

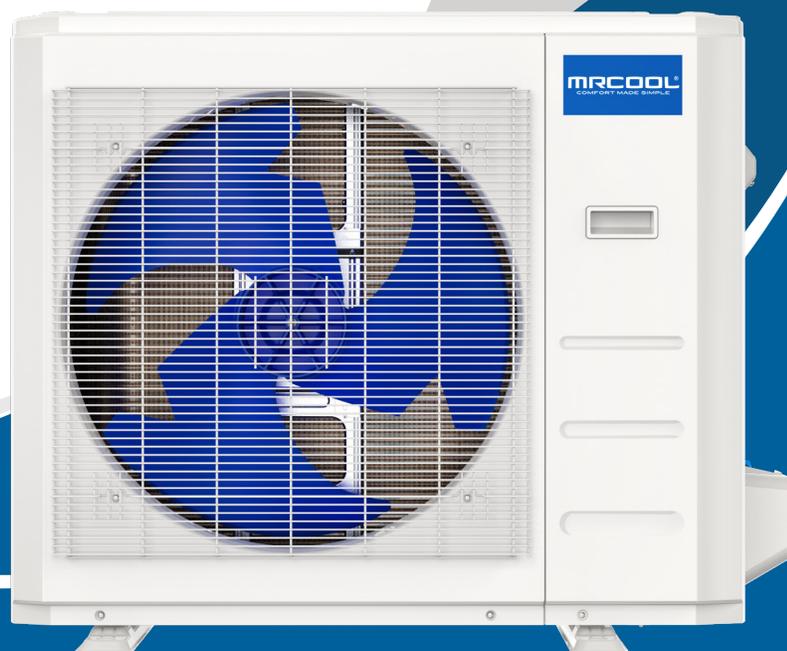
This product utilizes R-454B refrigerant

Advantage Series

SERVICE MANUAL

MODELS:

A-*-HP-WMAH-115D25-O
A-*-HP-WMAH-230D25-O
A-*-HP-C-115D25-O
A-*-HP-C-230D25-O



Read this manual carefully before installation and keep it where the operator can easily find it for future reference.

Due to updates and constantly improving performance, the information and instructions within this manual are subject to change without notice.

Version Date: March 11, 2025
Please visit www.mrcool.com/documentation
to ensure you have the latest version of this manual.



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Safety Precautions

Read Before Using

Incorrect usage may cause serious damage or injury.

The symbols below are used throughout this manual to indicate instructions that should be followed closely or actions that should be avoided to prevent death, injury, and/or property damage.



Indicates the possibility of personal injury or loss of life.



Indicates the possibility of property damage or serious consequences.

! WARNINGS FOR PRODUCT INSTALLATION

INSTALLATION MUST BE PERFORMED BY AN AUTHORIZED DEALER OR SPECIALIST. DEFECTIVE INSTALLATION CAN CAUSE WATER LEAKAGE, ELECTRICAL SHOCK, OR FIRE.

******ELECTRICAL WORK MUST BE COMPLETED BY A QUALIFIED ELECTRICAL TECHNICIAN******

-  **DO NOT** install the unit in a location that may be exposed to combustible gas leaks. If combustible gas accumulates around the unit, it could cause fire.
-  **DO NOT** turn on the power until the installation and all work has been completed.
-  **DO NOT** install a unit equipped with an auxiliary electric heater within 3 ft (1 m) of any combustible materials.

1. Turn off the unit and disconnect the power before performing any installation or repairs. Failure to do so can cause electric shock.
2. Installation must be performed according to the installation instructions. Improper installation could cause water leakage, electrical shock, fire, and could void the warranty. Contact an authorized service technician for repair or maintenance of this unit. This appliance must be installed in accordance with national wiring regulations.
3. Only use the included accessories, parts, and specified parts for installation. Using non-standard parts can cause water leakage, electrical shock, fire, and/or failure of the unit.
4. Install the unit in a firm location that can support the unit's weight. If the location cannot support the unit's weight, or the installation is not done properly, the unit may drop and cause serious injury and damage.
5. Install the drainage piping according to the instructions in this manual. Improper drainage could cause water damage to your home and/or property.
6. When moving or relocating the air conditioner, consult experienced service technicians for disconnection and re-installation of the unit.
7. For detailed information of how to install the indoor and outdoor units to their respective supports, please refer to the indoor unit installation and outdoor unit installation sections of this manual.
8. For units with a wireless network function, the USB device access, replacement, and maintenance operations must be carried out by professional staff.
9. Refer to details further in this manual regarding installing the unit to its support.



WARNINGS FOR PRODUCT USE

- ⓘ ***DO NOT*** insert fingers, rods, or other objects into the air inlet or outlet. This could cause injury, since the fan may be rotating at high speeds.
 - ⓘ ***DO NOT*** use flammable sprays such as hair spray, lacquer or paint near the unit, as this could cause fire and/or an explosion.
 - ⓘ ***DO NOT*** operate the unit in places near or around combustible gases. Emitted gas may collect around the unit and cause an explosion.
 - ⓘ ***DO NOT*** allow children to play with the appliance. Children must be supervised around the unit at all times.
 - ⓘ ***DO NOT*** operate the unit in a room where it could be exposed to excessive amounts of water, such as a bathroom or laundry room. Exposure to excessive water amounts can cause the electrical components to short circuit.
 - ⓘ ***DO NOT*** expose your body directly to direct cool airflow from the unit for a prolonged period of time.
1. If the unit operates abnormally (emits strange noises or a burning smell), immediately turn off the unit and disconnect the power in order to avoid electric shock, fire, and/or injury. Call your local dealer, or MRCOOL® tech support at (270) 366-0457, for further assistance.
 2. If the air conditioner is used together with burners or other heating devices, thoroughly ventilate the room in order to avoid an oxygen deficiency.
 3. In certain functional environments (such as kitchens and server rooms etc.), the use of specially designed air-conditioning units is highly recommended.
 4. This appliance can be used by children (8 years and older) and persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge if they have been given instruction concerning the use of the appliance and understand the hazards involved.
 5. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer, service agency, or the gas supplier.



ELECTRICAL WARNINGS

******ELECTRICAL WORK MUST BE COMPLETED BY A QUALIFIED ELECTRICAL TECHNICIAN******

- ⓘ ***DO NOT*** share the power supply with other appliances. The unit must be installed on a dedicated electrical circuit. An improper or insufficient power supply could cause fire and/or electrical shock.
1. The product must be properly grounded during installation or electrical shock could occur.
 2. Appropriate wiring standards, regulations, and the installation manual must be followed for all electrical work.
 3. If connecting power to fixed wiring, an all-pole disconnection device must be incorporated in the fixed wiring in accordance with the wiring rules and must meet the following requirements: at least 3 mm of clearances in all poles, a leakage current that may exceed 10 mA, and a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.
 4. For all electrical work, fuse the specified cables. Connect cables tightly and clamp them securely to prevent external forces from damaging the terminal. Improper electrical connections could overheat, causing fire and/or electrical shock.
 5. All electrical connections must be made according to the Electrical Connection Diagram located on the panels of the indoor and outdoor units.
 6. All wiring must be properly arranged to ensure that the control board cover can close properly. If the control board cover is not properly closed, it can lead to corrosion and cause the connection points on the terminal to heat up, catch fire, or cause electrical shock.
 7. Only use the specified wire. If the wire is damaged, it must be replaced by the manufacturer, its service agent, or similarly qualified person in order to avoid a hazard.
 8. Disconnection must be incorporated in the fixed wiring in accordance with the NEC, CEC, or local codes.



WARNINGS FOR CLEANING & MAINTENANCE

DO NOT clean the unit with excessive amounts of water.

DO NOT clean unit with combustibile cleaning agents, as these could cause deformation and/or fire.

1. Turn off the device and disconnect the power before cleaning. Failure to do this could result in electrical shock.

! CAUTION

DO NOT allow the air conditioner to operate for extended periods of time with the doors or windows open, or in very high humidity.

DO NOT operate the air conditioner with wet hands, as this could cause electric shock.

DO NOT use device for any other purpose than its intended use.

DO NOT climb onto or place objects on top of the outdoor unit.

1. Make sure that water condensation can drain smoothly and unhindered from the unit.
2. Turn off the unit and disconnect the power if the unit will not be used for an extended period of time.
3. As with any mechanical equipment, contact with sharp metal edges can result in personal injury. Ensure care is taken when handling the unit and any of its accessories by wearing gloves and protective clothing.

NOTE ON FLUORINATED GASES (NOT APPLICABLE FOR R-290 UNITS):

1. This unit contains fluorinated greenhouse gases.
2. For specific information on the type of gas and the amount, please refer to the relevant label on the unit itself.
3. Service, maintenance, and repair of this unit must be performed by a certified technician.
4. Product un-installation and recycling must be performed by a certified technician.
5. When checking the unit for leaks, maintain proper record-keeping of all checks.



FLAMMABLE REFRIGERANT WARNINGS

1. The installation of pipe-work should be kept to a minimum and should be protected from physical damage.
2. Refrigerant pipes should comply with national gas regulations.
3. All mechanical connections and ventilation openings should be kept clear of obstruction.
4. Utilize proper disposal processes based on national regulations.
5. Any person involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment specification.
6. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
7. Do not use any means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
8. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
9. Do not allow foreign matter (oil, water, etc.) to enter the piping, and securely seal the opening by pinching, taping, etc.
10. Do not pierce or burn.
11. Refrigerants may not contain an odor.
12. Working procedures that affect safety should only be carried out by competent persons.
13. The unit should be stored in a well-ventilated area where the room size corresponds to the room area as specific for operation, and should be stored so as to prevent potential mechanical damage from occurring.
14. Joints should be tested with detection equipment with a capability of 5 g/year of refrigerant or better, with the equipment in standstill and under operation or under a pressure of at least these standstill or operation conditions after installation. Detachable joints should NOT be used in the indoor side of the unit (brazed, welded joint could be used).
15. A leak detection system is installed. The unit must be powered except for service. For units with a refrigerant sensor, the indoor unit will display an error code and emit a buzzing sound, the compressor of the outdoor unit will immediately stop, and the indoor fan will start running. The service life of the refrigerant sensor is 15 years. When the refrigerant sensor malfunctions, the indoor unit will display the error code "FHCC". The refrigerant sensor cannot be repaired and can only be replaced by the manufacturer. It should only be replaced with the sensor specified by the manufacturer.
16. Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repairs to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.
17. Work should be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
18. All maintenance staff and others working in the local area should be instructed on the nature of work being carried out. Avoid work in confined spaces.
19. The area should 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.
20. If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment should be on site and readily available. Have a dry power or CO2 fire extinguisher adjacent to the charging area.
21. No person carrying out work in relation to a refrigerating system which involves exposing any pipe work should 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 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 should be displayed.
22. 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.



FLAMMABLE REFRIGERANT WARNINGS

23. 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 should be applied to installations using flammable refrigerants:
- the actual refrigerant charge 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 circuits should be checked for the presence of refrigerant;
 - marking to the equipment continues to be visible and legible, marking and signs that are illegible should 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.
24. 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 should be used.
25. Initial safety checks should include:
- that capacitors are discharged: this should be done in a safe manner to avoid the possibility of sparking;
 - that there are no live electrical components and wiring are exposed while charging, recovering, or purging the system;
 - that there is continuity of earth bonding.
26. Sealed electrical components should be replaced if damaged.
27. Intrinsically safe components should be replaced if damaged.
28. Check that wiring 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.
29. Under no circumstances should potential sources of ignition be used in the search for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) should not be used. The following leak detection methods are deemed acceptable for refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, 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 should be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% minimum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine may react with the refrigerant and corrode the copper work. Examples of leak detection fluids are the bubble method, fluorescent method agents, etc. If a leak is suspected, all naked flames should be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant should be recovered from the system, or isolated (by means of shut-off valves) in a part of the system remote from the leak. See the following instructions of removal of refrigerant.
30. When breaking into the refrigerant circuit to make repairs, or for any other purpose, conventional procedures should be used. However, for flammable refrigerants, it is even more vital to follow best practice. The following procedure should be adhered to:
- safely remove refrigerant following local and national regulations;
 - evacuate;
 - purge the circuit with inert gas;
 - evacuate;
 - continuously flush or purge with inert gas when using flame to open circuit;
 - open the circuit



FLAMMABLE REFRIGERANT WARNINGS

31. The refrigerant charge should be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For units containing flammable refrigerants, the system should be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. For appliances containing flammable refrigerants, refrigerant purging should be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process should be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system should be vented down to atmospheric pressure to enable work to take place. The outlet for the vacuum pump should not be close to any potential ignition sources, and ventilation should be available.
32. In addition to conventional charging procedures, the following requirements should be followed:
 - Work should be undertaken with appropriate tools only (in case of uncertainty, please consult the manufacturer of the tools for use with flammable refrigerants).
 - Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as shot as possible to minimize the amount of refrigerant contained in them.
 - Cylinders should be kept upright.
 - Ensure that the refrigeration system is grounded prior to charging the system with refrigerant.
 - Label the system when charging is complete (if not already).
 - Extreme care should be taken not to overfill the refrigeration system.
 - Prior to recharging the system, it should be pressure tested with oxygen-free nitrogen (OFN). The system should 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.
33. Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is good recommended practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample should be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.
 - a. Become familiar with the equipment and its operation.
 - b. Isolate the system electrically.
 - c. 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
 - d. Pump down refrigerant system, if possible.
 - e. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
 - f. Make sure that the cylinder is situated on the scales before recovery takes place.
 - g. Start the recovery machine and operate in accordance with instructions.
 - h. Do not overfill cylinders (no more than 80% volume liquid charge).
 - i. Do not exceed the maximum working pressure of the cylinder, even temporarily.
 - j. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and equipment are removed from the site promptly and all isolation valves on the equipment are closed off.
 - k. Recovered refrigerant should not be charged into another refrigeration system unless it has been cleaned and checked.
34. Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label should be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

FLAMMABLE REFRIGERANT WARNINGS

35. When removing refrigerant from a system, either for servicing or decommissioning, it is good recommended 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 number of cylinders for holding the total system charge is available. All cylinders to be used should be designated for the recovered refrigerant and labeled 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 should be in good working order with a set of instructions concerning the equipment that is at hand and should be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales should be available and in good working order. Hoses should be complete with leak-free disconnect couplings and in good condition. The recovered refrigerant should be processed according to local legislation 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 compressor body should not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it should be carried out safely.
36. An unventilated area where the appliance using flammable refrigerants is installed should be constructed so that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard. If appliances connected via an air duct system to one or more rooms below the ventilation requirements, that room should never contain potential ignition sources. A flame-producing device may be installed in the space if the device is provided with an effective flame arrest. Auxiliary devices which may be a potential ignition source should not be installed in the duct work. Examples of such are hot surfaces with a temperature exceeding 1292°F (700°C) and electric switching devices. Only auxiliary devices (such as a certified heater kit) approved by the manufacturer or declared suitable with the refrigerant should be installed in connecting ductwork. False or drop ceilings may be used as a return air plenum if a refrigerant detection system is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint. Refrigerant sensors for refrigerant detection systems should only be replaced with sensors specified by the manufacturer. A leak detection system is installed. The unit must be powered except for service.
37. Transport of equipment containing flammable refrigerants should comply with transportation regulations.
38. Marking of equipment using signs should comply with local regulations.
39. Disposal of equipment using flammable refrigerants should comply with national regulations.
40. Storage of equipment/appliances should be in accordance with the manufacturer's instructions.
41. Storage of packed (unsold) equipment should be constructed so that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge. The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

Symbols Displayed on Indoor & Outdoor Unit

	WARNING	This symbol shows that this appliance uses a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	CAUTION	This symbol shows that the operation manual should be read carefully.
	CAUTION	This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.
	CAUTION	
	CAUTION	This symbol shows that information is available such as the operating manual or installation manual.

Room Size Restriction

The units are connected via an air duct to one or more rooms, the bottom of the air outlet of the air duct in the room should be at a height ≥ 7.3 ft (2.2m) from the floor. In UL/CSA 60335-2-40, the R454B refrigerant belongs to mildly flammable refrigerants, which will limit the room area of the system service. Similarly, the total amount of refrigerant in the system should be less than or equal to the maximum allowable refrigerant charge, which depends on the room area serviced by the system.

SECTION TERMINOLOGY

Mc: the actual refrigerant charge in the system
A: the actual room area where the appliance is installed
Amin: the required minimum room area
Mmax: the allowable maximum refrigerant charge in a room
Qmin: the minimum circulation airflow

Anvmin: the minimum opening area for connected rooms
TAmin: the total area of the conditioned space (for appliances serving one or more rooms with an air duct system)
TA: The total area of the conditioned space connected by air ducts.

Refrigerant Charge and Room Area Limitations

For the purpose of determination of room area (A) when used to calculate the maximum allowable refrigerant charge (mmax) in an unventilated space, the following shall apply.

The room area (A) shall be defined as the room area enclosed by the projection to the floor of the walls, partitions and doors of the space in which the appliance is installed. Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space.

For units mounted higher than 6 ft (1.8m), spaces divided by partition walls which are no higher than 5.3ft/1.6m shall be considered a single space.

For fixed appliances, rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Amin, if the passageway complies with all of the following:

- it is a permanent opening
- it extends to the floor
- it is intended for people to walk through

For fixed appliances, the areas of the adjacent rooms, on the same floor, connected by a permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to Amin, provided all of the following are met:

- the space shall have appropriate openings
- the minimum opening area for natural ventilation Anvmin shall not be less than the following:

Height of Outlet/m	A/m ²	Mc/kg	Mmax/kg	Anvmin/m ²
2.2	5	5.0	2.685	0.045
2.2	6	5.0	2.941	0.042
2.2	7	5.0	3.177	0.038
2.2	8	5.0	3.396	0.035
2.2	9	5.0	3.602	0.031
2.2	10	5.0	3.797	0.028
2.2	11	5.0	3.983	0.024
2.2	12	5.0	4.160	0.020
2.2	13	5.0	4.330	0.016
2.2	14	5.0	4.493	0.013
2.2	15	5.0	4.651	0.009
2.2	16	5.0	4.803	0.005
2.2	17	5.0	4.951	0.001

2.1 Model Reference

Indoor Unit Model	Outdoor Unit Model	Capacity (Btu/h)	Power Supply
A-09-HP-WMAH-115D-O	A-09-HP-C-115D-O	9K	115V~, 60Hz, 1 Phase
A-12-HP-WMAH-115D-O	A-12-HP-C-115D-O	12K	
A-09-HP-WMAH-230D-O	A-09-HP-C-230D-O	09K	208/230V~, 60Hz, 1 Phase
A-12-HP-WMAH-230D-O	A-12-HP-C-230D-O	12K	
A-18-HP-WMAH-230D-O	A-18-HP-C-230D-O	18K	
A-24-HP-WMAH-230D-O	A-24-HP-C-230D-O	24K	
A-36-HP-WMAH-230D-O	A-36-HP-C-230D-O	36K	

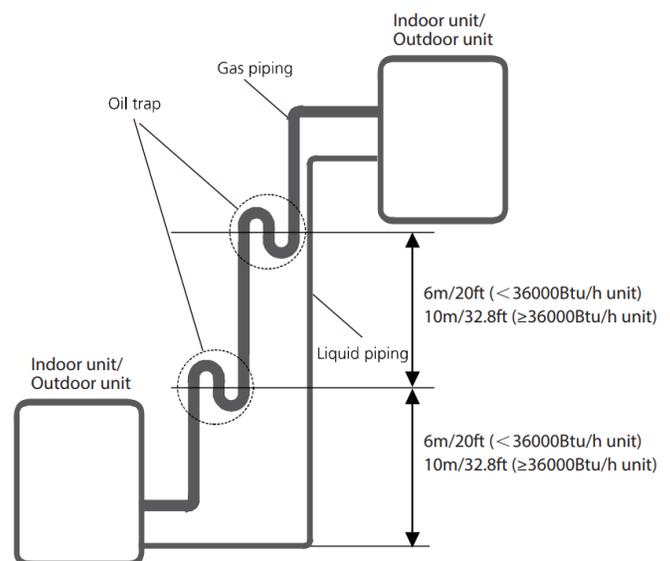
2.2 Pipe Length and Drop Height

The length and elevation of refrigerant lines are shown in the table below. If the pipe length exceeds standard pipe length, Additional refrigerant should be charged to ensure nominal cooling/heating capacity.

Capacity (Btu/h)	Standard Length	Max. Pipe Length	Max Elevation	Additional Refrigerant
9k/12k	24.6ft (7.5m)	82ft (25m)	49.2ft (15m)	0.16oz/ft (15g/m)
18K		98.4ft (30m)	65.6ft (20m)	
24K	24.6ft (7.5m)	164ft (50m)	82ft (25m)	0.32oz/ft (30g/m)
36K		213ft (65m)	98.4ft (30m)	

If oil flows back into the compressor this might cause liquid compression or deterioration of oil return. Oil traps in the rising gas pipe can prevent this.

- An oil trap should be installed every 20ft (6m) of vertical suction line (< 36000Btu/h unit).
- An oil trap should be installed every 32.8ft (10m) of vertical suction line (≥36000Btu/h unit).

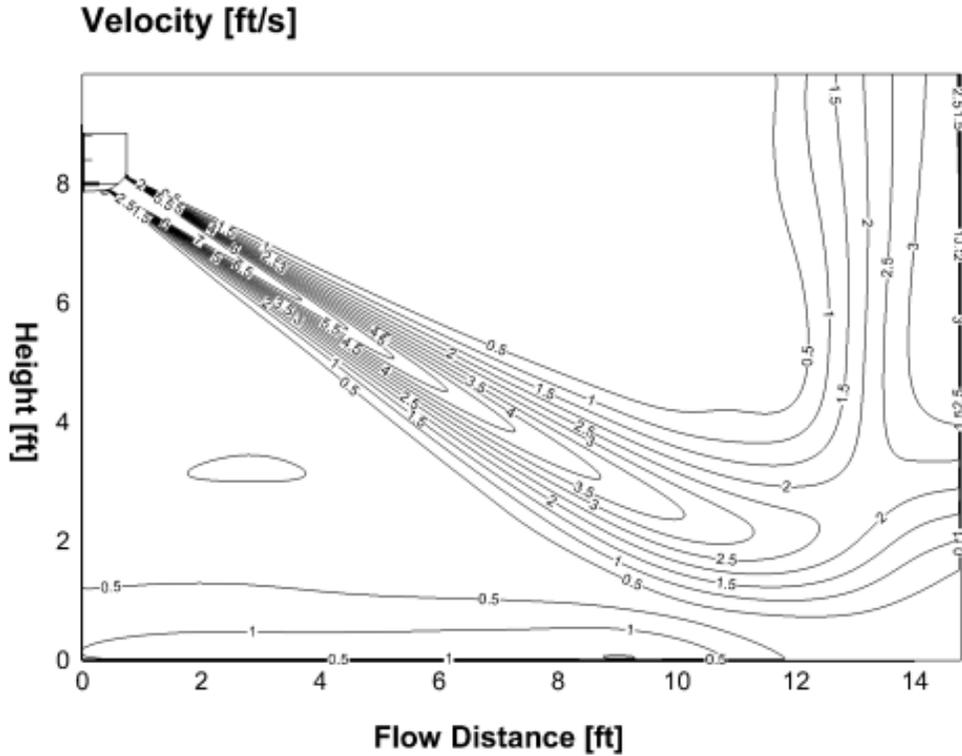


2 SYSTEM OVERVIEW

2.3 Air Velocity and Temperature Distributions

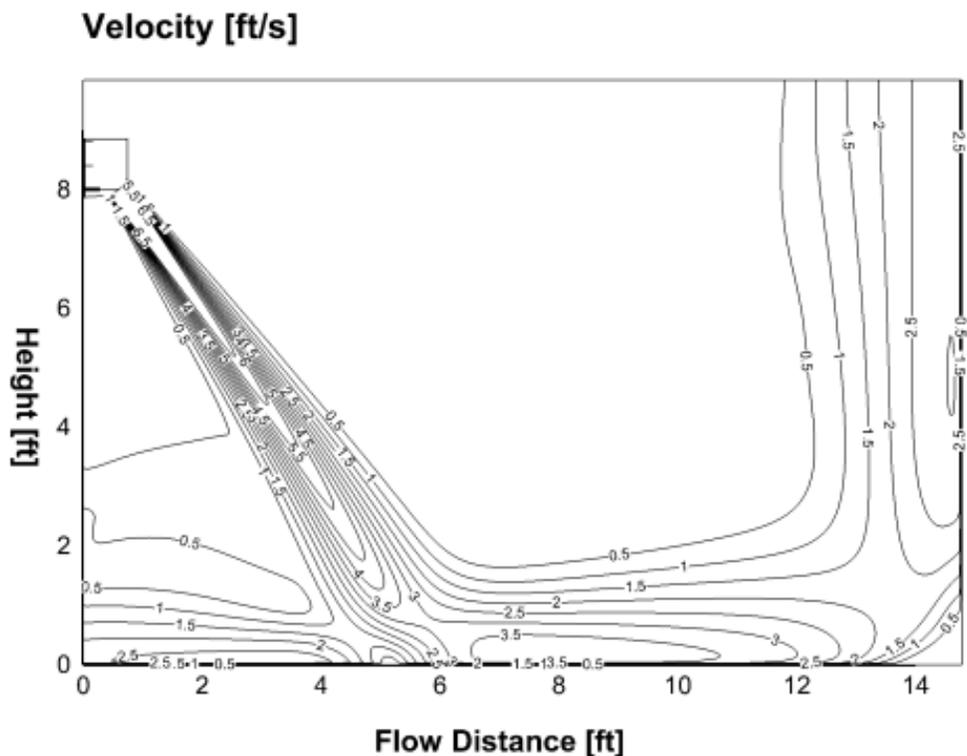
A-09-HP-WMAH-*D-O: Cooling (Indoor: 80.6°F /27°C Outdoor: 95°F /35°C)
Discharge angle 58°

Airflow Velocity Distributions

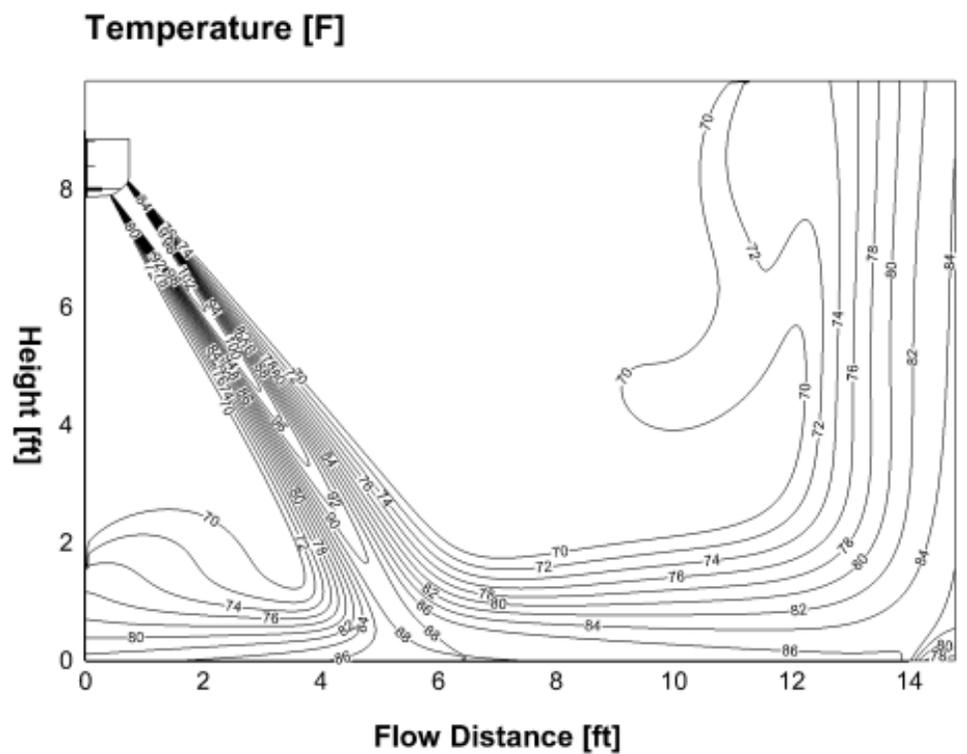


A-09-HP-WMAH-*D-O: Heating (Indoor: 68°F /20°C Outdoor: 44.6°F /7°C)
 Discharge angle 90°

Airflow Velocity Distributions



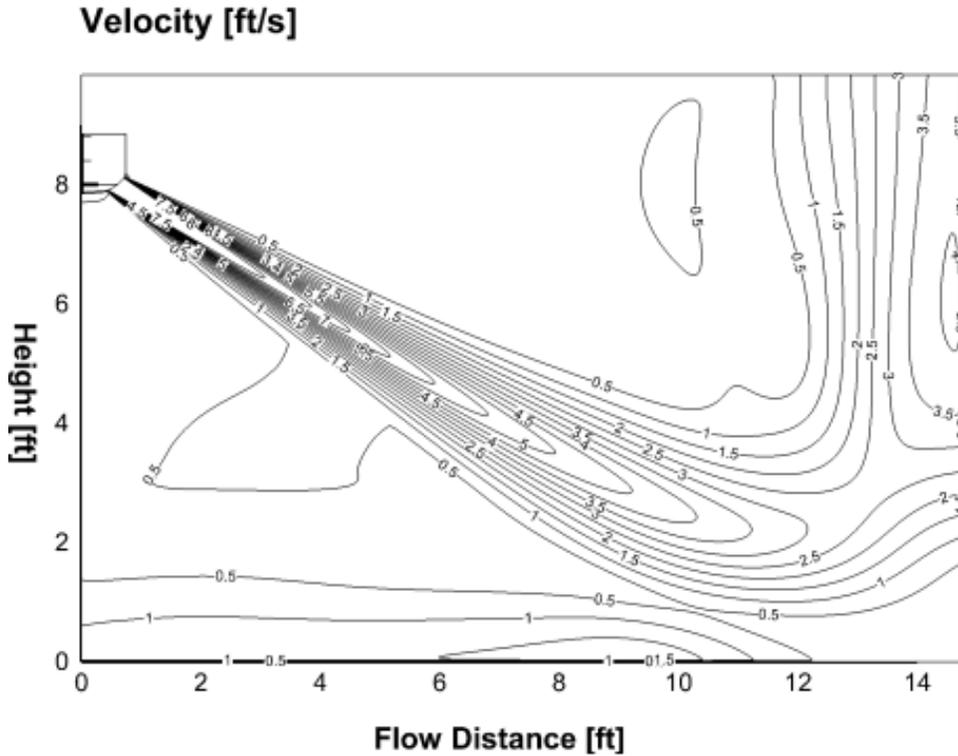
Temperature Distributions



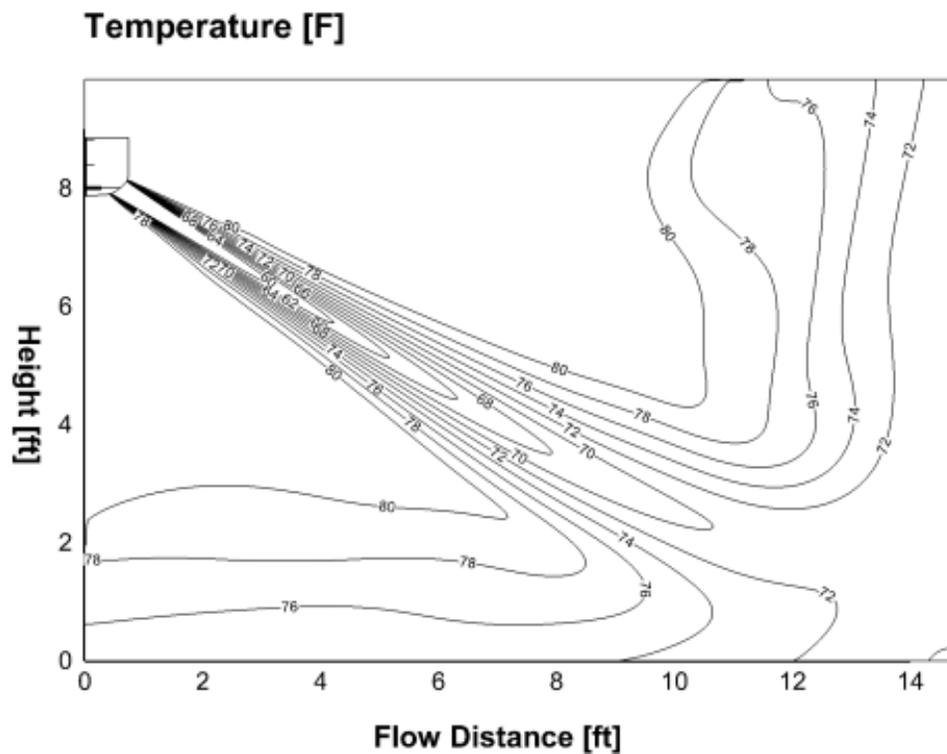
2 SYSTEM OVERVIEW

A-12-HP-WMAH-*D-O: Cooling (Indoor: 80.6°F /27°C Outdoor: 95°F /35°C)
Discharge angle 58°

Airflow Velocity Distributions

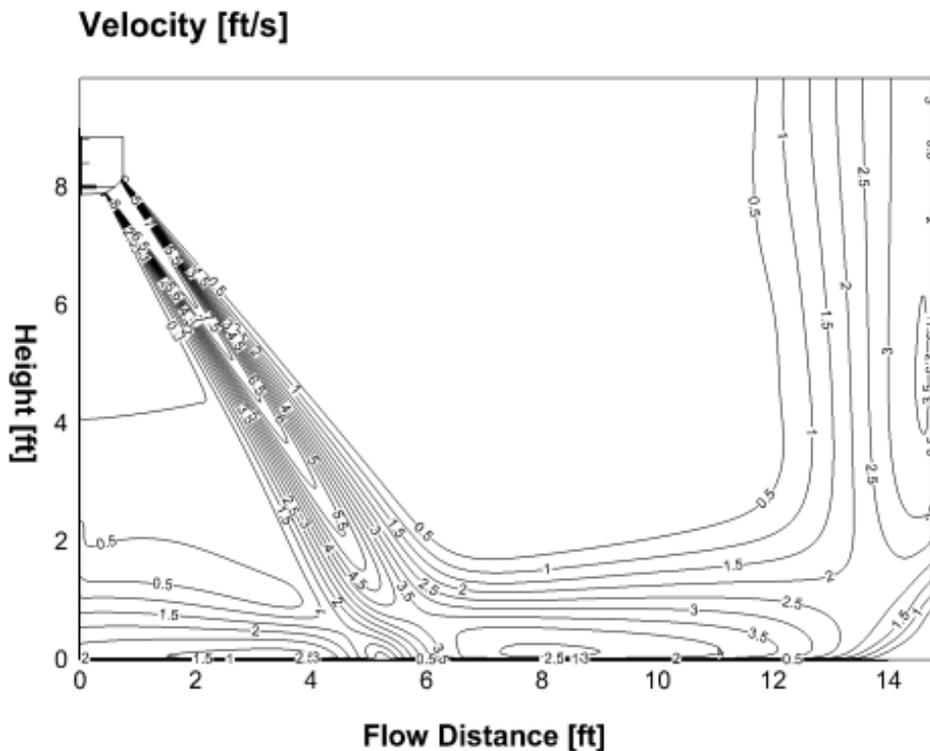


Temperature Distributions

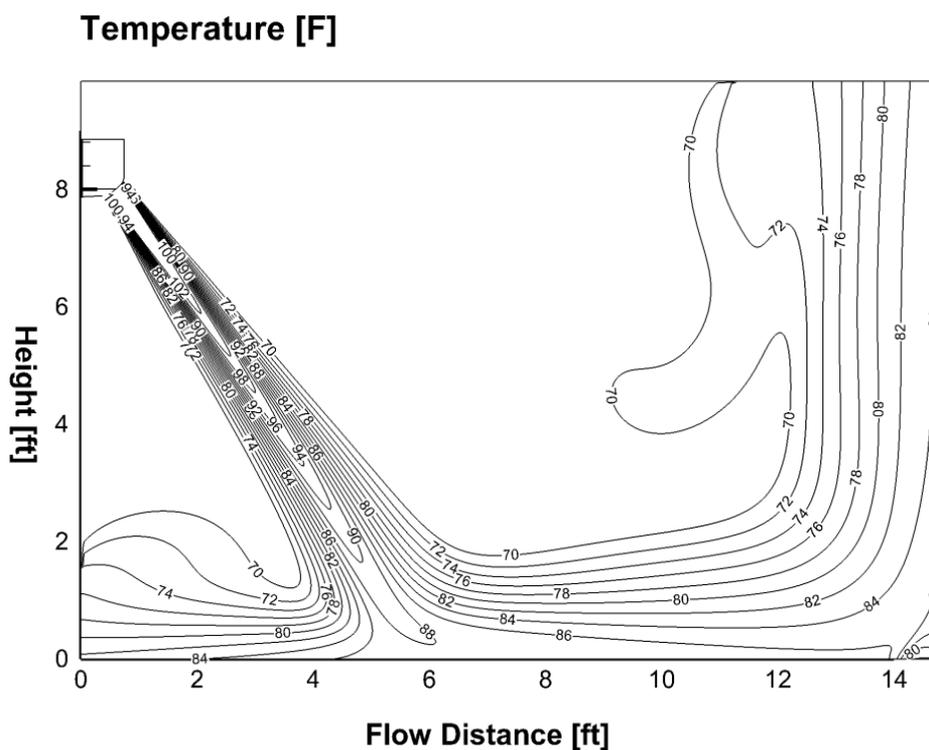


A-12-HP-WMAH-*D-O: Heating (Indoor: 68°F /20°C Outdoor: 44.6°F /7°C)
Discharge angle 90°

