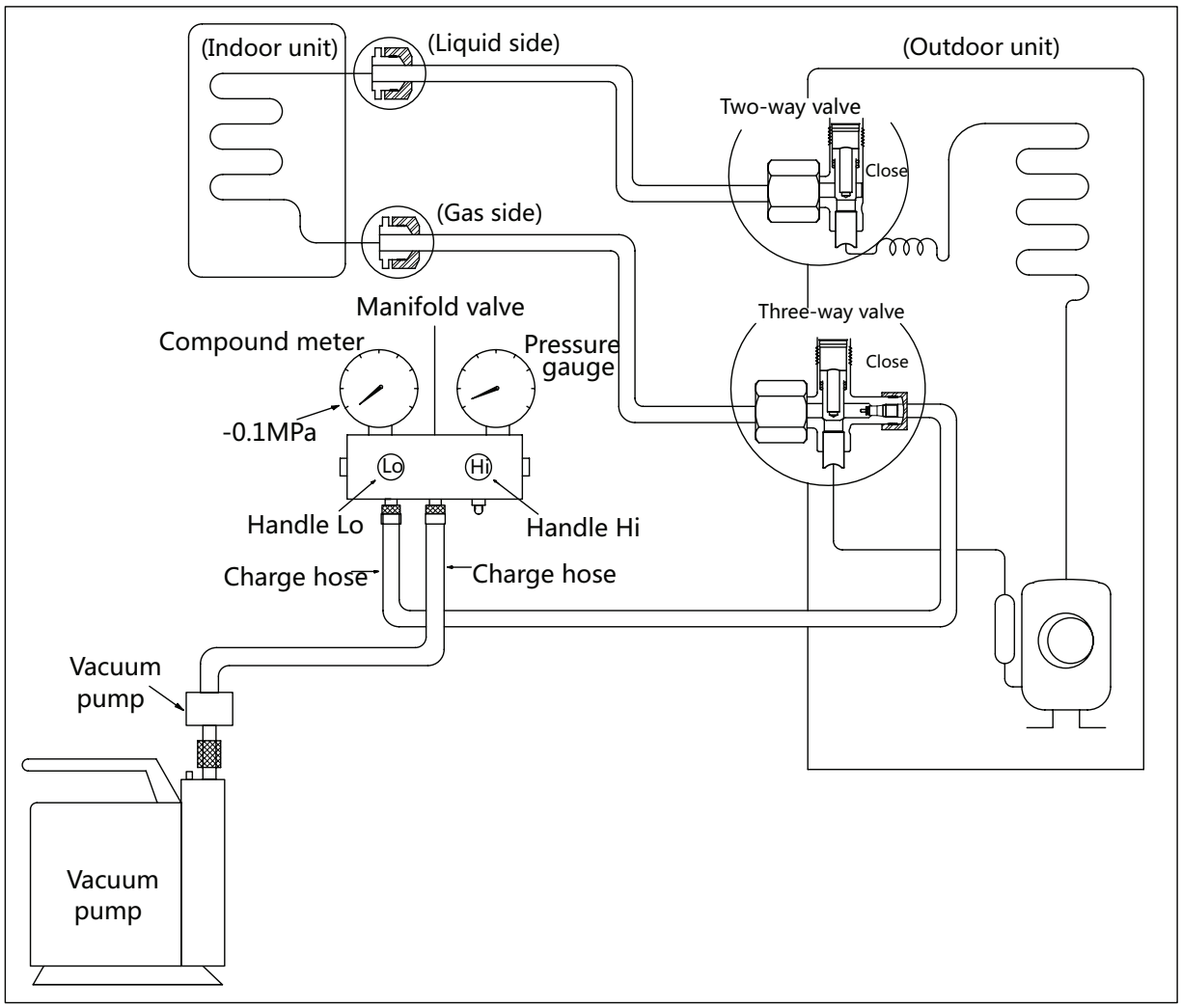
Collecting the refrigerant into the outdoor unit



Procedure:

1. Confirm that the 2- and 3-way valves are opened.
2. Connect the charge hose with the push pin of Handle Lo to the 3-way valve's gas service port.
3. Open the Handle Lo manifold valve to purge air from the charge hose for 5 seconds and then close it quickly.
4. Close the 2-way valve.
5. Operate the air conditioner in cooling mode. Cease operations when the gauge reaches 0.1 MPa (14.5 Psi).
6. Close the 3-way valve so that the gauge rests between 0.3 MPa (43.5 Psi) and 0.5 MPa (72.5 Psi).
7. Disconnect the charge set and mount the caps of service port and 2- and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 18N.m.
9. Check for gas leakage.

Air purging with vacuum pump

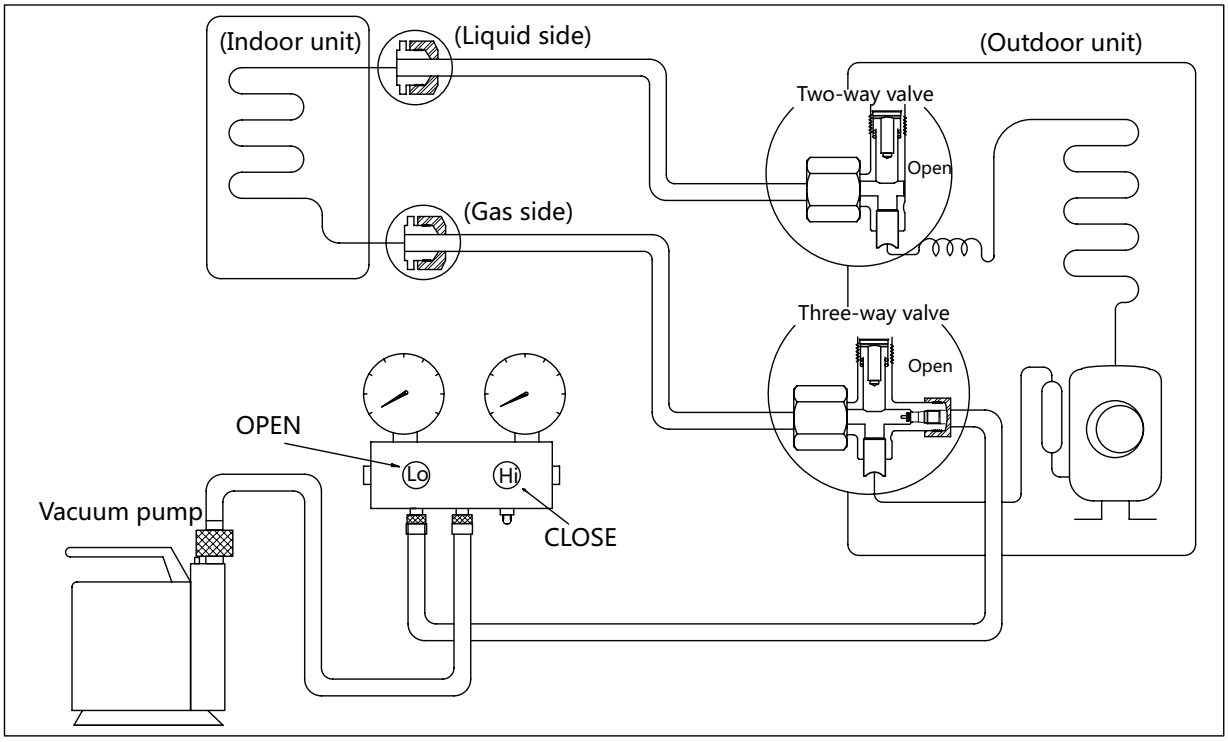


Procedure:

1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
3. Connect another charge hose to the vacuum pump.
4. Fully open the Handle Lo manifold valve.
5. Using the vacuum pump, evacuate the system for 30 minutes.
   - **c.** Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
     - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
     - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.
     - If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.
   - **d.** Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backwards, check whether there is gas leakage.
6. Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
   - **a.** Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
   - **b.** Remove the charge hose from the 3-way valve.
7. Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valve.

1.3.2 Outdoor Unit

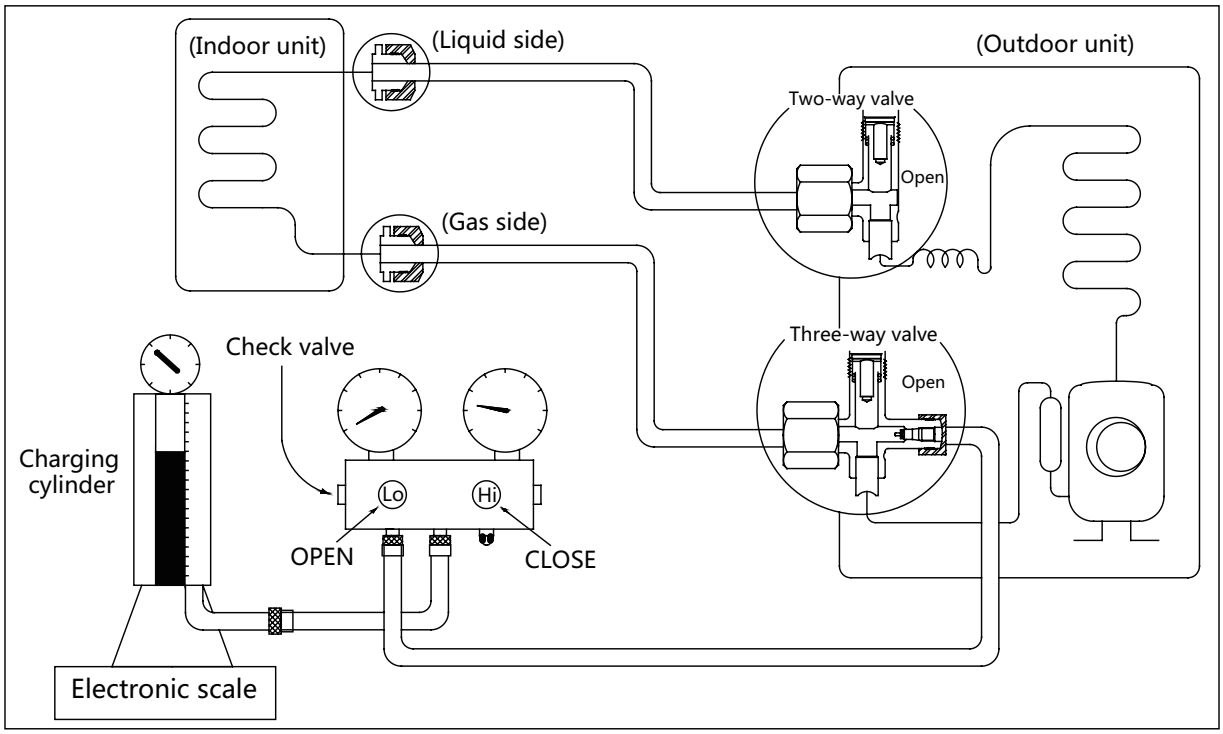
Evacuation for the whole system



Procedure:

1. Confirm that the 2- and 3-way valves are opened.
2. Connect the vacuum pump to the 3-way valve's service port.
3. Evacuate the system for approximately one hour. Confirm that the compound meter indicates -0.1 MPa (14.5Psi).
4. Close the valve (Low side) on the charge set and turn off the vacuum pump.

   Wait for five minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check whether there is gas leakage.
5. Disconnect the charge hose from the vacuum pump.
6. Mount the caps of service port and 2- and 3-way valves.
7. Use a torque wrench to tighten the caps to a torque of 18N.m.



Procedure:

1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.

   If the refrigerant is R410A, invert the cylinder to ensure a complete liquid charge.
4. Partially open the Handle Lo manifold valve.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode and charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18N.m.
12. Check for gas leakage.

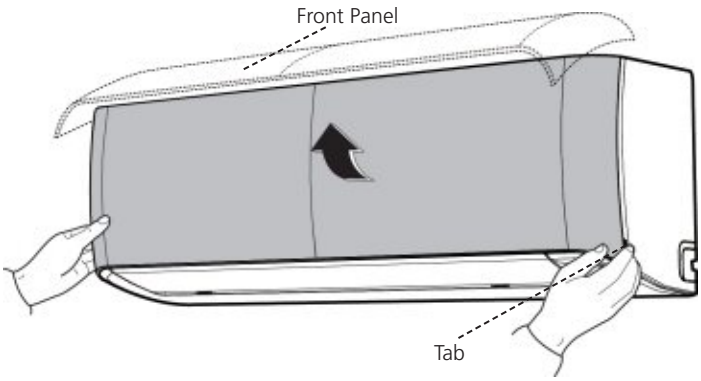
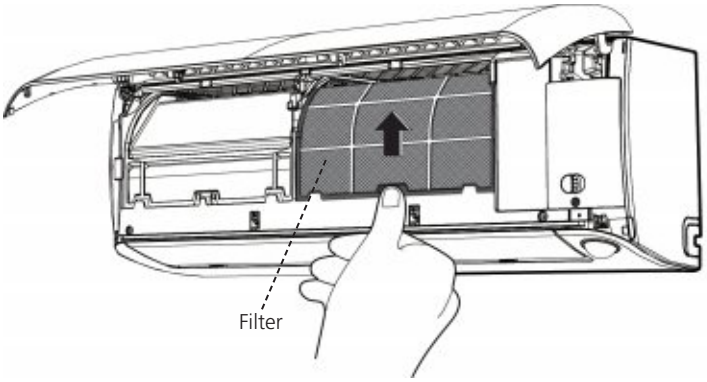
Note: 1. Mechanical connectors used indoors shall comply with local regulations.

2. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.

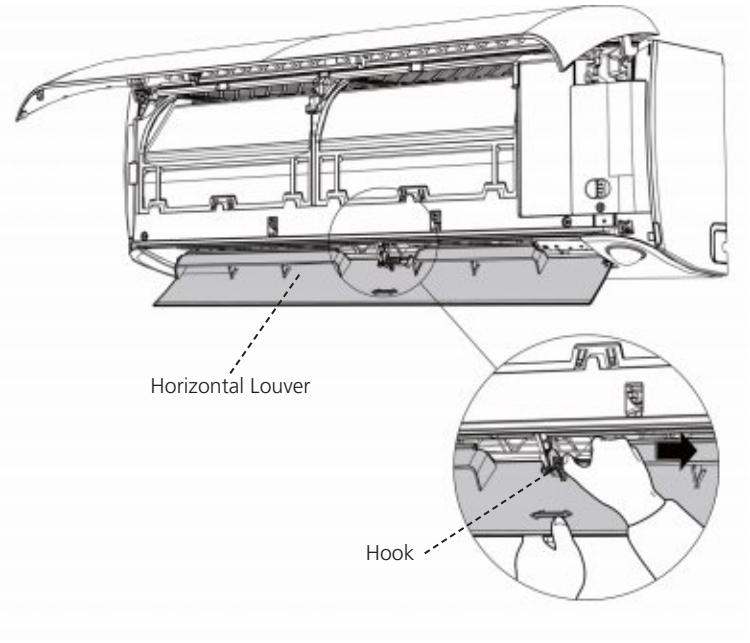
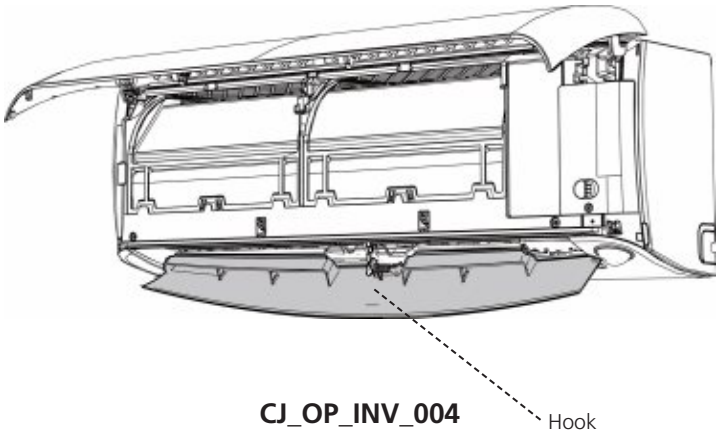
2. Disassembly

