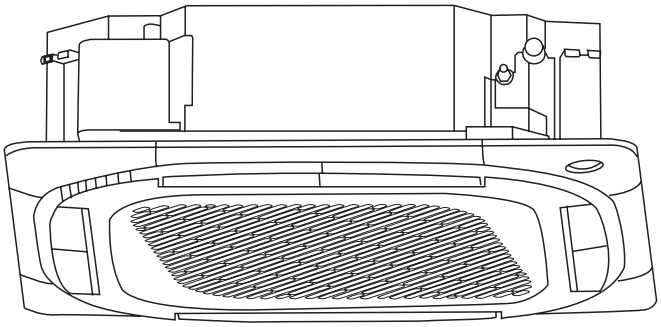
CYB-20 Inverter Series

Service Manual



Models:

CYB036GMSI20RL CYB048GMSI20RL

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Safety Precautions

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Safety Precautions

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1. Precautions

To prevent personal injury or damage to the property and unit, follow all precautions and instructions in this manual. Before performing service on the unit, refer to the service manual and its relevant sections.

Failure to follow these safety precautions may result in property damage, serious injury, or death.

WARNING: Indicates a potentially hazardous situation which, if not avoided, may result in serious injury or death.

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

1.1. In Case of Accidents or Emergency

WARNING

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

CAUTION

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

1.2. Pre-Installation & Installation

WARNING

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

CAUTION

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

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1.3. Operation & Maintenance

WARNING

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

CAUTION

- Do no install or operate the system for long periods in high humidity or in environments with direct exposure to sea wind or salt spray.
- Do not install the unit on a defective or damaged installation stand, or in an insecure location.
- Ensure the unit is installed at a level position.
- Do not install the unit in a position where noise or air discharge created by the outdoor unit will negatively impact the environment or nearby residences.
- Do not expose skin directly to the air discharged by the system for prolonged periods of time.
- Ensure the drain hose is installed correctly to ensure proper water drainage.
- When lifting or transporting the unit, it is recommended that two or more people are used for this task.
- When the system is not being used for an extended time, disconnect the power supply or turn off the breaker.

WARNING for Use with Flammable Refrigerant

1. Installation (Space)

- Keep the installation of the pipe-work to a minimum.
- Protect the pipe-work from physical damage.
- Ensure the refrigerant pipes comply with national gas regulations.
- Ensure the mechanical connections are accessible for maintenance purposes.
- In scenarios that require mechanical ventilation, keep the ventilation openings clear of obstructions.
- Dispose the product based on national regulations.

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2. Servicing
Anyone working on or breaking into a refrigerant circuit must hold a valid certificate from an industry-accredited authority, confirming their competence to handle refrigerants safely.

3. Maintenance requiring other skilled personnel should be supervised by someone competent in handling flammable refrigerants.

4. Do not use methods other than those recommended by the manufacturer to accelerate defrosting or clean the appliance.

5. Store the appliance away from continuous ignition sources, such as open flames, gas appliances, or electric heaters.

6. Make sure that foreign matter (oil, water, etc.) does not enter the piping. Also, when storing the piping, securely seal the opening by pinching, taping, etc.

7. Do not pierce or burn.

8. Be aware that refrigerant may not contain an odor.

9. Competent people must carry out all working procedures that affect safety.

10. Store the appliance in a well-ventilated room that meets the specified size requirements for operation.

11. Store the appliance in way that prevents mechanical damage from occurring.

12. Joints should be tested using equipment with a sensitivity of 5 g/year or better. Testing should be performed under both standstill and operational conditions, or at pressures equivalent to these conditions following installation. Do not use detachable joints in the indoor side of the unit (brazed, welded joints can be used).

13. When a flammable refrigerant is used, the requirements for the installation space and ventilation are determined according to:
The mass charge amount (M) used in the appliance.

14. The installation location.

- The piping material, pipe routing, and installation must include protection from physical damage, such as ASHRAE 15, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints must be accessible for inspection before being covered or enclosed.

- The protection devices, piping, and fittings should be protected as much as possible against adverse environmental effects. For example, the danger of water collecting, freezing in relief pipes, or accumulation of dirt and debris.

- Design and install refrigeration piping in a way that minimizes the likelihood of hydraulic shock damaging the system.

- Before applying any insulation, protect the steel pipes and components against corrosion with a rustproof coating.

- Take precautions to avoid excessive vibration or pulsation.

- The minimum floor area of the room must be presented as a specific value or in a table. Do not provide a formula.

- After completing the field piping for split systems, the pipework must 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 and high sides should match their respective design pressures, unless the high side cannot be isolated from the low side. In this case, the entire system must be pressure tested to the low side design pressure.

  - After removing the pressure source, maintain the test pressure for at least one hour. The test gauge must show no decrease in pressure. The test gauge resolution must not exceed 5% of the test pressure.

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- During the evacuation test, after achieving a vacuum level specified in the manual or less, isolate the refrigeration system from the vacuum pump. The pressure should not rise above 1,500 microns within 10 minutes. Specify the vacuum pressure level in the manual; it must be less than 500 microns or the value required by national and local codes for specific building types (residential, commercial, or industrial).

- Field-made indoor refrigerant joints should be tightness tested according to the following requirements: The test method must demonstrate a sensitivity of at least 5 grams of refrigerant per year at a minimum pressure of 0.25 times the maximum allowable pressure. No leak must be detected.

- Correct the minimum room area of the space Amin by multiplying it by the altitude adjustment factor (AF), as determined by the building site's ground level altitude (Halt) in the table below.

Altitude Adjustment Factor

Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1.00	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.12
Halt	1800	2000	2200	2400	2600	2800	3000	3200	
AF	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.40	

- Warning: Keep the required ventilation openings clear of obstruction.

- Only perform the service as recommended by the manufacturer.

14. Qualification of Workers
Qualified personnel must perform any maintenance, service, and repair operations. Safety-critical procedures must only be performed by competent personnel who have completed the required training and received a certification of competence. 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 60335-2-40 4th Edition.

Examples for such working procedures are:

- Breaking into the refrigerant circuit.
- Opening of sealed components.
- Opening of ventilated enclosures.

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2. Servicing Information (For Flammable Materials)

2.1. Checks to the Area

- Before starting work on systems containing flammable refrigerants, complete safety checks to minimize the risk of ignition. When repairing the refrigerating system, comply with the following precautions prior to conducting work on the system.

2.2. Work Procedure

- Complete the work under a controlled procedure to minimize the risk of flammable gas or vapor from being present.

2.3. General Work Area

- Inform all maintenance staff and others working nearby about the details of the current project. Avoid working in confined spaces.

2.4. Checking for Presence of Refrigerant

- Check the area with an appropriate refrigerant detector before and during work, ensuring the technician is aware of potentially flammable atmospheres.
- Ensure the leak detection equipment is compatible with flammable refrigerants.

2.5. Presence of Fire Extinguisher

- If conducting any hot work on the refrigeration equipment or any associated parts, ensure an appropriate fire extinguishing equipment is available. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

2.6. No Ignition Sources

- When working on refrigeration pipework that contains or previously held flammable refrigerants, do not use ignition sources in a way that creates a risk of fire or explosion.
- Keep all possible ignition sources, including cigarettes, a safe distance from the site during installation, repair, removal, or disposal, as flammable refrigerant may be released into the surrounding area.
- Prior to starting the work, survey the area around the equipment to make sure that there are no flammable hazards or ignition risks.
- Display No Smoking signs.

2.7. Ventilated Area

- Before breaking into the system or conducting any hot work, ensure the area is open or adequately ventilated. A degree of ventilation must be carried out during the duration of the work. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2.8. Checks to the Refrigeration Equipment

- Ensure the electrical components being charged are fit for purpose and meet the required specifications. Follow the manufacturer's maintenance and service guidelines at all times. If in doubt, consult the manufacturer's technical department for assistance.

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- Apply the following checks to installations using flammable refrigerants:
  - The refrigerant charge must match the size of the room where the refrigerant components 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 must be checked for the presence of refrigerant.

  - Ensure the markings to the equipment are visible and legible. Correct markings and signs that are illegible.

- Position refrigeration pipes and components away from corrosive substances. If exposure is unavoidable, ensure they are constructed from corrosion-resistant materials or properly protected.

2.9. Checks to Electrical Devices

- Maintenance of electrical components must begin with initial safety checks and component inspections. If a fault exists that could compromise safety, then no electrical supply must be connected to the circuit until it is correctly dealt with. If the fault cannot be corrected immediately but is necessary to continue operation, an adequate temporary solution must be used. This must be reported to the owner of the equipment so all parties are advised.

- Initial safety checks should include:
  - The capacitors are discharged. This must be done in a safe manner to avoid the possibility of sparking.

  - No live electrical components and wiring are exposed while charging, recovering, or purging the system.

  - There is continuity of earth bonding.

2.10. Sealed Electrical Components Must Be Replaced

- Before removing any sealed covers or components, ensure all electrical supplies are disconnected from the equipment. If the equipment being serviced requires an electrical supply, a permanent leak detector must be placed at the most critical point to provide warnings of potentially hazardous situations.

- Ensure that the work on the electrical components does not alter the casing in a way that compromises its level of protection. This includes damage to cables, excessive number of connections, terminals not made to original specifications, damage to seals, incorrect fitting of glands, etc.

- Ensure that the apparatus is mounted securely.

- Ensure that the seals or sealing materials have not degraded in a way that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts must be in accordance with the manufacturer's specifications.

2.11. Intrinsically Safe Components Must Be Replaced

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

  Note: The use of silicone sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to work.

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2.12 Cabling

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

2.13. Detection of Flammable Refrigerants

- Do not use potential sources of ignition to search for or detect refrigerant leaks. Do not use a halide torch (or any other detector using a naked flame).

- The following leak detection methods are deemed acceptable for refrigerant systems: Electronic leak detectors may be used to detect refrigerant leaks. However, in the case of flammable refrigerants, the sensitivity may not be adequate or may need recalibration. Calibrate the detection equipment in a refrigerant-free area. Ensure that the detector is not a potential source of ignition and suitable for the refrigerant being used. Set the leak detection equipment to a percentage of the refrigerant's LFL. In addition, calibrate the equipment to the refrigerant being employed and confirm the appropriate percentage of gas (25% maximum). Leak detection fluids are also suitable to use with most refrigerants. Avoid using detergents containing chlorine as the chlorine may react with the refrigerant and corrode the copper pipe-work.

- Examples of leak detection fluids are
  - Bubble method
  - Fluorescent method agents

- If a leak is suspected, remove or extinguish all naked flames.

- If refrigerant leakage is found that requires brazing, recover all of the refrigerant from the system, or isolate (using the shut off valves) the refrigerant in a part of the system remote from the leak.

2.14. Removal & Evacuation

- When breaking into the refrigerant circuit to make repairs or for any other purpose, use conventional procedures. However, it is important that the best practices are followed since flammability is a consideration.

- Adhere to the following procedure:
  - Safely remove refrigerant following local and national regulations.

  - Evacuate.

  - Purge the circuit with inert gas (optional for A2L).

  - Evacuate (optional for A2L).

  - Continuously flush or purge with inert gas when using a flame to open the circuit.

- If venting is not allowed due to local and national codes, recover the refrigerant charge into the correct cylinders. For appliances containing flammable refrigerants, purge the system with oxygen-free nitrogen to render the appliance safe from flammable refrigerants. This process might need to be repeated several times. Do not use compressed air or oxygen to purge refrigerant systems.

- For appliances containing flammable refrigerants, purge the refrigerants by breaking the vacuum in the system with OFN and continuing to fill it until the operating pressure is achieved. Then, vent the system to atmosphere and pull it down to a vacuum (optional for A2L). Repeat this process until no refrigerant is within the system (optional for A2L). When the final OFN charge is used, vent down the system to atmospheric pressure to enable work to take place.

- Ensure that the outlet for the vacuum pump is not close to any potential ignition sources. Ventilation must be available.

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2.15. Charging Procedures

In addition to conventional charging procedures, follow these requirements:

- Ensure that appropriate tools are used during operation. In case of uncertainty, consult the manufacturer of the tools for information on use with flammable refrigerants.
- Make sure that the contamination of different refrigerants does not occur when using charging equipment. Use hoses or lines as short as possible to minimize the amount of refrigerant contained in them.
- Keep the cylinders upright.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete, unless it's done already. Take extreme care to not overfill the refrigeration system.
- Prior to recharging the system, pressure test it with OFN. Leak test the system after the charging is complete but before commissioning. Complete a follow-up leak test before leaving the site.

2.16. Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, take an oil and refrigerant sample in case analysis is required before reusing the recovered refrigerant. It is essential that electrical power is available before the task is commenced.

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

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2.17. Labeling

- Label the equipment stating that it has been decommissioned and emptied of refrigerant. Date and sign the label. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

2.18. Recovery

- When removing refrigerant from the system, either for servicing or decommissioning, it is recommended to remove all the refrigerant safely.

- When transferring refrigerant into cylinders, only employ appropriate refrigerant recovery cylinders. Ensure that the correct number of cylinders for holding the total system charge is available. Ensure that all the cylinders intended to be used are designated for that recovered refrigerant and labeled for that refrigerant (i.e. special cylinder for the recovery of the refrigerant). Make sure that the cylinders are complete with a pressure-relief valve and associated shut-off valves. Evacuate the empty recovery cylinders. If possible, allow the empty recovery cylinders to cool before the recovery occurs.

- Ensure that the recovery equipment is in good operating condition, along with a set of instructions concerning the equipment. Make sure the recovery equipment is suitable for recovering the flammable refrigerant. If in doubt, consult the manufacturer. In addition, ensure that a set of calibrated weighing scales is available and in good operating order. Complete the hoses with leak-free disconnect couplings.

- Process the recovered refrigerant according to the local legislation. Arrange a relevant waste transfer note. Do not mix refrigerants in recovery units, especially not in cylinders.

- If compressors or compressor oils are needed to be removed, ensure that they have been evacuated to an acceptable level. This makes sure that flammable refrigerant does not remain within the lubricant. Do not heat the compressor body with an open flame or other ignition sources to accelerate this process. When oil is drained from the system, it should be carried out safely.

2.19. Transportation, Marking, & Storage for Units

1. Comply with the transport regulations when moving the equipment containing flammable refrigerants.

2. Mark the equipment with appropriate signs, complying with local regulations.

3. Comply with national regulations when disposing of equipment with flammable refrigerants.

4. Store the equipment in accordance with the manufacturer's instructions.

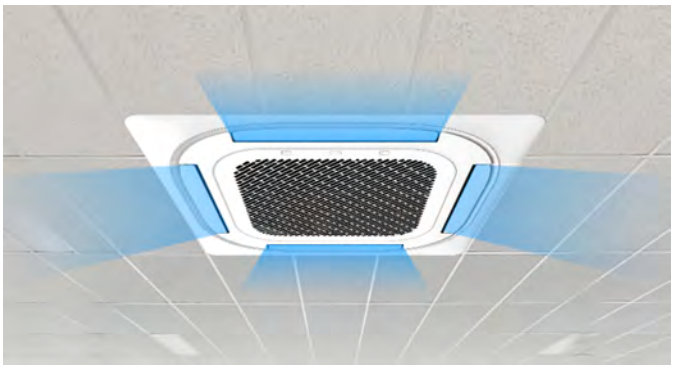
5. Construct the storage package protection in a manor that ensures potential mechanical damage to the equipment cannot cause a refrigerant charge leak. Local regulations determine the maximum quantity of equipment permitted to be stored together.

Indoor Unit Four-Way Cassette 2

Contents

Indoor Unit Four-Way Cassette 2

1. Feature
Compact Cassette (9K-18K)

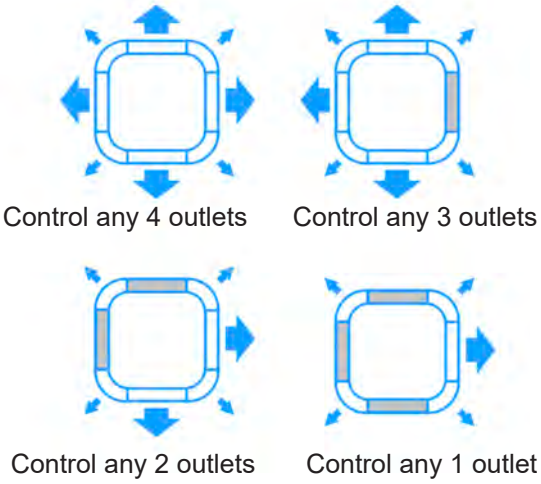


1.1. Nearly 360° Air Discharge for the Highest Efficiency & Comfort

The nearly 360° air discharge delivers an even, powerful airflow, users are never bothered by harsh, cold air drafts.

1.2. Individual Vane Control Customizes Everyone's Own Comfort

The individual vane control offers four possible cooling experiences in one occasion.



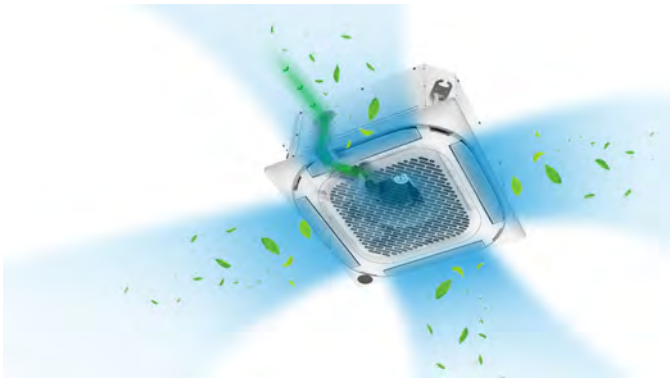
1.3. Fresh Air

A dedicated port draws in fresh outdoor air, keeping the indoor environment fresh and healthy.

The indoor unit's PCB also features a new fan connection port (CN8) that provides 220V (less than 200W) power to the external fan motor.

Indoor Unit Four-Way Cassette 2

New Four-Way Cassette (24K-48K)



1.1. 360° Airflow

The 360° directional wind can deliver air evenly throughout every corner in any space, reducing hot and cold spots in the room.

1.2. Easy Installation

The cassette is much slimmer due to the redesigned heat exchanger and overall structures. It now requires less space for the installation.

1.3. Reserved Remote On-Off & Alarm Ports (Optional for Fixed-Speed Units, Standard for Inverter Units)

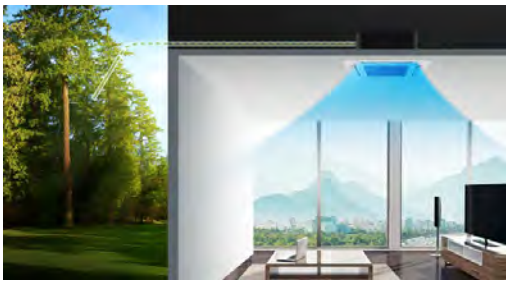
Remote On-Off: With the reserved ports, a remote switch can be easily connected to enable the remote control.