Airflow Velocity Distributions



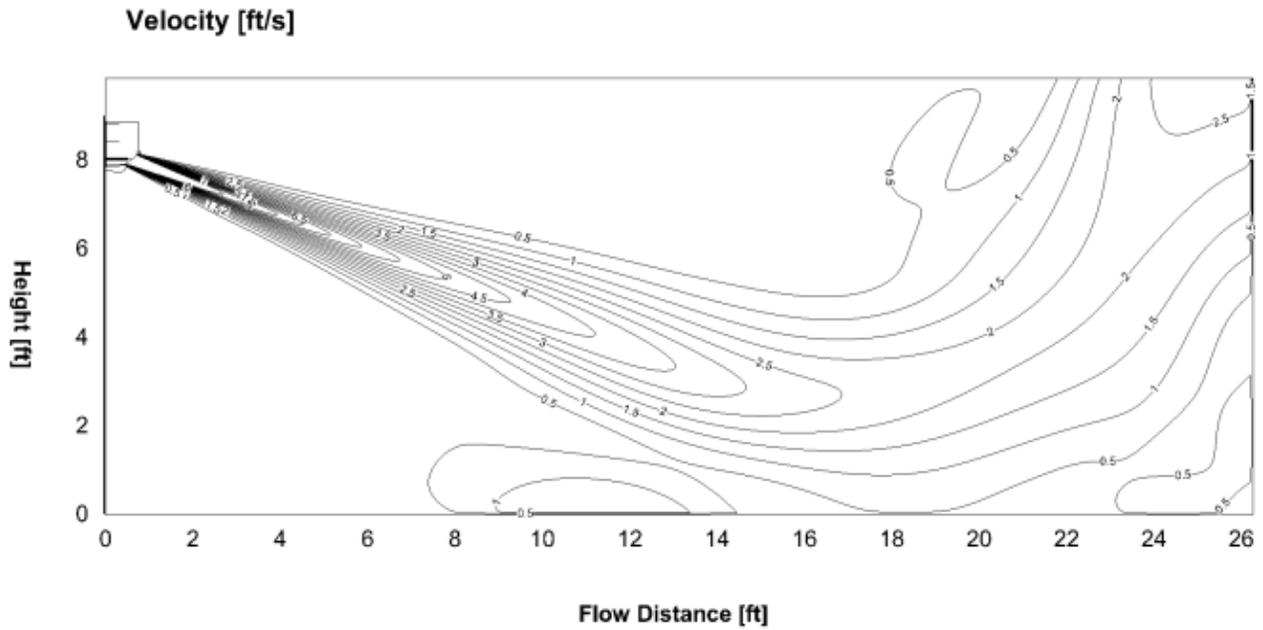
Temperature Distributions



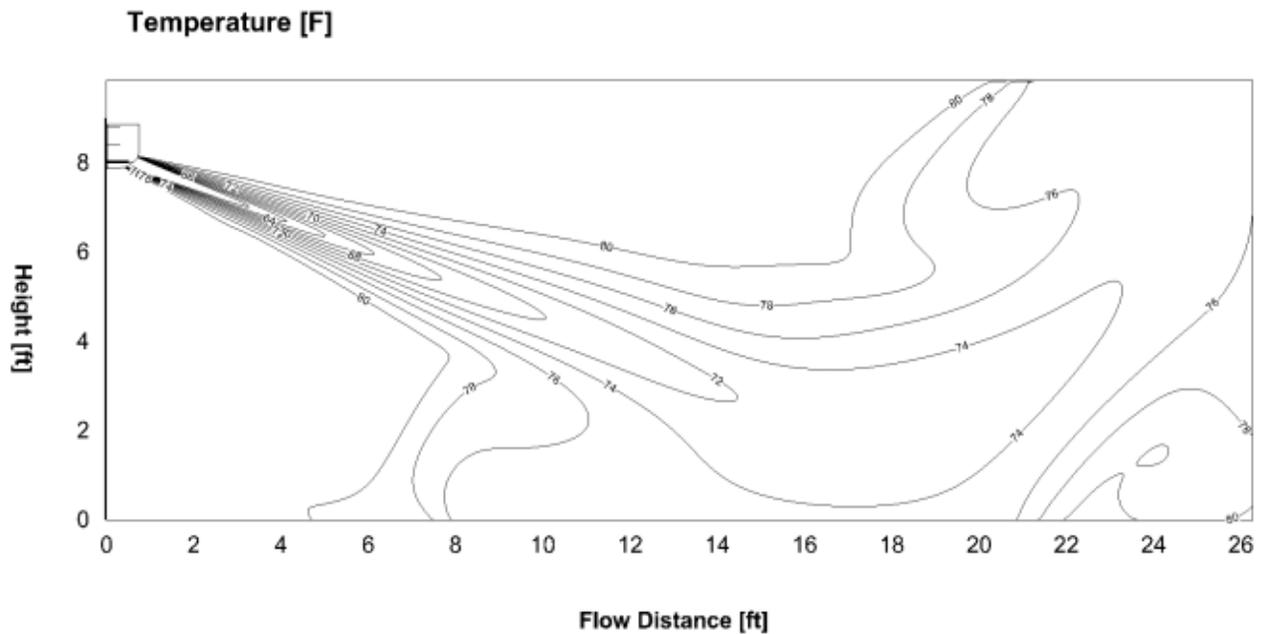
2 SYSTEM OVERVIEW

A-18-HP-WMAH-230D-O: Cooling (Indoor: 80.6°F /27°C Outdoor: 95°F /35°C)
Discharge angle 50°

Airflow Velocity Distributions

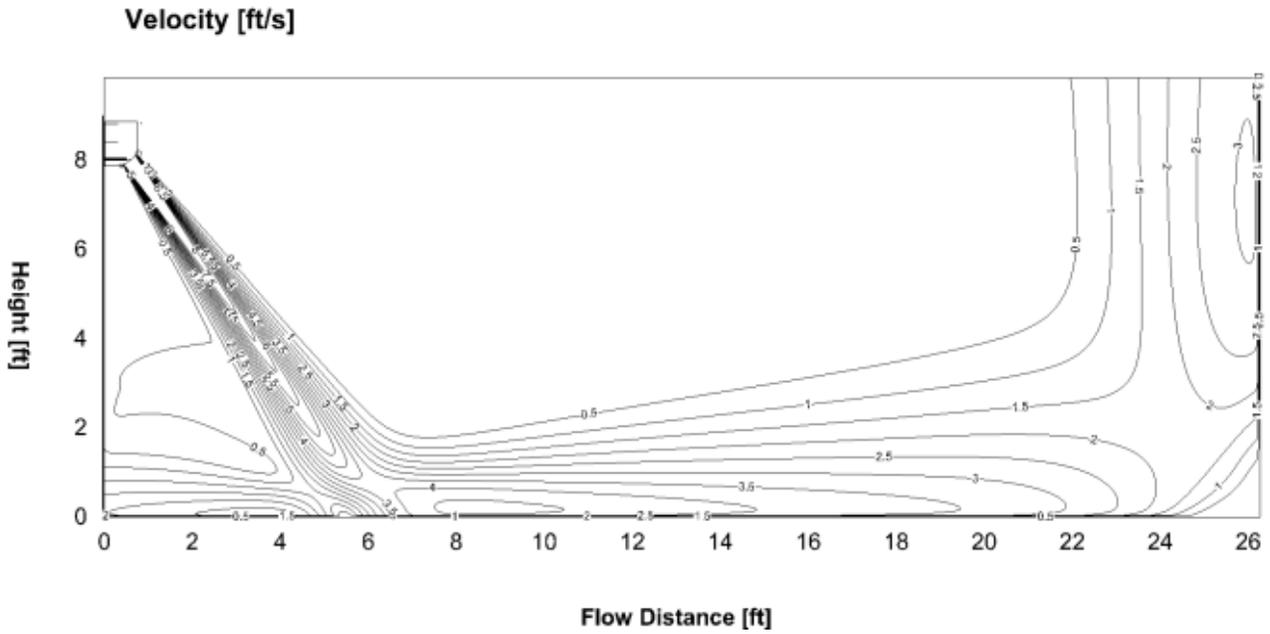


Temperature Distributions

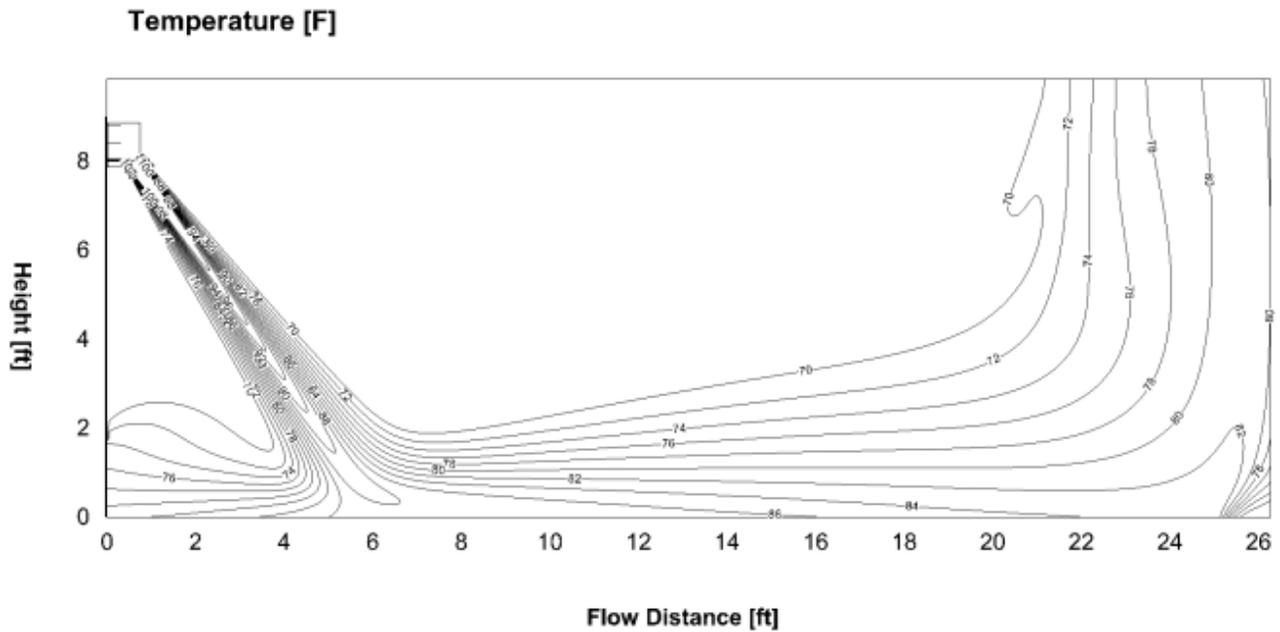


A-18-HP-WMAH-230D-O: Heating (Indoor: 68°F /20°C Outdoor: 44.6°F /7°C)
Discharge angle 84°

Airflow Velocity Distributions



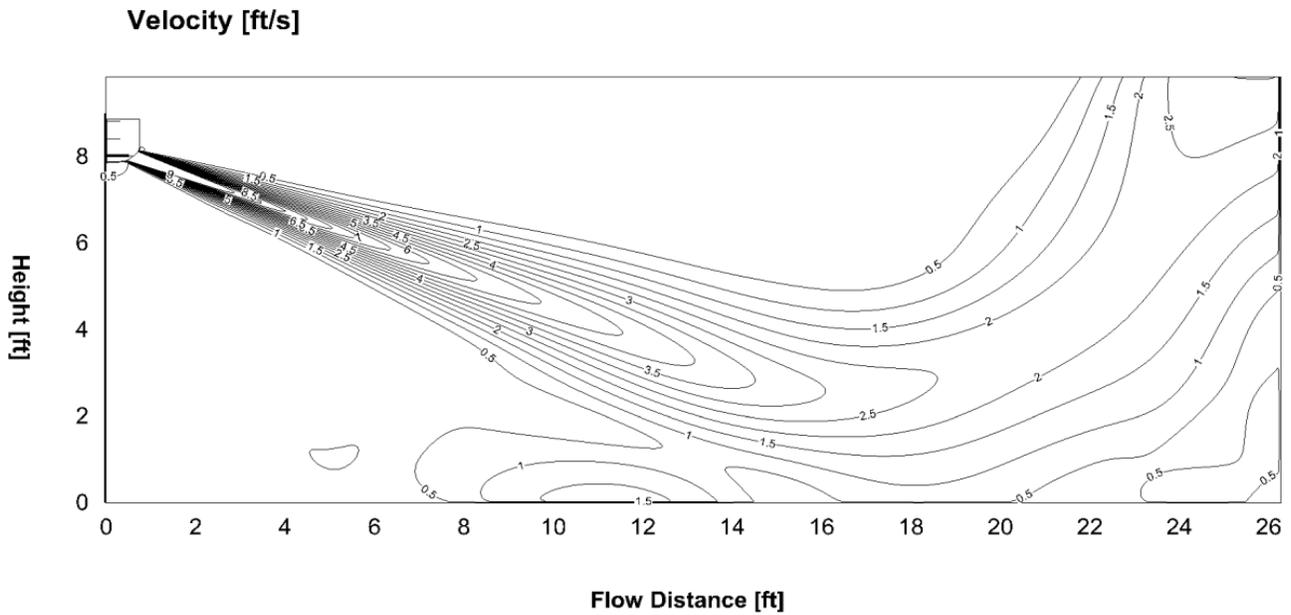
Temperature Distributions



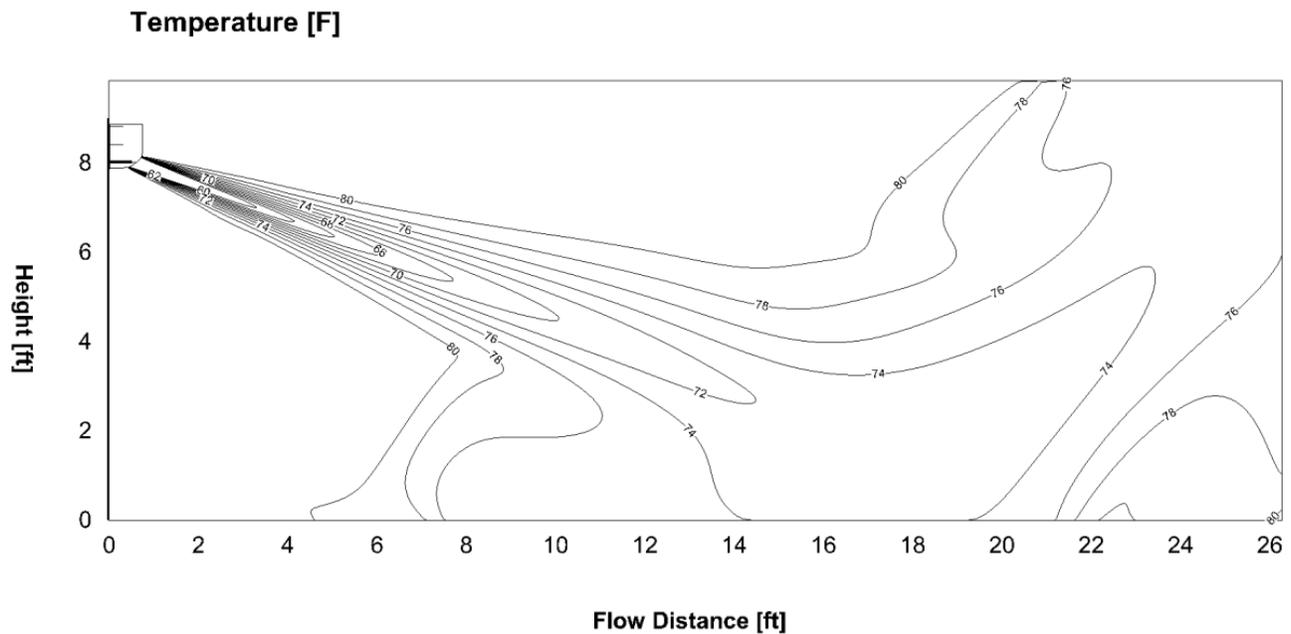
2 SYSTEM OVERVIEW

A-24-HP-WMAH-230D-O: Cooling (Indoor: 80.6°F /27°C Outdoor: 95°F /35°C)
Discharge angle 50°

Airflow Velocity Distributions

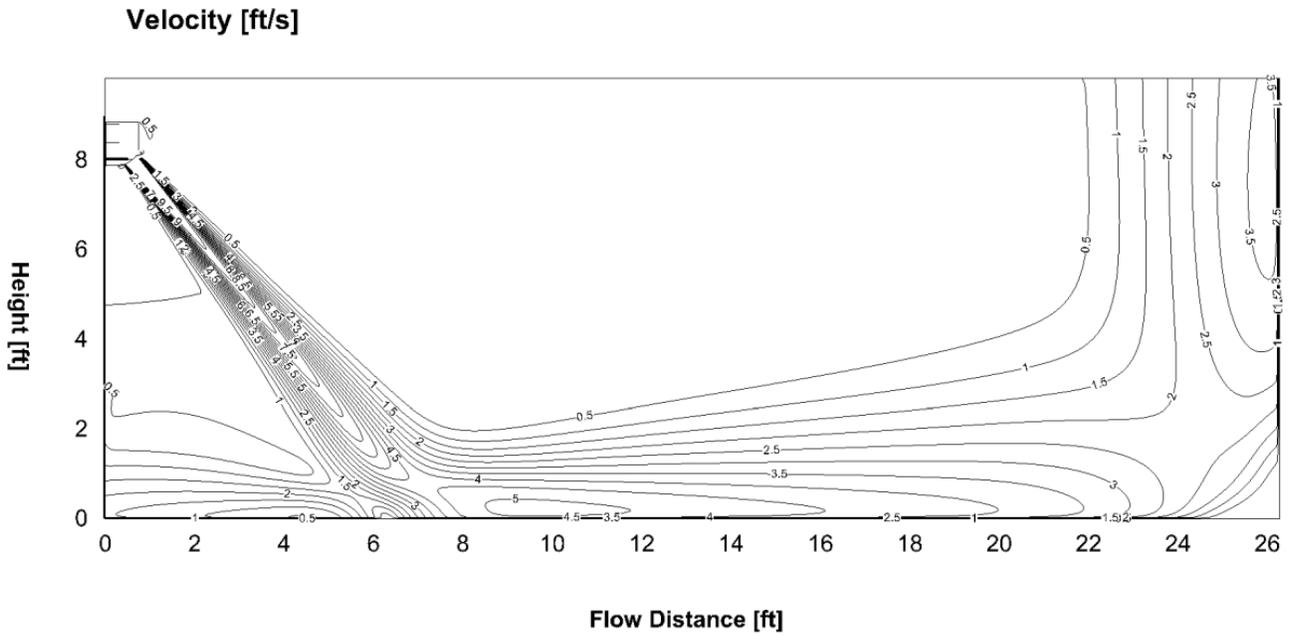


Temperature Distributions

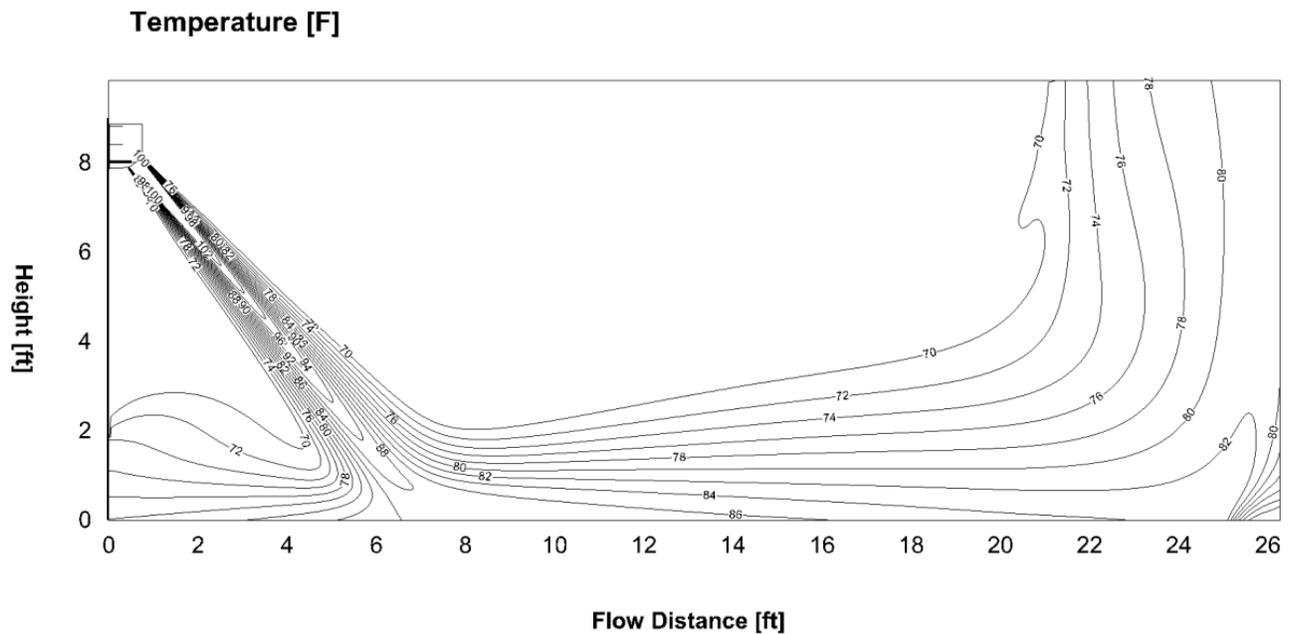


A-24-HP-WMAH-230D-O: Heating (Indoor: 68°F /20°C Outdoor: 44.6°F /7°C)
 Discharge angle 77°

Airflow Velocity Distributions



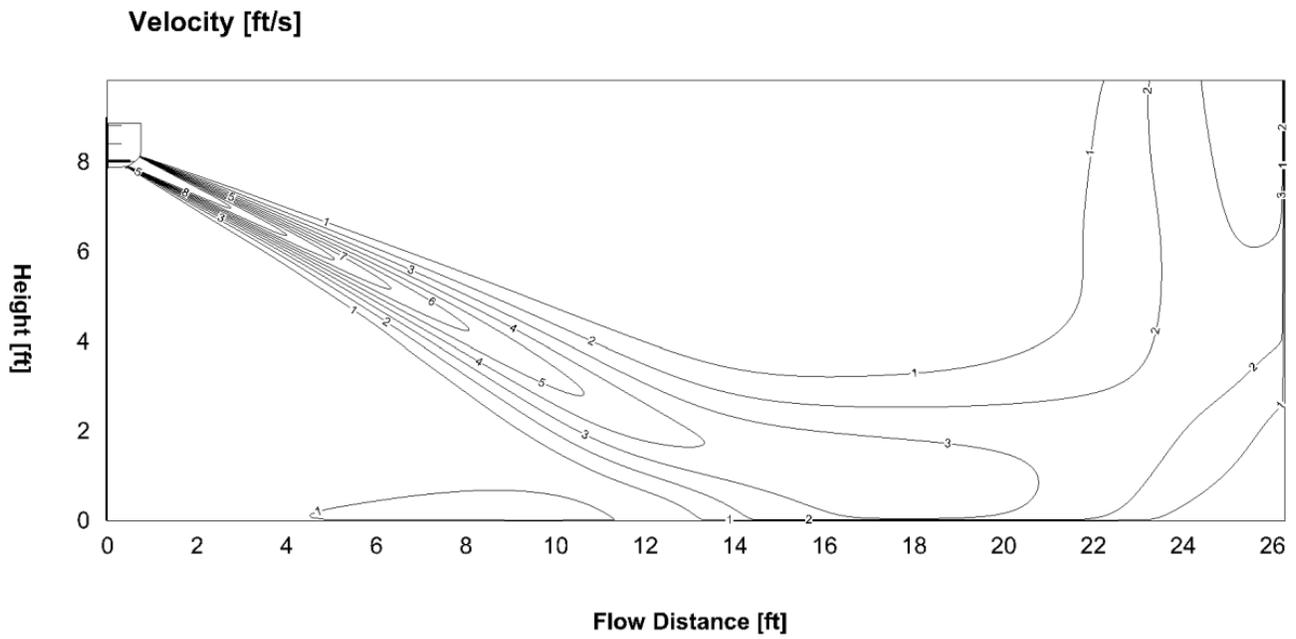
Temperature Distributions



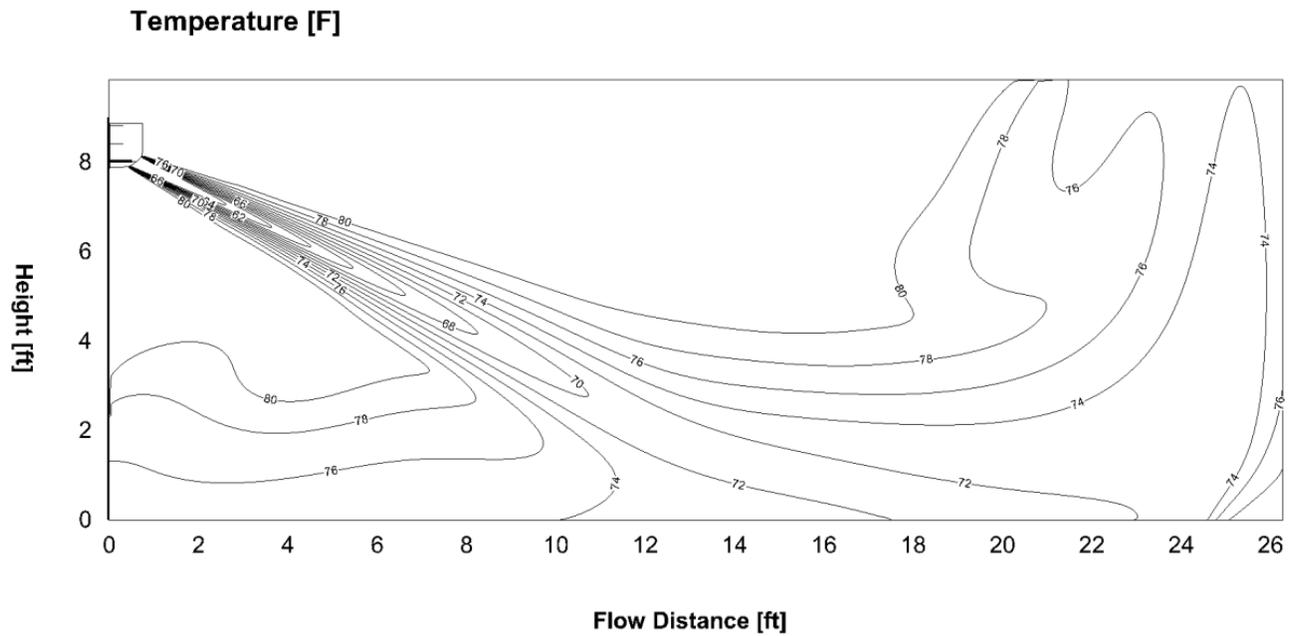
2 SYSTEM OVERVIEW

A-36-HP-WMAH-230D-O: Cooling (Indoor: 80.6°F /27°C Outdoor: 95°F /35°C)
Discharge angle 55°

Airflow Velocity Distributions

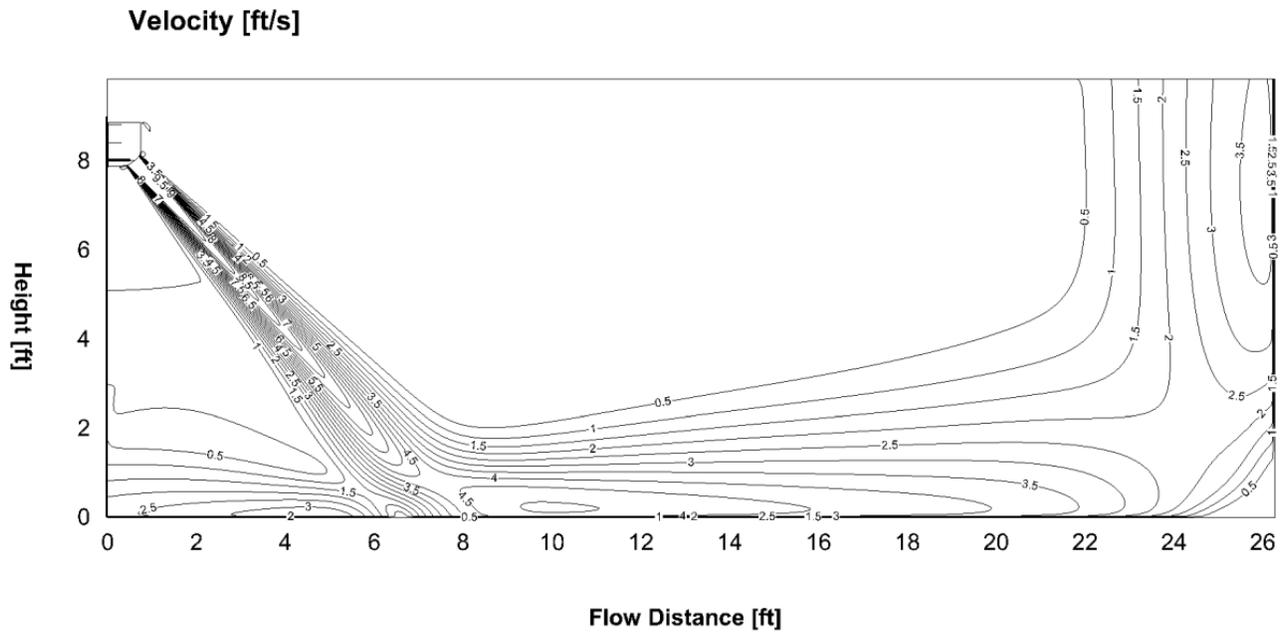


Temperature Distributions

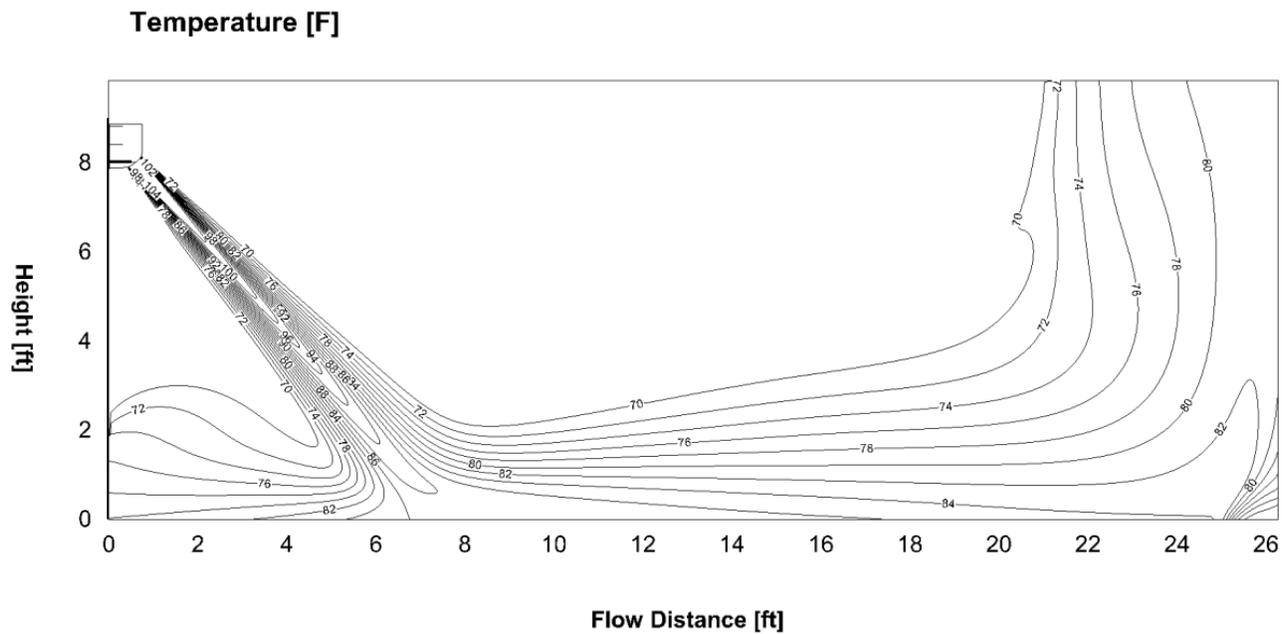


A-36-HP-WMAH-230D-O: Heating (Indoor: 68°F /20°C Outdoor: 44.6°F /7°C)
Discharge angle 75°

Airflow Velocity Distributions



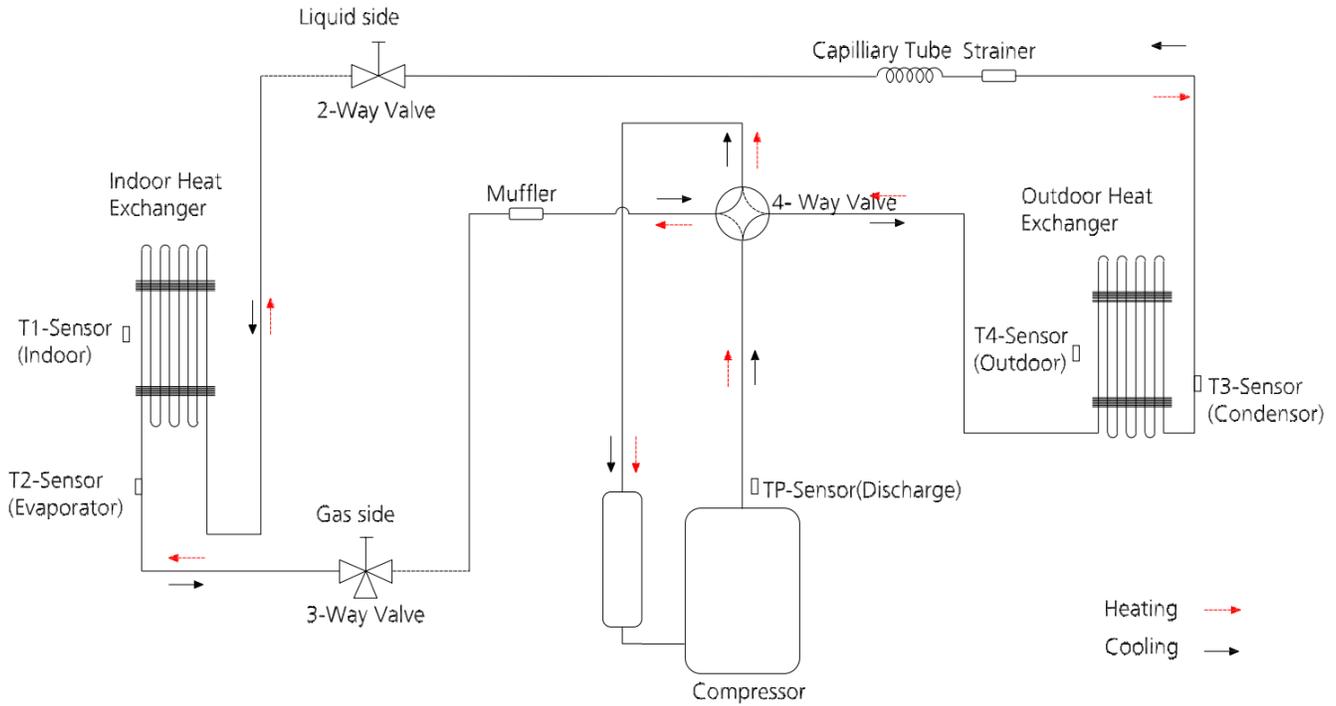
Temperature Distributions



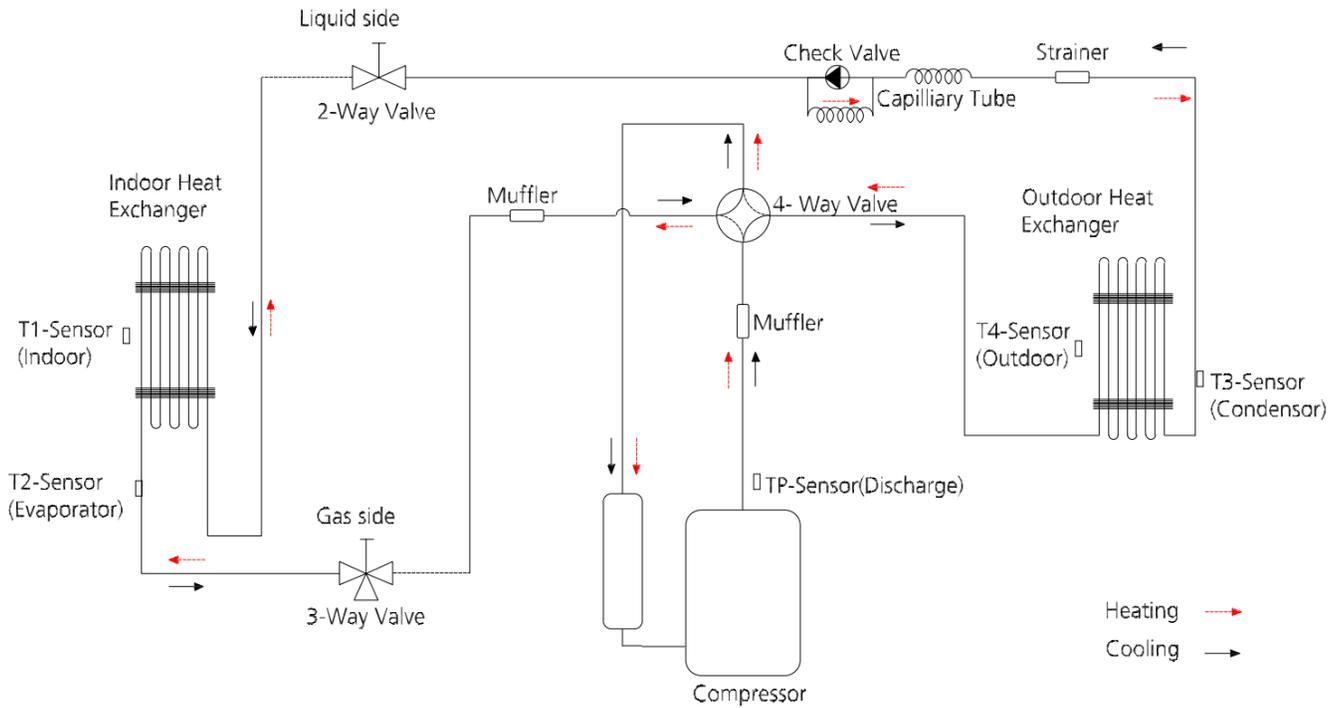
2 SYSTEM OVERVIEW

2.4 Refrigerant Cycle Diagrams

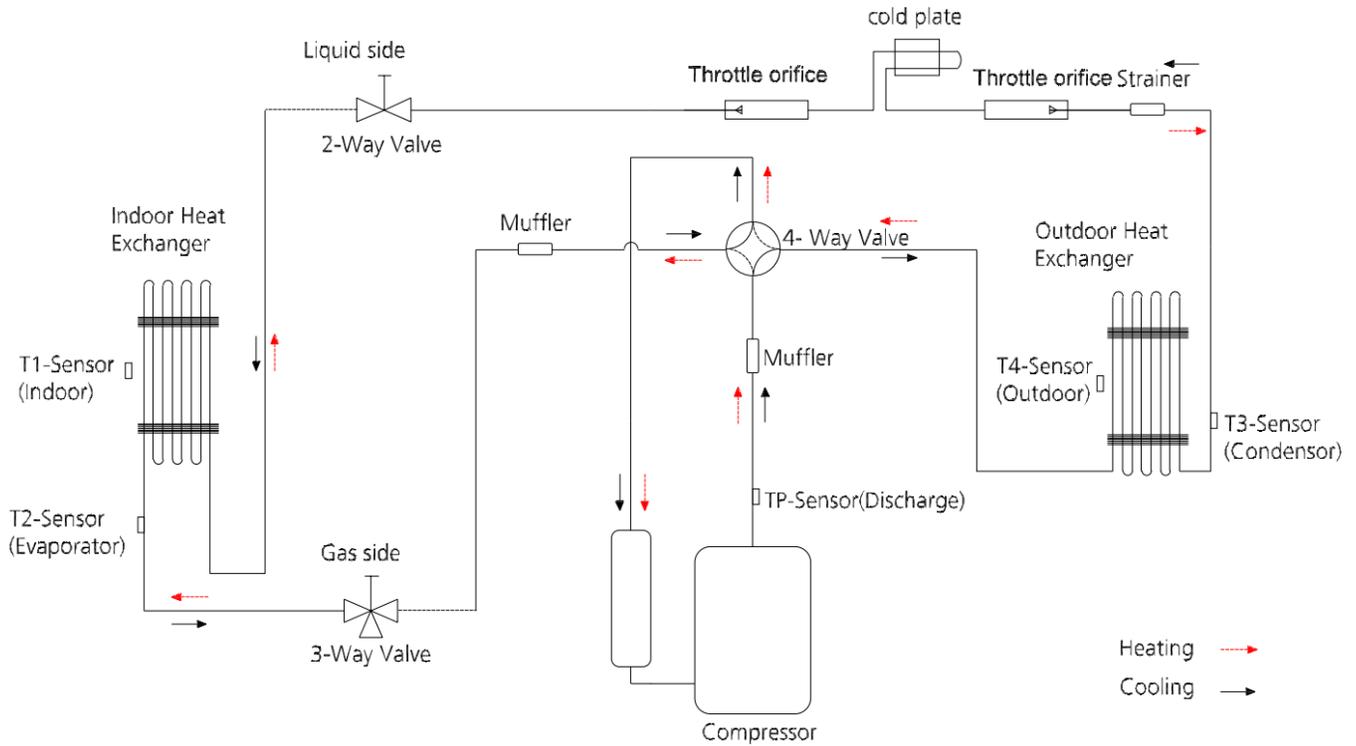
**A-09-HP-C-115D-O, A-09-HP-C-230D-O
A-12-HP-C-115D-O, A-12-HP-C-230D-O**