2.1 Indoor unit

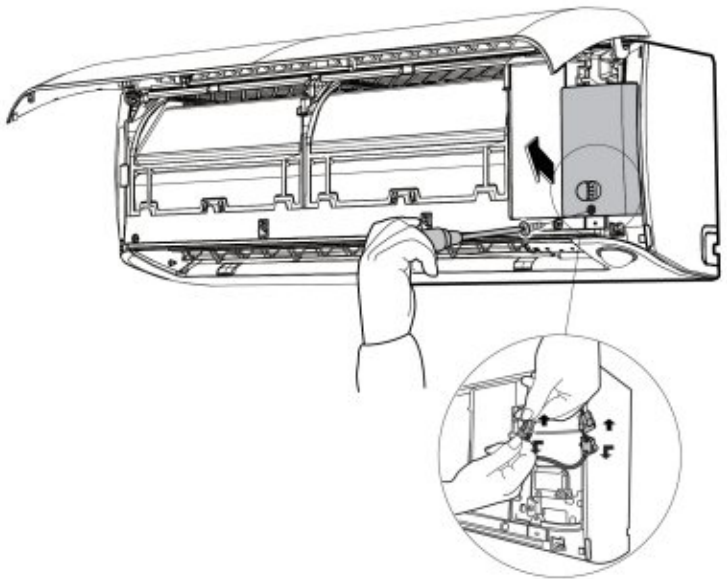
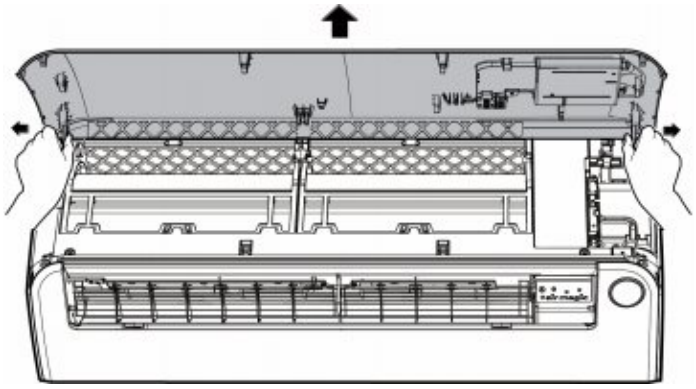
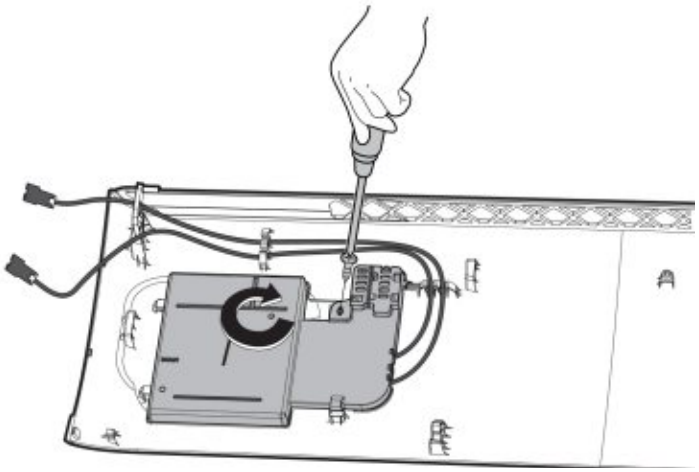
1. Front Panel

Procedure	Illustration
3) Hold the front panel by the tabs on the both sides and lift it (see CJ_OP_INV_001).	 **CJ_OP_INV_001**
4) Push up the bottom of an air filter while pressing the bottom of the middle parts, and then pull the air filter out downwards (see CJ_OP_INV_002).	 **CJ_OP_INV_002**

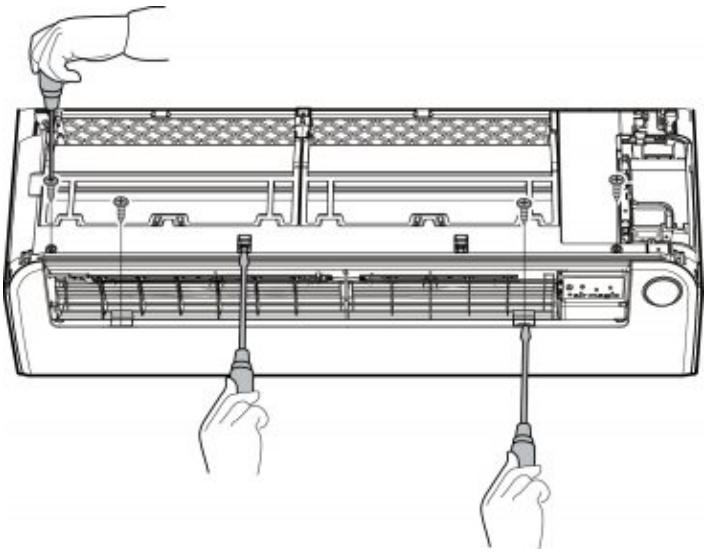
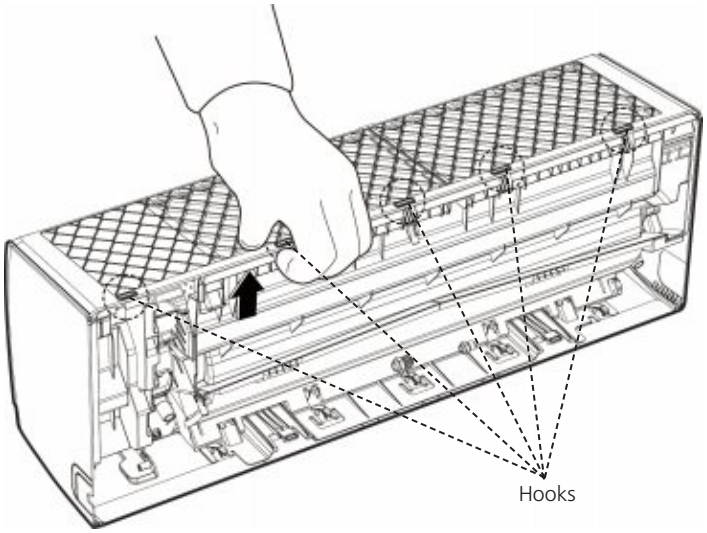
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
5) Open the horizontal louver and push the hook towards right to open it (see CJ_OP_INV_003).	 **CJ_OP_INV_003**
6) Bend the horizontal louver lightly by both hands to loosen the hooks, then remove the horizontal louver (see CJ_OP_INV_004).	 **CJ_OP_INV_004**

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
7) Remove 1 screw and then remove the electrical cover(see CJ_OP_INV_005). 8) Disconnect the two connectors for display board(see CJ_OP_INV_005) .	 **CJ_OP_INV_005**
9) Slid the front panel side to side to release each axis (see CJ_OP_INV_006)	 **CJ_OP_INV_006**
10)Remove one screw and rotate the display board clockwise. Then take it out of the clips. (see CJ_OP_INV_007).	 **CJ_OP_INV_007**

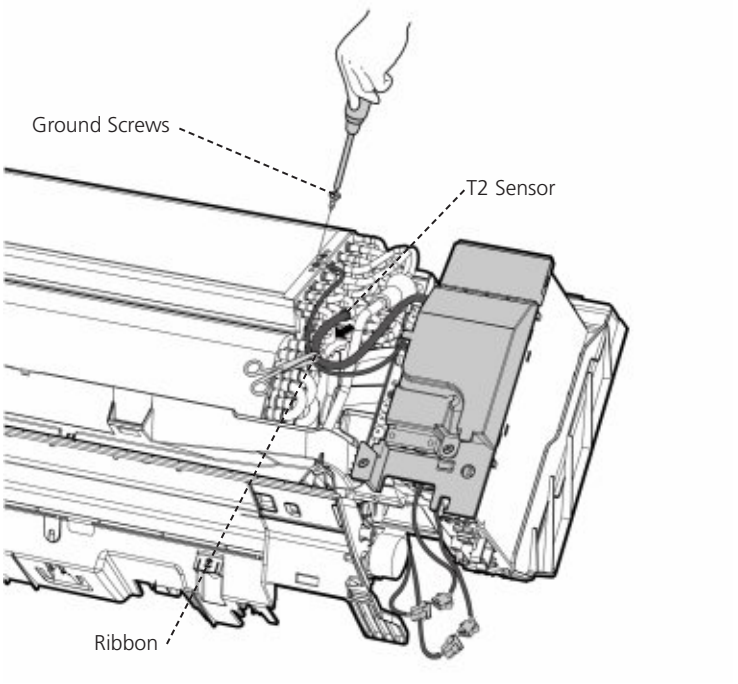
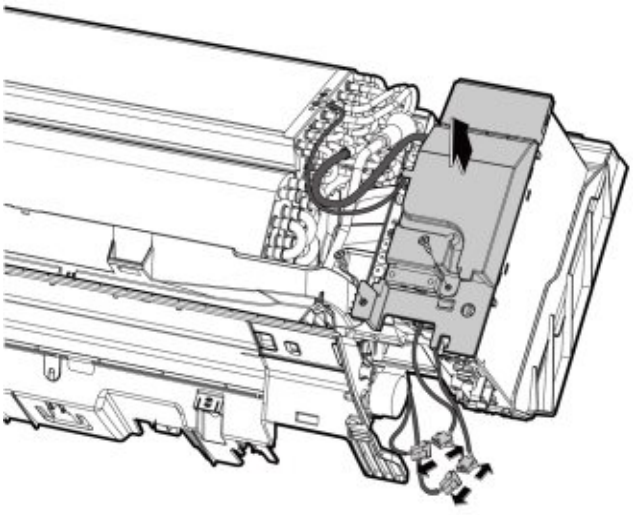
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
11)Open the screw caps(2) and then remove the 4 screws (see CJ_OP_INV_008). 12)Release the 2 hooks.	 **CJ_OP_INV_008**
13)Release the 5 hooks in the back (see CJ_OP_INV_009). 14)Pull out the panel frame from the indoor unit.	 **CJ_OP_INV_009**

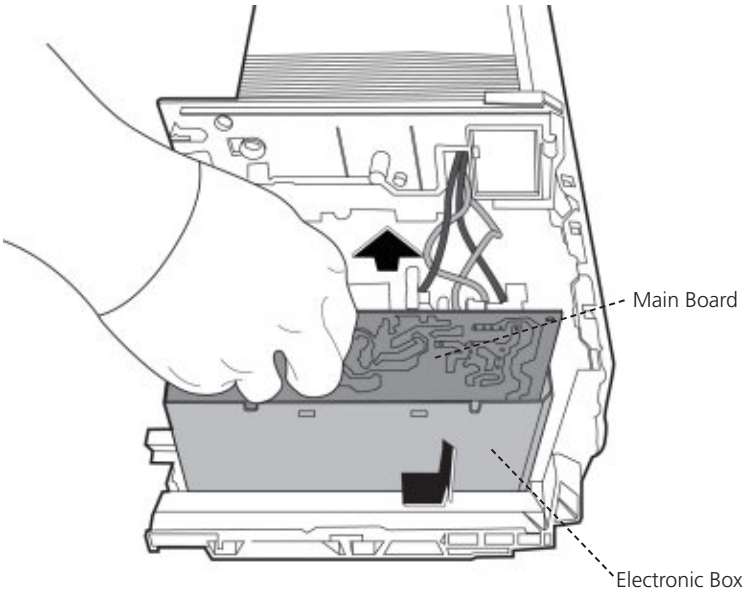
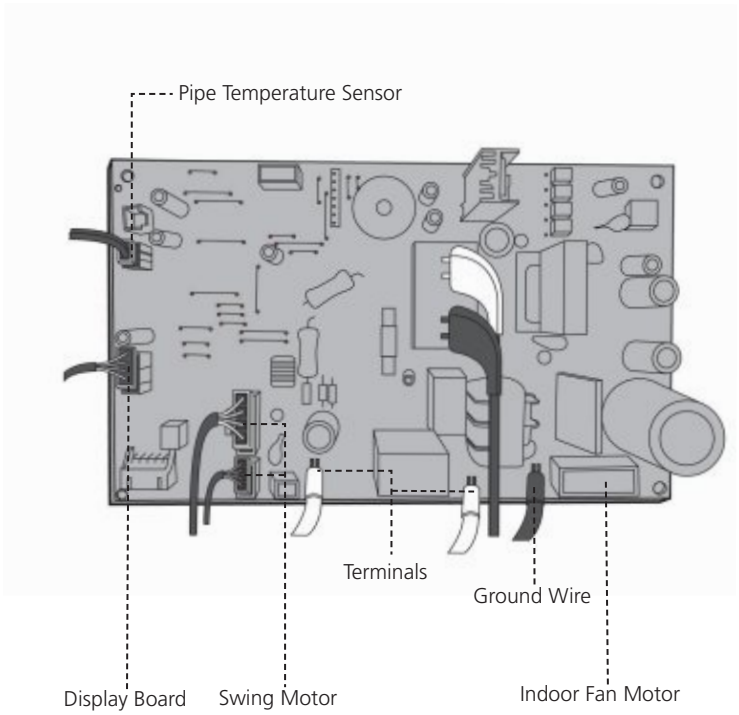
Note: This section is for reference only. Actual unit appearance may vary.

2. Electrical parts

Note: Remove the front panel (refer to 1. Front panel) before disassembling electrical parts.

Procedure	Illustration
1) Cut the ribbon by a shear, then pull out the coil temperature sensor (T2) (see CJ_OP_INV_010). 2) Remove the two screws used for the ground connection (see CJ_OP_INV_010).	 **CJ_OP_INV_010**
3) Remove the fixing screws(1 for electronic cover and 1 for terminal cover), and then remove the cover of electronic box and the terminal cover along the direction indicated in right image to remove it. 4) Disconnect the connector of fan motor and the step motor (see CJ_OP_INV_011).	 **CJ_OP_INV_011**

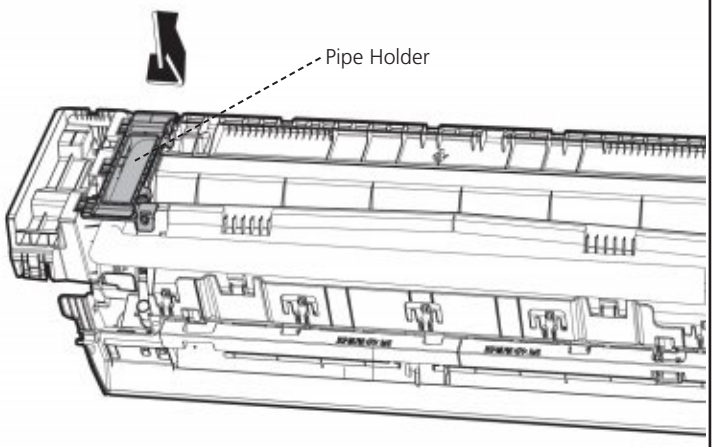
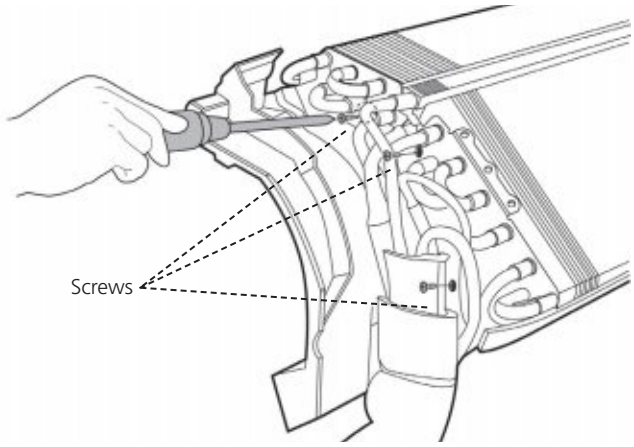
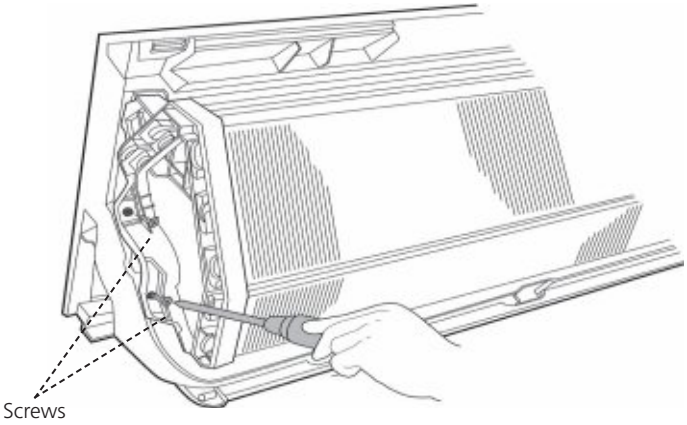
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
5) Disconnect the wires. Then remove the electronic main box (CJ_OP_INV_011-2). 6) Pull out the Electrical control box along the direction indicated in right image. to remove it (CJ_OP_INV_011-2).	 **CJ_OP_INV_012**
7) The connector of each port is indicated in right image. (CJ_OP_INV_013).	 **CJ_OP_INV_013**

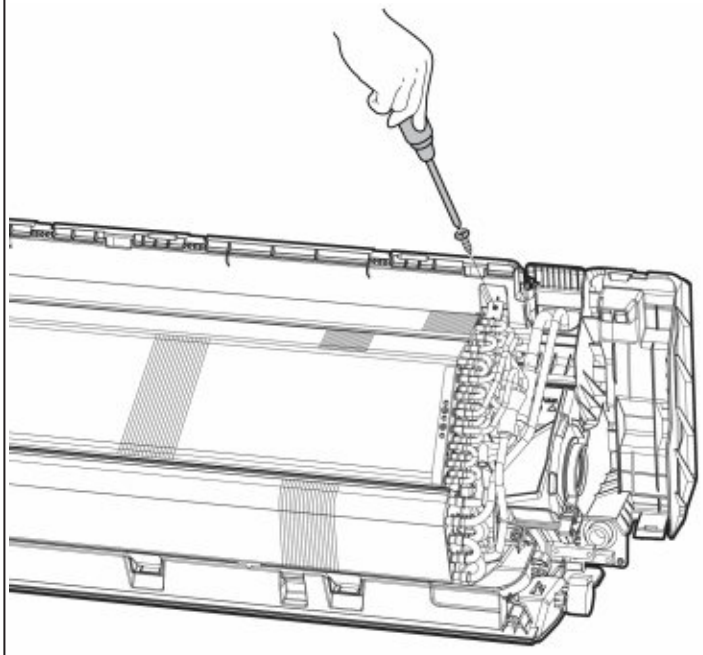
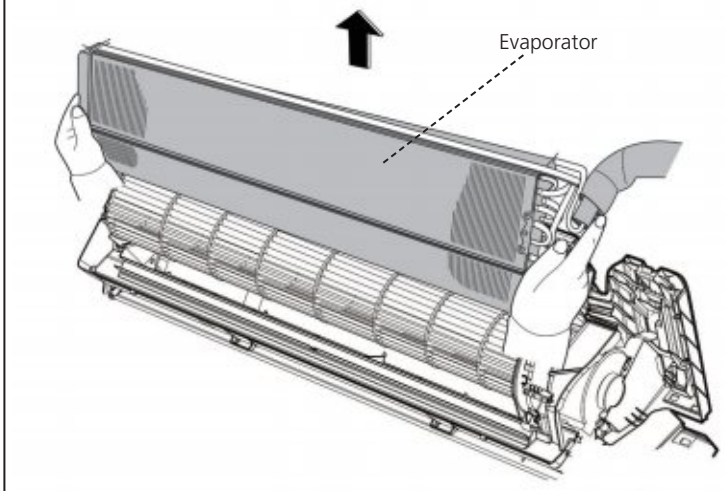
Note: This section is for reference only. Actual unit appearance may vary.