Alarm: The built-in PCB can trigger an alarm signal, enabling an external light or vibration gauge.

Indoor Unit Four-Way Cassette 2

1.4. Fresh Air

The fresh air intake function provides a refreshing and comfortable experience.

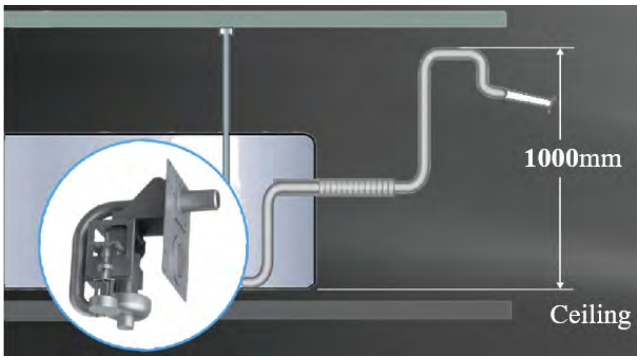


1.5. Wired Controller (Optional)

Compared to infrared remote controllers, the wired controller can be mounted on the wall to prevent it from being misplaced. It is primarily designed for commercial areas, making air conditioning control more convenient.

1.6. Built-in Drain Pump

The drain pump can lift the condensed water up to 3-¼ feet (1,000 mm). It is convenient to install drainage pipes under most conditions. The drainage pipe can be installed on either the left or right side.



Indoor Unit Four-Way Cassette

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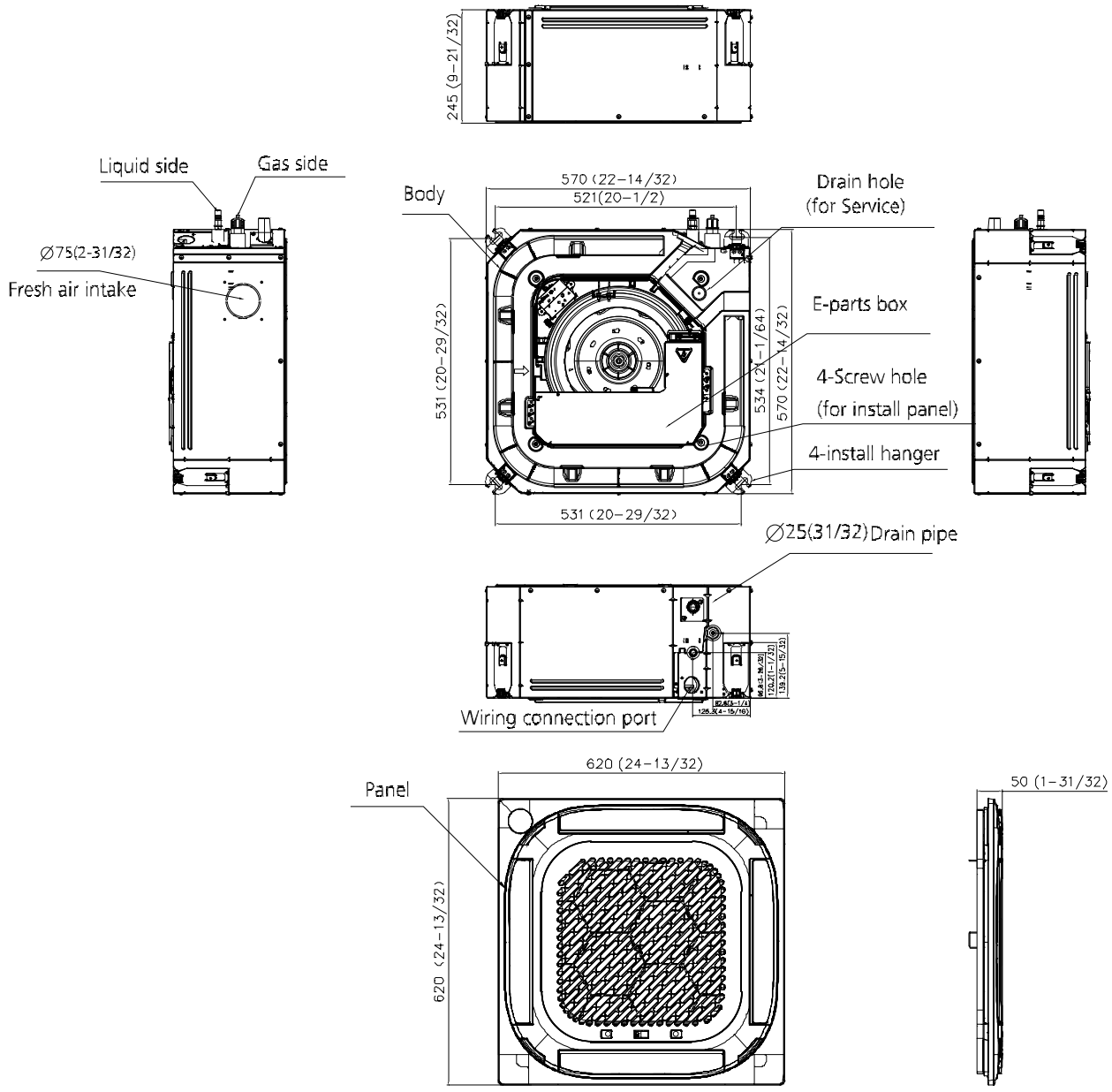
2. Dimensional Drawings

9K-18K



Indoor Unit Four-Way Cassette

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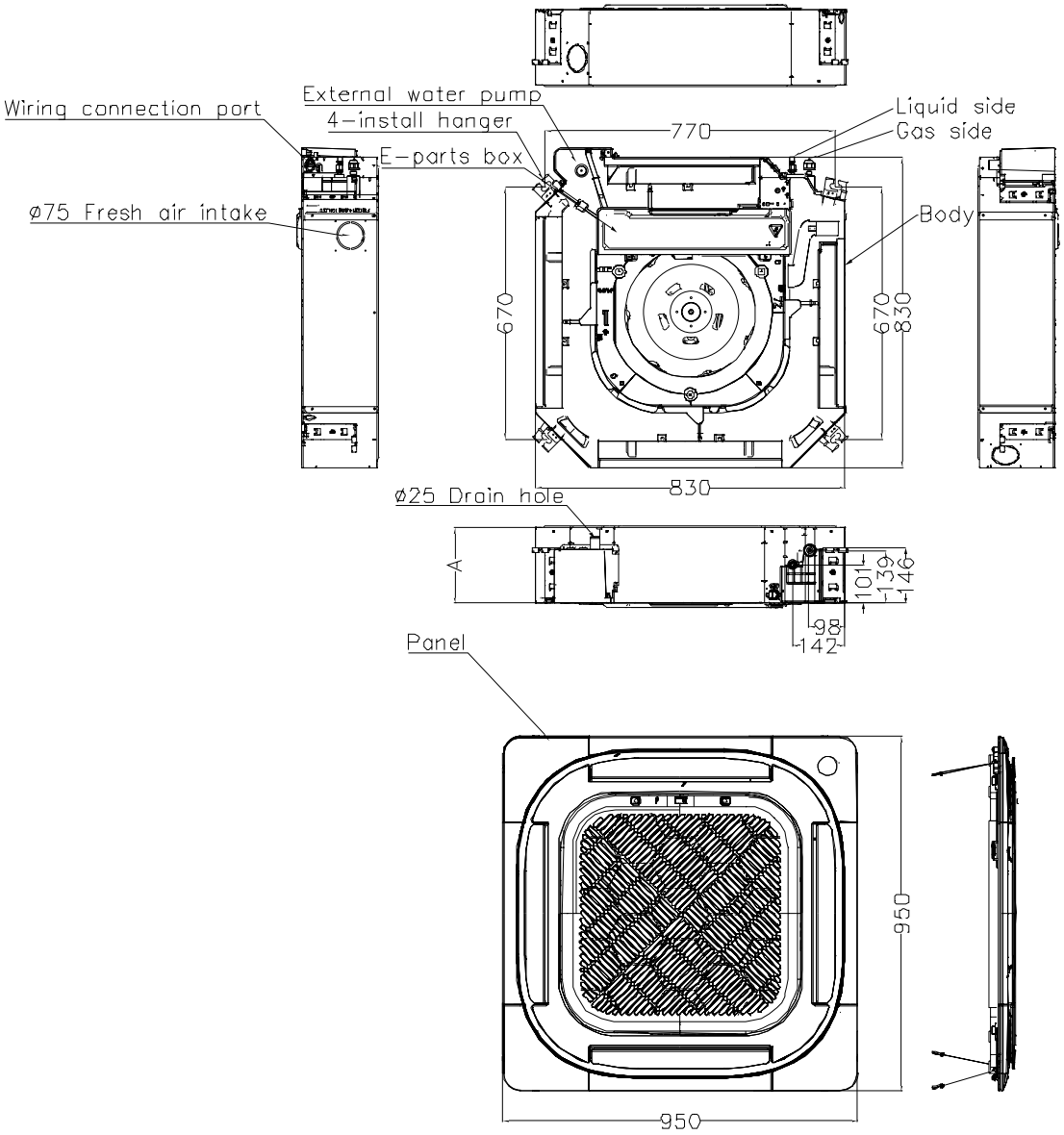

Model (KBtu/h)	Unit	A
24	mm	205
	inch	8-⅛
36	mm	245
	inch	9-⅝
48	mm	287
	inch	11-¼

Indoor Unit Four-Way Cassette

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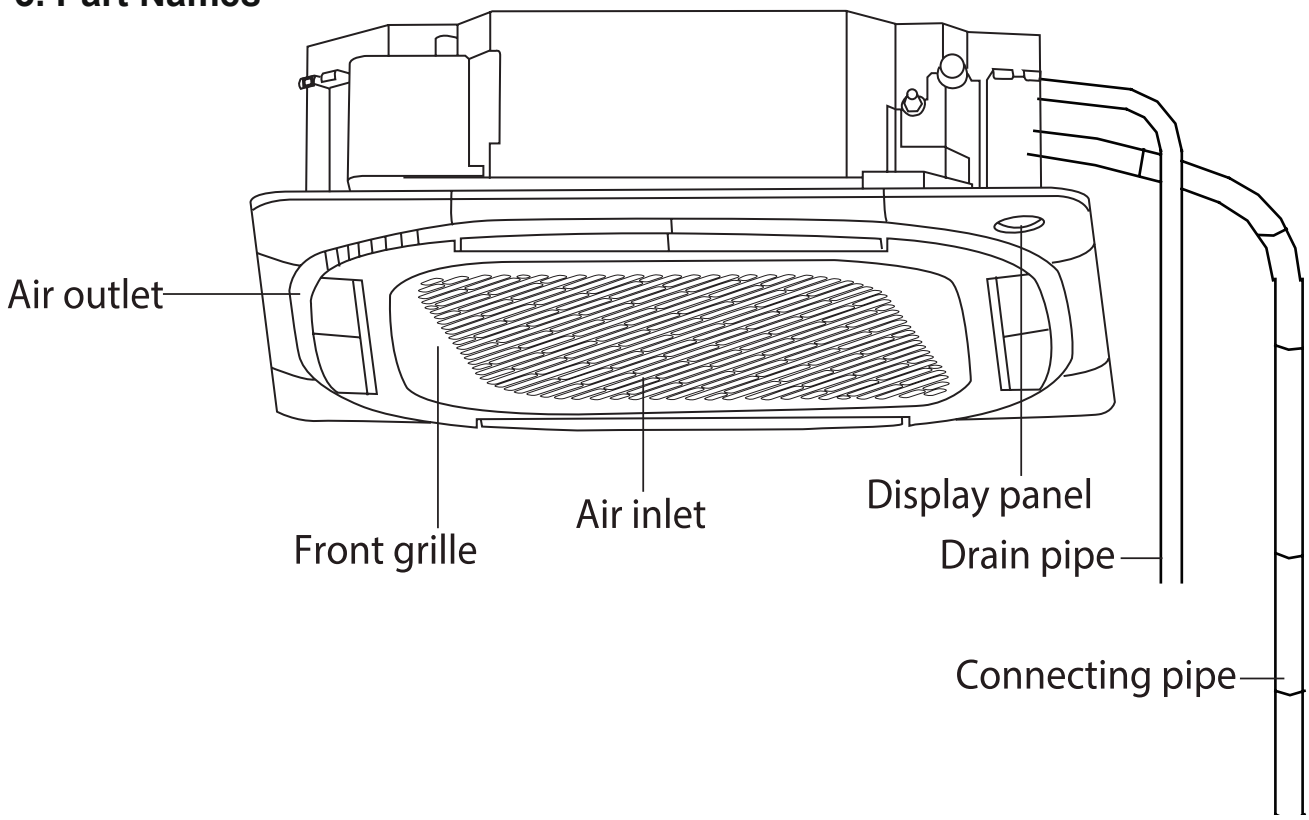
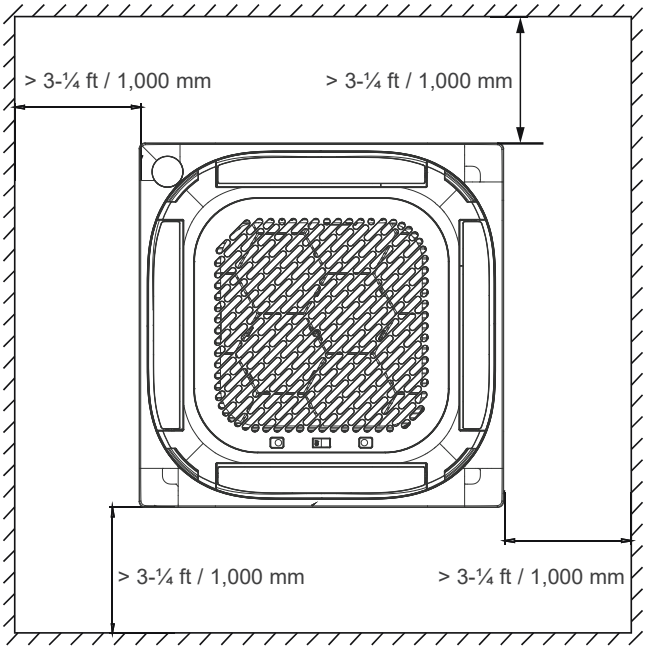
3. Part Names



4. Service Place



Indoor Unit Four-Way Cassette 2

5. Accessories

The air conditioning system comes with the following accessories. Use all of the installation parts and accessories to properly install the air conditioner. Improper installation may result in water leakage, electrical shock, fire, or equipment failure.

Name	Shape	Quantity
Manual		3
Soundproof/insulation sheath (24K/36K/48K)		1
Soundproof/insulation sheath (24K/36K/48K)		1
Outlet pipe sheath (24K/36K/48K)		1
Bolt (24K/36K/48K)		6
Remote controller		1
Magnetic ring (9K/12K/18K)		2
Wireless module cable		1
Remote controller holder (purchase separately)		1
Drain joint		1
Seal ring		1
Copper nut		2
Tapping screws		2 (9K/12K/18K) 6 (24K/36K/48K)
Throat bander (24K/36K/48K)		2
Conduit installation plate		1
Anti-shock rubber		1
Dry battery AAA		2
Rubber block (24K/36K/48K)		1

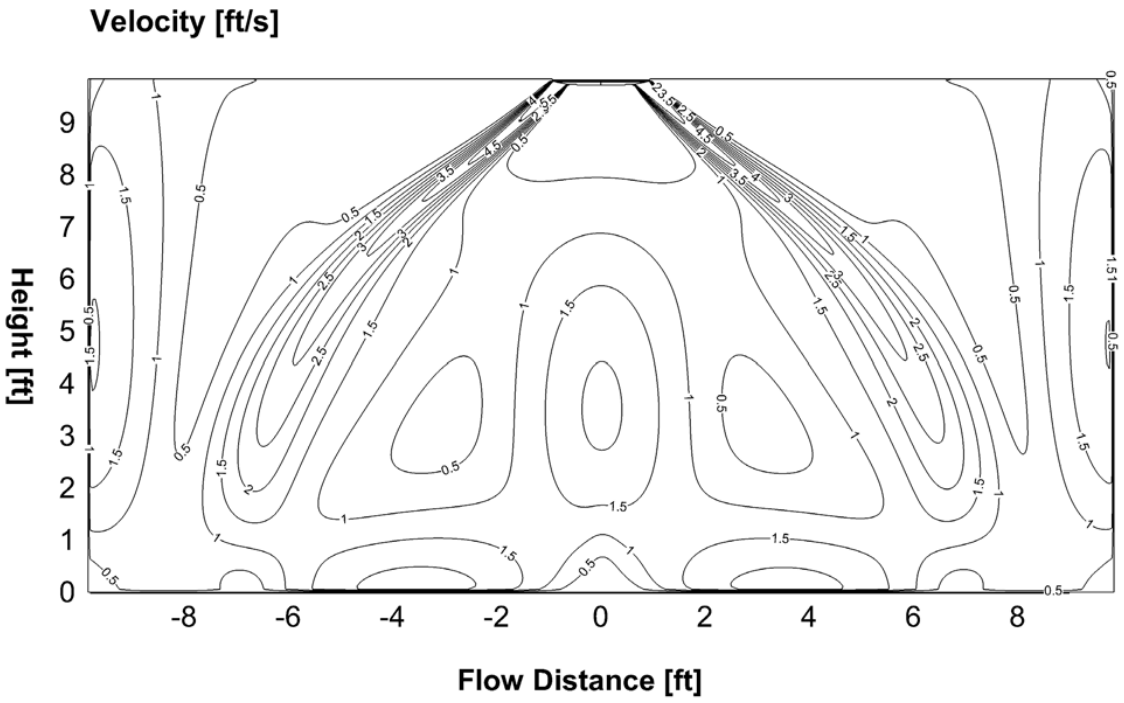
Optional accessories:

- There are two types of remote controllers: wired and wireless.
- Select a remote controller based on the customer's preferences and requirements, and install in an appropriate place.
- Refer to the catalogs and technical literature for guidance on selecting a suitable remote controller.