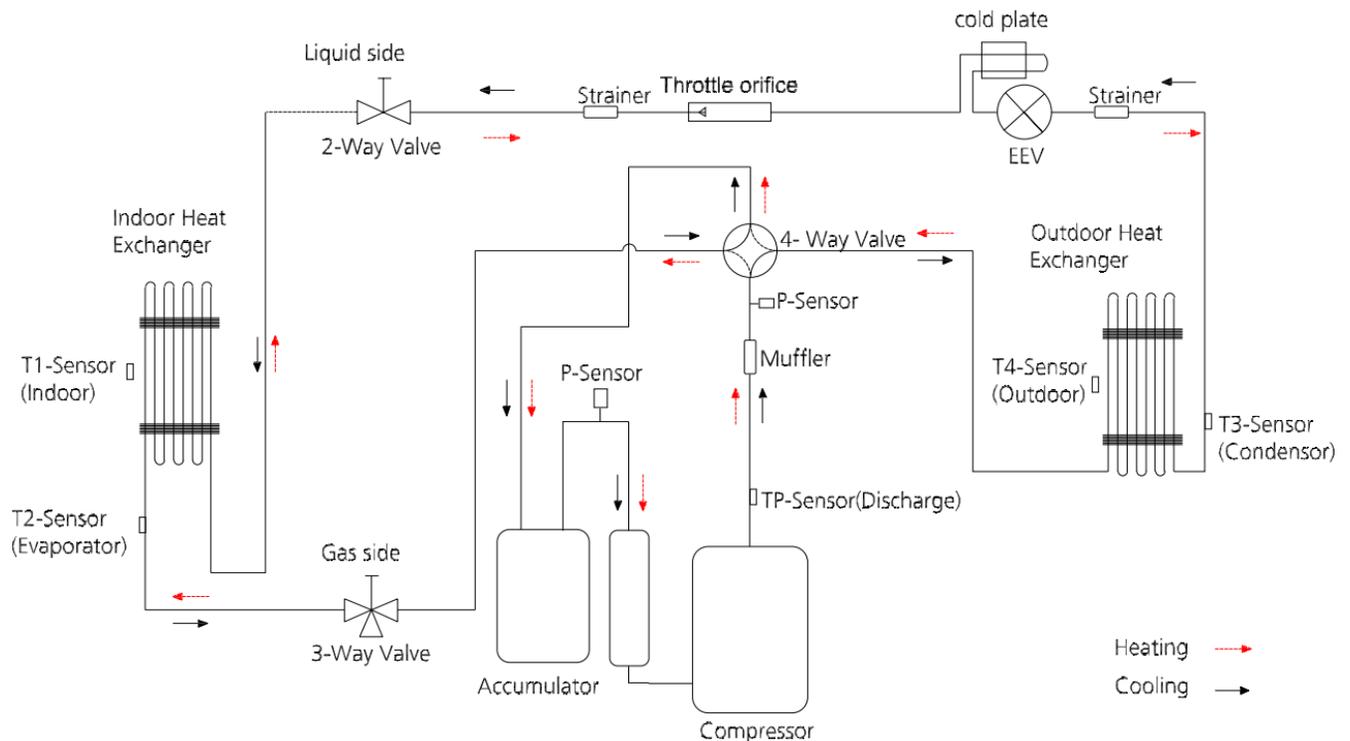
A-18-HP-C-230D-O



A-24-HP-C-230D-O



A-36-HP-C-230D-O



2 SYSTEM OVERVIEW

2.5 Electrical Wiring Diagrams

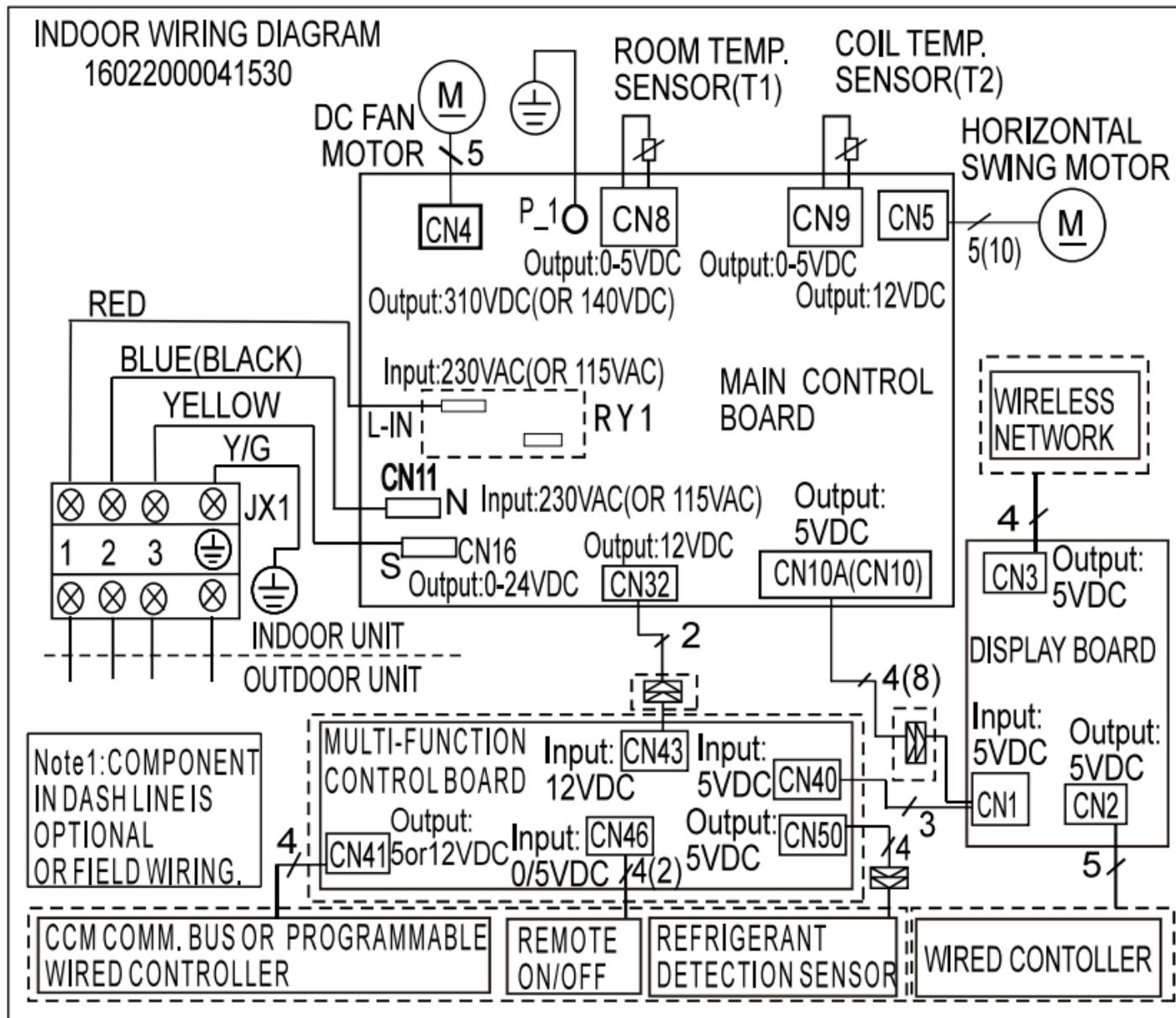
Indoor and Outdoor Unit Wiring Diagram:

Indoor Unit		Outdoor Unit	
IDU Model	IDU Wiring Diagram	ODU Model	ODU Wiring Diagram
A-09-HP-WMAH-115D-O	16022000041530	A-09-HP-C-115D-O	16022000040773
A-12-HP-WMAH-115D-O		A-12-HP-C-115D-O	
A-09-HP-WMAH-230D-O		A-09-HP-C-230D-O	16022000040610
A-12-HP-WMAH-230D-O		A-12-HP-C-230D-O	
A-18-HP-WMAH-230D-O		A-18-HP-C-230D-O	
A-24-HP-WMAH-230D-O		A-24-HP-C-230D-O	16022000040790
A-36-HP-WMAH-230D-O		A-36-HP-C-230D-O	16022000040650

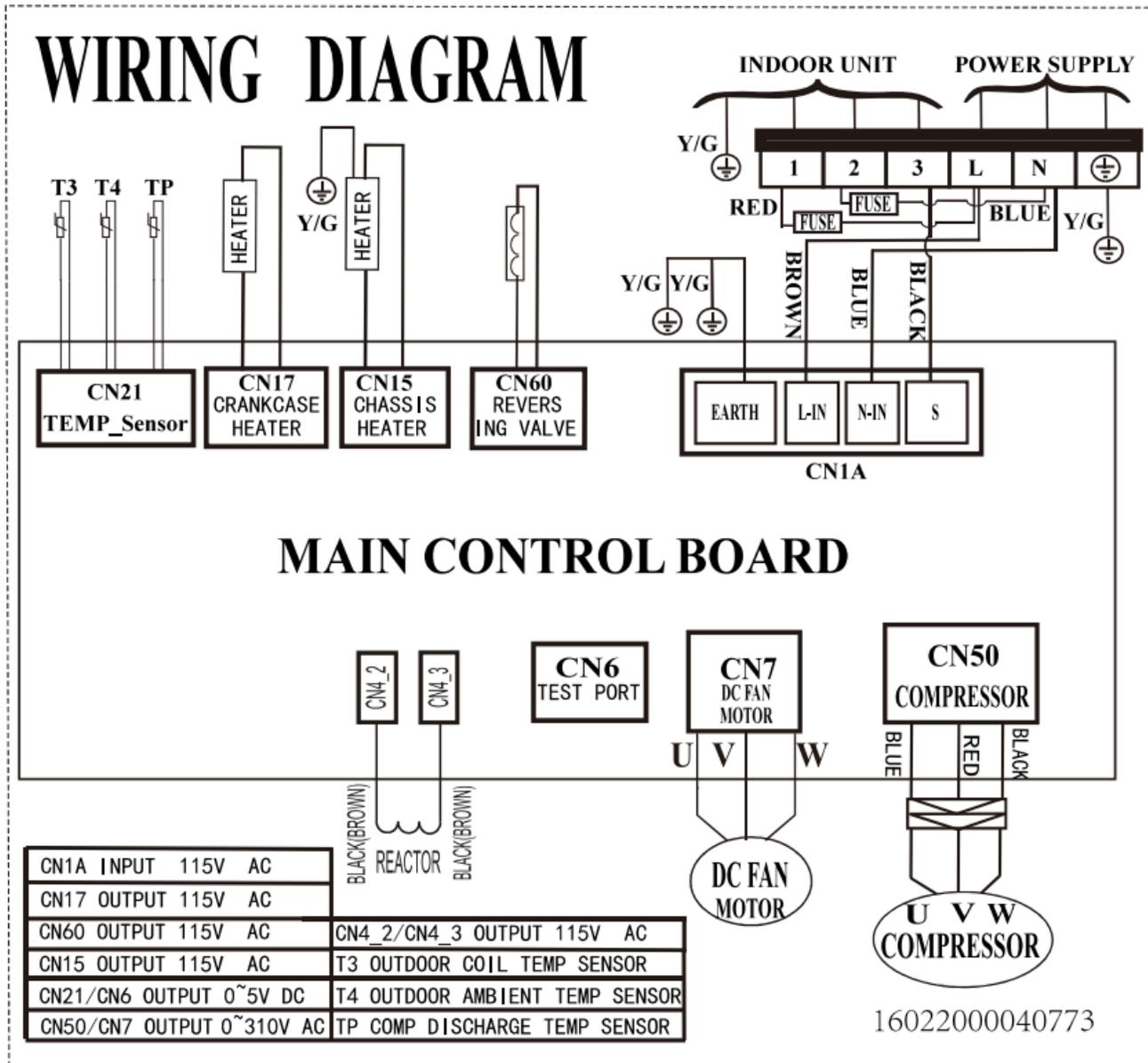
Outdoor Unit Printed Circuit Board Diagram:

Outdoor Unit	
ODU Model	ODU Printed Circuit Board
A-09-HP-C-115D-O	17122000062141
A-12-HP-C-115D-O	
A-09-HP-C-230D-O	17122000057661
A-12-HP-C-230D-O	
A-18-HP-C-230D-O	
A-24-HP-C-230D-O	17122000048064
A-36-HP-C-230D-O	17122300007152

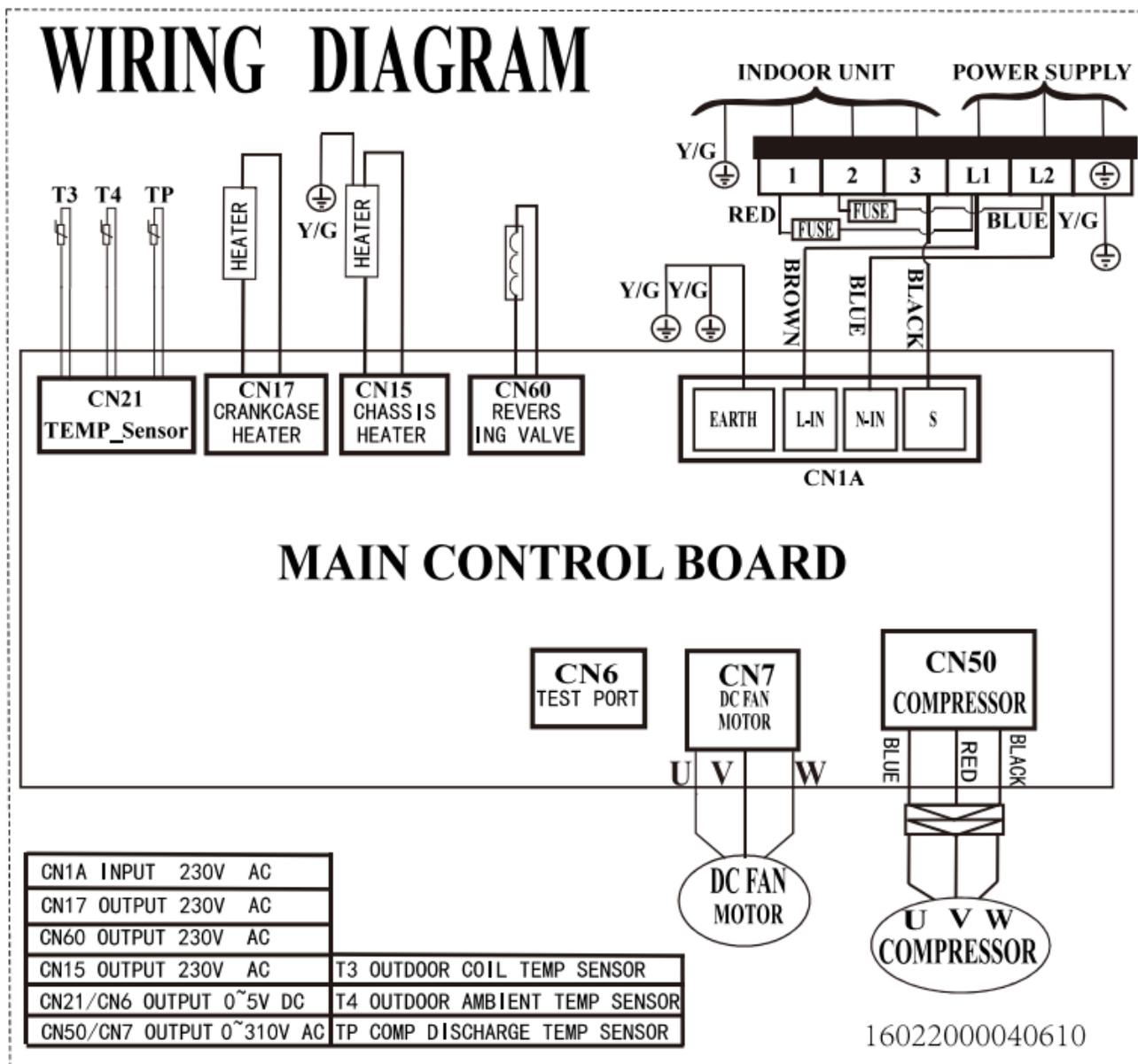
Indoor unit wiring diagram: 16022000041530



Outdoor unit wiring diagram: 16022000040773

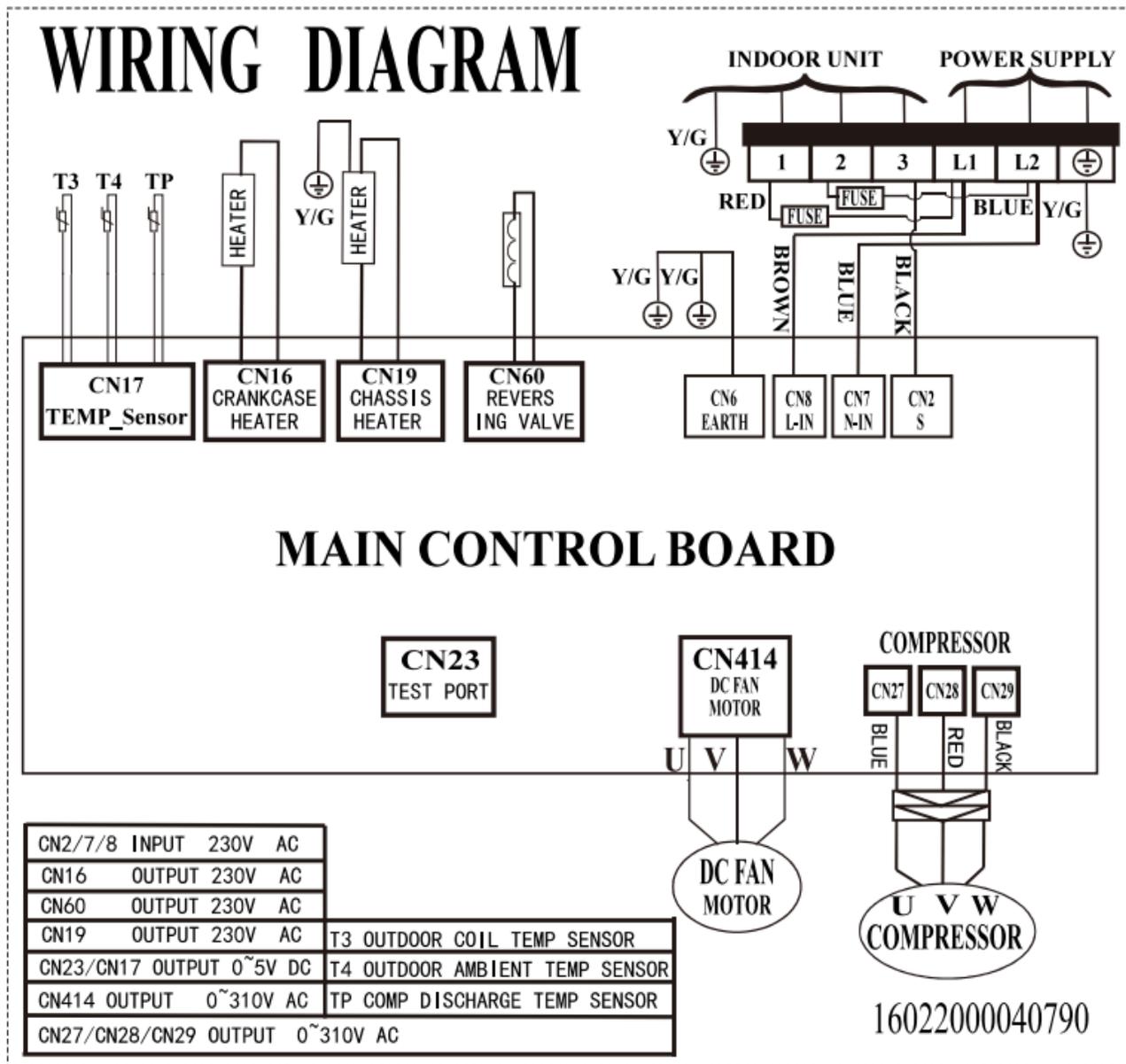


Outdoor unit wiring diagram: 16022000040610

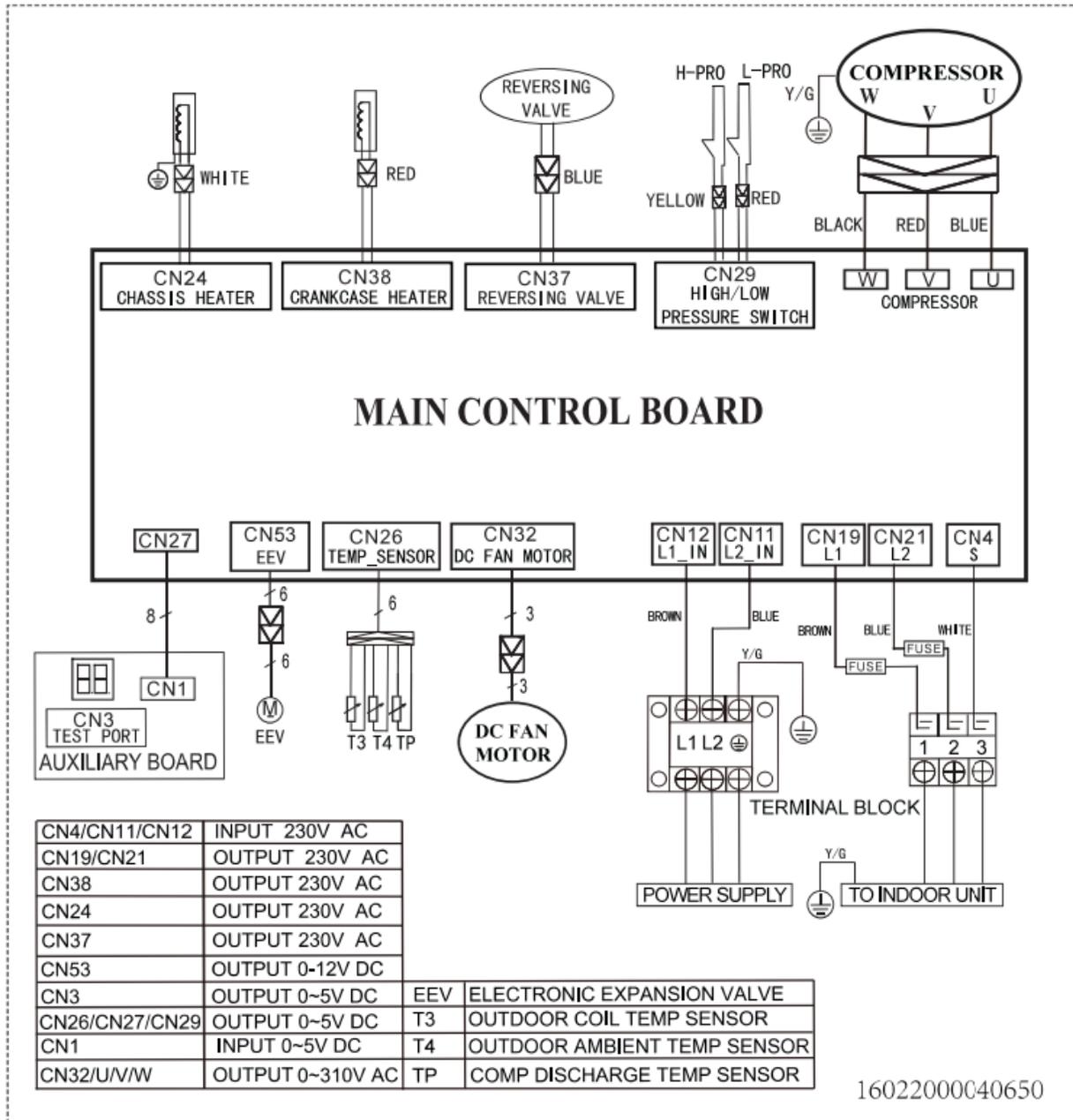


2 SYSTEM OVERVIEW

Outdoor unit wiring diagram: 16022000040790

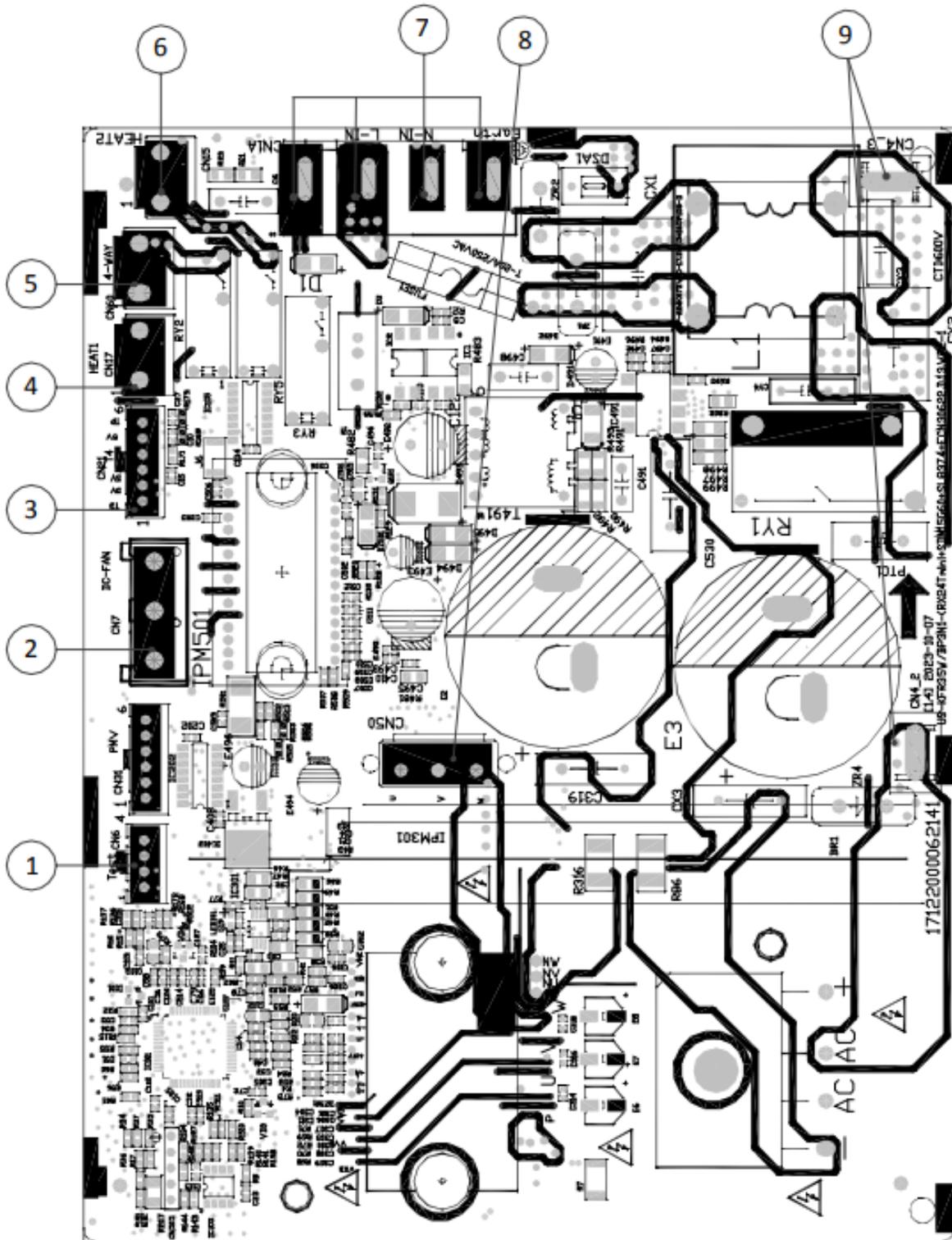


Outdoor unit wiring diagram: 16022000040650



2 SYSTEM OVERVIEW

Outdoor unit printed circuit board diagram: 17122000062141



No.	Name	NC#	Meaning
1	TESTPORT	CN6	Used for testing (Output: 0-5VDC)
2	DC-FAN	CN7	Connects to DC fan (Output: 0-310VAC)
3	TP T4 T3	CN21	Connects to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (output: 0-5VDC)
4	HEAT1	CN17	Connects to compressor heater, 115VAC when is ON
5	4-WAY	CN60	Connects to 4 way valve, 115VAC when is ON
6	HEAT2	CN15	Connects to chassis heater, 115VAC when is ON
7	CN1A	/	S: connects to indoor unit communication
		/	L_in: connects to L-line (115VAC input)
		/	N_in: connects to N-line (115VAC input)
		/	Earth
8	CN50	W	Connects to compressor .0VAC (standby), 0-310VAC (running)
		V	
		U	
9	REACTOR	CN4_2	Connects to reactor, 115VAC when is ON
		CN4_3	

Note: This section is for reference only. Please take practicality as standard.

No.	Name	NC#	Meaning
1	TESTPORT	CN6	Used for testing
2	PMV	CN31	Connects to electric expansion valve (Output: 0-2VDC)
3	DC-FAN	CN7	Connects to DC fan (Output: 0-310VAC)
4	TP T4 T3	CN21	Connects to pipe temp sensor T3, ambient temp sensor T4, exhaust temp., sensor TP (Output: 0-310VDC)
5	HEAT1	CN17	Connects to compressor heater (Output: 230VAC)
6	4-WAY	CN60	Connects to 4 way valve (Output: 230VAC)
7	HEAT2	CN15	Connects to chassis heater (Output: 230VAC)
8	CN1A	CN16	S: connects to indoor unit communication
		CN2	L_in: connects to L-line (230VAC input)
		CN1	N_in: connects to N-line (230VAC input)
		CN3	Earth
9	CN50	W	Connects to compressor (Output: 0-310VAC)
		V	
		U	

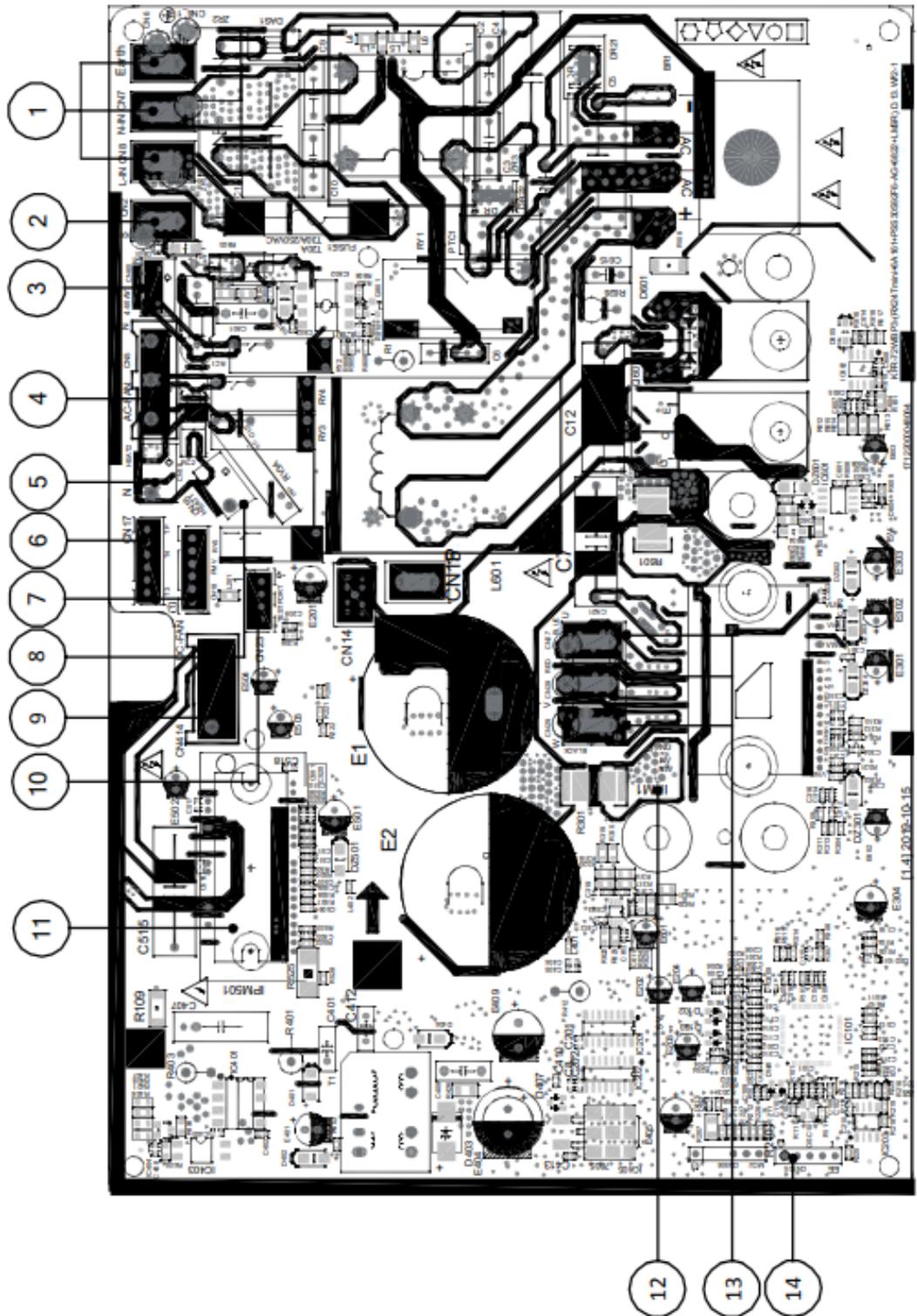
Note: This section is for reference only. Please take practicality as standard.

No.	Name	NC#	Meaning
1	Power Supply	CN6	Earth: Connects to ground
		CN7	N_in: Connects to N-line (230VAC input)
		CN8	L_in: Connects to L-line (230VAC input)
2	S	CN2	S: Connects to indoor communication (230VAC input)
3	4-WAY	CN60	Connects to 4 way valve (Output: 230VAC)
4	AC-FAN	CN5	Connects to AC fan
5	HEAT2	CN19	Connects to chassis heater (Output: 230VAC)
6	TP T4 T3	CN17	Connects to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5VDC)
7	PMV	CN18	Connects to Electric Expansion Valve
8	HEAT1	CN16	Connects to compressor heater (Output: 230VAC)
9	DC-FAN	CN414	Connects to DC fan (Output: 0~310VAC)
10	TESTPORT	CN23	Used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
13	U	CN27	Connects to compressor (Output: 0~310VAC)
	V	CN28	
	W	CN29	
14	EE_PORT	CN505	EEPROM programmer port

Note: This section is for reference only. Please take practicality as standard.

2 SYSTEM OVERVIEW

Outdoor unit printed circuit board diagram: 17122300007152



No.	Name	NC#	Meaning
1	Compressor	W	Connect to compressor (Output: 0~310VAC)
		V	
		U	
2	DC-FAN1	CN32	Connect to DC fan (Output 0~310VAC)
3	TESTPORT	CN45	Used for testing
4	HEAT_Y	CN38	Connect to compressor heater (Output: 230VAC)
5	4-WAY	CN37	Connect to 4 way valve 1 (Output: 230VAC)
		CN25	Connect to 4 way valve 2 (Output: 230VAC)
		CN42	Connect to 4 way valve 3 (Output: 230VAC)
6	HEAT_D	CN24	Connect to chassis heater (Output: 230VAC)
7	Power Supply	CN11	N_in: connect to N-line (230VAC input)
		CN12	L_in: connect to L-line (230VAC input)
8	S-A	CN43	S: connect to indoor unit communication (230VAC input)
	S-B		
	S-C		
	S-D		
	S-E		
	S-F		
9	TBH-IN TBH-OUT T3B TF	CN9	Connect to cold plate inlet temp. sensor TBH-IN, cold plate outlet temp. sensor TBH-OUT, condenser coil middle temp. sensor T3B, refrigerant tube inlet temp. sensor
10	OLP TEMP. SENSOR	CN30	Connect to compressor top temp. sensor (Output: 0~50VDC)
11	T2B	CN28	Connect to evaporator coil outlet temperature sensor T2B
12	/	CN27	Connect to key board CN1
13	T3 T4 TP	CN26	Connect to condenser coil temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5VDC)
14	H-PRO, L-PRO	CN29	Connect to high and low pressure switch (pin1-pin2&pin3-pin4:5VDC pulse wave)

2 SYSTEM OVERVIEW

No.	Name	NC#	Meaning
15	EEVA	CN17	Connect to electric expansion valve (Output: 0~12VDC)
	EEVB	CN16	
	EEVC	CN22	
	EEVD	CN14	
	EEVE	CN13	
	EEVF	CN1	
	EEV1	CN53	
	EEV2	CN44	
	EEV3	CN3	
16	H_YL	CN49	Connect to high pressure sensor
17	DC-FAN2	CN10	Connect to DC fan (Output 0~310VAC)

Note: This section is for reference only. Please take practicality as standard.

3.1 Display Functions

Display Code	Display Code Meaning
	<ul style="list-style-type: none"> When Wireless Control feature is activated (For APP control units)
	<ul style="list-style-type: none"> Displays temperature, operation feature and Error codes:
 <i>(for 3 seconds)</i>	<ul style="list-style-type: none"> TIMER ON is set (if the unit is OFF, “” remains on when TIMER ON is set). SWING, TURBO or SILENCE feature is turned on.
 <i>(for 3 seconds)</i>	<ul style="list-style-type: none"> TIMER OFF is set. SWING, TURBO or SILENCE feature is turned off.
	<ul style="list-style-type: none"> When defrosting.
	<ul style="list-style-type: none"> When Active Clean feature is turned on.
	<ul style="list-style-type: none"> When 46 F(8 C) heating feature is turned on.

3.2 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 a certain level for a period of time, the compressor ceases operation.

Automatic shutoff based on fan speed:

If the indoor fan speed registers below 200RPM or over 2100RPM 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 the 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.

3.3 Basic Functions

Unit Element Abbreviations:

Abbreviation	Element
T1	Indoor room temperature sensor
T2	Evaporator coil temperature sensor
T3	Condenser coil temperature sensor
T4	Outdoor ambient temperature sensor
Tsc	Adjusted setting of temperature
TP	Compressor discharge temperature sensor
CDIFTEMP	Cooling shutdown temperature
HDIFTEMP2	Heating shutdown temperature
TCDI1	Enter defrost temperature
TCDE1	Exit defrost temperature 1
TCDE2	Exit defrost temperature2 (maintain for a period of time)
TIMING_DEFROST_TIME	Enter defrost time

In this manual, such as CDIFTEMP, HDIFTEMP2, TCDE1, TCDE2, TIMING_DEFROST_TIME...etc, they are well-setting parameter of EEPROM.

Fan Mode:

When fan mode is activated:

- The outdoor fan and compressor cease operation.
- 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 75°F (24°C). (Tsc=75°F (24°C)).

Cooling Mode:

Compressor Control:

Reach the configured temperature

1. When the compressor runs continuously for within 120 minutes.
 - If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency(fb) is less than minimum limit frequency(FminC).
 - Compressor runs at FminC more than 10 minutes.
 - T1 is lower than or equal to (Tsc-CDIFTEMP-32.9°F (0.5°C)).

Note: CDIFTEMP is EEPROM setting parameter. It is 35.6°F (2°C).

2. When the compressor runs continuously for more than 120 minutes.
 - If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency(FB) is less than minimum limited frequency(FminC).
 - Compressor runs at FminC more than 10 minutes.
 - T1 is lower than or equal to (Tsc-CDIFTEMP).

Note: CDIFTEMP is EEPROM setting parameter. It is 35.6°F (2°C) usually.

3. If one of the following conditions is satisfied, not judge protective time.
 - Compressor running frequency(fr) is more than test frequency (TestFre).
 - Compressor running frequency is equal to test frequency, T4 is more than 59°F (15°C) or T4 fault.
 - Change setting temperature.
 - Turn on/off turbo or sleep function.
 - Various frequency limit shutdown occurs.

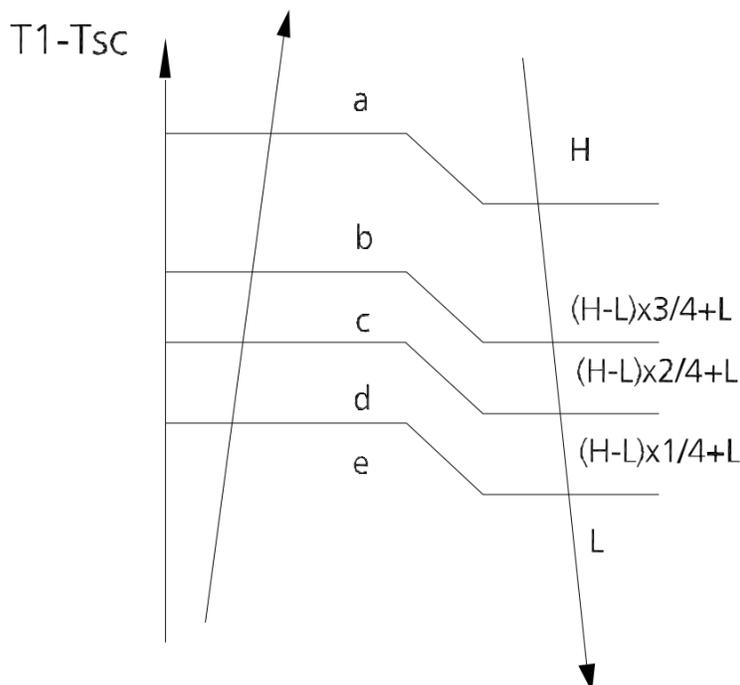
Indoor Fan Control:

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

For DC Fan Motor Units:

- **Descent Curve**
 - When T1-Tsc is lower than 6.3°F (3.5°C), fan speed reduces to 80%.
 - When T1-Tsc is lower than 1.8°F (1°C), fan speed reduces to 60%.
 - When T1-Tsc is lower than 0.9°F (0.5°C), fan speed reduces to 40%.
 - When T1-Tsc is lower than 0°F (0°C), fan speed reduces to 20%.
 - When T1-Tsc is lower than -0.9°F (-0.5°C), fan speed reduces to 1%.
- **Rise Curve**
 - When T1-Tsc is higher than or equal to 0°F (0°C), fan speed increases to 20%.
 - When T1-Tsc is higher than or equal to 0.9°F (0.5°C), fan speed increases to 40%.
 - When T1-Tsc is higher than or equal to 1.8°F (1°C), fan speed increases to 60%.
 - When T1-Tsc is higher than or equal to 2.7°F (1.5°C), fan speed increases to 80%.
 - When T1-Tsc is higher than or equal to 7.2°F (4°C), fan speed increases to 100%.