3. Evaporator

Note: Remove the front panel and electrical parts (refer to 1. Front panel and 2. Electrical parts) before disassembling evaporator.

Procedure	Illustration
1) Disassemble the pipe holder located at the rear of the unit (see CJ_OP_INV_014).	 **CJ_OP_INV_014**
2) Remove the 3 screws on the evaporator located at the fixed plate (see CJ_OP_INV_015).	 **CJ_OP_INV_015**
3) Remove the 2 screws on the evaporator located at the base of the bearing side (see CJ_OP_INV_016).	 **CJ_OP_INV_016**

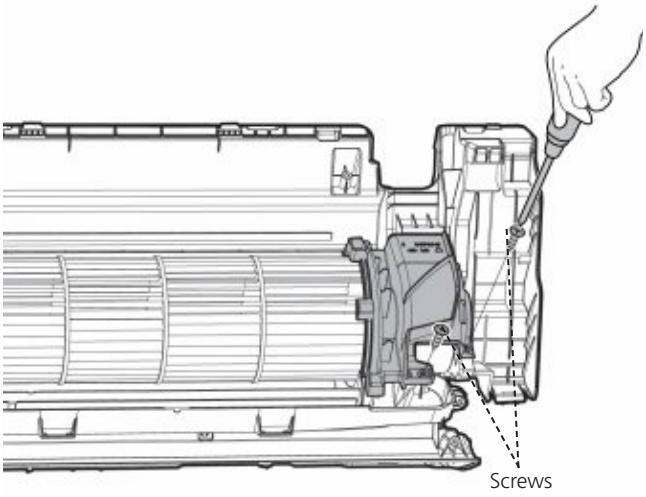
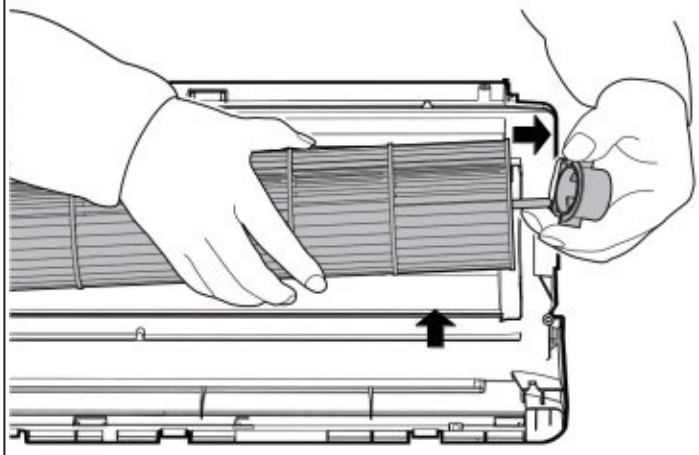
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
4) Remove 1 screw on the evaporator located at the top of the evaporator. (see CJ_OP_INV_017).	 CJ_OP_INV_017
5) Pull out the evaporator (see CJ_OP_INV_017).	 CJ_OP_INV_017

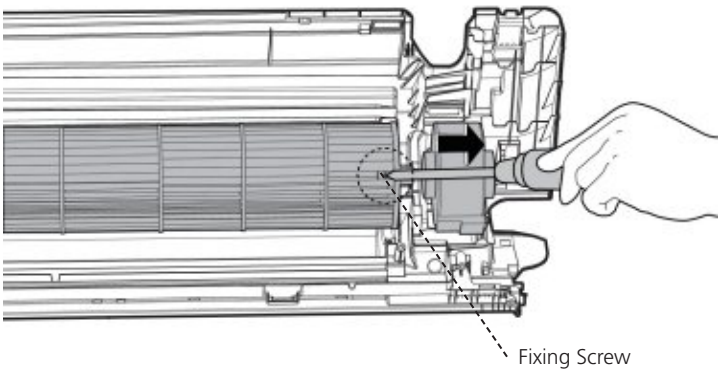
Note: This section is for reference only. Actual unit appearance may vary.

4. Fan motor and fan

Note: Remove the front panel, electrical parts and evaporator (refer to 1. Front panel, 2. Electrical parts, and 3. Evaporator). before disassembling fan motor and fan.

Procedure	Illustration
1) Remove the two screws and remove the fixing board of the fan motor (see CJ_OP_INV_018).	 **CJ_OP_INV_018**
2) Remove the bearing sleeve(see CJ_OP_INV_019).	 **CJ_OP_INV_019**

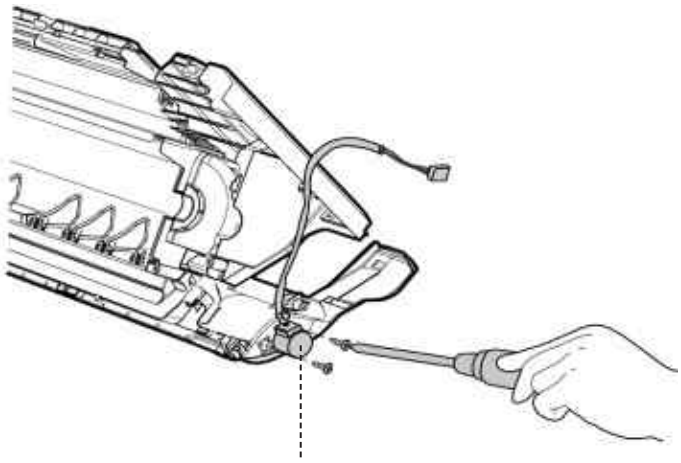
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Remove the fixing screw (see CJ_OP_INV_020). 4) Pull out the fan motor and fan assembly from the side.	 **CJ_OP_INV_021**

Note: This section is for reference only. Actual unit appearance may vary.

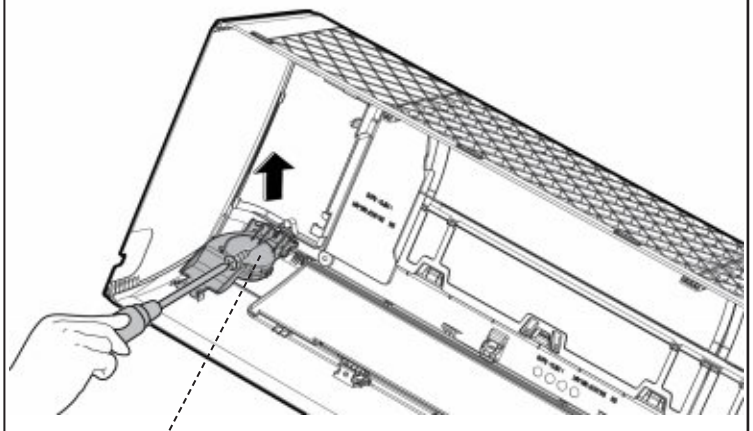
5. Step motor

Note: Remove the front panel and electrical parts (refer to 1. Front panel, 2. Electrical parts) before disassembling step motor.

Procedure	Illustration
1) Remove the two screws, then remove the stepping motor (see CJ_OP_INV_021).	 CJ_OP_INV_021

6. INTELLIGENT EYE

Note: Remove the front panel and electrical parts (refer to 1. Front panel, 2. Electrical parts, 3. Evaporator and 4. Fan motor and fan) before disassembling step motor.

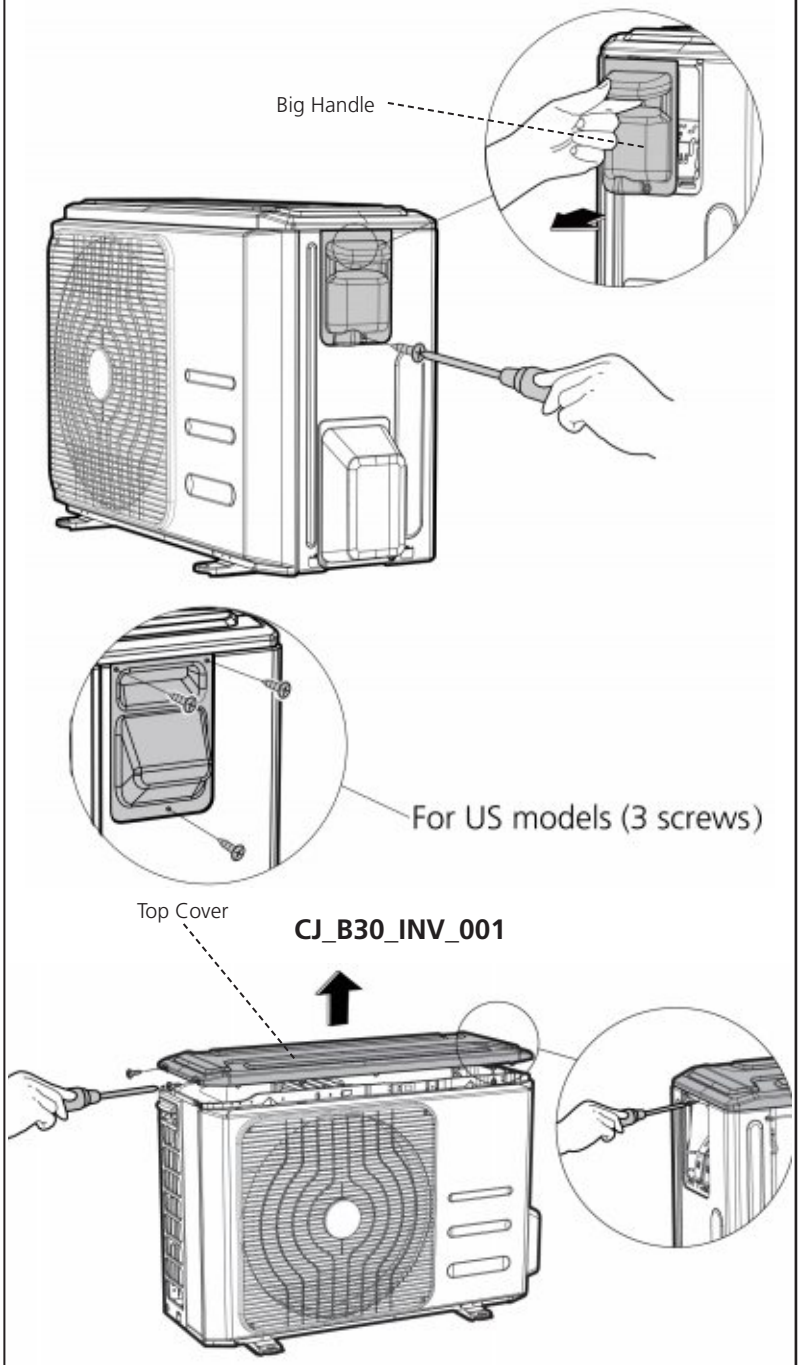
Procedure	Illustration
1) Remove the 1 screw, then remove the intelligent eye. (see CJ_OP_INV_021).	 CJ_OP_INV_021

Note: This section is for reference only. Actual unit appearance may vary.

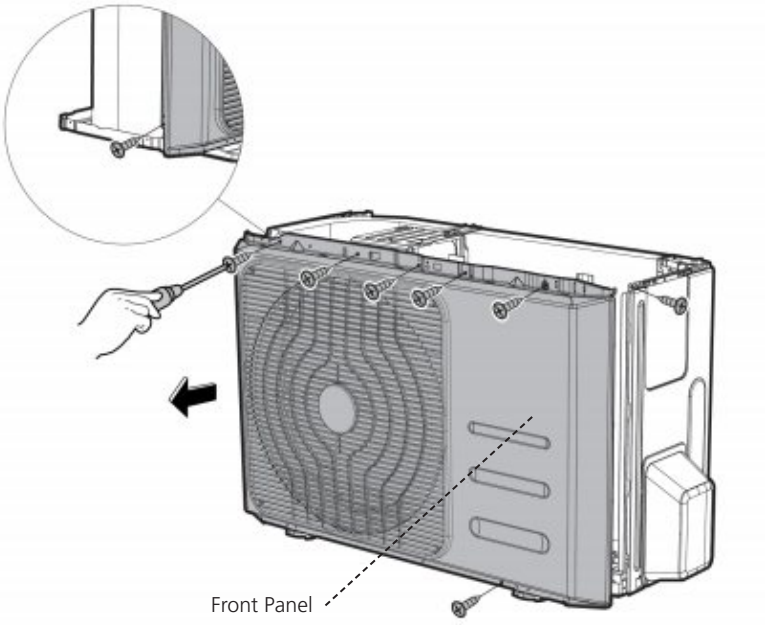
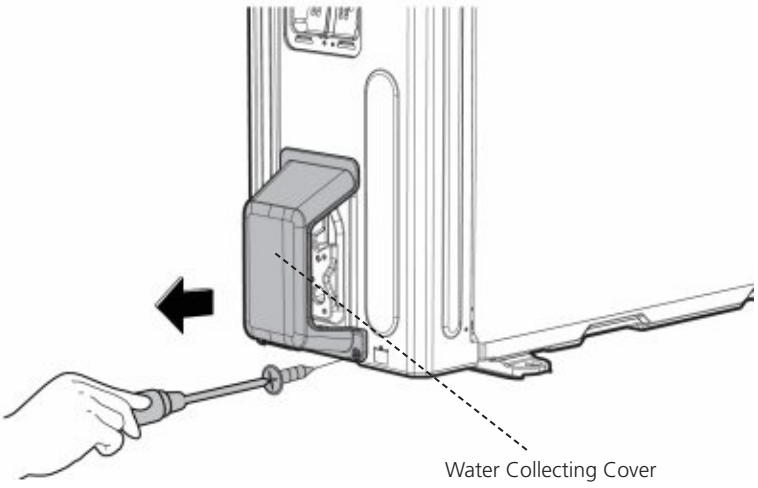
2.2 Outdoor unit

1. Panel Plate

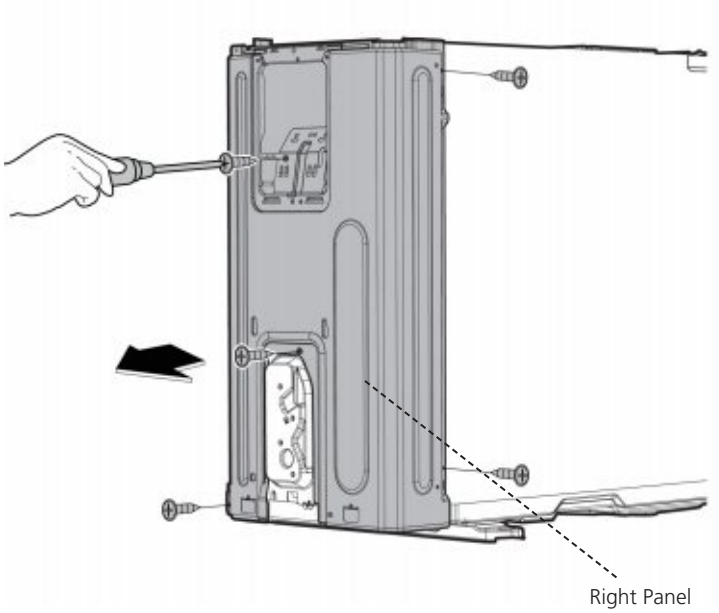
38QHP09E8S 38QHP12E8S

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the big handle and then remove the big handle (1 screws) (see CJ_B30_INV_001). 3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_B30_INV_002).	 CJ_B30_INV_001 CJ_B30_INV_002

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (8 screws) (see CJ_B30_INV_003).	 **CJ_B30_INV_003**
5) Remove the screws of water collecting cover and then remove the water collecting cover (1 screw) (see CJ_B30_INV_004).	 **CJ_B30_INV_004**

Note: This section is for reference only. Actual unit appearance may vary.

