

This product utilizes R-454B refrigerant

Olympus Series Cassette Air Handler Service Manual

MODELS:
CASSETTE*HP-230C-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: May 12, 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.



WARNING 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.

1. Installation must be performed according to the installation instructions. Improper installation could cause water leakage, electrical shock, or fire.
2. Contact an authorized service technician for repair or maintenance of this unit.
3. This appliance must be installed in accordance with national wiring regulations.
4. 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.
5. 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.
6. Install the drainage piping according to the instructions in this manual. Improper drainage could cause water damage to your home and/or property.
7. When moving or relocating the air conditioner, consult experienced service technicians for disconnection and re-installation of the unit.
8. 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.
9. USB device access, replacement, and maintenance operations must be carried out by professional staff.



WARNING FOR CLEANING & MAINTENANCE

1. **DO NOT** clean the unit with excessive amounts of water.
2. **DO NOT** clean the unit with combustible cleaning agents, as these could cause deformation and/or fire.
3. Turn off the device and disconnect the power before cleaning. Failure to do this could result in electrical shock.

TAKE NOTE OF FUSE SPECIFICATIONS

- The unit's circuit board (PCB) is designed with a fuse to provide over-current protection.
- The specifications of the fuse are printed on the circuit board, examples of such are T5A/250VAC and T10A/250VAC.

Note: Only a blast-proof ceramic fuse can be used.



WARNING 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 is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
 5. Turn off the unit and disconnect the power before performing any cleaning, installation, or repairing. Failure to do so can cause electric 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. Turn off and unplug the unit during storms.



ELECTRICAL WARNINGS

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

- ⚠ **DO NOT** share the power supply with other appliances. An improper or insufficient power supply could cause fire and/or electrical shock.
1. Only use the specified wire. If the wire is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
 2. The product must be properly grounded during installation or electrical shock could occur.
 3. Appropriate wiring standards, regulations, and the installation manual must be followed for all electrical work.
 4. 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.
 5. Connect cables tightly and clamp them securely to prevent external forces from damaging the terminal.



ELECTRICAL WARNINGS

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. Disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.



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. When a flammable refrigerant is used, the requirements for installation space of the appliance and/or ventilation requirements are determined according to:
 - The mass charge amount (M) used in the unit.
 - The installation location.
 - The type of ventilation of the location of the unit.
 - Piping material, pipe routing, and installation must include protection from physical damage in operation and service. This must be in compliance with local codes and standards, such as ASHRAE 15, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints must be accessible for inspection prior to being covered or enclosed.
 - Protection devices, piping and fittings must be protected as much as possible against adverse environmental effects. For example, against the danger of water collecting and freezing in relief pipes or against accumulation of dirt or debris.



FLAMMABLE REFRIGERANT WARNINGS

- Piping in refrigeration systems must be designed and installed to minimize the likelihood of hydraulic shock, resulting in damage from the system.
 - Steel pipes and components must be protected against corrosion with a rust-proof coating before applying insulation.
 - Precautions must be taken against excessive vibration or movement of the unit.
 - The minimum floor area of the room must be mentioned in the form of a table or a single figure without reference to a formula.
17. After completion of field piping for split systems, the field pipework should be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:
 - The minimum test pressure for the low side of the system should be the low side design pressure and the minimum test pressure for the high side of the system should be the high side design pressure, unless the high side of the system cannot be isolated from the low side of the system in which case the entire system should not be pressure tested to the low side design pressure.
 - The test pressure after removal of pressure source shall be maintained for at least 1 hour with no decrease of pressure indicated by the test gauge, with test gauge resolution not exceeding 5% of the test pressure.
 18. 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.
 19. 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.
 20. 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.
 21. 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.
 22. 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.
 23. 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.
 24. 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.
 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;
 - refrigerant 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 or protected against corrosion.



FLAMMABLE REFRIGERANT WARNINGS

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
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 short as possible to minimize the amount of refrigerant contained in them.



FLAMMABLE REFRIGERANT WARNINGS

- 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
- 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.
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.
36. 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.
37. 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,



FLAMMABLE REFRIGERANT WARNINGS

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.

38. Transport of equipment containing flammable refrigerants should comply with transportation regulations.
39. Marking of equipment using signs should comply with local regulations.
40. Disposal of equipment using flammable refrigerants should comply with national regulations.
41. Storage of equipment/appliances should be in accordance with the manufacturer's instructions.
42. 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.
43. During the evacuation test, after achieving a vacuum level specified in the manual or less, the refrigeration system shall be isolated from the vacuum pump and the pressure shall not rise above 1500 microns within 10 minutes. The vacuum pressure level should be specified in the manual, and should be the lessor of 500 microns of the value required for compliance with national and local codes and standards, which may vary between residential, commercial, and industrial buildings.
 - Field-made refrigerant joints indoors should be tightness-tested according to the following requirements: the test method should have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak should be detected.
 - Any servicing should be performed only as recommended by MRCOOL®.
43. Any maintenance, service, or repair operations must be performed by qualified personnel. Every working procedure that affects safety should only be carried out by competent persons that are both trained and certified. The training of these procedures should be carried out by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation. All training should follow the ANNEX HH requirements of UL 60334-2-40 4th Edition.

Examples of such working procedures are:

 - breaking into a refrigerant circuit
 - opening of sealed components
 - opening of ventilated enclosures

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.

2 SYSTEM OVERVIEW

2.1 Model Reference

Indoor Unit Model	Capacity (Btu/h)	Power Supply
CASSETTE09HP-230C-O	9K	1Ph, 208/230V~, 60Hz
CASSETTE12HP-230C-O	12K	
CASSETTE18HP-230C-O	18K	
CASSETTE24HP-230C-O	24K	

2.2 External Appearance

9/12/18K

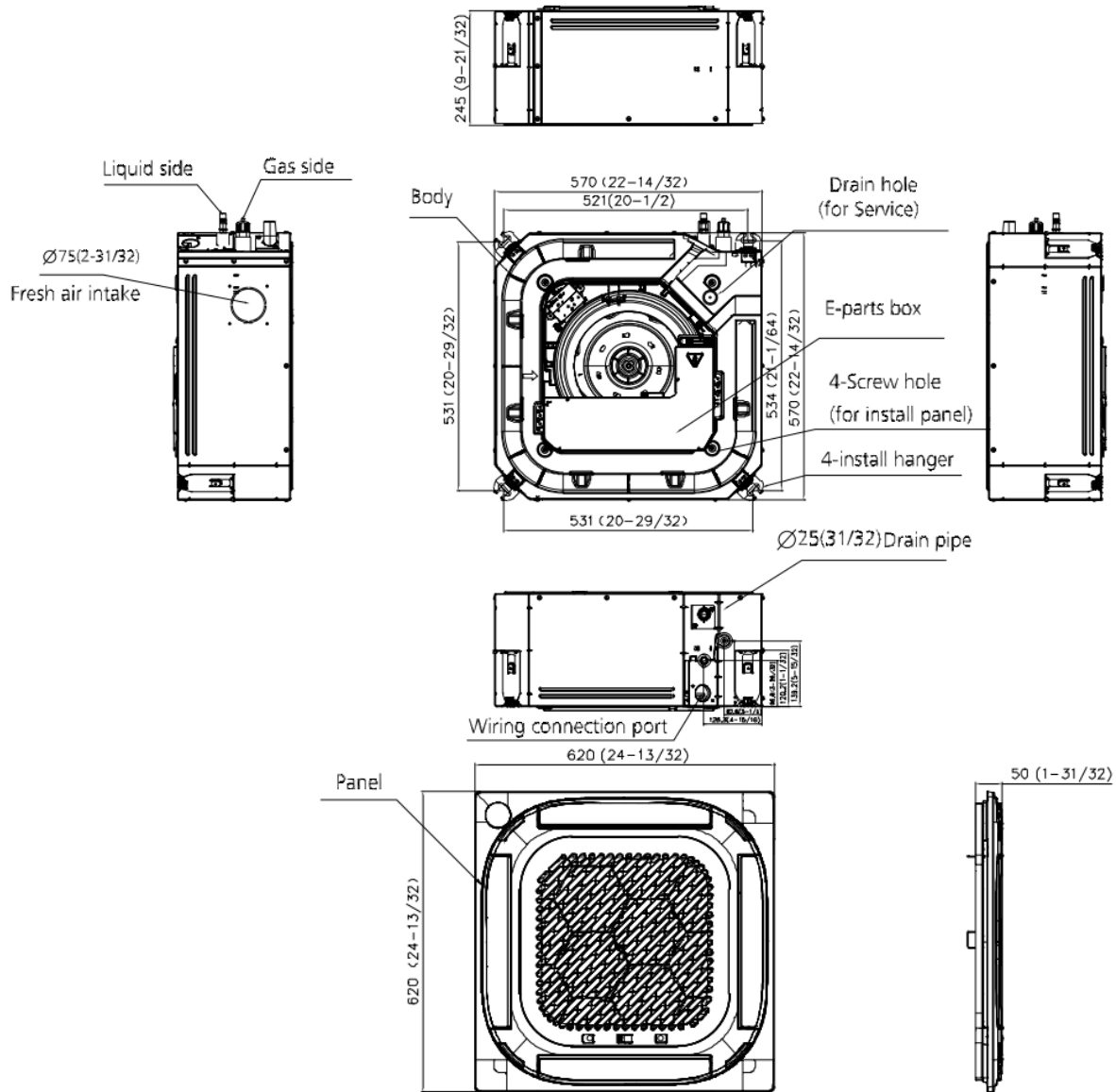


24K



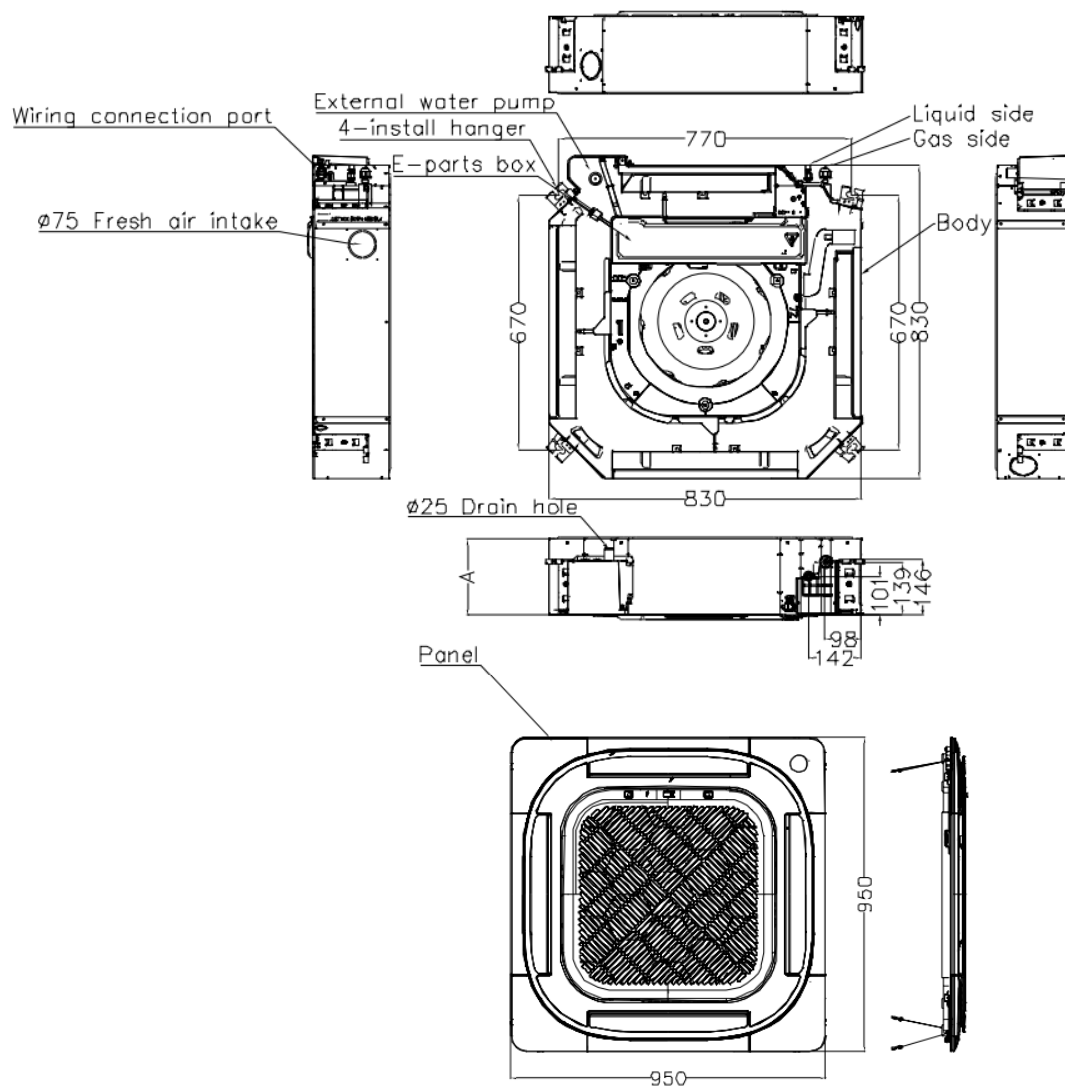
2.3 Dimensional Drawings

9/12/18K



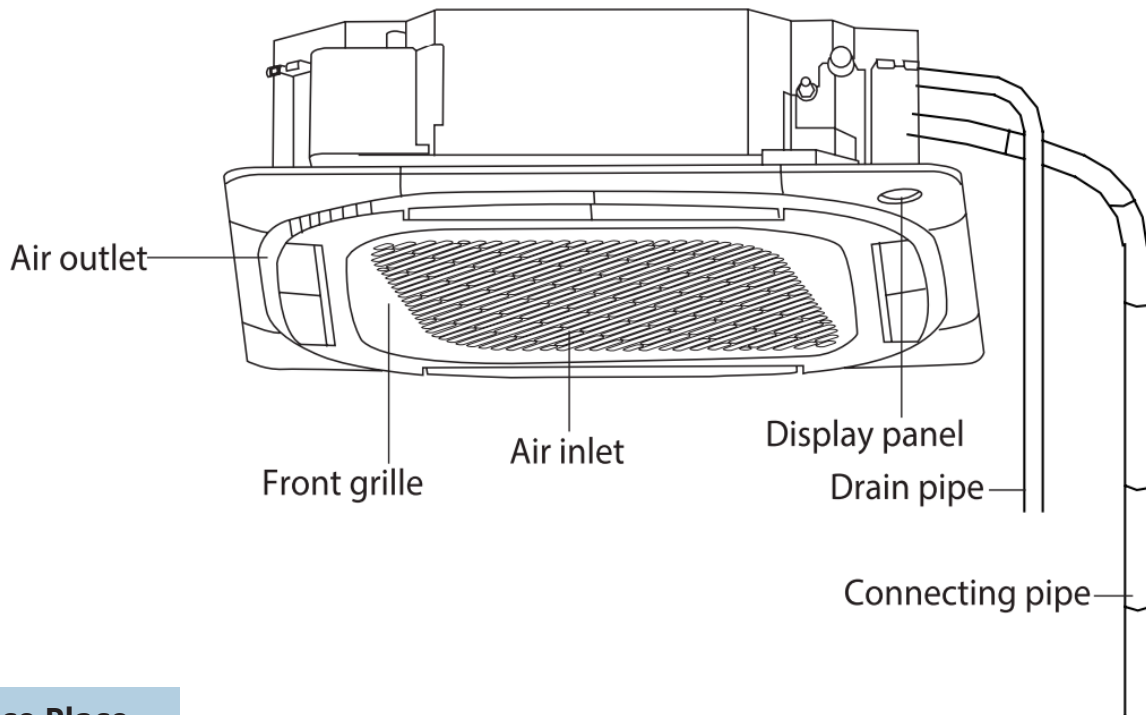
2 SYSTEM OVERVIEW

24K

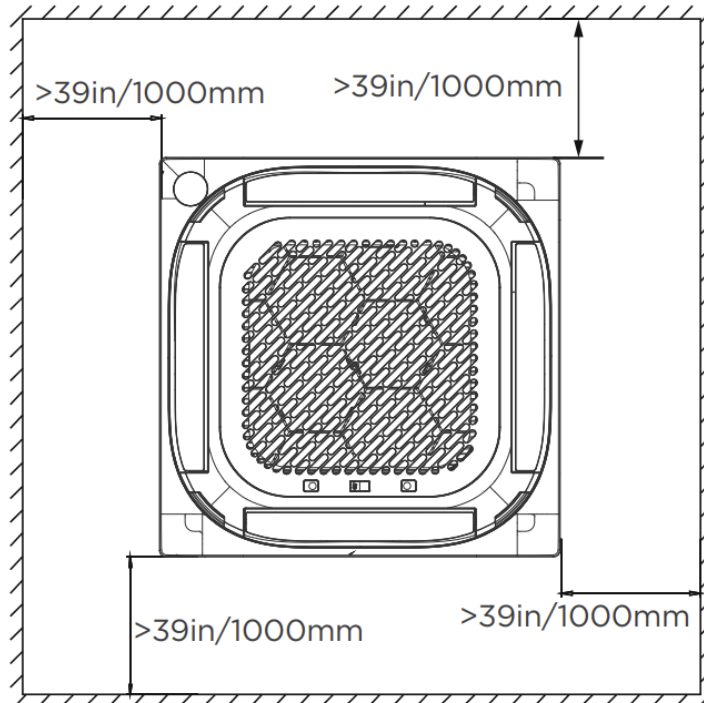


Model (KBtu/h)	Unit	A
24	mm	205
	inch	8.07

2.4 Part Names



2.5 Service Place



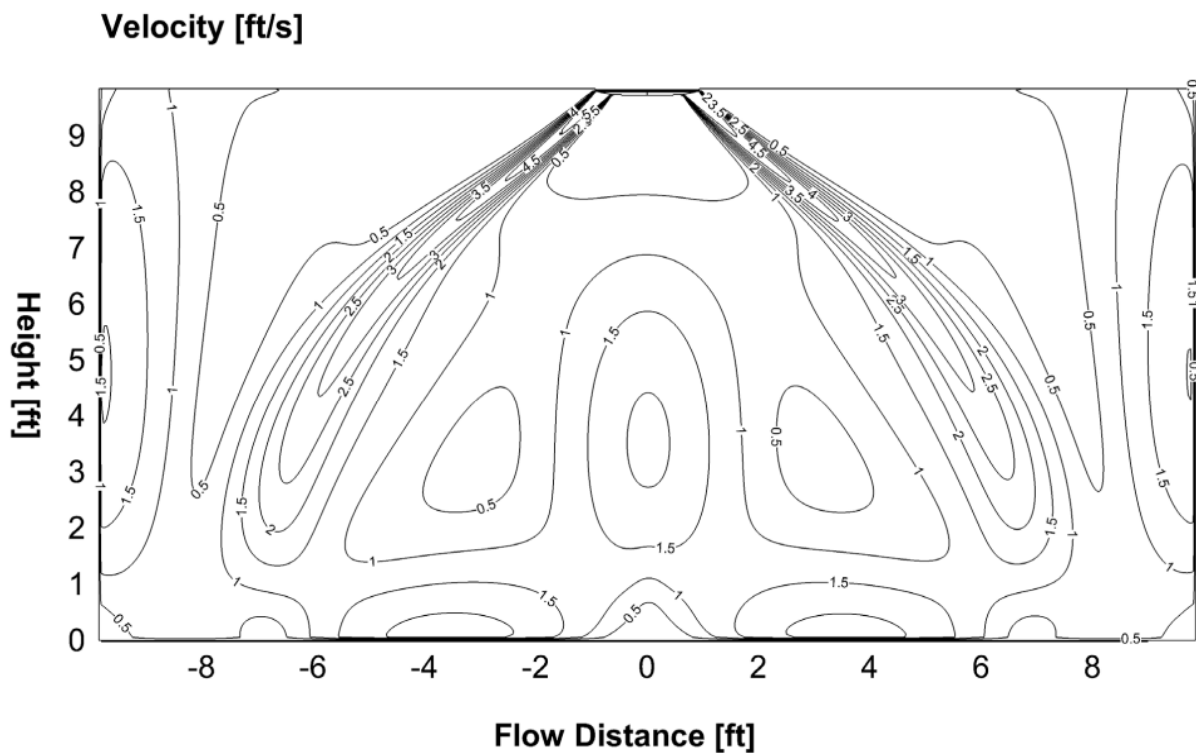
2 SYSTEM OVERVIEW

2.6 Air Velocity & Temperature Distributions

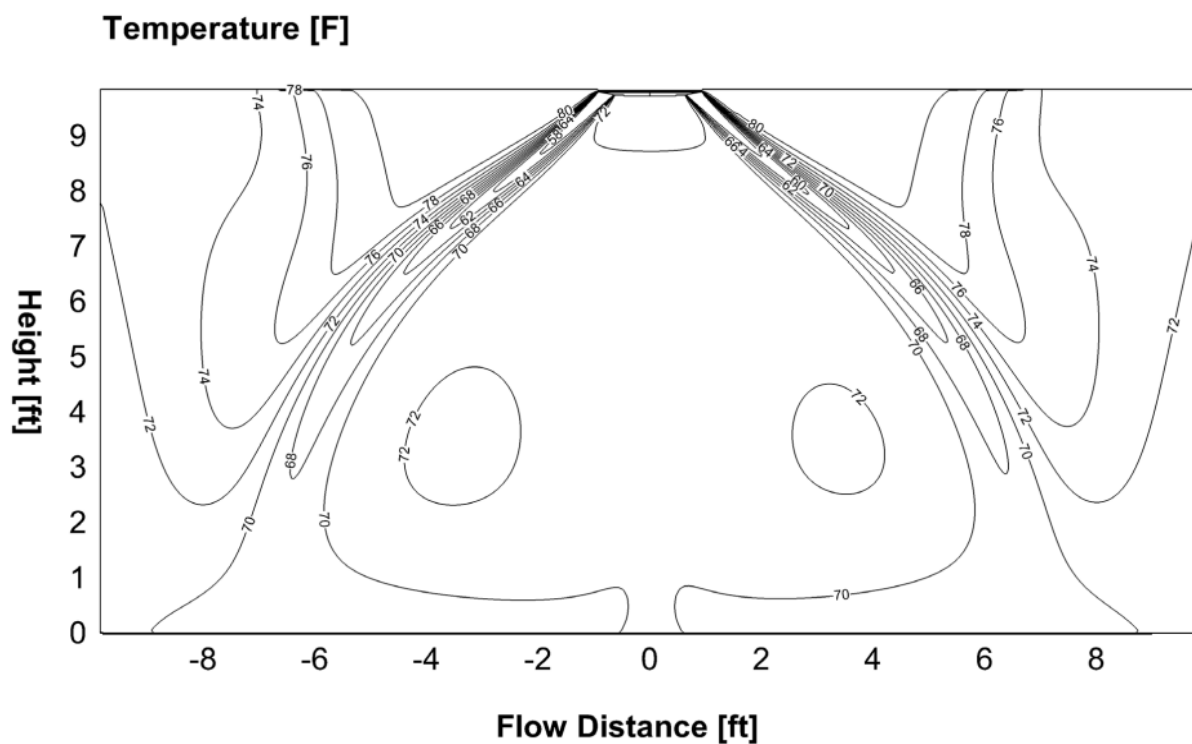
CASSETTE09-HP230C-O:

Discharge angle 50°

Cooling Airflow Velocity Distributions



Cooling Temperature Distributions

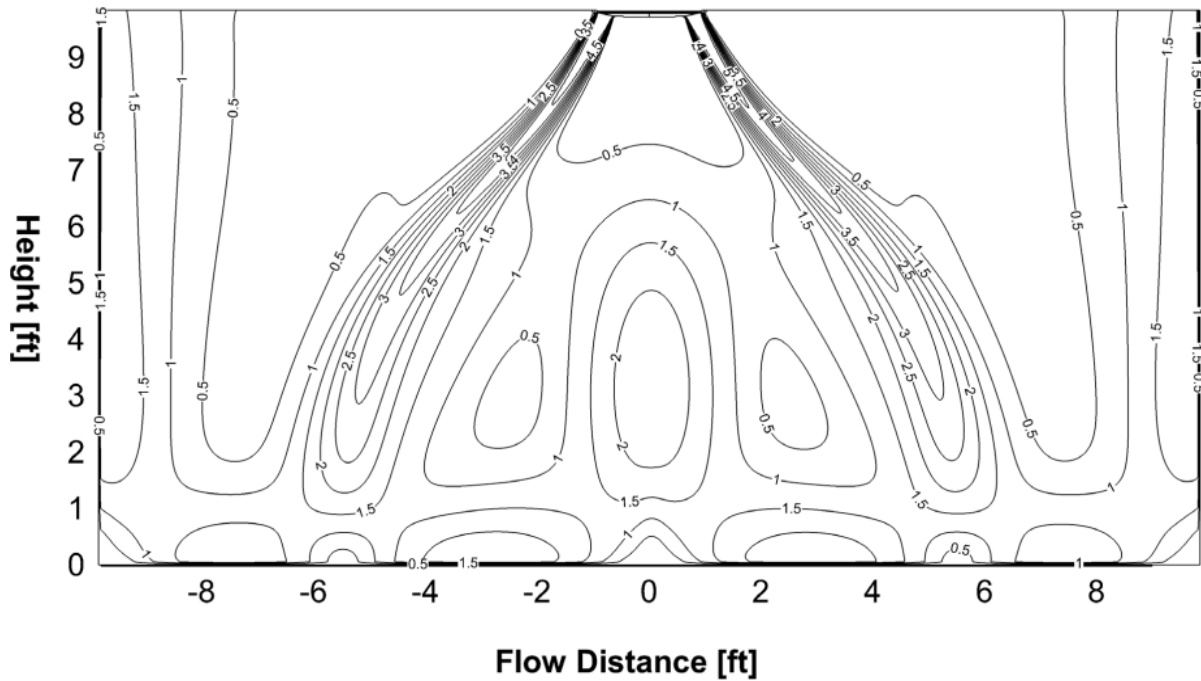


CASSETTE09-HP230C-O:

Discharge angle 65°

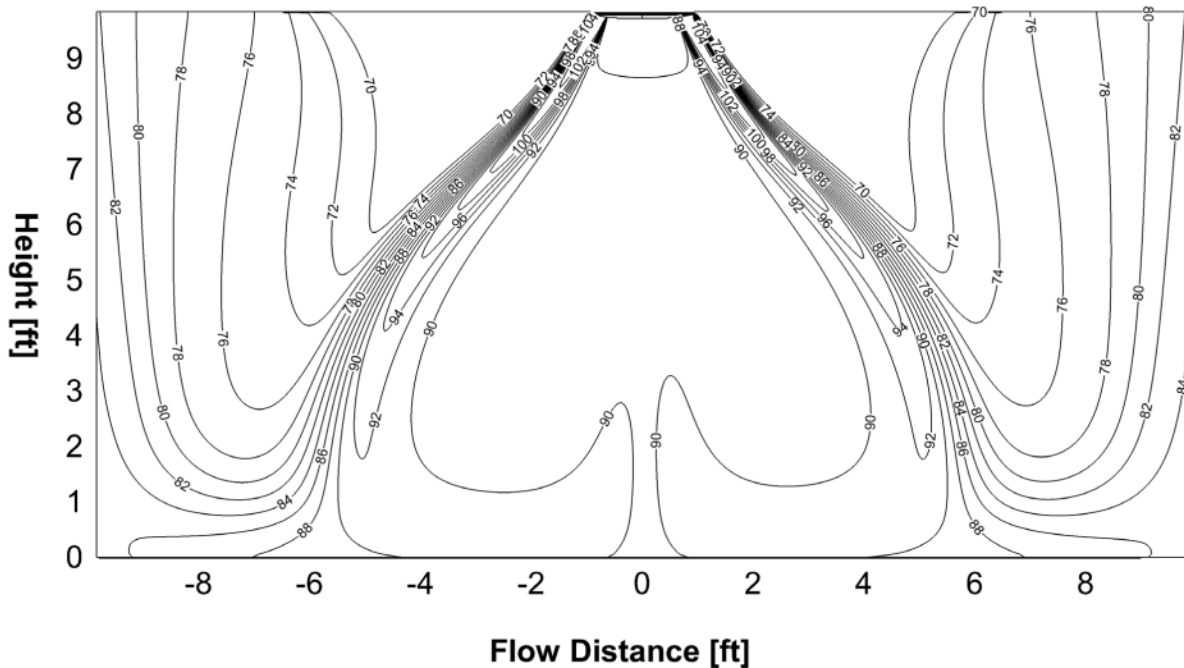
Heating Airflow Velocity Distributions

Velocity [ft/s]



Heating Temperature Distributions

Temperature [F]



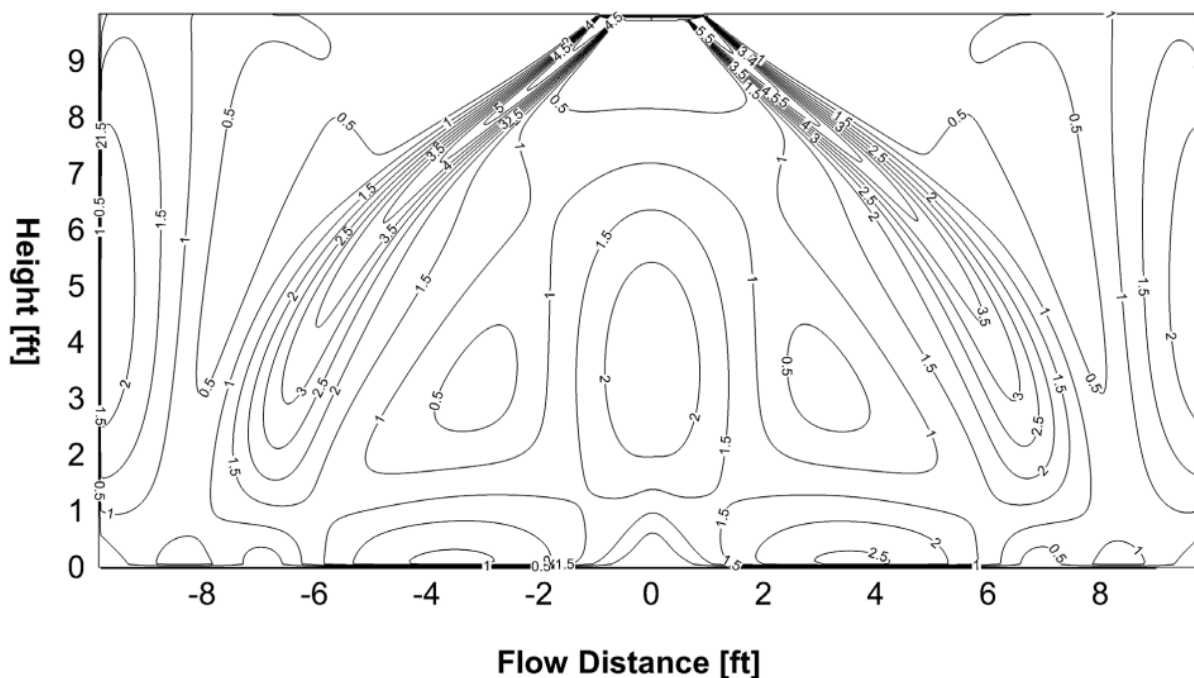
2 SYSTEM OVERVIEW

CASSETTE12-HP230C-O:

Discharge angle 50°

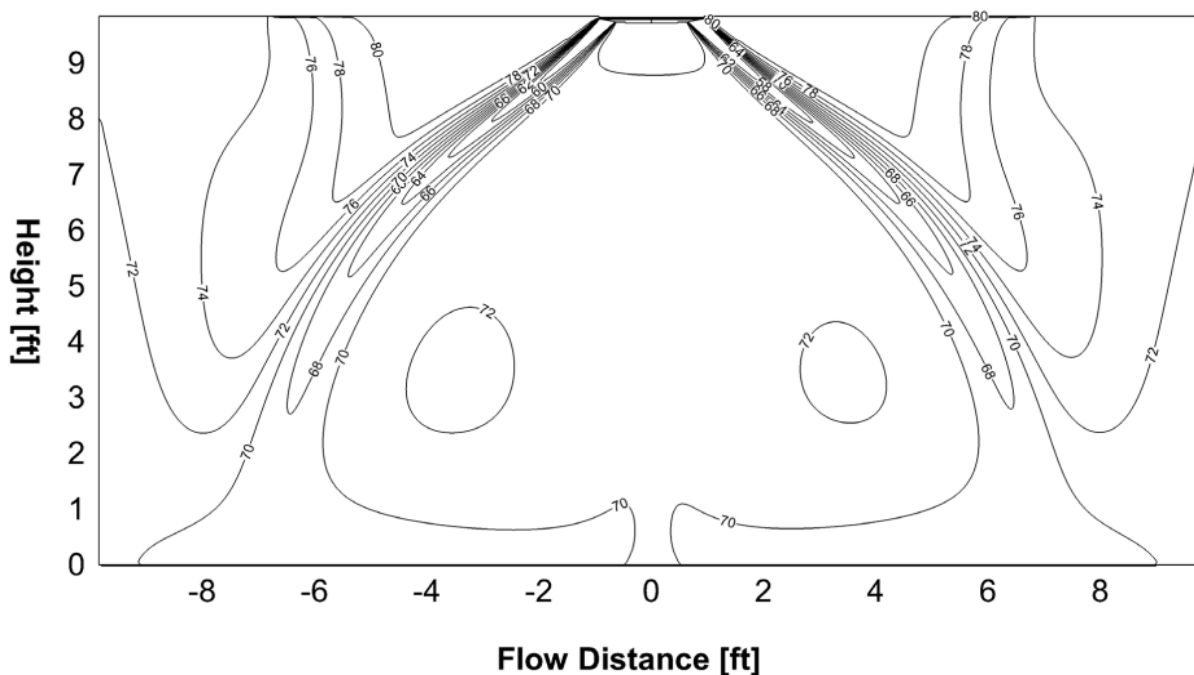
Cooling Airflow Velocity Distributions

Velocity [ft/s]



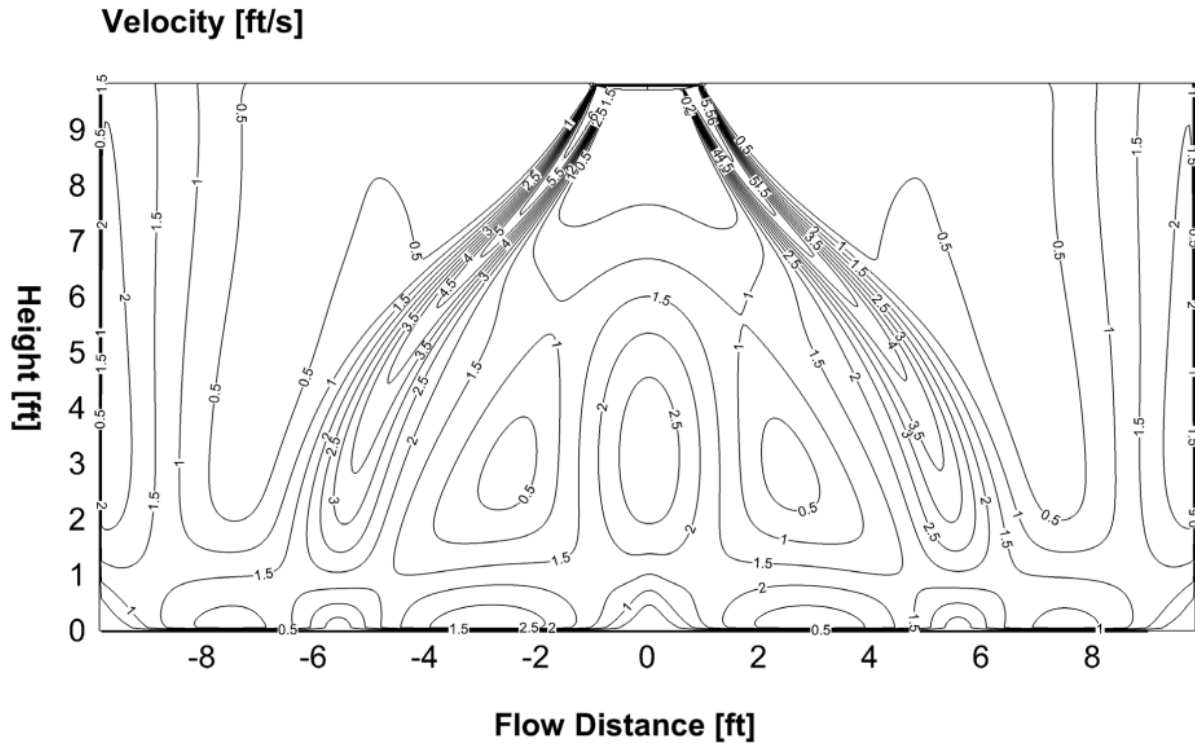
Cooling Temperature Distributions

Temperature [F]

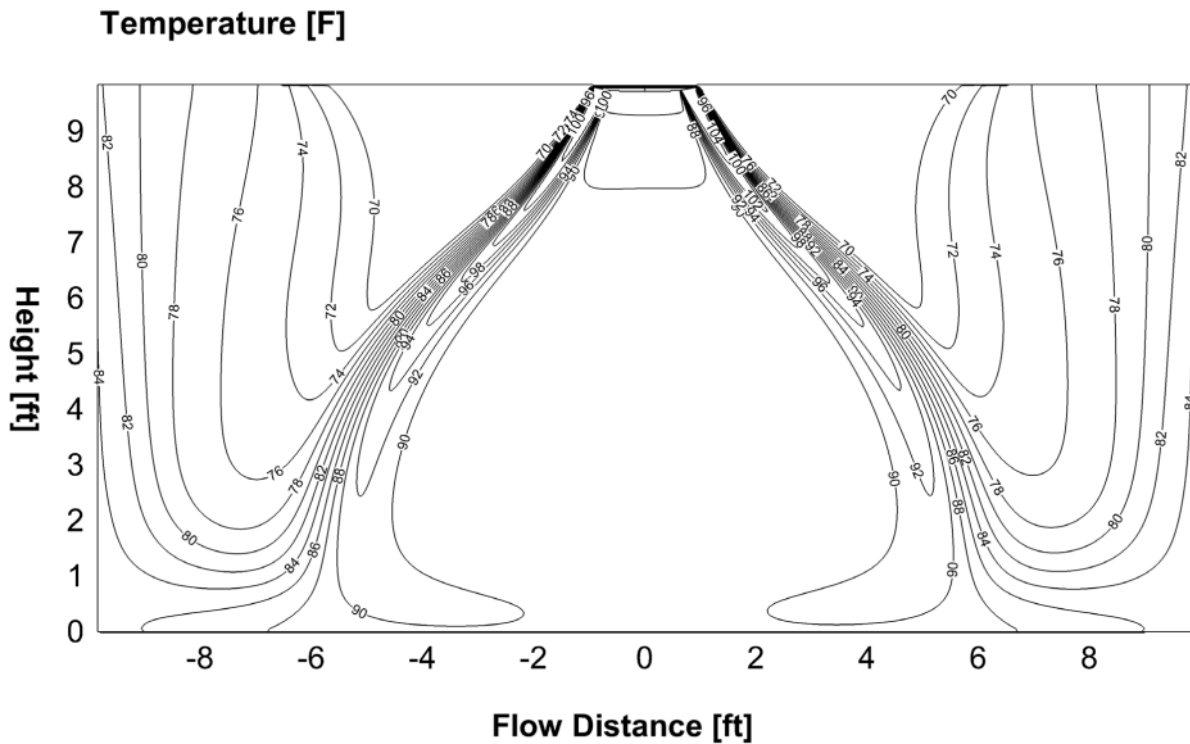


CASSETTE12-HP230C-O:
Discharge angle 65°

Heating Airflow Velocity Distributions



Heating Temperature Distributions

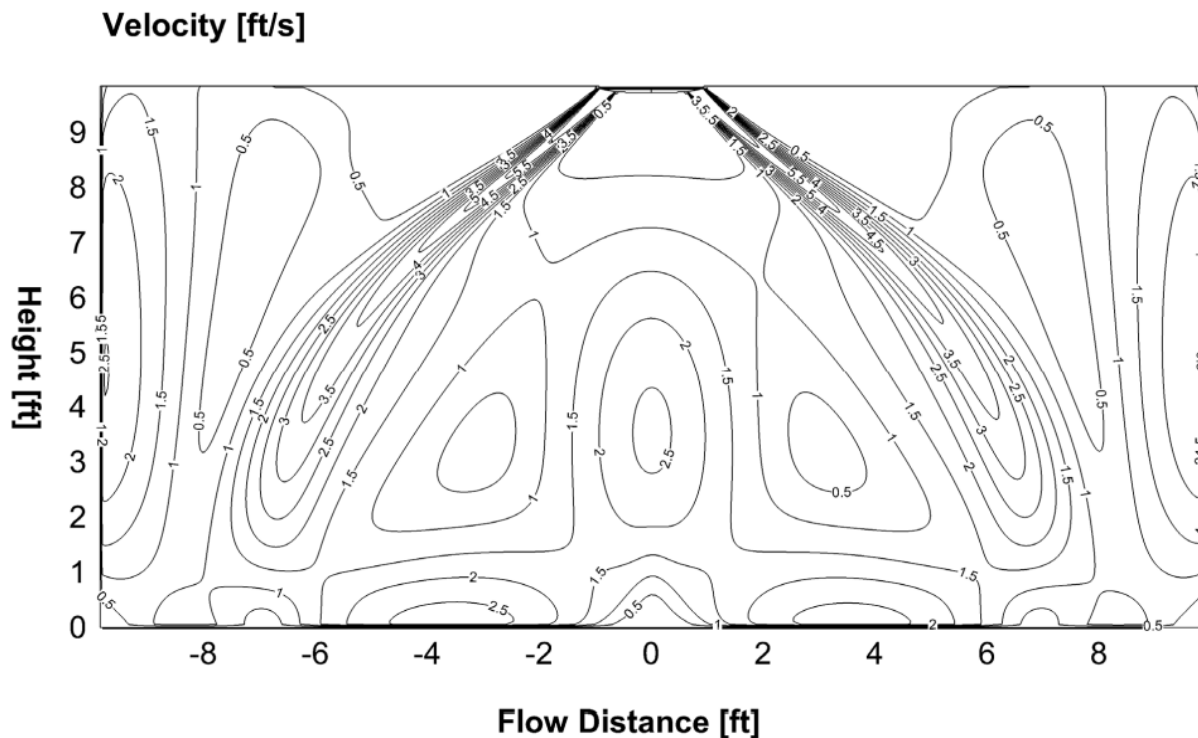


2 SYSTEM OVERVIEW

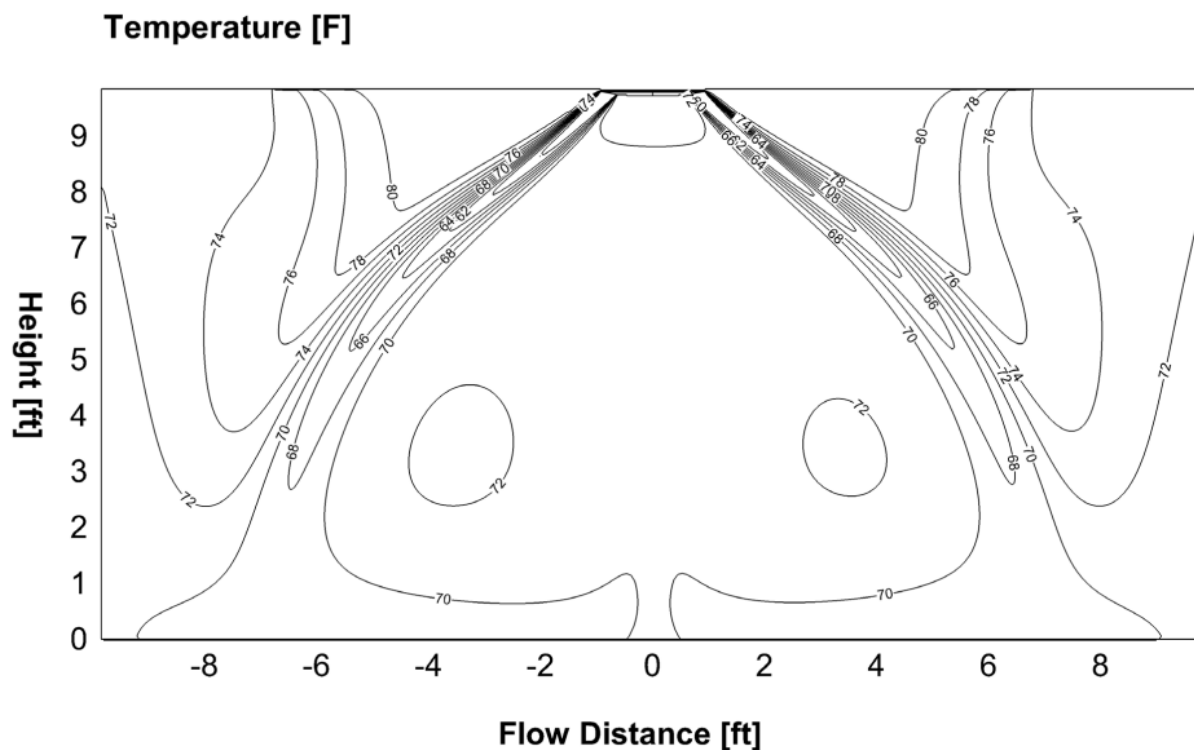
CASSETTE18-HP230C-O:

Discharge angle 50°

Cooling Airflow Velocity Distributions



Cooling Temperature Distributions

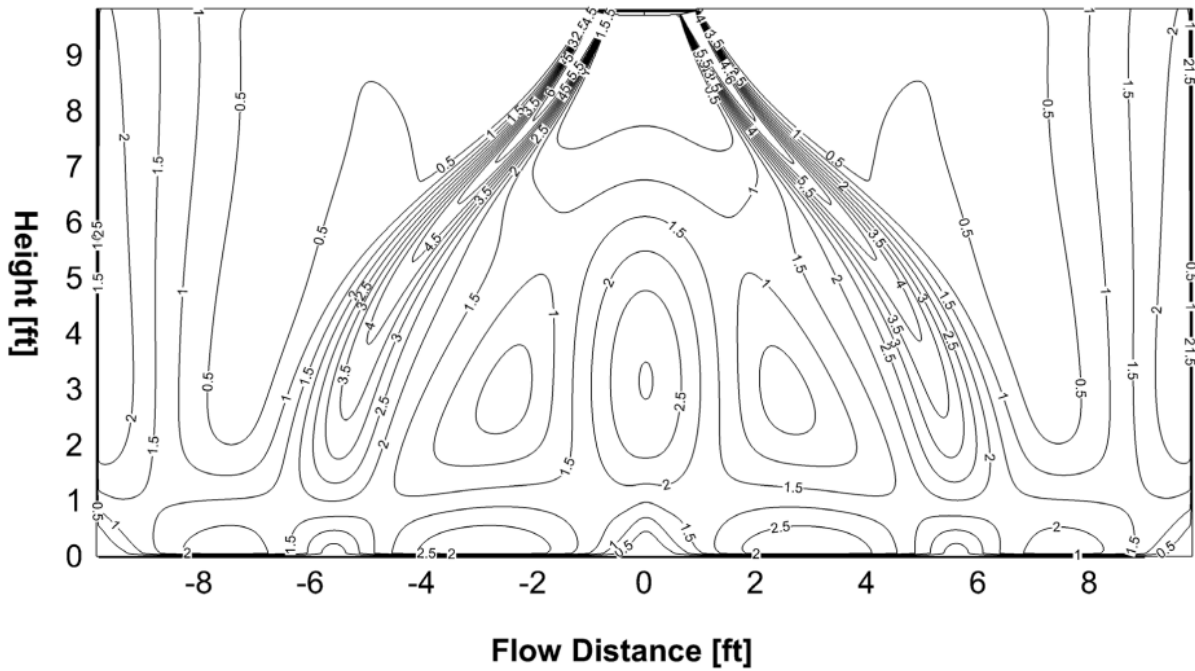


CASSETTE12-HP230C-O:

Discharge angle 65°

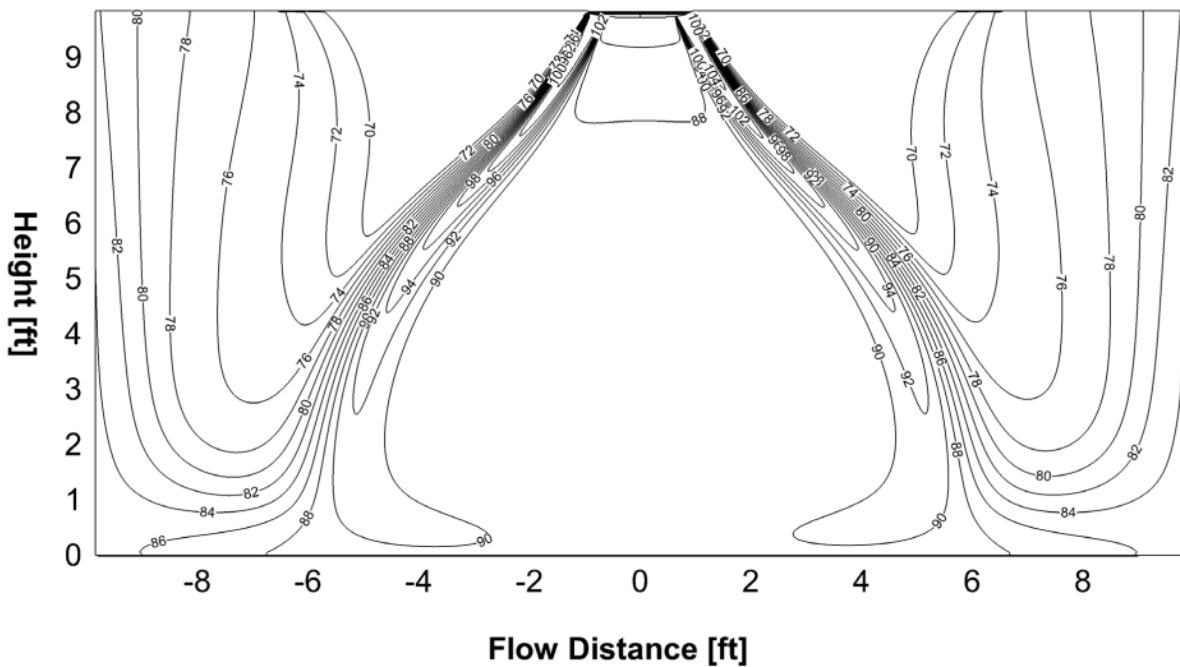
Heating Airflow Velocity Distributions

Velocity [ft/s]



Heating Temperature Distributions

Temperature [F]

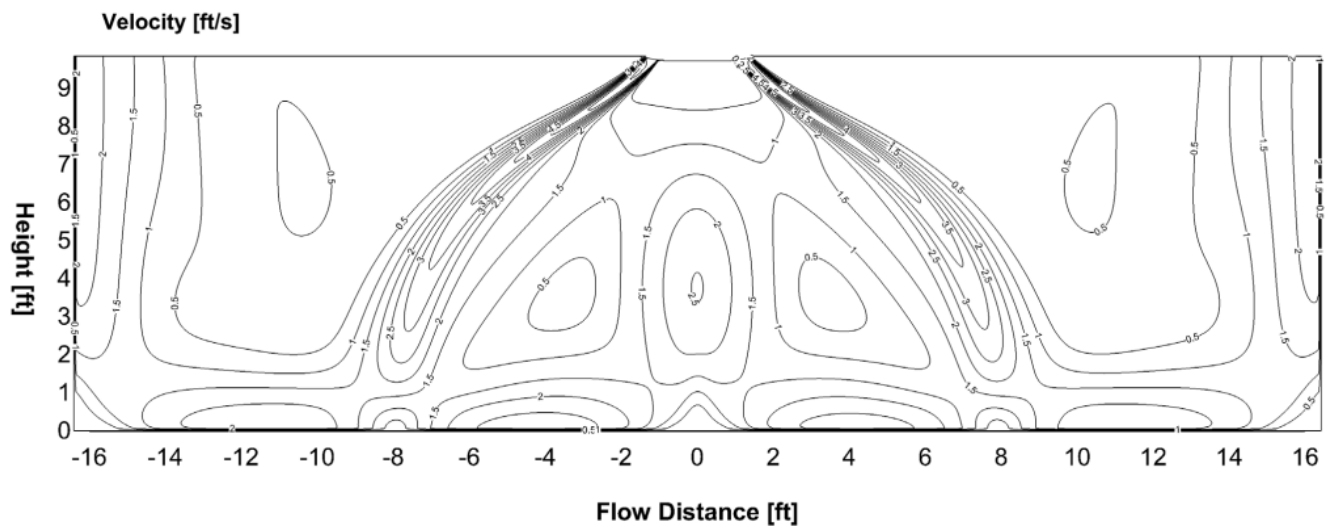


2 SYSTEM OVERVIEW

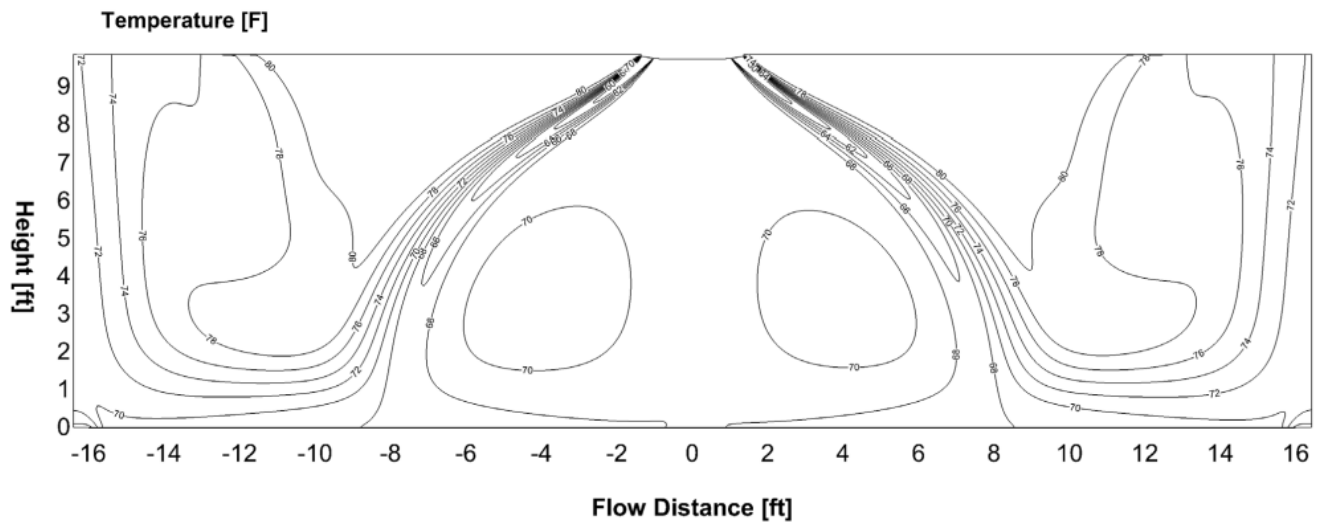
CASSETTE24-HP230C-O:

Discharge angle 50°

Cooling Airflow Velocity Distributions

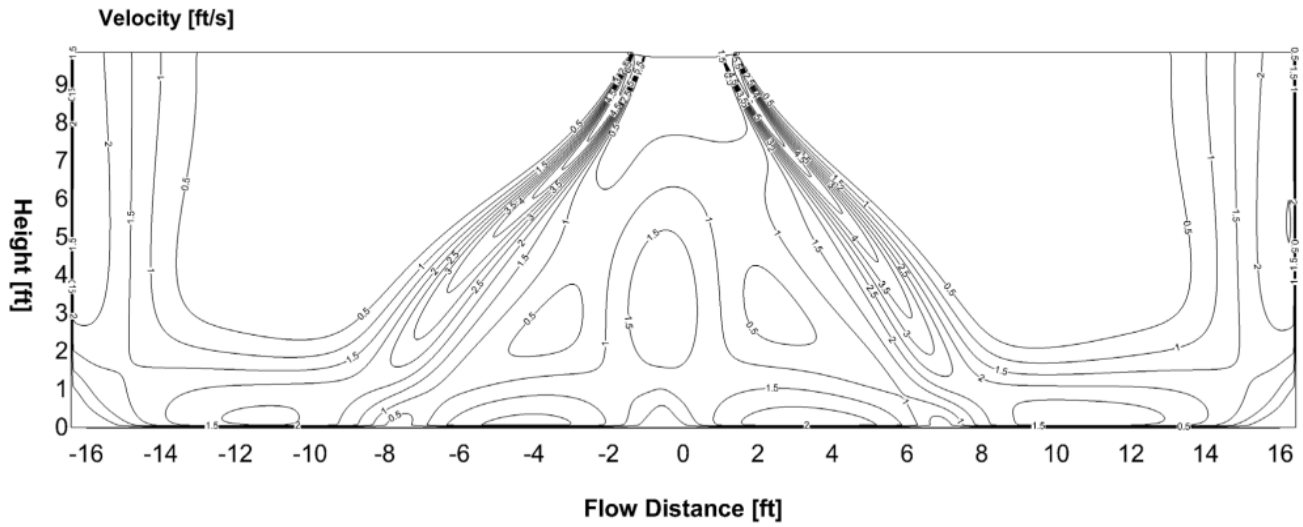


Cooling Temperature Distributions

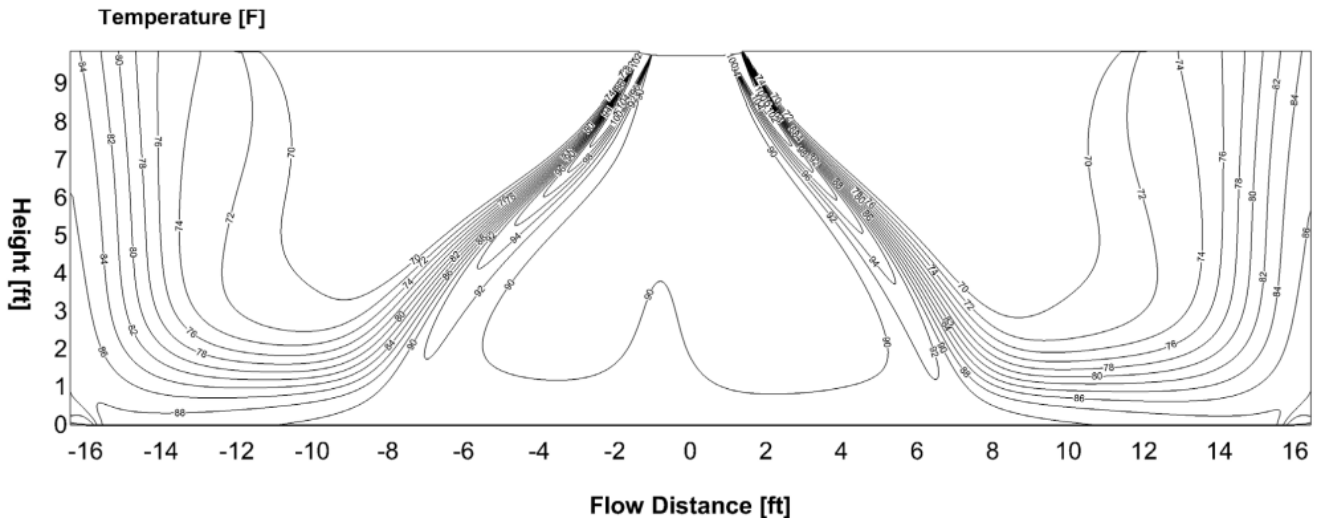


CASSETTE12-HP230C-O:
Discharge angle 65°

Heating Airflow Velocity Distributions

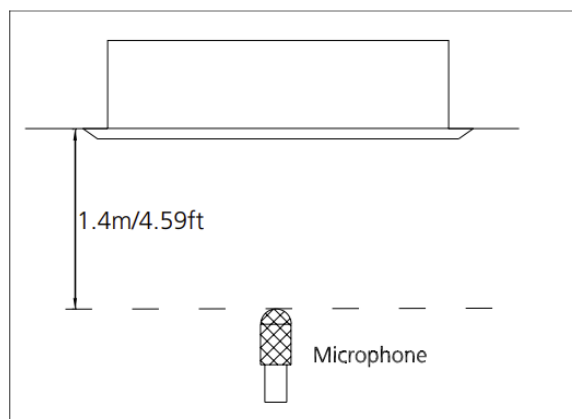


Heating Temperature Distributions



2 SYSTEM OVERVIEW

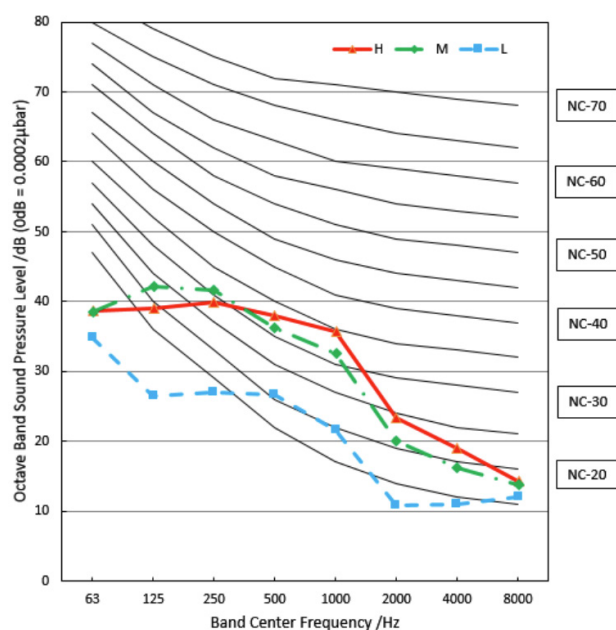
2.7 Sound Pressure Levels & Curves



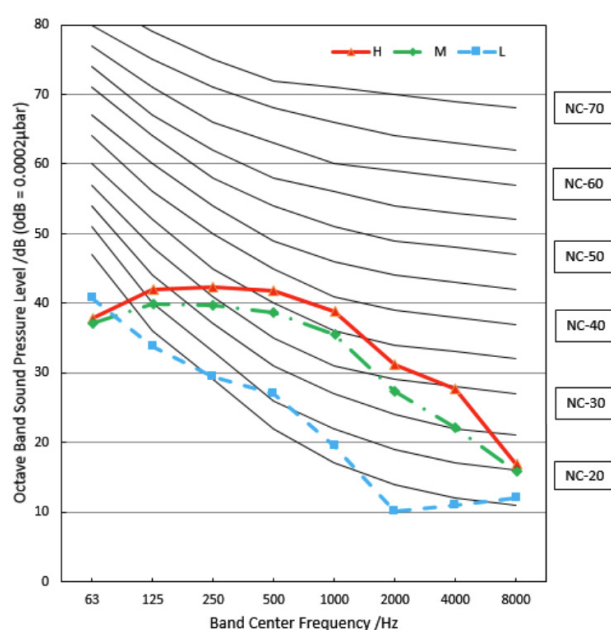
Notes:

- Sound is measured at 4.59ft (1.4m) away from the noisiest location of the unit.
- Data is valid at free field condition.
- Data is valid at nominal operation condition.
- Reference acoustic pressure $OdB=20\mu Pa$.
- The sound level will vary depending on a range of factors such as the construction -(acoustic absorption coefficient) of a particular room in which the equipment is installed.
- The operating conditions are assumed to be standard.

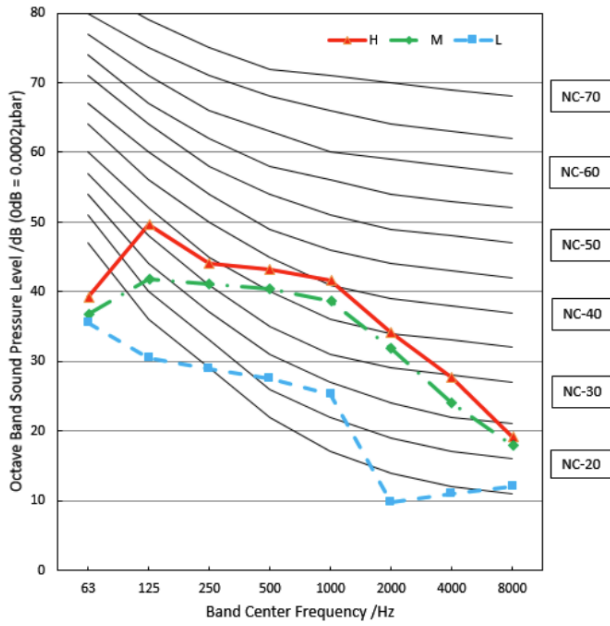
CASSETTE09HP-230C-O



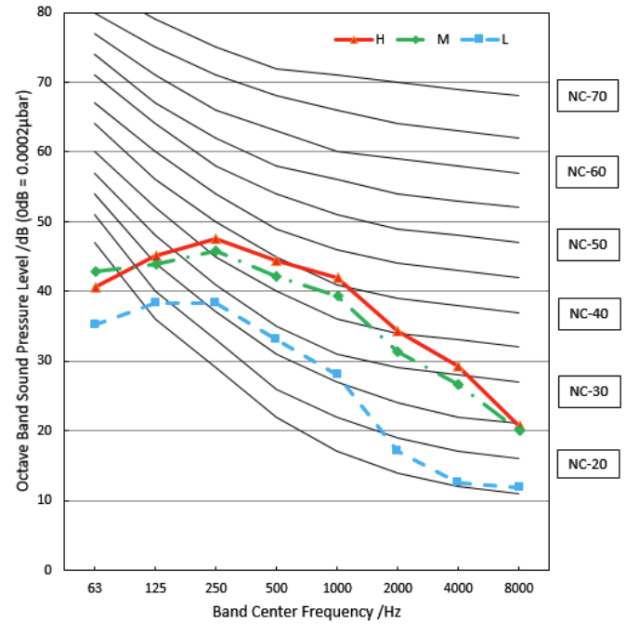
CASSETTE12HP-230C-O



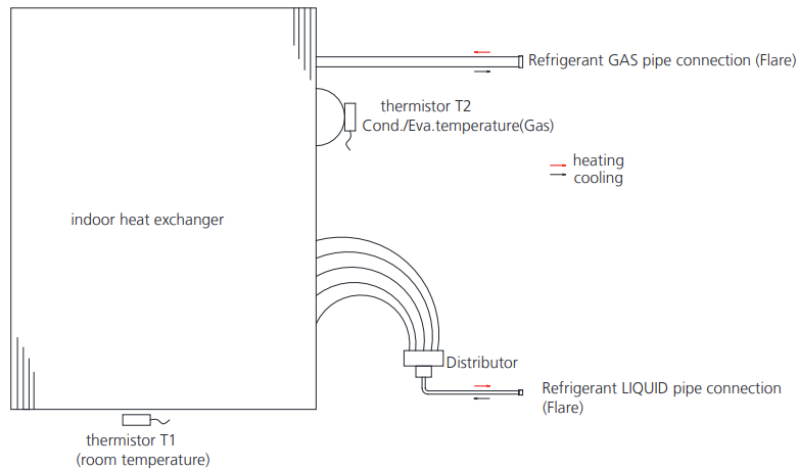
CASSETTE18HP-230C-O



CASSETTE24HP-230C-O



2.8 Refrigerant System Diagram



2.9 Electrical

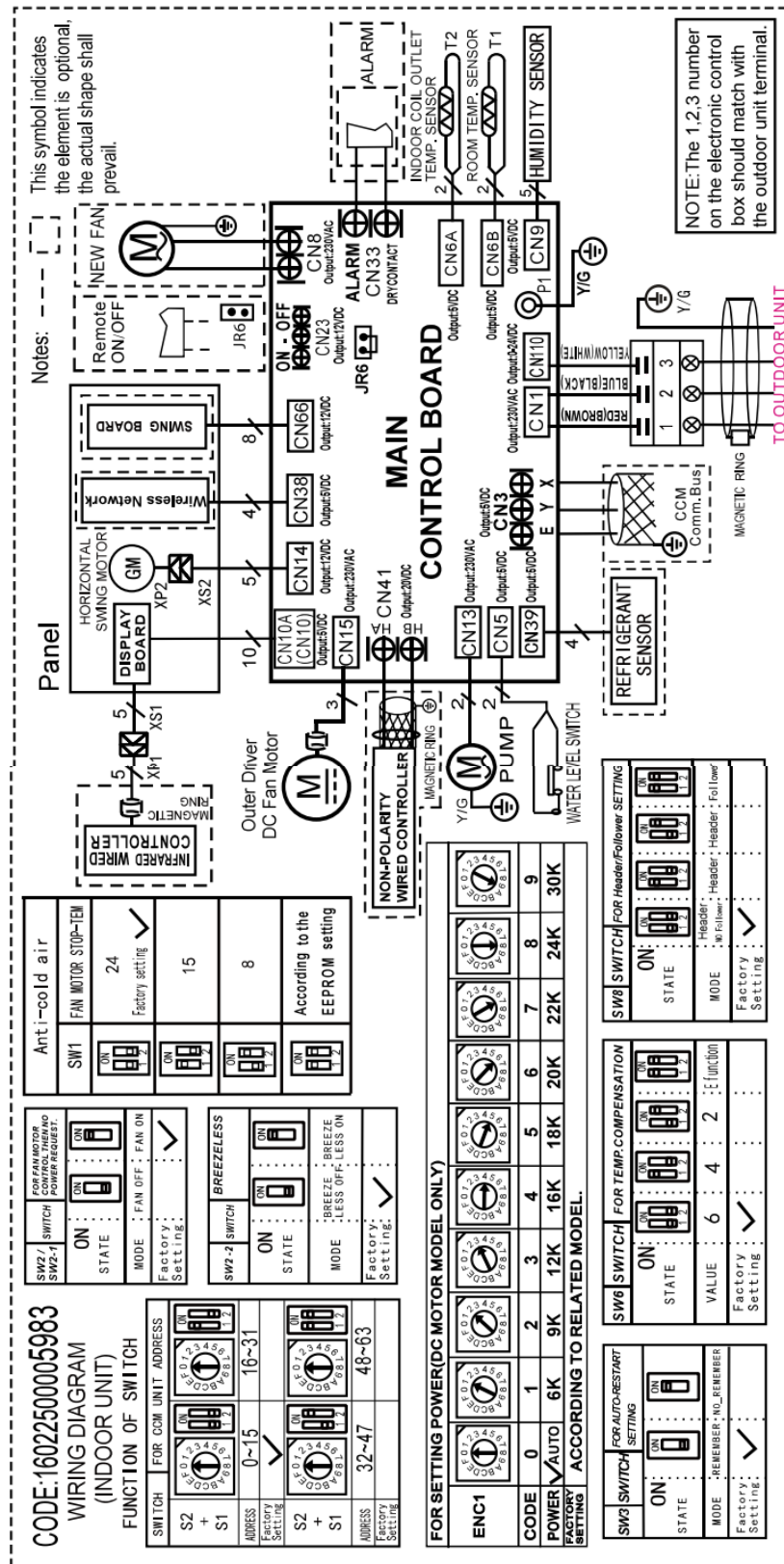
Indoor Model	9K~24K	
Power	Phase	1
	Frequency and Volt	208/230V,60Hz
Minimum Circuit Ampacity	A	3
Max Fuse	A	15

2 SYSTEM OVERVIEW

IDU Capacity (Btu/h)	IDU Wiring Diagram
9~18k	16022500005983
24K	16022500006023

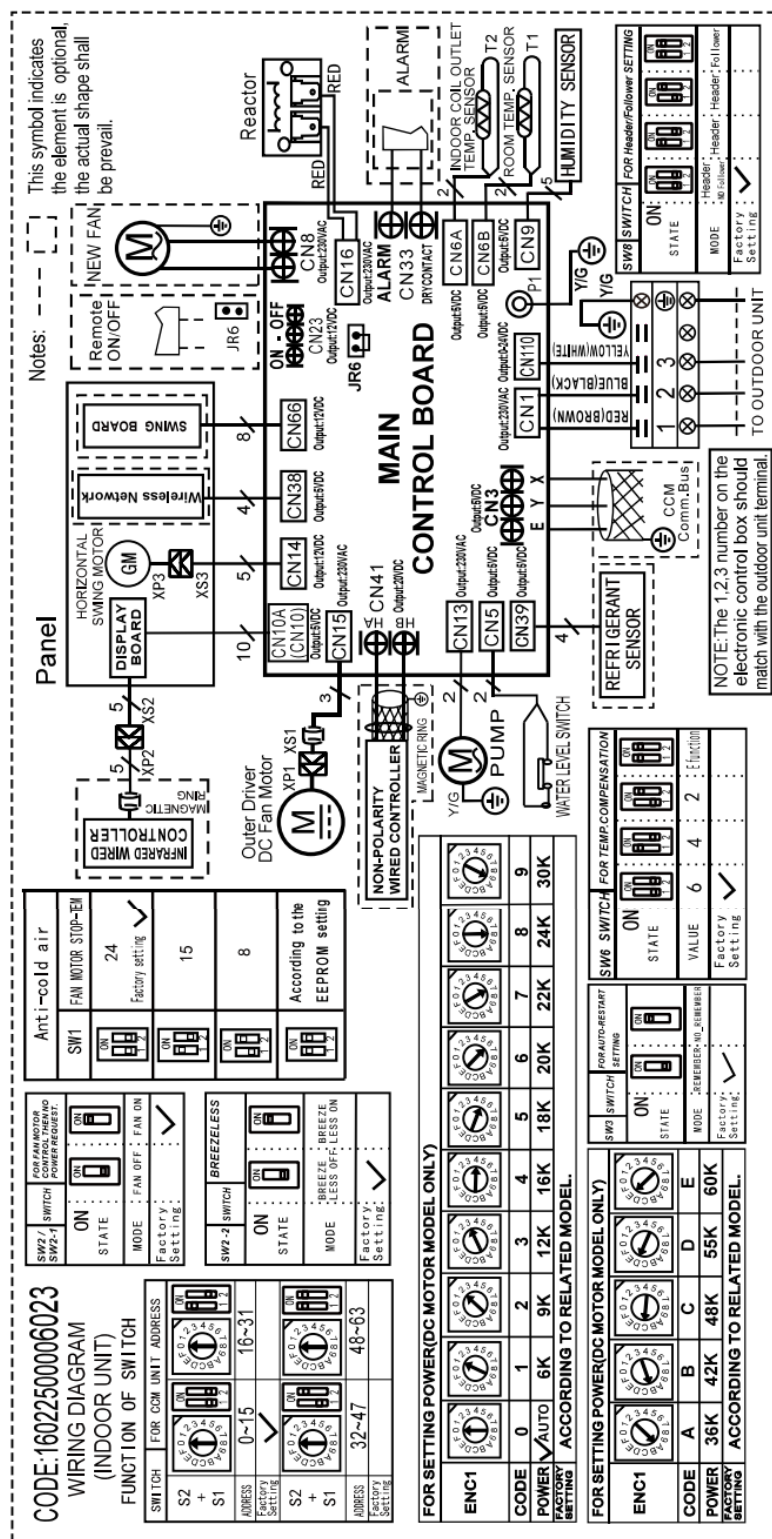
Abbreviation	Paraphrase
Y/G	Yellow-Green Conductor
PUMP	PUMP
TO CCM Comm.Bus	Central Controller
T1	Indoor Room Temperature
T2	Coil Temperature of Indoor Heat Exchanger

Indoor Unit Wiring Diagram: 1602250005983

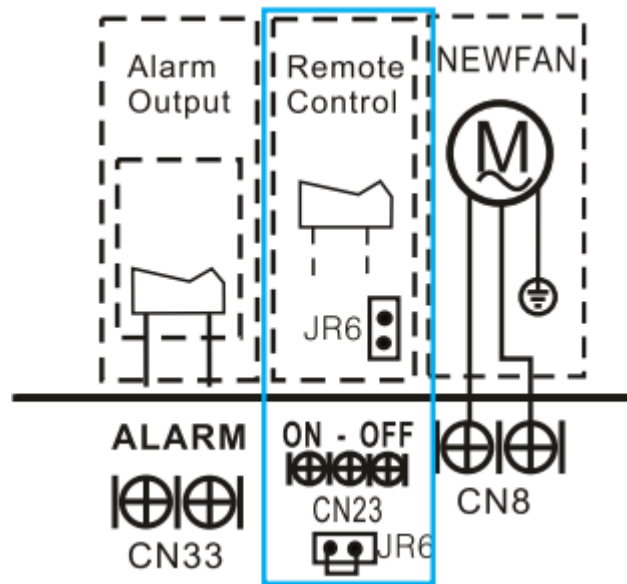


2 SYSTEM OVERVIEW

Indoor Unit Wiring Diagram: 16022500006023

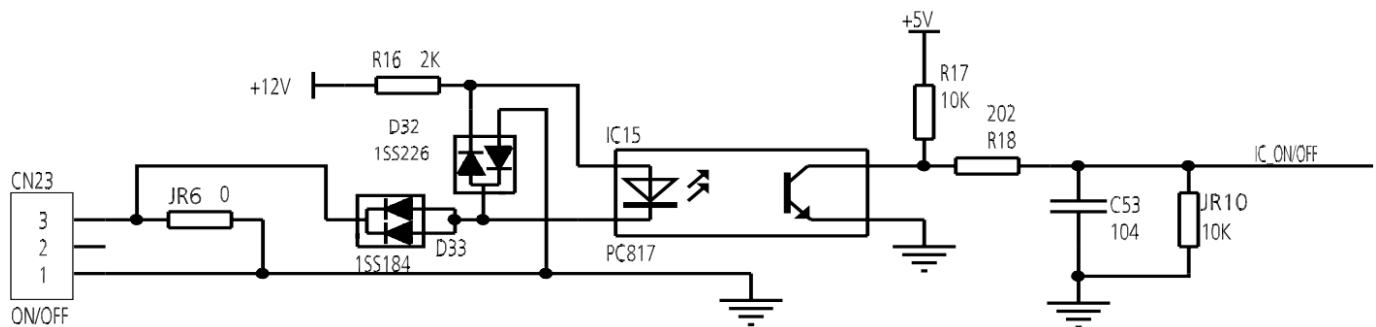


Connectors:

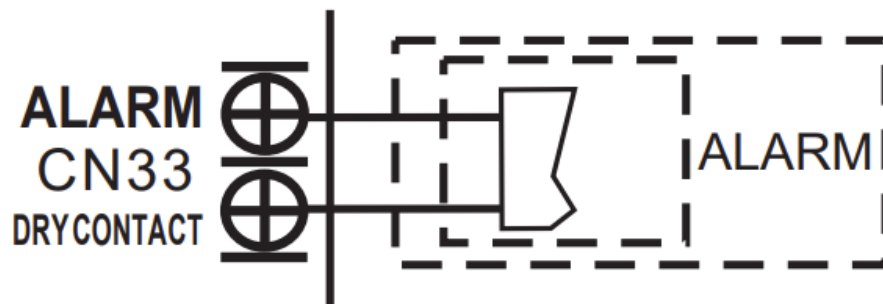


For Remote Control (ON-OFF) Terminal Port CN23 and Short Connector of JR6.

1. Remove the short connector of JR6 when you use ON-OFF function.
2. When the remote switch is off (OPEN); the unit will be off.
3. When the remote switch is on (CLOSED); the unit will be on.
4. When the switch is closed/open the unit will respond to the demand within 2 seconds.
5. When the remote switch is on you can use the remote controller to select the mode desired; when the remote switch is off the unit will not respond to any demand from the remote.
6. The voltage of the port is 12VDC with a design max current of 5mA.