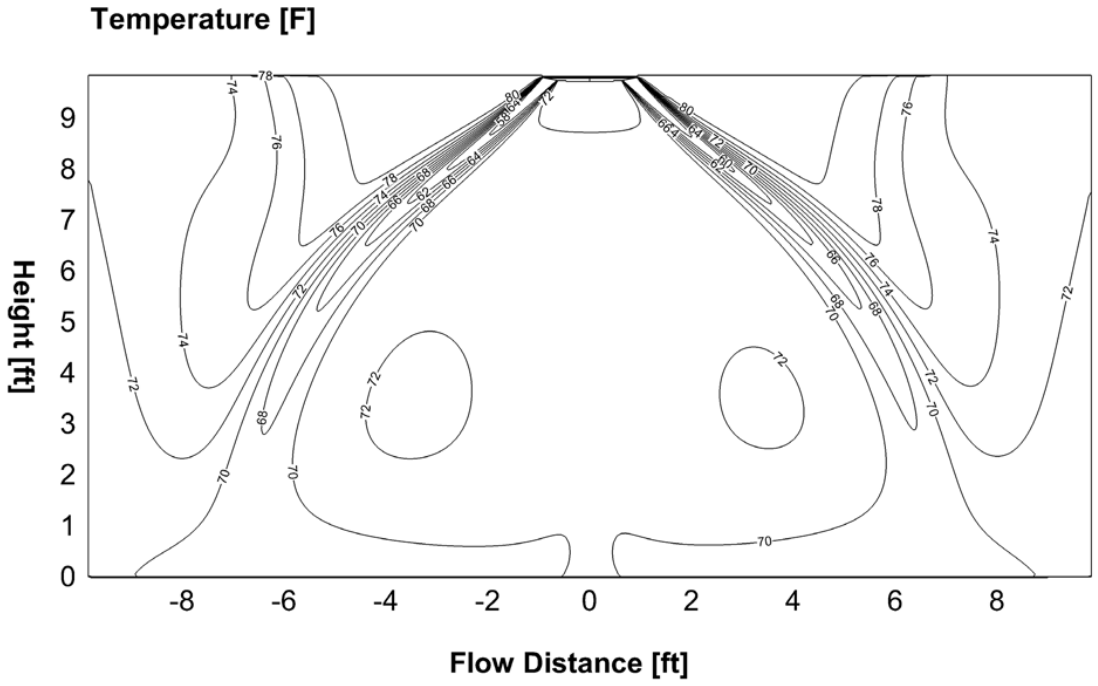
Indoor Unit Four-Way Cassette 2

6. Air Velocity & Temperature Distributions

9K: Discharge angle 50°
Cooling airflow velocity distributions



Cooling temperature distributions



Indoor Unit Four-Way Cassette

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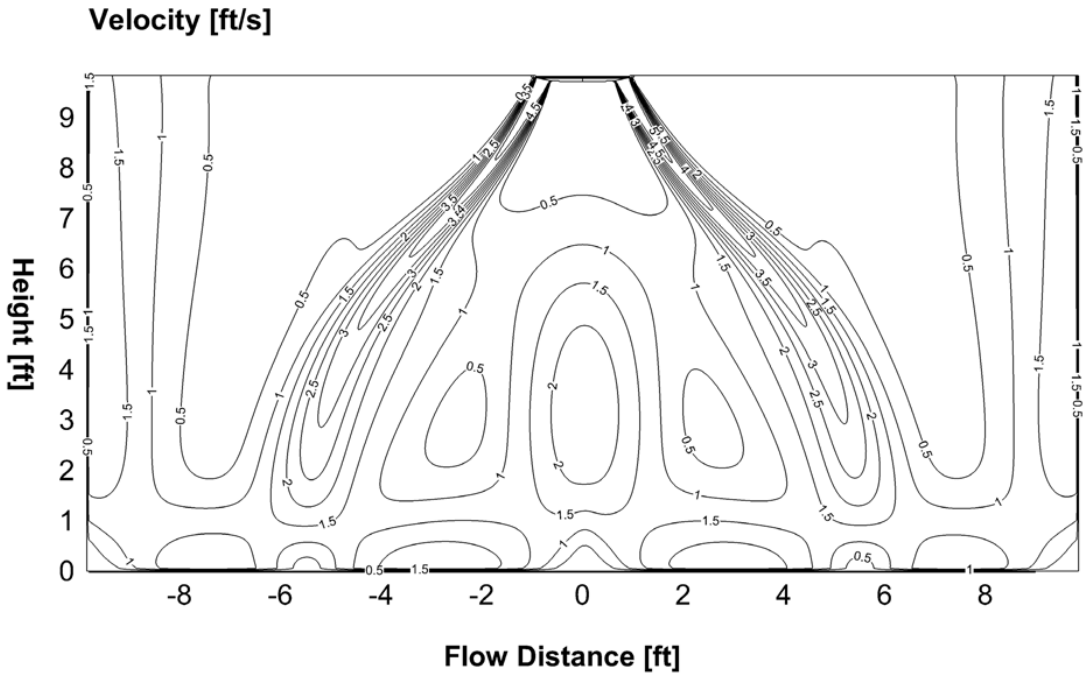
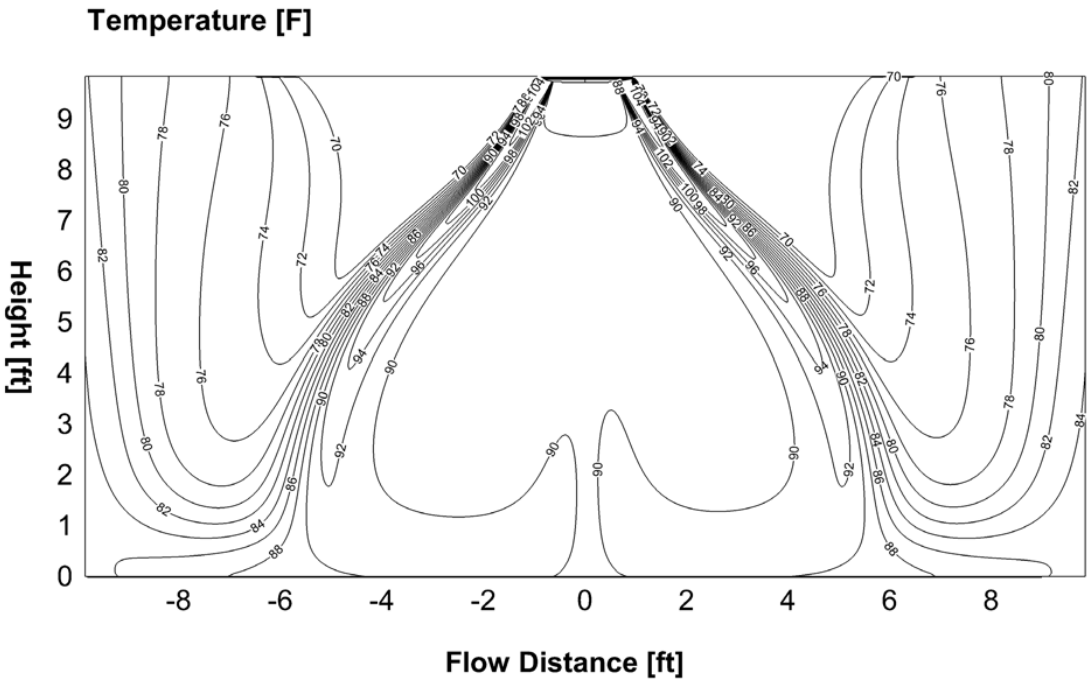
9K: Discharge angle 65°
Heating airflow velocity distributions