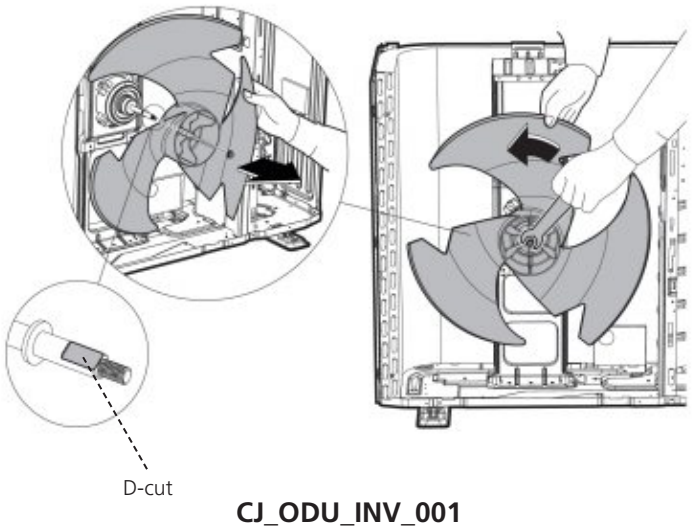
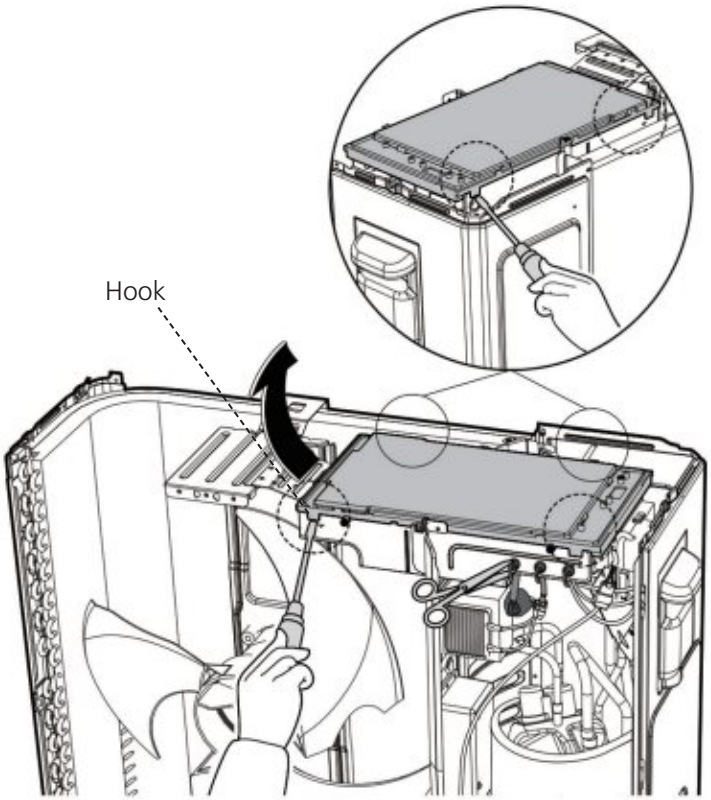
Procedure	Illustration
6) Remove the screws of the right panel and then remove the right panel (5 screws) (see CJ_B30_INV_005).	 CJ_B30_INV_005

Note: This section is for reference only. Actual unit appearance may vary.

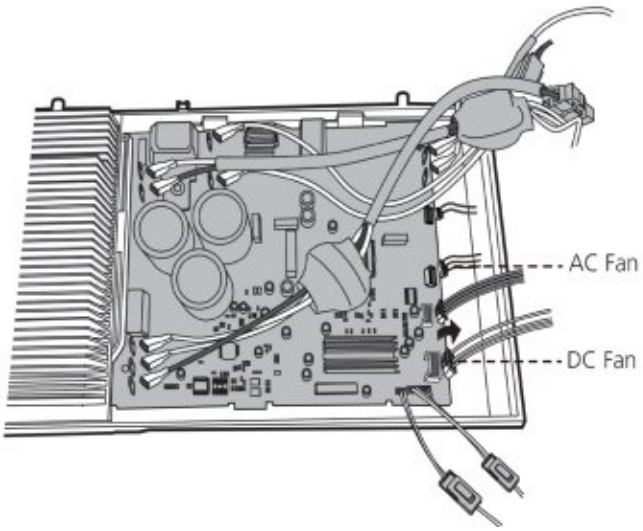
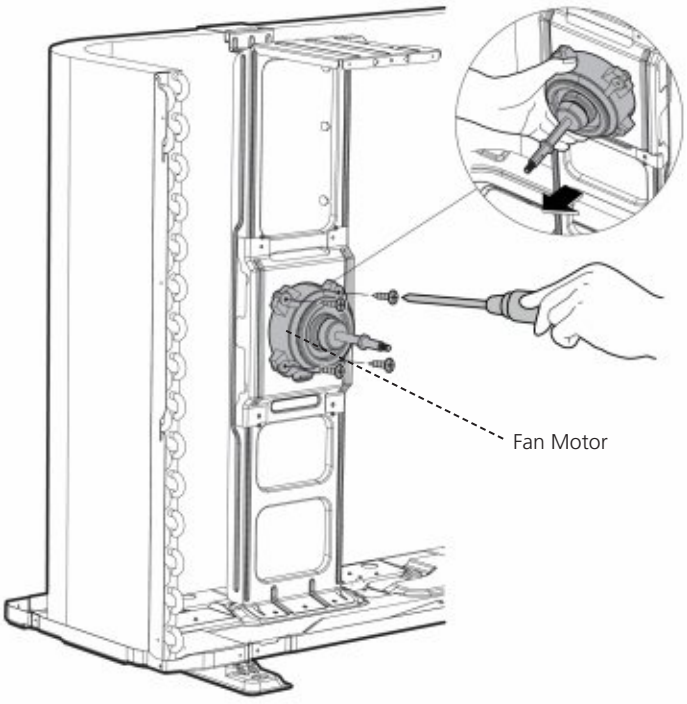
2. Fan disassembly

Note: Remove the panel plate and (refer to 1. Panel plate) before disassembling fan.

38QHP09E8S 38QHP12E8S

Procedure	Illustration
1) Remove the nut securing the fan with a spanner (see CJ_ODU_INV_001). 2) Remove the fan.	 **CJ_ODU_INV_001**
3) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_INV_002).	 **CJ_ODU_INV_002**

Note: This section is for reference only. Actual unit appearance may vary.

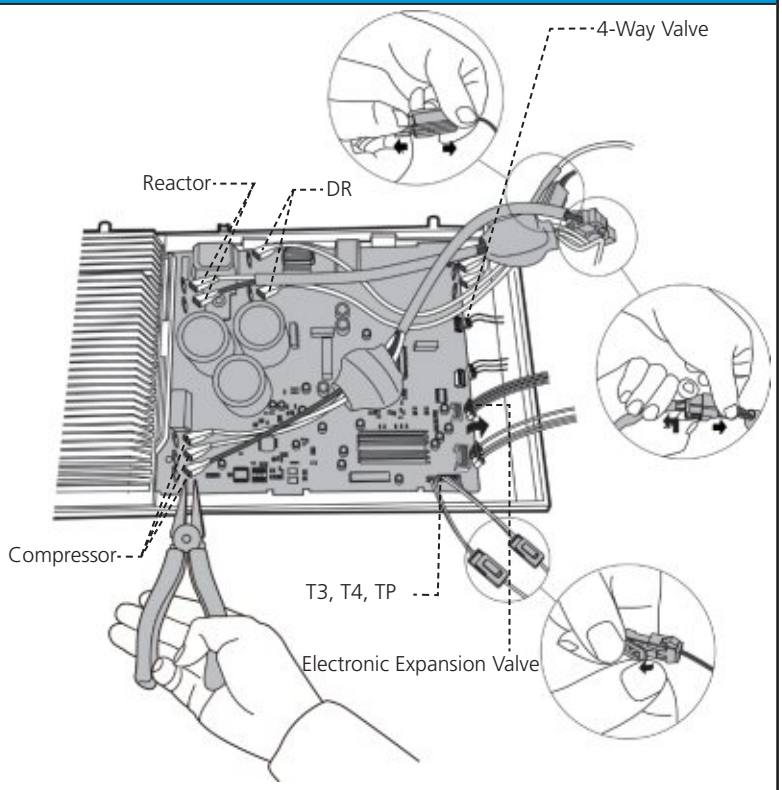
Procedure	Illustration
4) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_INV_003).	 **CJ_ODU_INV_003**
5) Remove the fixing screws of the fan motor (4 screws) (see CJ_ODU_INV_004). 6) Remove the fan motor.	 **CJ_ODU_INV_004**

Note: This section is for reference only. Actual unit appearance may vary.

3. Electrical parts

Note: Remove the panel plate and fan assembly (refer to 1. Panel plate and 2. Fan assembly) before disassembling electrical parts.

38QHP09E8S 38QHP12E8S

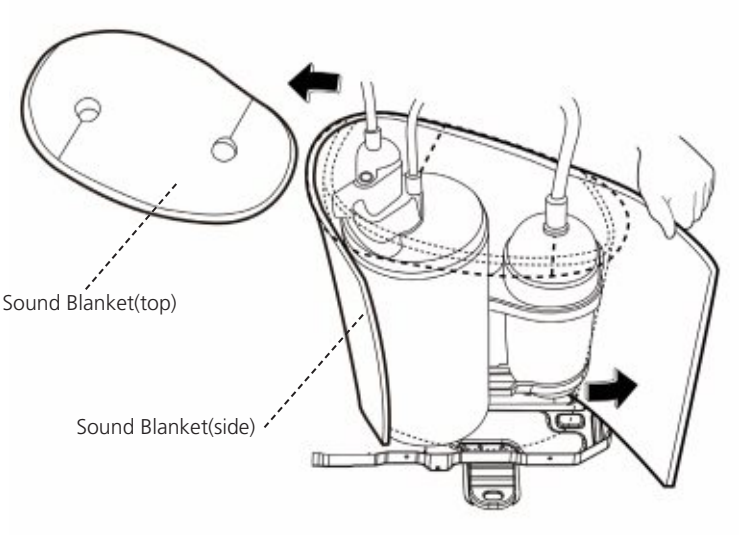
Procedure	Illustration
1) Remove the connector for the compressor (see CJ_ODU_INV_005). 2) Pull out the two blue wires connected with the four way valve (see CJ_ODU_INV_005). 3) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(T5) (see CJ_ODU_INV_005). 4) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_INV_005). 5) Remove the connector for the DR and reactor (see Fig CJ_ODU_INV_005). 6) Then remove the electronic control box.	 **CJ_ODU_INV_005**

Note: This section is for reference only. Actual unit appearance may vary.

4. Sound blanket

WARNING: Recover refrigerant from the refrigerant circuit before remove the compressor.

Note: Remove the panel plate, electrical parts, and fan assembly (refer to 1. Panel plate, 2. Electrical parts, and 3. Fan assembly) before disassembling sound blanket.

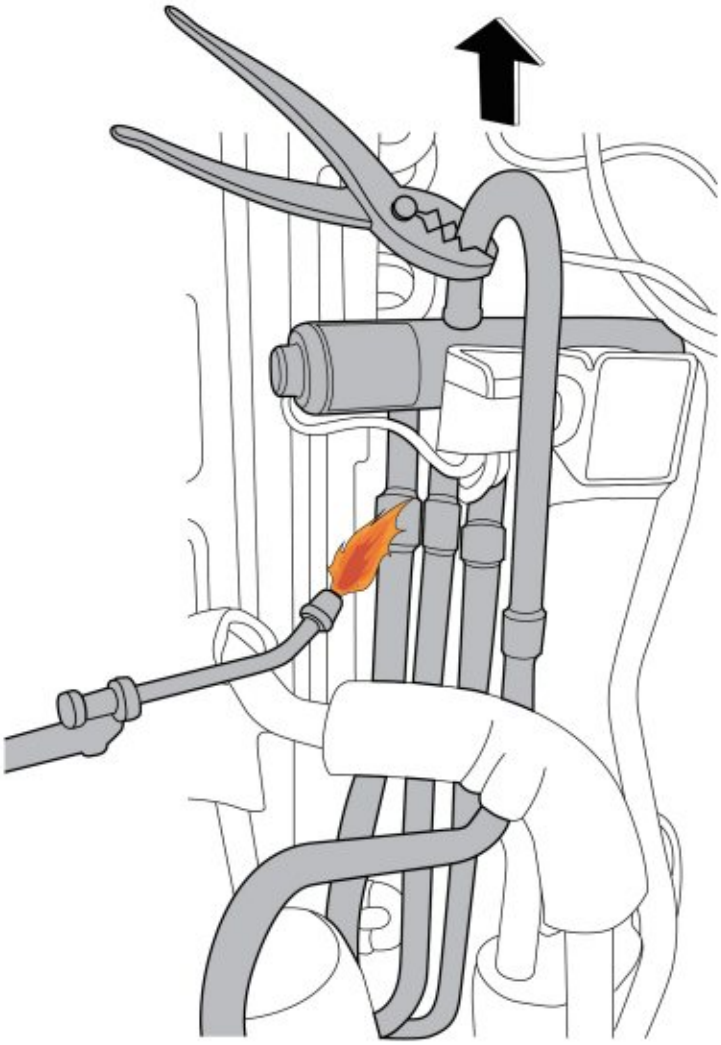
Procedure	Illustration
1) Remove the sound blanket (side and top) (see CJ_ODU_INV_006).	 CJ_ODU_INV_006

Note: This section is for reference only. Actual unit appearance may vary.

5. Four-way valve

WARNING: Recover refrigerant from the refrigerant circuit before remove the four-way valve.

Note: Remove the panel plate, electrical parts, and fan assembly (refer to 1. Panel plate, 2. Electrical parts, and 3. Fan assembly) before disassembling four-way valve.

Procedure	Illustration
1) Heat up the brazed parts and then detach the the four-way valve and the pipe (see CJ_ODU_INV_007). 2) Remove the four-way valve assembly with pliers.	

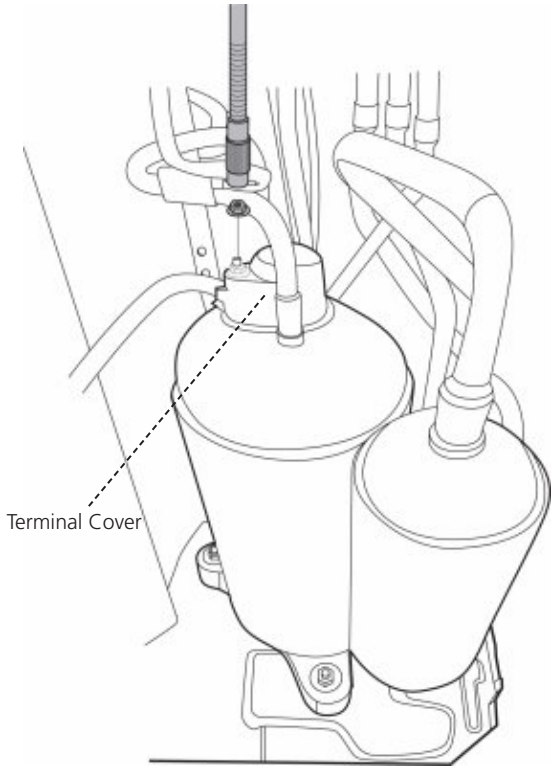
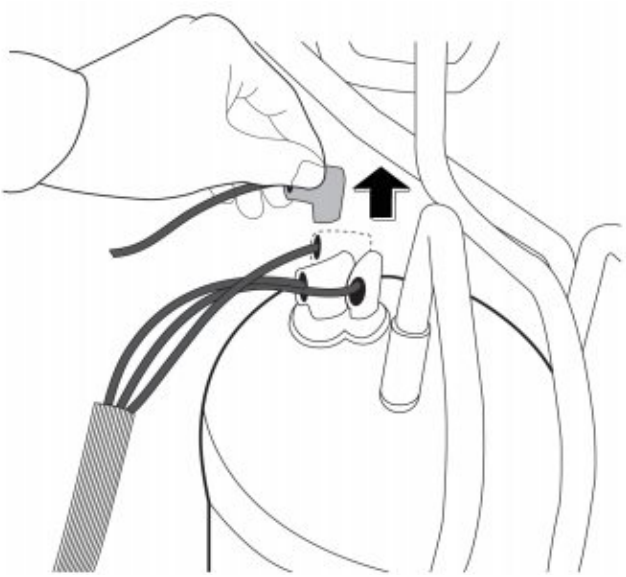
CJ_ODU_INV_007

Note: This section is for reference only. Actual unit appearance may vary.