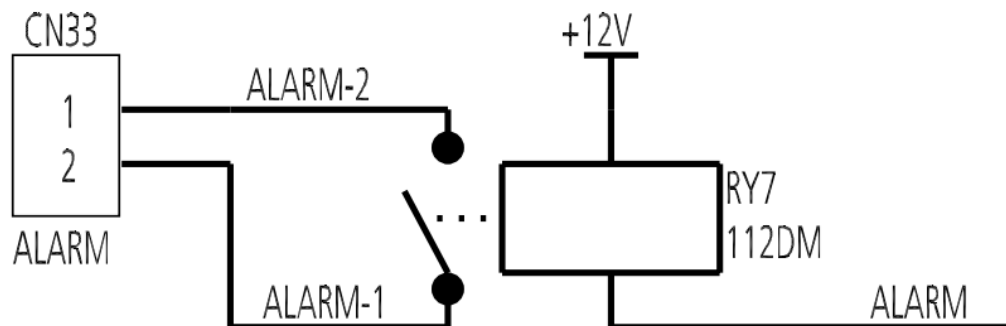


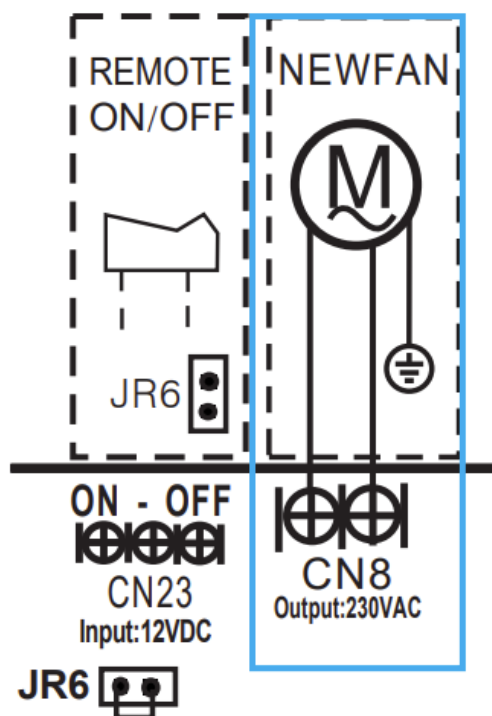
2 SYSTEM OVERVIEW



For ALARM Terminal Port CN33.

1. Provide the terminal port to connect ALARM as the port will not supply power from the unit.
2. Although the design voltage can support higher voltage it is highly advised to have the incoming power less than 24V with a current draw of less than 0.5A.
3. When the unit occurs a problem the relay will close then the ALARM will activate.





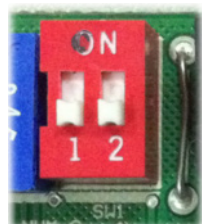
For New Motor Terminal Port CN8.

1. Connect the new fan motor to the port ignoring L/N of the fan motor.
2. The output voltage will be the power supply voltage.
3. The new motor cannot exceed 200W or 1A.
4. The new motor will work when a call is made for the indoor fan to operate.
5. When the unit goes into forced cooling mode or capacity testing mode the new motor will not work.

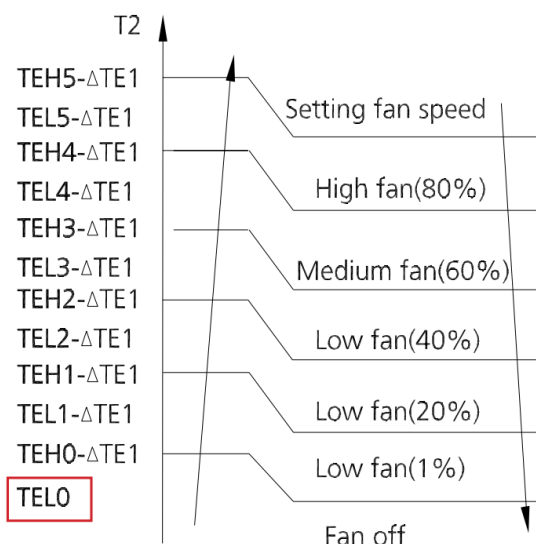


2 SYSTEM OVERVIEW

Micro-Switch:



Anti-Cold Air	
SW1	Fan Motor Stop
	24 (Factory Setting)
	15
	8
	According to the EEPROM Setting



Micro-switch SW1 is for selection of the indoor fan stop temperature (TEL0) when it is in anti-cold wind action in heating mode.

Range: 24°C, 15°C, 8°C, According to the EEPROM setting (reserved).



Fan Motor Control Then No Power Request	
SW2/ SW2-1	Mode
	Fan Off
	Fan On (Factory Setting)

Micro-switch SW2/SW2-1 is for selection of indoor FAN ACTION if room temperature reaches the set point and the compressor stops.

Range: OFF: Anti-cold wind is available in heating mode. ON: No anti-cold wind function.

Note: SW2 dip switch is only reserved as a physical part but without mode modification function, if changes are needed to the factory setting use the remote control.



Breezeless	
SW2-2	Mode
	Off (Factory Setting)
	On

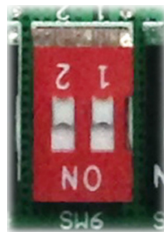
Micro-switch SW2-2 is for selection of breezeless function.

Range: OFF, ON.



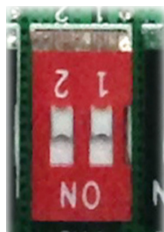
For Auto-Restart Setting	
SW3	Mode
	Remember (Factory Setting)
	No Remember

Micro-switch SW3 is for selection of the Auto-Restart Function.
Range: Active, Inactive.



For Temp. Compensation	
SW6	Mode
	6 (Factory Setting)
	4
	2
	E Function

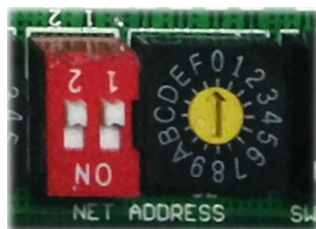
Micro-switch SW6 is for the selection of temperature compensation in heating mode. This helps to reduce the temperature difference between the ceiling and floor so that the unit can run properly. If the height of installation is lower, a smaller value can be chosen.
Range: 6°C, 4°C, 2°C, E Function (reserved for special customizing).



For Header/Follower Setting	
SW8	Mode
	Header No Follower (Factory Setting)
	Header
	Header
	Follower

Micro-switch SW8 is for setting Main or Slave (for some models).
Range: No Slave, Main & Slave.

2 SYSTEM OVERVIEW

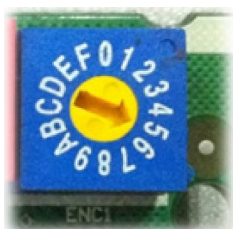


For CCM Unit Address		
S2 + S1	Address Dial	Address
		0~15 (Factory Setting)
		16~31
		32~47
		48~63

Micro-switch S1 and Dial switch S2 are for address settings when controlling the unit by a central controller.

Range: 00-63

For Setting Power (DC Motor Model Only)										
ENC1										
Code	0	1	2	3	4	5	6	7	8	9
Power	√ Auto	6K	9K	12K	16K	18K	20K	22K	24K	30K
Factory Setting	According To Related Model									



Dial switch ENC1: The indoor PCB is universally designed for whole series units from 6K to 30K. The ECN1 setting will tell the main program what size the unit is.

Range: AUTO, 6K, 9K, ..., 30K.

Note: AUTO means the indoor unit is equipped with different outdoor units which can automatically identify the capacity of the outdoor unit, model, single, or multi-zone match up and set the indoor units parameters.

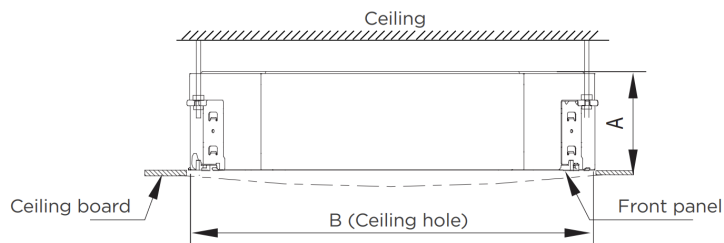
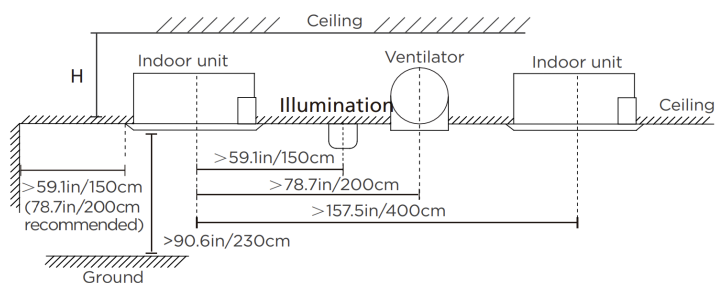
Usually there is glue on the switch as the switch position cannot be changed at random unless you use the PCB as a spare part on another unit. If using on a different unit you will have to select the proper position to match the size of the system.

3.1 Location

DO NOT install the unit in the following locations:

- Coastal areas with high salt content in the air.
- Areas with oil drilling or fracking.
- Areas with caustic gases in the air, such as hot springs.
- Areas that experience power fluctuations, such as factories.
- Enclosed spaces, such as cabinets.
- Kitchens that use natural gas.
- Areas with strong electromagnetic waves.
- Areas that store flammable materials or gas.
- Rooms with high humidity, such as bathrooms or laundry rooms.

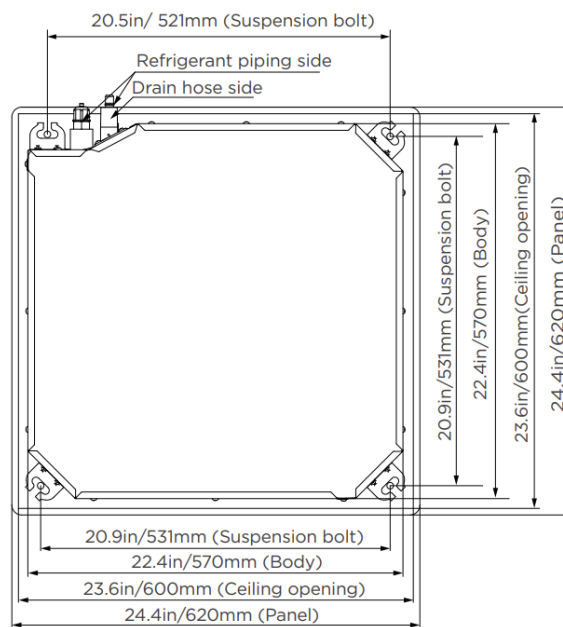
3.2 Indoor Unit Installation



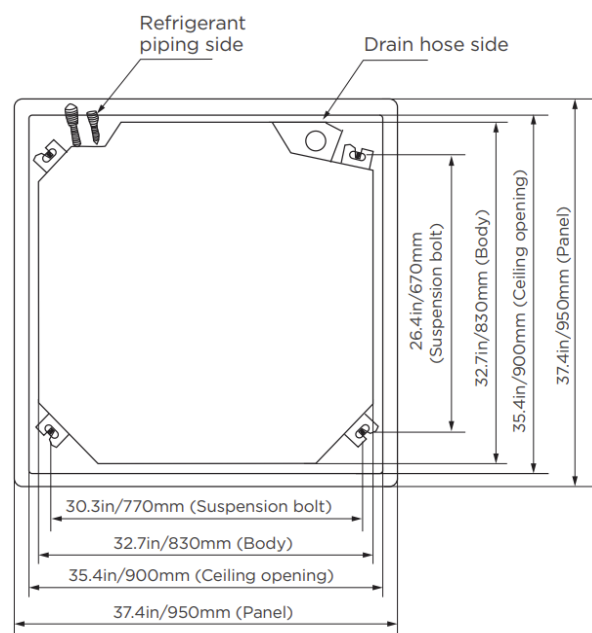
Capacity (Btu/h)	A (inch/mm)	H (inch/mm)	B (inch/mm)
9/12/18K	9.6/245	>11.4/290	23.6/600
24K	8.07/205	>9.06/230	35.4/900

Hand the Indoor Unit:

1. Use the included paper template to cut a rectangular hole in the ceiling, leaving at least 39in (1m) on all sides. The cut hole size should be 16in (4cm) larger than the body size. Be sure to mark the areas where ceiling hook holes will be drilled.



Model: 9K/12K/18K

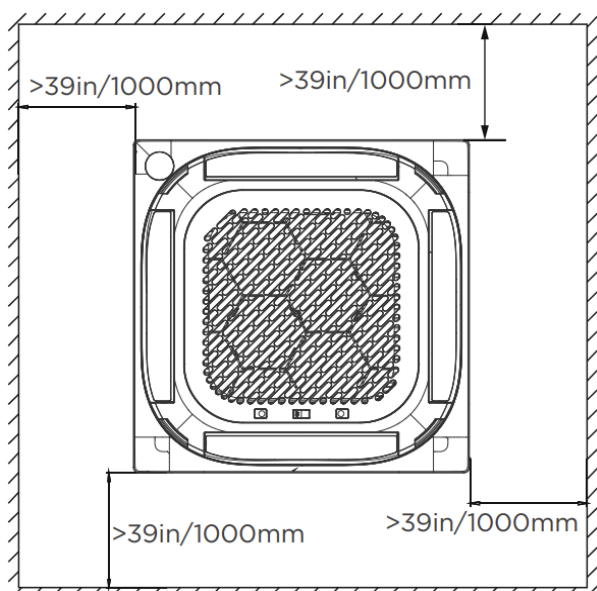


Model: 24K

! CAUTION

The unit body should align perfectly with the hole, Be sure that the unit and the hole are the same size before moving on.

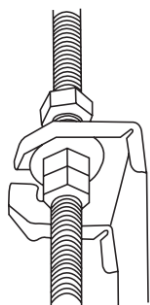
3 INSTALLATION



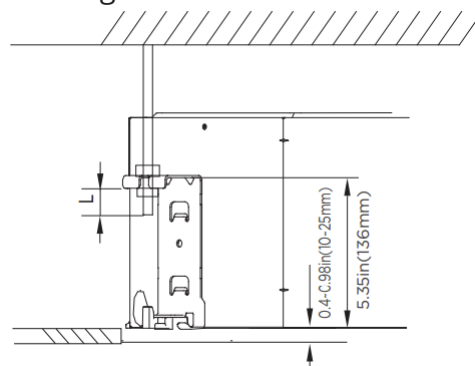
2. Drill 4 holes 4.7in~6.1in (12cm~15.5cm) deep at the ceiling hook positions in the internal ceiling. Be sure to hold the drill at a 90° angle to the ceiling.
3. Using a hammer, insert the ceiling hooks into the pre-drilled holes. Secure the bolt using the included washers and nuts.
4. Install the four suspension bolts.



5. Mount the indoor unit. You will need two people to lift and secure it. Insert suspension bolts into the unit's hanging holes. Fasten them using the included washers and nuts.

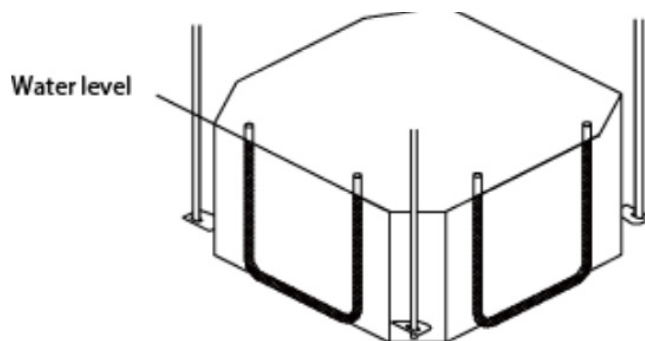


NOTE: The bottom of the unit should be 0.4~0.98in (10~25mm) higher than the ceiling board. Generally, L (indicated in the next figure) should be half the length of the suspension bolt or long enough to prevent the nuts from coming off.



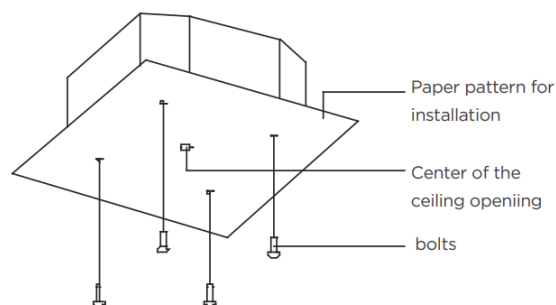
! CAUTION

Be sure that the unit is completely level. The unit is equipped with a built-in drain pump and float switch. If the unit is tilted against the direction of condensate flow (the drainpipe is raised), the float switch may malfunction and cause water to leak.



NOTE FOR NEW HOME INSTALL

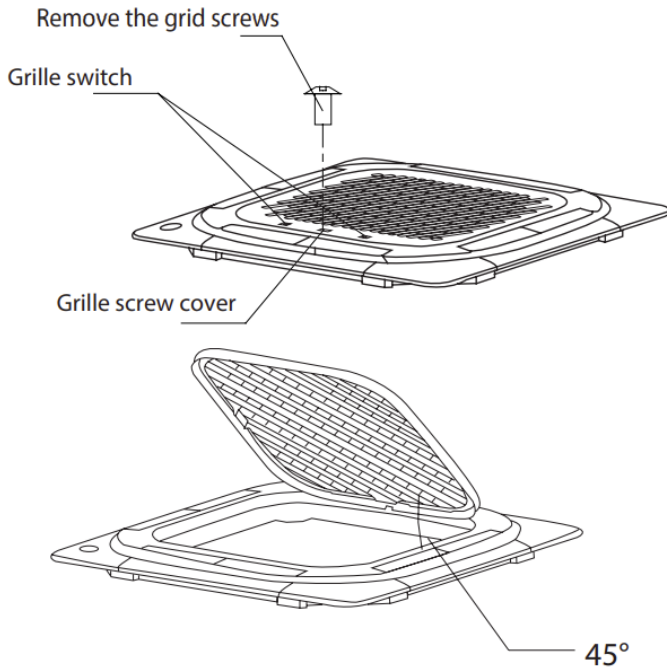
When installing the unit in a new home, the ceiling hooks can be embedded in advance. Make sure that the hooks do not come loose due to concrete shrinkage. After installing the indoor unit, fasten the installation paper template onto the unit with bolts to determine in advance the dimension and position of the opening on the ceiling. Follow the instructions above for the remainder of the installation.



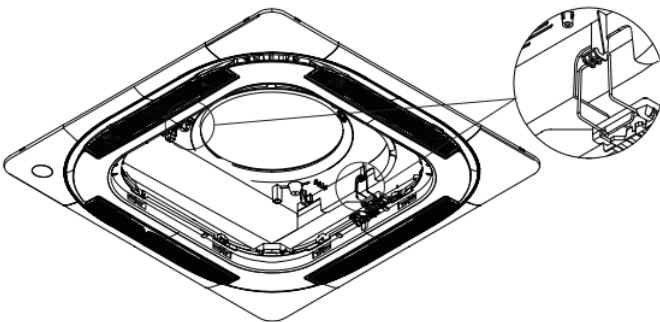
3.3 Panel Installation

Remove the Front Grille:

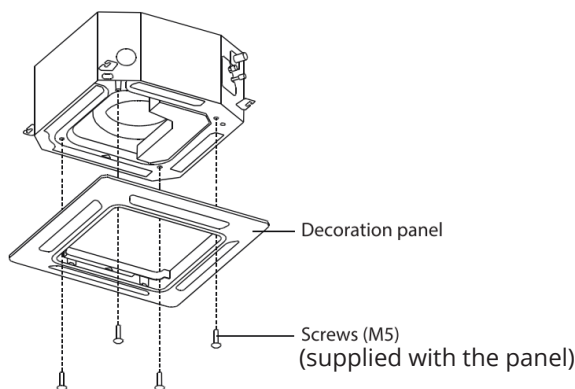
1. Push both of the tabs towards the middle simultaneously to unlock the hook on the grille.
2. Hold the grille at a 45° angle, lift it up slightly and detach it from the main body.



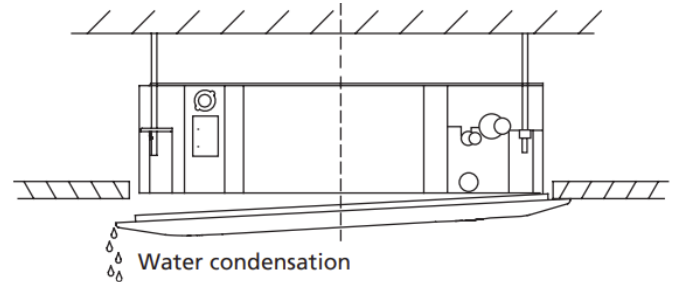
The panel hook is pre-hung to the indoor unit flow guide ring, as shown:



Install the panel with four screws (M5), as shown:

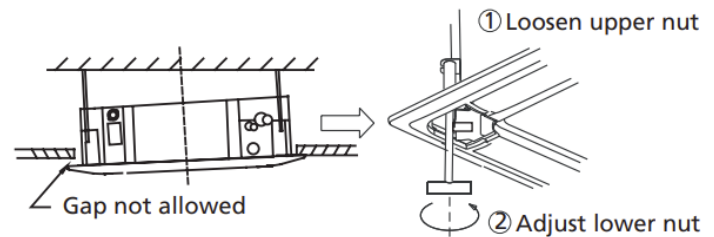


NOTE: If the height of the indoor unit needs to be adjusted, you can do so through the opening at the panel's four corners. Make sure that the internal wiring and drainpipe are not affected by this adjustment.



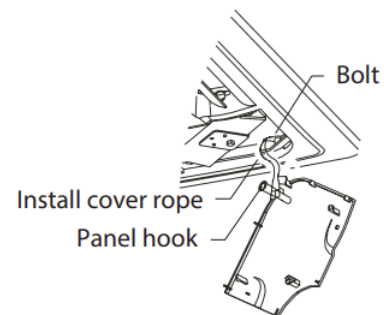
! CAUTION

Failure to tighten screws can cause water leakage.



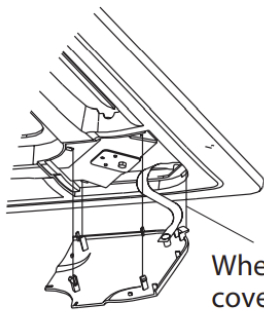
! CAUTION

If the unit is not hung correctly and a gap exists, the unit's height must be adjusted to ensure proper function. The unit's height can be adjusted by loosening the upper nut and adjusting the lower nut. Hang the intake grille on the panel, and then connect the lead connectors of the louver motor and the control box on the panel to the corresponding connectors of the main body.



Re-install into the style grid.
Re-install the installation cover.
Fix the installation cover plate rope to the pillar of the installation cover plate and gently press the installation cover plate into the panel.

3 INSTALLATION

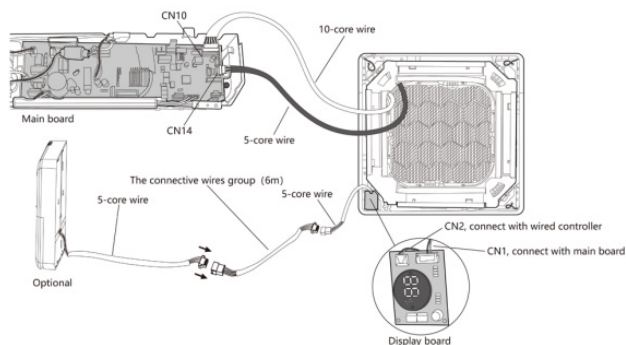


When installing the cover, slide the four slide fasteners into the corresponding slots on the panel.

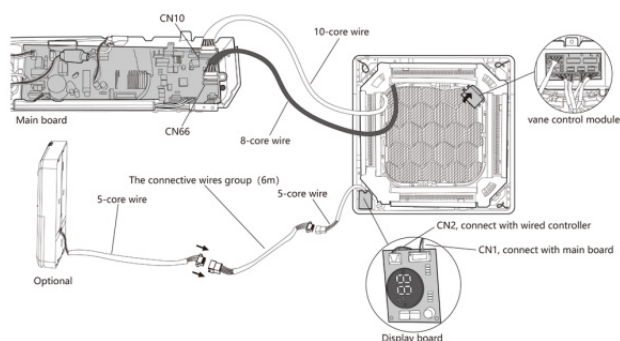
NOTE: After installation, the connector ends of the display, swing, water pump, and other wire bodies must be placed in the electric control box.

Connection Diagram:

For panels with out van control module, the display board CN1 is connected to the main control board CN10, the motor cable is connected to the main control board CN14.



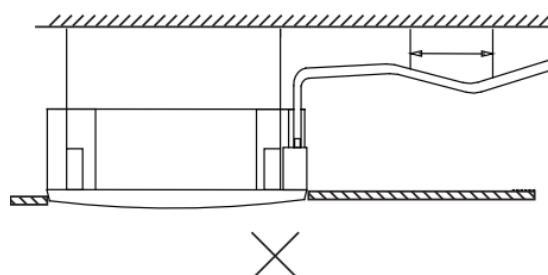
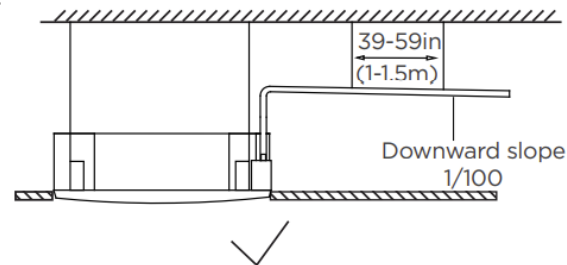
For panels with a vane control module, the display board CN1 is connected to the main control board CN10, the vane control motor cable is connected to the main control board CN66.



The display board CN2 is connected to a connecting cable then connects to the other side of the connecting cable to an optional wired controller.

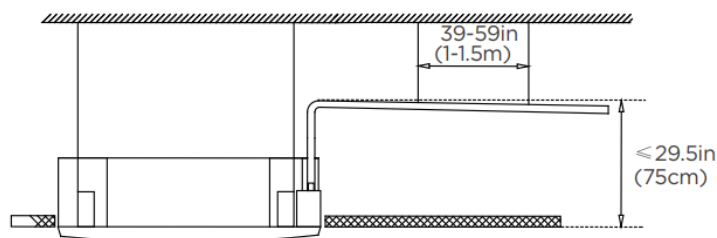
3.4 Drain Pipe Installation

Install the drainpipe as illustrated in the following figure.

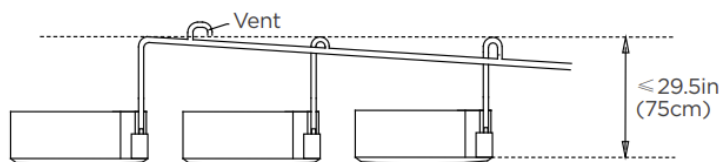


NOTE ON DRAINPIPE INSTALLATION:

- When using an extended drainpipe, tighten the indoor connection with an additional protection tube to prevent it from pulling loose.
- The drainpipe should slope downward at a gradient of at least 1/100 to prevent water from flowing back into the air conditioner.
- To prevent the pipe from sagging, space hanging wires every 39~59in (1~1.5m).
- If the outlet of the drainpipe is higher than the body's pump joint, provide a lift pipe for the exhaust outlet of the indoor unit. The lift pipe must be installed no higher than 29.5in (75cm) from the ceiling board and the distance between the unit and the lift pipe must be less than 11.8in (30cm),
- Incorrect installation could cause water to flow back into the unit and flood.
- To prevent air bubbles, keep the drain hose level or slightly tilted up (3in/<75mm).