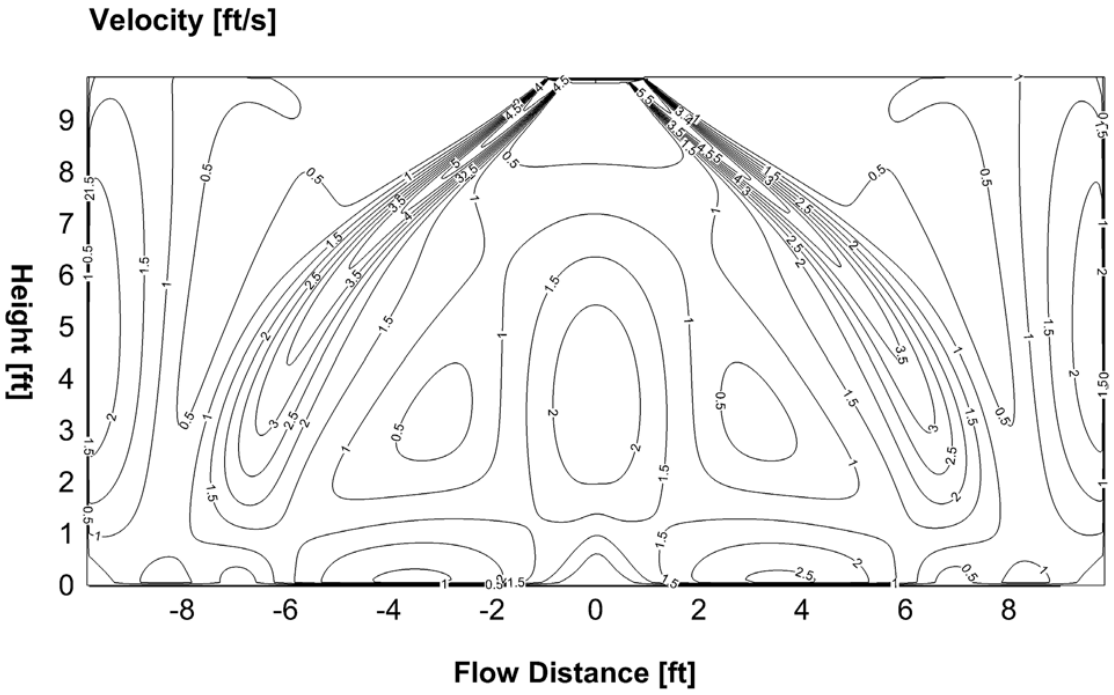
Heating temperature distributions



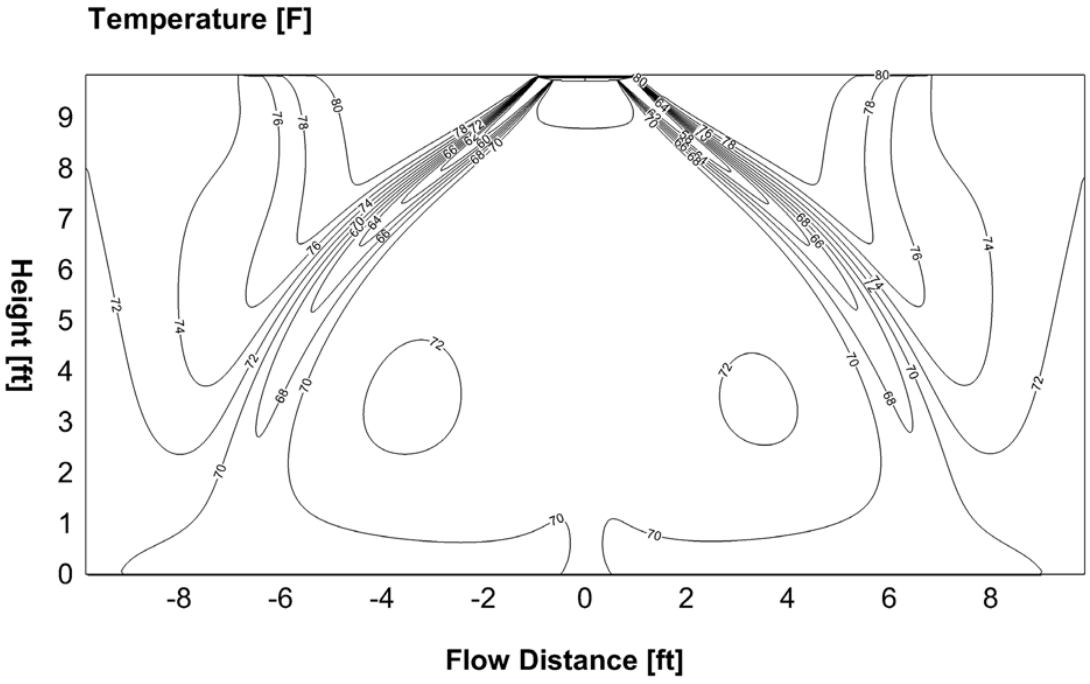
Indoor Unit Four-Way Cassette

2

12K: Discharge angle 50°
Cooling airflow velocity distributions



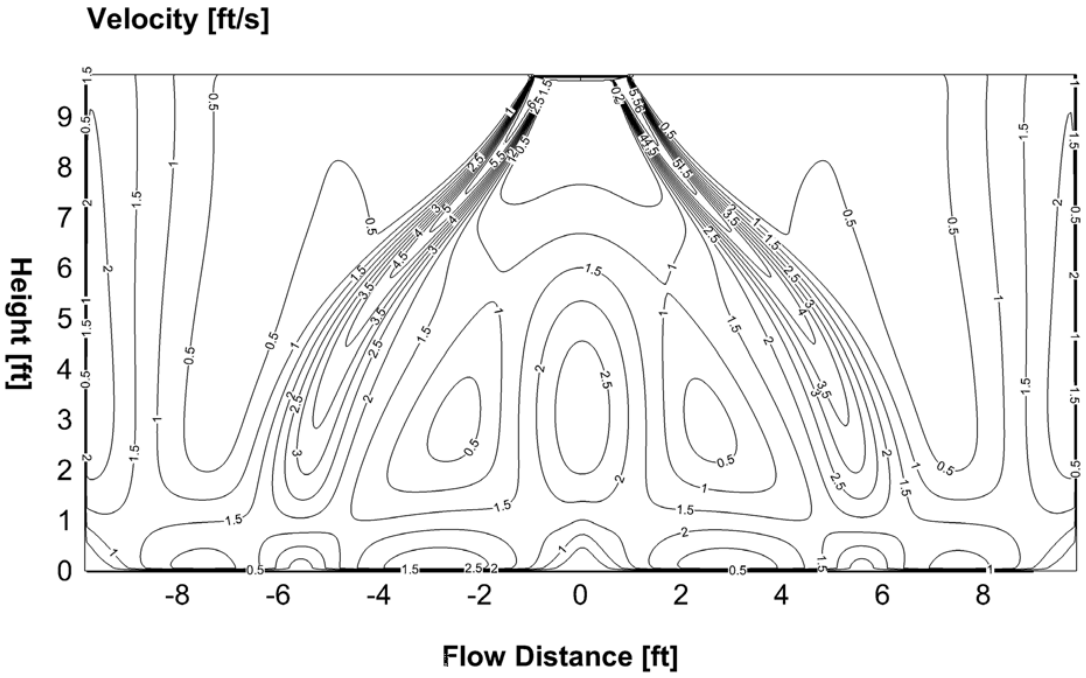
Cooling temperature distributions



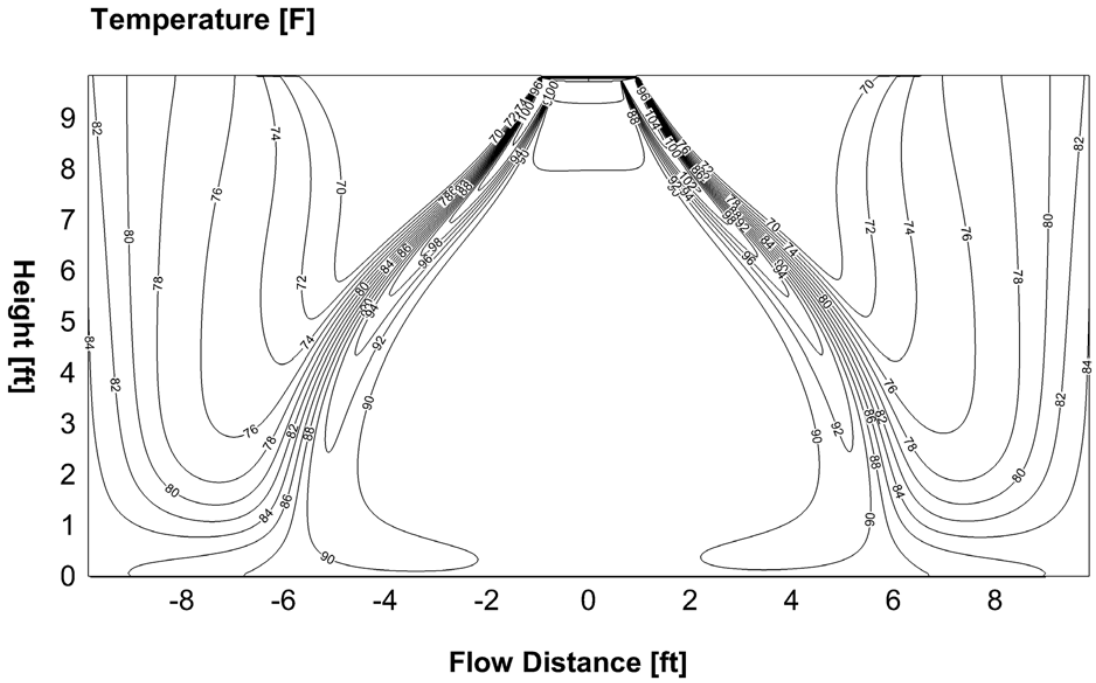
Indoor Unit Four-Way Cassette

2

12K: Discharge angle 65°
Heating airflow velocity distributions



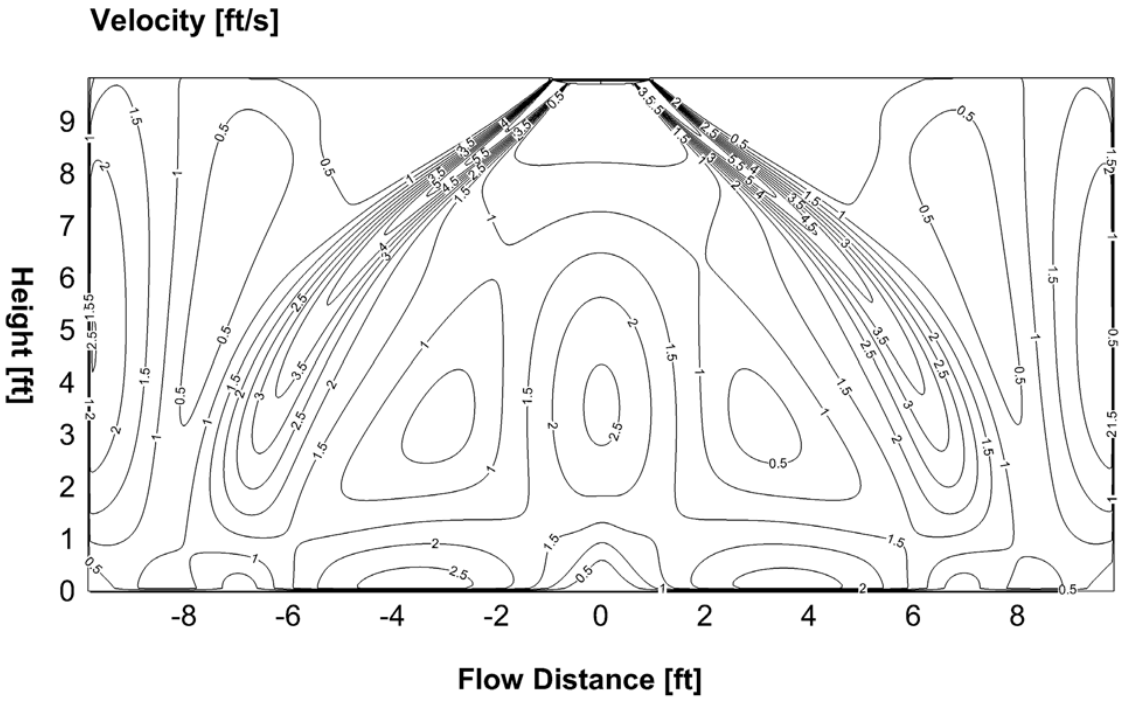
Heating temperature distributions



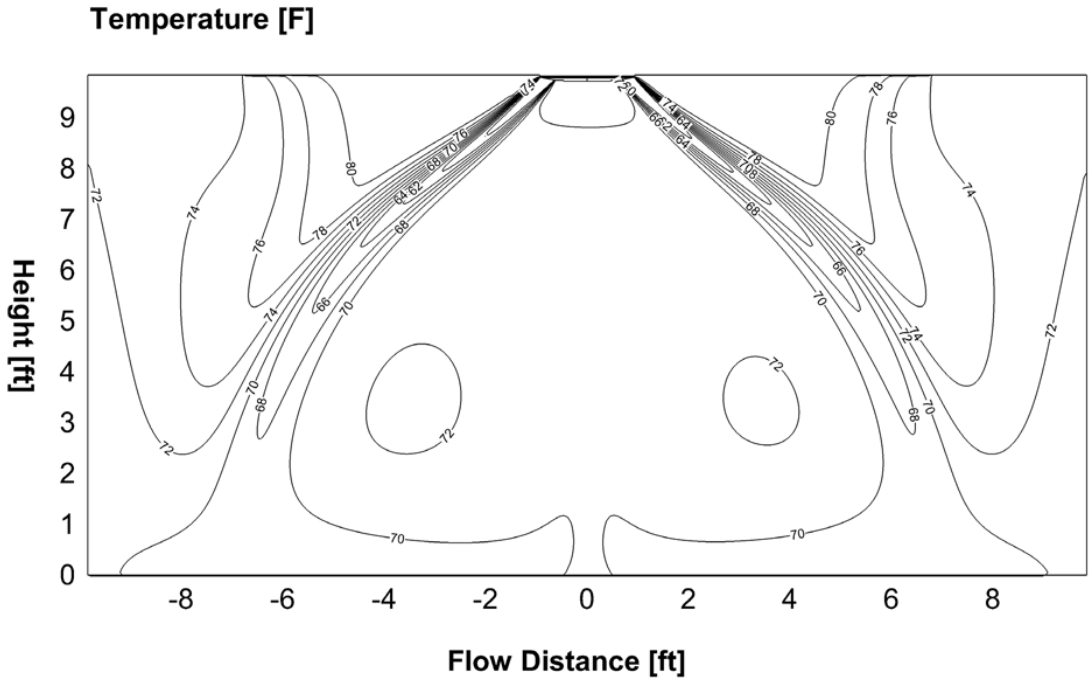
Indoor Unit Four-Way Cassette

2

18K: Discharge angle 50°
Cooling airflow velocity distributions



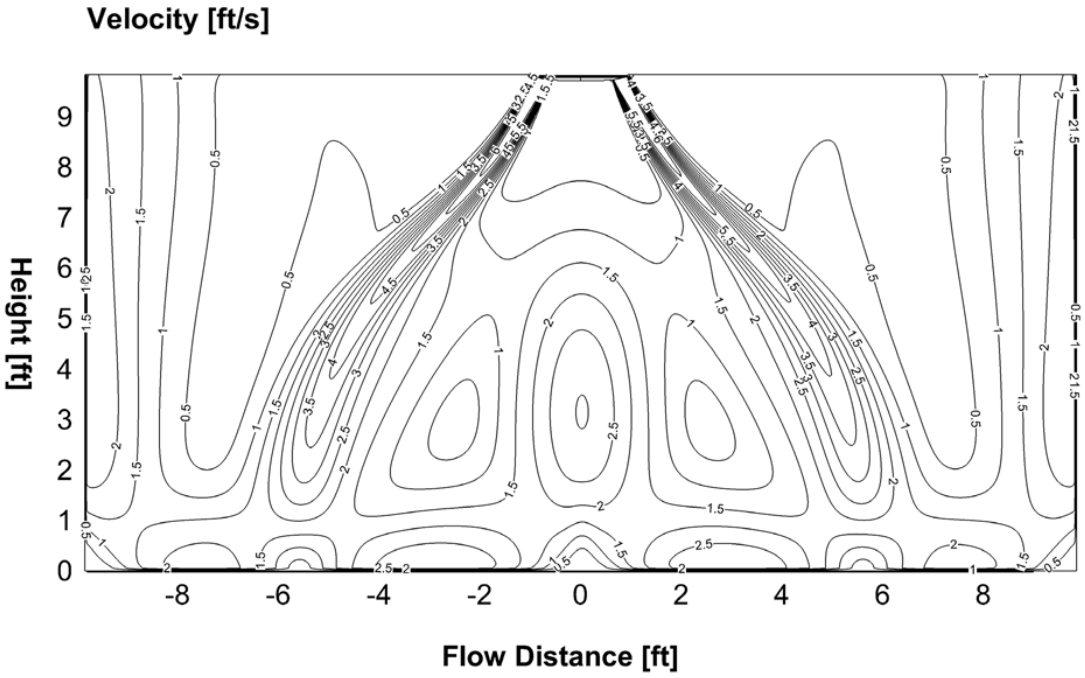
Cooling temperature distributions



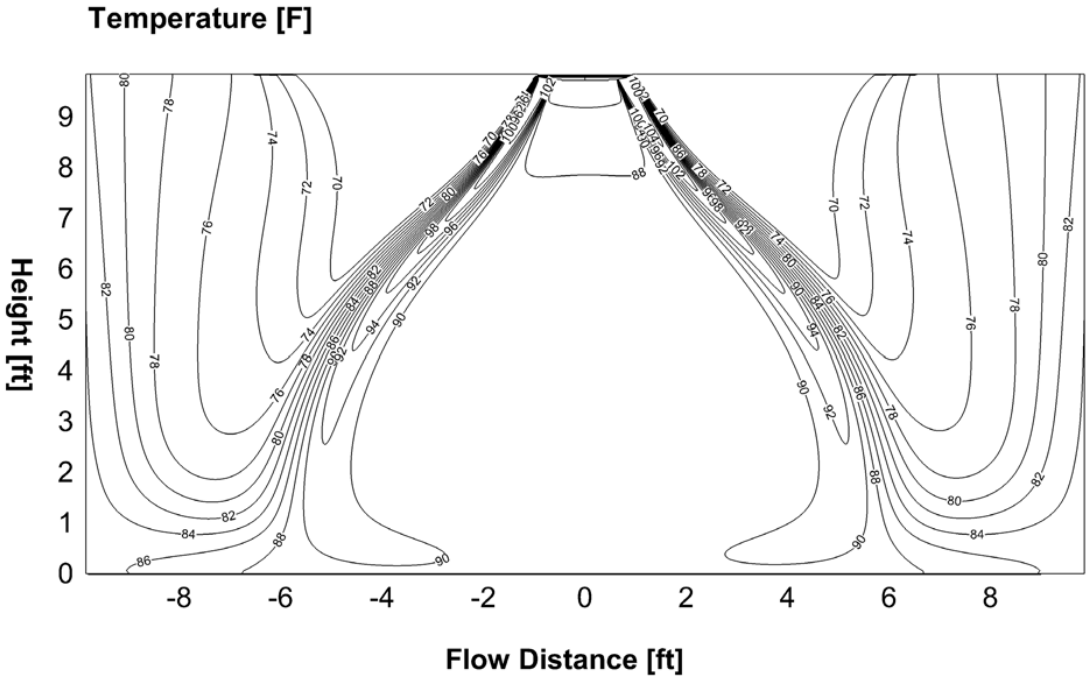
Indoor Unit Four-Way Cassette

2

18K: Discharge angle 65°
Heating airflow velocity distributions



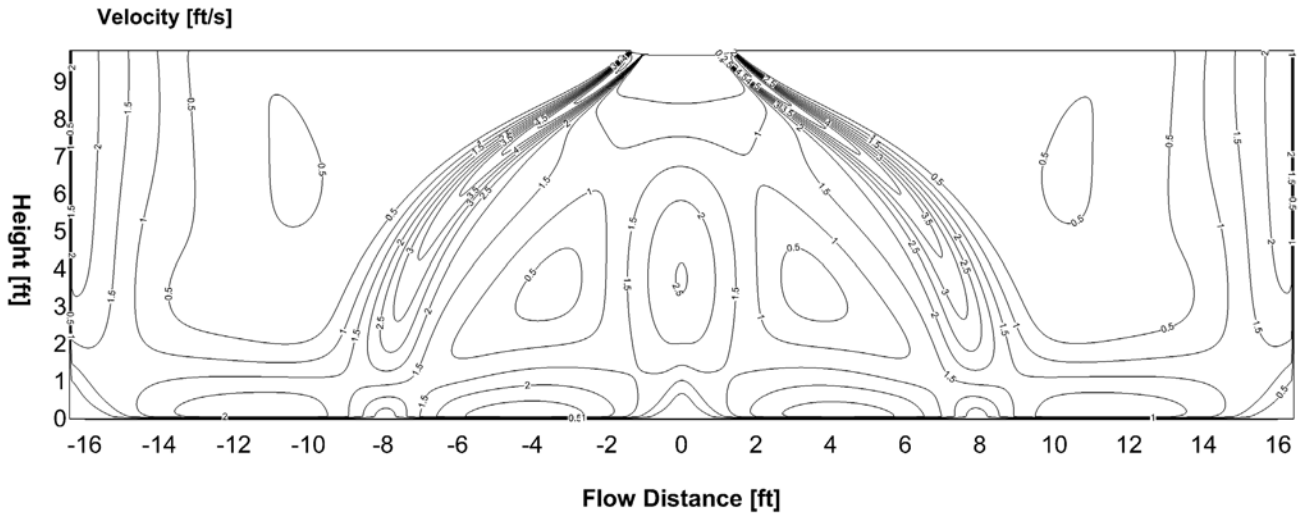
Heating temperature distributions



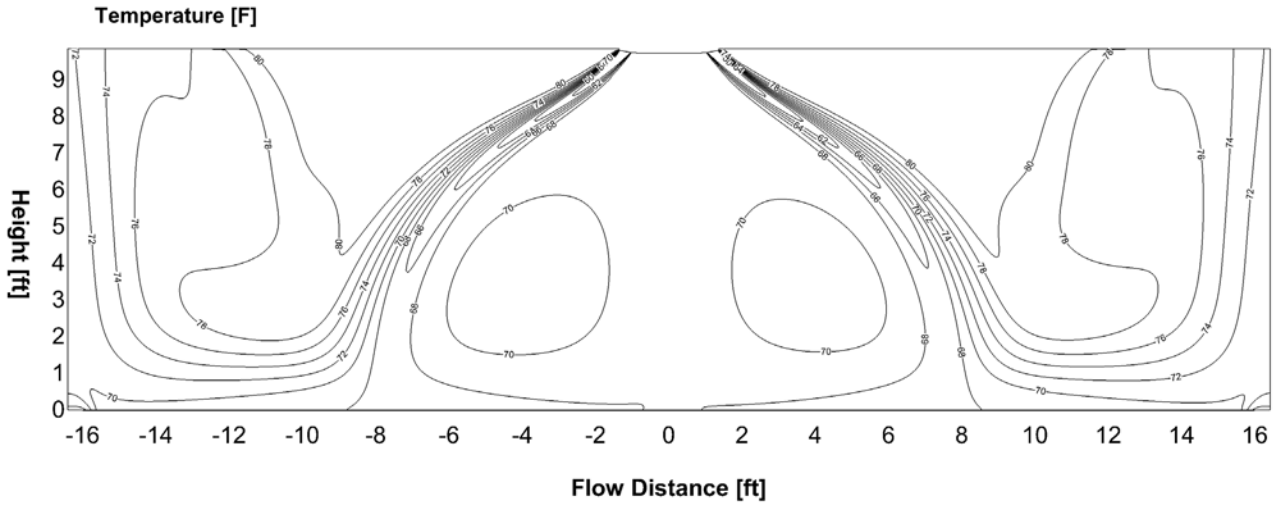
Indoor Unit Four-Way Cassette

2

24K: Discharge angle 50°
Cooling airflow velocity distributions



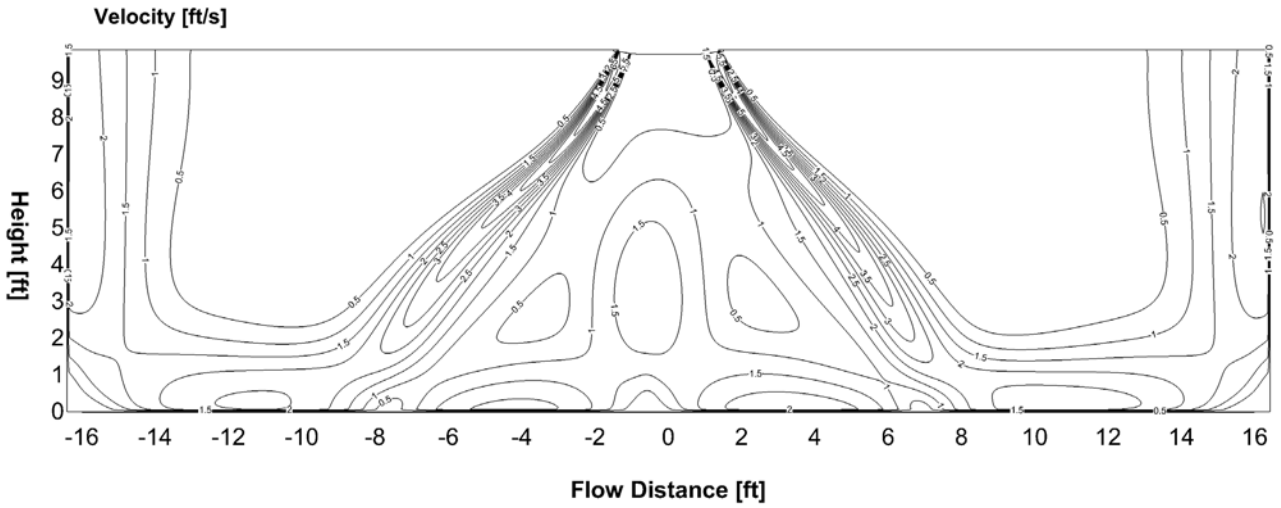
Cooling temperature distributions



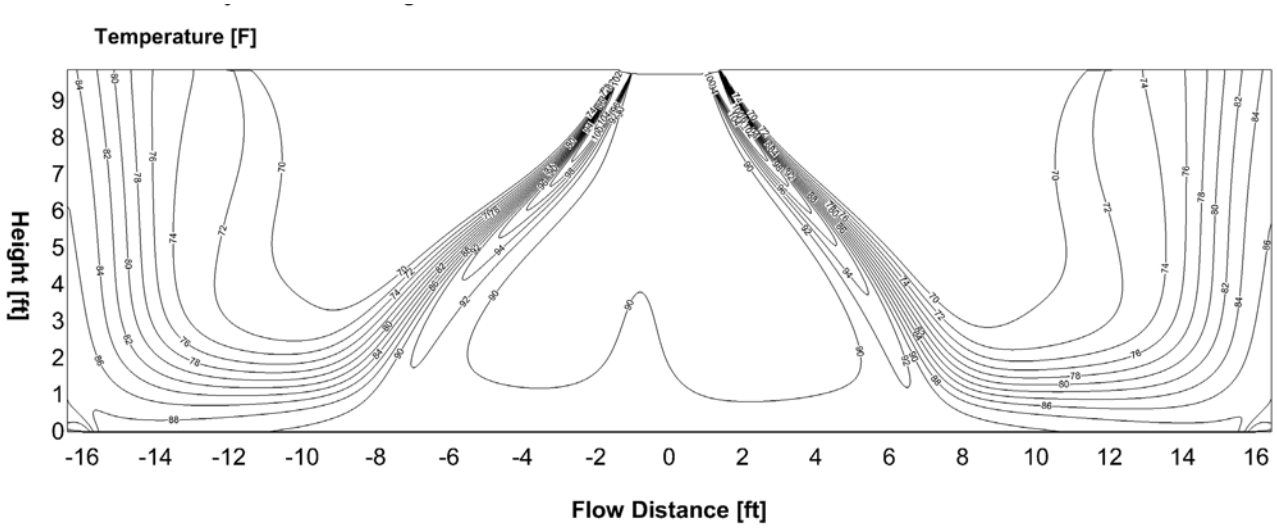
Indoor Unit Four-Way Cassette

2

24K: Discharge angle 65°
Heating airflow velocity distributions



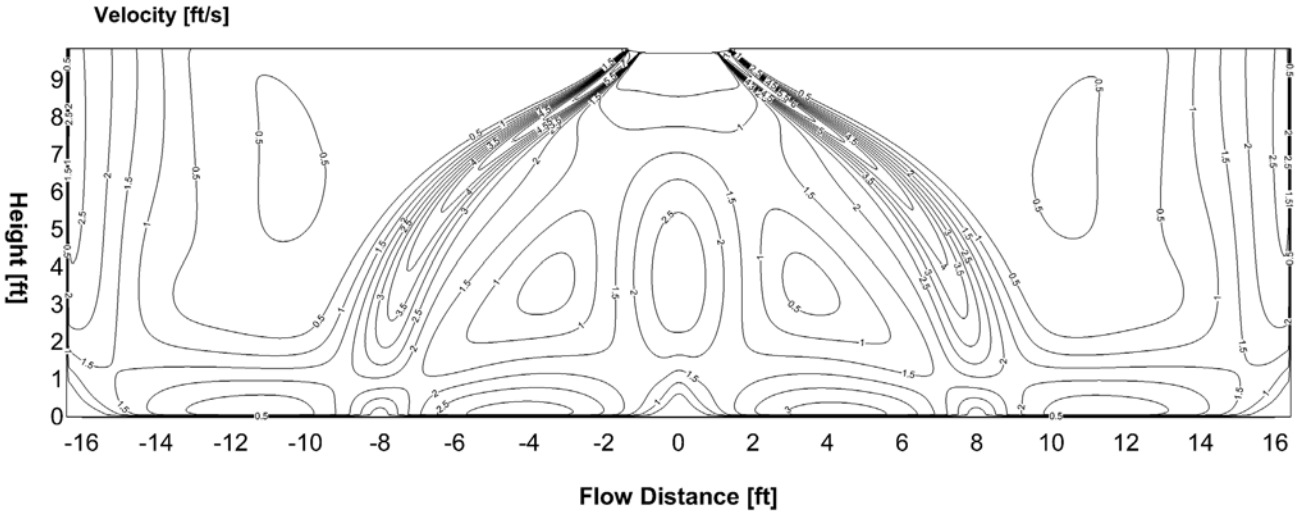