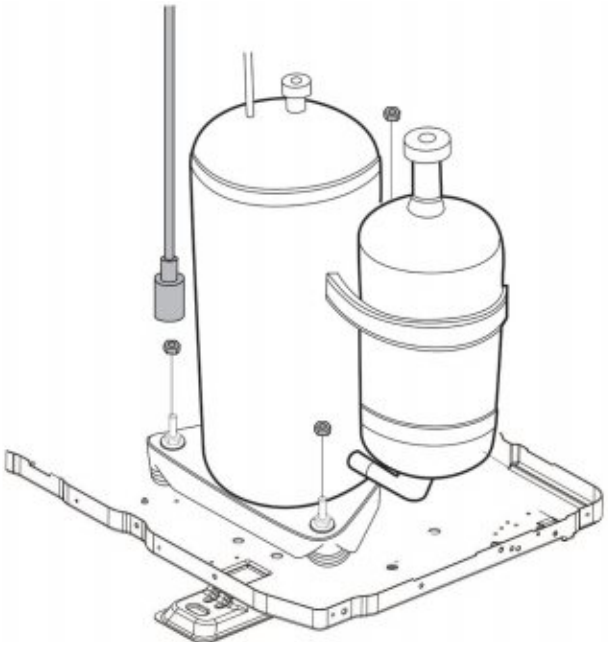
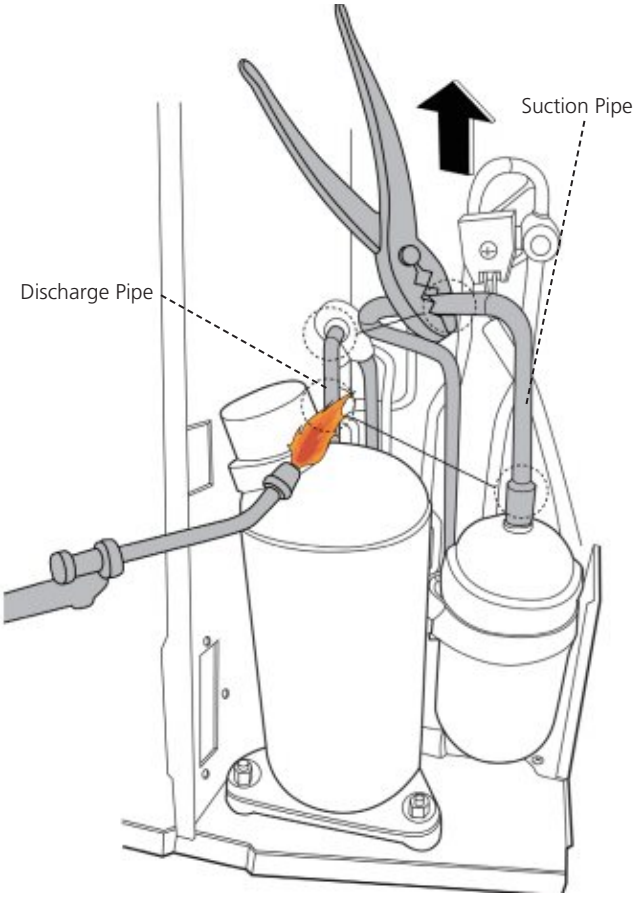
6. Compressor

WARNING: Recover refrigerant from the refrigerant circuit before remove the compressor.

Note: Remove the panel plate, electrical parts, and fan assembly (refer to 1. Panel plate, 2. Electrical parts, and 3. Fan assembly) before disassembling compressor.

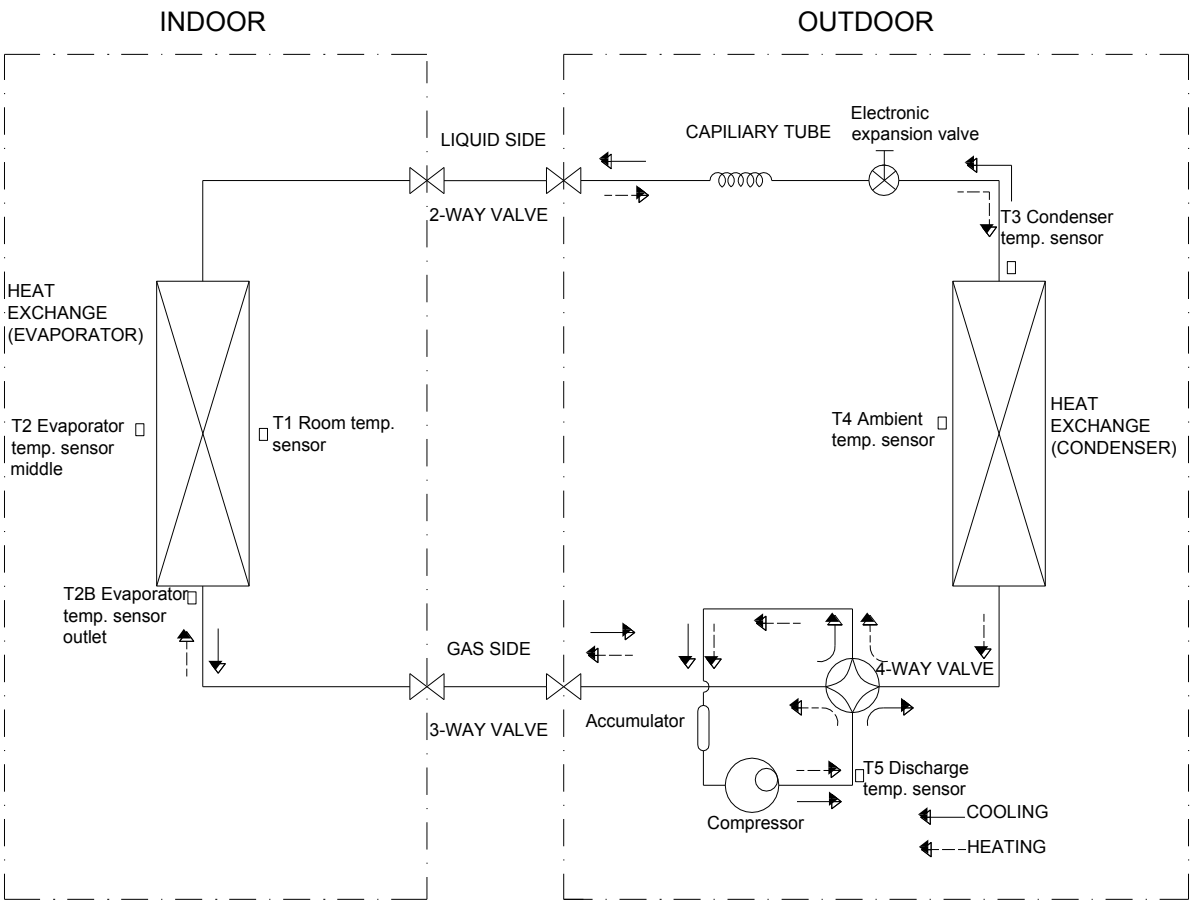
Procedure	Illustration
1) Remove the flange nut of terminal cover and remove the terminal cover (see CJ_ODU_INV_008).	 CJ_ODU_INV_008
2) Disconnect the connectors (see CJ_ODU_INV_009).	 CJ_ODU_INV_009

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Remove the hex nuts and washers securing the compressor, located on the bottom plate (see CJ_ODU_INV_010).	 CJ_ODU_INV_010
4) Heat up the brazed parts and then remove the the discharge pipe and the suction pipe (see CJ_ODU_INV_011). 5) Lift the compressor from the base pan assembly with pliers.	 CJ_ODU_INV_011

Note: This section is for reference only. Actual unit appearance may vary.

3. Refrigerant Cycle Diagram



Troubleshooting

Contents

1. Safety Caution 50

2. General Troubleshooting 51

3. Error Diagnosis and Troubleshooting Without Error Code.....52

3.1 Remote maintenance.....52

3.2 Field maintenance 53

4. Quick Maintenance by Error Code.....58

5. Troubleshooting by Error Code.....59

5.1 Common Check Procedures.....59

5.2 E0/F4/EA (EEPROM parameter error) 61

5.3 E1 (Indoor and outdoor unit communication error) 62

5.4 E3/F5 (Fan speed is operating outside of the normal range) 64

5.5 EF (Intelligent eye module error diagnosis and solution) 66

5.6 E4/E5/F1/F2/F3 (Open circuit or short circuit of temperature sensor diagnosis and solution).....67

5.7 Eb (Communication error between the indoor PCB and display board).....68

5.8 F0(Overload current protection diagnosis and solution).....69

5.9 P0(IPM malfunction or IGBT over-strong current protection diagnosis and solution).....70

5.10 P1(Over voltage or too low voltage protection diagnosis and solution).....71

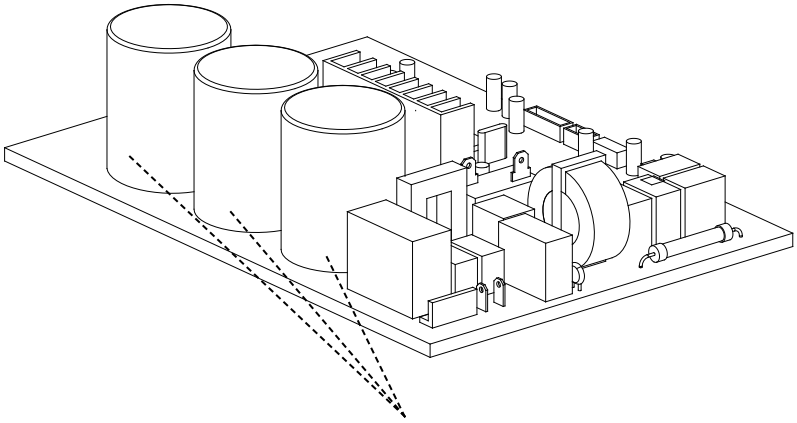
5.11 P2(High temperature protection of IPM module diagnosis and solution).....73

5.12 P4(Inverter compressor drive error diagnosis and solution) 74

1. Safety Caution

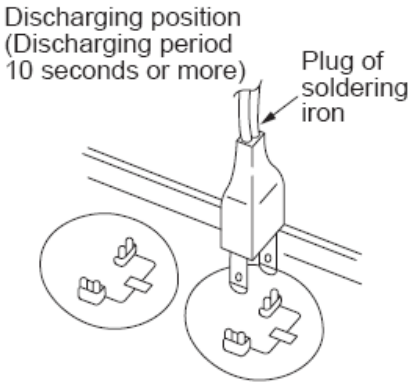
WARNING

Electricity remains in capacitors even when the power supply is off.
Ensure the capacitors are fully discharged before troubleshooting.



Electrolytic Capacitors

For other models, connect discharge resistance (approx.100Ω 40W) or a soldering iron plug between the positive and negative terminals of the electrolytic capacitor. The terminals are located on the bottom surface of the outdoor PCB.



Note: This picture is for reference only. Actual appearances may vary.

2. General Troubleshooting

2.1 Error Display (Indoor Unit)

When the indoor unit encounters a recognized error, an error code will be displayed. These error codes are described in the following table:

Display	Error Information	Solution
E0/ER	Indoor unit EEPROM parameter error	Page 61
E1	Indoor / outdoor units communication error	Page 62
E3	The indoor fan speed is operating outside of the normal range	Page 64
E4	Indoor room temperature sensor T1 is in open circuit or has short circuited	Page 67
E5	Evaporator coil temperature sensor T2 is in open circuit or has short circuited	Page 67
E8	Communication error between the indoor PCB and display board	Page 68
EF	Intelligent eye module error	Page 66
F0	Overload current protection	Page 69
F1	Outdoor ambient temperature sensor T4 open circuit or short circuit	Page 67
F2	Condenser coil temperature sensor T3 is in open circuit or has short circuited	Page 67
F3	Compressor discharge temperature sensor TP open circuit or short circuit	Page 67
F4	Outdoor unit EEPROM parameter error	Page 61
F5	The outdoor fan speed is operating outside of the normal range	Page 64
P0	IPM malfunction or IGBT over-strong current protection	Page 70
P1	Over voltage or over low voltage protection	Page 71
P2	High temperature protection of IPM module	Page 73
P4	Inverter compressor drive error	Page 74

For other errors:

The display board may show a garbled code or a code undefined by the service manual. Ensure that this code is not a temperature reading.

Troubleshooting:

Test the unit using the remote control. If the unit does not respond to the remote, the indoor PCB requires replacement. If the unit responds, the display board requires replacement.

3. Error Diagnosis and Troubleshooting Without Error Code

WARNING

Be sure to turn off unit before any maintenance to prevent damage or injury.

3.1 Remote maintenance

SUGGESTION: When troubles occur, please check the following points with customers before field maintenance.

	Problem	Solution
1	Unit will not start	Page 54-55
2	The power switch is on but fans will not start	Page 54-55
3	The temperature on the display board cannot be set	Page 54-55
4	Unit is on but the wind is not cold(hot)	Page 54-55
5	Unit runs, but shortly stops	Page 54-55
6	The unit starts up and stops frequently	Page 54-55
7	Unit runs continuously but insufficient cooling(heating)	Page 54-55
8	Cool can not change to heat	Page 54-55
9	Unit is noisy	Page 54-55

3.2 Field maintenance

	Problem	Solution
1	Unit will not start	Page 56-57
2	Compressor will not start but fans run	Page 56-57
3	Compressor and condenser (outdoor) fan will not start	Page 56-57
4	Evaporator (indoor) fan will not start	Page 56-57
5	Condenser (Outdoor) fan will not start	Page 56-57
6	Unit runs, but shortly stops	Page 56-57
7	Compressor short-cycles due to overload	Page 56-57
8	High discharge pressure	Page 56-57
9	Low discharge pressure	Page 56-57
10	High suction pressure	Page 56-57
11	Low suction pressure	Page 56-57
12	Unit runs continuously but insufficient cooling	Page 56-57
13	Too cool	Page 56-57
14	Compressor is noisy	Page 56-57
15	Horizontal louver can not revolve	Page 56-57

1.Remote Maintenance	Electrical Circuit							Refrigerant Circuit						
Possible causes of trouble	Power failure	The main power tripped	Loose connections	Faulty transformer	The voltage is too high or too low	The remote control is powered off	Broken remote control	Dirty air filter	Dirty condenser fins	The setting temperature is higher/lower than the room's(cooling/heating)	The ambient temperature is too high/low when the mode is cooling/heating	Fan mode	SILENCE function is activated(optional function)	Frosting and defrosting frequently
Unit will not start	☆	☆	☆	☆										
The power switch is on but fans will not start			☆	☆	☆									
The temperature on the display board cannot be set						☆	☆							
Unit is on but the wind is not cold(hot)										☆	☆	☆		
Unit runs, but shortly stops					☆					☆	☆			
The unit starts up and stops frequently					☆						☆			☆
Unit runs continuously but insufficient cooling(heating)								☆	☆	☆	☆		☆	
Cool can not change to heat														
Unit is noisy														
Test method / remedy	Test voltage	Close the power switch	Inspect connections - tighten	Change the transformer	Test voltage	Replace the battery of the remote control	Replace the remote control	Clean or replace	Clean	Adjust the setting temperature	Turn the AC later	Adjust to cool mode	Turn off SILENCE function.	Turn the AC later

Check heat load			☆							Heavy load condition
Tighten bolts or screws	☆									Loosen hold down bolts and / or screws
Close all the windows and doors			☆							Bad airproof
Remove the obstacles			☆	☆						The air inlet or outlet of either unit is blocked
Reconnect the power or press **ON/OFF** button on remote control to restart								☆		Interference from cell phone towers and remote boosters
Remove them	☆									Shipping plates remain attached

Others

2.Field Maintenance	Electrical Circuit														
Possible causes of trouble	Power failure	Blown fuse or varistor	Loose connections	Shorted or broken wires	Safety device opens	Faulty thermostat / room temperature sensor	Wrong setting place of temperature sensor	Faulty transformer	Shorted or open capacitor	Faulty magnetic contactor for compressor	Faulty magnetic contactor for fan	Low voltage	Faulty stepping motor	Shorted or grounded compressor	Shorted or grounded fan motor
Unit will not start	☆	☆	☆	☆	☆			☆							
Compressor will not start but fans run				☆		☆			☆	☆				☆	
Compressor and condenser (outdoor) fan will not start				☆		☆				☆					
Evaporator (indoor) fan will not start				☆					☆		☆				☆
Condenser (Outdoor) fan will not start				☆		☆			☆		☆				☆
Unit runs, but shortly stops										☆		☆			
Compressor short-cycles due to overload										☆		☆			
High discharge pressure															
Low discharge pressure															
High suction pressure															
Low suction pressure															
Unit runs continuously but insufficient cooling															
Too cool						☆	☆								
Compressor is noisy															
Horizontal louver can not revolve			☆	☆									☆		
Test method / remedy	Test voltage	Inspect fuse type & size	Inspect connections - tighten	Test circuits with tester	Test continuity of safety device	Test continuity of thermostat / sensor & wiring	Place the temperature sensor at the central of the air inlet grille	Check control circuit with tester	Check capacitor with tester	Test continuity of coil & contacts	Test continuity of coil & contacts	Test voltage	Replace the stepping motor	Check resistance with multimeter	Check resistance with multimeter

Replace the compressor														☆		Compressor stuck	Refrigerant Circuit
Leak test				☆	☆		☆		☆	☆						Shortage of refrigerant	
Replace restricted part				☆	☆					☆						Restricted liquid line	
Clean or replace				☆	☆											Dirty air filter	
Clean coil				☆	☆											Dirty evaporator coil	
Check fan				☆	☆											Insufficient air through evaporator coil	
Change charged refrigerant volume		☆				☆		☆	☆	☆						Overcharge of refrigerant	
Clean condenser or remove obstacle				☆				☆	☆	☆						Dirty or partially blocked condenser	
Purge, evacuate and recharge				☆				☆								Air or incompressible gas in refrigerant cycle	
Remove obstruction to air flow				☆				☆								Short cycling of condensing air	
Remove obstruction in air or water flow								☆								High temperature condensing medium	
Remove obstruction in air or water flow								☆								Insufficient condensing medium	
Replace compressor		☆														Broken compressor internal parts	
Test compressor efficiency				☆		☆	☆									Inefficient compressor	
Replace valve					☆											Expansion valve obstructed	
Replace valve					☆					☆						Expansion valve or capillary tube closed completely	
Replace valve					☆					☆						Leaking power element on expansion valve	
Fix feeler bulb						☆										Poor installation of feeler bulb	
Check heat load				☆		☆										Heavy load condition	Others
Tighten bolts or screws		☆														Loosen hold down bolts and / or screws	
Remove them		☆														Shipping plates remain attached	
Choose AC of lager capacity or add the number of AC				☆												Poor choices of capacity	
Rectify piping so as not to contact each other or with external plate		☆														Contact of piping with other piping or external plate	

4. Quick Maintenance by Error Code

If you do not have the time to test whether specific parts are faulty, you can directly change the required parts according the error code.