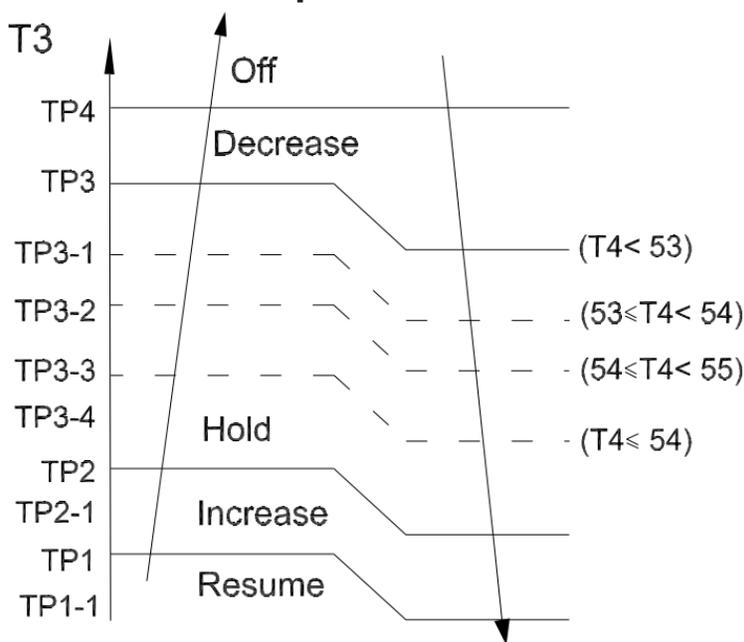
For AC Fan Motor Units:



Outdoor Fan Control:

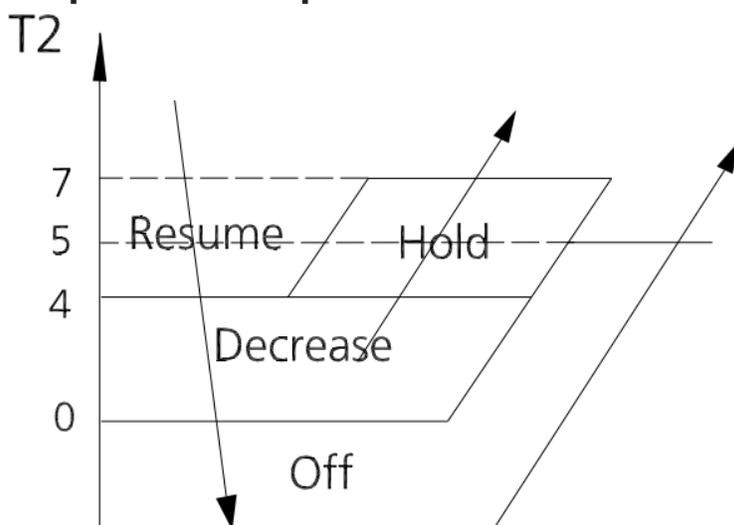
- The outdoor unit will be run at different fan speeds according to T4 and compressor running frequency.
- For different outdoor units, the fan speeds are different.

Condenser Temperature Protection:



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

Evaporator Temperature Protection:



- Off: Compressor stops.
- Decrease: Decreases the running frequency to lower level per 1 minute.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

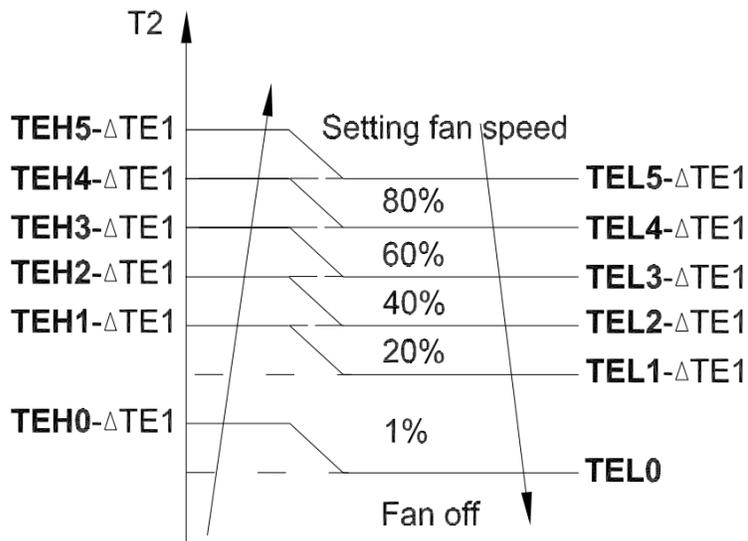
3 PRODUCT FEATURES

Heating Mode: Compressor Control:

- Reach the configured temperature.
 - If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency(fb) is less than minimum limit frequency(FminH).
 - Compressor runs at FminH more than 10 minutes.
 - T1 is higher than or equal to Tsc+ HDIFTEMP2.
- Note: HDIFTEMP2 is EEPROM setting parameter. It is 35.6°F (2°C) usually.
- If one of the following conditions is satisfied, do not judge protective time.
 - Compressor running frequency(fr) is more than test frequency(TestFre).
 - When compressor running frequency is equal to test frequency, T4 is more than 59°F (15°C) or T4 fault.
 - Change setting temperature.
 - Turn on/off turbo or sleep function.
 - When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

Indoor Fan Control:

- In heating mode, the indoor fan operates continuously. The fan speed can be set to 1%-100%, or mute. And the anti-cold wind function has priority.
 - Anti-cold air function
 - The indoor fan is controlled by the indoor temperature T1 and indoor unit coil temperature T2.



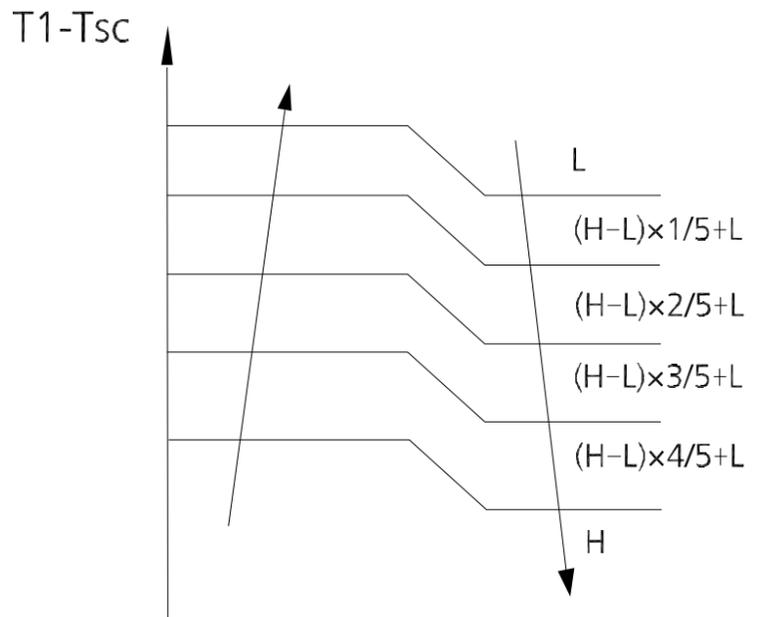
$T1 \geq 66^\circ\text{F} (19^\circ\text{C})$	$\Delta TE1 = 0$
$59^\circ\text{F} (15^\circ\text{C}) \leq T1 < 66^\circ\text{F} (19^\circ\text{C})$	$\Delta TE1 = 19^\circ\text{C} - T1 (66^\circ\text{F} - T1)$
$T1 < 59^\circ\text{F} (15^\circ\text{C})$	$\Delta TE1 = 7.2^\circ\text{F} (4^\circ\text{C})$

2. Auto fan

For DC fan motor units:

- Rise curve**
 - When T-Tsc is higher than $-2.7^\circ\text{F} (-1.5^\circ\text{C})$, fan speed reduces to 80%.
 - When T1-Tsc is higher than $0^\circ\text{F} (0^\circ\text{C})$, fan speed reduces to 60%.
 - When T1-Tsc is higher than $0.9^\circ\text{F} (0.5^\circ\text{C})$, fan speed reduces to 40%.
 - When T1-Tsc is higher than $1.8^\circ\text{F} (1^\circ\text{C})$, fan speed reduces to 20%.
- Descent curve**
 - When T1-Tsc is lower than or equal to $0.9^\circ\text{F} (0.5^\circ\text{C})$, fan speed increases to 40%.
 - When T1-Tsc is lower than or equal to $0^\circ\text{F} (0^\circ\text{C})$, fan speed increases to 60%.
 - When T1-Tsc is lower than or equal to $-2.7^\circ\text{F} (-1.5^\circ\text{C})$, fan speed increases to 80%.
 - When T1-Tsc is lower than or equal to $5.4^\circ\text{F} (3^\circ\text{C})$, fan speed increases to 100%.

For AC fan motor units:



Outdoor Fan Control:

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

Defrosting Mode:

- If any one of the following conditions is satisfied, system will enter the defrosting mode.

After the compressor starts up and keeps running, take the lowest temp of T3 (between 7 to 12 minutes) as T30.

Condition 1: If the compressor cumulate running time is up to 29 minutes and $T3 < TCDI2$ and $T3 \leq T30 - T30SUBT30ONE$ and $T4 < -7.6^\circ\text{F}$ (-22°C) (DEFROST_T4_ADD).

Condition 2: If the compressor cumulate running time is up to 35 minutes and $T3 < TCDI2$ and $T3 \leq T30 - T30SUBT30TWO$ and $T4 < -7.6^\circ\text{F}$ (-22°C) (Defrost_T4_ADD).

Condition 3: If the compressor cumulate running time is up to 29 minutes and $T3 < -24$ (TCDI3_ADD) for 3 minutes and $T4 > -7.6^\circ\text{F}$ (-22°C) (DEFROST_T4_ADD).

Condition 4: For the model active this condition if the compressor cumulate running time is up to 120 minutes and $T3 < -5^\circ\text{F}$ (-15°C) and $T4 < -7.6^\circ\text{F}$ (-22°C).

Condition 5: This is just for the first time defrost after power on condition, on the scenario when first time defrost or power off and power back on or turn on from standby mode you need to check the ice accumulate situation (the defrost time reckon reset), when the compressor cumulate4 running time is up to 30 minutes $T4 - T3 < (0.5T4 + KDELTT_ADD)$ and $T3 < TCDIN5_ADD$, $T4 < -7.6^\circ\text{F}$ (-22°C).

Condition 6: For the model active this condition if the compressor cumulate running time is up to TIMING_DEFROST_TIME (Hour) and $T4 \leq -7.6^\circ\text{F}$ (-22°C) (DEFROST_T4_ADD), the T4 without malfunction.

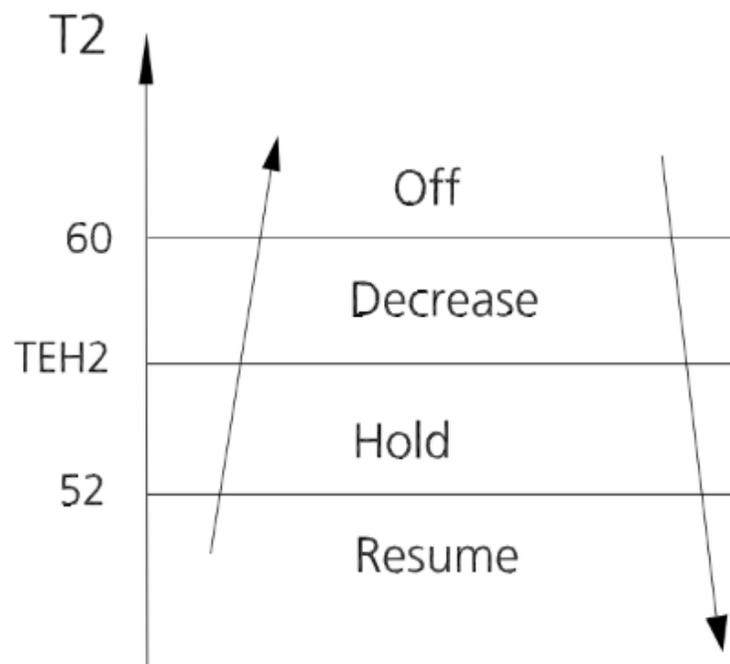
Condition 7: When T3 or T4 is lower than 41°F (-3°C) (last for 30 seconds) cumulate running for (EE-TIME-DEFROST7_ADD+30) minutes (not need based on T30 keep running with minimum 10 minutes).

Condition 8: When T3 or T4 is lower than 26.6°F (-3°C) (last for 30 seconds) cumulate running for (EE_TIME_DEFROST7_ADD+30) minutes (It will run a minimum of 10 minutes not needing to be based on T30).

- In defrosting mode the compressor continues to run and the indoor and outdoor motor will cease operation. The defrost light of the indoor unit will turn on and the "dF" symbol will be displayed.
- In condition 1~5 if any of the following conditions are satisfied the defrost cycle ends and the machine switches to normal heating mode.

- T3 rises above TCDE1.
- T3 maintained above TCDE2 for 80 seconds.
- Unit runs for 15 minutes consecutively in defrosting mode.
- Condition 6, if any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode.
 - Unit runs for 10 minutes consecutively in defrosting mode.
 - T3 rises above 50°F (10°C).
- Condition 7-8, if any one of the following conditions is satisfied, defrost ends and the machine switches to normal heat mode.
 - T3 rises above $TCDE1 + 7.2^\circ\text{F}$ (4°C)
 - T3 maintained above $TCDE2 + 7.2^\circ\text{F}$ (4°C) for 80 seconds.
 - Unit runs for 15 minutes consecutively in defrosting mode.

Evaporator Temperature Protection:

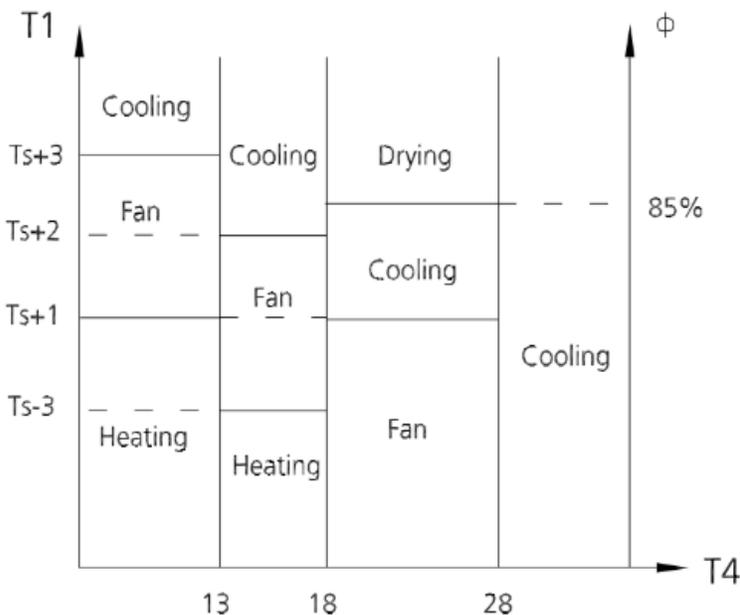


- Off: Compressor stops.
- Decrease: Decreases the running frequency to the lower level per 20 seconds.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

Auto Mode:

- This mode can be selected with the remote controller and the setting temperature can be changed between 60°F - 86°F (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.

3 PRODUCT FEATURES



- If the setting temperature is modified, the machine selects a new running function.

Drying Mode:

- In drying mode, the unit operates the same as auto fan in cooling mode.
- All protections are activated and operate the same as they do in cooling mode.

Low Room Temperature Protection:

If the room temperature is lower than 50°F (10°C), the compressor ceases operation and does not resume until the room temperature exceeds 53.6°F (12°C).

Forced Operation Function:

Forced Cooling Mode:

The compressor and outdoor fan continue to run (fixed at rated frequency), and the indoor fan runs at rated speed. After running for 30 minutes, the unit will switch to auto mode with a preset temperature of 76°F (24°C).

Forced Auto Mode:

Forced auto mode operates the same as normal auto mode with a preset temperature of 76°F (24°C).

- The unit exits forced operation when it receives the following signals:
 - Switch on
 - Switch off
 - Timer on
 - Timer off
 - Sleep mode
 - Follow me
 - Changes in:
 - Mode
 - Fan Speed
 - Setting temperature

Forced Defrosting Mode:

- Press the AUTO/COOL button continuously for 5s under forced cooling mode to enter this mode.
- Indoor fan will stop, defrosting lamp will light on
- Quit this mode and turn off the unit when:
 - Quit normal defrosting
 - Turned off by remote
- Press AUTO/COOL button continuously for 5s again

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.
- The timer function will not change the units operation mode. Suppose the unit is off now, it will not start up on start after setting the "timer off" function and when reaching the setting time, the timer LED will be off and the units running mode will not be changed.
- The setting time is relative time.
- The unit will quit the timer function when it has malfunctioned.

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 1.8°F (1°C) (no higher than 86°F (30°C)) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at a low speed.
- When heating the temperature decreases 1.8°F (1°C) (no lower than 60.8°F (16°C)) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at a low speed. The anti-cold wind function will take priority.
- The operating time for sleep mode is 8 hours, after which the unit will exit this mode.
- The timer setting is available in this mode.

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 case of sudden power failure, will restore those settings automatically within 3 minutes of power returning.
- 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 will be in standby mode.

Active Clean Function:

- The active clean technology washes away dust, mold, and grease that may cause odors when it adheres to the heat exchanger by automatically freezing and then rapidly thawing the frost. The internal wind wheel then keeps operating to blow-dry the evaporator, thus preventing the growth of mold and keeping the inside clean.
- When this function is turned on, the indoor unit displays "CL", after 20 to 130 minutes, the unit will turn off automatically and cancel the active clean function.

Follow Me:

- 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 units 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.

FP Mode 46.4°F (8°) Heating:

In heating mode, the temperature can be set to as low as 46.4°F (8°C) preventing the indoor area from freezing if in a unoccupied space during cold weather.

Silence

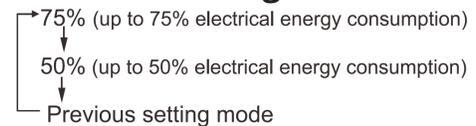
Press "Silence" on the remote control to enable the SILENCE function. While this function is active, the indoor unit will run at a faint breeze (1% fan speed), which reduces noise to the lowest possible level.

ECO Function:

- Used to enter energy efficient mode.
 - Under cooling mode, press ECO button and the remote control will adjust the temperature automatically to 75.2°F (24°C) and the fan speed to Auto to save energy (but only if the set temperature is less than 75.2°F (24°C)).
 - If the set temperature is more than 75.2°F (24°C) and 86°F (30°C) press the ECO button and the fan speed will change to auto and the set temperature will remain unchanged.
- When the unit receives signals such as switch off, turbo, silence, self clean, forced cooling, mode change, sleep mode, or adjusting the set temperature to less than 76°F (24°C), it will cease ECO operation.
- When there is any temperature sensor malfunction the unit will cease ECO mode.
- The indoor fan will run in auto fan mode when put into ECO mode. The set temperature and fan speed can be changed by the remote.

Electrical Energy Consumption Control:

Press the " Gear" Button on the remote control to enter energy efficient mode in a sequence of the following:



Turn off the unit or activate ECO, sleep, turbo, FP, silence, or self clean to quit this function.

Breeze Away:

This feature avoids direct airflow from blowing on the body.

Note: this feature is only available under cool, fan-only, or dry mode.

Wireless Control (APP):

Wireless control allows you to control your air conditioner using your phone.

4 MAINTENANCE

4.1 First Time Installation Check

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

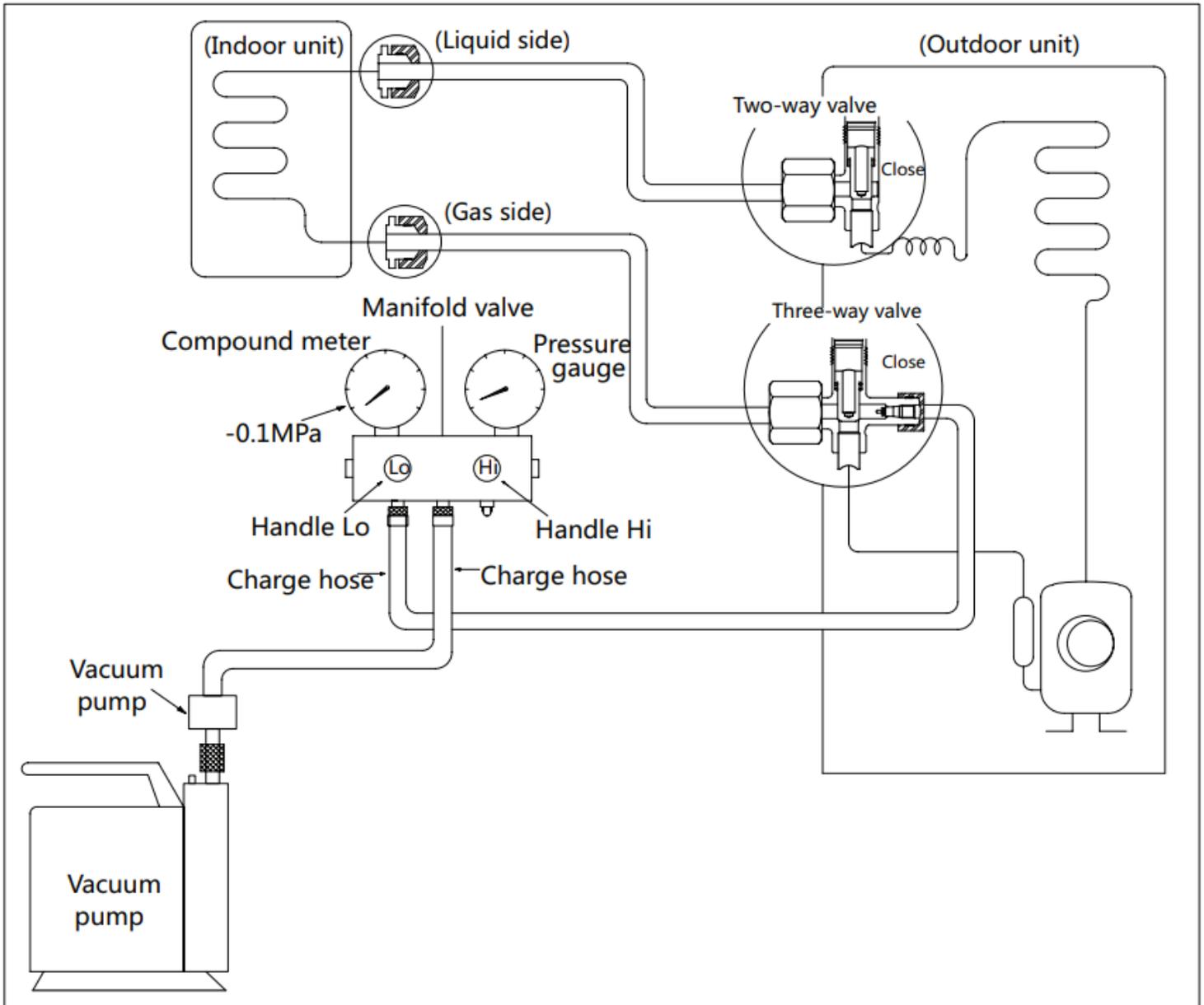
- Increasing pressure in the system.
- Increasing the operating current.
- Decreasing the cooling or heating efficiency.
- Congesting the capillary tubing due to ice build-up in the refrigerant circuit.
- Corroding the refrigerant system.

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 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 and outdoor units connections as if a leak is present bubbles will form on the connection.

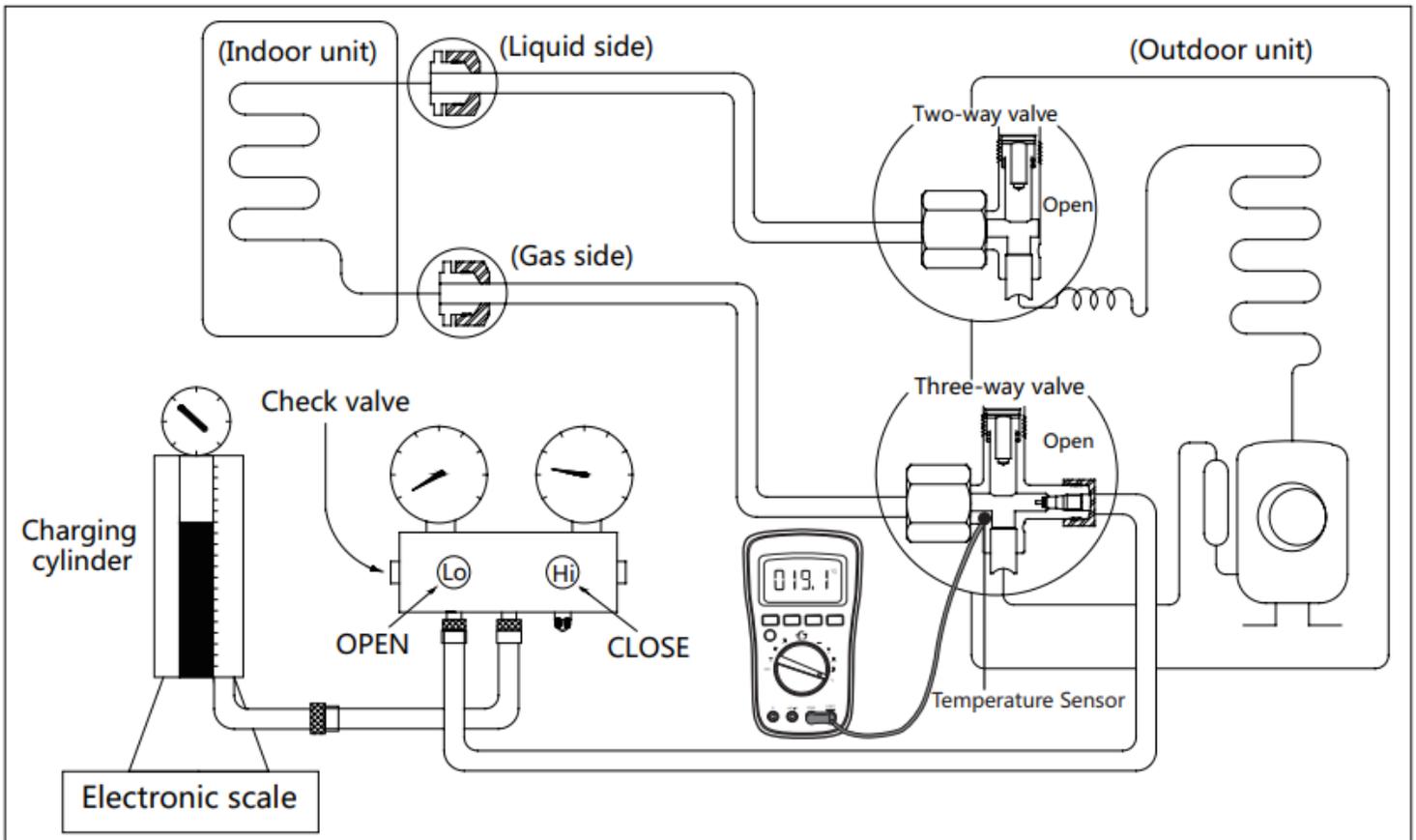
Air Purging with Vacuum Pump:



Procedure:

1. Tighten the flare nuts of the indoor and outdoor units and confirm that both the 2-way 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 14.5 Psi (-0.1 MPa).
 - If the meter does not indicate 14.5 Psi (-0.1 MPa) after 30 minutes continue evacuating for an additional 20 minutes.
 - If the pressure does not achieve 15.5 Psi (-0.1 Mpa) after 50 minutes check for leaks.
 - B. If the pressure successfully reaches 15.5 Psi (-0.1 MPa) fully close the Handle Lo valve then cease vacuum pump operations.
6. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backwards, check if there is a leak.
 - 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. 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-way and 3-way valves and tighten the cap of the 2-way and 3-way valves.

4.2 Refrigerant Recharge



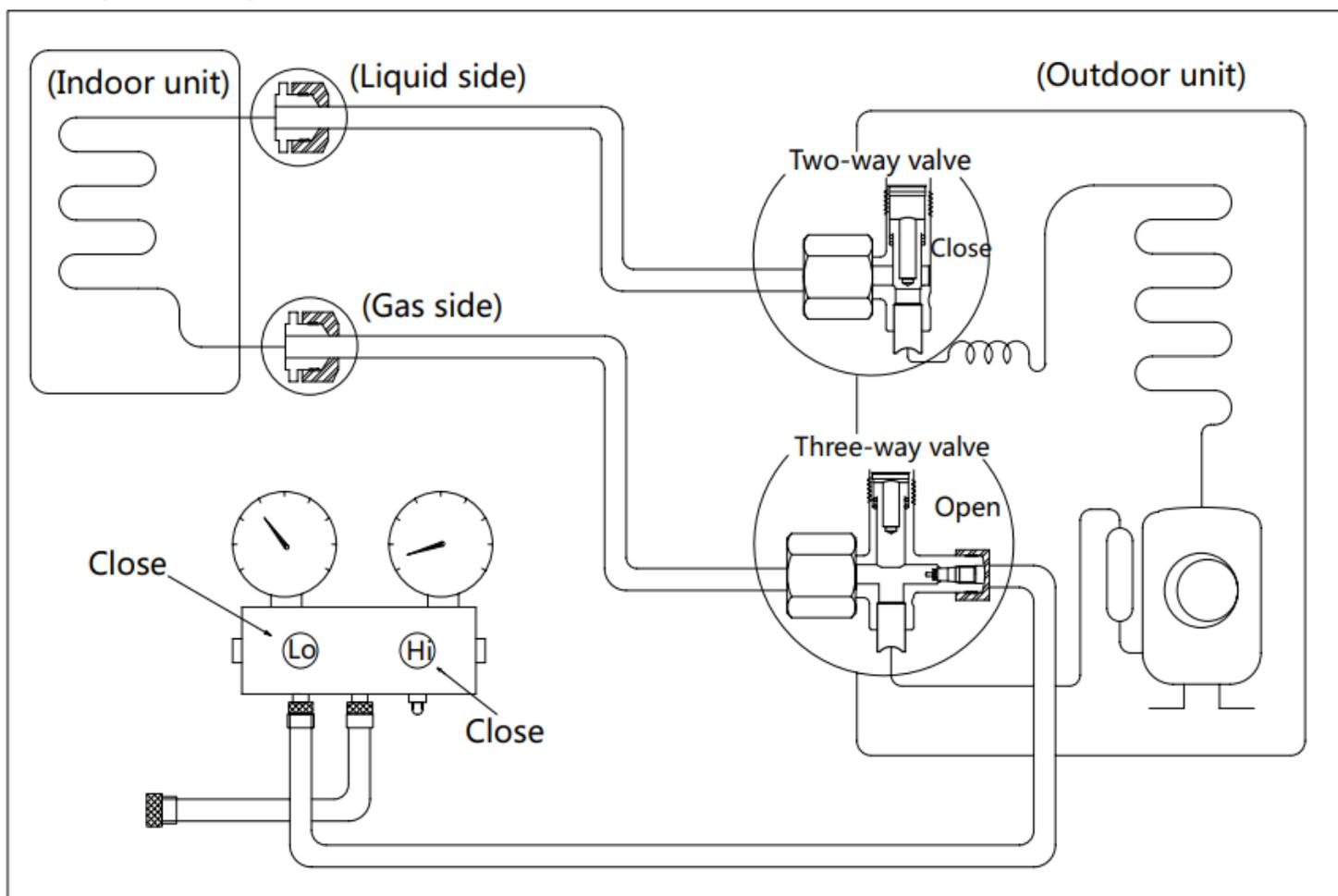
Procedure:

1. Close both 2-way and 3-way valves.
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.
4. If the refrigerant is R410A/R32 invert the cylinder to ensure a complete liquid charge.
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 a push pin Handle Lo to the 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-way and 3-way valves).
8. Operate the air conditioner in cooling mode to 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, the value of pressure refers to chapter System Pressure Table). Turn off the air conditioner and then disconnect the charge hose from the 3-way service port immediately.
10. Mount the caps of the service port and the 2-way and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 13.276 ft lb (18Nm).
12. Check for leaks.

4.3 Re-Installation

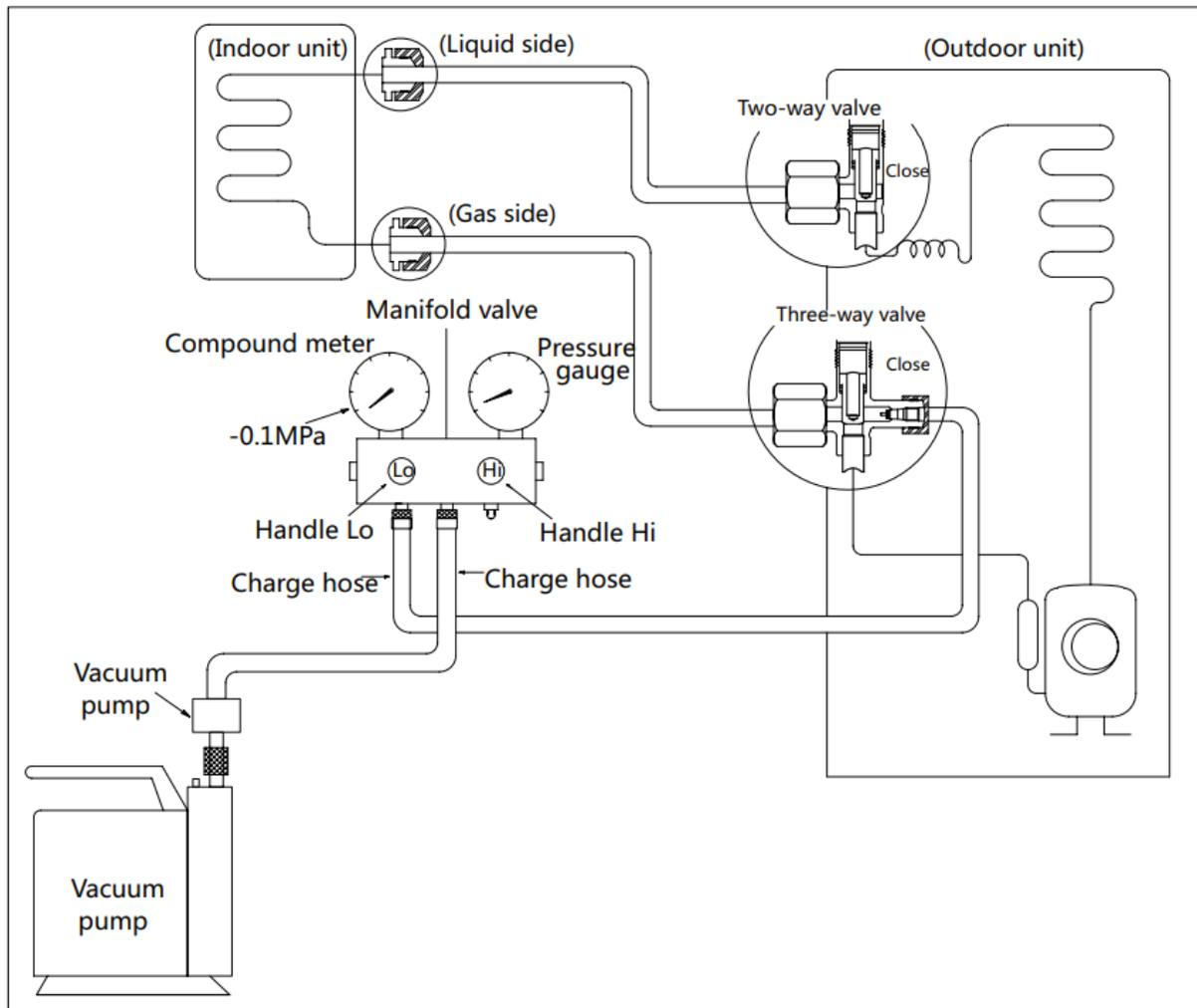
Indoor Unit:

Collecting the refrigerant into the outdoor unit:

**Procedure:**

1. Confirm that the 2-way 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 14.5 Psi (0.1 Mpa).
6. Close the 3-way valve so that the gauge rest between 43.5 Psi (0.3MPa) and 72.5 Psi (0.5MPa).
7. Disconnect the charge set and mount the caps of the service port and the 2-way and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 13.276 ft lb (18Nm).
9. Check for leaks.

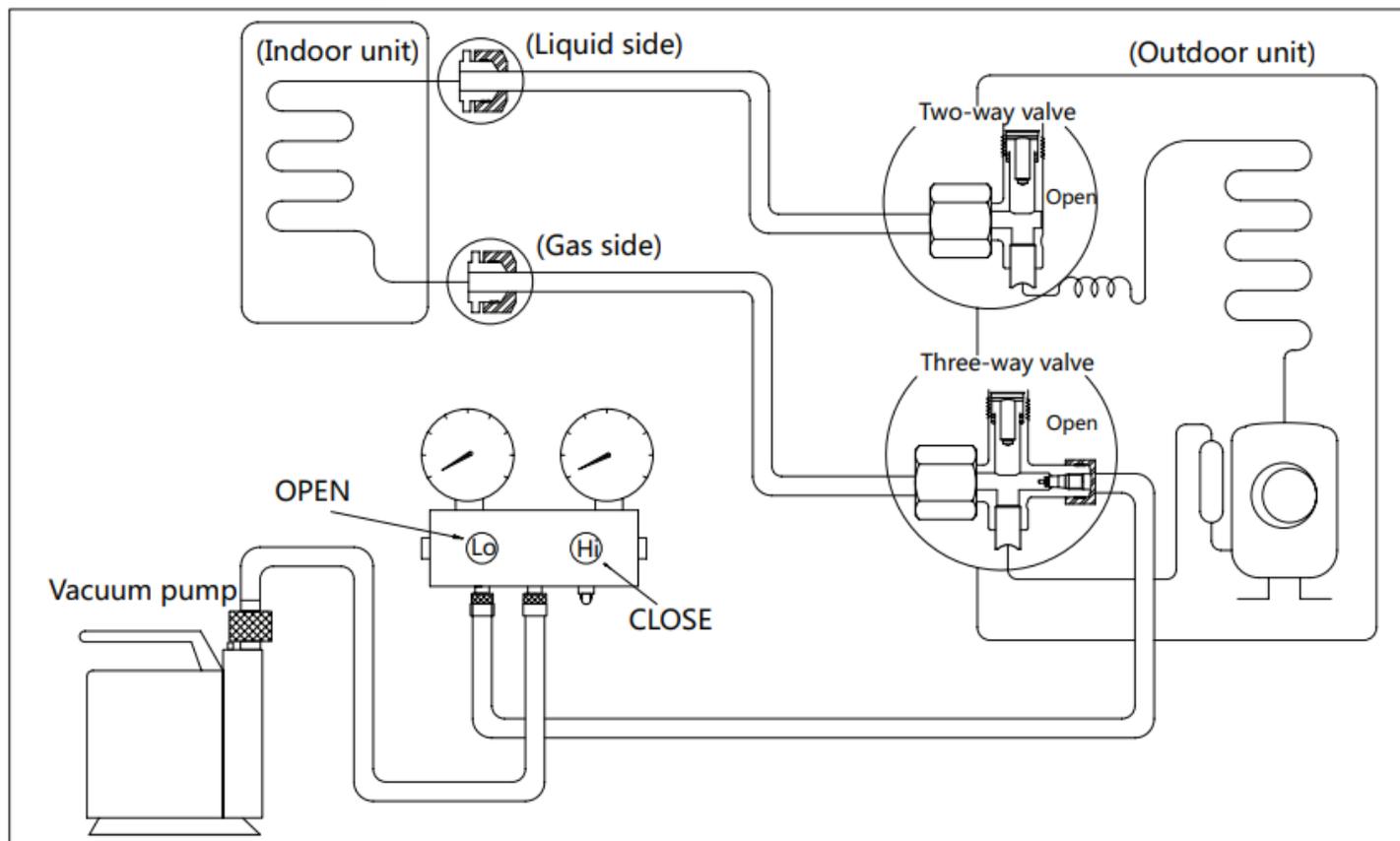
Air Purging with Vacuum Pump:



Procedure:

1. Tighten the flare nuts of the indoor and outdoor units and confirm that both the 2-way 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 14.5 Psi (-0.1 MPa).
 - If the meter does not indicate 14.5 Psi (-0.1 MPa) after 30 minutes continue evacuating for an additional 20 minutes.
 - If the pressure does not achieve 15.5 Psi (-0.1 MPa) after 50 minutes check for leaks.
 - B. If the pressure successfully reaches 15.5 Psi (-0.1 MPa) fully close the Handle Lo valve then cease vacuum pump operations.
6. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backwards, check if there is a leak.
 - A. Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
 - B. Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
 - C. Remove the charge hose from the 3-way valve.
7. Fully open the 2-way and 3-way valves and tighten the cap of the 2-way and 3-way valves.