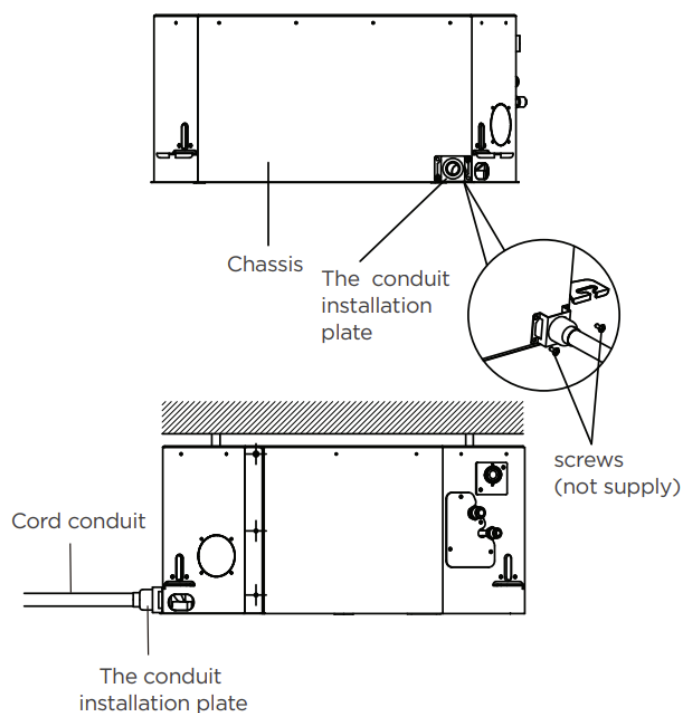


NOTE: When connecting multiple drainpipes, install the pipes as illustrated in the following figure.



Pass the drain hose through the wall hole. Make sure the water drains to a safe location where it will not cause water damage or a slipping hazard. NOTE: The drainpipe outlet should be at least 1.9in (5cm) above the ground. If it touches the ground, the unit may become blocked and malfunction. How to install the conduit installation plate (if supplied).

1. Fix the sheath connector (not supplied) on the wire hole of the conduit installation plate.
2. Fix the conduit installation plate on the chassis of the unit.



3.5 Refrigerant Pipe Installation

Recommended Copper Pipe Thickness

Pipe Diameter (inch(mm))	Thickness (inch/mm)
Ø1/4 (Ø6.35)	0.024/0.6
Ø3/8 (Ø9.52)	0.028/0.7
Ø1/2 (Ø12.7)	0.03/0.75
Ø5/8 (Ø15.9)	0.03/0.75
Ø3/4 (Ø19)	0.031/0.8
Ø7/8 (Ø22)	0.039/1

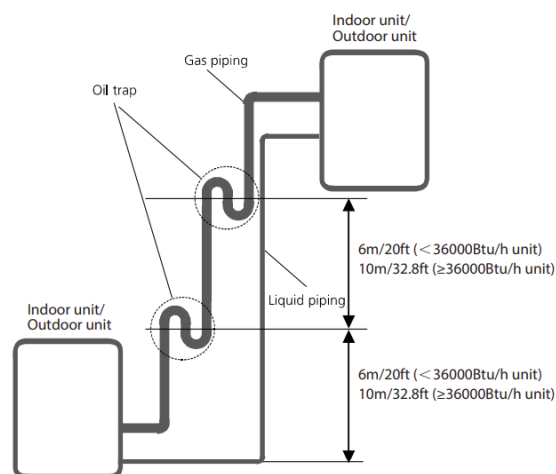
Maximum Length and Drop Height:

Be sure that the length of the refrigerant pipe, the number of bends, and the drop height between the indoor and outdoor units meet the requirements shown in the following table.

Capacity (Btu/h)	Max. Length (ft/m)	Max. Elevation (ft/m)
9/12K	82/25	49.2/15
18K	98.4/30	65.6/20
24K	164/50	82/25

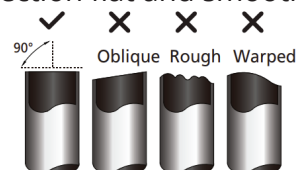
CAUTION:

1. The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.
2. Oil Traps
 - If oil flows back into the outdoor unit's compressor, this may cause liquid compression or deterioration of oil return. Oil traps in the rising gas piping can prevent this.
 - An oil trap should be installed every 20ft (6m) of vertical suction line riser (<36K Btu/h unit).
 - An oil trap should be installed every 32.8ft (10m) of vertical suction line riser (≥36K Btu/h unit).



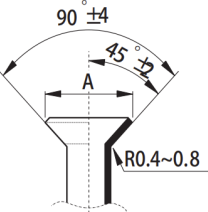
Procedure of Connecting Pipes:

1. Choose the pipe size according to the specification table.
2. Confirm the cross way of the pipes.
3. Measure the necessary pipe length.
4. Cut the selected pipe with a pipe cutter.
 - Make the section flat and smooth.

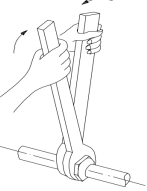


3 INSTALLATION

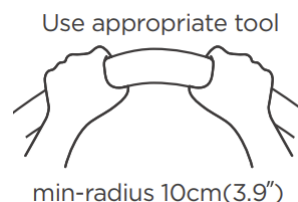
5. Insulate the copper pipe.
 - Before test operation, the joint parts should not be heat insulated.
6. Flare the pipe.
 - Insert a flare nut into the pipe before flaring the pipe.
 - According to the following table to flare the pipe.

Pipe Diameter (inch(mm))	Flare Dimension A		Flare Shape
	Min.	Max.	
Ø1/4 (Ø6.35)	0.33/8.4	0.34/8.7	
Ø3/8 (Ø9.52)	0.52/13.2	0.53/13.5	
Ø1/2 (Ø12.7)	0.64/16.2	0.65/16.5	
Ø5/8 (Ø15.9)	0.76/19.2	0.78/19.7	
Ø3/4 (Ø19)	0.91/23.2	0.93/23.7	
Ø7/8 (Ø22)	1.04/26.4	1.06/26.9	

- After flaring the pipe, the opening end must be sealed to avoid dust or impurities from coming into the piping.
7. Drill holes if the pipes need to pass through the wall.
 8. If needed bend the pipes slowly to pass through the wall.
 9. Bind and wrap the wire together with the insulated pipes if necessary.
 10. Set the wall conduit.
 11. Set the supporter for the pipe.
 12. Locate the pipe and fix it by the supporter.
 - For horizontal refrigerant pipe, the distance between supporters should not exceed 3.2ft (1m).
 - For vertical refrigerant pipe, the distance between supports should not exceed 4.9ft (1.5m).
 13. Connect the pipe to the indoor and outdoor unit by using two crescent wrenches.
 - Be sure to use two crescent wrenches and proper torque to fasten the nut, too much torque will damage the bell housing, and too little of torque can cause leakage. **Refer to the following table for different pipe connections.**

Pipe Diameter (inch(mm))	Torque	Flare Shape
	N.m (lb.ft)	
Ø1/4 (Ø6.35)	18~20 (13.3~14.8)	
Ø3/8 (Ø9.52)	32~39 (23.6~28.8)	
Ø1/2 (Ø12.7)	49~59 (36.1~43.5)	
Ø5/8 (Ø15.9)	57~71 (42~52.4)	
Ø3/4 (Ø19)	67~101 (49.4~74.5)	
Ø7/8 (Ø22)	85~110 (62.7~81.1)	

NOTE: MINIMUM BEND RADIUS
 Carefully bend the tubing in the middle according to the diagram below.
 DO NOT bend the tubing more than 90° or more than 3 times.



3.6 Insulation

Insulation of Refrigerant Pipe:

Cut the pipe—insulation (except joint section)—flare the pipe—piping layout and connection—vacuum—insulate the joining parts

Purpose of Refrigerant Pipe Insulation:

- During operation the temperature of the gas pipe and liquid pipe will be hot/cold. Therefore, it is necessary to install insulation; otherwise it will lower performance or burn up the compressor.
- The gas pipe temperature is low during cooling. If there is insufficient insulation it will condensate and drip.
- The temperature of the gas pipe is high (122°F~212°F (50°C~100°C) during heating. Insulation must be installed to prevent burns.

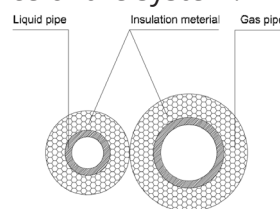
Insulation Material Selection for Refrigerant Pipe:

- The insulation rating should be over 248°F (120°C).
- Choose insulation according to local codes and ordinances.
- The thickness of the insulation should be above 0.39in (10mm). If in a hot or wet environment use thicker insulation.

Humidity<80%RH	Humidity≥80%RH
10mm/0.39in	15mm/0.59in

Installation Highlights:

- The gas and liquid pipe should be insulated separately, if the gas pipe and liquid pipe were insulated together it will decrease the performance of the system.



- The insulation material at the joint pipe should be 1.96in~3.93in (5cm~10cm) longer than the gap of insulation material.

- The insulation material at the joint pipe should be inserted into the gap of the insulation material.
- The insulation material at the joint pipe should be banded to the gap pipe and liquid pipe tightly.
- The a joining part should be glued together.
- Be sure not to bind the insulating material over-tight, it may extrude out the air in the material and cause it to rot.

Insulation of Drainage Pipe:

Operational procedure of refrigerant pipe insulation.

Select the suitable pipe—insulation (except joint section)—Piping layout and connection—drainage test—insulate the joint parts.

Purpose of drainage pipe insulation.

The temperature of the condensate drainage water is very low. If the insulation is not enough, it shall for dew and may leak which will cause damage to the house.

Insulation material selection for drainage pipe.

- The insulation material should be flame retardant material, the flame retardancy of the material should be selected according to the local law.
- Thickness of the insulation layer is usually above 10mm/0.39in.
- Use specific glue to past the seam of insulation material, and then bind with adhesive tape. The width of tape shall not be less than 5cm/1.97in. Make sure it is firm and avoid dew.

Installation and highlights of insulation construction.

- The single pipe should be insulated before connecting to another pipe, the joint part should be insulated after the drainage test.
- There should be no insulation gap between the insulation material.

3.7 Electrical Wiring

Highlights of Electrical Wiring Installation:

- All wiring must comply with local and national electrical codes, regulations, and must be installed by a licensed electrician.
- All electrical connections must be made according to the Electrical Connection Diagram located on the panels of the indoor and outdoor unit.
- If there is a serious safety issue with the power supply, stop work immediately. Explain your reasoning to the client, and refuse to install the unit until the safety issue is properly resolved.
- Power voltage should be within 90~110% of the rated voltage. Insufficient power supply can cause malfunction, electrical shock, or fire.
- Installation of an external surge suppressor at the outdoor disconnect is recommended.

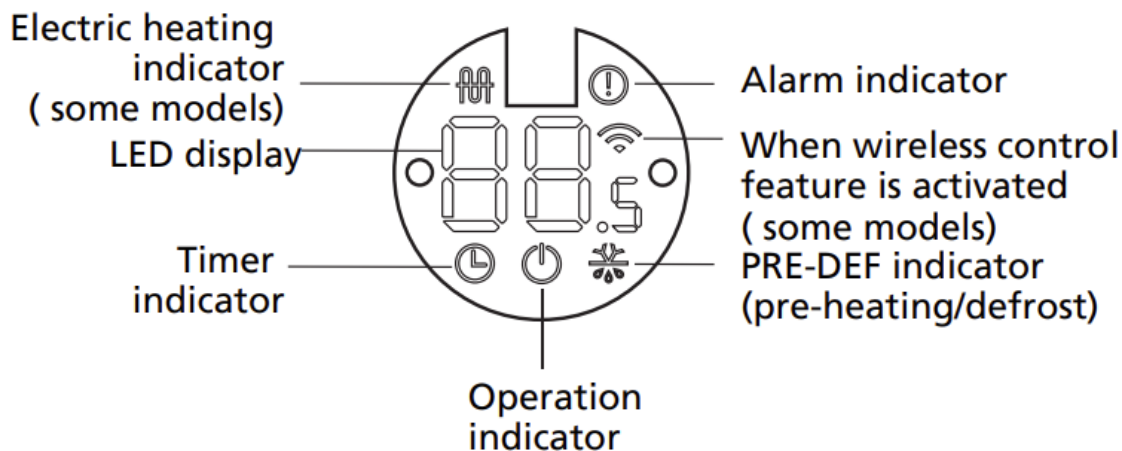
- If connecting power to fixed wiring, a switch or circuit breaker that disconnects all poles and has a contact separation of at least 1/8in(3mm) must be incorporated in the fixed wiring. The qualified technician must use an approved circuit breaker or switch.
- Only connect the unit to an individual branch circuit. Do not connect another appliance to that outlet.
- Make sure to properly ground the air conditioner.
- Every wire must be firmly connected. Loose wiring can cause the terminal to overheat, resulting in product malfunction and possible fire.
- Do not let wires touch or rest against refrigerant tubing, the compressor, or any moving parts within the unit.
- If the unit has an auxiliary electric heater, it must be installed at least 40in(1m) away from any combustible material.
- To avoid electrical shock, never touch the electrical components after the power supply has been turned off. After turning off the power, always wait 10 minutes or more before you touch the electrical components.
- Make sure that you do not cross your electrical wiring with your signal wiring as this may cause distortion, interference, or possibly damage to the circuit boards.
- No other equipment should be connected to the same power circuit.
- Connect the outdoor wires before connecting the indoor wires.

Table: Minimum Cross-Sectional Area of Power and Signal Cables:

Rated Current of Appliance (A)	AWG
≤6	18
6~10	16
10~16	14
16~25	12
25~32	10

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4.1 Display Functions



4.2 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.

4.3 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
TP	Compressor discharge temperature sensor
Tsc	Adjusted setting temperature
CDIFTEMP	Cooling shutdown temperature
HDIFTEMP2	Heating shutdown temperature

In this manual, such as CDIFTEMP, HDIFTEMP2,...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).

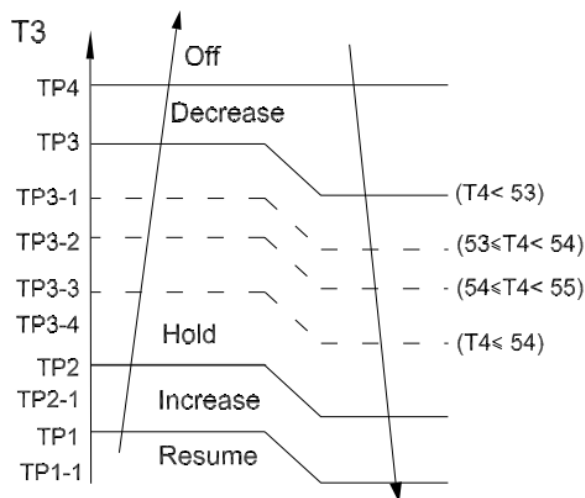
Cooling Mode:

Compressor Control

1. In cooling mode, the indoor fan operates continuously. The fan speed can be set to 1%~100%, or low, medium, high, and auto.
2. Auto fan action in cooling mode:
 - **Descent Curve**
 - When T1-Tsc is lower than 6.3°F/3.5°C, the fan speed reduces to 80%.
 - When T1-Tsc is lower than 1.8°F/1°C, the fan speed reduces to 60%.
 - When T1-Tsc is lower than 0.9°F/0.5°C, the fan speed reduces to 40%.
 - When T1-Tsc is lower than 0°F/0°C, the fan speed reduces to 20%.
 - When T1-Tsc is lower than -0.9°F/-0.5°C, the fan speed reduces to 1%.
 - **Rise Curve**
 - When T1-Tsc is higher than or equal to 0°F/0°C, the fan speed increases to 20%.

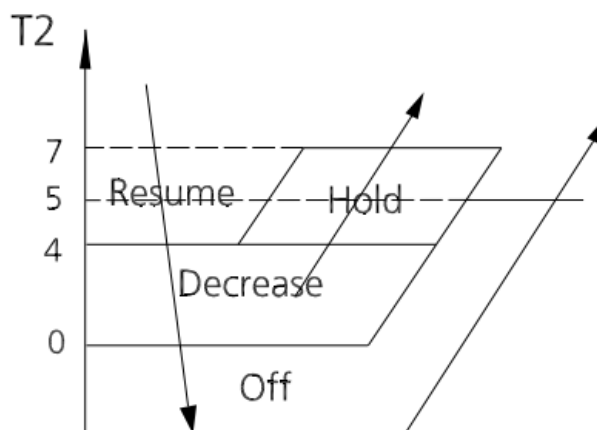
- When T1-Tsc is higher than or equal to 0.9°F/0.5°C, the fan speed increases to 40%.
- When T1-Tsc is higher than or equal to 1.8°F/1°C, the fan speed increases to 60%.
- When T1-Tsc is higher than or equal to 2.7°F/1.5°C, the fan speed increases to 80%.
- When T1-Tsc is higher than or equal to 7.2°F/4°C, the fan speed increases to 100%.

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 the lower level per 1 minute.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

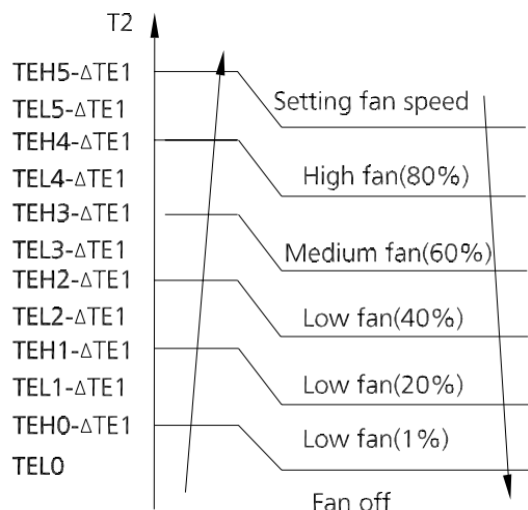
HEATING MODE:

Indoor Fan Control

1. In heating mode, the indoor fan operates continuously. The fan speed can be set to 1%~100% and auto.
- Anti-cold air function.
- If the temperature difference of T2 changes during auto fan and causes the fan speed to change, run

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the current fan speed for 30 seconds first, the default interval is the interval before the fan speed changes, and then judge T2 according to the current interval after 30 seconds to get the final anti-cold air interval.

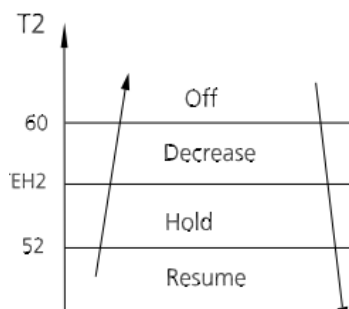


$\Delta TE1=0$

2. Auto fan action in heating mode:

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

Evaporator Coil Temperature Protection



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

Auto-Mode:

- This mode can be selected with the remote controller and the temperature setting can be adjusted between $60.8^{\circ}\text{F}\sim 80^{\circ}\text{F}$ ($16^{\circ}\text{C}\sim 30^{\circ}\text{C}$).

Case 1:

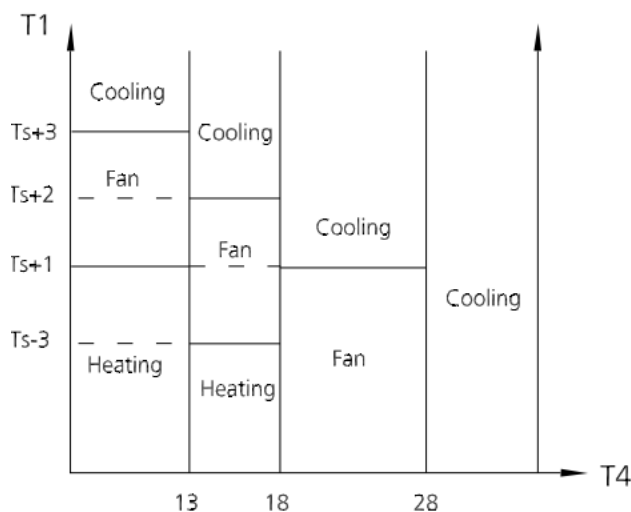
- In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of ΔT ($\Delta T=T1-T_s$).

ΔT	Running Mode
$\Delta T > 3.6^{\circ}\text{F}$ (2°C)	Cooling
-5.4°F (-3°C) $\leq \Delta T \leq 3.6^{\circ}\text{F}$ (2°C)	Fan-Only
$\Delta T < -5.4^{\circ}\text{F}$ (-3°C)	Heating

- Indoor fan will run at auto fan speed.
- The louver operates the same as in relevant mode.
- If the machine switches mode between heating and cooling, the compressor will keep stopping for a certain time and then choose the mode according to the ΔT .

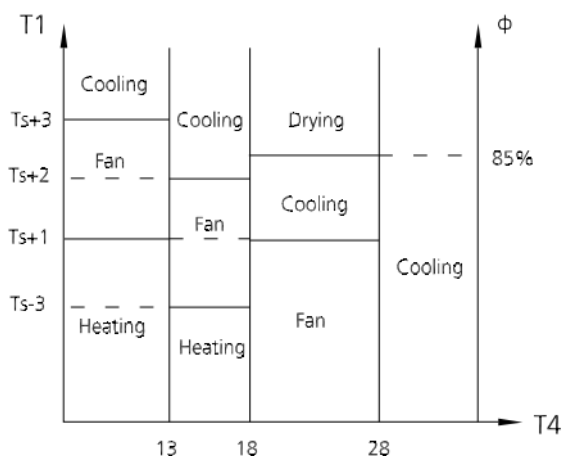
Case 2:

In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of $T1$, T_s and the outdoor ambient temperature ($T4$).



Case 3:

In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of $T1$, T_s , outdoor ambient temperature ($T4$) and relative humidity (Φ).



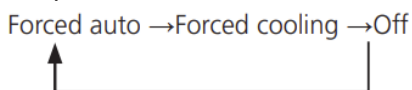
Drying Mode:

- In drying mode, the system 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 operations and does not resume until the room temperature exceeds 53.6°F/12°C.

Forced Operation Function:

Press the AUTO/COOL button, the system will run as shown in the sequence below:



- Forced cooling mode:

The compressor and outdoor fan continue to run and the indoor fan runs at breeze speed. After running for 30 minutes, the system 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 off
 - Changes in:
 - mode
 - fan speed
 - sleep mode
 - follow me

Timer Function:

- The timing range is 24 hours.
- Timer On. The machine turns on automatically at the preset time.
- Timer Off. The machine turns off automatically at the preset time.
- Timer On/Off. The machine turns on automatically at the preset On Time, and then turns off automatically at the preset Off Time.

- Timer Off/On. The machine turns off automatically at the preset Off Time and then turns on automatically at the preset On Time.
- The timer does not change the units operation mode. If the unit is off now, it does not start up immediately after the "timer off" function is set. When the setting time is reached, the timer LED switches off and the unit running mode remains unchanged.
- The timer uses relative time, not clock time.

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 (to 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 (to 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. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits 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 the case of a sudden power failure, will restore those settings automatically within 3 minutes after power returns.

FP Mode (46°F(8°C) Heating)

In heating mode, the temperature can be set to as low as 46°F/8°C, preventing the indoor area from freezing if unoccupied during severe cold weather.

Follow Me:

- Once the follow me function is active, the remote control will send a signal every 3 minutes, with no beeps. The unit automatically sets the temperature according to the measurements from the remote control.
- The unit will only change modes if the information from the remote control makes it necessary, not from the unit's temperature settings.
- 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.

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Optional Functions:

Silence (Multi-zone systems do not have this function)

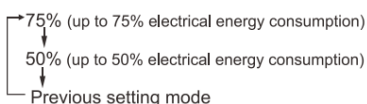
- Press "Silence" or keep pressing the Fan button for more than 2 seconds on the remote control to enable the SILENCE function. While this function is active, the compressor frequency is maintained at a lower level than F3. The indoor unit will run at a faint breeze (1%), which reduces noise to the lowest possible level.
- When matched with a multi-zone, this function is disabled.

ECO Function (Multi-zone systems do not have this function)

- Used to enter the energy efficient mode.
 - Under cooling mode, press the ECO button, the remote controller will adjust the temperature automatically to 75°F/24°C, the fan speed to AUTO to save energy (but only if the set temperature is less than 75°F/24°C). If the set temperature is more than 75°F/24°C and 86°F/30°C, press the ECO button, the fan speed will change to AUTO, the set temperature will remain unchanged.
- When pressing the ECO button, modifying the mode, or adjusting the set temperature to less than 75°F/24°C, the system will cease the ECO operation.
- Operation time in ECO mode is 8 hours. After 8 hours the system ceases this mode.

Electrical Energy Consumption Control Function (Multi-zone systems do not have this function)

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



Turn off the unit or activate ECO, sleep, Super Cool, 46°F/8°C Heating, Silence, or Self Clean Functions to cease this mode.

Breeze Away (for some models) (Multi-zone systems do not have this function)

- This feature avoids direct airflow blowing on the body and makes you feel in the cool air.
- NOTE: This feature is available under cooling mode, fan-only mode, and drying mode.

Active Clean Function (for some models) (Multi-zone systems do not have this 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 keeps the inside clean.

- When this function is turned on, the indoor unit display window appears "CL", after 20 to 45 minutes, the unit will turn off automatically and cancel Active Clean Function.

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.

5.2 Error Display (Indoor Unit)

Display	Error Information	Solution
FC	Forced cooling (not an error code)	--
EC 07	ODU fan speed out of control	TS23
EC 51	ODU EEPROM parameter error	TS19
EC 52	ODU coil temp. sensor (T3) error	TS25
EC 53	ODU ambient temp. sensor (T4) error	TS25
EC 54	COMP. discharge temp. sensor (TP) error	TS25
EC 56	IDU coil outlet temp. sensor (T2B) error (multi-zone)	TS25
EC C1	Other IDU refrigerant sensor detects leakage (multi-zone)	TS39
EH 00	IDU EEPROM Malfunction	TS19
EH 03	IDU fan speed out of control	TS23
EH 0A	IDU EEPROM parameter error	TS19
EH 0E	Water-level alarm malfunction	TS27
EH 12	Main unit or secondary units malfunction	TS40
EH 3A	External fan DC bus voltage is too low protection	TS37
EH 3B	External fan DC bus voltage is too high fault	TS37
EH 60	IDU room temp. sensor (T1) error	TS25
EH 61	IDU evaporator coil temp. sensor (T2) error	TS25
EH BA	Communication error between the indoor unit and external fan module	TS37
EH C1	Refrigerant sensor detects leakage	TS39
EH C2	Refrigerant sensor is out of range and leakage is detected	TS39
EH C3	Refrigerant sensor is out of range	TS38
EL 01	IDU & ODU communication error	TS20
EL 0C	System lacks refrigerant	TS26
EL 11	Communication malfunction between main unit and secondary units	TS40
FH 07	Communication malfunction between indoor unit and auto-lifting panel	TS38
FH CC	Refrigerant sensor error	TS28
PC 00	ODU IPM module protection	TS29
PC 01	ODU voltage protection	TS34
PC 02	Compressor top (or IPM) temp. protection	TS31
PC 03	Pressure protection (low or high pressure) (for some models)	TS30
PC 04	Inverter compressor drive error	TS35
PC 0L	Low ambient temperature protection (for some models)	--

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.