You can find the parts to replace by error code in the following table.

Part requiring replacement	Error Code								
	E0	ER	E1	E3	E4	E5	E8	EF	F0
Indoor PCB	✓	✓	✓	✓	✓	✓	✓	x	x
Outdoor PCB	x	x	✓	x	x	x	x	x	✓
Display Board	x	x	x	x	x	x	✓	x	x
Reactor	x	x	✓	x	x	x	x	x	x
Indoor fan motor	x	x	x	✓	x	x	x	x	x
Outdoor fan motor	x	x	x	X	x	x	x	x	x
Temperature sensor	x	x	x	x	✓	✓	x	x	x
T2 Sensor	x	x	x	x	x	x	x	x	x
Additional refrigerant	x	x	x	x	x	x	x	x	x
Compressor	x	x	x	x	x	x	x	x	✓
IPM board	x	x	x	x	x	x	x	x	x
Outdoor unit	x	x	x	x	x	x	x	x	✓
Intelligent Eye	x	x	x	x	x	x	x	✓	x

Part requiring replacement	Error Code								
	F1	F2	F3	F4	F5	P0	P1	P2	P4
Indoor PCB	x	x	x	x	x	x	x	x	x
Outdoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display Board	x	x	x	x	x	x	x	x	x
Reactor	x	x	x	x	x	x	✓	x	x
Indoor fan motor	x	x	x	x	x	x	x	x	x
Outdoor fan motor	x	x	x	x	✓	x	x	x	x
Temperature sensor	✓	✓	✓	x	x	x	X	x	x
T2 Sensor	x	x	x	x	x	x	x	x	x
Additional refrigerant	x	x	x	x	x	x	x	x	x
Compressor	x	x	x	x	x	✓	x	x	✓
IPM board	x	x	x	x	x	✓	✓	x	✓
Outdoor unit	x	x	x	x	x	x	x	x	x
Intelligent Eye	x	x	x	x	x	x	x	x	x

5. Troubleshooting by Error Code

5.1 Common Check Procedures

5.1.1 Temperature Sensor Check

Disconnect the temperature sensor from PCB, measure the resistance value with a tester.

Temperature Sensors.

Room temp.(T1) sensor,

Indoor coil temp.(T2) sensor,

Outdoor coil temp.(T3) sensor,

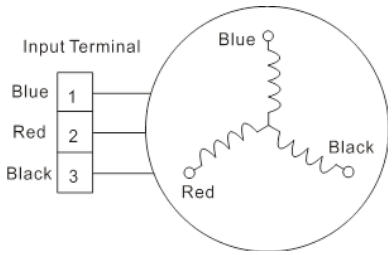
Outdoor ambient temp.(T4) sensor,

Compressor discharge temp.(Tp) sensor.

Measure the resistance value of each winding by using the multi-meter.

5.1.2 Compressor checking

Measure the resistance value of each winding by using the tester.



Position	Resistance Value
	KTN110D42UFZ
Blue - Red	1.82Ω(20°C/68°F)
Blue - Black	
Red - Blue	



5.1.3 IPM Continuity Check

Turn off the power, let the large capacity electrolytic capacitors discharge completely, and dismount the IPM. Use a digital tester to measure the resistance between P and UVWN; UVW and N.

Digital tester		Normal resistance value	Digital tester		Normal resistance value
(+)Red	(-)Black		(+)Red	(-)Black	
P	N	∞	U	N	∞
	U		V		
	V	(Several MΩ)	W		(Several MΩ)
	W		(+)Red		

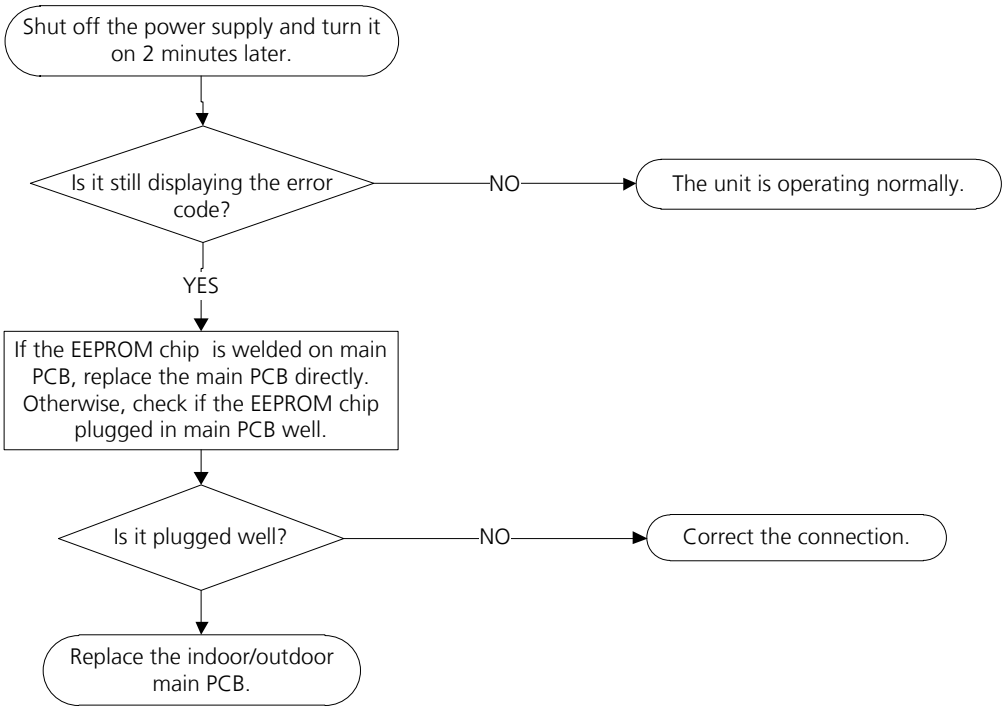
5.2 E0/F4/EA (EEPROM parameter error)

Description: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare:

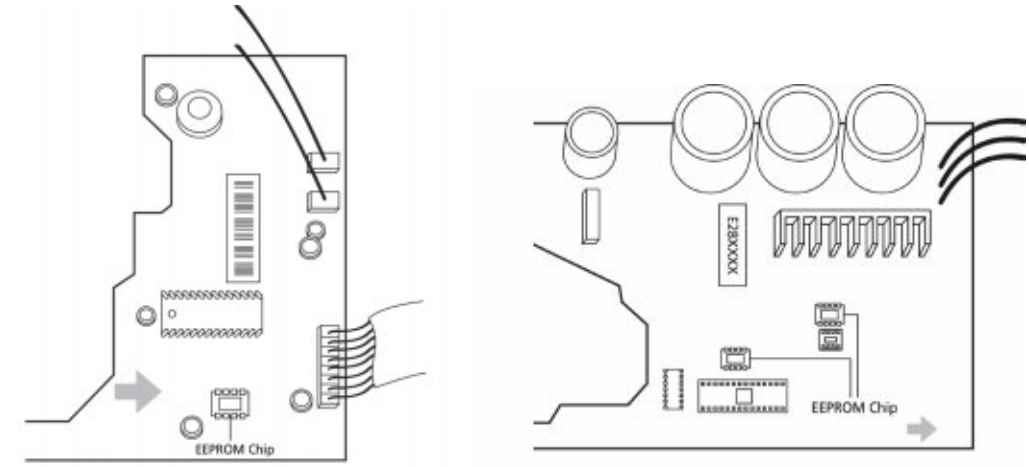
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:



Remarks:

The location of the EEPROM chip on the indoor and outdoor PCB is shown in the following two images:



Note: These images are for reference only.

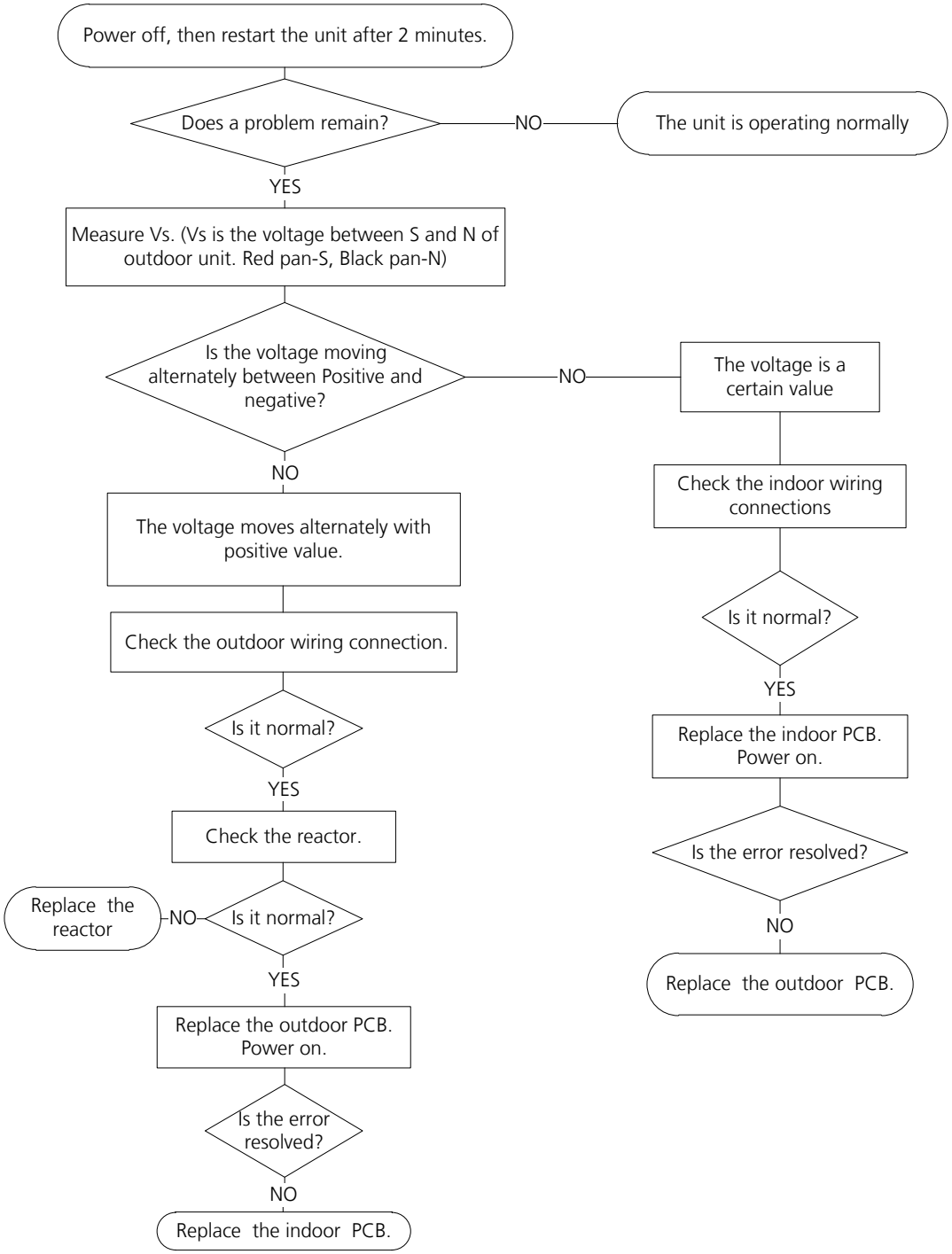
5.3 E1 (Indoor and outdoor unit communication error)

Description: The indoor unit has not received feedback from the outdoor unit for 150 seconds, four consecutive times.

Recommended parts to prepare:

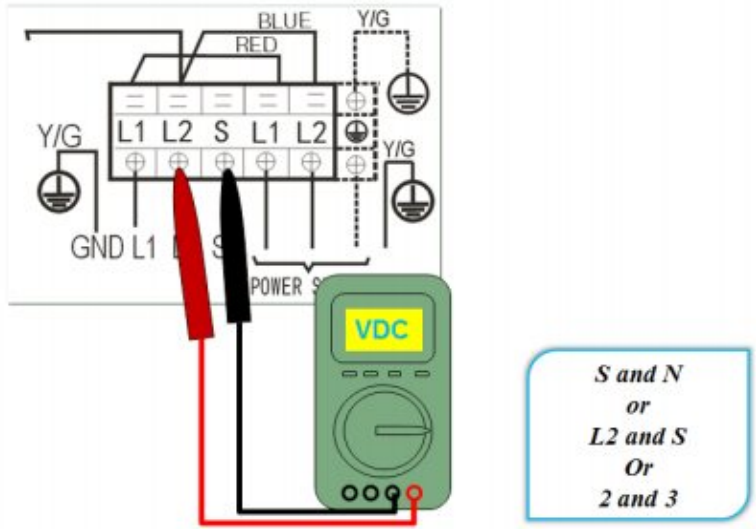
- Indoor PCB
- Outdoor PCB
- Reactor

Troubleshooting and repair:



Remarks:

- Use a multimeter to test the DC voltage between 2 port and 3 port of outdoor unit. The red pin of multimeter connects with 2 port while the black pin is for 3 port.
- When AC is normal running, the voltage is moving alternately as positive values and negative values.
- If the outdoor unit has malfunction, the voltage has always been the positive value.
- While if the indoor unit has malfunction, the voltage is a fixed value.



- Use a multimeter to test the resistance of the reactor which does not connect with capacitor.
- The normal value should be around zero ohm. Otherwise, the reactor must have malfunction.



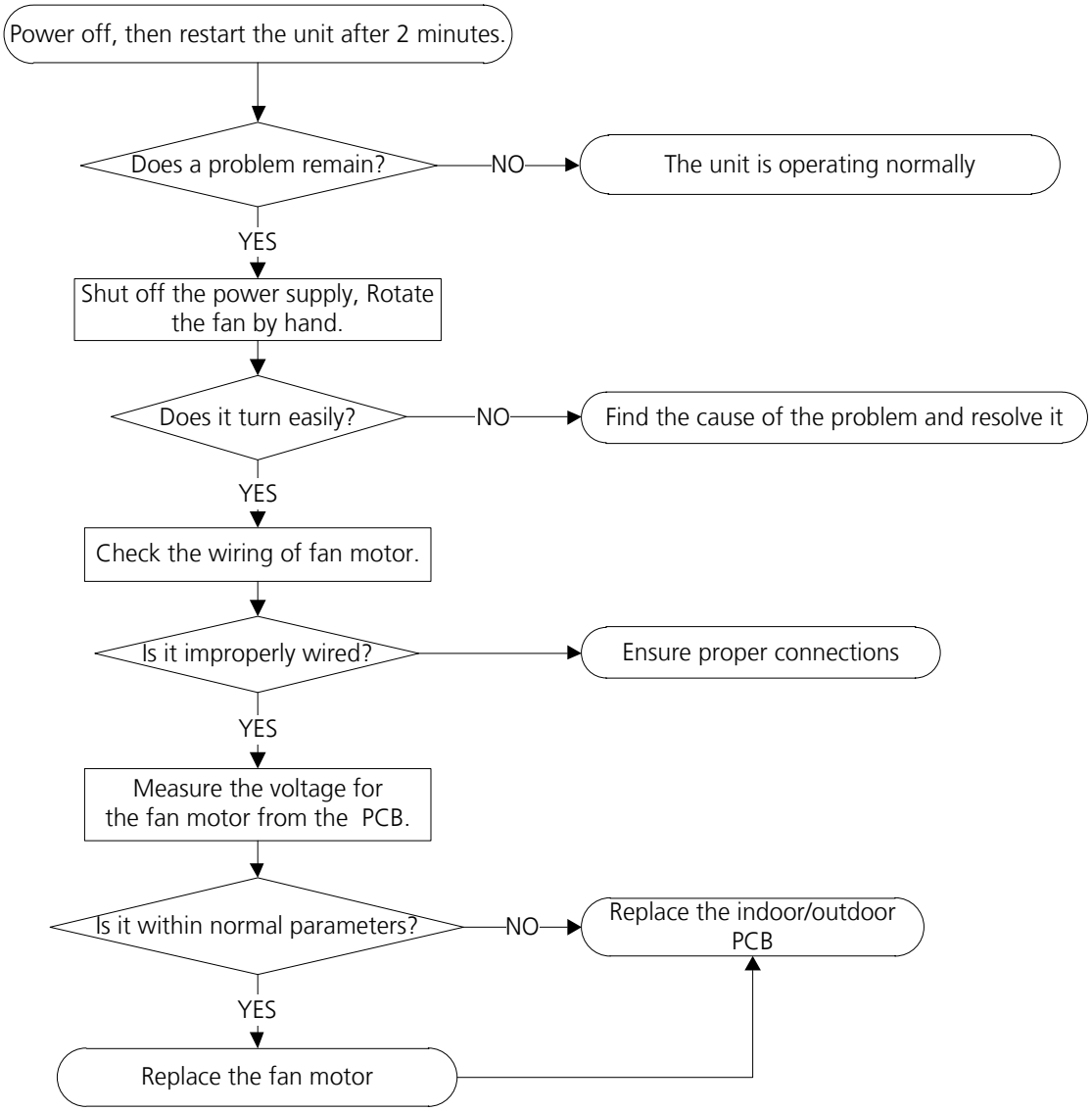
5.4 E3/F5(Fan speed is operating outside of the normal range)

Description: When the indoor fan speed keeps too low (300RPM) or too high (1500RPM) for certain time, the unit will stop and the LED will display the failure(E3). When the outdoor fan speed registers below 200RPM or over 1500RPM for an extended period of time, the unit will stop and the LED will display the failure(F5).