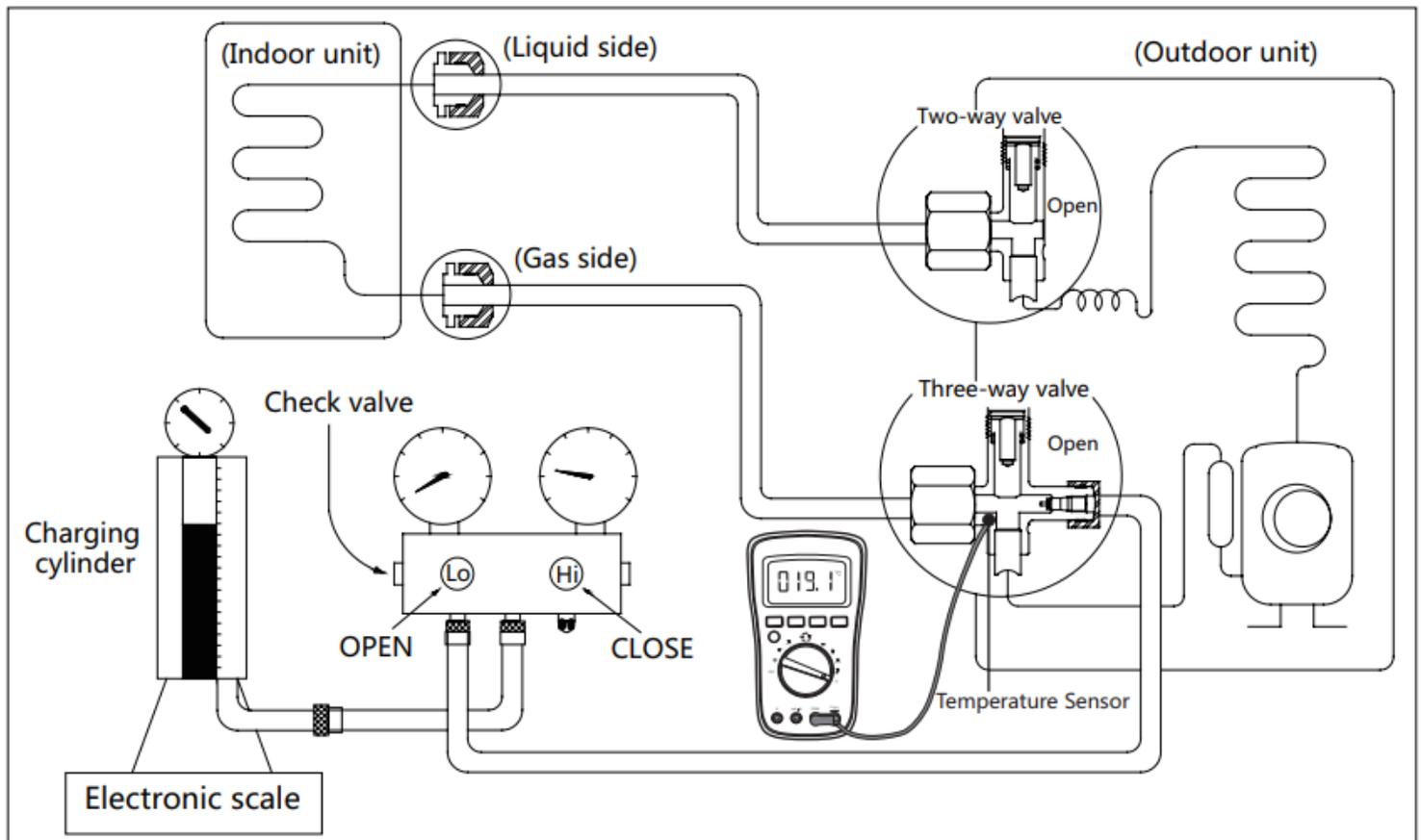
Outdoor Unit: Evacuation for the Whole System:



Procedure:

1. Confirm that the 2-way 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 14.5 Psi (-0.1 MPa).
4. Close the valve (Low side) on the charge set and turn off the vacuum pump.
5. 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. Disconnect the charge hose from the vacuum pump.
7. Mount the caps of the service port and the 2-way and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 13.276 ft lb (18 Nm).

Refrigerant Charging:



Procedure:

1. Close both 2-way and 3-way valves.
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.
4. If the refrigerant is R410A/R32 invert the cylinder to ensure a complete liquid charge.
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 a push pin Handle Lo to the 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-way and 3-way valves.
8. Operate the air conditioner in cooling mode to 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, the value of pressure refers to chapter System Pressure Table). Turn off the air conditioner and then disconnect the charge hose from the 3-way service port immediately.
10. Mount the caps of the service port and the 2-way and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 13.276 ft lb (18 Nm).
12. Check for leaks.

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.

5.1 Safety Caution

WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking the indoor/outdoor PCB, please equip yourself with anti-static gloves or a wrist strap to avoid damaging the board.

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

Note: If using the inverter test tool for maintenance, remove the big handle from the unit, take out the detection cable, take out the female end of the cable, and connect the inverter testing tool. After maintenance is completed, insert the female end back into the port.



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

5 TROUBLESHOOTING

5.2 Error Display (Indoor Unit)

Display	Error Information	Solution
DF	Defrost	Normal Display, not error code
CL	Filter cleaning reminder (power on display for 15 seconds)	
CL	Active clean	
nF	Filter replacement reminder (power on display for 15 seconds)(for some models)	
FP	Heating in Room Temperature under 46.4°F (8°C)	
FC	Forced Cooling	
AP	AP Mode of Wifi Connection	
CP	Remote Switched Off	
EH 00	IDU EEPROM Malfunction	
EH 0A	Indoor EEPROM Parameter Error	TS01-IDU
EL 01	IDU & ODU Communication Error	TS02-S-INV
EH 02	Zero-Crossing Signal Detection Error	TS03
EH 03	IDU Fan Speed Out of Control	TS04-S-IDU
EC 51	ODU EEPROM Parameter Error	TS01-ODU
EC 52	ODU Coil Temperature Sensor (T3) Error	TS05-ODU
EC 53	ODU Ambient Temperature Sensor (T4) Error	TS05-ODU
EC 54	Comp. Discharge Temperature Sensor (TP) Error	TS05-ODU
EC 56	IDU Coil Outlet Temperature Sensor (T2B) Error (Multi-Zone)	TS05-ODU
EH 60	IDU Room Temperature Sensor (T1) Error	TS05-IDU
EH 61	IDU Pipe Temperature (T2) Sensor Error	TS05-IDU
EC 07	ODU Fan Speed Out of Control	TS04-ODU
EH 0B	IDU Main Control Board & Display Board Communication Error	TS07
FH CC	Refrigerant Sensor Error	TS05-N10
EH C1	Refrigerant Sensor Detects Leakage	TS06-N10
EH C2	Refrigerant Sensor is Out of Range & Leakage is Detected	TS06-N10
EH C3	Refrigerant Sensor is Out of Range	TS05-N10
EC C1	Other IDU Refrigerant Sensor Detects Leakage (Multi-Zone)	TS06-N10
EL 0C	System Lacks Refrigerant	TS06-INV
PC 00	ODU IPM Module Protection	TS09-S
PC 01	ODU Voltage Protection	TS10-S
PC 02	Compressor Top (or IPM) Temperature Protection	TS11-S-INV
PC 04	Inverter Compressor Drive Error	TS12-S
PC 03	Pressure Protection (low or high pressure)	TS26-INV
PC 0L	Low Ambient Temperature Protection	LP
----	IDUs Mode Conflict (Multi-Zone)	TS14

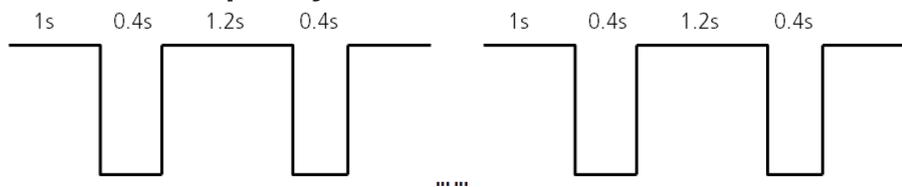
For Other Errors:

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.

LED Flash Frequency:



5.3 Error Display (Outdoor Unit with Auxiliary Board)

Display	Error Information	Solution
DF	Defrost	Normal display, not error code
FC	Forced cooling	
EC 51	ODU EEPROM Parameter Error	TS01-ODU
EL 01	IDU & ODU Communication Error	TS02-S-INV
PC 40	Communication Error between Outdoor Main Chip & Compressor-Driven Chip	TS31
PC 08	ODU Overcurrent Protection	TS08-S
PC 10	ODU Low AC Voltage Protection	TS10-S
PC 11	ODU Main Control Board DC Bus High Voltage Protection	TS10-S
PC 12	ODU Main Control Board DC Bus Low Voltage Protection/341 MCE Error	TS10-S
PC 00	ODU IPM Module Protection	TS09-S
PC 0F	PFC Module Protection	TS30
EC 71	Over Current Failure of ODU DC Fan Motor	TS04-ODU
EC 72	Lack Phase Failure of ODU DC Fan Motor	TS38
EC 07	ODU Fan Speed Out of Control	TS04-ODU
PC 43	ODU Compressor Lack Phase Protection	TS39
PC 44	ODU Zero Speed Protection	TS08-S
PC 45	ODU IR Chip Drive Failure	TS40
PC 46	Compressor Speed Out of Control	TS08-S
PC 49	Compressor Overcurrent Failure	TS08-S
PC 30	System High Pressure Protection	TS26-INV
PC 31	System Low Pressure Protection	TS26-INV
PC 0a	High Temperature Protection of Condenser	TS27-INV
PC 06	Discharge Temperature Protection of Compressor	TS32
LC 06	High Temperature Protection of Inverter Module (IPM)	TS11-S-INV
PC 02	Compressor Top (or IPM) Temperature Protection	TS11-S-INV
PH 90	High Temperature Protection of Evaporator	--
PH 91	Low Temperature Protection of Evaporator	--
EC 52	ODU Coil Temperature Sensor (T3) Error	TS05-ODU
EC 53	ODU Ambient Temperature Sensor (T4) Error	TS05-ODU
EC 54	Comp. Discharge Temperature Sensor (TP) Error	TS05-ODU
EC 50	Open or Short Circuit of Outdoor Unit Temperature Sensor (T3, T4, TP)	TS05-ODU
PC 0L	Low Ambient Temperature Protection	LP

5 TROUBLESHOOTING

5.4 Outdoor Unit Point Check Function

- A check switch is included on the auxiliary board.
- Press SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 button is pushed.

Number of Presses	Display	Remark		
00	Normal display	Display running frequency, running state or malfunction code		
01	Indoor unit capacity demand code	S communication models display "--"		
03	The frequency after the capacity requirement transfer			
04	The frequency after the frequency limit			
05	The frequency of sending to 341 chip			
06	Indoor unit evaporator temperature	If the temp. is lower than -9°C, the digital display tube will show "-9". If the temp is higher than 70 degrees, the digital display tube will show "70".		
07	Condenser pipe temp. (T3)			
08	Outdoor ambient temp. (T4)			
09	Compressor discharge temp. (TP)	The display value is between (0-199°C). If the temp. is lower than (0°C) the digital display tube will show "0". If the temp. is higher than 99°C, light the decimal point of the high digit tube. (For example, the digital display tube will show "0.5", so 0.5 multiplied by 10 to become 5, then added to 100 to become 105°C).		
10	AD value of current	The display value is hex number. For example, the digital display tube shows "Cd", so $C*161+d*160=12*16+13=205$, it means AD value is 205.		
11	AD value of voltage			
12	Indoor unit running mode code	Standby:0, Cooling:1, Heating:2, Fan only:3, Drying:4, Forced cooling:6, Defrosting:7		
13	Outdoor unit running code	Standby:0, Cooling:1, Heating:2, Fan only:3, Drying:4, Forced cooling:6, Defrosting:7		
14	EXV open angle	Actual data/4.		
		If the value is higher than 99, light the decimal point of the high digit tube. For example, the digital display tube show "2.0", so 2.0 multiplied by 10 to become 20, then added to 100 to become 120, it means the EXV open angle is $120 \times 4 = 480p$.		
15	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is hex number. For example, the digital display tube show 2A, the corresponding binary is 101010, so Bit5=1, Bit3=1, and Bit1=1 It means frequency limit caused by T2, T3, and current
		Bit6	Frequency limit caused by PFC	
		Bit5	Frequency limit caused by high temperature of T2	
		Bit4	Frequency limit caused by low temperature of T2	
		Bit3	Frequency limit caused by T3	
		Bit2	Frequency limit caused by TP	
		Bit1	Frequency limit caused by current	
Bit0	Frequency limit caused by voltage			
16	DC fan motor speed	0:off, 1:turbo, 2:high, 3:medium, 4:low, 5:breeze, 6:super breeze 7:other		

Number of Presses	Display	Remark
17	IGBT radiator temp.	The display value is between 0-130 degrees. If the temp. is lower than 0°C, the digital display tube will show "0". If the temp. is higher than 99 degrees, light the decimal point of the high digit tube. (For example, the digital display tube show "0.5", so 0.5 multiplied by 10 to become 5, then added to 100 to become 105°C).
18	Indoor unit number	The indoor unit can communicate with the outdoor unit well
19	Evaporator pipe temp. T2 of 1# indoor unit	S communication models display "--"
20	Evaporator pipe temp T2 of 2# indoor unit	
21	Evaporator pipe temp. T2 of 3# indoor unit	
22	1# Indoor unit capacity demand code	
23	2# Indoor unit capacity demand code	
24	3# Indoor unit capacity demand code	
25	Room temp. T1 of 1# indoor unit	
26	Room temp. T1 of 2# indoor unit	
27	Average room temp. T1	If the temp. is lower than 0 degrees, the digital display tube will show "0". If the temp. is higher than 70 degrees, the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show "--"
28	Reason of stop	
29	Evaporator pipe temp. sensor T2B of 1# indoor unit	S communication models display "--"
30	Evaporator pipe temp. T2b of 2# indoor unit	

Compliant Record Form:

Compliant Record Form

Request No:

Date:

Installation Date:

Service Date:

Customer Information			
Name		Telephone No.	
Home Address			
Email			
Product Information			
Indoor Unit Model		Outdoor Unit Model	
Serial No. of Indoor Unit			
Serial No. of Outdoor Unit			
Working Mode	<input type="checkbox"/> Cooling <input type="checkbox"/> Heating <input type="checkbox"/> Fan Only <input type="checkbox"/> Dry		
Setting Temperature	___ °F / °C	Fan Speed	<input type="checkbox"/> Turbo <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> Auto
Temperature of Air Inlet	___ °F / °C	Temperature of air outlet	___ °F / °C
Installation / Condition Information			
Indoor Temperature	___ °F / °C	Indoor Humidity	___ %RH
Outdoor Temperature	___ °F / °C	Outdoor Humidity	___ %RH
Length of Connecting Pipe		Pipe Diameter	Gas pipe: Liquid pipe:
Length of Wiring		Wire diameter	
System Running Pressure	___ MPa or ___ Bar or ___ PSI		
Room size (L*W*H)			
Photo of Installation of Indoor Unit (Photo #1)		Photo of Installation of Outdoor Unit (Photo #2)	
Failure Description			
Error Code of Indoor Unit		Code of Outdoor PCB	
Unit does not start			
Remote Control does not work			
Indoor display shows nothing			
No Cooling or Heating at all			
Less Cooling or Heating			
Unit Starts but Stops Shortly			
High noise			
High Vibration			

Parameter Checking Information by Remote Controller

Display Code	Displaying Code Meaning	Display Value	Display Value Meaning
T1	Room Temperature		
T2	Indoor Coil Temperature		
T3	Outdoor Coil Temperature		
T4	Ambient Temperature		
TP	Discharge Temperature		
FT	Targeted Frequency		
Fr	Actual Frequency		
dL	Compressor Current		
Uo	Outdoor AC Voltage		
Sn	Indoor Capacity Test	/	N/A
--	Reserve	/	N/A
Pr	Outdoor Fan Speed		
Lr	EXV Opening Steps		
ir	Indoor Fan Speed		
HU	Indoor Humidity		
TT	Adjusted Setting Temperature		
DT	Reserve	/	N/A
iF	Reserve	/	N/A
nA	Reserve	/	N/A
oT	GA algorithm Frequency		

Approval From Manufacture

<input type="checkbox"/> Approved	
<input type="checkbox"/> More Proof Needed	
<input type="checkbox"/> Rejected	

5 TROUBLESHOOTING

5.5 Information Inquiry & Setting

- To enter engineer mode, in power-on or standby mode, and in non-locked state, press the key combination "ON/OFF + Air Speed" for 7s:
- After entering the engineer mode, the remote control will display icons of "Auto, Cool, Dry, Heat", and the Battery icon; at the same time, it will also display the numeric code of the current engineer mode (for the initial engineer mode, the numeric code displayed is 0), and all other icons are inactive.
- In engineer mode, the value of the current numeric code can be adjusted circularly through the UP/Down key, with the setting range of 0 to 30. Each time the current numeric code is adjusted, the special code of the engineer mode will be transmitted with a delay of 0.6s. The code can also be transmitted by pressing "OK", and the special code of the engineer mode sent contains information of the currently displayed numeric code (if the numeric code is 0, the code to enter the engineer mode will be transmitted).
- In engineer mode, other keys or operations are invalid except for the ON/OFF key, the UP/DOWN key, the OK key, or executing the operation to exit the engineer mode.

Code	Query Content	Advanced Function Setting
0	Error Code	Press "ON/OFF" for 2s to enter the Capacity, the code displayed is "Ch", press "OK" to send the Query Capacity code; press the UP/DOWN key to select 1 to 100k
1	T1 Temperature	Press "ON/OFF" for 2s to enter the Power Down Memory Selector, the code displayed is "Ch", press "OK" to send the Query Power Down Memory Selector code; press the UP/DOWN key to select 1 or 0 and press "OK" to confirm, 1 indicates that the power down memory exists, and 0 indicates that no power down memory exists; and press "ON/OFF" for 2s to exit. (Set within 1 minute after power on)
2	T2 Temperature	Press "ON/OFF" for 2s to enter the Internal Fan Control Selector after the pre-set temperature is reached, the code displayed is "Ch", press "OK" to send the Query Internal Fan Control Selector code; press the UP/DOWN key to select 1 to 13: 1- Stop the fan, 2- Min. fan speed, 3- Set the air speed, 4- Terminal stop for 4 min. running for 1 min., 5- Terminal stop for 8 min. running for 1 min., 6- Terminal stop for 16 min. running for 1 min., 7- Terminal stop for 24 min. running for 1 min., 8- Terminal stop for 48 min. running for 1 min., 9- Terminal stop for 15 min. running for 2.5 min., 10- Terminal stop for 20 min. running for 2.5 min., 11- Terminal stop for 60 min. running for 2.5 min., 12- Set fan speed (but stops the fan when the set fan speed is auto fan), and 13- Breeze fan (but stops the fan when the set fan speed is auto fan) press "OK" to confirm, and press "ON/OFF" for 2s to exit. (Item 5~13 are valid for some models) (Set within 1 minute after power is on)
3	T3 Temperature	Press "ON/OFF" for 2s to enter the Mode Selector, press the UP/DOWN key to select CH (cool and heat, Auto + Cool + Dry + Heat + Fan), HH (Heat only, Heat only + Fan), CC (Cool only, Auto + Cool + Dry + Fan) or nU (Cool and Heat without Auto, Cool + Dry + Heat + Fan), press "OK" to confirm, and the mode selected can be memorized when the remote control is powered down and powered on; and press "ON/OFF" for 2s to exit. When the remote control does not burn any parameters, the mode setting will not be memorized. (CC or nU is valid for some models) (Set within 1 minute after power is on)
4	T4 Temperature	Press the "ON/OFF" for 2s to enter the Min. Set Temperature Selector, press the UP/DOWN key to select "16°C~24°C", press "OK" to confirm, and the Min. Set Temperature can be memorized when the remote control is powered on and power lost; and press "ON/OFF" for 2s to exit. When the remote control does not burn any parameters, the min. set temperature will not be memorized. (Set within 1 minute after power is on)
5	TP Temperature	Press "ON/OFF" for 2s to enter the Max. Set Temperature Selector, press the UP/DOWN key to select "25°C~30°C", press "OK" to confirm, and the Max. Set Temperature can be memorized when the remote control is power on and power lost; and press "ON/OFF" for 2s to exit. When the remote control does not burn any parameters, the max. set temperature will not be memorized. (Set within 1 minute after power is on)

Code	Query Content	Advanced Function Setting
6	Compressor Target Frequency Ft	Press "ON/OFF" for 2s to enter the Multi-split Cooling and Heating Preference Selector, the code displayed is "Ch", press "OK" to send the Query Multi-split Cooling and Heating Preference Selector code; press the UP/DOWN key to select H (heating preferred), C (cooling preferred), or A (master settings), press "OK" to confirm; and press "ON/OFF" for 2s to exit. (Set within 1 minute after power on) (Only multi models are effective)
7	Compressor Running Frequency	/
8		/
9	Current AC Voltage Uo	/
10		/
11		Press "ON/OFF" for 2s to enter the Min. Desired Cooling Frequency Selector, the code displayed is Ch, press "OK" to send the Query Min. desired Cooling Frequency Selector code; press the UP/DOWN key to select the minimum cool frequency desired and press "OK" to confirm; press "ON/OFF" for 2s to exit (Range: 10-50Hz, --; "--" cancels the settings) (for some models) (Set within 1 minute after power is on)
12	Set Speed Pr of Outdoor Fan	Press "ON/OFF" for 2s to enter the Min. Desired Heating Frequency Selector, the code displays is "Ch", press "OK" to send the Query Min. Desired Heating Frequency Selector code; press the UP/DOWN key to select the min. desired heating frequency value, press "OK" to confirm; and press the "ON/OFF" for 2s to exit. (Range: 10-50Hz, --;"--" cancels the settings) (for some models) (Set within 1 minute after power in on)
13	Opening Lr of EEV	Press "ON/OFF" for 2s to enter the Max. Running Frequency Selector of the restricted are 6 in the cooling mode T4, the code displayed is "Ch", press "OK" to send the Query Max. Running Frequency Selector code of the restricted are 6 in the cooling mode T4; press the UP/DOWN key to select the limit, then press "OK" to confirm; and press "ON/OFF" for 2s to exit. (Range:20-150Hz,--, "--" cancels the settings) (for some models)
14	Actual Running Speed ir of the Indoor Fan	Press "ON/OFF" for 2s to enter the Resonance Point Frequency Selector, the code displayed is "Ch", press "OK" to send the Resonance Point Frequency Selector code; press the UP/DOWN key to select the outdoor forced running frequency ("10-250Hz"), then press "OK" to confirm; and press "ON/OFF" for 2s to exit. (Range: 10-250Hz, --;"--" cancels the settings) (for some models)
15	Indoor Humidity Hu	Press "ON/OFF" for 2s to enter the Outdoor Forced Running Frequency Selector, the code displayed is "Ch", press "OK" to send the Query Outdoor Forced Running Frequency Selector code; press the UP/DOWN key to select the outdoor forced running frequency ("10-250Hz), then press "OK" to confirm; and press "ON/OFF" for 2s to exit. (Range: 10-250Hz, --, "--" cancels the settings) (for some models)
16	Set Temperature TT after Compensation	Press "ON/OFF" for 2s to enter One-Key Recovery, the code displayed is "rS", then press "OK" to send the One-Key Recovery code, the mode selector of the remote control will recover to "Cooling and Heating", the min. temperature recovers to 16°C, and the max. Temperature recovers to 30°C; and press "ON/OFF" for 2s to exit. (for some models)
17	/	/
18	WIFI Signal Strength	Press "ON/OFF" for 2s to enter Model Selection the code displayed is "Ch", then press "OK" to send the Model Selection code, Press the UP/DOWN key to select, such as 23, 26, 32, 35, 51, 72, 120 , etc; and press "ON/OFF" for 2s to exit.
19	DC Bus Voltage AD Value	Press "ON/OFF" for 2s to enter the Cooling Frequency Threshold Settings; press the UP/DOWN key to select the cooling frequency threshold, press "OK" to confirm; and press the "ON/OFF" for 2s to exit. (Range: 40, 41,..... 83, 84,--, "--" cancels the settings) (set within 1 minute after power is on)
20	Indoor Target Frequency OT	Press "ON/OFF" for 2s to enter the Heating Frequency Threshold Settings; press the UP/DOWN key to select the cooling frequency threshold, press "OK" to confirm; and press "ON/OFF" for 2s to exit. (Range: 40, 41,... 83, 84,--, "--" cancels the settings) (set within 1 minute after power is on)

5 TROUBLESHOOTING

Code	Query Content	Advanced Function Setting
21	Reserve	Press "ON/OFF" for 2s to enter the Cooling Temperature Compensation Value Settings, the code displayed is "Ch", then press "OK" to send the Query Cooling Temperature Compensation Value code; press the UP/DOWN key to select the cooling temperature compensation value, then press "OK"; and press "ON/OFF" for 2s to exit. (Range: -3.0, -2.5, -2.0, ...2.0, 2.5, 3.0, 3.5, --, "--" cancels the settings)
22		Press "ON/OFF" for 2s to enter the Cooling Temperature Compensation Value Settings, the code displayed is "Ch", the press "OK" to send the Query Heating Temperature Compensation Value code; press the UP/DOWN key to select the heating temperature compensation value, then press "OK"; and press "ON/OFF" for 2s to exit. (Range: -6.5, -6,...1.0, 1.5, 2.0,...6.0, 6.5, 7.0, 7.5, --, "--" cancels the setting)
23		Press "ON/OFF" for 2s to enter the Max. Cooling Air Speed Settings, the code displayed is "Ch", press "OK" to send the Query Max. Cooling Air Speed code; press the UP/DOWN key to select the mx. cooling air speed, then press "OK"; and press "ON/OFF" for 2s to exit. Range: -41, -40, -39, ...17, 18, 19, 20, --, "--" cancels the settings)
24		Press "ON/OFF" for 2s to enter the Min. Cooling Air Speed Settings, the code displayed is "Ch", press "OK" to send the Query Min. Cooling Air Speed code; press the UP/DOWN key to select the minimum cooling air speed and press "OK" to confirm; press "ON/OFF" for 2s to exit. (Range: -41, -40, -39,...17, 18, 19, 20, --, "--" cancels the settings)
25		Press "ON/OFF" for 2s to enter the Max. Heating Air Speed Settings, the code displayed is "Ch", press "OK" to send the Query Max. Heating Air Speed code; press the UP/DOWN key to select the maximum heating air speed and press "OK" to confirm; press "ON/OFF" for 2s to exit. (Range: -41, -40, -39,...17, 18, 19, 20, --, "--" cancels the settings)
26		Press "ON/OFF" for 2s to enter the Min. Heating Air Speed Settings, the code displayed is "Ch", press "OK" to send the Query Min. Heating Air Speed code; press the UP/DOWN key to select the maximum heating air speed and press "OK" to confirm; press "ON/OFF" for 2s to exit. (Range: -41, -40, -39,...17, 18, 19, 20, --, "--" cancels the settings)
27		/
28		Press "ON/OFF" for 2s to enter the Temperature of Stop Fan, the code displayed is "Ch", press "OK" to send the Temperature of Stop Fan code; press the UP/DOWN key to select 16, 17, 18...28 and press "OK" to confirm; press "ON/OFF" for 2s to exit.
29		
30		

- In Channel 1~30 settings of the engineer mode, long press the ON/OFF key to return to the previous engineer mode.
- When the setting is successful, "CS" will be displayed; When the setting fails, "CF" will be displayed.

Exit of Engineer Mode:

1. In engineer mode, press the key combination of "ON/OFF + Air Speed" for 2s.
2. The engineer mode will be exited if there are no valid key operations for continuous 60s.

Error Code of Engineer Mode:

Display	Error Information
Na	No fault or protection
EH 00	IDU EEPROM malfunction
EH 0A	Indoor EEPROM parameter error
EL 01	IDU & ODU communication error
EH bA	Communication error between indoor unit and indoor external fan module
EH 30	Parameters error of indoor external fan
EH 35	Phase failure of indoor external fan
EH 36	Indoor external fan current sampling bias fault
EH 37	Indoor external fan zero speed failure
EH 38	Indoor external fan stall failure
EH 39	Out of step failure of indoor external fan
EH 3A	Low voltage protection of indoor external fan DC bus
EH 3b	Indoor external fan DC bus voltage is too high fault
EH 3E	Indoor external fan overcurrent fault
EH 3F	Indoor external fan module protection/hardware overcurrent protection
EH 03	IDU fan speed out of control
EC 51	ODU EEPROM parameter error
EC 52	ODU coil temp. sensor (T3) error
EC 53	ODU ambient temp. sensor (T4) error
EC 54	COMP. Discharge temp. sensor (TP) error
EC 55	ODU IPM module temp. sensor (TH) error
EC 0d	Outdoor unit malfunction
EH 60	IDU room temp. sensor (T1) error
EH 61	Evaporator coil temperature sensor T2 is in open circuit or short circuit
EC 71	Outdoor external fan overcurrent fault
EC 75	Outdoor external fan module protection/hardware overcurrent protection
EC 72	Outdoor external fan phase failure
EC 74	Outdoor external fan current sampling bias fault
EC 73	Zero speed failure of outdoor unit DC fan
EC 07	ODU fan speed out of control
EL OC	System lacks refrigerant
PC 00	ODU IPM module protection
PC 10	ODU low AC voltage protection
PC 11	ODU main control board DC bus high voltage protection
PC 12	ODU main control board DC bus low voltage protection/341 MCE error
PC 02	Compressor top (or IPM) temp. Protection
PC 40	Communication error between outdoor main chip and compressor driven chip

5 TROUBLESHOOTING

Display	Error Information
PC 41	Compressor current sampling circuit failure
PC 42	Compressor start failure
PC 43	ODU compressor lack phase protection
PC 44	ODU zero speed protection
PC 45	ODU IR chip drive failure
PC 46	Compressor speed has been out of control
PC 49	Compressor overcurrent failure
PC 06	Discharge temperature protection of compressor
PC 08	ODU current protection
PH 09	Anti-cold air in heating mode
PC 0F	PFC module protection
PC 30	System overpressure protection
PC 31	System pressure is too low protection
PC 03	Pressure protection (low or high pressure)
PC 0L	Outdoor low temp. protection
PH 90	Low temperature protection of evaporator
PH 91	Low temperature protection of evaporator
PC 0A	High temperature protection of condenser
PH 0C	Indoor unit humidity sensor malfunction
LH 00	Evaporator temp. freq.limited
LH 30	Indoor external fan current freq. limited
LH 31	Indoor external fan voltage freq. limited
LC 01	Condenser coil temp. (T3) freq. limited
LC 02	Current freq. limited
LC 05	Voltage freq. limited
LC 03	Current freq. limited
LC 06	IPM module temp. freq. limited
LC 30	High pressure freq. limited
LC 31	Low pressure freq. limited
LH 07	Remote control frequency limitation in effect
--	IDUs mode conflict (multi-zone)

5.6 Error Diagnosis Without Error Code

Remote Maintenance:

Suggestion: When troubles occur, please check the following points with the customer before field maintenance.

No.	Problem	Solution
1	Unit will not start	TS17-TS18
2	The power switch is on but fans will not start	TS17-TS18
3	The temperature on the display board cannot be set	TS17-TS18
4	Unit is on but the air is not cold/hot	TS17-TS18
5	Unit runs but shortly stops	TS17-TS18
6	The unit starts up and stops frequently	TS17-TS18
7	Unit runs continuously but insufficient cooling/heating	TS17-TS18
8	Cool cannot change to heat	TS17-TS-18
9	Unit is noisy	TS17-TS18

Field Maintenance:

No.	Problem	Solution
1	Unit will not start	TS19-TS20
2	Compressor will not start but fans run	TS19-TS20
3	Compressor and condenser fan will not start	TS19-TS-20
4	Air handler fan will not start	TS19-TS20
5	Condenser fan will not start	TS19-TS20
6	Unit runs but shortly stops	TS19-TS20
7	Compressor short-cycles due to overload	TS19-TS20
8	High suction pressure	TS19-TS20
9	Low discharge pressure	TS19-TS20
10	High suction pressure	TS19-TS20
11	Low suction pressure	TS19-TS20
12	Unit runs continuously but insufficient cooling	TS19-TS20
13	Too cool	TS19-TS20
14	Compressor is noisy	TS19-TS20
15	Horizontal louver cannot revolve	TS19-TS20

5 TROUBLESHOOTING

1. Remote Maintenance	Electrical Circuit									Refrigerant Circuit				
Possible causes of trouble	Power failure	The main power tripped	Loose connections	Faulty transformer	The voltage too high or too low	The remote control is powered off	Broken the 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 activate	Frosting and defrosting frequency
Unit will not start	√	√	√	√	X	X	X	X	X	X	X	X	X	X
The power switch is on but fans will not start	X	X	√	√	√	X	X	X	X	X	X	X	X	X
The temperature on the playboard cannot be set	X	X	X	X	X	√	√	X	X	X	X	X	X	X
Unit is on but the air is not cold/hot	X	X	X	X	X	X	X	X	X	√	√	√	X	X
Unit runs but shortly stops	X	X	X	X	√	X	X		X	√	√	X	X	X
The unit startup and stops frequently	X	X	X	X	√	X	X	X	X	X	√	X	X	√
Unit runs continuously but insufficient cooling/heating	X	X	X	X	X	X	X	√	√	√	√	X	√	X
Cool cannot change to heat	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unit is noisy	X	X	X	X	X	X	X	X	X	X	X	X	X	X
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 on the unit later	Adjust to cool mode	Turn off the silence function	Turn on the unit later

1. Remote Maintenance	Others					
Possible causes of trouble	Heavy load condition	Loosen hold down bolts or screws	Bad airproof	The air inlet or outlet of either unit is blocked	Interference from cell phone towers and remote boosters	Shipping plates remain attached
Unit will not start	X	X	X	X	X	X
The power switch is on but fans will not start	X	X	X	X	√	X
The temperature on the playboard cannot be set	X	X	X	X	X	X
Unit is on but the air is not cold/hot	X	X	X	X	X	X
Unit runs but shortly stops	X	X	X	X	X	X
The unit startup and stops frequently	X	X	X	√	X	X
Unit runs continuously but insufficient cooling/heating	√	X	√	√	X	X
Cool cannot change to heat	X	X	X	X	X	X
Unit is noisy	X	√	X	X	X	√
Test method/ remedy	Check heat load	Tighten bolts and screws	Close all windows and doors	Remove the obstacles	Reconnect the power or press ON/OFF button on the remote to restart operation	Remove item

5 TROUBLESHOOTING

2. Field Maintenance	Refrigerant Circuit								Others														
Possible causes of trouble	Compressor stuck	Shortage of refrigerant	Restricted liquid line	Dirty air filter	Dirty evaporator coil	Insufficient air through evaporator coil	Overcharge of refrigerant	Dirty or partially blocked condenser	Air or incompressible gas in refrigerant cycle	Short cycling of condensing air	High temperature condensing medium	Insufficient condensing medium	Broken compressor internal parts	Inefficient compressor	Expansion valve obstructed	Expansion valve or capillary tube close completely	Leaking power element on expansion valve	Poor installation of feeler bulb	Heavy load condition	Loosen hold down bolts and/or screws	Shipping plates remain attached	Poor choices of capacity	Contact of piping with other piping or external plate
Unit will not start	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Compressor will not start but fans run	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Compressor and condenser fan will not start	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Air handler fan will not start	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Condenser fan will not start	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unit runs but shortly stops	X	√	√	X	X	X	√	√	X	X	X	X	X	X	√	√	X	X	X	X	X	X	X
Compressor short-cycles due to overload	X	√	X	X	X	X	√	√	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
High discharge pressure	X	X	X	X	X	X	√	√	√	√	√	√	X	X	X	X	X	X	X	X	X	X	X
Low discharge pressure	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	X	X	X	X	X	X	X	X
Test method/ remedy	Replace the compressor	Leak test	Replace restricted part	Clean or replace	Clean coil	Check fan	Change charged refrigerant volume	Clean condenser or remove obstacle	Purge, evacuate and recharge	Remove obstruction to air flow	Remove obstruction in air or water flow	Remove obstruction in air or water flow	Replace compressor	Test compressor efficiency	Replace valve	Replace valve	Replace valve	Fix feeler bulb	Check heat load	Tighten bolts or screws	Remove them	Choose system of larger capacity or add another system	Rectify piping so as to not contact with each other or with external plate

2. Field Maintenance	Refrigerant Circuit								Others															
Possible causes of trouble	Compressor stuck	Shortage of refrigerant	Restricted liquid line	Dirty air filter	Dirty evaporator coil	Insufficient air through evaporator coil	Overcharge of refrigerant	Dirty or partially blocked condenser	Air or incompressible gas in refrigerant cycle	Short cycling of condensing air	High temperature condensing medium	Insufficient condensing medium	Broken compressor internal parts	Inefficient compressor	Expansion valve obstructed	Expansion valve or capillary tube close completely	Leaking power element on expansion valve	Poor installation of feeler bulb	Heavy load condition	Loosen hold down bolts and/or screws	Shipping plates remain attached	Poor choices of capacity	Contact of piping with other piping or external plate	
High suction pressure	X	X	X	X	X	X	√	X	X	X	X	X	X	√	X	X	X	√	√	X	X	X	X	
Low suction pressure	X	√	√	√	√	√	X	X	X	X	X	X	X	X	√	√	√	X	X	X	X	X	X	
Unit runs continuously but insufficient cooling	X	√	√	√	√	√	X	√	√	√	X	X	X	√	X	X	X	√	√	X	X	√	X	
Too Cool	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Compressor is noisy	X	X	X	X	X	X	√	X	X	X	X	X	√	X	X	X	X	X	√	√	X	√	√	
Horizontal louver cannot revolve	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Test method/ remedy	Replace the compressor																							
	Leak test																							
	Replace restricted part																							
	Clean or replace																							
	Clean coil																							
	Check fan																							
	Change charged refrigerant volume																							
	Clean condenser or remove obstacle																							
	Purge, evacuate and recharge																							
	Remove obstruction to air flow																							
	Remove obstruction in air or water flow																							
	Remove obstruction in air or water flow																							
	Replace compressor																							
	Test compressor efficiency																							
Replace valve																								
Replace valve																								
Replace valve																								
Fix feeler bulb																								
Check heat load																								
Tighten bolts or screws																								
Remove them																								
Choose system of larger capacity or add another system																								
Rectify piping so as to not contact with each other or with external plate																								

5 TROUBLESHOOTING

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	√	√	√	√	√	X	X	√	X	X	X	X	X	X	X
Compressor will not start but fans run	X	X	X	√	X	√	X	√	√	X	X	X	X	√	X
Compressor and condenser fan will not start	X	X	X	√	X	√	X	X	X	√	X	X	X	X	X
Air handler fan will not start	X	X	X	√	X	X	X	X	√	X	√	X	X	X	√
Condenser fan will not start	X	X	X	√	X	√	X	X	√	X	√	X	X	X	√
Unit runs but shortly stops	X	X	X	X	X	X	X	X	X	√	X	√	X	X	X
Compressor short-cycles due to overload	X	X	X	X	X	X	X	X	X	√	X	√	X	X	X
High discharge pressure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Low discharge pressure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
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

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
High suction pressure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Low suction pressure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unit runs continuously but insufficient cooling	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Too cool	X	X	X	X	X	X	√	√	X	X	X	X	X	X	X
Compressor is noisy	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Horizontal louver can not revolve	X	X	√	√	X	X	X	X	X	X	X	X	√	X	X
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

5.7 Quick Maintenance by Error Code

If you do not have the time to test which specific parts are faulty, you can change the required parts according to the error code. You can find the parts to replace by error code in the following table.