5.3 Information Inquiry & Setting

In order to enter to engineering mode and check the data of the system (data checking mode), please follow these steps:

- Make sure that the system is in standby status or working in non-locked conditions.
- Press the "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0", and also "Auto, Cool, Dry, Heat, Battery" icons will be displayed at the same time.
- Press the "UP" or "Down" buttons to choose different channel numbers that want to check (from 0-30) on the remote controller, and then the display will show the parameter value.

Channel	Code	Meaning	Remark
0		Error Code	Refer to the next list of error codes Empty means no error code
1	T1	Room temperature	Actual data, °C
2	T2	Indoor coil temperature	Actual data, °C
3	T3	Outdoor coil temperature	Actual data, °C
4	T4	Ambient temperature	Actual data, °C
5	TP	Discharge temperature	Actual data, °C
6	FT	Targeted frequency	Actual data
7	Fr	Actual frequency	Actual data
8	dl	Running current	3.2A-3
9	Ac	AC voltage	
10	Sn	Reserved	
11	--	Indoor operating mode	0-Off; 1-Cooling; 2-Heating; 3-Fan Only; 4-Drying; 5-Auto; 7-Defrosting; 12-Active Clean
12	Pr	Outdoor fan speed	Actual data/8
13	Lr	EXV opening steps	Actual data/8
14	lr	Indoor fan speed	Actual data/8
15	Hu	Humidity (if a sensor is there)	Actual data, %
16	TT	Set temperature including compensation	Actual data, °C
17	nA	Reserved	
18	nA	Reserved	
19	Uo	Outdoor DC bus voltage	
20	oT	Target Frequency calculated by indoor	Without limitation
21	nA	Reserve	
22~30	nA		

Note:

1. The channel number indicates a certain parameter value (Check next table).
2. The indoor unit display will show the code for 2s and then the parameter value.
3. In the engineering mode, the other keys or operations are invalid except for the following buttons "Power", "Up", "Down", and "Ok".
4. In order to exit from the engineering mode, press the "Power" + "Fan" buttons together for 2s to quit checking and return back to the home screen
5. The engineering mode will be exited if there is no valid input data for 60s.

Error Code of Engineer Mode:

Display	Error Information
EH 00	IDU EEPROM malfunction
EH 0A	Indoor EEPROM parameter error
EL 01	IDU & ODU communication error
EH 8A	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
EH 85	Intelligent eye communication failure
EL 0E	System lacks refrigerant
EH 0E	Water-level alarm malfunction
EH 0F	Intelligent eye malfunction
FH 07	Communication malfunction between indoor unit and auto-lifting panel
PC 00	ODU IPM module protection
PC 10	Over low voltage protection
PC 11	Over voltage protection
PC 12	DC voltage protection

Display	Error Information
PC 02	Top temperature protection of compressor High temperature protection of IPM module
PC 40	Communication error between outdoor main chip and compressor driven chip
PC 41	Current Input detection protection
PC 42	Compressor start error
PC 43	Lack of phase (3 phase) protection
PC 44	Outdoor unit zero speed protection
PC 45	341PWM error
PC 46	Compressor speed malfunction
PC 49	Compressor over current protection
PC 06	Compressor discharge temperature protection
PC 08	Outdoor current protection
PH 09	Anti-cold air in heating mode
PC 0F	PFC module malfunction
PC 30	System overpressure protection
PC 31	System pressure is too low protection
PC 03	Pressure protection
PC 0L	Outdoor low ambient temperature protection
PH 90	Evaporator coil temperature over high protection
PH 91	Evaporator coil temperature over low protection
PC 0A	Condenser high temperature protection
PH 0C	Indoor unit humidity sensor failure
LH 00	Frequency limit caused by T2
LH 30	Indoor external fan current limit
LH 31	Indoor external fan voltage limit
LC 01	Frequency limit caused by T3
LC 02	Frequency limit caused by TP
LC 05	Frequency limit caused by voltage
LC 03	Frequency limit caused by current
LC 06	Frequency limit caused by PFC
LC 30	Frequency limit caused by high pressure
LC 31	Frequency limit caused by low pressure
LH 07	Frequency limit caused by remote controller
----	IDUs comm. conflict (match with multi outdoor unit)
NR	No malfunction and protection

Advanced Function Setting:

In order to enter to the engineering mode and check the advanced function settings please follow these steps.

If you want to check the current functions set value (Presetting Page):

1. First, you will need to disconnect the power supply from the unit and wait 1 minute.
2. Then re-connect the power supply to the unit and it should enter standby mode.
3. Press the "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0", then the "Auto, Cool, Dry, Heat, Battery" icons will be displayed at the same time.
4. Press "UP" or "Down" buttons to choose different channel numbers that you want to check (from 0-30) on the remote controller.
5. The press the "Power" button for 2s until the remote controller screen shows "Ch".
6. Press the "OK" button to query the current function set value while the remote controller shows "Ch" and the function set vale will be shows on the indoor units display.

If you want to change the current functions set value:

1. First, you will need to disconnect the power supply form the unit and wait 1 minute.
2. Then connect the power supply again to the unit and it should enter standby mode.
3. Press the "Power" + "Fan" buttons together for 7s until the remote controller screen shows "0" then the "Auto, Cool, Dry, Heat, Battery" icons will be displayed at the same time.
4. Press the "UP" or "Down" buttons to choose different channel numbers that you want to change (from 0~30) on the remote controller.
5. The press the "Power" button for 2s until the remote controller screen shows "Ch".
6. Press the "Up" or "Down" button to choose the desired set value from the screen of the remote control.
7. The press "OK" to send the new set value to the indoor unit, the indoor will display "CS" which means that the new set value is uploaded successfully.
8. Finally, disconnect the power supply again from the unit and wait for 10 minutes then re-connect.

Note:

1. The channel number indicates a certain function and each number will be showed on the indoor units screen indicates the current function set value (Check the table following table).
2. In the engineering mode the other keys or operations are invalid except for the following buttons "Power", "Up", "Down", and "OK".
3. I order to set a new set value successfully you need to finish the steps (from 2 to 7) within 1 minute only.
4. The engineering mode will be exited if there is no valid input data for 60s.
5. In order to exit from the engineering mode please follow these steps.
 - Press the "Power" button for 2s until the remote controller screen shows "0".
 - The press the "Power" + "Fan" buttons together for 2s to quit the engineering mode and back to the home screen.

Channel	Function	Parameter Value Meaning	Remark
0	Capacity setting (Btu/h)	1-100K	
1	Auto-restart function	0- Inactive 1- Active	
2	Fan control when Ts reached	1- Fan stop 2- Fan runs at lowest RPM 3- Fan runs at setting RPM 4~11- Fan stops for 4 mins and runs for 1 min	
3	Mode lock	CH- Cooling and heating (all modes) HH- Heating only (Heating + Fan only) CC- Cooling only (Cooling + Drying + Fan only) nU- Cooling and heating without Auto	Remote controller will change as well.
4	Lowest setting temperature	16-24	Remote controller will change as well.
5	Highest setting temperature	25-30	Remote controller will change as well.
6	Reserved		
7	Twins selection	0- No twins; 1- Master unit; 2- Secondary unit	
8	/	Nothing to set	
9	/	Nothing to set	
10	/	Nothing to set	
11	Min. frequency limitation in cooling mode	10,11,12,..., 49,50,-- (cancel)	
12	Min. frequency limitation in heating mode	20,21,22,...,149,250,-- (cancel)	
13	Max. frequency selection in T4 limitation of Zone 6	20,21,22,...,149,250,-- (cancel)	
14	/	Nothing to set	
15	Frequency selection of outdoor forced-operation	10,11,12,...,249,250,-- (cancel)	
16	One button reset	rS- Reset	
17	nA	Nothing to set	
18	Capacity setting (kW)	23,26,32,35,51,72,120,-- (cancel)	
19	Max. frequency selection in cooling mode	40,41,42,...,83,83,-- (cancel)	
20	Max. frequency selection in heating mode	40,41,42,...,83,84,-- (cancel)	Without limitation
21	Cooling temperature compensation	-3.0,-2.5,-2.0,...,3.0,3.5,-- (cancel)	
22	Heating temperature compensation	-6.5,-6.0,-5.5,...,0.5,1.0,1.5,...,7.0,7.5,-- (cancel)	
23	Max. fan speed selection in cooling	-41,-40,-39,...,19,20,-- (cancel)	

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Channel	Function	Parameter Value Meaning	Remark
24	Min. fan speed selection in cooling	-41,-40,-39,...,19,20,-- (cancel)	
25	Max. fan selection in heating	-41,-40,-39,...,19,20,-- (cancel)	
26	Min. fan speed selection in heating	-41,-40,-39,...,19,20,-- (cancel)	
27	Reserved	Nothing to set	
28	Anti-cold air stop fan temperature	16~28	Remote controller will change as well.
29	Reserved	Nothing to set	
30	Reserved	Nothing to set	

5.4 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	TS14-TS15
2	The power switch is on but fans will not start	TS14-TS-15
3	The temperature on the display board cannot be set	TS14-TS-15
4	Unit is on but the air is not cold/hot	TS14-TS-15
5	Unit runs but shortly stops	TS14-TS-15
6	The unit starts up and stops frequently	TS14-TS-15
7	Unit runs continuously but insufficient cooling/heating	TS14-TS-15
8	Cool cannot change to heat	TS14-TS-15
9	Unit is noisy	TS14-TS-15

Field Maintenance:

No.	Problem	Solution
1	Unit will not start	TS16-TS17
2	Compressor will not start but fans run	TS16-TS17
3	Compressor and condenser fan will not start	TS16-TS17
4	Air handler fan will not start	TS16-TS17
5	Condenser fan will not start	TS16-TS17
6	Unit runs but shortly stops	TS16-TS17
7	Compressor short-cycles due to overload	TS16-TS17
8	High suction pressure	TS16-TS17
9	Low discharge pressure	TS16-TS17
10	High suction pressure	TS16-TS17
11	Low suction pressure	TS16-TS17
12	Unit runs continuously but insufficient cooling	TS16-TS17
13	Too cool	TS16-TS17
14	Compressor is noisy	TS16-TS17
15	Horizontal louver cannot revolve	TS16-TS17

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

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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

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

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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
	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
	Too Cool	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
	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	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

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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

5.5 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 03	EH 60	EH 61	EL 0C	EH C1/ EH C2	EH 0E	EC 53	EH 0b
Indoor PCB	✓	✓	✓	✓	✓	✓	X	✓	X	✓
Outdoor PCB	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
T3 Sensor	X	X	X	X	X	X	X	X	X	X
T4 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	X
Additional Refrigerant	X	X	X	X	X	✓	✓	✓	X	X
Water-Level Switch	X	X	X	X	X	X	X	✓	X	X
Water Pump	X	X	X	X	X	X	X	✓	X	X
Display Board	X	X	X	X	X	X	X	X	X	✓

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Part Requiring Replacement	Error Code										
	EC 54	EC 51	EC 52	EC 56	EC 07	PC 00	PC 01	PC 02	PC 04	PC 03	FH CC/ EH C3
Indoor PCB	X	X	X	X	X	X	X	X	X	X	✓
Outdoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X
Outdoor Fan Motor	X	X	X	X	✓	✓	X	✓	✓	X	X
T3 Sensor	X	X	✓	X	X	X	X	X	X	X	X
TP Sensor	✓	X	X	X	X	X	X	X	X	X	X
T2B Sensor	X	X	X	✓	X	X	X	X	X	X	X
Refrigerant Sensor	X	X	X	X	X	X	X	X	X	X	✓
Reactor Sensor	X	X	X	X	X	X	✓	X	X	X	X
Compressor	X	X	X	X	X	✓	X	X	✓	X	X
IPM Module Board	X	X	X	X	X	✓	✓	✓	✓	X	X
Pressure Protector	X	X	X	X	X	X	X	X	X	✓	X
Additional Refrigerant	X	X	X	X	X	X	X	X	X	✓	X

5.6 Troubleshooting by Error Code

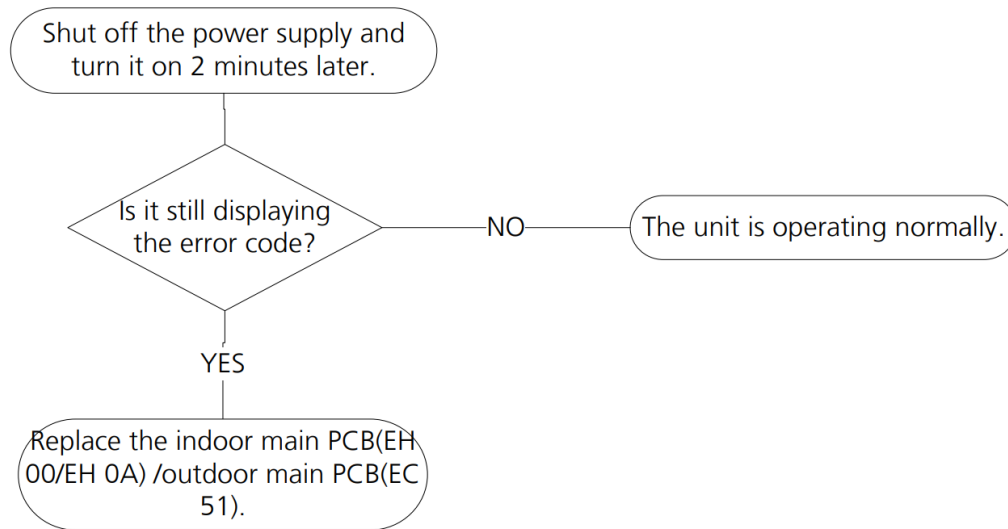
EH 00/ EH 0A/ EC 51: EEPROM Malfunction Error Diagnosis and Solution.

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

Recommended parts to prepare:

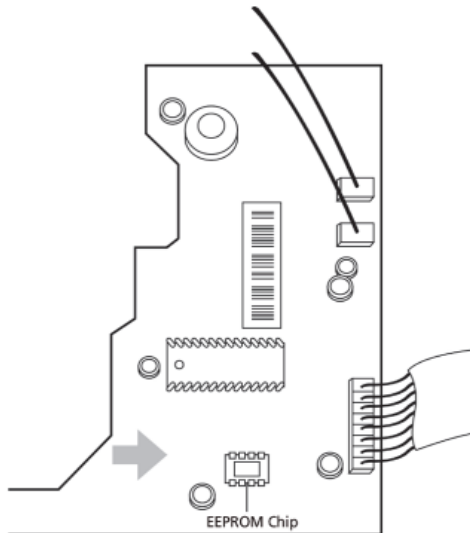
- Indoor PCB
- Outdoor PCB

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 indoor PCB is shown in the following images:



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

Troubleshooting and repair of the compressor driven chip EEPROM parameter error and communication error between the outdoor main chip and compressor driven chip are the same as EC 51.

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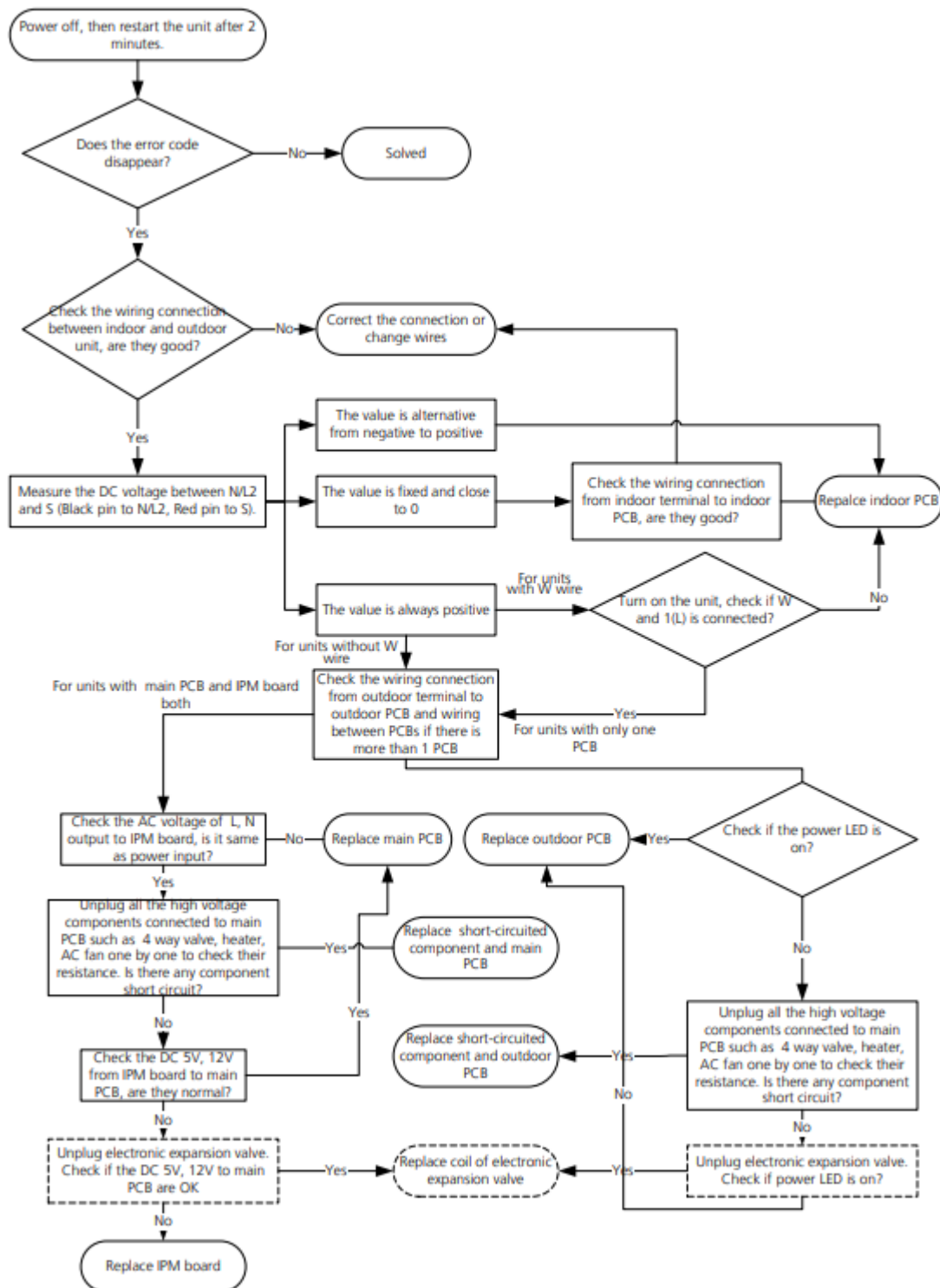
EL 01: IDU & ODU Communication Error Diagnosis and Solution.

Description: Indoor unit cannot communicate with the outdoor unit.

Recommended parts to prepare:

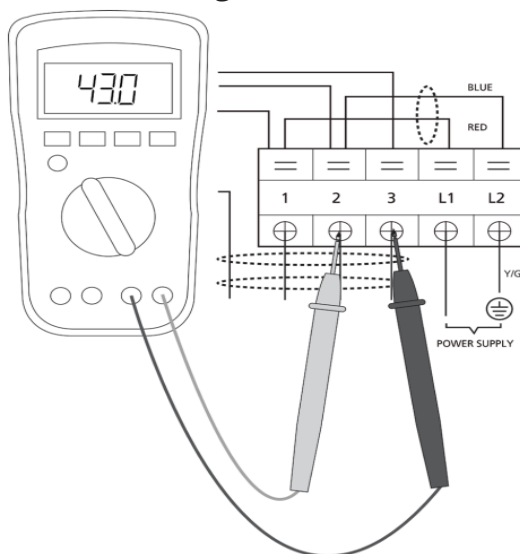
- Indoor PCB
- Outdoor PCB
- Reactor

Troubleshooting and repair:

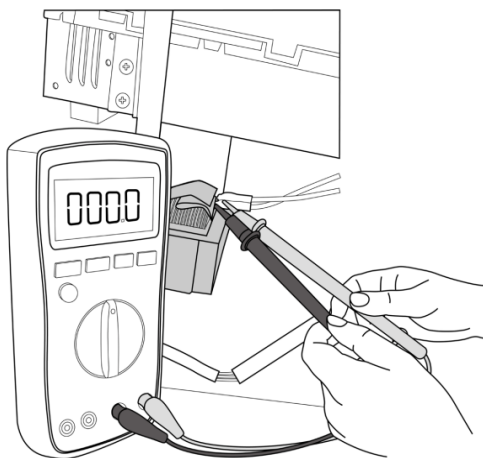


Remarks:

- 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.



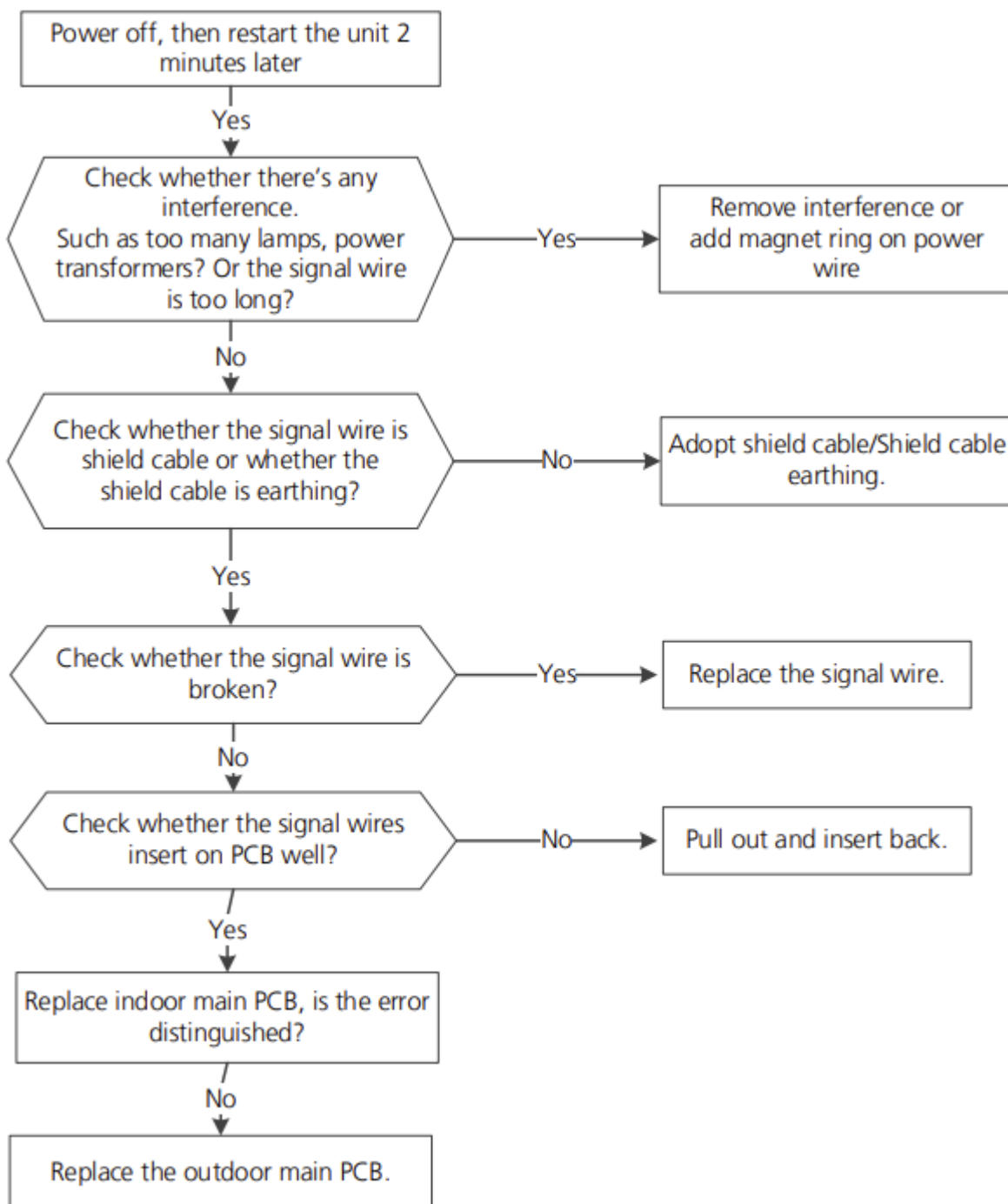
Note: The pictures and the values are for reference only, actual condition and specific values may vary.