Recommended parts to prepare:

- Wiring mistake
- Faulty fan assembly
- Faulty fan motor
- Faulty PCB

Troubleshooting and repair:



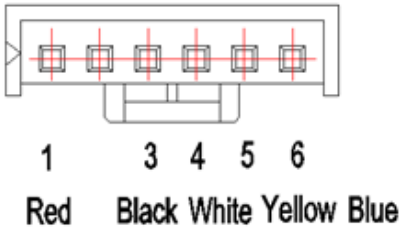
Index:

1. Indoor or Outdoor DC Fan Motor(control chip is in fan motor)

Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must has problems and need to be replaced.

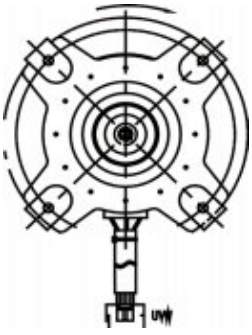
- DC motor voltage input and output (voltage: 220-240V~):

No.	Color	Signal	Voltage
1	Red	Vs/Vm	280V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	14-18.5V
5	Yellow	Vsp	0~5.6V
6	Blue	FG	14-18.5V



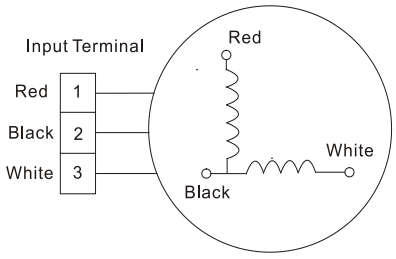
2. Outdoor DC Fan Motor (control chip is in outdoor PCB)

Power on ,and check if the fan can run normally, if the fan can run normally, the PCB must has problems and need to be replaced, If the fan can't run normally, measure the resistance of each two pins. If the resistance is not equal to each other, the fan motor must have problems and need to be replaced, otherwise the PCB must has problems and need to be replaced.



3. Indoor AC Fan Motor

Power on and set the unit running in fan mode at high fan speed. After running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V(208~240V power supply) or 50V(115V power supply), the PCB must has problems and need to be replaced.



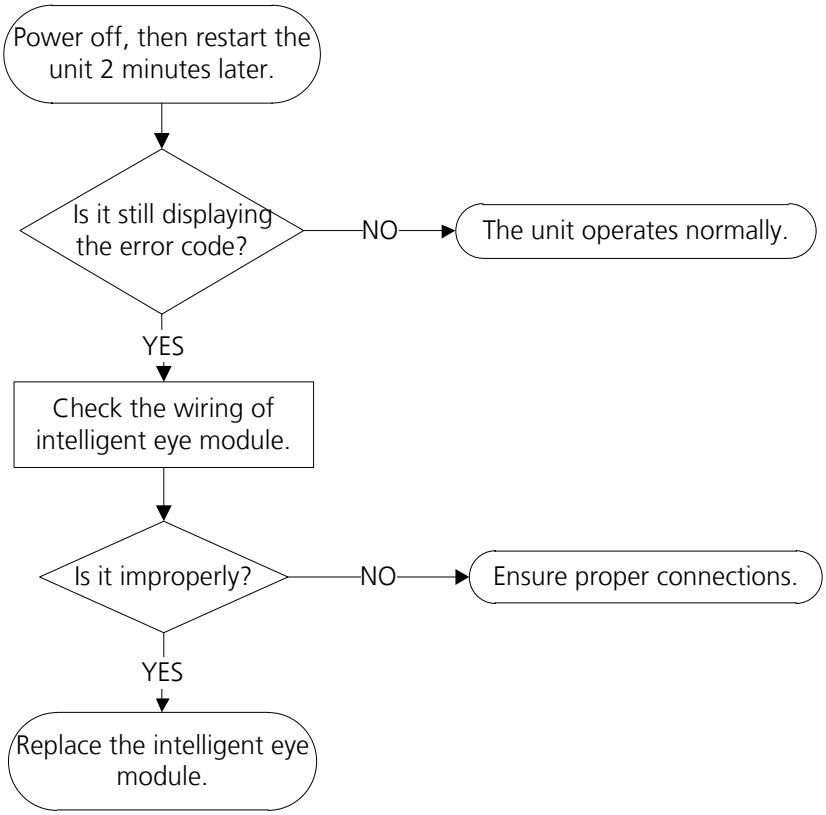
5.5 EF (Intelligent eye module error diagnosis and solution)

Description: If the intelligent eye module malfunctions, the LED will display the failure.

Recommended parts to prepare:

- Intelligent eye

Troubleshooting and repair:



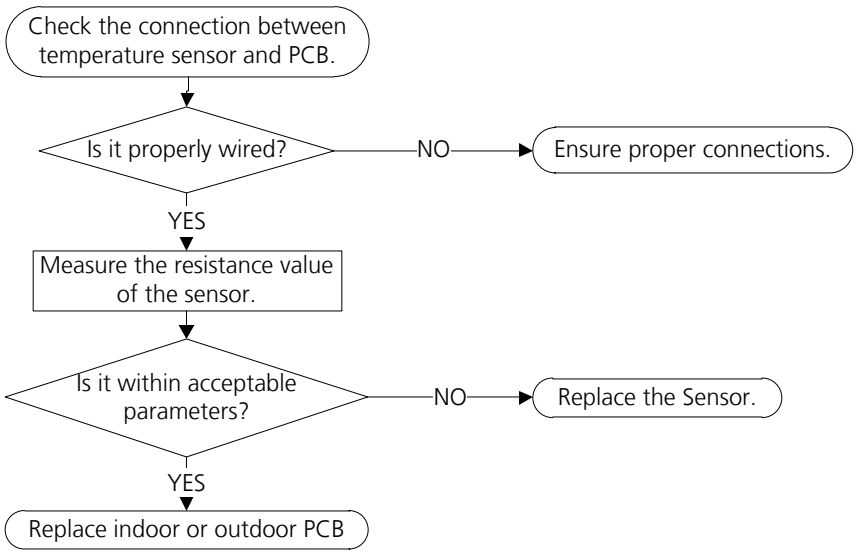
5.6 E4/E5/F1/F2/F3 (Open circuit or short circuit of temperature sensor diagnosis and solution)

Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED will display the failure.

Recommended parts to prepare:

- Wiring mistake
- Faulty sensor
- Faulty PCB

Troubleshooting and repair:





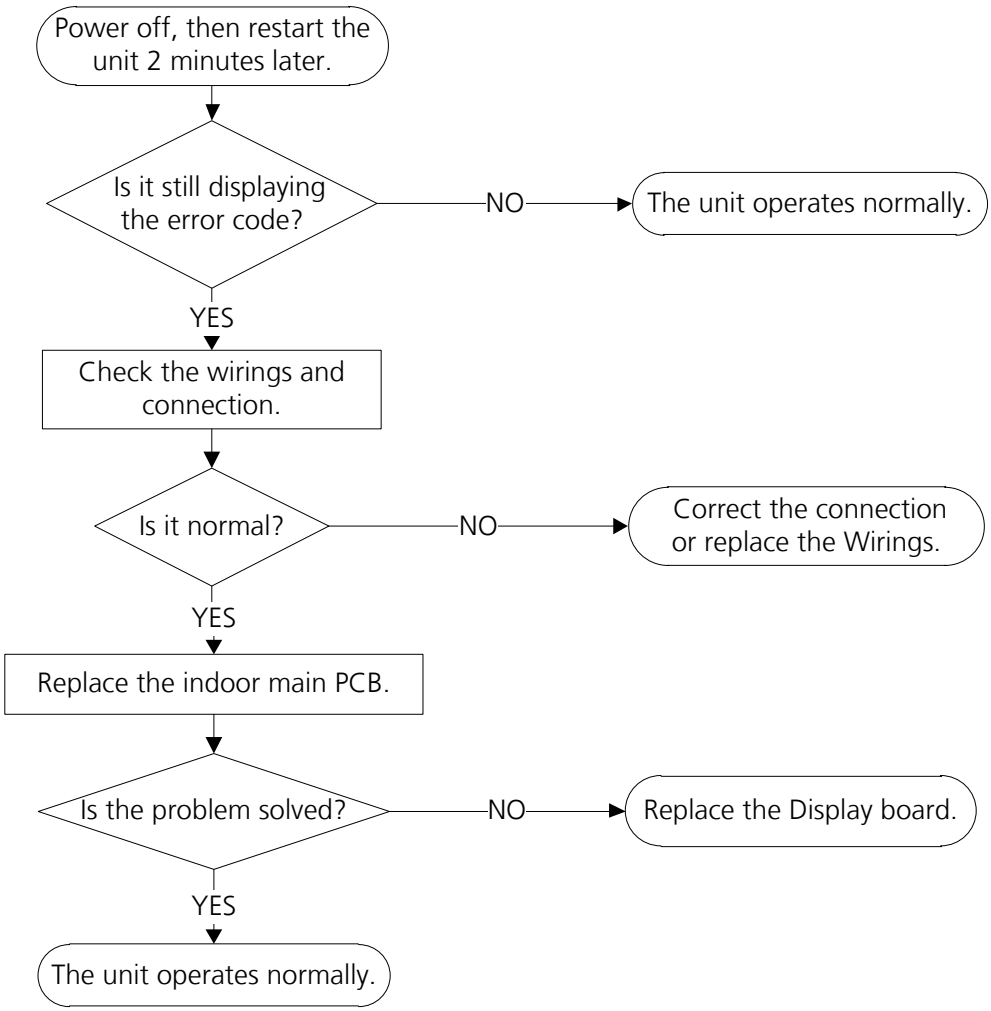
5.7 Eb (Communication error between the indoor PCB and display board)

Description: Indoor PCB does not receive feedback from Display board.

Recommended parts to prepare:

- Wiring mistake
- PCB faulty
- Display board malfunction

Troubleshooting and repair:



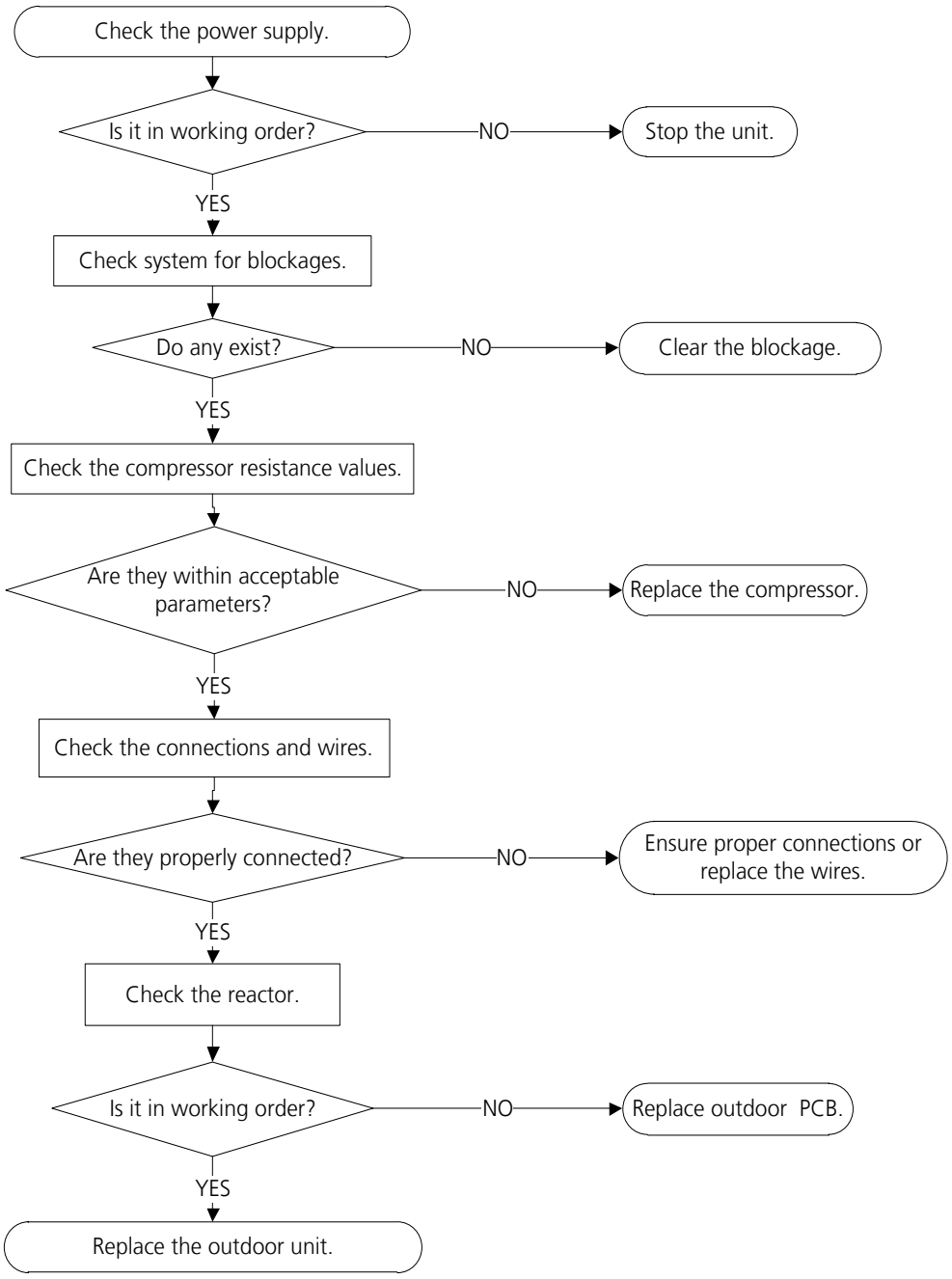
5.8 F0(Overload current protection diagnosis and solution)

Description: An abnormal current rise is detected by checking the specified current detection circuit.

Recommended parts to prepare:

- Power supply problems.
- System blockage
- Faulty PCB
- Wiring mistake
- Compressor malfunction

Troubleshooting and repair:



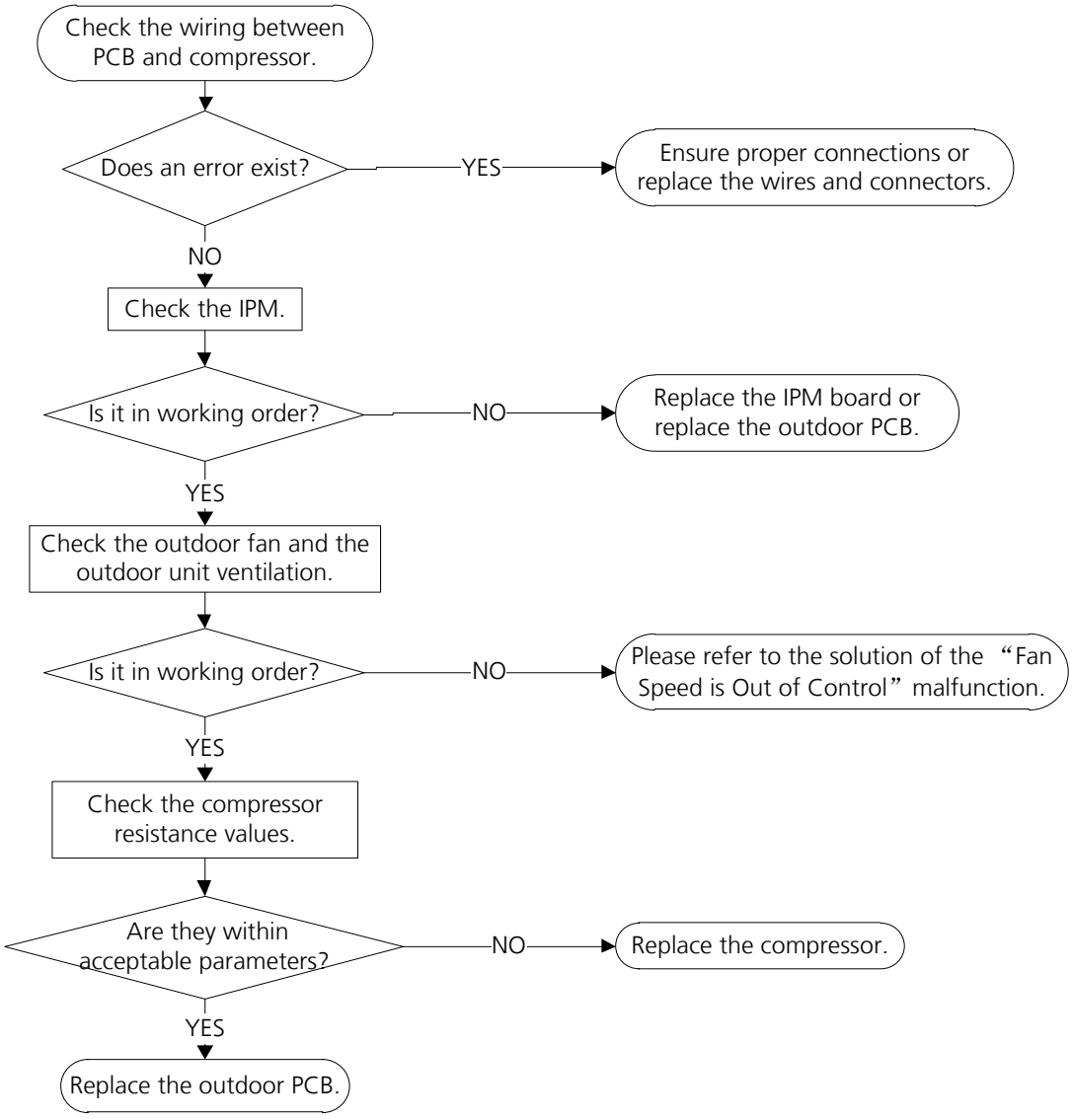
5.9 P0(IPM malfunction or IGBT over-strong current protection diagnosis and solution)

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the display LED shows "P0" and the AC turn off.