Heating temperature distributions



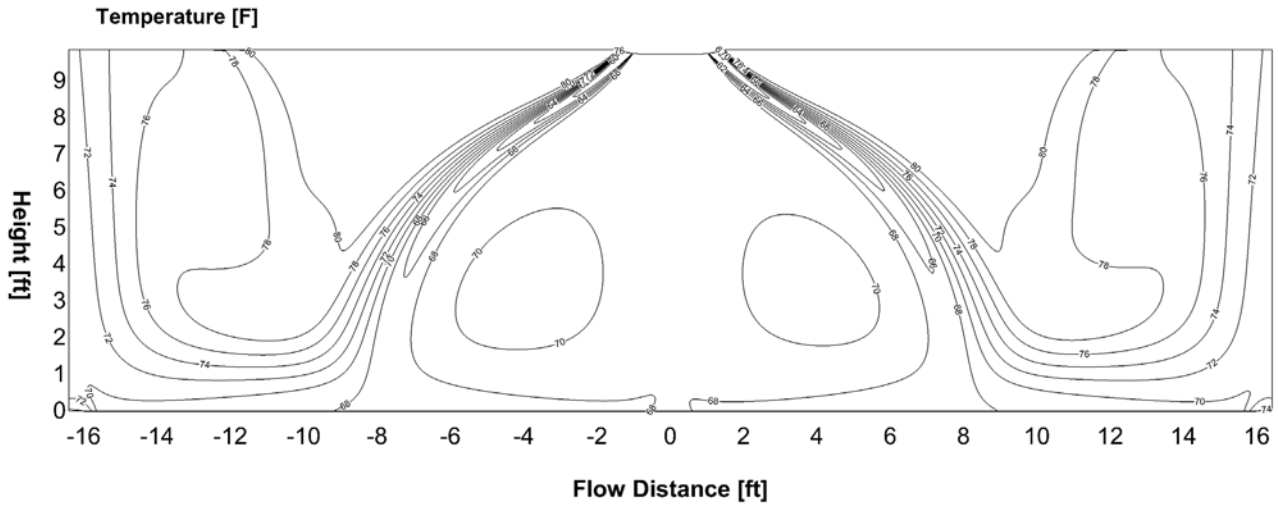
Indoor Unit Four-Way Cassette

2

36K: Discharge angle 50°
Cooling airflow velocity distributions



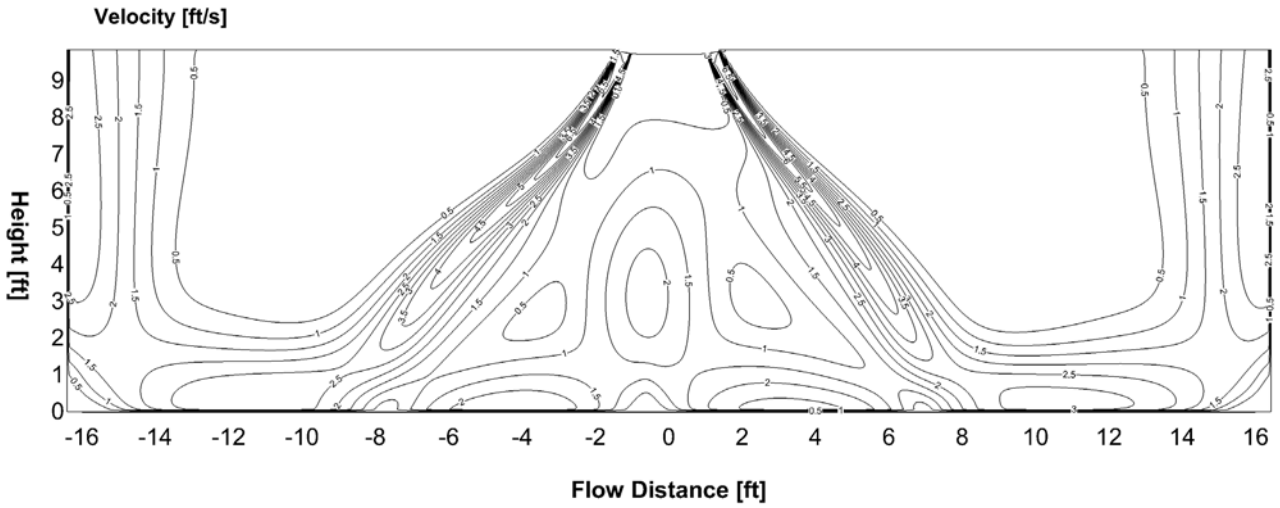
Cooling temperature distributions



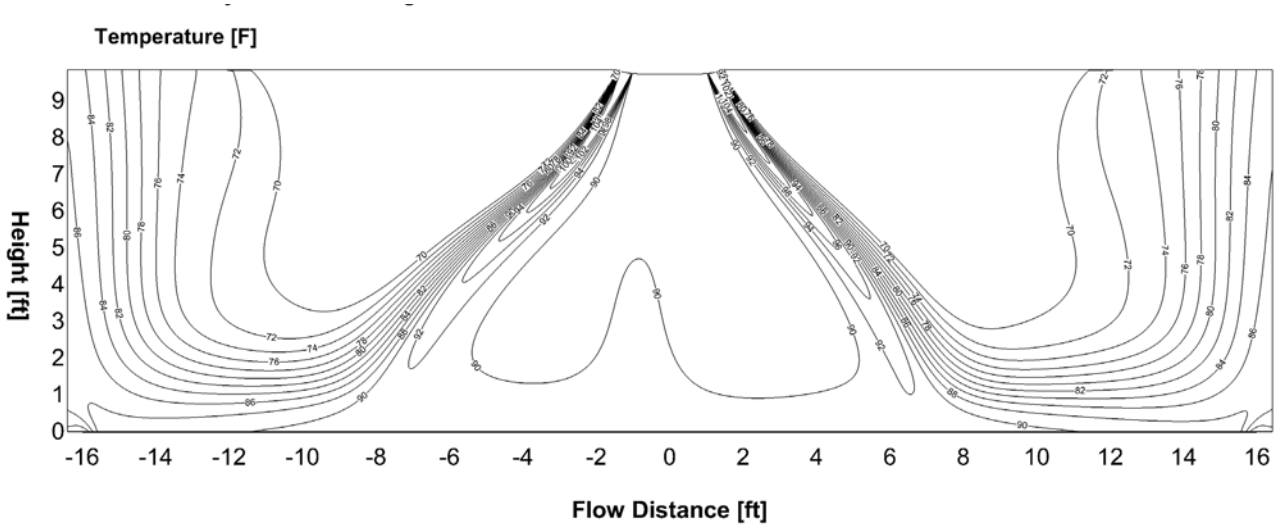
Indoor Unit Four-Way Cassette

2

36K: Discharge angle 65°
Heating airflow velocity distributions



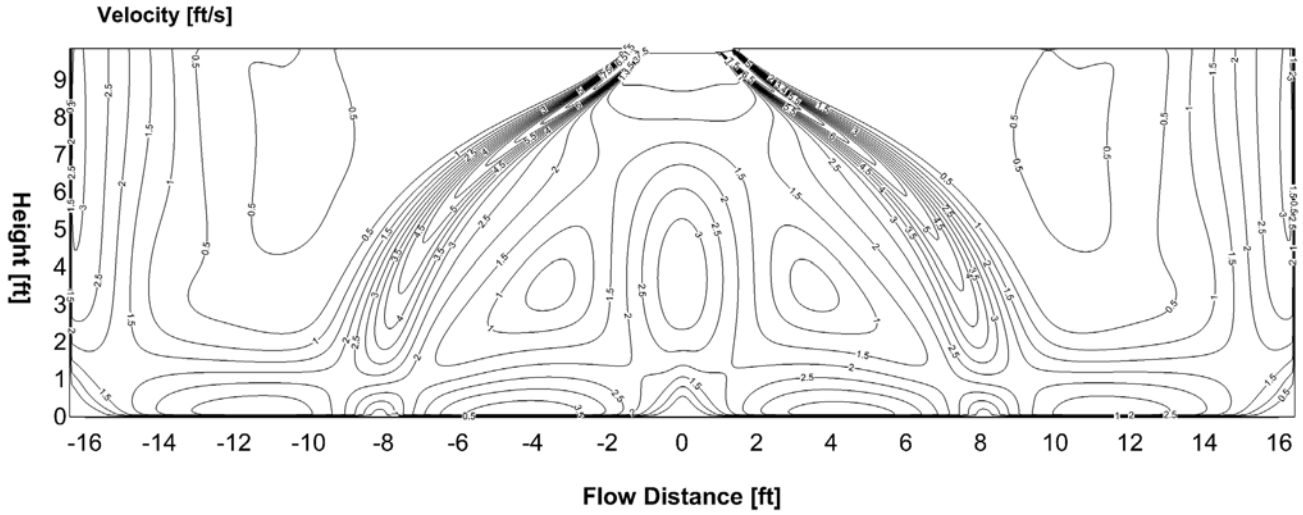
Heating temperature distributions



Indoor Unit Four-Way Cassette

2

48K: Discharge angle 50°
Cooling airflow velocity distributions

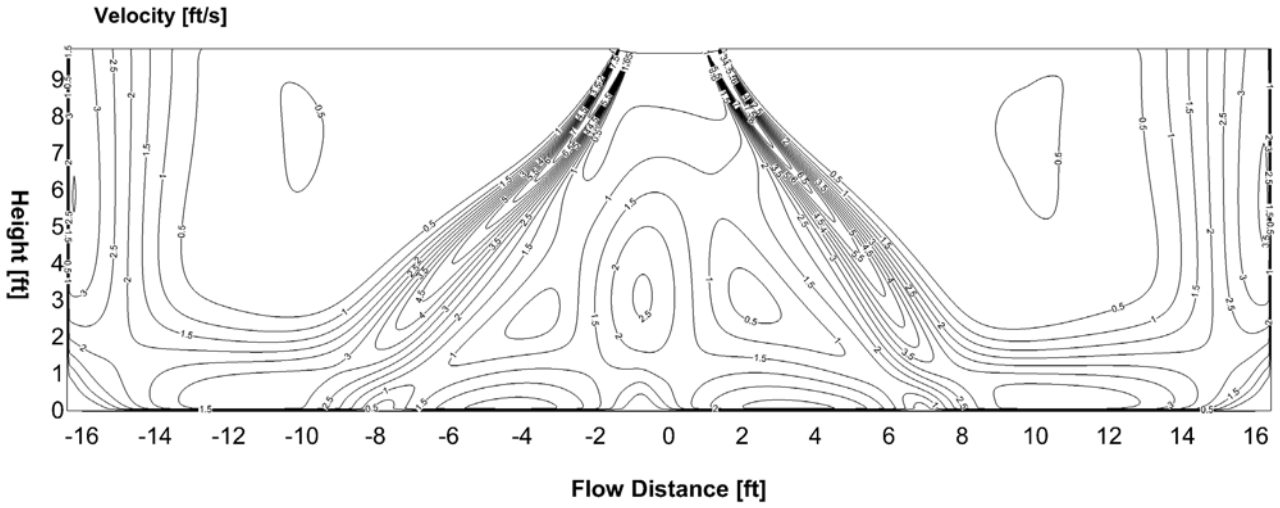


Cooling temperature distributions

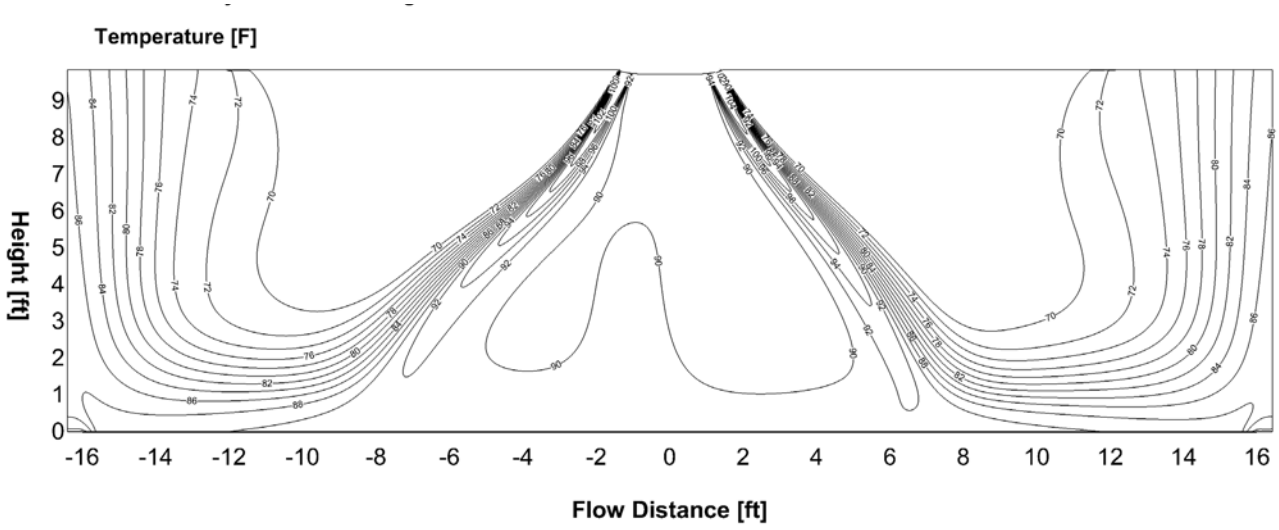
Indoor Unit Four-Way Cassette

2

48K: Discharge angle 65°
Heating airflow velocity distributions



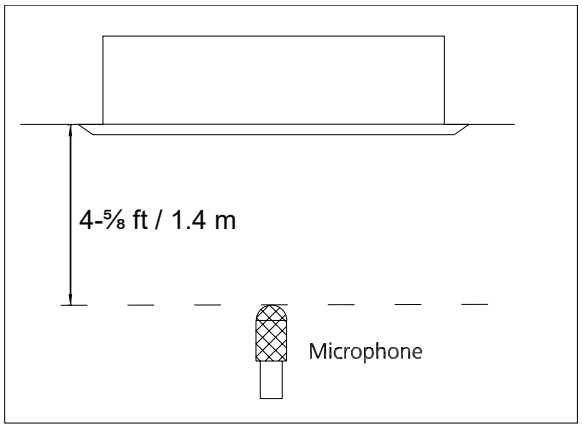
Heating temperature distributions



Indoor Unit Four-Way Cassette 2

7. Sound Pressure Levels

7.1. Sound Pressure Level

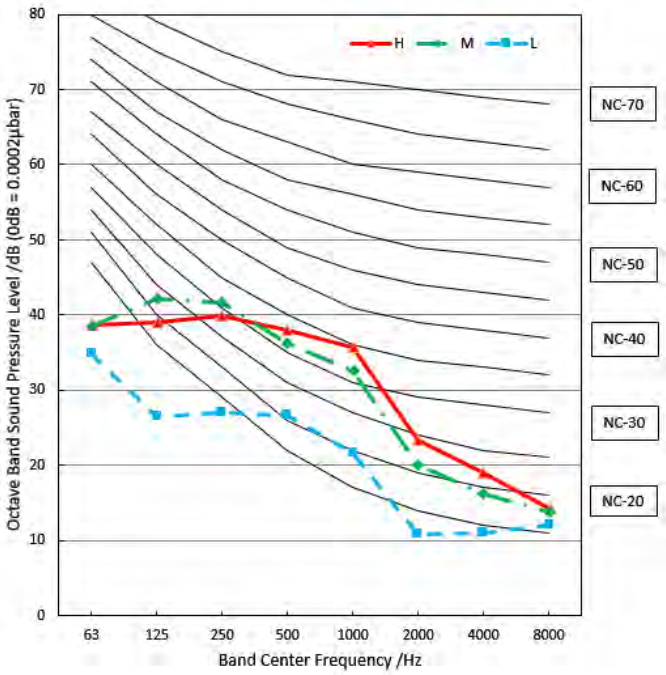


Notes:

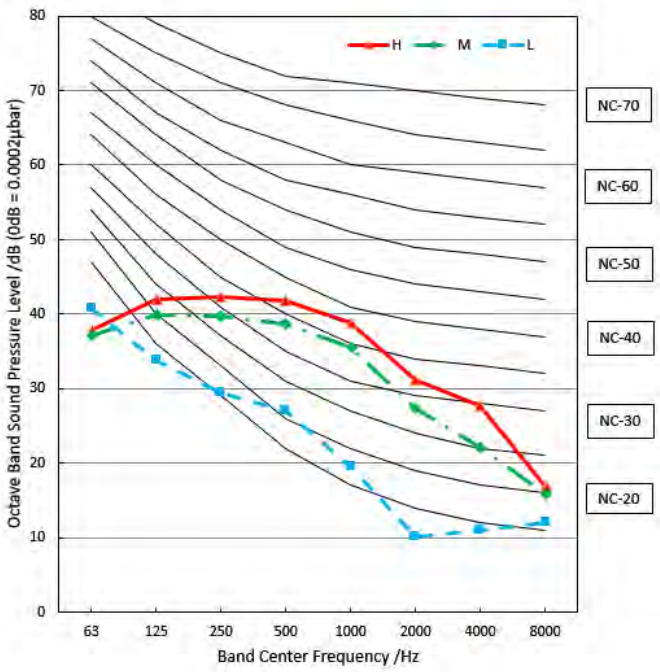
- The sound is measured 4-⅝ feet (1.4 m) away from the noisiest location of the unit.
- Data is valid at a nominal operation condition.
- Reference acoustic pressure OdB = 20μPa.
- Sound levels may vary depending on factors such as the room's construction where the equipment is installed.