485 Communication (S1,S2 Communication)

Recommended parts to prepare:

- Signal wires
- Magnet ring
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:



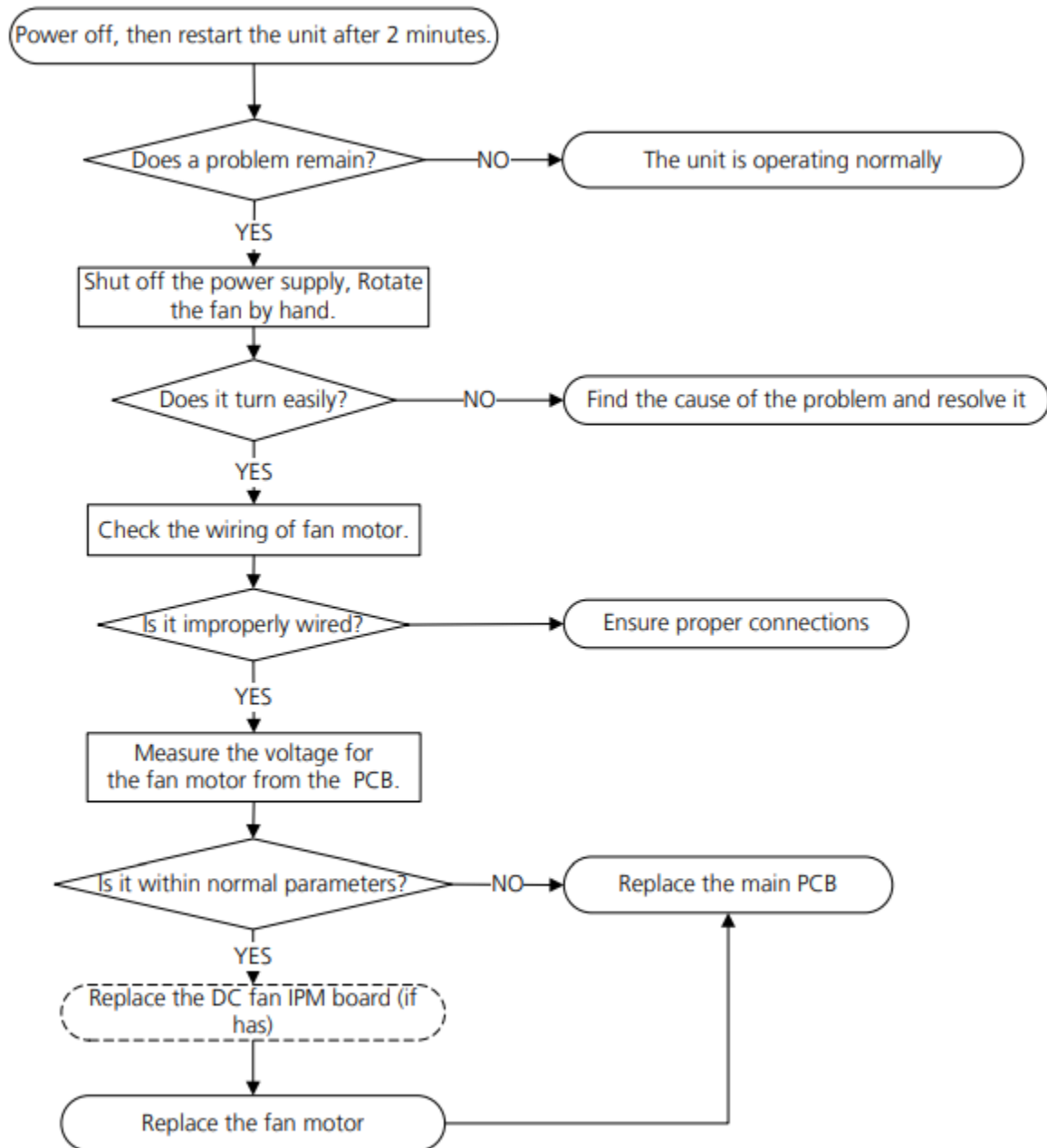
EH 03/ EC 07: Fan Speed Out of Control Diagnosis and Solution.

Description: When the indoor/outdoor fan speed keeps too low or too high for a certain time, the unit ceases operation and the LED displays a fault.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB

Troubleshooting and repair:



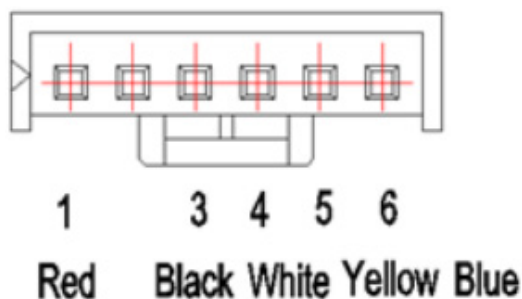
5 TROUBLESHOOTING

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.

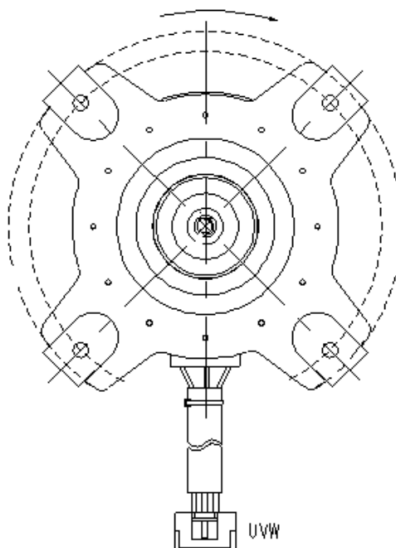
NO.	Color	Signal	Voltage
1	Red	Vs/Vm	192V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5-16.5V



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.



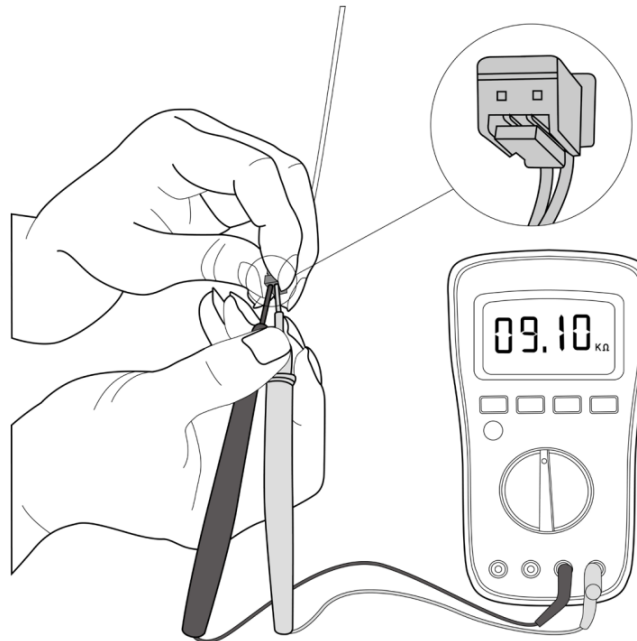
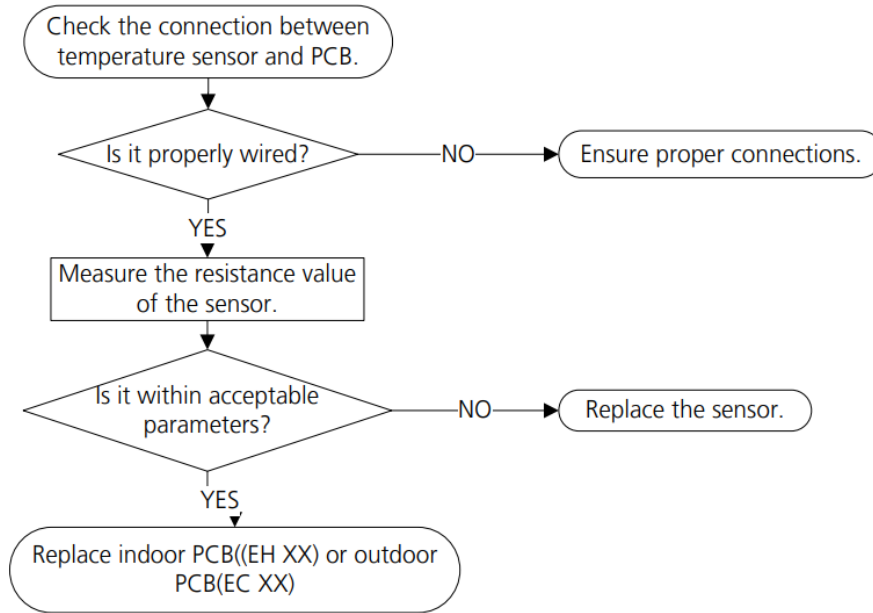
EH 60/ EH 61/ EC 53/ EC 52/ EC 54/ EC 56: Open Circuit or Short Circuit of Temperature Sensor Diagnosis and Solution.

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

Recommended parts to prepare:

- Connection wires
- Sensors
- PCB

Troubleshooting and repair:



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

5 TROUBLESHOOTING

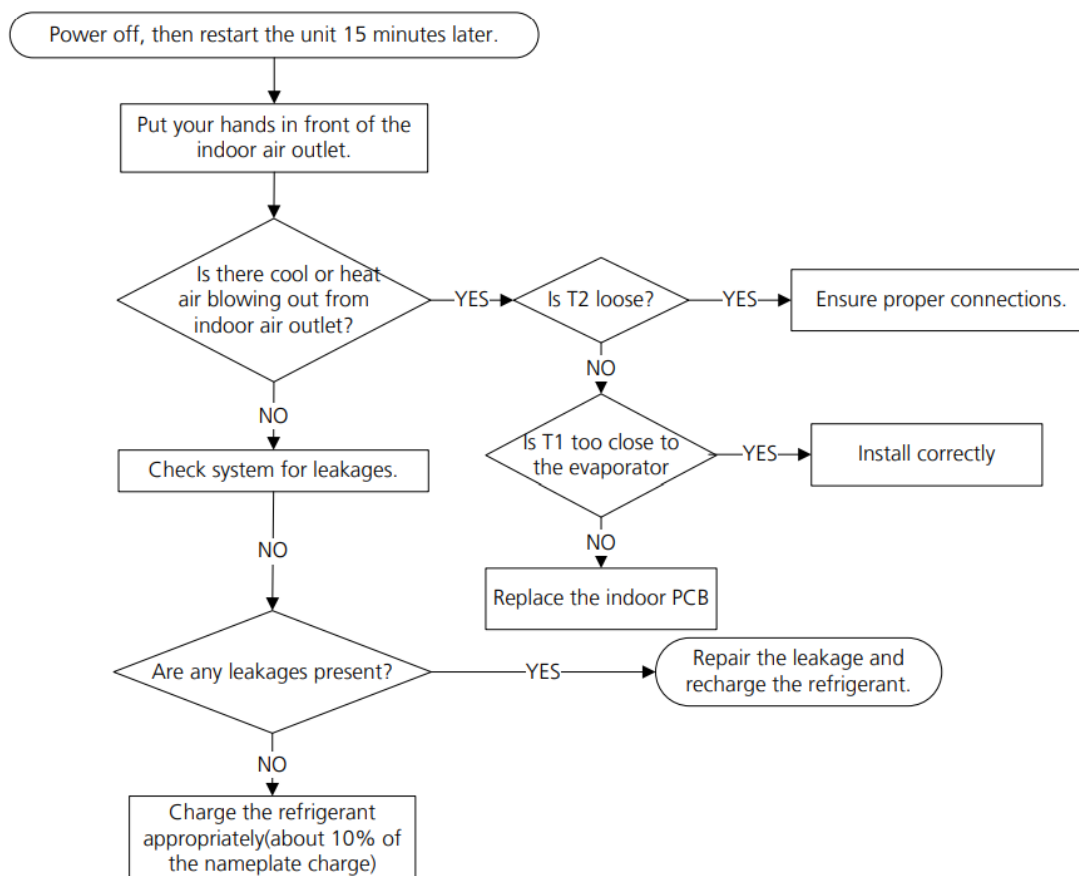
EL 0C: System Lacks Refrigerant Diagnosis and Solution.

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

Recommended parts to prepare:

- Indoor PCB
- Additional refrigerant

Troubleshooting and repair:



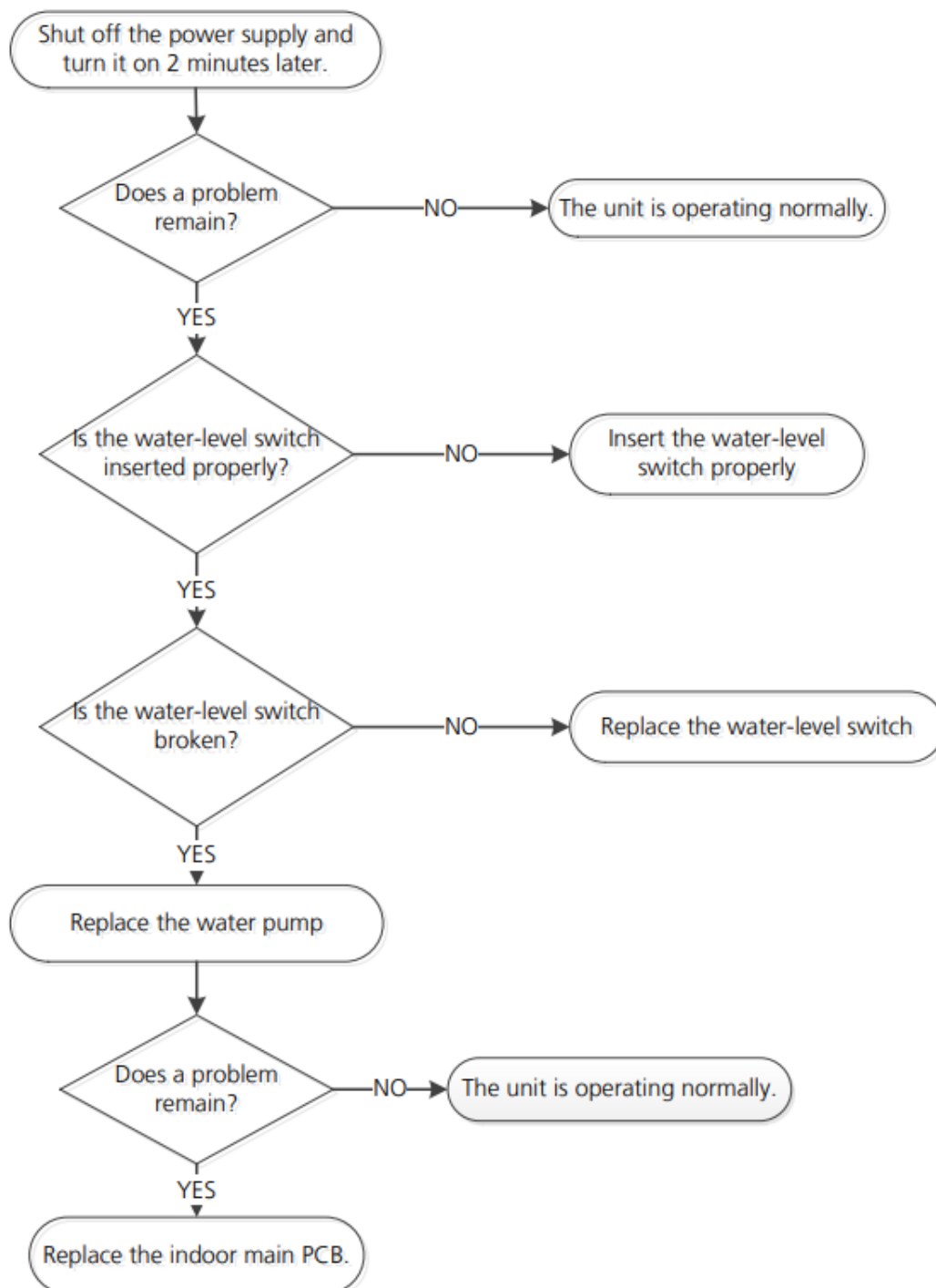
EH 0E: Water-Level Alarm Malfunction Diagnosis and Solution.

Description: If the sampling voltage is not 5V, the LED displays a fault code.

Recommended parts to prepare:

- Connection wires
- Water-level switch
- Water pump
- Indoor PCB

Troubleshooting and repair:



5 TROUBLESHOOTING

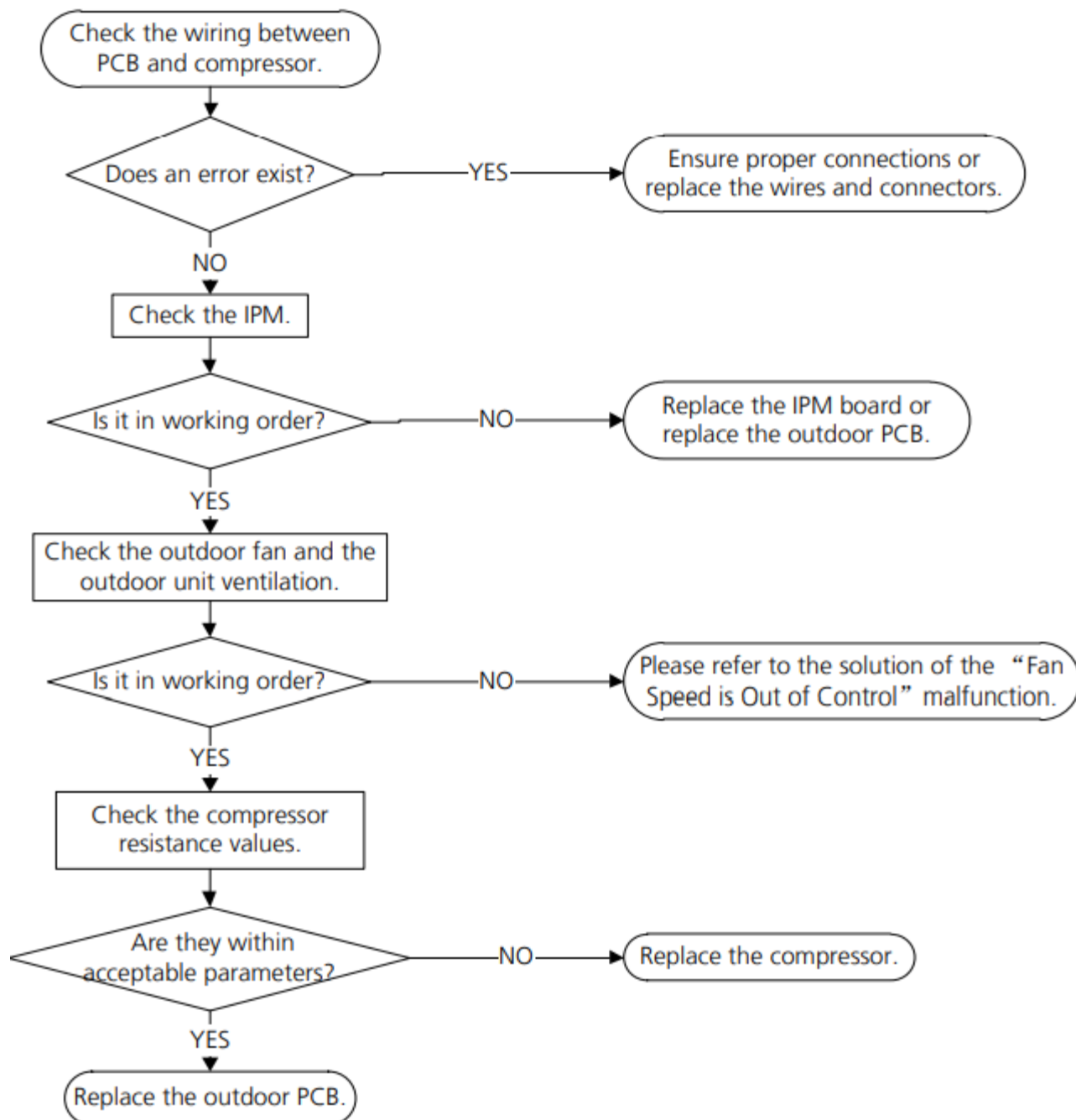
PC 00: ODU IPM Module Protection Diagnosis and Solution.

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

Recommended parts to prepare:

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

Troubleshooting and repair:

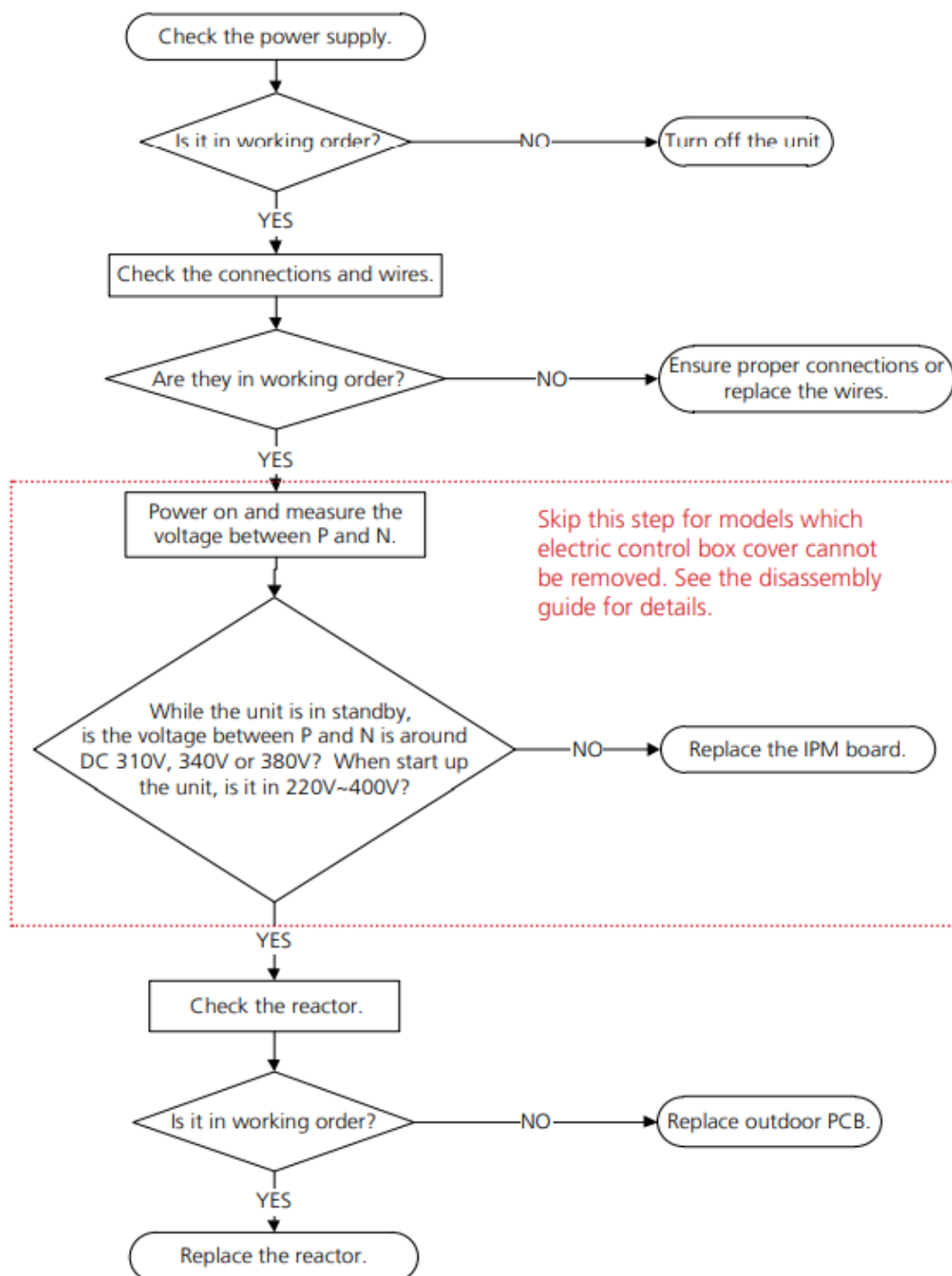


PC 01: ODU Voltage Protection Diagnosis and Solution.

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
- PCB
- Reactor

Troubleshooting and repair:

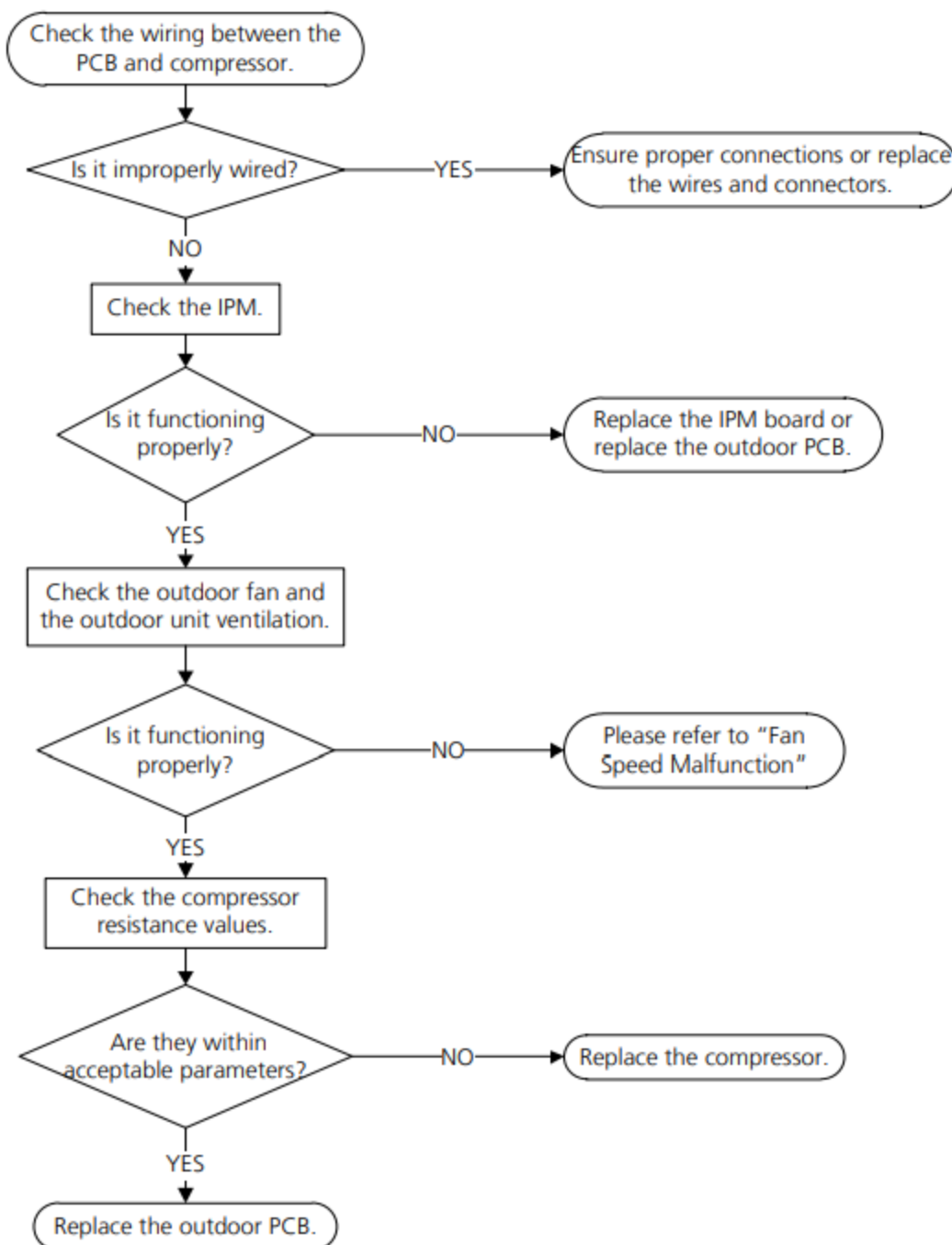
PC 04: Inverter Compressor Drive Error Diagnosis and Solution.