Recommended parts to prepare:

- Wiring mistake
- IPM malfunction
- Faulty outdoor fan assembly
- Compressor malfunction
- Faulty outdoor PCB

Troubleshooting and repair:



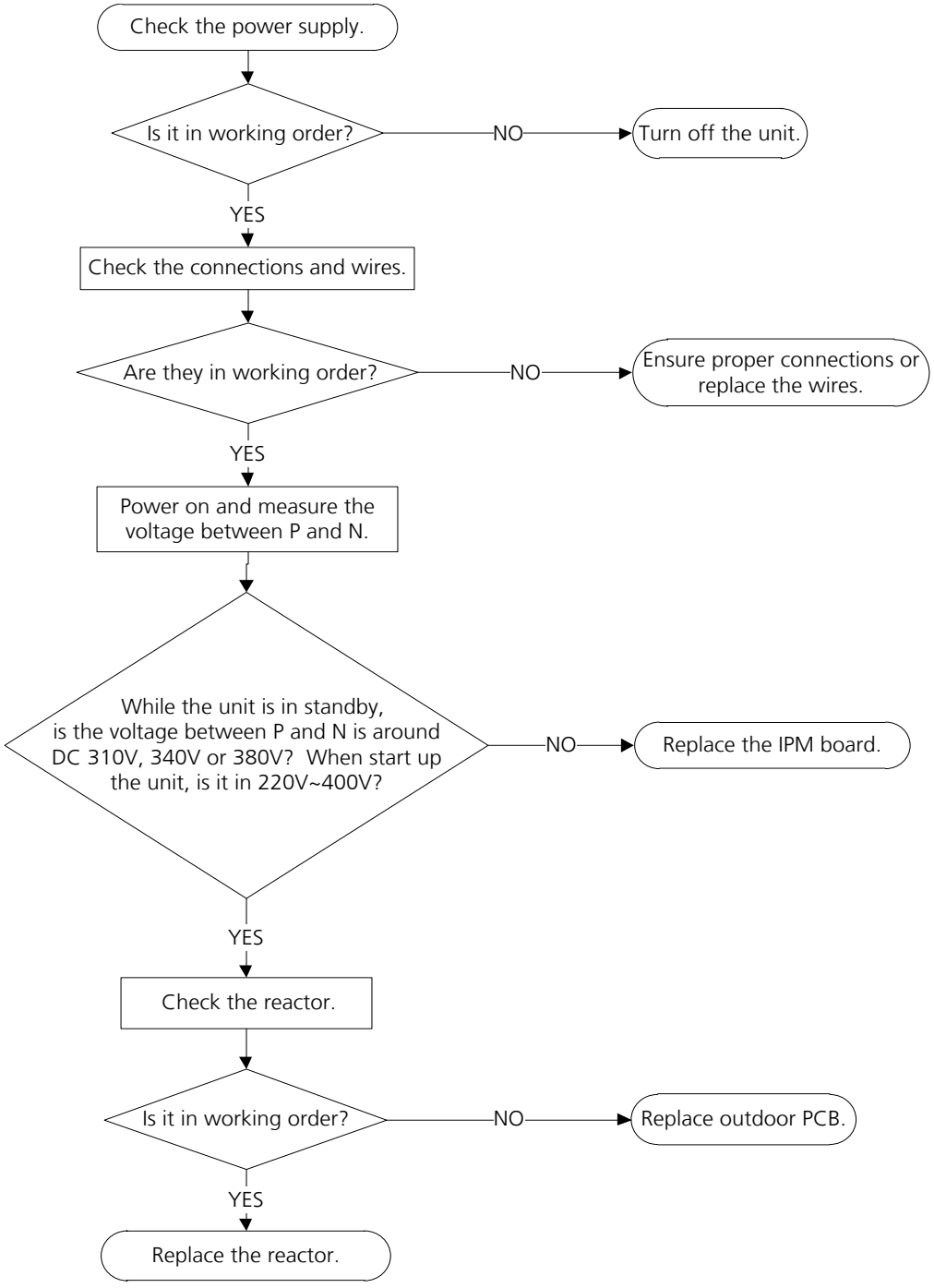
5.10 P1(Over voltage or too low voltage protection diagnosis and solution)

Description: Abnormal increases or decreases in voltage are detected by checking the specified voltage detection circuit.

Recommended parts to prepare:

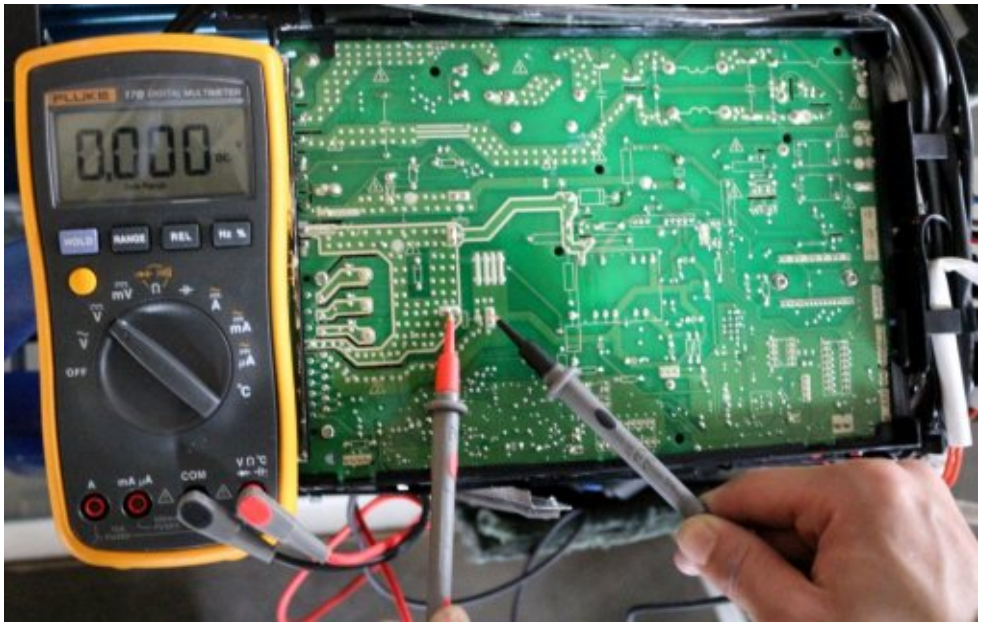
- Power supply issues
- System leakage or blockage
- Faulty PCB

Troubleshooting and repair:



Remark:

- Measure the DC voltage between P and N port. The normal value should be around 310V.



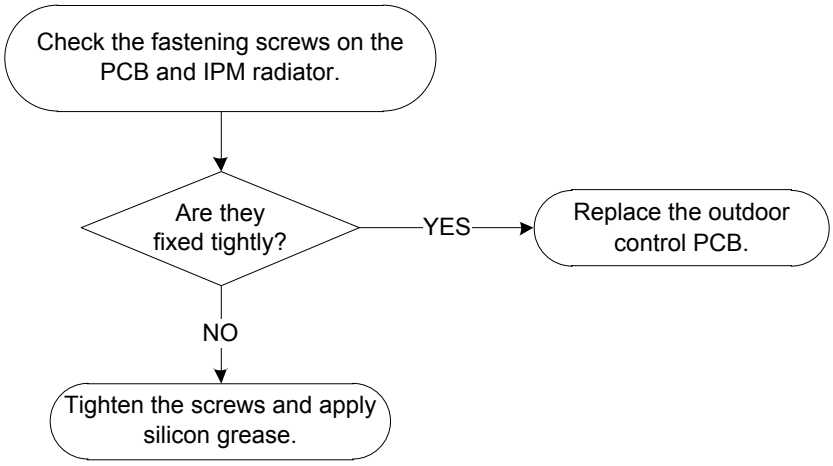
5.11 P2(High temperature protection of IPM module diagnosis and solution)

Description: If the temperature of IPM module is higher than limited value, the LED displays this failure code.

Recommended parts to prepare:

- Faulty PCB
- Connection problems

Troubleshooting and repair:



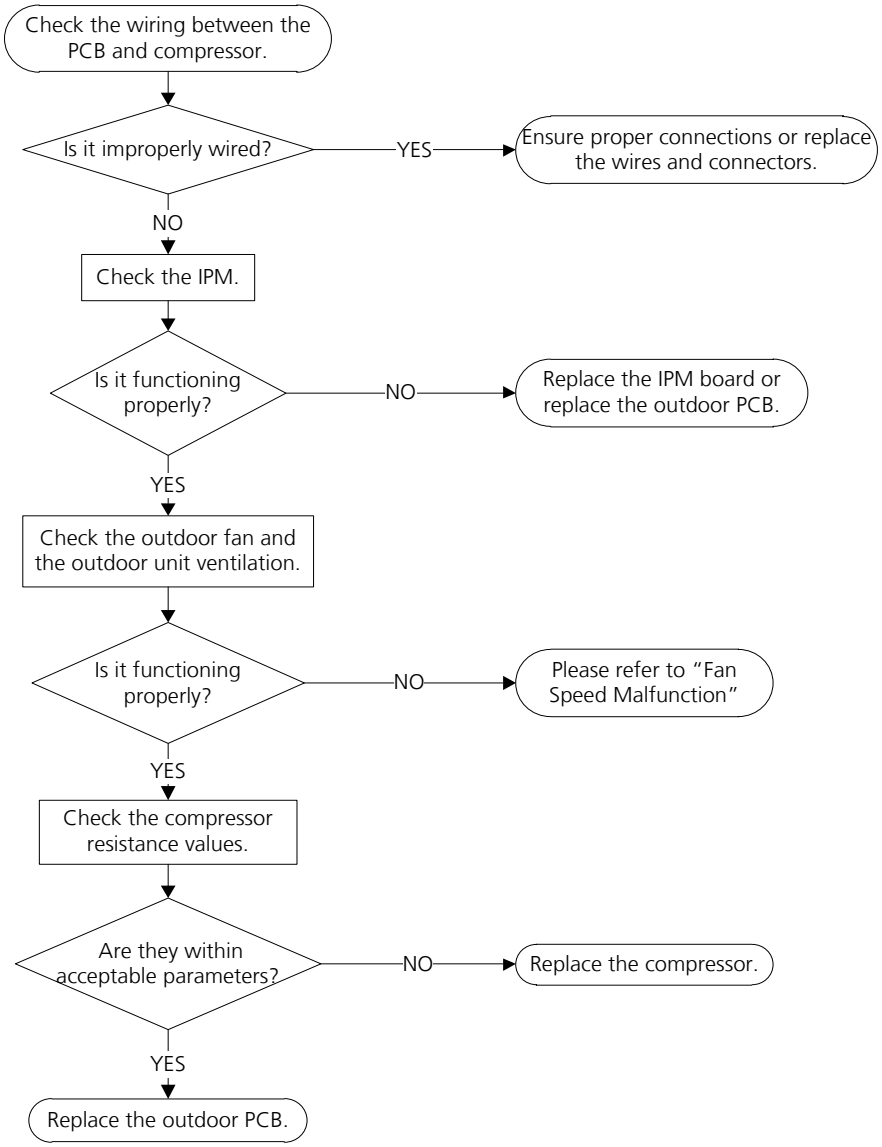
5.12 P4(Inverter compressor drive error diagnosis and solution)

Description: An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection and so on.

Recommended parts to prepare:

- Wiring mistake
- IPM malfunction
- Faulty outdoor fan assembly
- Compressor malfunction
- Faulty outdoor PCB

Troubleshooting and repair:



Appendix

Contents

i) Temperature Sensor Resistance Value Table for T1, T2, T3, and T4 (°C – K) 76

ii) Temperature Sensor Resistance Value Table for TP (°C – K).....77

iii) Pressure On Service Port 78

i) Temperature Sensor Resistance Value Table for T1,T2,T3 and T4 (°C – K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231

ii) Temperature Sensor Resistance Value Table for TP (°C – K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

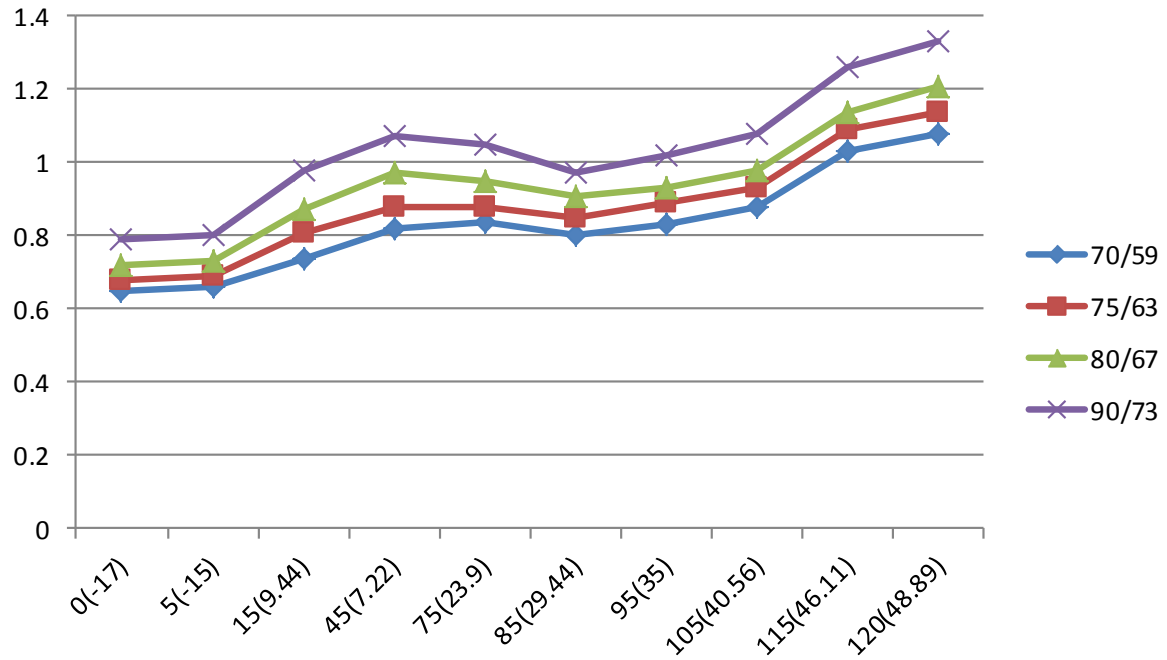
iii) Pressure On Service Port(R32)

Cooling chart:

°F(°C)	ODT / IDT	0(-17)	5(-15)	15 (9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
BAR	70/59	6.5	6.6	7.4	8.2	8.4	8.0	8.3	8.8	10.3	10.8
BAR	75/63	6.8	6.9	8.1	8.8	8.8	8.5	8.9	9.3	10.9	11.4
BAR	80/67	7.2	7.3	8.7	9.7	9.5	9.1	9.3	9.8	11.4	12.1
BAR	90/73	7.9	8.0	9.8	10.7	10.5	9.7	10.2	10.8	12.6	13.3

°F(°C)	ODT / IDT	0(-17)	5(-15)	15 (9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
PSI	70/59	95	96	108	118	121	115	119	128	150	157
PSI	75/63	99	101	117	128	126	122	129	135	158	165
PSI	80/67	105	106	125	141	138	132	135	143	165	176
PSI	90/73	114	115	142	155	152	141	148	157	184	193

°F(°C)	ODT / IDT	0(-17)	5(-15)	15 (9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
MPA	70/59	0.65	0.66	0.74	0.82	0.84	0.80	0.83	0.88	1.03	1.08
MPA	75/63	0.68	0.69	0.81	0.88	0.88	0.85	0.89	0.93	1.09	1.14
MPA	80/67	0.72	0.73	0.87	0.97	0.95	0.91	0.93	0.98	1.14	1.21
MPA	90/73	0.79	0.80	0.98	1.07	1.05	0.97	1.02	1.08	1.26	1.33



Heating chart:

°F(°C)	ODT / IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
BAR	55	30.9	29.1	25.8	23.3	21.2	18.9	16.8
BAR	65	33.2	30.6	27.1	25.9	23.8	20.9	19.4
BAR	75	34.5	32.1	28.4	26.8	25.4	21.9	20.4

°F(°C)	ODT / IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
PSI	55	448	421	374	337	308	273	244
PSI	65	480	444	394	375	346	303	282
PSI	75	499	466	411	389	369	318	296

°F(°C)	ODT / IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
MPA	55	3.09	2.91	2.58	2.33	2.12	1.89	1.68
MPA	65	3.32	3.06	2.71	2.59	2.38	2.09	1.94
MPA	75	3.45	3.21	2.84	2.68	2.54	2.19	2.04