7.2. NC Curves

9K



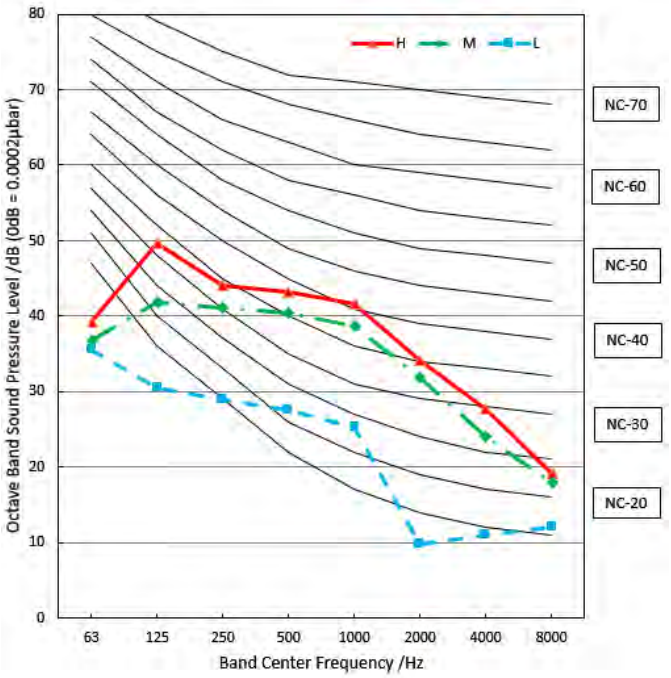
12K



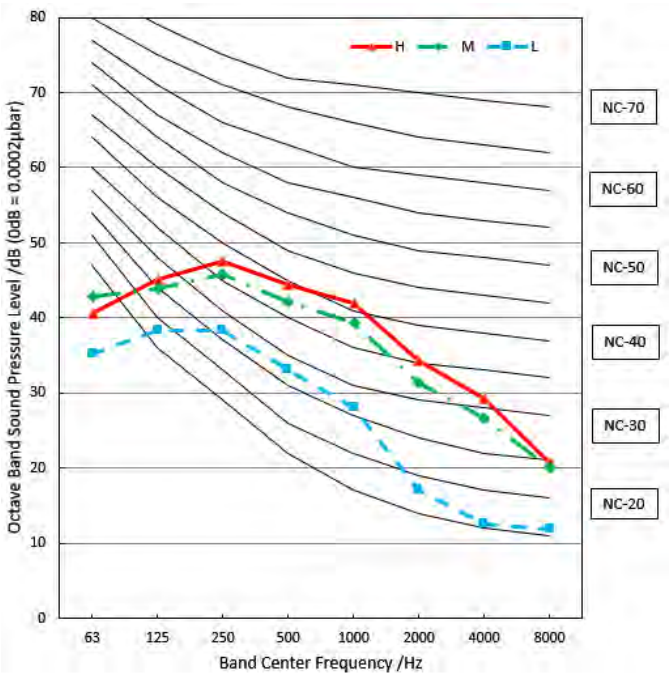
Indoor Unit Four-Way Cassette

2

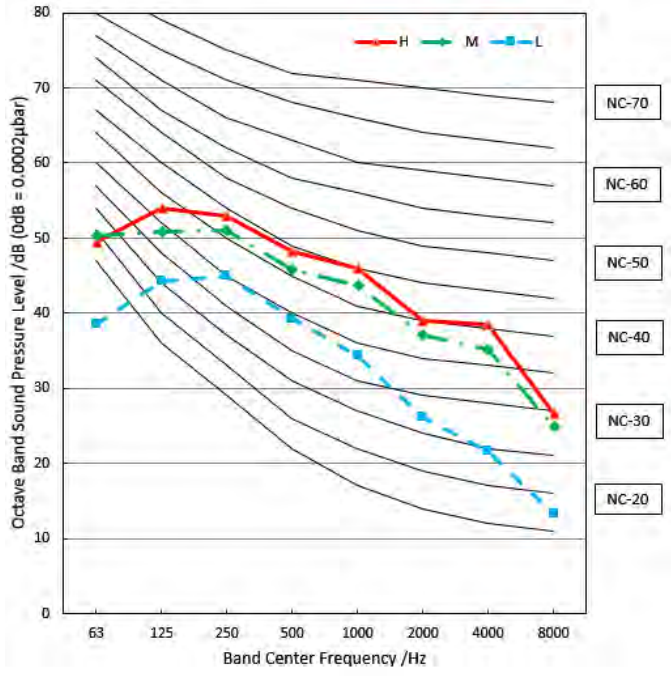
18K



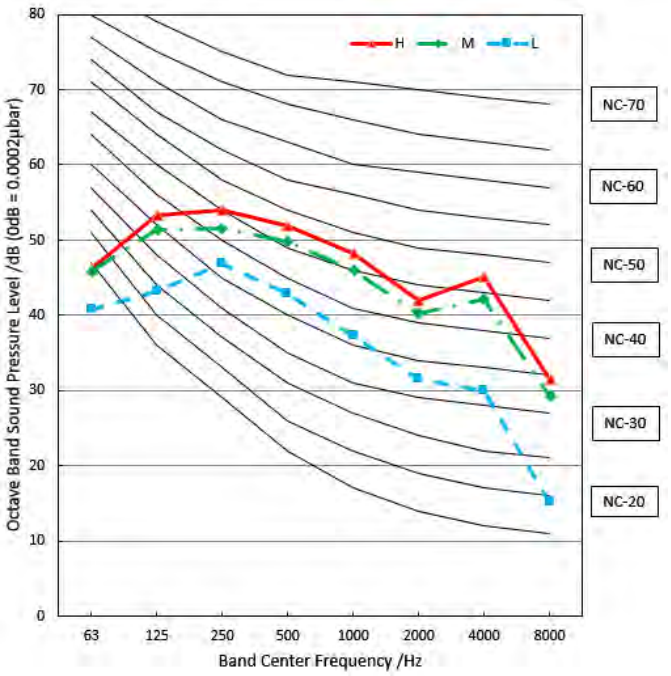
24K



36K



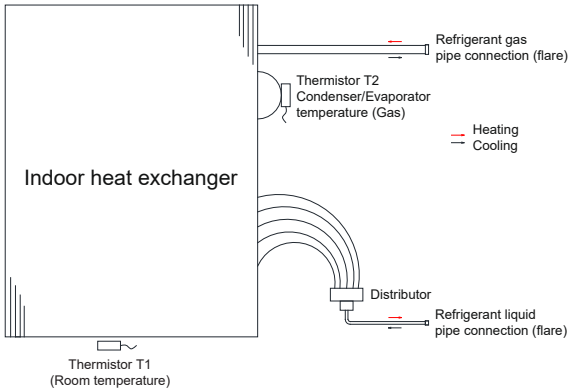
48K



Indoor Unit Four-Way Cassette

2

8. Refrigerant System Diagram



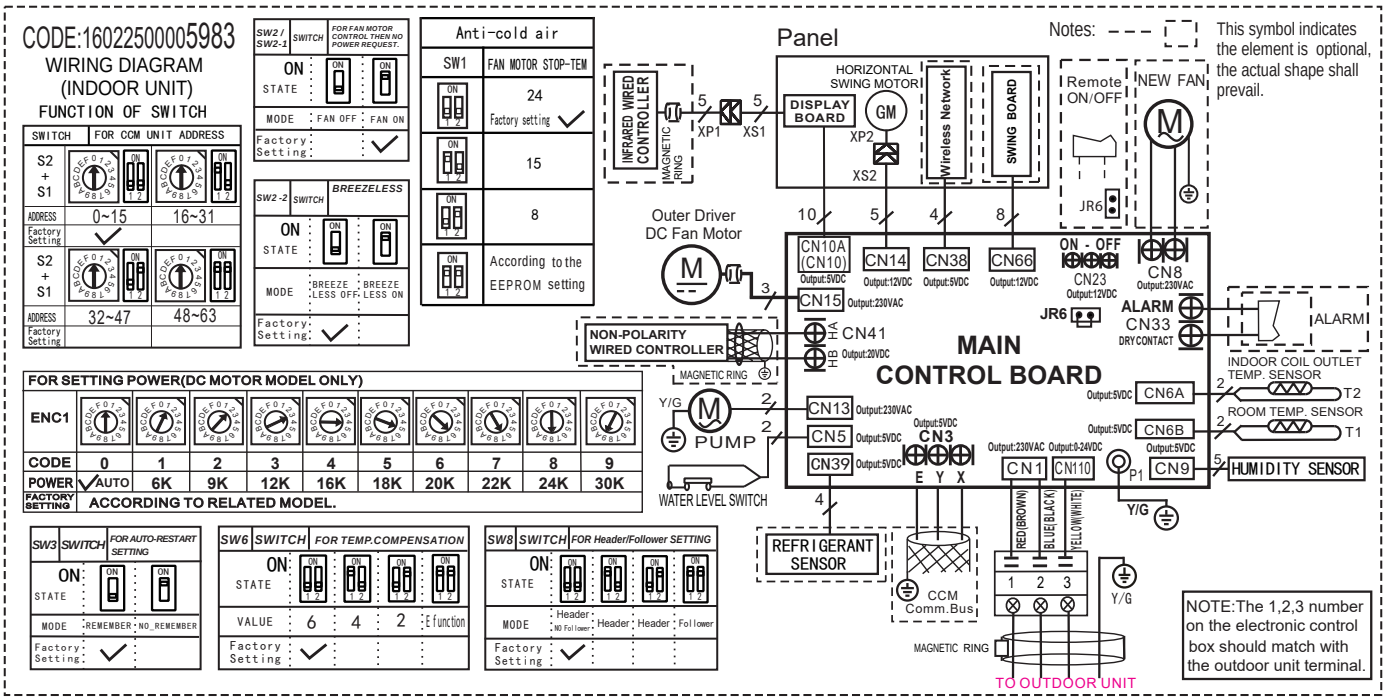
9. Electrical Characteristics

-

Indoor Model		9K~48K
Power	Phase	1
	Frequency & Voltage	208/230V, 60Hz
Minimum Circuit Ampacity	A	3
Max Fuse	A	15

10. Electrical Wiring Diagrams

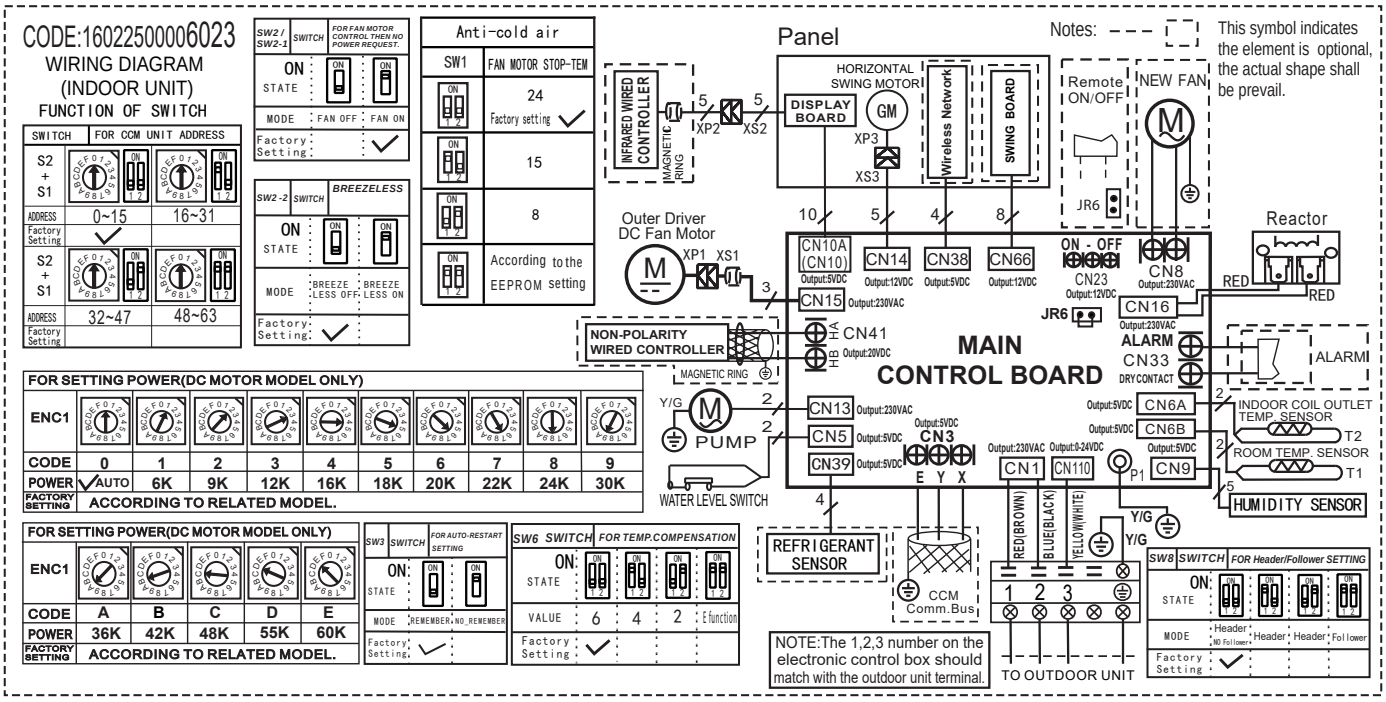
9K~18K



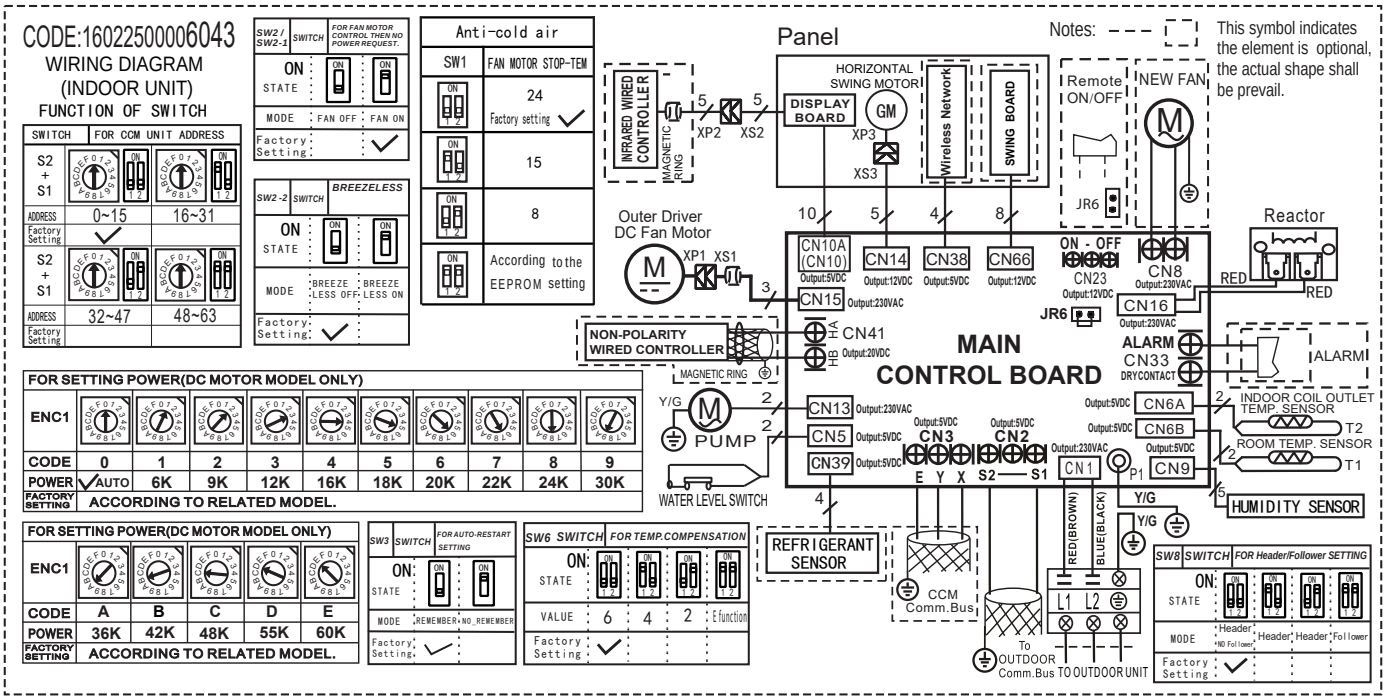
Indoor Unit Four-Way Cassette

2

24K



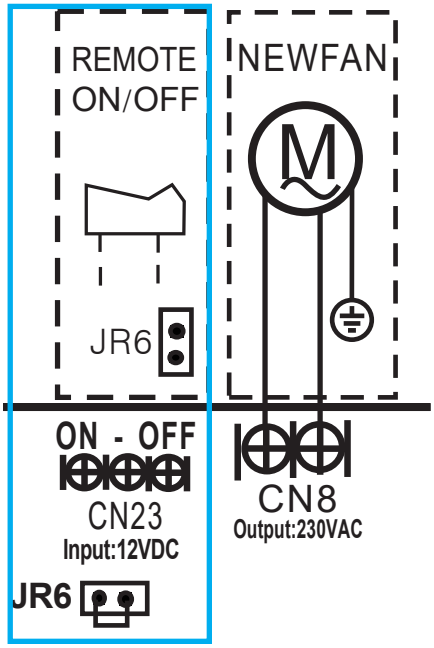
36K~48K



Indoor Unit Four-Way Cassette

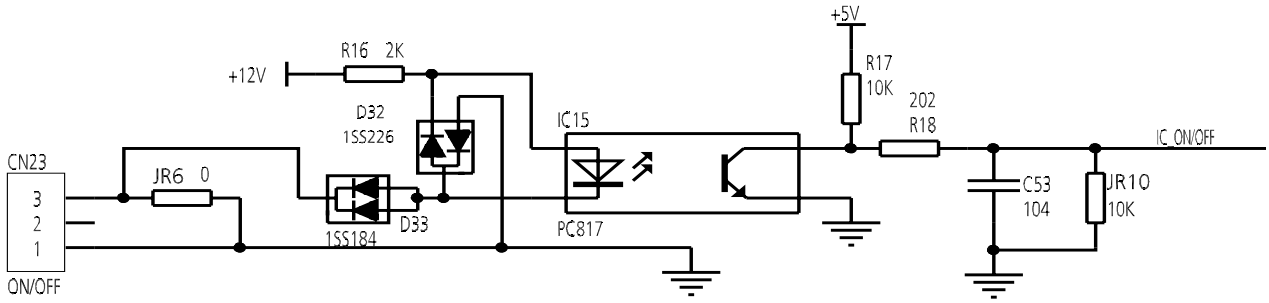
2

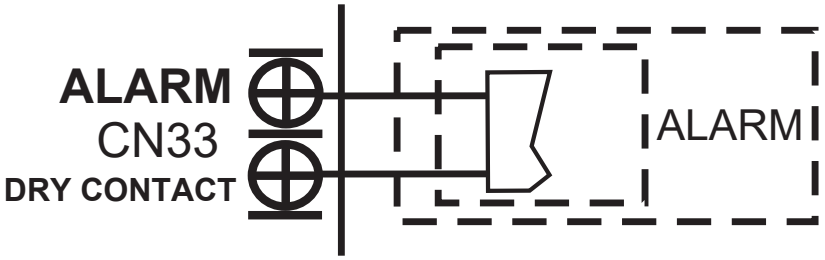
10.1. Connectors Introduction



A. For the remote control (On-Off) terminal port CN23 and JR6 short connector.

1. Remove the JR6 short connector when using the On-Off function.
2. When the remote switch is off (open); the unit will be off.
3. When the remote switch is on (close); the unit will be on.
4. When closing or opening the remote switch, the unit will respond to the demand within 2 seconds.
5. When the remote switch is on, users can use the remote or wire controller to select the mode they want. When the remote switch is off, the unit will not respond to the demand from the remote or wire controller.
6. The voltage of the port is 12V DC. The design maximum current is 5mA.