Part Requiring Replacement	Error Code									
	EH 00/ EH 0A	EL 01	EH 02	Eh 03	EH 60	EH 61	EH 0B	EL 0C	EC 56	FH CC
Indoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	X	✓
Outdoor PCB	X	✓	X	X	X	X	X	X	✓	X
Display Board	X	X	X	X	X	X	✓	X	X	X
Indoor Fan Motor	X	X	X	✓	X	X	X	X	X	X
T1 Sensor	X	X	X	X	✓	X	X	X	X	X
T2 Sensor	X	X	X	X	X	✓	X	✓	X	X
T2B Sensor	X	X	X	X	X	X	X	X	✓	X
Refrigerant Sensor	X	X	X	X	X	X	X	X	X	✓
Reactor	X	✓	X	X	X	X	X	X	X	X
Compressor	X	X	X	X	X	X	X	X	X	✓
Additional Refrigerant	X	X	X	X	X	X	X	✓	X	X

Part Requiring Replacement	Error Code									
	EC 53	EC 52	EC 54	EC 51	EC 07	PC 00	PC 01	PC 02	PC 03	PC 04
Outdoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Indoor Fan Motor	X	X	X	X	X	X	X	X	X	X
Outdoor Fan Motor	X	X	X	X	✓	✓	X	✓	X	✓
T3 Sensor	X	✓	X	X	X	X	X	X	X	X
T4 Sensor	✓	X	X	X	X	X	X	X	X	X
TP Sensor	X	X	✓	X	X	X	X	X	X	X
Reactor	X	X	X	X	X	X	✓	X	X	X
Compressor	X	X	X	X	X	✓	X	X	X	✓
IPM Module Board	X	X	X	X	X	✓	✓	✓	X	✓
High Pressure Protector	X	X	X	X	X	X	X	✓	X	X
Low Pressure Protector	X	X	X	X	X	X	X	X	✓	X
Additional Refrigerant	X	X	X	X	X	X	X	X	✓	X

Part Requiring Replacement	Error Code				
	PC 06	PC 08/44/49	PC 0A	PC 0F	PC 40
Outdoor PCB	√	√	√	√	√
Outdoor Fan Motor	X	√	√	X	X
T3 Sensor	X	X	√	X	X
TP Sensor	√	X	X	X	X
Pressure Sensor	X	X	X	X	X
Reactor	X	√	X	√	X
Compressor	X	X	X	X	X
IPM Module Board	X	√	X	X	√
High Pressure Valve Assembly	√	X	X	X	X
High Pressure Protector	X	X	X	X	X
Low Pressure Protector	X	X	X	X	X
Additional Refrigerant	√	X	√	X	X
Electric Control Box	X	X	X	X	√

Part Requiring Replacement	Error Code				
	PC 41	PC 43	PC 10/11/12	PC 30	PC 31
Outdoor PCB	√	√	√	√	√
Outdoor Fan Motor	X	X	X	√	X
T3 Sensor	X	X	X	X	X
TP Sensor	X	X	X	X	X
Pressure Sensor	X	X	X	X	X
Reactor	X	X	√	X	X
Compressor	X	√	X	X	X
IPM Module Board	X	X	√	X	X
High Pressure Valve Assembly	X	X	X	X	X
High Pressure Protector	X	X	X	√	X
Low Pressure Protector	X	X	X	X	√
Additional Refrigerant	X	X	X	X	√

5 TROUBLESHOOTING

5.8 Troubleshooting by Error Code

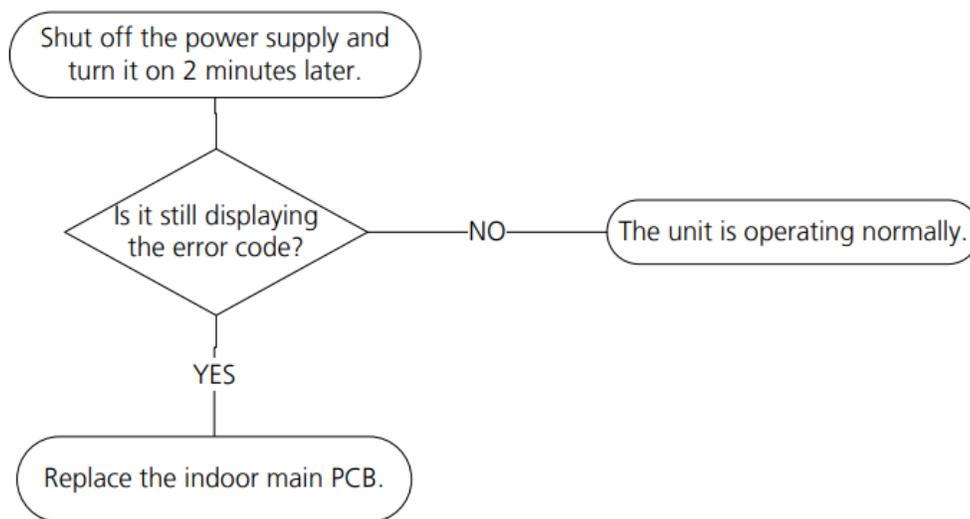
TS01-IDU: IDU EEPROM malfunction or indoor EEPROM parameter error diagnosis and solution.

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

Recommended parts to prepare:

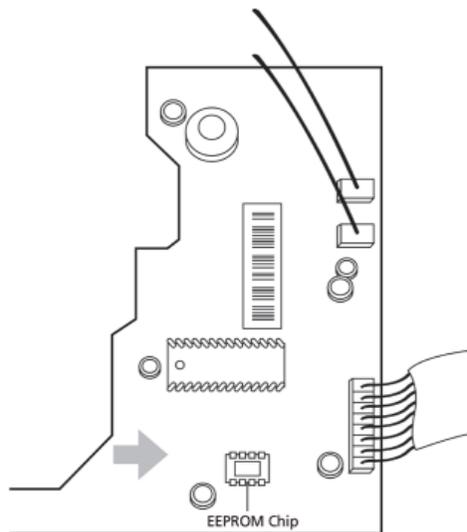
- Indoor PCB

Troubleshooting and repair:



Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. The location of the EEPROM chip on the indoor PCB is shown in the following image:



Note: These pictures are for reference, actual appearance may vary.

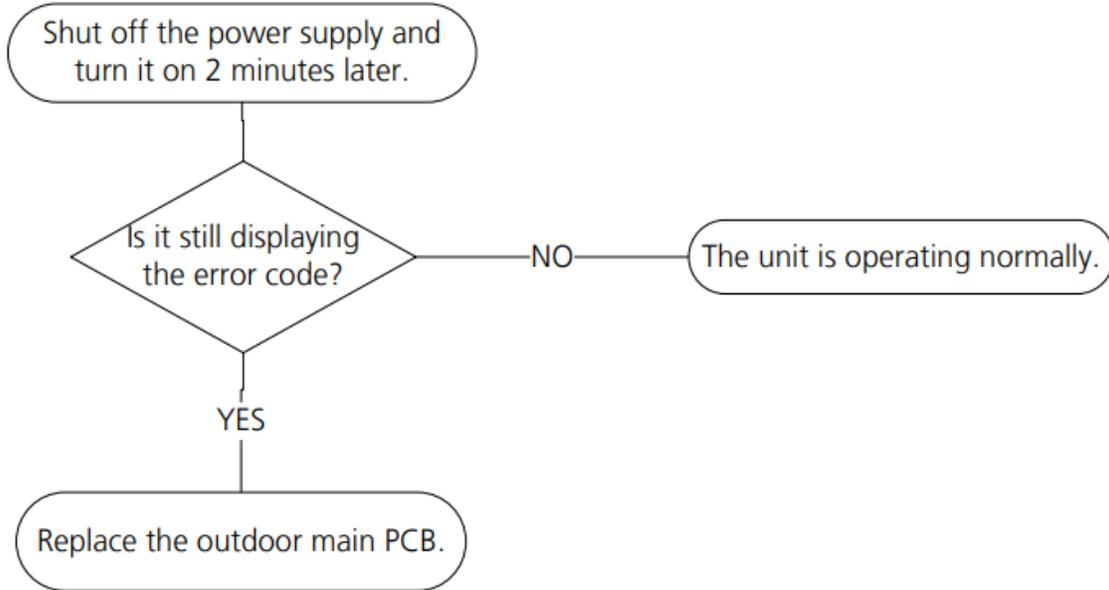
TS01-ODU: ODU EEPROM parameter error diagnosis and solution

Description: Outdoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare:

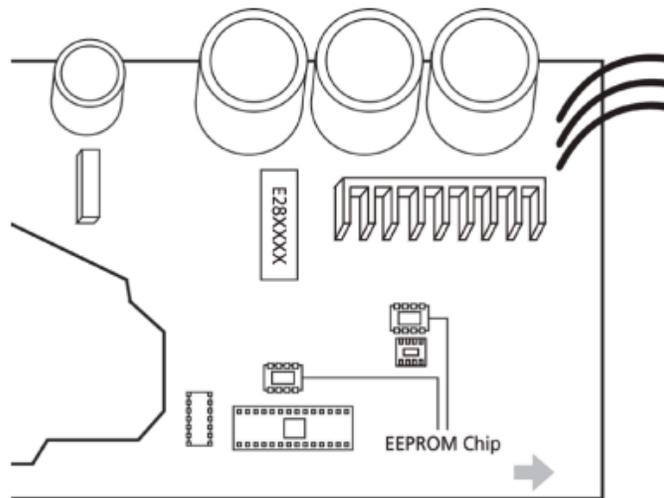
- Outdoor PCB

Troubleshooting and repair:



Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. The location of the EEPROM chip on the outdoor PCB is shown in the following image:



Note: This picture is for reference only, actual appearance may vary.

5 TROUBLESHOOTING

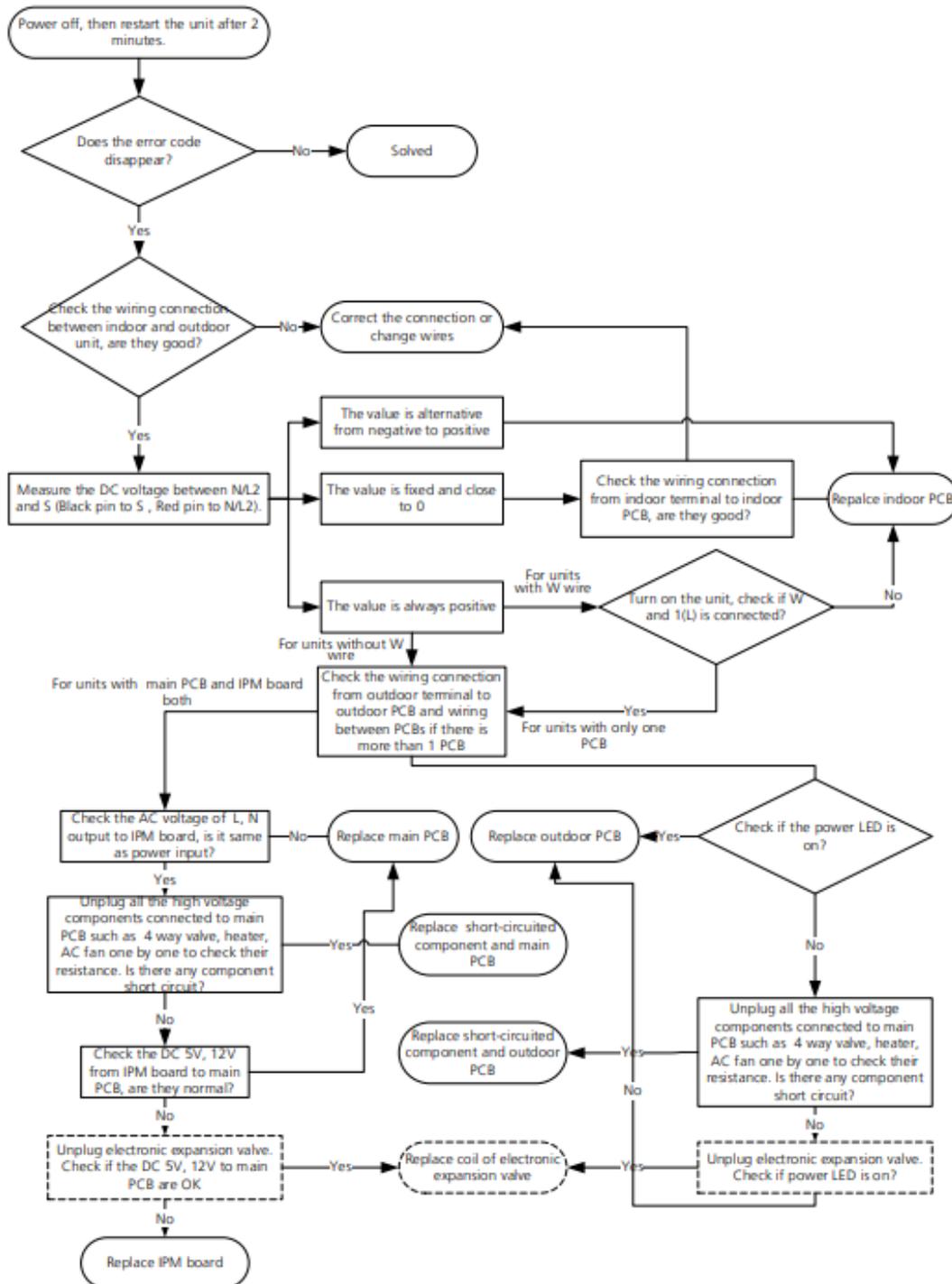
TS02-S-INV: IDU & ODU communication error diagnosis and solution

Description: Indoor unit can not communicate with outdoor unit

Recommended parts to prepare:

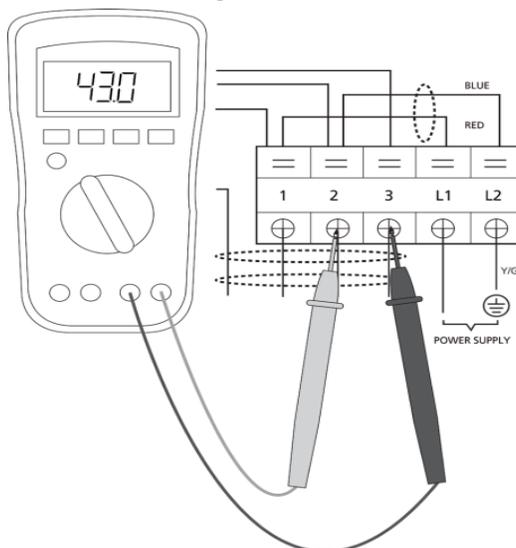
- Indoor PCB
- Outdoor PCB
- Short-circuited component

Troubleshooting and repair:

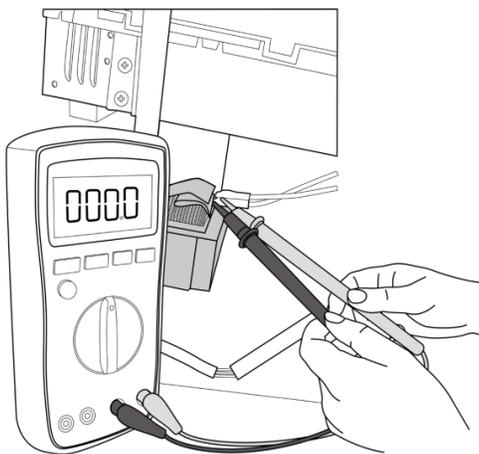


Remarks:

- Use a multimeter to test the DC voltage between 2 port (or S or L2 port) and 3 port (or N or S port) of outdoor unit. The red pin of the multimeter connects with 2 port (or S or L2 port) while the black pin is for 3 port (or N or S port).
- When AC is running normal the voltage will move alternately between -25V to 25V.
- If the outdoor unit has a malfunction, the voltage will alternate with a positive value.
- If the indoor unit has a malfunction the voltage will be a certain value.



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



Note: The pictures and the values are for reference only, actual condition and specific values may vary.

5 TROUBLESHOOTING

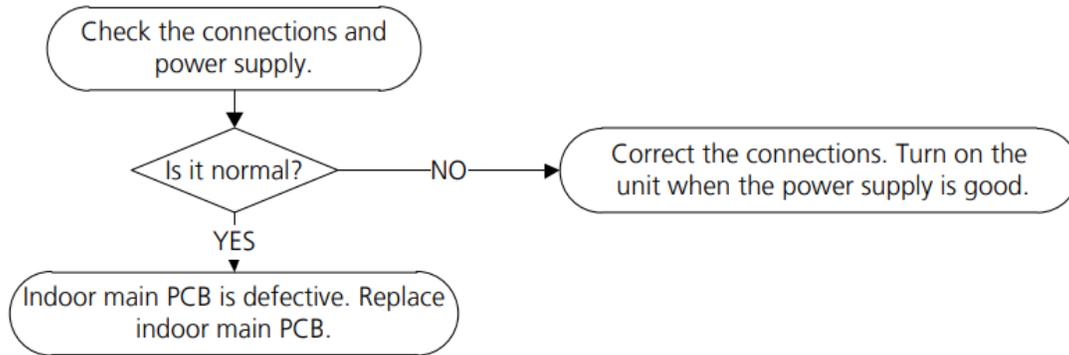
TS03: Zero crossing detection error diagnosis and solution

Description: When PCB does not receive zero crossing signal feedback for 4 minutes or the zero crossing signal time interval is abnormal.

Recommended parts to prepare:

- Connection wires
- Indoor main PCB

Troubleshooting and repair:



Note: Zero crossing detection error is only valid for the unit with AC fan motor, for other models, this error is invalid.

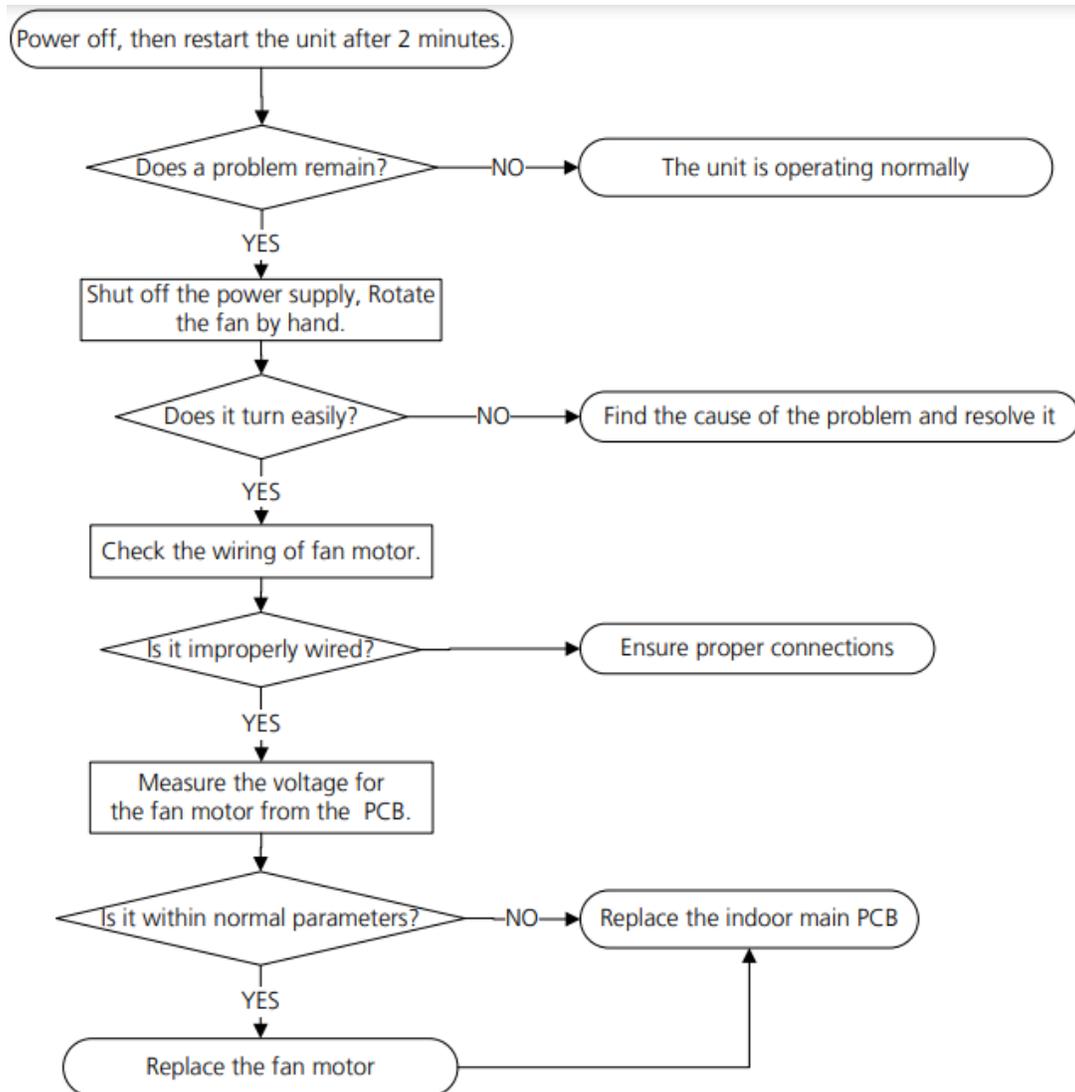
TS04-S-IDU: The indoor fan speed is operating outside of normal range diagnosis and solution

Description: When the indoor fan speed keeps too low or too high for a period of time the LED displays the failure code and the AC turns off.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- Indoor main PCB

Troubleshooting and repair:



5 TROUBLESHOOTING

Index:

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

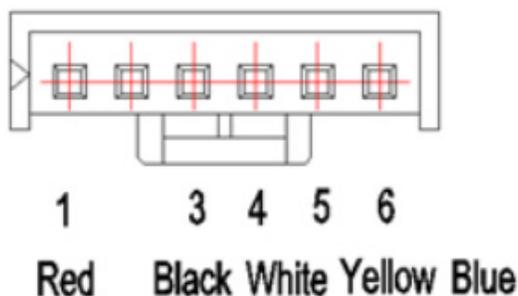
Power on and make sure the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 on the fan motor connector. If the value of the voltage is not in the range showing in the tables below the PCB will have problems and will need to be replaced.

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

NO.	Color	Signal	Voltage
1	Red	Vs/Vm	192V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	14-17.5V
5	Yellow	Vsp	0~5.6V
6	Blue	FG	14-17.5V

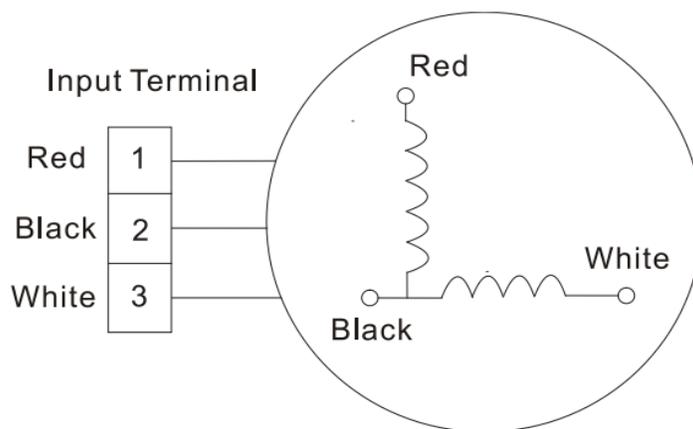
DC motor voltage input and output (voltage: 115V~)

NO.	Color	Signal	Voltage
1	Red	Vs/Vm	140V~190V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	14-17.5V
5	Yellow	Vsp	0~5.6V
6	Blue	FG	14-17.5V



2. Indoor AC 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 has problems and will need to be replaced.



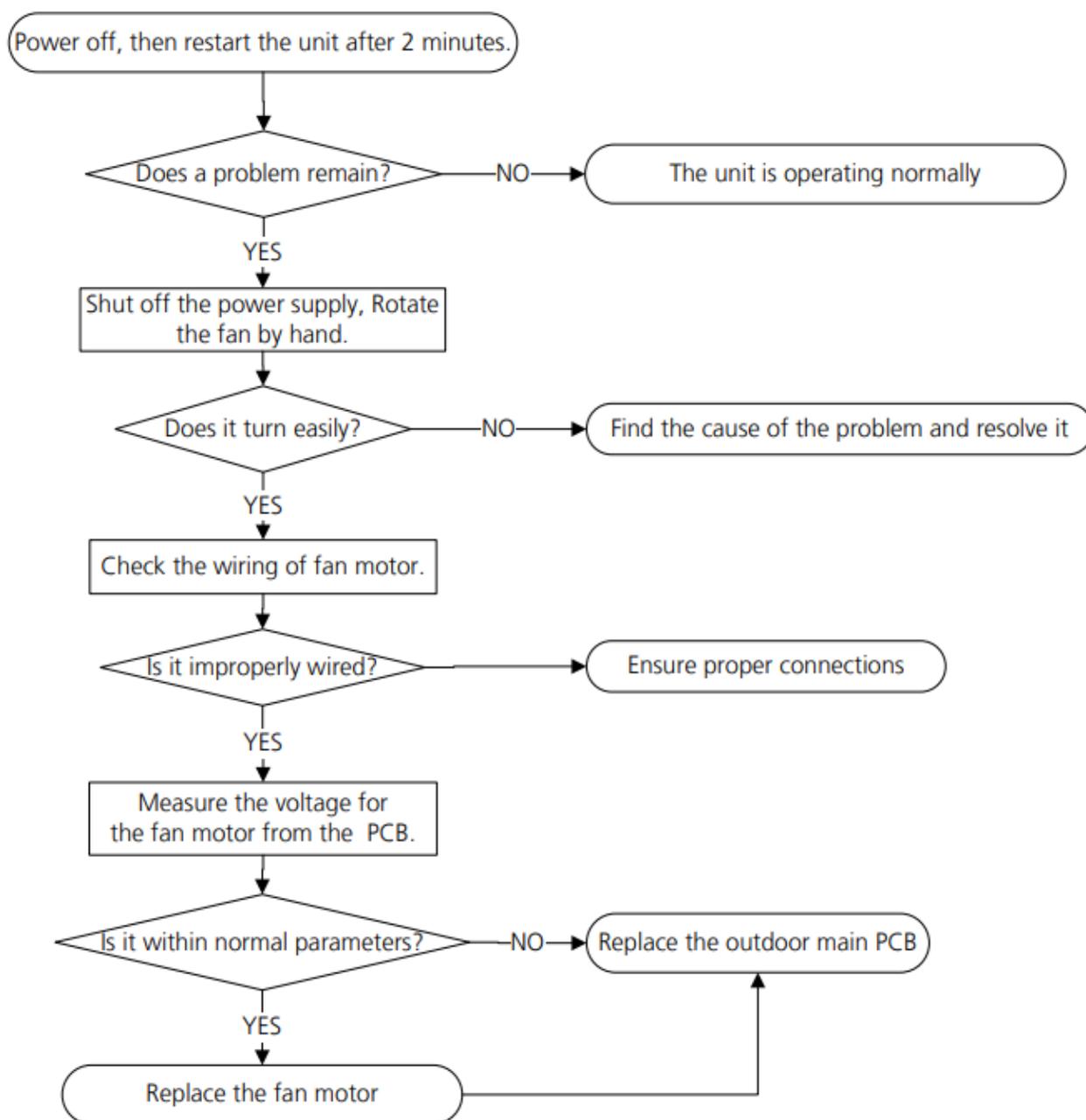
TS04-ODU: The outdoor fan speed is operating outside of normal range diagnosis and solution

Description: When the outdoor fan speed keeps too low or too high for a certain time, the LED displays the failure code and the system turns off.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- Outdoor main PCB

Troubleshooting and repair:

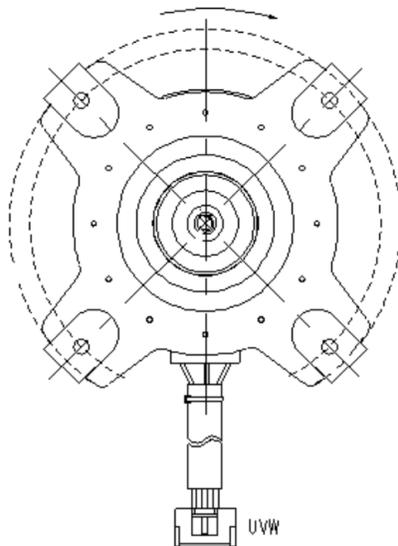


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Index:

1. Outdoor DC fan motor (control chip is in outdoor PCB)

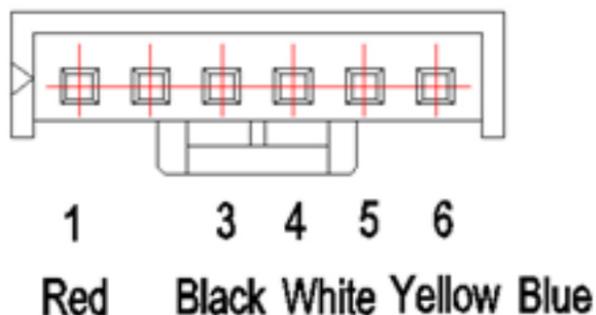
Release the UVW connector and measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other the fan motor has a problem and needs to be replaced. Otherwise the PCB has a problem and needs to be replaced.



2. DC fan motor (control chip is in fan motor, single fan)

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

NO.	Color	Signal	Voltage
1	Red	Vs/Vm	192V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5-16.5V



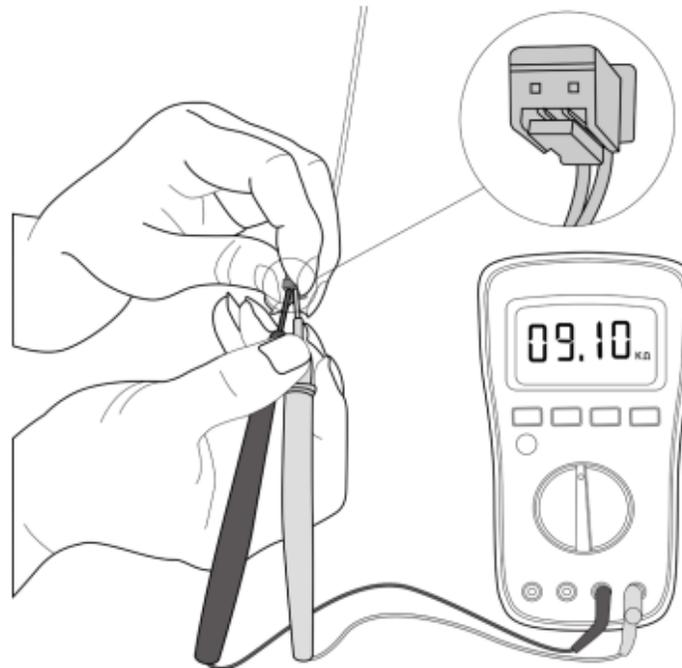
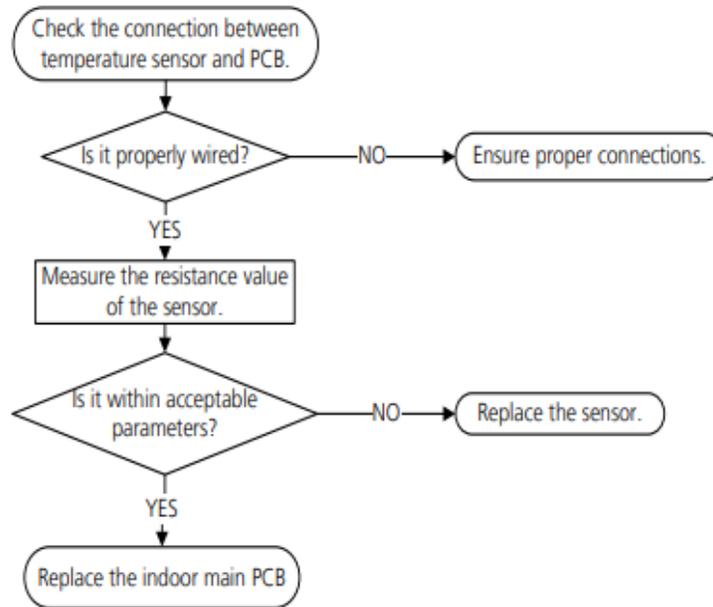
TS05-IDU: Open circuit or short circuit of indoor temperature sensor (T1, T2) diagnosis and solution

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

Recommended parts to prepare:

- Connection wires
- Sensors
- Indoor main PCB

Troubleshooting and repair:



Note: The picture and the value are for reference only, actual appearance and values may vary.

5 TROUBLESHOOTING

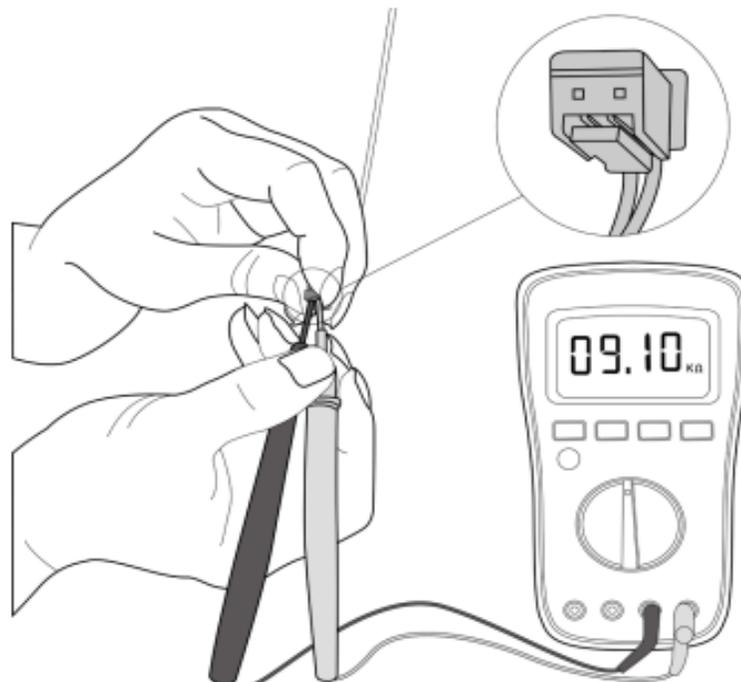
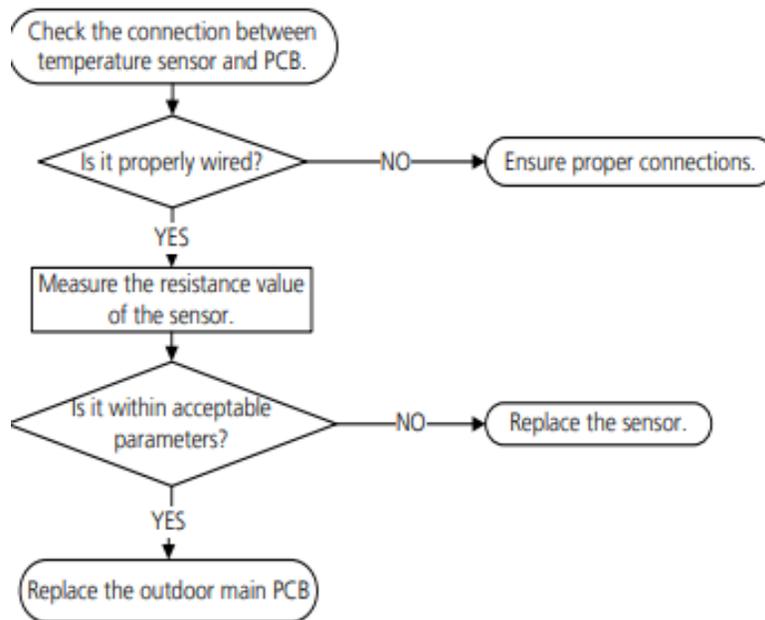
TS05-ODU: Open circuit or short circuit of outdoor temperature sensor (T3, T4, TP, T2B, TH) diagnosis and solution

Description: If the sampling voltage is lower than 0.06V or higher than 4.94V the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting and repair:



Note: For certain models the outdoor unit will use a combination sensor, T3, T4 and TP are the same sensor. This picture and value are for reference only, actual appearance and value may vary.

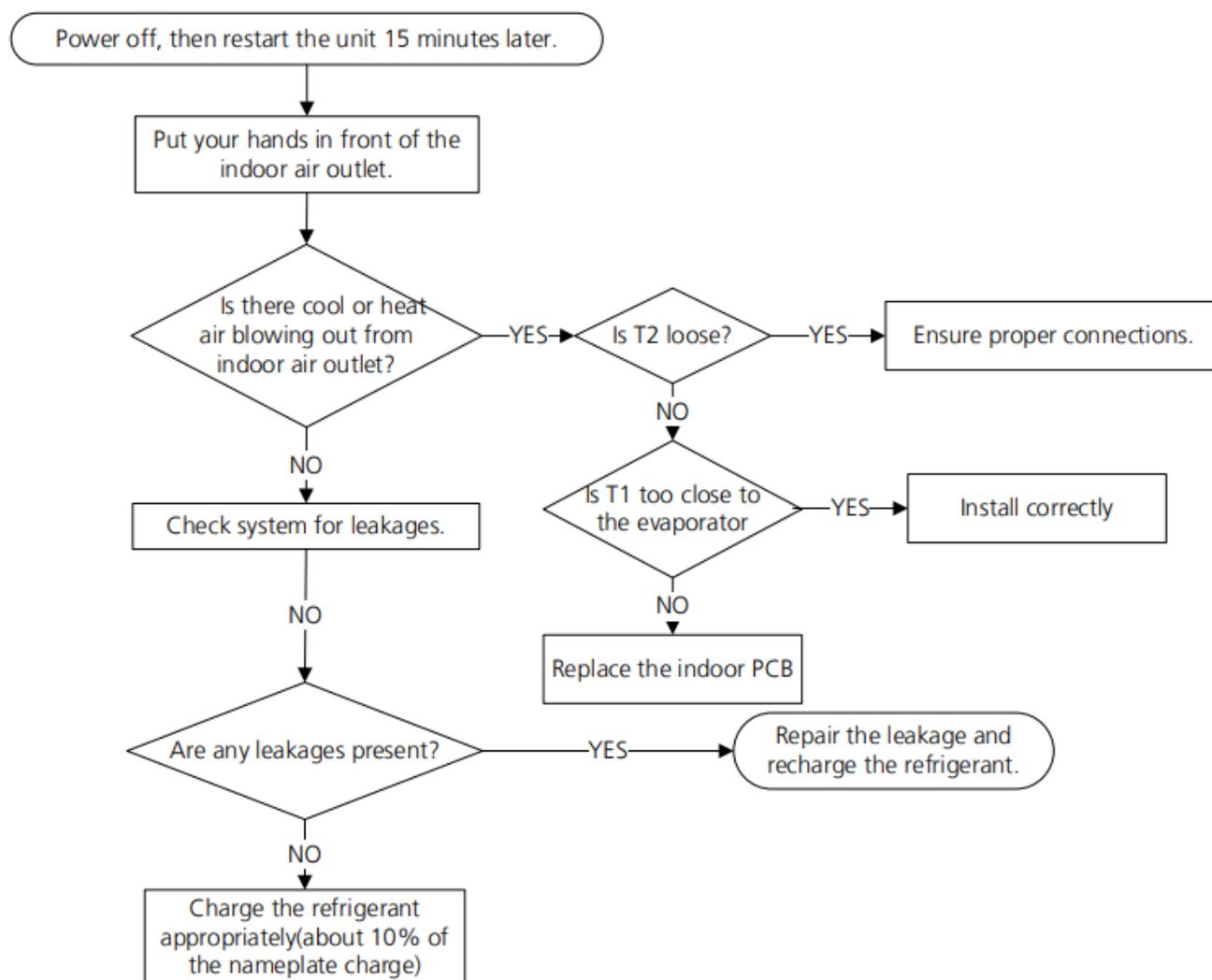
TS06-INV: System lacks refrigerant diagnosis and solution

Description: Judging the abnormality of the refrigeration system according to the number of compressor as well as the changes in the operating parameters caused by excessive exhaust temperature.