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

Recommended parts to prepare:

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

Troubleshooting and repair:



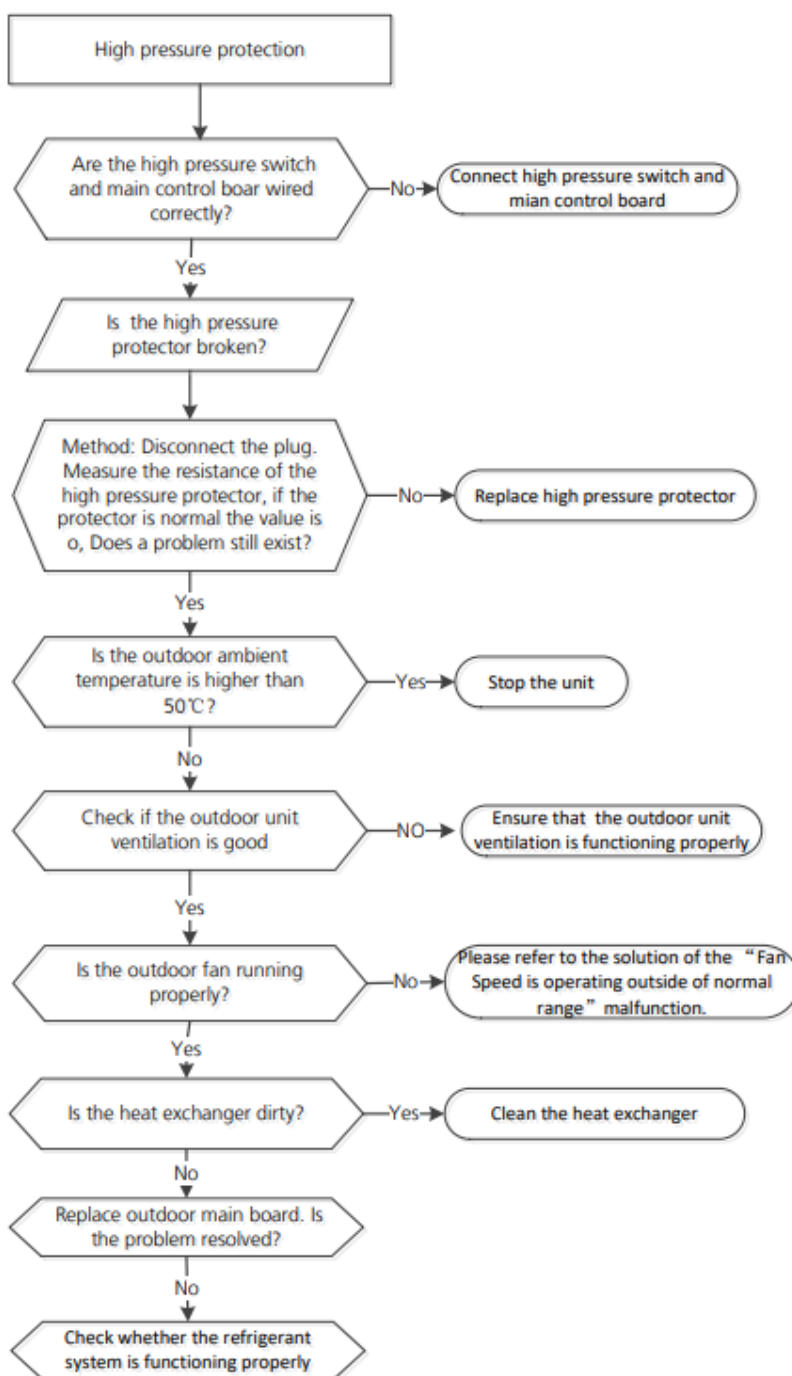
PC 03: Pressure Protection (Low or High Pressure) Diagnosis and Solution.

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.

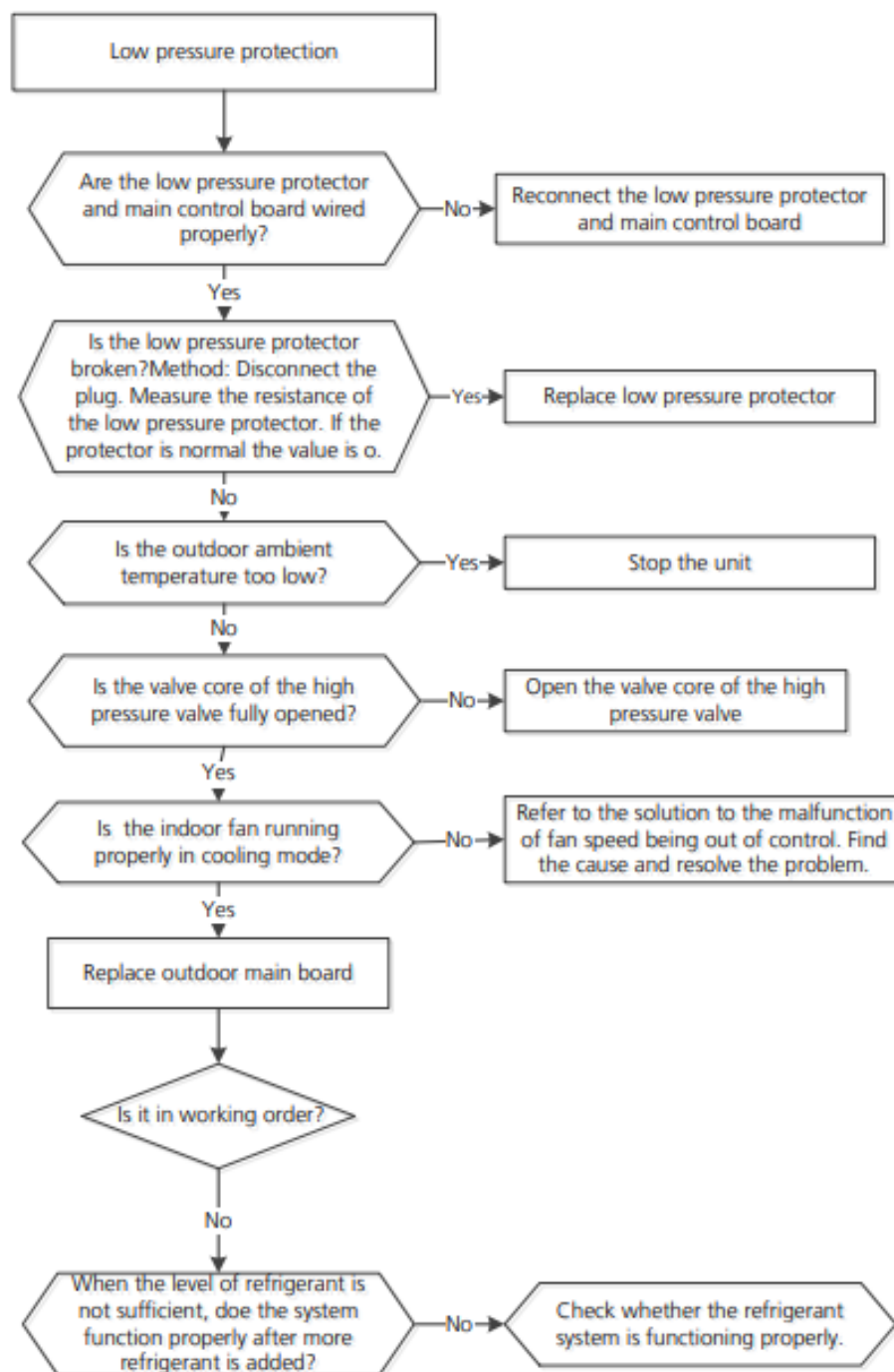
Recommended parts to prepare:

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

Troubleshooting and repair:



PC 03: Cont.



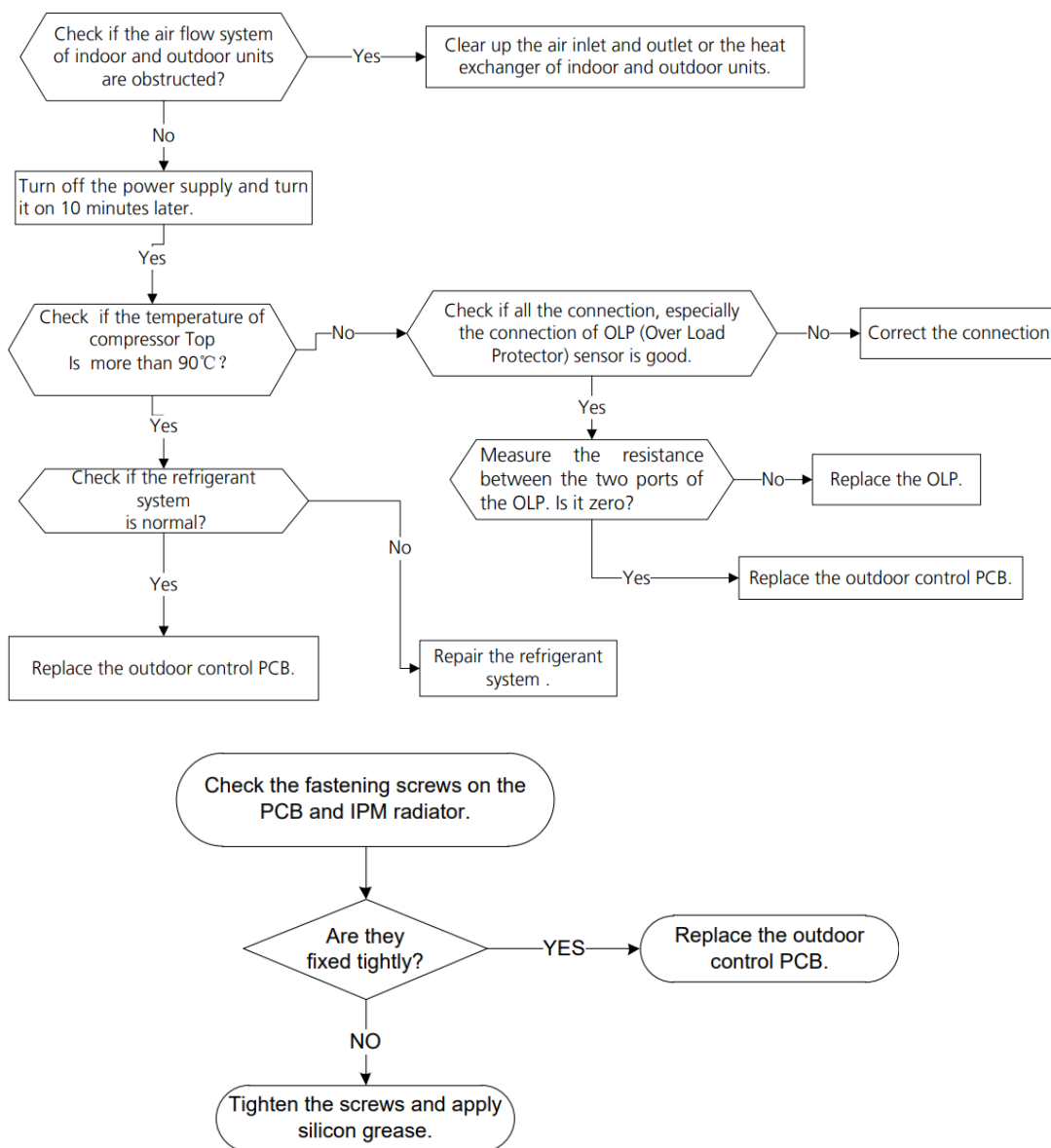
PC 02: Compressor Top (or IPM) Temp. Protection Diagnosis and Solution.

Description: (For some models with overload protection). If the sampling voltage is not 5V, the LED will display a fault code. If the temperature of the IPM module is higher than a certain value, the LED will display a fault code.

Recommended parts to prepare:

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

Troubleshooting and repair:



5 TROUBLESHOOTING

PC 0L: Low Ambient Temperature Protection.

Description: It is a protection function. When the compressor is off and the outdoor ambient temperature (T4) is lower than -35°C for 10s, the AC will stop and display the fault code. When the compressor is on and the outdoor ambient temperature (T4) is lower than -40°C for 10s, the AC will stop and display the fault code. When the outdoor ambient temperature (T4) is no lower than -32°C for 10s, the unit will exit the protection.

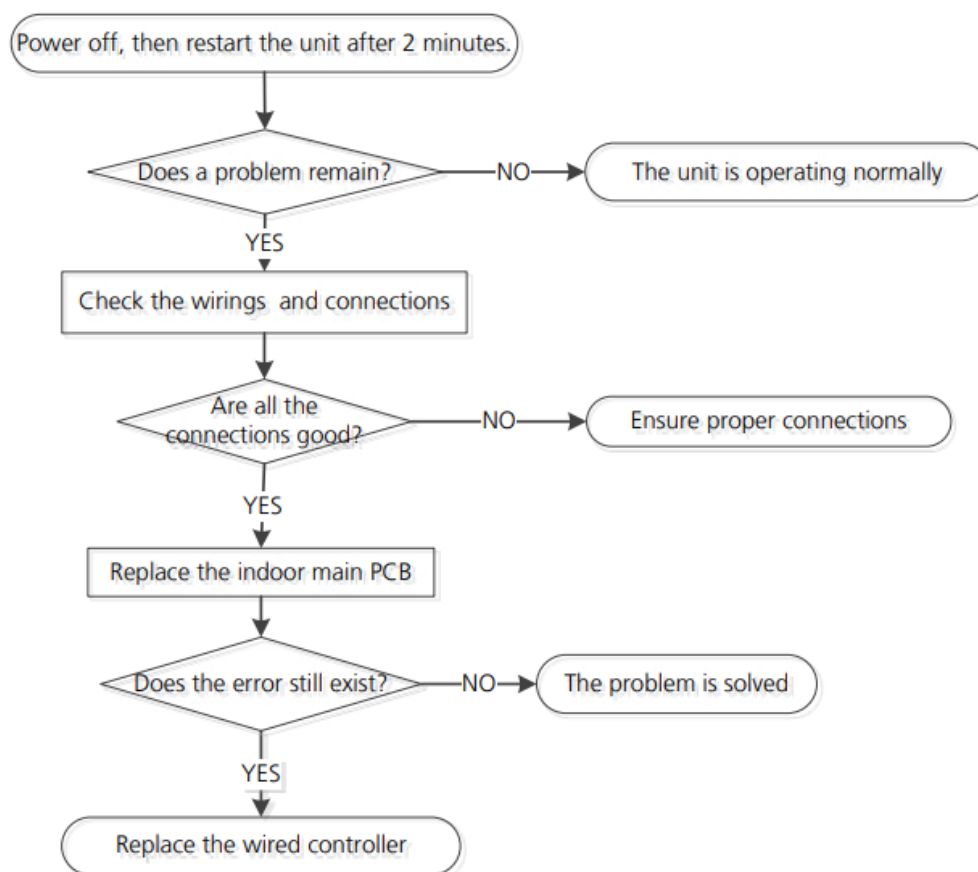
EH b3: Communication malfunction Between Wire and Master Control Diagnosis and Solution.

Description: If the indoor PCB does not receive feedback from the wired controller, the error displays on the wired controller..

Recommended parts to prepare:

- Connection wires
- Indoor PCB
- Wired Controller

Troubleshooting and repair:

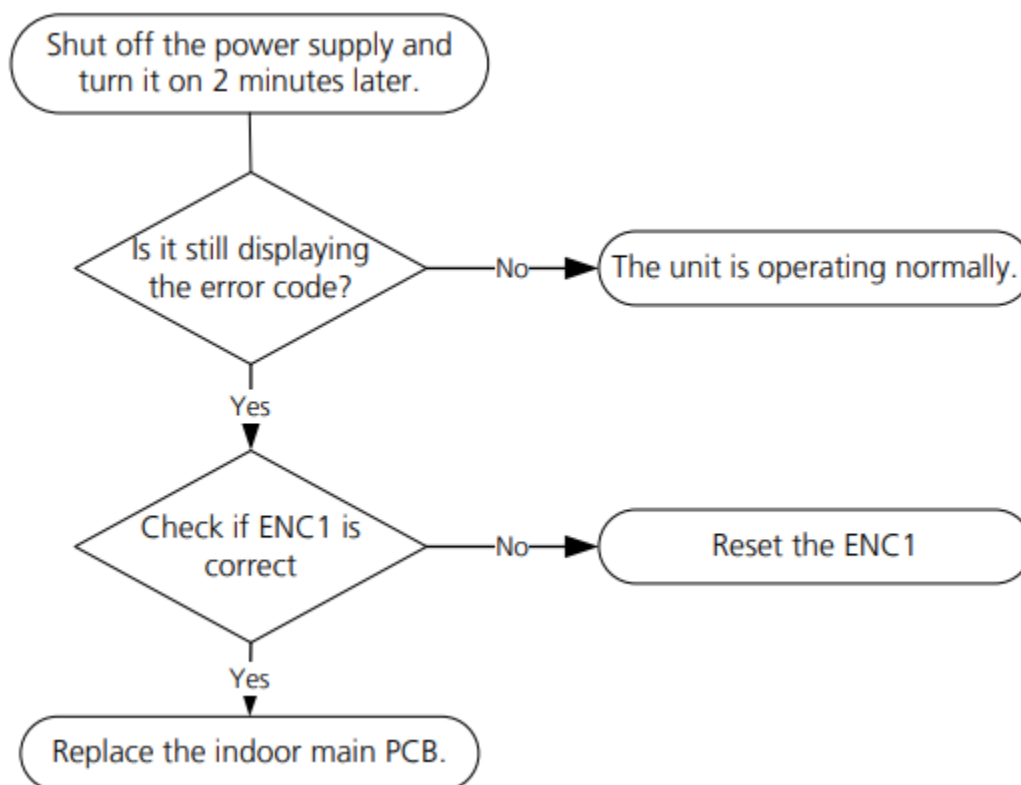


EH bA: Communication Error Between the Indoor Unit and the External Fan module/ EH 3A: External Fan DC Bus Voltage is too Low Protection/ EH 3b: External fan DC bus voltage is too High Fault Diagnosis and Solution.

Description: The indoor unit does not receive the feedback from the external fan module during 150s or the indoor unit receives abnormal increases or decreases in voltage from the external fan module.

Recommended parts to prepare:

- Indoor main PCB

Troubleshooting and repair:

5 TROUBLESHOOTING

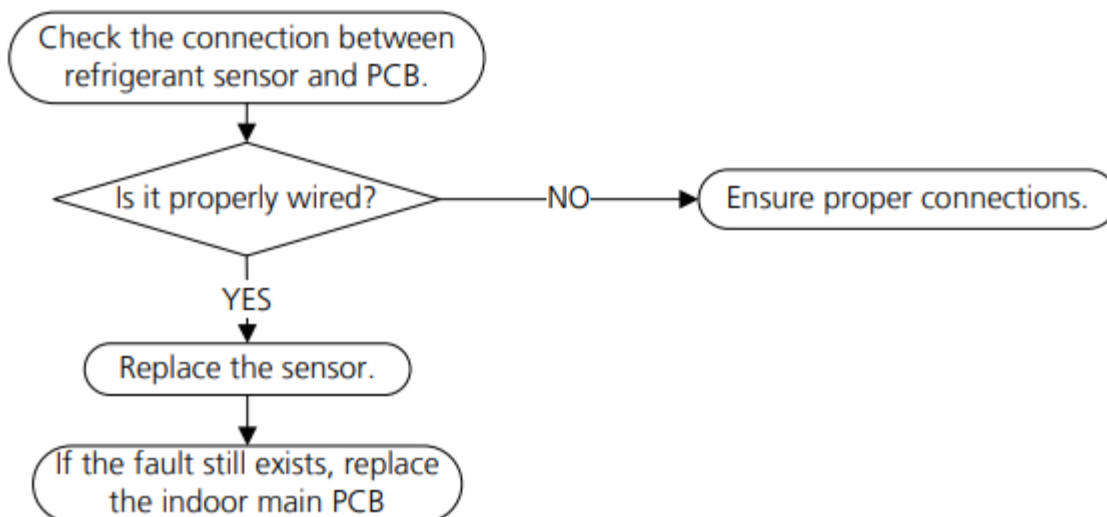
FH CC: Refrigerant Sensor Error/ EH C3: Refrigerant Sensor is Out of Range Diagnosis and Solution.

Description: 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:



EH C1: Refrigerant Sensor Detects Leakage/ EH C2: Refrigerant Sensor is Out of Range and Leakage is Detected Diagnosis and Solution

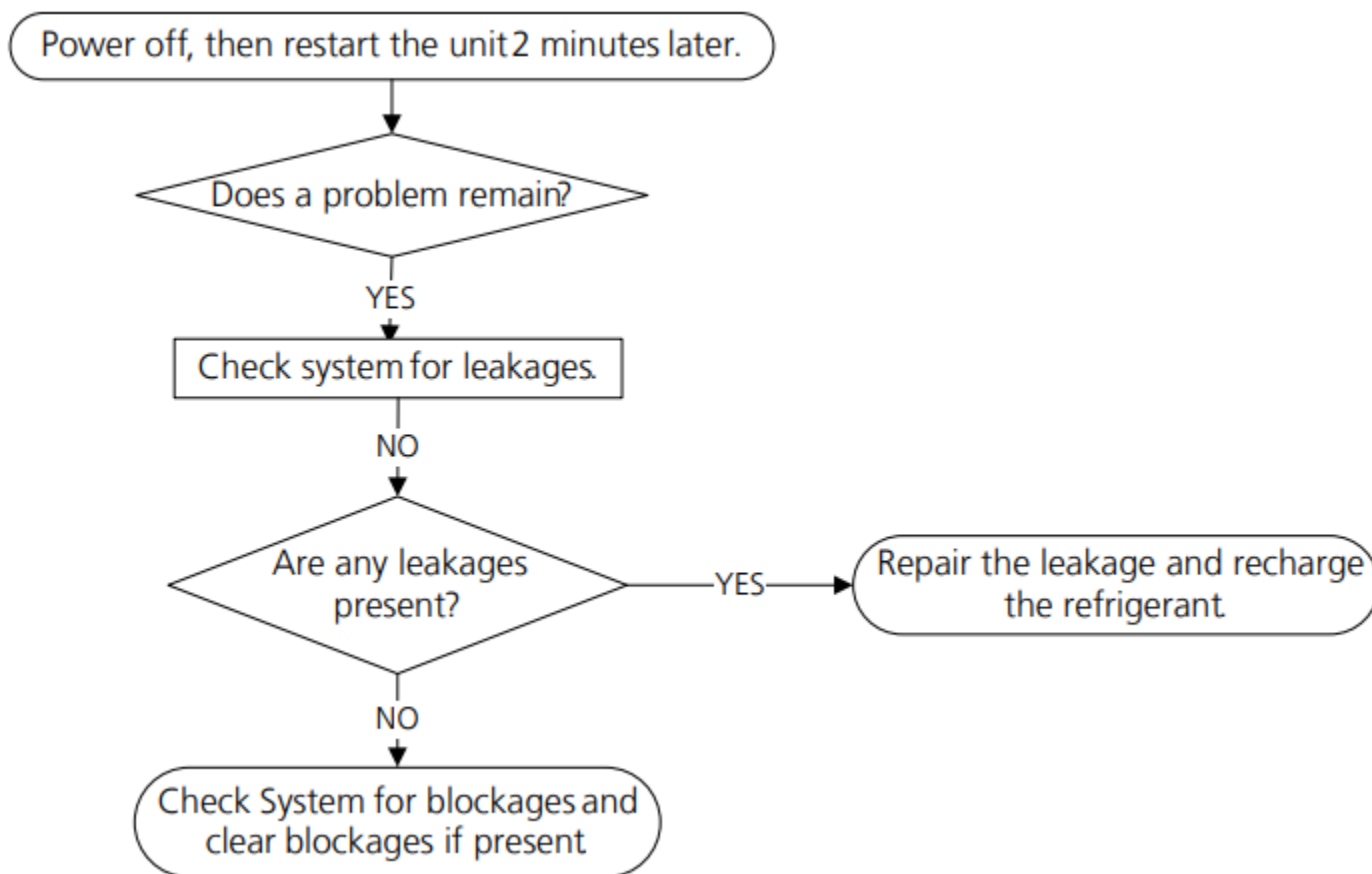
Description: The refrigerant sensor detects a concentration higher than or equal to 10%*LFL for 10 seconds or the refrigerant sensor detects a concentration higher than or equal to 20%*LFL or the multi model receives the refrigerant leakage protection fault sent by the outdoor unit.

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:



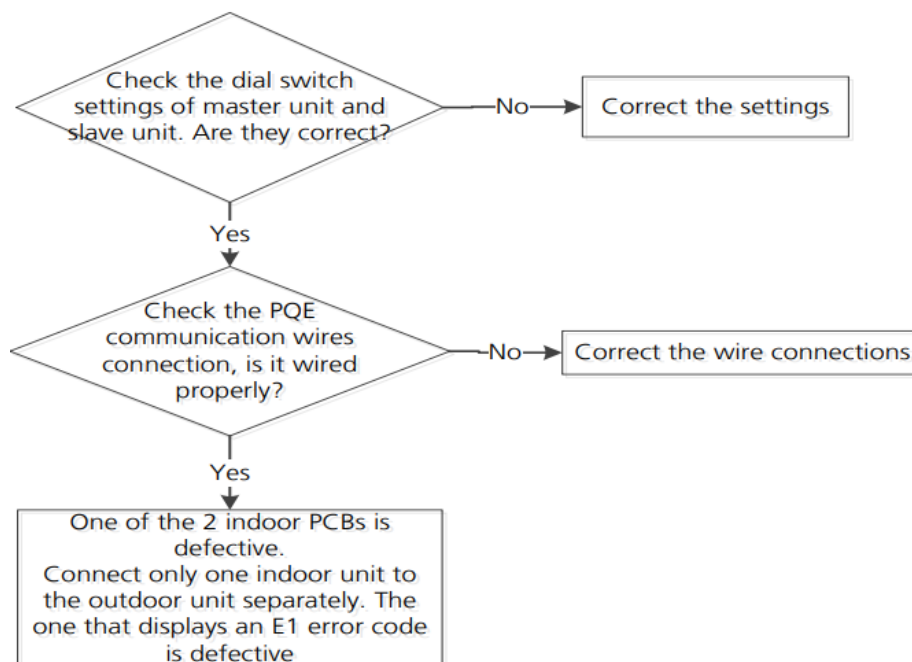
EL 11: Communication Malfunction Between the Main unit and Secondary Units (for Twin Systems) Diagnosis and Solution.

Description: When set in twin systems the master unit and slave unit cannot be recognized normally.

Recommended parts to prepare:

- Connection wires
- Indoor man PCB

Troubleshooting and repair:



EH 12: Main Unit or Secondary Unit Malfunction (for Twin System) Diagnosis and Solution.

Description: When set in twin systems, one indoor unit displays this error code which means another unit is faulty. Check another indoor unit's error code and then follow the prescribed solutions to resolve the malfunction.

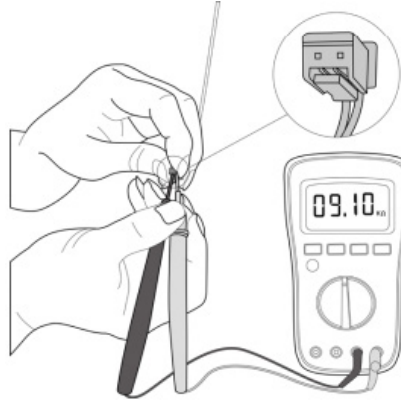
5.7 Check Procedures

! 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.

6 TEMPERATURE SENSOR RESISTANCE TABLE

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

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	150.2
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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Service Manual

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