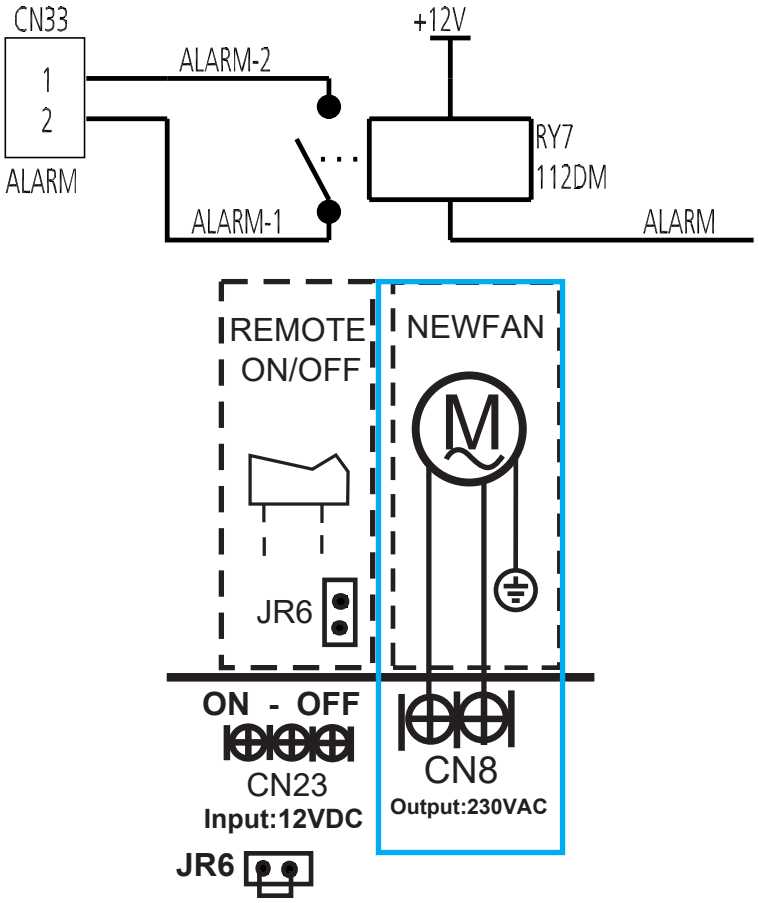


Indoor Unit Four-Way Cassette

2

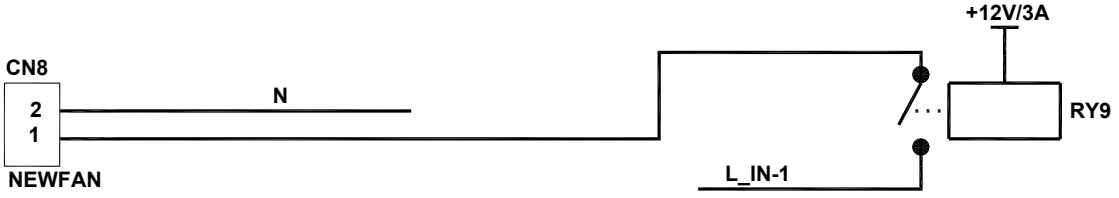
B. For the alarm terminal port CN33.

1. Connect the alarm to the terminal port, ensuring the port is de-energized. Power must be supplied by the alarm system rather than the unit.
2. While the design can handle higher voltages, we recommend a power supply of less than 24V and 0.5A.
3. When the unit encounters an issue, the relay closes and triggers the alarm.



C. For the new fresh motor terminal port CN8.

1. Connect the fan motor to the port.
2. The output voltage is the power supply.
3. The fresh motor cannot exceed 200W or 1A. Follow the smaller one.
4. The fresh motor will operate when the indoor fan motor operates. When the indoor fan motor stops, the fresh motor will also stop.
5. When the unit enters Forced Cooling mode or Capacity Testing mode, the fresh motor does not operate.



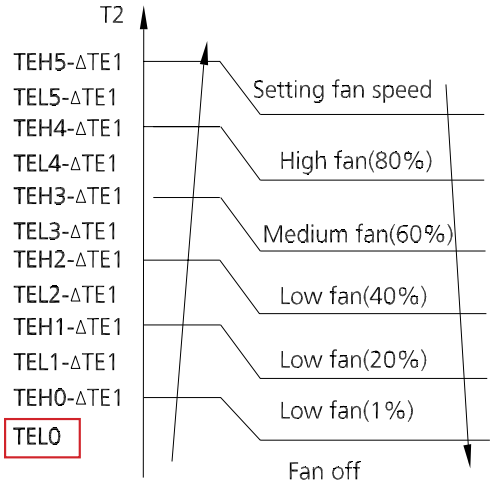
Indoor Unit Four-Way Cassette

2

10.2. Micro-Switch Introduce

Anti-cold air	
SW1	FAN MOTOR STOP-TEM
ON 1 2	24 Factory setting
ON 1 2	15
ON 1 2	8
ON 1 2	According to the EEPROM setting

A. Use the micro-switch SW1 to select the fan stop temperature (TEL0) during anti-cold wind operation in Heating mode.
Range: 75.2°F (24°C), 59°F (15°C), 46.4°F (8°C), according to the EEPROM setting (reserved for special customizing).



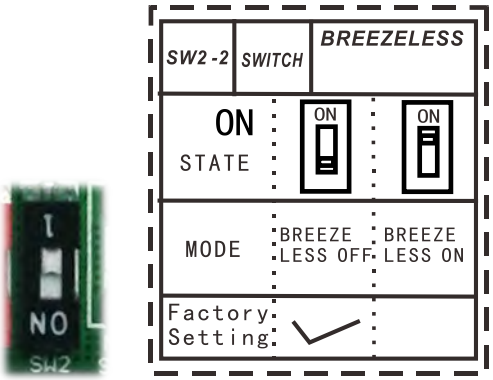
SW2 / SW2-1	SWITCH	FOR FAN MOTER CONTROL THEN NO POWER REQUEST.
STATE	ON	ON
MODE	FAN OFF	FAN ON
Factory Setting		✓

B. Use the micro-switch SW2/SW2-1 to configure the indoor fan behavior when the set point is met and the compressor stops.
Range: Off (anti-cold wind is available in Heating mode), Keep running (no anti-cold wind function).

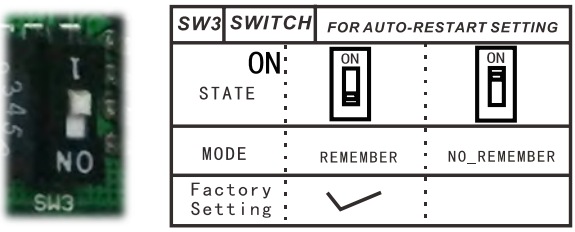
Note: The SW2 dip switch is reserved for physical components only and does not function as a mode modifier. If users want to make changes on the factory setting, use the remote or wire controller to reset the switch. This depends on the model.

Indoor Unit Four-Way Cassette

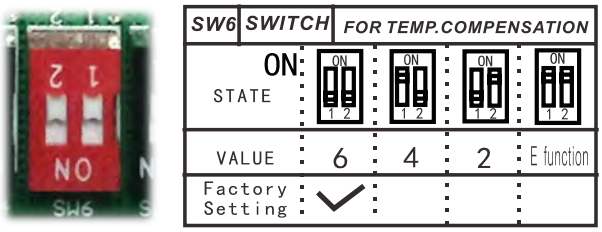
2



C. Use the micro-switch SW2-2 to select the Breezeless function.
Range: Off or On.



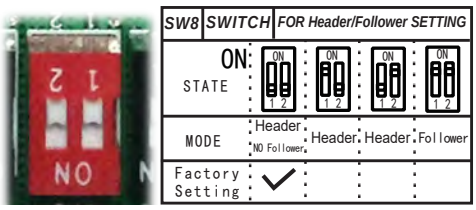
D. Use the micro-switch SW3 to select the Auto-restart function.
Range: Active or inactive.



E. Use the micro-switch SW6 to select the temperature compensation in Heating mode. This helps reduce the real temperature difference between the ceiling and floor, so that the unit can run properly.

If the height of the installation is lower, a smaller value can be chosen.

Range: 42.8°F (6°C), 39.2°F (4°C), 35.6°F (2°C), E function (reserved for special customizing)



F. Use the micro-switch SW8 to configure the main or slave settings. This is for some models.
Range: No follower, header, and follower

Indoor Unit Four-Way Cassette

2

SWITCH	FOR CCM UNIT ADDRESS	
S2 + S1		
ADDRESS	0~15	16~31
Factory Setting	✓	
S2 + S1		
ADDRESS	32~47	48~63
Factory Setting		

G. The micro-switch S1 and dial-switch S2 are used for address setting when the user wants to control the device via 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.									

FOR SETTING POWER(DC MOTOR MODEL ONLY)					
ENC1					
CODE	A	B	C	D	E
POWER	36K	42K	48K	55K	60K
FACTORY SETTING	ACCORDING TO RELATED MODEL.				

H. Dial-switch ENC1: The indoor PCB is universally designed for whole series from 6K-60K. The ENC1 setting will tell the main program what size the unit is.

Range: Auto, 6K, 9K,....., 60K

Note: In Auto mode, the indoor unit identifies the connected outdoor unit's capacity and mode — whether it's a mono or multi-zone system — and automatically matches the indoor parameters.

Glue is usually applied to the switch to prevent accidental changes, unless the user intends to use the PCB as a spare part for another unit. Then, the user selects the right position to match the size of the unit.

Installation

3

Contents

Installation

3

1. Location Selection

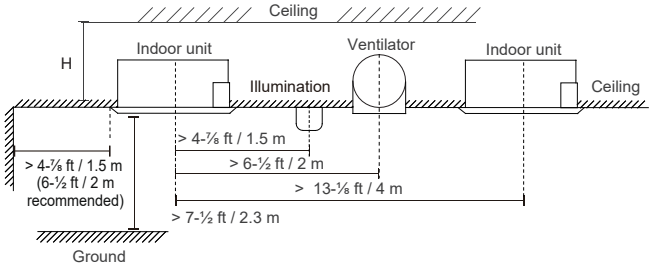
1.1. Refer to the Installation Manual to choose the best location for the unit.

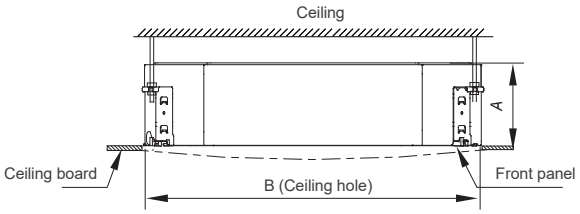
1.2. Do not install the unit in the following locations:

- Areas with oil drilling or fracking.
- Coastal areas with high salt content in the air.
- Areas with gases in the air, such as near 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.
- If possible, do not install the unit in a location that is exposed to direct sunlight.

2. Indoor Unit Installation

2.1. Service Space for the Indoor Unit





Capacity (Btu/h)	A (inch/mm)	H (inch/mm)	B (inch/mm)
9K/12K/18K	9-⅝ / 245	> 11-⅜ / 290	23-⅝ / 600
24K	8-⅛ / 205	> 9 / 230	35-⅜ / 900
36K	9-⅝ / 245	> 10-¾ / 271	
48K	11-¼ / 287	> 12-¼ / 313	

Installation

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2.2. Hang the Indoor Unit

1. Use the included paper template to cut a rectangular hole in the ceiling, leaving at least 3-⅜ feet (1 m) on all sides. The cut hole size should be 16 inches (406.4 mm) larger than the body size.

Be sure to mark the areas where the ceiling hook holes will be drilled.

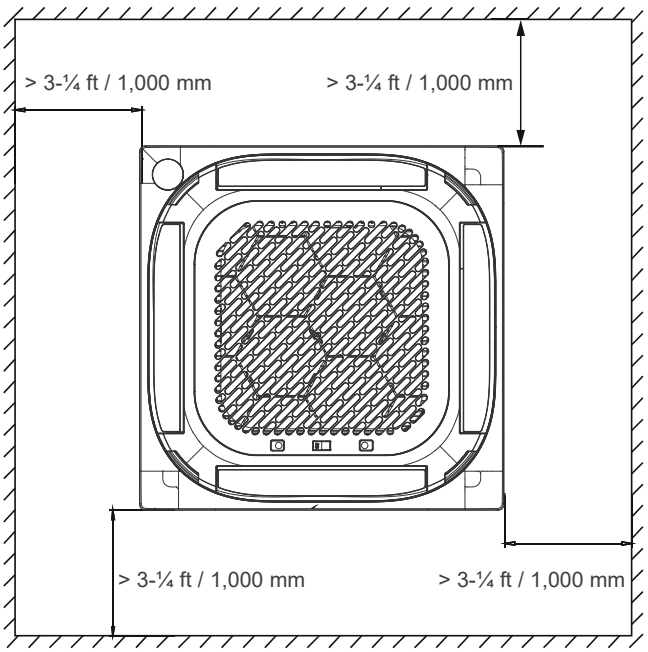
Refer to illustrations below.

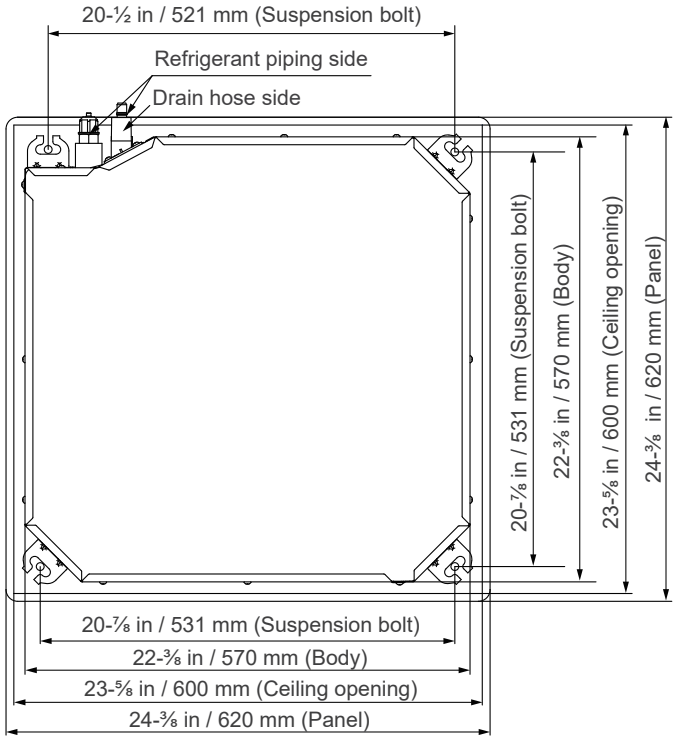
2. Drill four holes, between 4-¾ - 6-⅛ inches (120-155 mm) deep, at the marked ceiling hook positions in the internal ceiling. Be sure to hold the drill at a 90° angle to the ceiling.

3. Use a hammer to insert the ceiling hooks into the pre-drilled holes. Secure the bolt using the included washers and nuts.

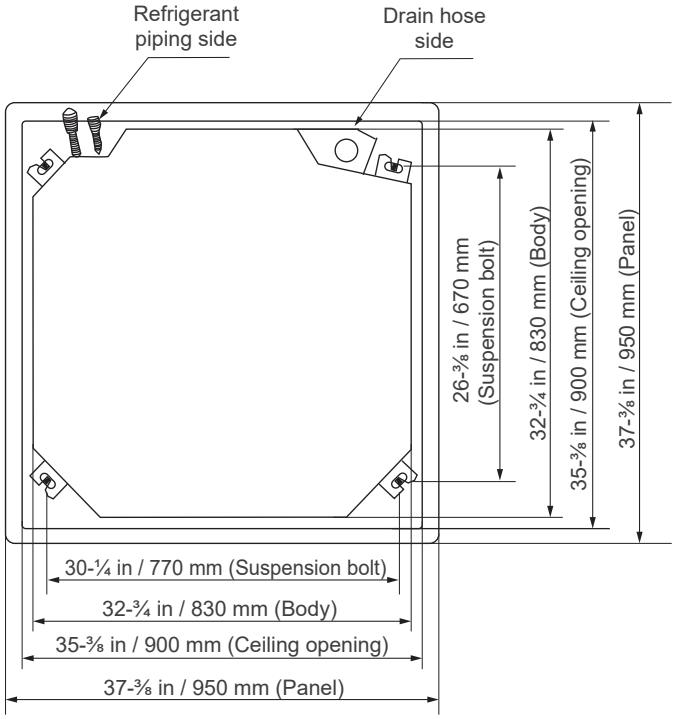
Caution:

The unit's body should align perfectly with the hole. Ensure that the unit and hole are the same size before proceeding.





Model: 9K/12K/18K



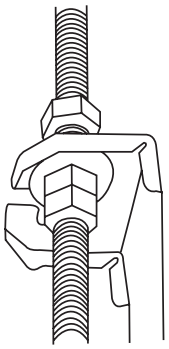
Model: 24K/36K/48K

Installation

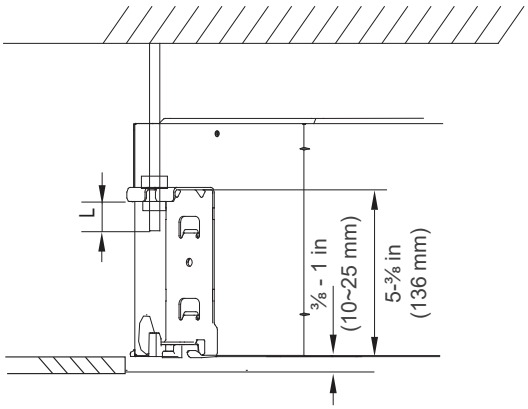
3

4. Install the four suspension bolts.

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

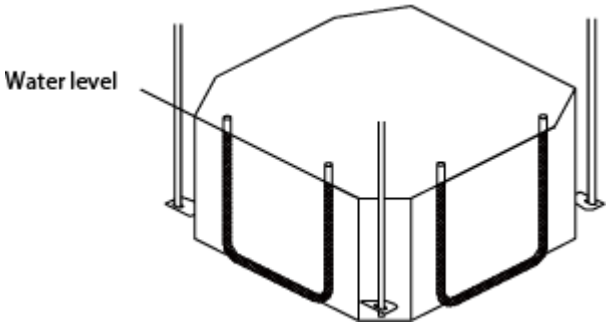


Note: The bottom of the unit should be ⅜ of an inch to 1 inch (10-25 mm) higher than the ceiling board. Generally, L (indicated in the following figure) should be half the length of the suspension bolt or long enough to prevent the nuts from coming off.