Recommended parts to prepare:

- Indoor PCB
- Additional refrigerant

Troubleshooting and repair:



5 TROUBLESHOOTING

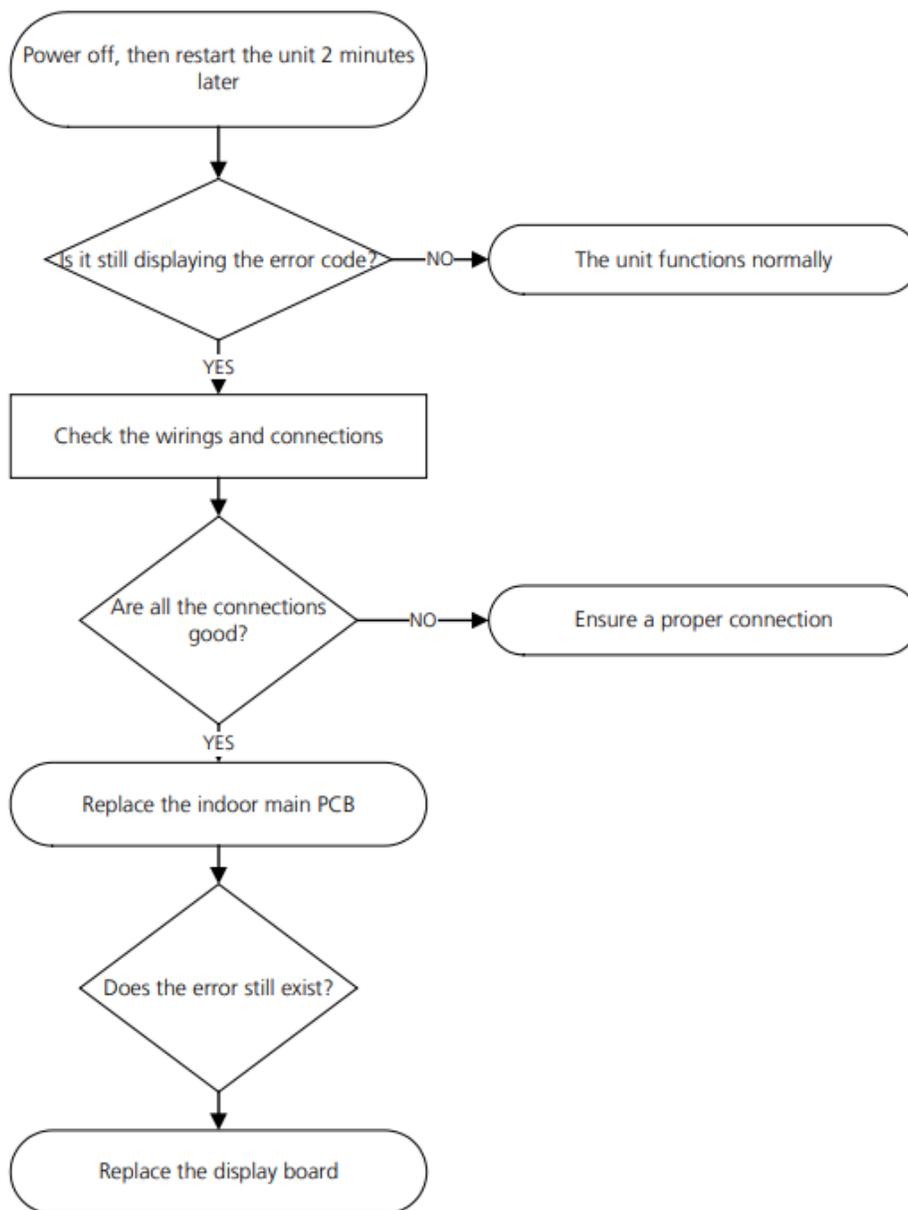
TS07: Indoor PCB/Display board communication error diagnosis and solution

Description: Indoor PCB does not receive feedback from the display board.

Recommended parts to prepare:

- Communication wire
- Indoor PCB
- Display board

Troubleshooting and repair:



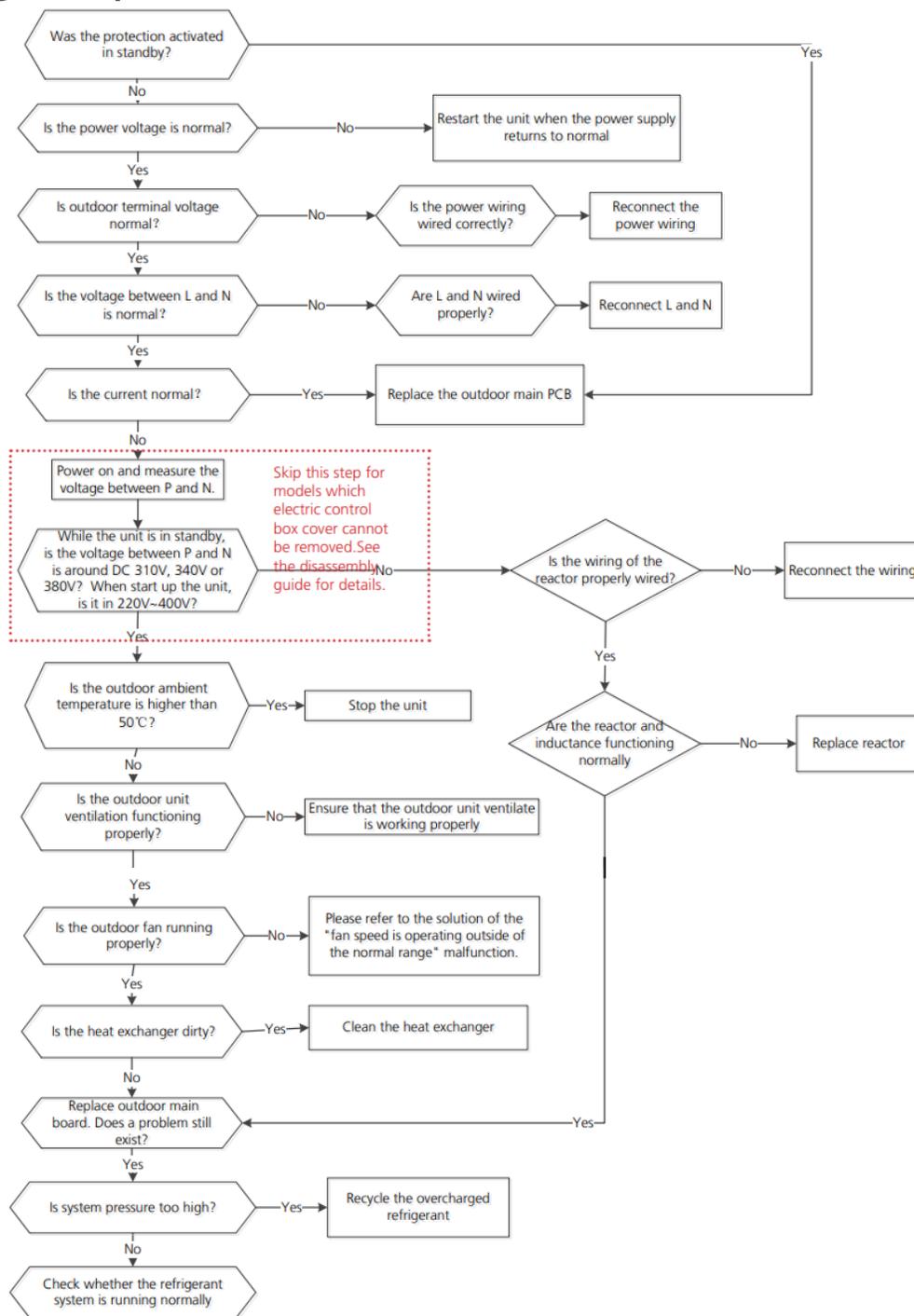
TS08-S: Current overload protection diagnosis and solution

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

Recommended parts to prepare:

- Connection wires
- Reactor
- Outdoor fan
- Outdoor PCB

Troubleshooting and repair:



5 TROUBLESHOOTING

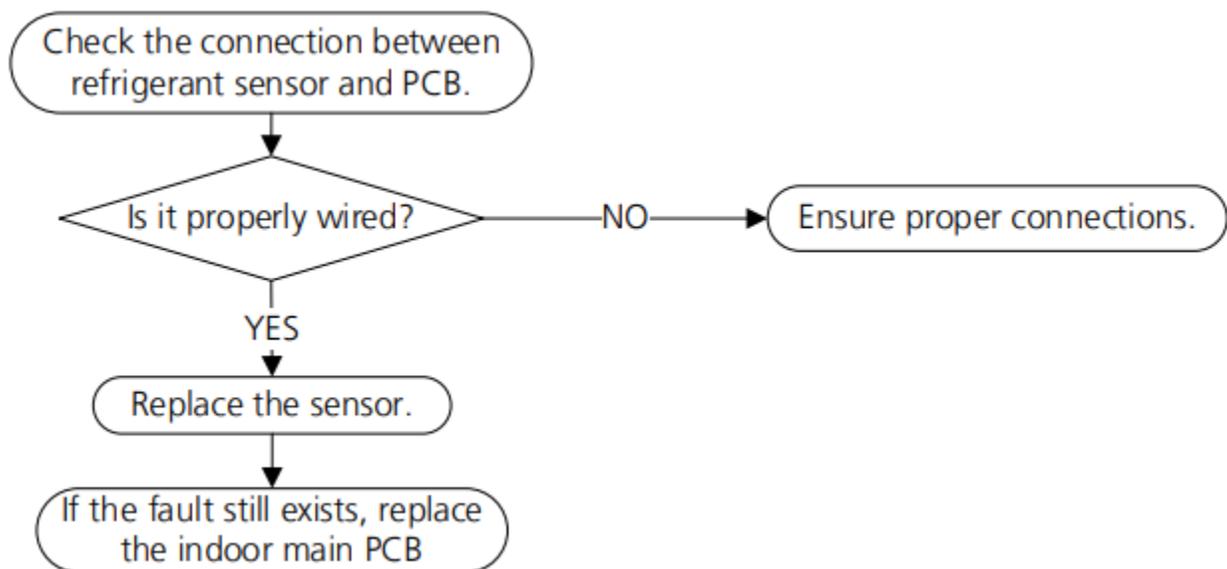
TS05-N10: Refrigerant sensor error or refrigerant sensor is out of range diagnosis and solution

Description: The indoor unit receives a fault signal for 10s or the indoor unit does not receive feedback from the refrigerant sensor for 150s.

Recommended parts to prepare:

- Connection wires
- Sensors
- Indoor main PCB

Troubleshooting and repair:



TS06-N10: Refrigerant sensor detects leakage or refrigerant sensor is out of range and leakage is detected diagnosis and solution

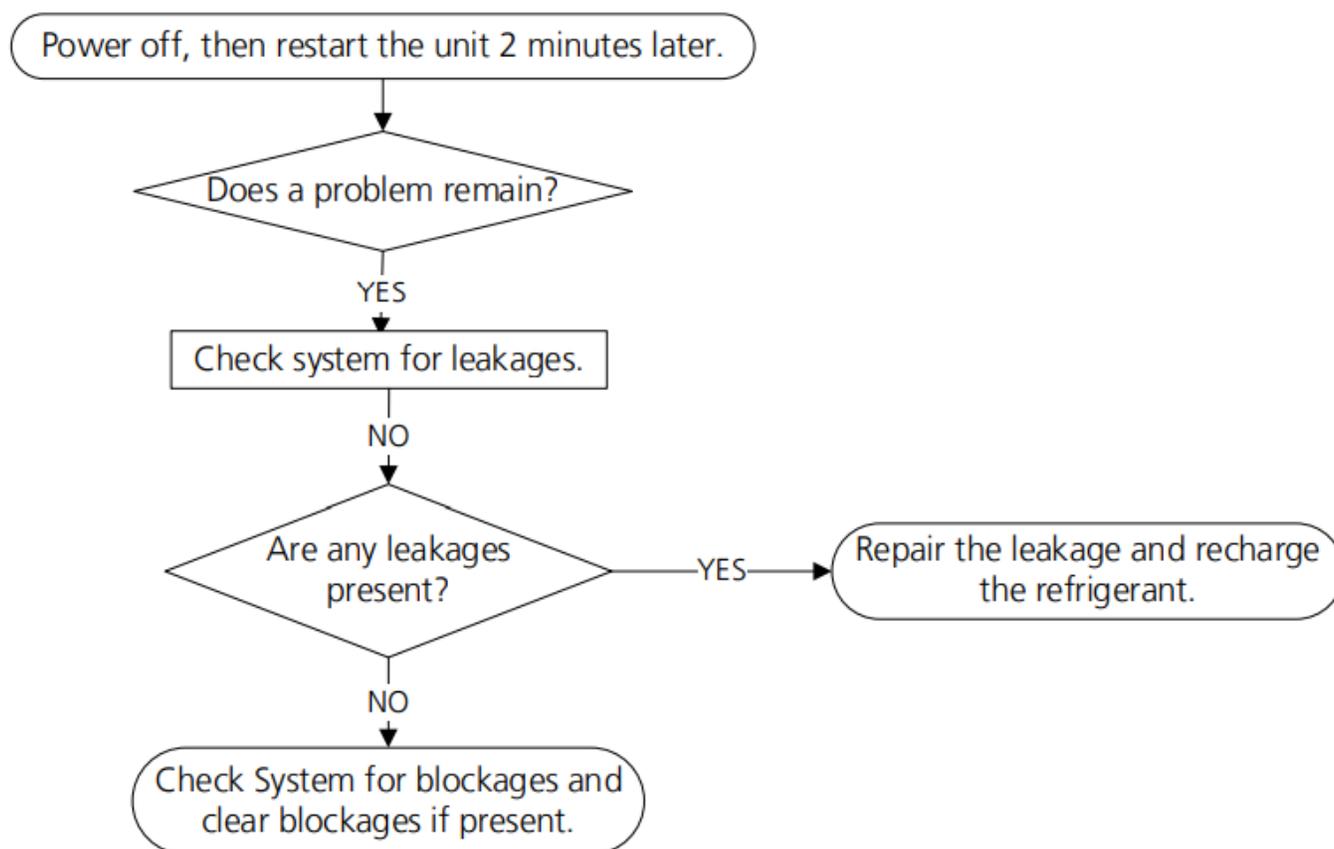
Description: The refrigerant sensor detects a concentration higher than or equal to 10%*LFL for 10 seconds or the refrigerant sensor detects a concentration higher than or equal to 20%*LFL or the multi model receives the refrigerant leakage protection fault sent by the outdoor unit.

Multi-zone: Only the buzzer of the indoor unit that detects refrigerant leakage continues to sound the alarm, the shortest sound is 10 seconds and the longest sound is 5 minutes (you can press any key on the remote control, wired controller, APP, and so on to eliminate the alarm) and any other non-refrigerant leakage fault the indoor unit will only display ECC1 and the buzzer will not make a sound.

Recommended parts to prepare:

- Additional refrigerant

Troubleshooting and repair:



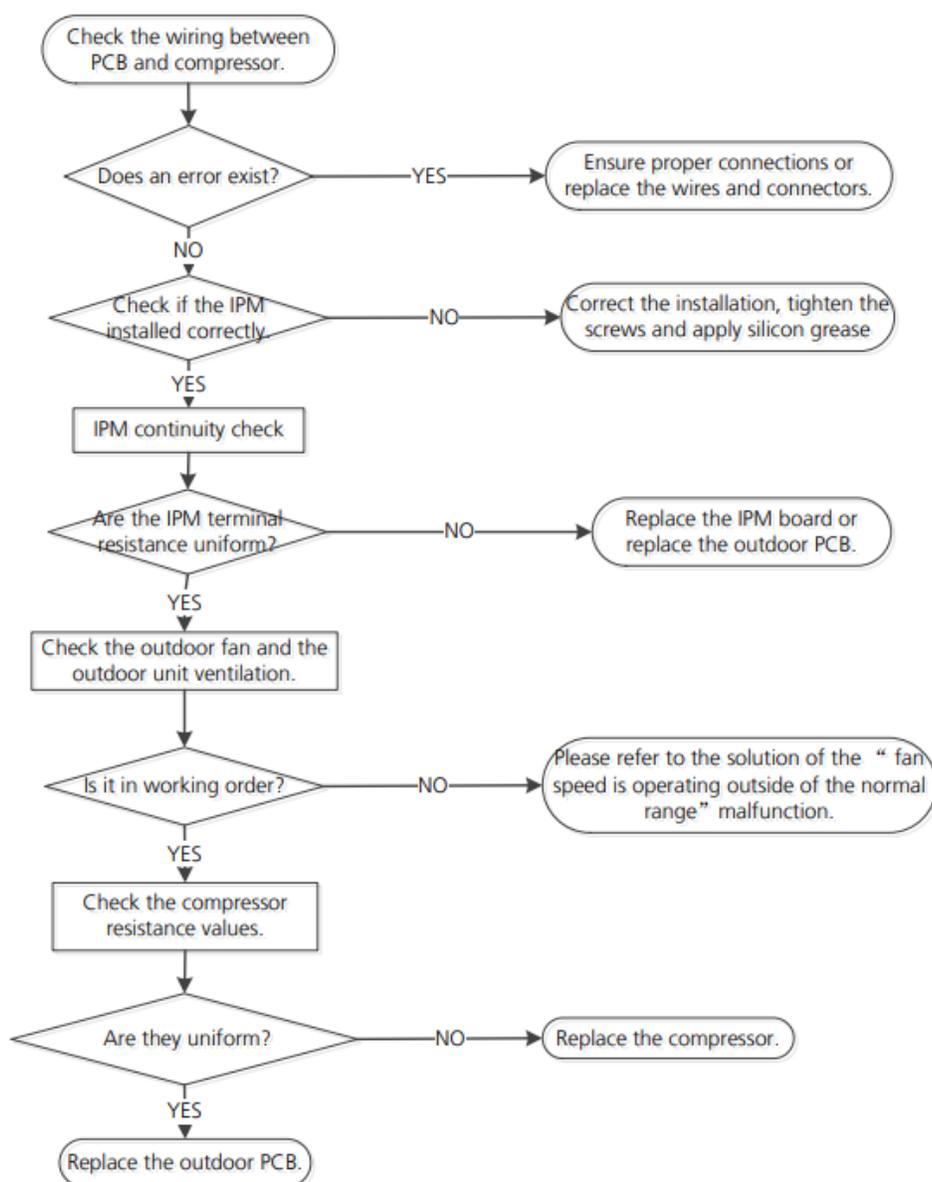
TS09-S: ODU IPM module protection diagnosis and solution

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal the LED displays a fault code and the system turns off.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Troubleshooting and repair:



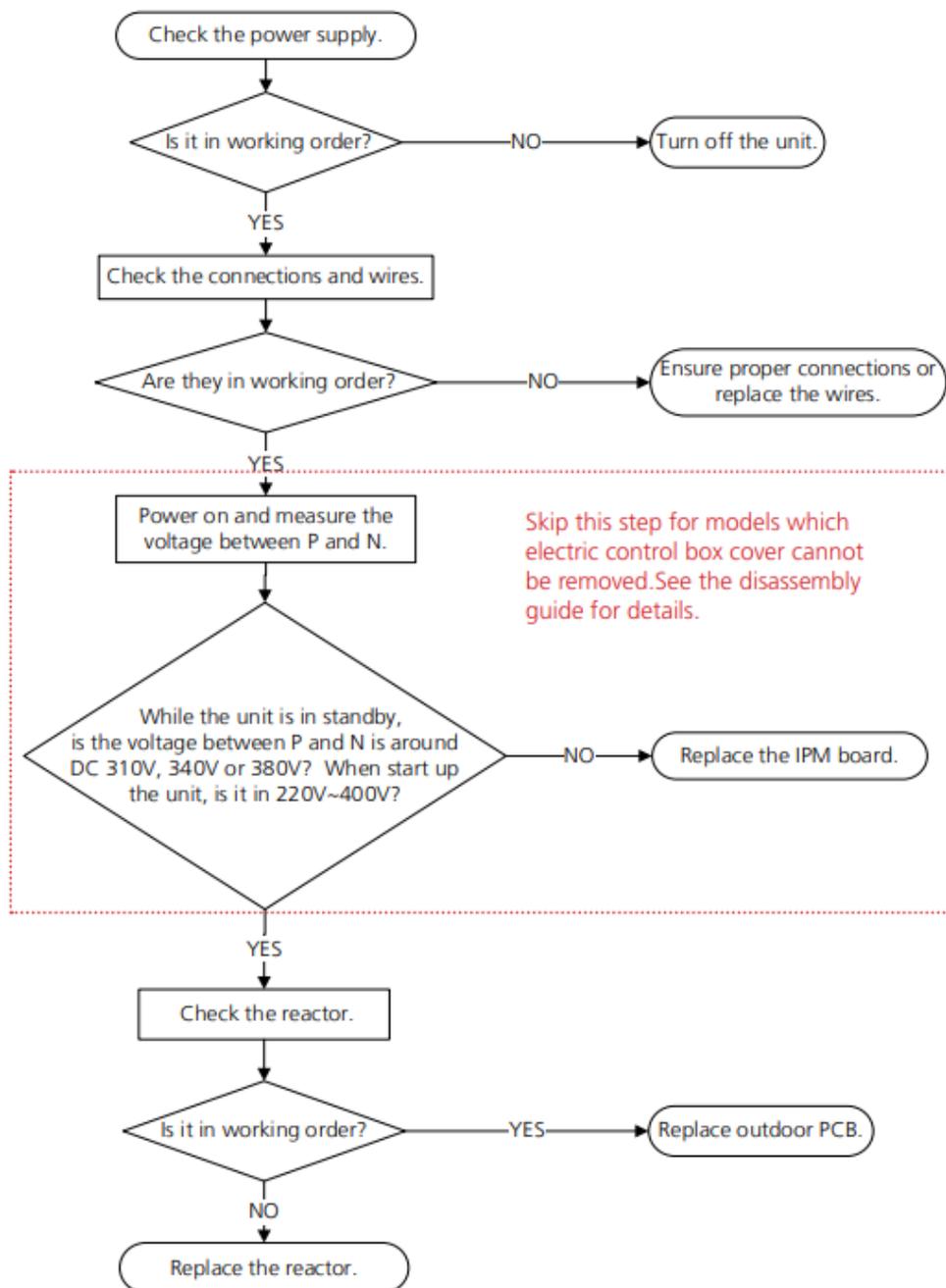
TS10-S: ODU voltage protection diagnosis and solution

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

Recommended parts to prepare:

- Power supply wires
- IPM module board
- PCM
- Reactor

Troubleshooting and repair:



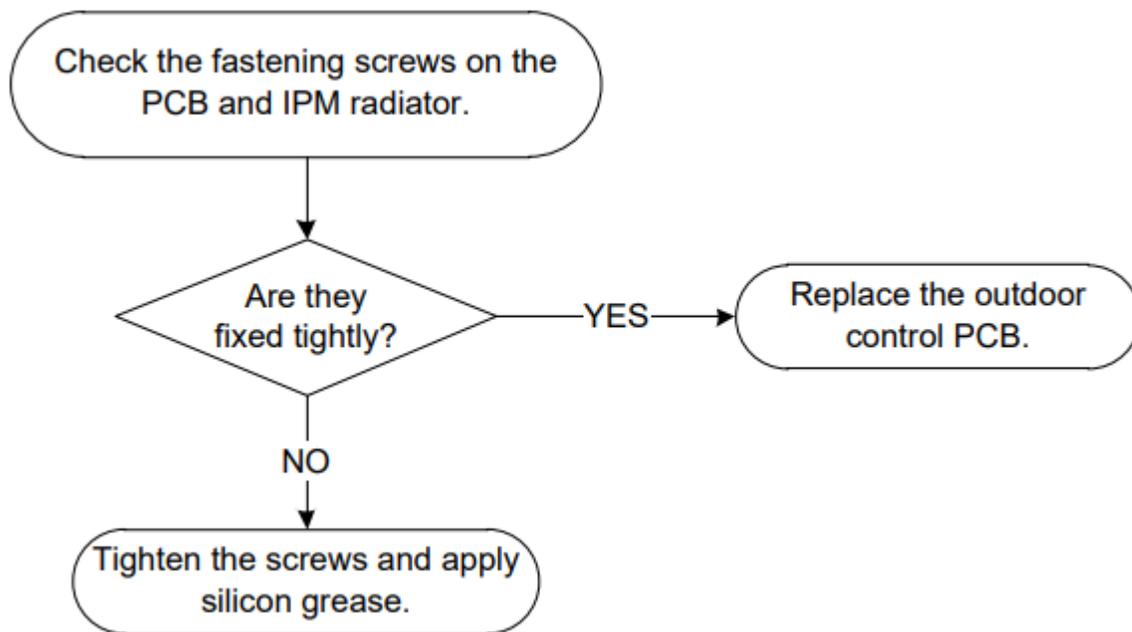
TS11-S-INV: Compressor top (or IPM) temp. Protection diagnosis and solution

Description: If the temperature of the IPM module is higher than a certain value the LED displays a fault code.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blockages

Troubleshooting and repair:



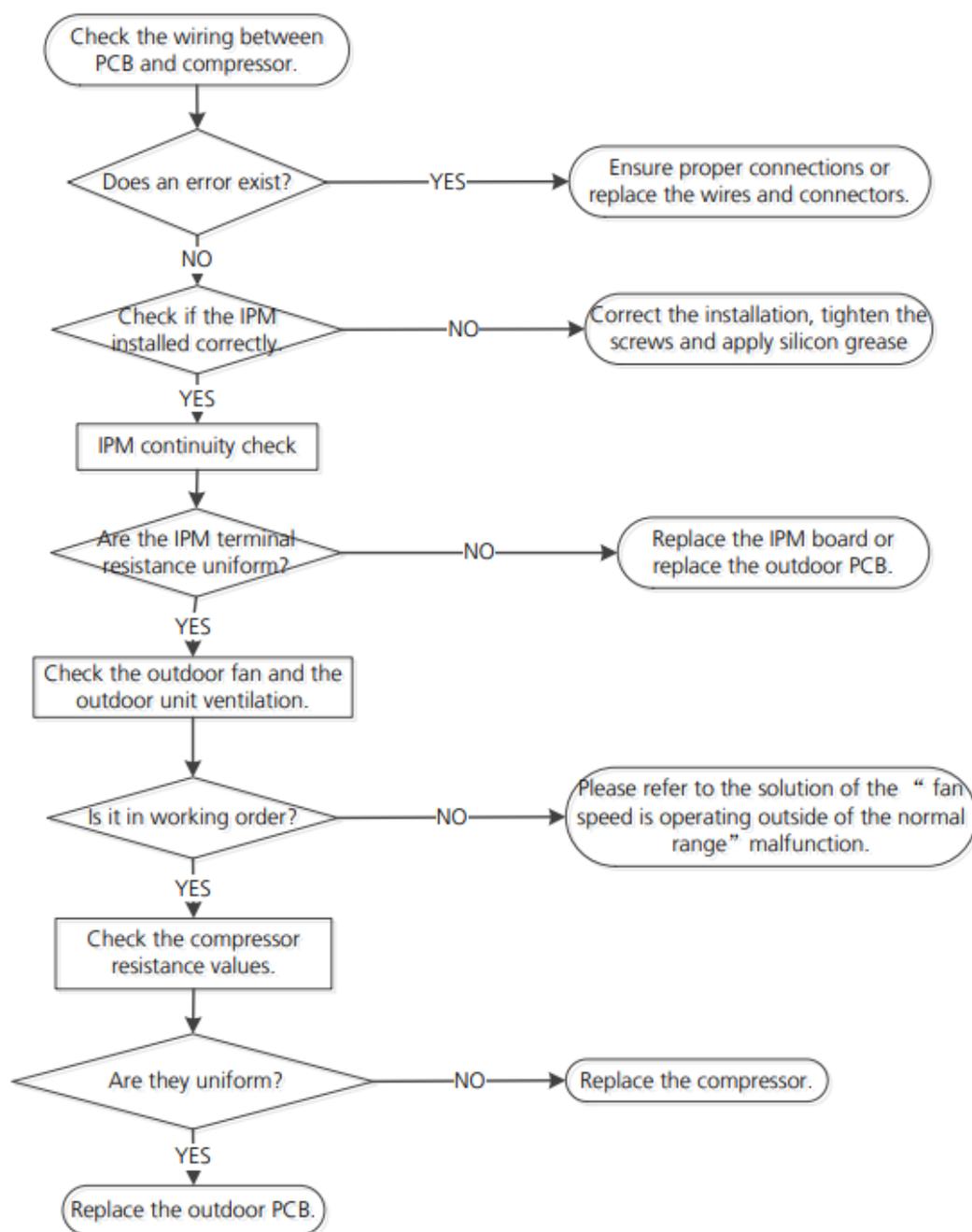
TS12-S: Inverter compressor drive error diagnosis and solution

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

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- Outdoor fan assembly
- Compressor

Troubleshooting and repair:



5 TROUBLESHOOTING

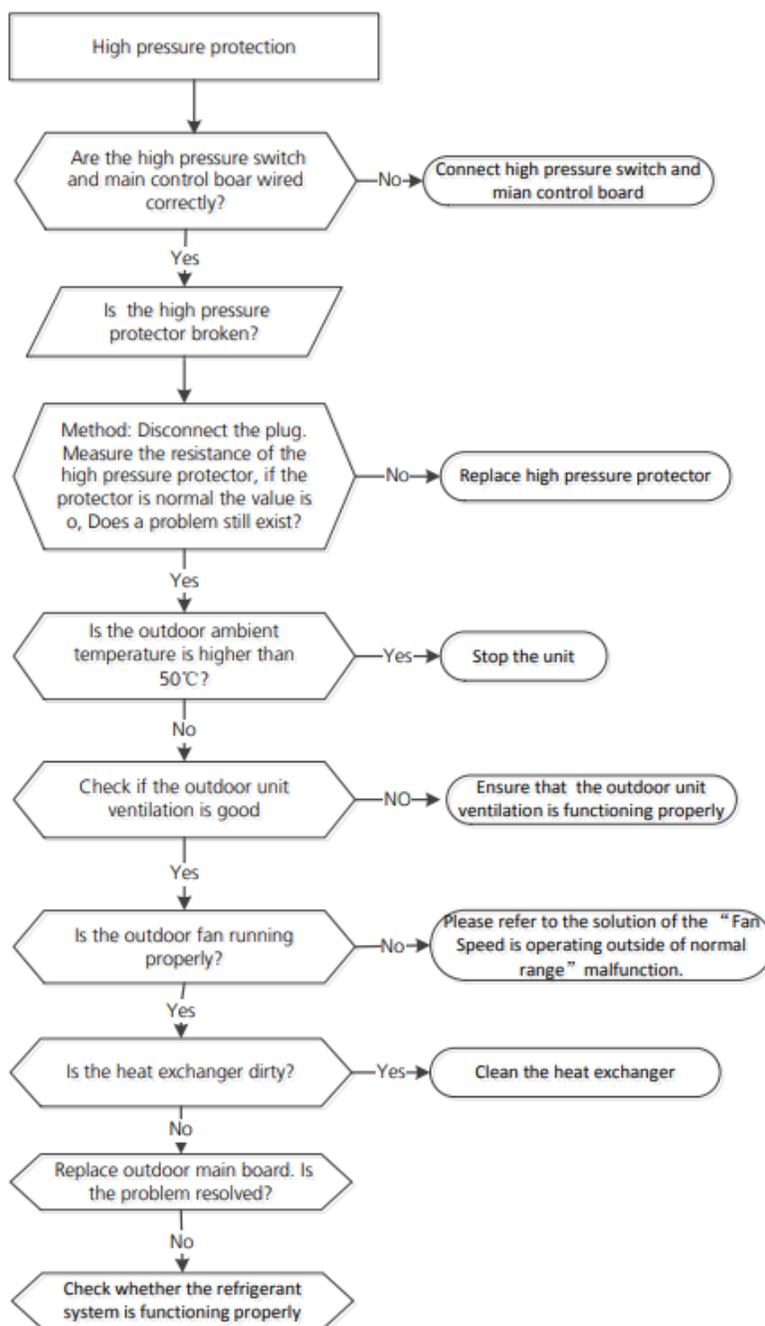
TS26-INV: System pressure protection (low or high pressure) diagnosis and solution

Description: The outdoor pressure switch cut off the system due to high pressure (if pressure is higher than 638 PSI.(4.4MPa)). Or the outdoor pressure switch cut off the system due to low pressure (if the pressure is lower than 18.85 PSI.(0.13MPa) the LED will display a fault code.

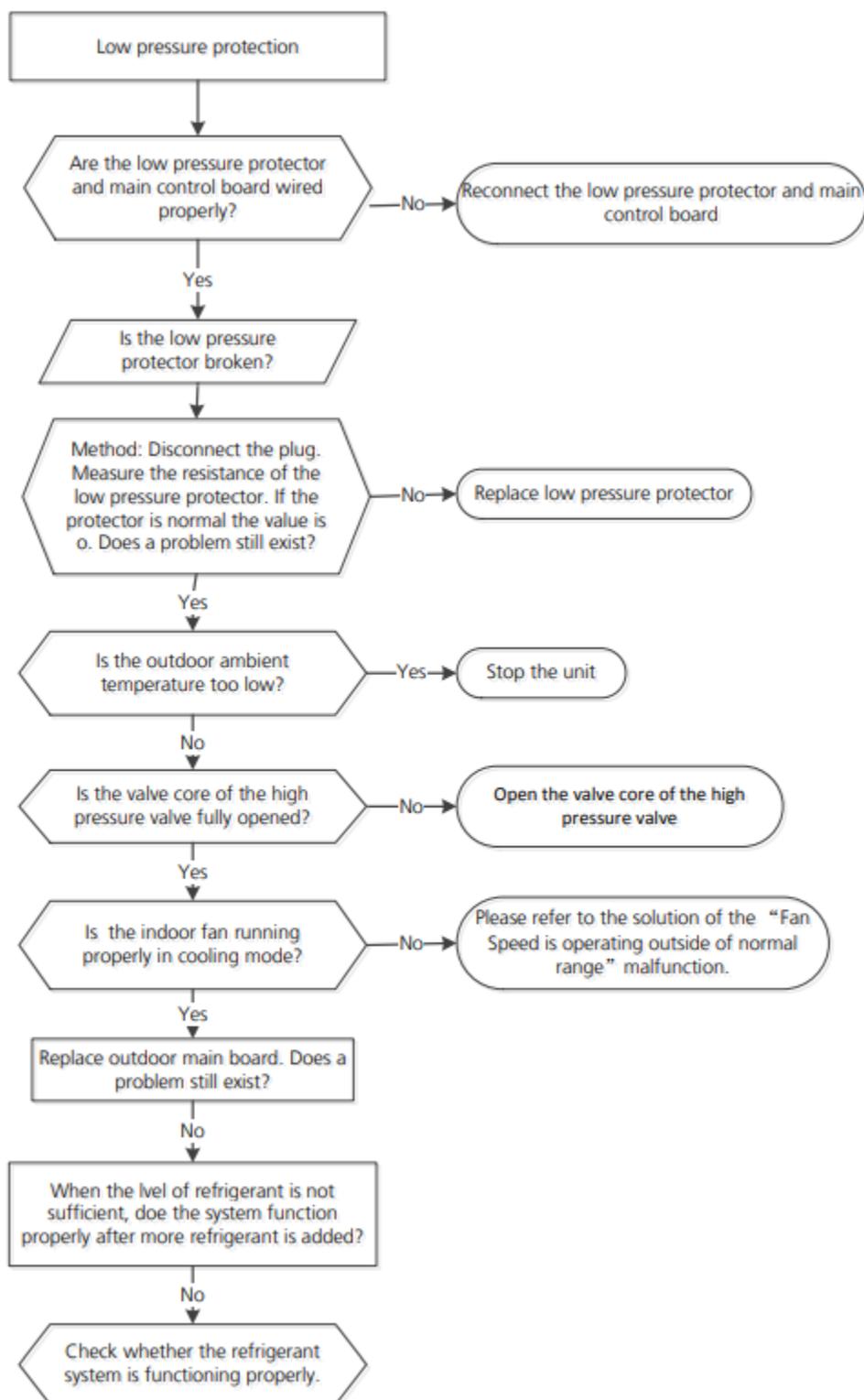
Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Refrigerant
- Pressure switch
- Outdoor fan

Troubleshooting and repair:



TS26-INV Cont.



TS14: IDUs mode conflict (match with multi outdoor unit)

Description: The indoor units cannot work in cooling mode and heating mode at the same time.

Heating mode always has priority.

- Suppose indoor unit A is working in cooling mode or fan mode, and indoor unit B is set to heating mode, unit A will change to off and unit B will continue working in heating mode.
- Suppose indoor unit A is working in heating mode and indoor unit B is set to cooling or fan mode, unit B will then change to standby and unit A will have no change.

	Cooling mode	Heating mode	Fan	Off
Cooling mode	No	Yes	No	No
Heating mode	Yes	No	Yes	No
Fan	No	Yes	No	No
Off	No	No	No	No

Note:

No: No mode conflict

Yes: Mode conflict

LP (Low temperature protection of outdoor unit)

Description: LP is a protection function. When the compressor is off the outdoor ambient temperature (T4) is lower than -31°F (-35°C) for 10s, the system will stop and display the fault code.

When the compressor is on and the outdoor ambient temperature (T4) is lower than -40°F (-40°C) for 10s the system will stop and display the fault code.

When the outdoor ambient temperature (T4) is no lower than -25.6°F (-32°C) for 10s, the unit will exit protection.

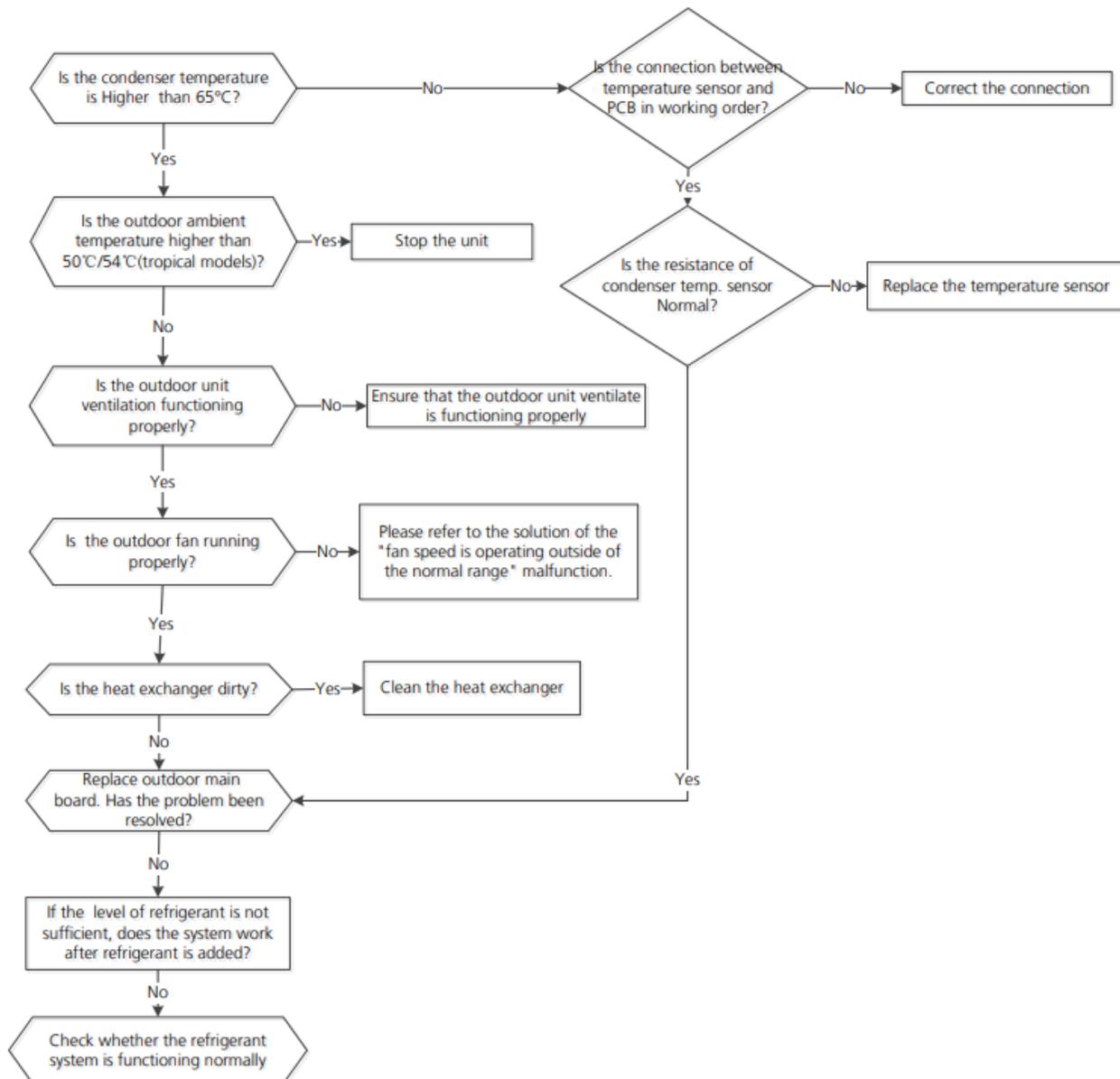
TS27-INV: High temperature protection of condenser diagnosis and solution

Description: When the outdoor pipe temperature sensor is no more than 149°F(65°C) the unit will stop. It will start again only when the outdoor pipe temperature sensor is less than 125.6°F(52°C).

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- Condenser temperature sensor
- Refrigerant
- Outdoor fan

Troubleshooting and repair:



5 TROUBLESHOOTING

TS30: PFC module protection diagnosis and solution

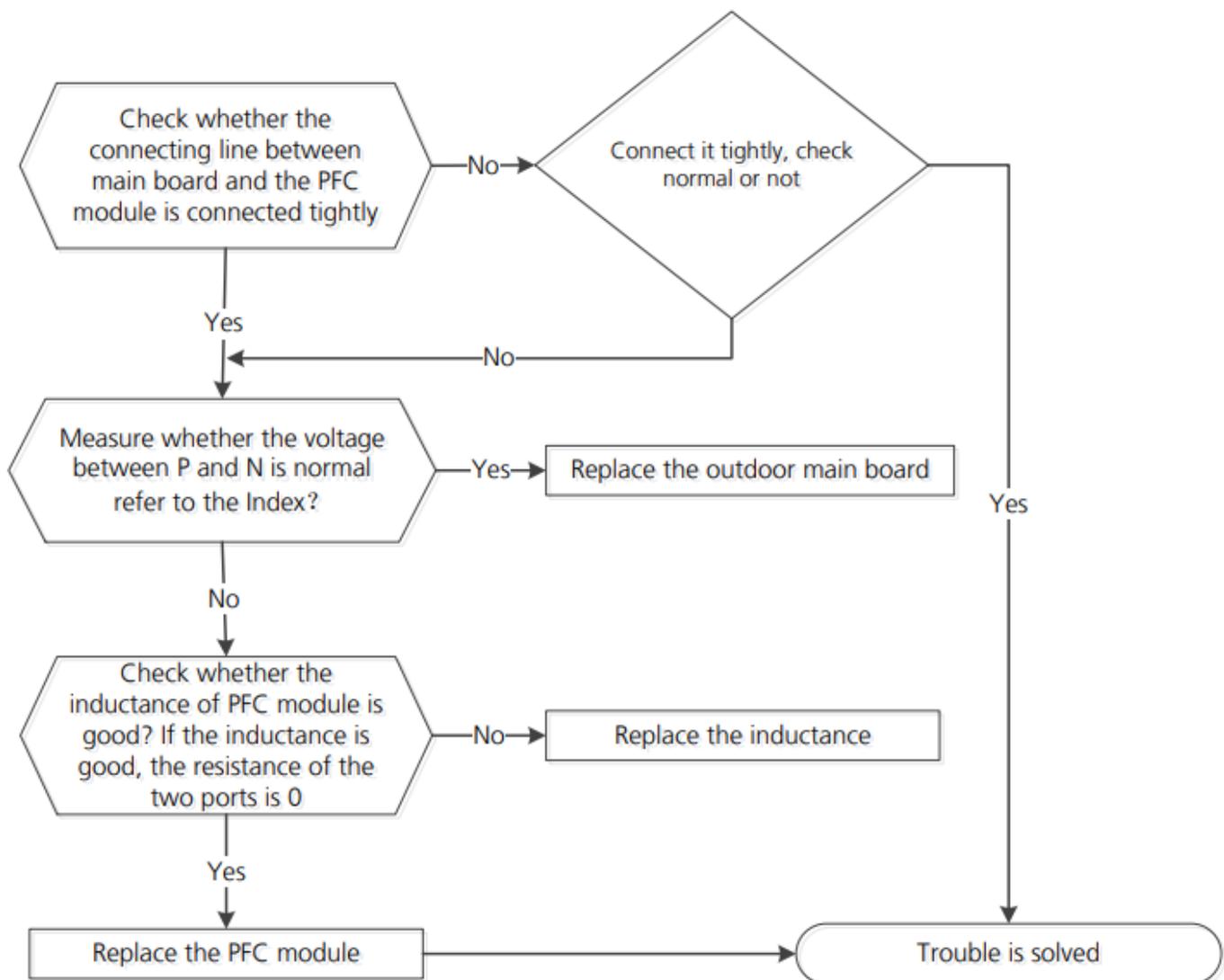
Description: When the voltage signal that the IPM sends to the compressor drive chip is abnormal the LED will display the fault code and the system will turn off.

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- Inductance
- PFC module

Troubleshooting and repair:

First test the resistance between every two ports of U,V,W of the IPM and P,N. If any result in reading 0 or close to 0 the IPM is defective, otherwise please follow the procedure below:



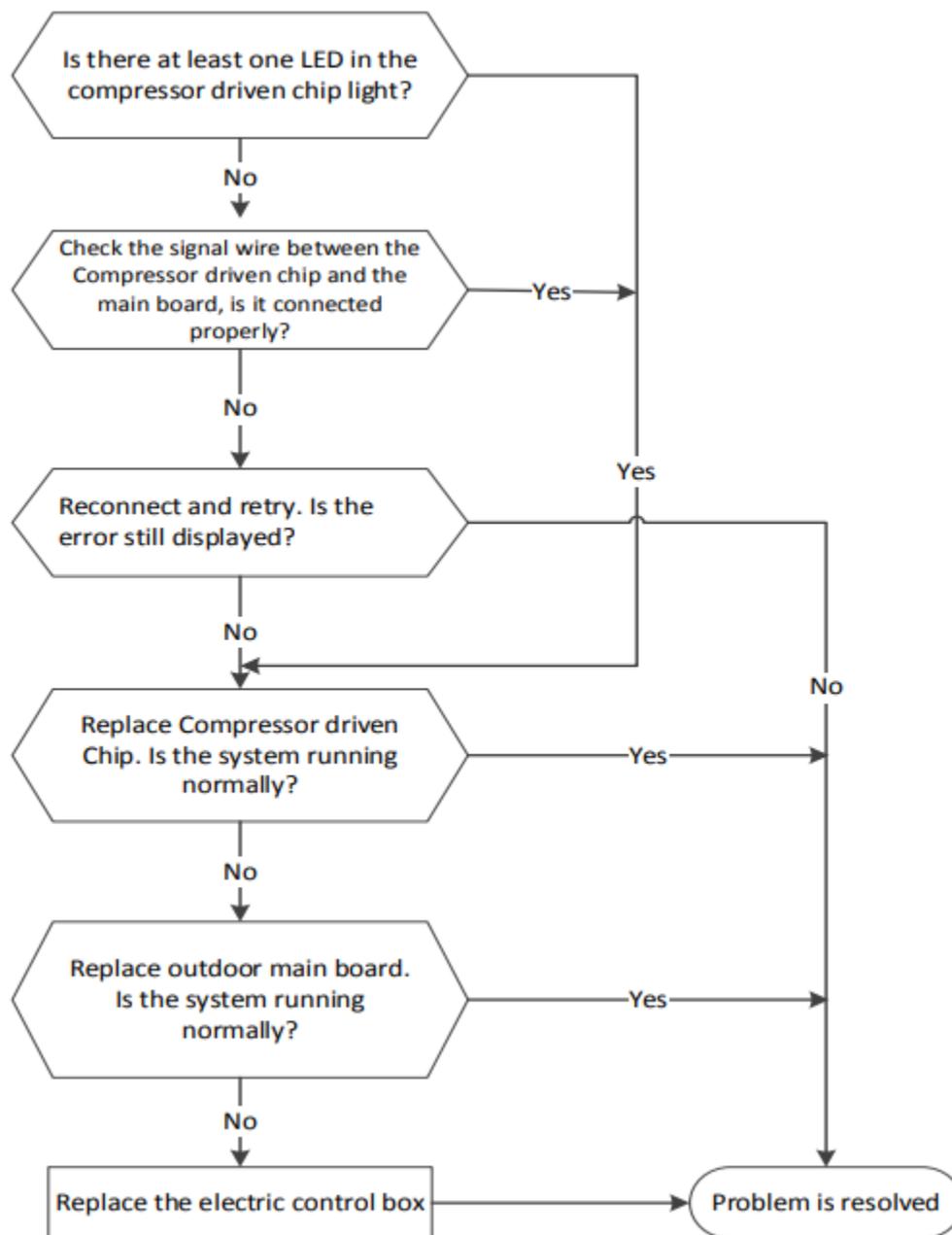
TS31: Communication error between the outdoor main chip and the compressor drive chip diagnosis and solution

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- IPM board
- Electric control box

Troubleshooting and repair:



5 TROUBLESHOOTING

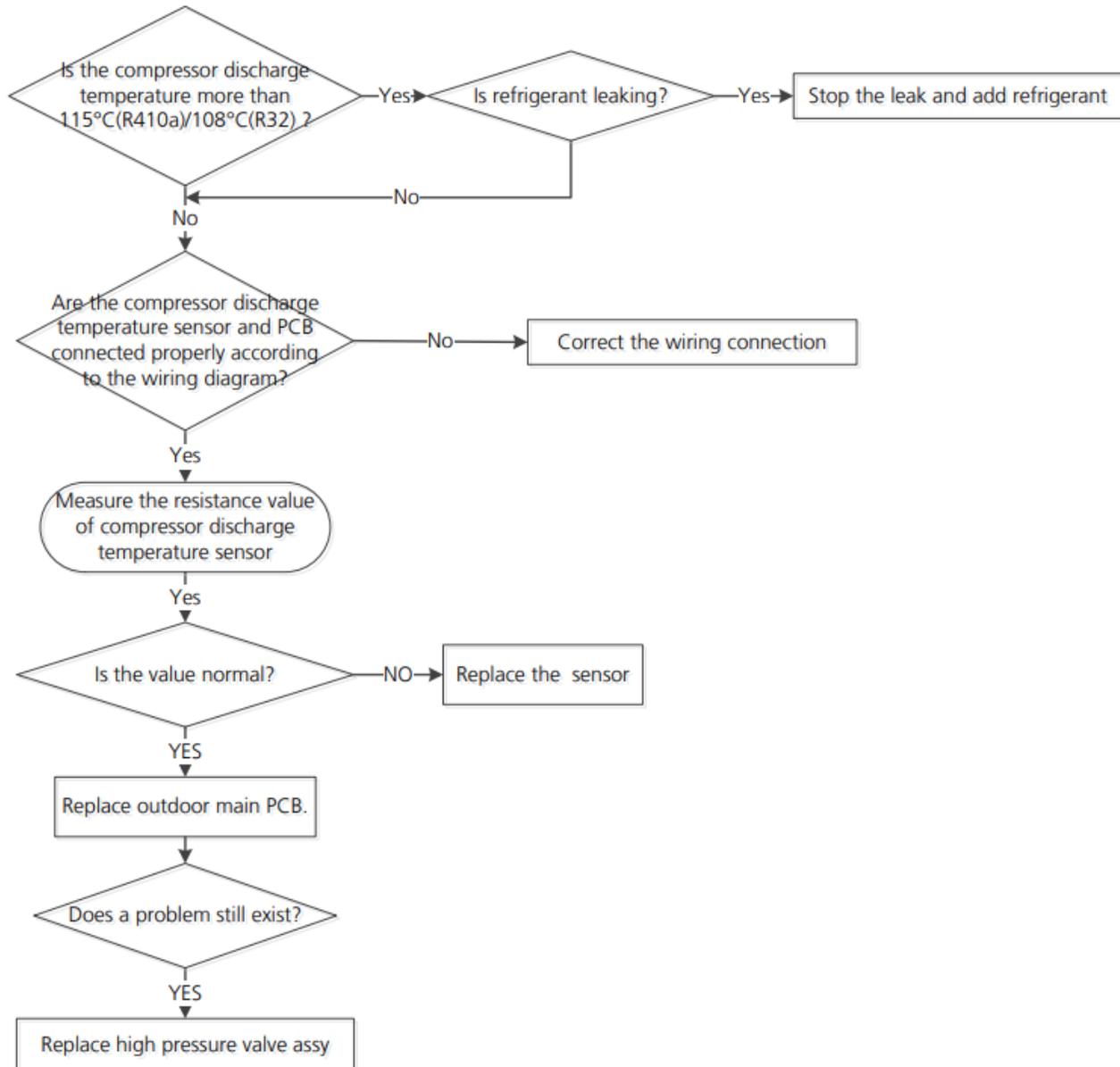
TS32: Discharge temperature protection of compressor diagnosis and solution

Description: If the compressor discharge temperature exceeds a certain level for 9s the compressor will cease operation and the LED will display a fault code.

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- Discharge temperature sensor
- Additional refrigerant

Troubleshooting and repair:



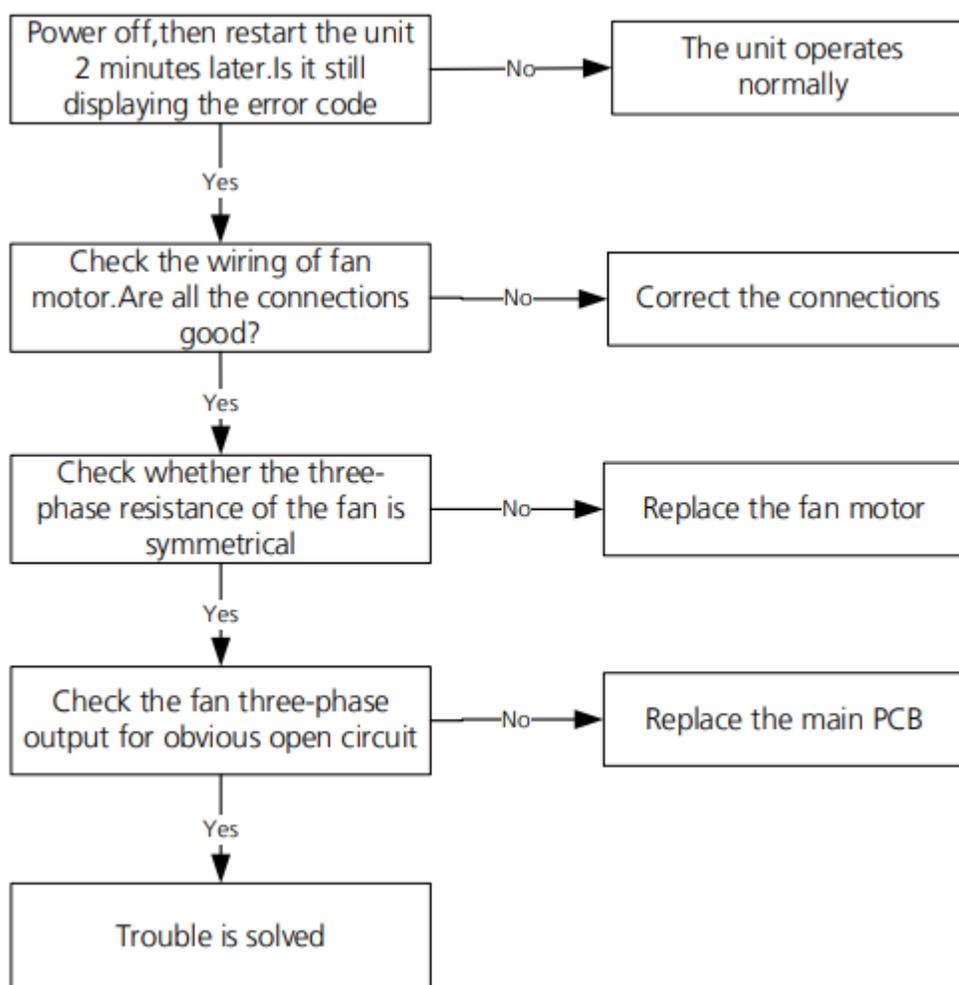
Note: For certain models the outdoor unit will use a combination sensor, T3, T4 and TP are the same sensor. This picture and value are for reference only, actual appearance and value may vary.

TS38: Lack of phase failure of ODU DC fan motor diagnosis and solution

Description: When the three-phase sampling current of the DC motor is abnormal (especially when the current of one or more phases is always small and almost 0) the LED display will show a fault code.

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- Fan motor

Troubleshooting and repair:

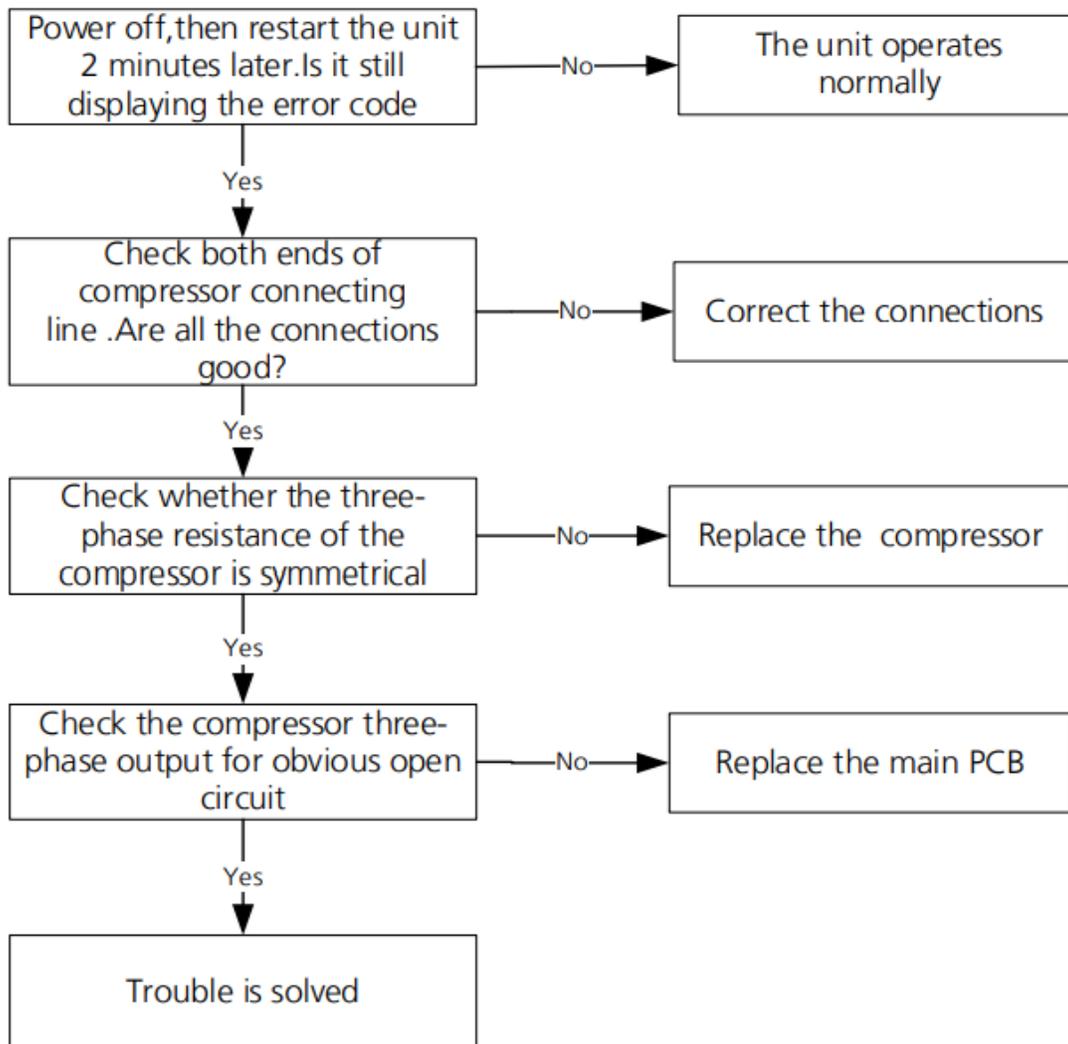
TS39: ODU compressor lack of phase protection diagnosis and solution

Description: When the three-phase sampling current of the DC motor is abnormal (especially when the current of one or more phases is always small and almost 0) the LED display will show a fault code.

Recommended parts to prepare:

- Connection wires
- Outdoor main PCB
- Compressor

Troubleshooting and repair:

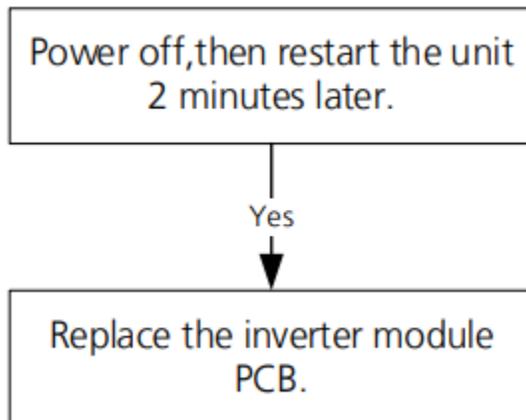


TS40: ODU IR chip drive failure diagnosis and solution

Description: When the IR chip detects its own parameter error the LED displays the fault code when powered on.

Recommended parts to prepare:

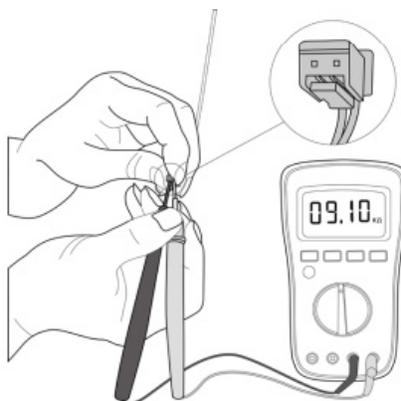
- Inverter module PCB

Troubleshooting and repair:**5.9 Check Procedures****! WARNING**

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. Operate only after the compressor and coil has returned to normal temperature in case of injury.

Temperature Sensor Check:

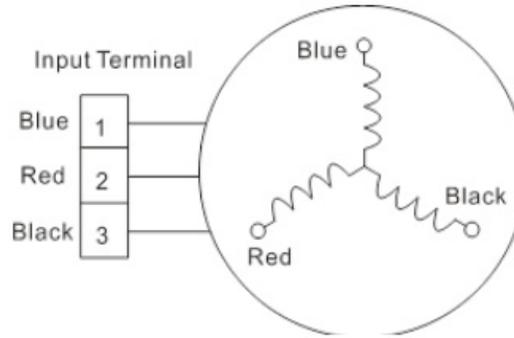
1. Disconnect the temperature sensor from the PCB.
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table.



Note: The picture and the value are for reference only, actual condition and specific values may vary.

5 TROUBLESHOOTING

1. Disconnect the compressor power cord from the outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



Resistance Value	KSK89D53UEZ	KSK89D29UEZD	KSN98D22UFZ	KSK103D33UEZ3 KSK103D33UEZ3(MD) KSK103D33UEZ3
Blue-Red	2.35Ω	1.99Ω	1.57Ω	2.13Ω
Blue-Black				
Red-Black				

Resistance Value	KSK103D32UEZ31	KTN150D30UFZA KTN150D30SFZA
Blue-Red	4.06Ω	1.02Ω
Blue-Black		
Red-Black		

Resistance Value	KSM135D23UFZ	KTN110D42UFZ	KSN140D21UFZ	KTM140D78UFZ3
Blue-Red	1.72Ω	1.82Ω	1.28Ω	1.5Ω
Blue-Black				
Red-Black				

Resistance Value	KTF235D22UMT ATF235D22TMT KTF250D22UMT	KTM240D46UKT2
Blue-Red	0.75Ω	1.04Ω
Blue-Black		
Red-Black		

Resistance Value	KSN140D58UFZ	KTM240D43UKT	KSN98D64UFZ23	ASN140D35TFZ
Blue-Red	1.86Ω	1.03Ω	2.7Ω	0.83Ω
Blue-Black				
Red-Black				

Resistance Value	KTF420D62UNT	ASN108D22TEZ
Blue-Red	0.86Ω	1.76Ω
Blue-Black		
Red-Black		

Resistance Value	KTM240D63SKT2	KTM240D57UMT	DTN210D32UFZ	KSN140D33UFZB3
Blue-Red	1.19Ω	0.62Ω	1.7Ω	1.68Ω
Blue-Black				
Red-Black				

Resistance Value	KTM110D79UFZA3	GSD098XKUF7JV6B
Blue-Red	1.88Ω	2.83Ω
Blue-Black		
Red-Black		



Note: The picture and the value are for reference only, actual condition and specific values may vary.

IPM Continuity Check:



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

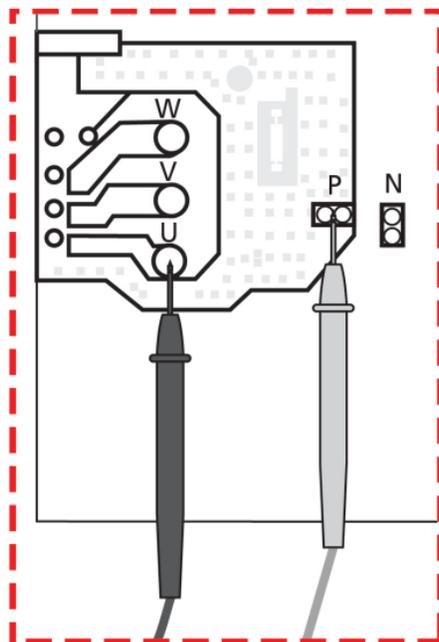
1. Turn off the outdoor unit and disconnect the power supply.
2. Discharge electronic capacitors and ensure all energy-storage units have been discharged.
3. Disassemble the outdoor PCB or disassemble the IPM board.
4. Measure the resistance value between P and U (U,W,N), U(V,W) and N.

Digital tester		Resistance Value	Digital Tester		Resistance Value	
(+)Red	(-)Black	∞ (Several MΩ)	(+)Red	(-)Black	∞ (Several MΩ)	
P	N		N	U		N
	U			V		
	V			W		
	W			-		

Or test the conductivity of IPM with diode mode:

Needle-type Tester		Normal Value	Needle-Type Tester		Normal Value
Red	Black		Red	Black	
P	U	Open-Circuit	N	U	0.3-0.5V
	V			V	
	W			W	

Needle-type Tester		Normal Value	Needle-Type Tester		Normal Value
Red	Black		Red	Black	
P	U	0.3-0.5V	N	U	Open-Circuit
	V			V	
	W			W	

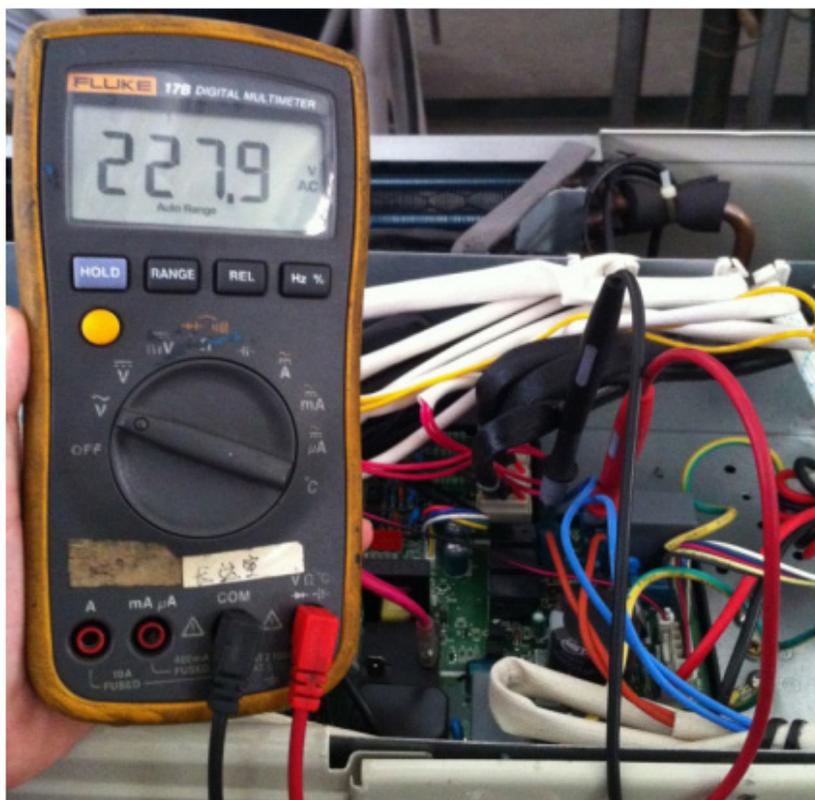


Note: The picture and the value are for reference only, actual condition and specific values may vary.

4-way Valve Check

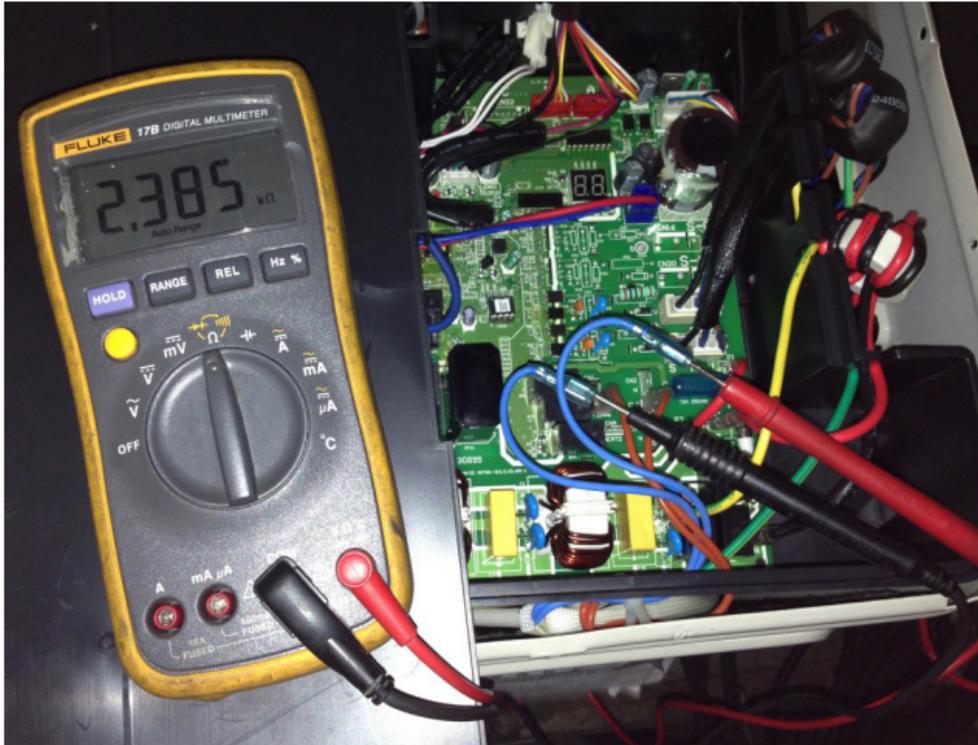
1. Power on and use a digital tester to measure the voltage. When the unit operates in cooling it is 0V, when the unit operates in heating it is about 230VAC.

If the value of the voltage is not in range the PCB has problems and needs to be replaced.



5 TROUBLESHOOTING

2. Turn the power off and use a digital tester to measure the resistance. The value should be $1.8\sim 2.5\text{ K}\pm 5\%\Omega$.

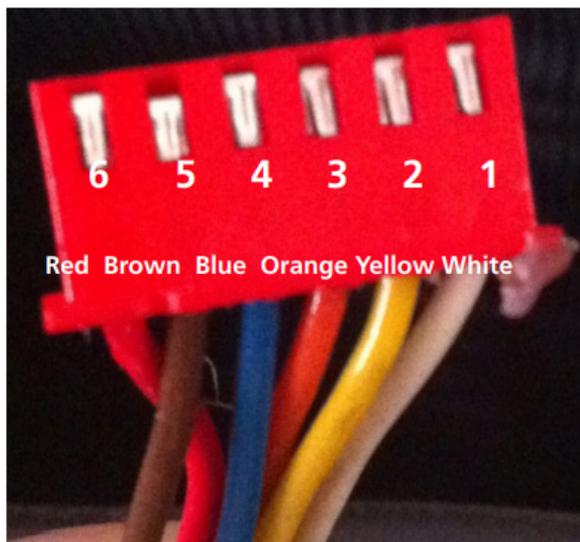


EXV (EEV) Check:

WARNING

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

1. Disconnect the connector from the outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



Color of Lead Winding	Normal Value
Red-Blue	About 50Ω
Red-Yellow	
Brown-Orange	
Brown-White	

6 TEMPERATURE SENSOR RESISTANCE TABLE

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
-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	1.711
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			

6 TEMPERATURE SENSOR RESISTANCE TABLE

Other Temperature Sensor Resistance Value Table (°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	1.89627	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.83003	108	226	0.49989
-11	12	66.0898	29	84	8.3356	69	156	1.76647	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.70547	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.64691	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.59068	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.53668	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.48481	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.43498	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.38703	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.34105	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.29078	118	244	0.37956
-1	30	37.1988	39	102	5.3689	79	174	1.25423	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.2133	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.17393	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.13604	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.09958	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.06448	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	1.03069	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.99815	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.96681	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.93662	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.90753	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.8795	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.85248	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.82643	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.80132	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.77709	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.7537	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.73119	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	2.4467	99	210	0.64862	139	282	0.22231

7 SYSTEM PRESSURE TABLE

System Pressure Table-R454B

Pressure			Temperature		Pressure			Temperature	
Kpa	Bar	PSI	°C	°F	Kpa	Bar	PSI	°C	°F
58.196	0.58	8.44	-60	-76	935.23	9.35	135.64	8	46.4
61.517	0.62	8.92	-59	-74.2	963.75	9.64	139.78	9	48.2
64.988	0.65	9.43	-58	-72.4	992.93	9.93	144.01	10	50
68.615	0.69	9.95	-57	-70.6	1022.8	10.23	148.34	11	51.8
72.402	.072	10.50	-56	-68.8	1053.3	10.53	152.76	12	53.6
76.354	0.76	11.07	-55	-67	1084.5	10.85	157.29	13	55.4
80.478	0.80	11.67	-54	-65.2	1116.4	11.16	161.91	14	57.2
84.776	0.85	12.30	-53	-63.4	1149	11.49	166.64	15	59
89.256	0.89	12.95	-52	-61.6	1182.3	11.82	171.47	16	60.8
93.923	0.94	13.62	-51	-59.8	1216.3	12.16	176.40	17	62.6
98.781	0.99	14.33	-50	-58	1251.1	12.51	181.45	18	64.4
103.84	1.04	15.06	-49	-56.2	1286.6	12.87	186.60	19	66.2
109.1	1.09	15.82	-48	-54.4	1322.8	13.23	191.85	20	68
114.56	1.15	16.61	-47	-52.6	1359.9	13.60	197.23	21	69.8
120.25	1.20	17.44	-46	-50.8	1397.7	13.98	202.71	22	71.6
126.15	1.26	18.30	-45	-49	1436.3	14.36	208.31	23	73.4
132.28	1.32	19.18	-44	-47.2	1475.7	14.76	214.02	24	75.2
138.64	1.39	20.11	-43	-45.4	1515.9	15.16	219.85	25	77
145.24	1.45	21.06	-42	-43.6	1557	15.57	225.82	26	78.8
152.09	1.52	22.06	-41	-41.8	1598.9	15.99	231.89	27	80.6
159.18	1.59	23.09	-40	-40	1641.6	16.42	238.09	28	82.4
166.54	1.67	24.15	-39	-38.2	1685.2	16.85	244.41	29	84.2
174.15	1.74	25.26	-38	-36.4	1729.7	17.30	250.86	30	86
182.04	1.82	26.40	-37	-34.6	1775	17.75	257.43	31	87.8
190.2	1.90	27.59	-36	-32.8	1821.3	18.21	264.15	32	89.6
198.65	1.99	28.81	-35	-31	1868.4	18.68	270.98	33	91.4
207.39	2.07	30.08	-34	-29.2	1916.5	19.17	277.95	34	93.2
216.42	2.16	31.39	-33	-27.4	1965.6	19.66	285.08	35	95
225.76	2.26	32.74	-32	-25.6	2015.5	20.16	292.31	36	96.8
235.41	2.35	34.14	-31	-23.8	2066.5	20.67	299.71	37	98.6
245.37	2.45	35.59	-30	-22	2118.4	21.18	307.24	38	100.4
255.67	2.56	37.08	-29	-20.2	2171.3	21.71	314.19	39	102.2
266.29	2.66	38.62	-28	-18.4	2225.2	22.25	322.73	40	104
277.25	2.77	40.21	-27	-16.6	2280.2	22.80	330.70	41	105.8
288.56	2.89	41.85	-26	-14.8	2336.1	23.36	338.81	42	107.6
300.22	3.00	43.54	-25	-13	2393.2	23.93	347.09	43	109.4
312.24	3.12	45.28	-24	-11.2	2451.3	24.51	355.52	44	111.2
324.63	3.25	47.08	-23	-9.4	2510.4	25.10	364.09	45	113
337.39	3.37	48.93	-22	-7.6	2570.7	25.71	372.84	46	114.8
350.54	3.51	50.84	-21	-5.8	2632.1	26.32	381.74	47	116.6
364.08	3.64	52.80	-20	-4	2694.7	26.95	390.82	48	118.4
378.02	3.78	54.83	-19	-2.2	2758.33	27.58	400.04	49	120.2
392.37	3.92	56.91	-18	-0.4	2823.2	28.23	409.46	50	122
407.13	4.07	59.05	-17	1.4	2889.3	28.89	419.04	51	123.8

System Pressure Table-R454B Cont.

Pressure			Temperature		Pressure			Temperature	
Kpa	Bar	PSI	°C	°F	Kpa	Bar	PSI	°C	°F
422.31	4.22	61.25	-16	3.2	2956.5	29.57	428.79	52	125.6
437.92	4.38	63.5	-15	5	3025	30.25	438.72	53	127.4
453.98	4.54	65.84	-14	6.8	3094.7	30.95	448.83	54	129.2
470.47	4.70	68.23	-13	8.6	3165.7	31.66	459.13	55	131
487.43	4.87	70.69	-12	10.4	3238.1	32.38	469.63	56	132.8
504.84	5.05	73.22	-11	12.2	3311.7	33.12	480.30	57	134.6
522.73	5.23	75.81	-10	14	3386.7	33.87	491.18	58	136.4
541.1	5.41	78.48	-9	15.8	3463	34.63	502.25	59	138.2
559.95	5.60	81.21	-8	17.6	3540.7	35.41	513.52	60	140
579.31	5.79	84.02	-7	19.4	3619.9	36.20	525.00	61	141.8
599.16	5.99	86.90	-6	21.2	3700.5	37.01	536.69	62	143.6
619.54	6.20	89.85	-5	23	3782.7	37.83	548.61	63	145.4
640.43	6.40	92.88	-4	24.8	3866.3	38.66	560.74	64	147.2
661.86	6.62	95.99	-3	26.6	3951.5	39.52	573.10	65	149
683.82	6.84	99.18	-2	28.4	4038.3	40.38	585.69	66	150.8
706.34	7.06	102.44	-1	30.2	4126.8	41.27	598.52	67	152.6
729.41	7.29	105.79	0	32	4217	42.17	611.60	68	154.4
753.06	7.53	109.22	1	33.8	4309	43.09	624.95	69	156.2
777.28	7.77	112.73	2	35.6	4402.9	44.03	638.56	70	158
802.08	8.02	116.33	3	37.4	4498.7	44.99	652.46	71	159.8
827.47	8.27	120.01	4	39.2	4596.5	45.97	666.64	72	161.6
853.49	8.53	123.78	5	41	4696.5	46.97	681.15	73	163.4
880.11	8.80	127.64	6	42.8	4798.9	47.99	696.00	74	165.5
907.35	9.07	131.60	7	44.6	4904.1	49.04	711.25	75	167



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