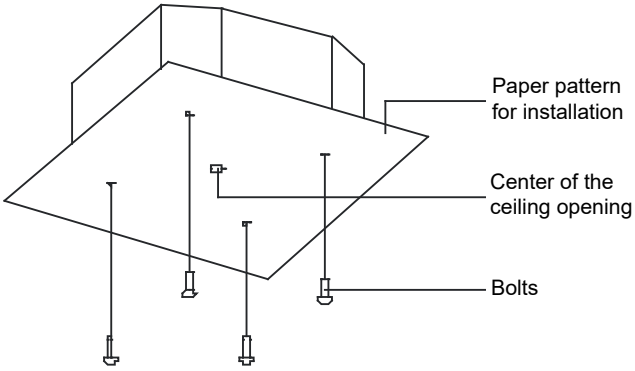
Caution:
Ensure that the unit is completely level.

The unit is equipped with a built-in drain pump and float switch. If the unit is tilted against the direction of the condensate flow (the drainpipe side is raised), the float switch may malfunction and cause water leakage.



Note for New Home Installations

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 the dimensions and position of the ceiling opening. Follow the instructions above for the remainder of the installation.



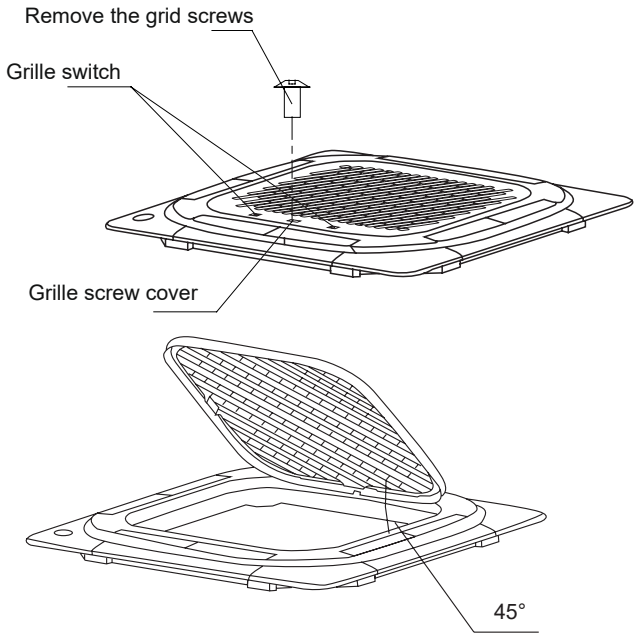
Installation

3

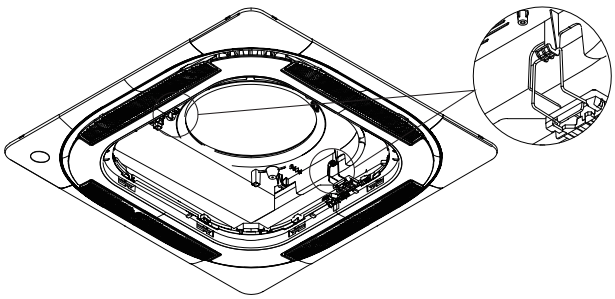
2.3. Panel Installation

Remove the Front Grille

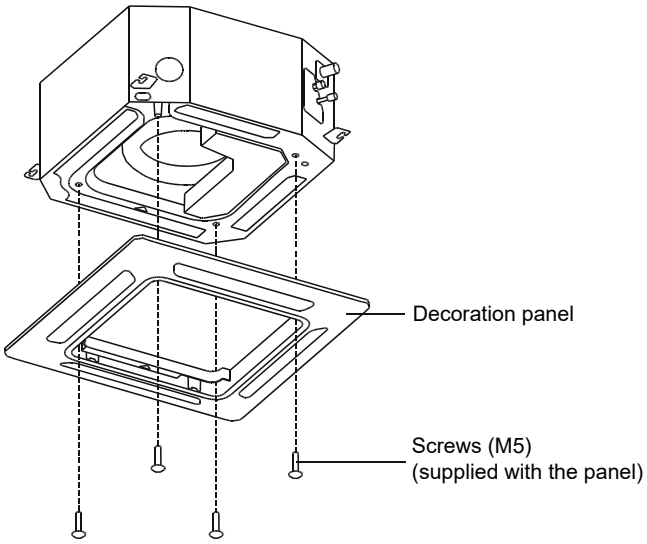
1. To unlock the grille hook, push both of the tabs toward the middle simultaneously.
2. Hold the grille at a 45° angle, lift it up slightly, and detach it from the main body.



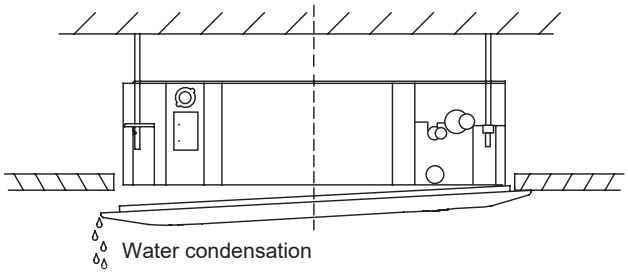
The panel hook is pre-hung to the indoor unit's flow guide ring, as shown:



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



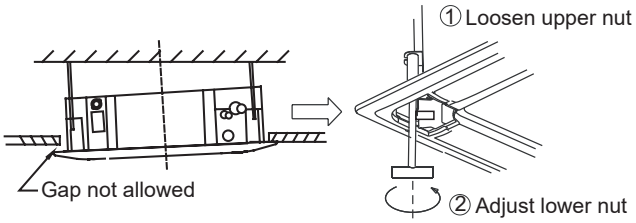
Note: To adjust the indoor unit's height, use the openings at the four corners of the panel. Make sure that the internal wiring and drainpipe are not affected by this adjustment.



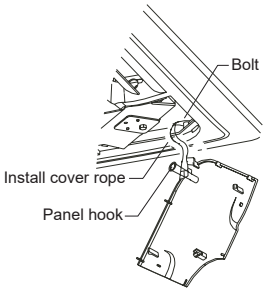
Installation

3

Caution:
Failure to tighten the screws can cause water leakage.



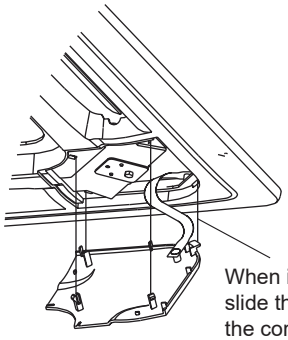
Caution:
If the unit is not hanging correctly and a gap exists, adjust its height to ensure proper function. To do this, loosen the upper nut and adjust the lower nut.



Re-install into the style grid.

Re-install the installation cover.

Attach the rope to the pillar and gently press the cover plate into the panel.

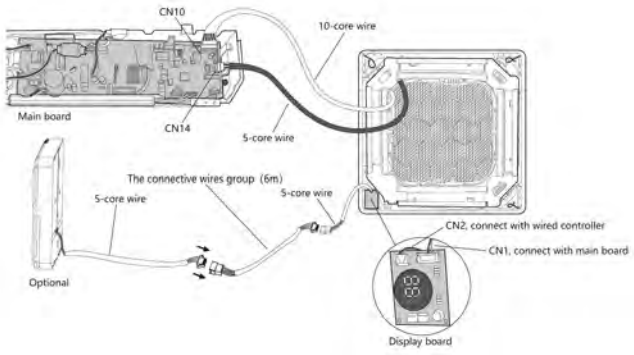


When installing the cover, slide the four fasteners into the corresponding slots on the panel.

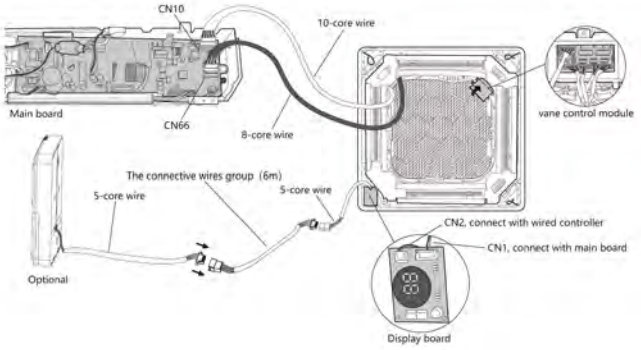
Note: After installation, place the plugs of the display, swing, water pump, and other wire bodies into the electric control box.

Connection Diagram

For panels without a vane control module, the display board CN1 connects to the main control board CN10. The motor cable connects to the main control board CN14.



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



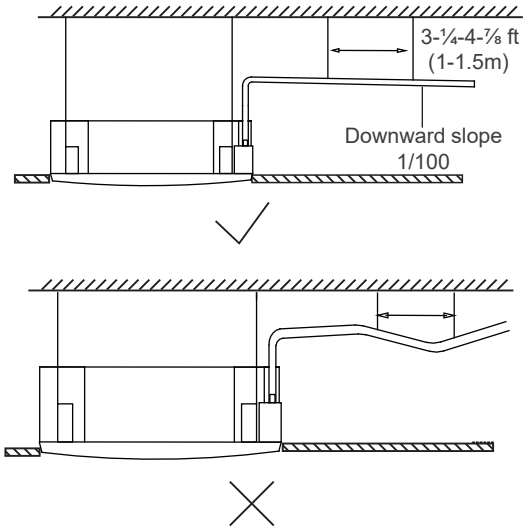
The display board CN2 attaches to a connecting cable.

Installation

3

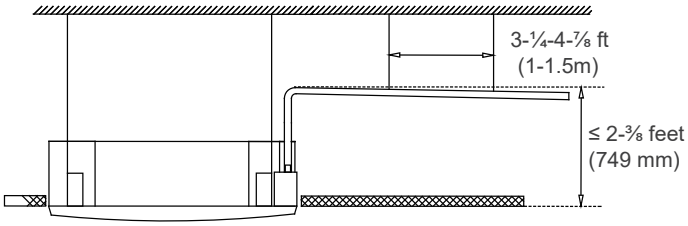
3. Drainage Pipe Installation

Install the drainpipe as illustrated in the following figure:

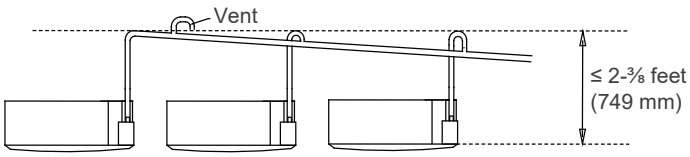


Notes on Drainpipe Installation:

- When using an extended drainpipe, tighten the indoor connection with an additional protection tube to prevent accidental disconnection.
- 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 the hanging wires every 3-¼ - 4-⅞ feet (1 - 1-½ m).
- If the drainpipe outlet is higher than the pump joint, install a lift pipe for the indoor unit's exhaust outlet. Do not install the lift pipe higher than 2-⅜ feet (749 mm) from the ceiling board. The distance between the unit and lift pipe must be less than 11-¾ inches (300 mm).
- Improper installation may result in water backflow, potentially flooding the unit.
- To prevent air bubbles, keep the drain hose level or slightly tilted up (3 inches or less than 75 mm).



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



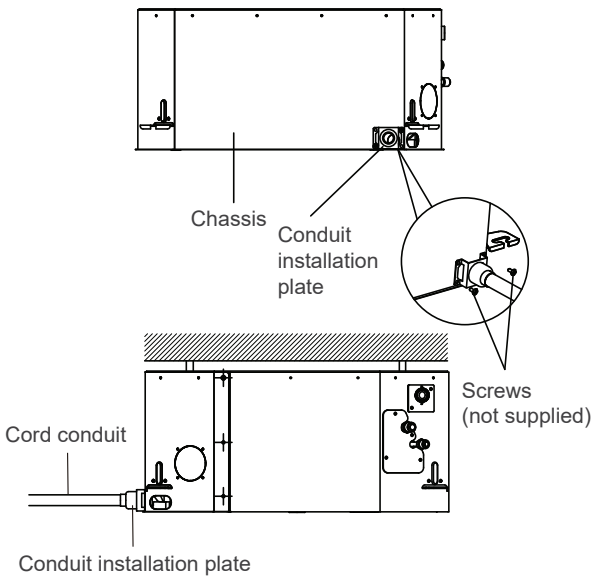
Pass the drain hose through the wall hole. Make sure the water drains to a safe location where it will not cause water damage or a slipping hazard.

Note: The drainpipe outlet should be at least 1-⅞ inches (48.3 mm) above the ground. If it touches the ground, the unit may become blocked, potentially leading to a malfunction. If the water is discharged directly into the sewer, ensure that the drain has a U or S pipe to catch odors that might otherwise come back into the house.

Install the Conduit Installation Plate (if supplied)

1. Attach the sheath connector (not supplied) to the wire hole of the conduit installation plate.

2. Attach the conduit installation plate to the unit's chassis.



Installation

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4. Refrigerant Pipe Installation

4.1. 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

4.2. Maximum Length & Drop Height

Ensure 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)
9K/12K	82 / 25	49-⅜ / 15
18K	98-⅜ / 30	65-⅝ / 20
24K	164 / 50	82 / 25
36K/48K/60K	246 / 75	98-⅜ / 30

Caution:

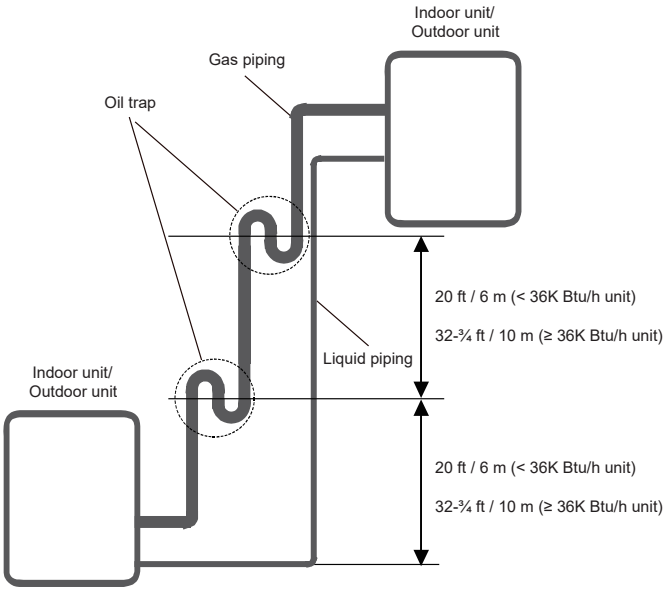
1. The capacity test is based on the standard length, while the maximum permissive length is based on the system reliability.

2. Oil Traps

- If oil flows back into the outdoor unit's compressor, this might cause liquid compression or the deterioration of the oil return. Oil traps in the rising gas piping can prevent this.

- Install an oil trap every 20 feet (6 m) on the vertical suction line riser (< 36K BTU/h unit).

- Install an oil trap every 32-¾ feet (10 m) on the vertical suction line riser (≥ 36K BTU/h unit).



Installation

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4.3. Procedure for Connecting Pipes

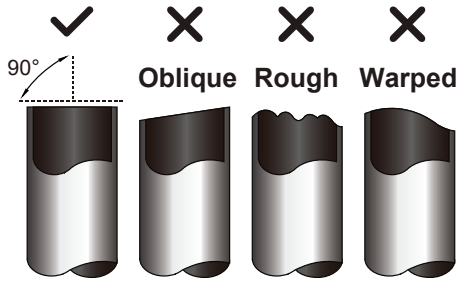
1. Choose the pipe size according to the specification table.

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.



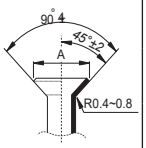
5. Insulate the copper pipe.

- Before the test operation, do not heat insulate the joint parts.

6. Flare the pipe.

- Insert a flare nut into the pipe before flaring the pipe.

- Flare the pipe according to the following table.

Pipe Diameter inch (mm)	Flare dimension A (inch/mm)		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, seal the opening with an end cap or adhesive tape to prevent dust or contaminants from entering the pipe.

7. If pipes need to pass through the wall, drill holes.

8. Bend the pipes as needed for a smooth fit through the wall, per field conditions.

9. Bind and wrap the wire together with the insulated pipe if necessary.

10. Set the wall conduit.

11. Set the supporter for the pipe.

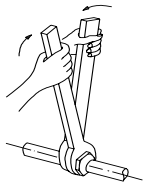
12. Locate the pipe and attach it to the supporter.

For horizontal refrigerant pipes, the distance between the supporter should not exceed 3-¼ feet (1 m).

For vertical refrigerant pipes, the distance between the supporter should not exceed 4-⅞ feet (1-½ m).

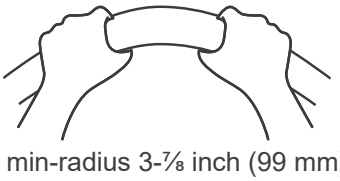
13. Connect the pipe to the indoor and outdoor units using two spanners.

14. Use two spanners to fasten the nut to the specified torque setting. Over-torquing will damage the bell mouthing, while under-torquing may cause leakage. Refer to the following table for different pipe connections:

Pipe Diameter inch / mm	Torque N.m (lb.ft)	Sketch Map
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)	

Carefully bend the tubing in the middle according to the diagram.

Do not bend the tubing more than 90° or more than three times.



Installation

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5. Engineering of Insulation

5.1. Refrigerant Pipe Insulation

Operational Procedure of the Refrigerant Pipe Insulation

1. Cut the suitable pipe.
2. Insulation (except the joint section).
3. Flare the pipe.
4. Piping layout and connection.
5. Vacuum drying.
6. Insulate the joint parts.

Purpose of the Refrigerant Pipe Insulation

During operation, the temperature of the gas pipe and liquid pipe will undergo extreme over-heating and over-cooling. Therefore, it is necessary to insulate. Otherwise, it will degrade the performance and burn out the compressor.

The gas pipe temperature is very low during cooling. If the insulation is not enough, dew may form and cause leakage damage.

The gas pipe temperature is very high during heating (generally 122-212°F/50-100°C). Finish the insulation to prevent injuries from accidental contact.

Select the Insulation Material for the Refrigerant Pipe

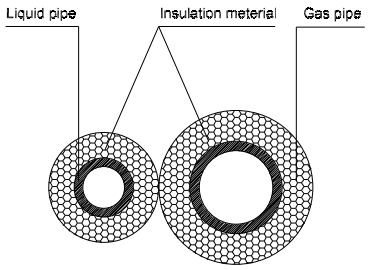
The burning performance should be over 248°F (120°C). Choose the insulation materials according to local laws.

The recommended insulation casing thickness is:

Humidity < 80%RH	Humidity ≥ 80%RH
⅜ inch / 10 mm	⅝ inch / 15 mm

Notes

Insulate the gas pipe and liquid pipe separately. If the gas pipe and liquid pipe were insulated together, it will decrease the performance of the air conditioner.



The pipe joint insulation should be 2-4 inches (50.8-101.6 mm) longer than the gap to ensure a proper seal.

Insert the pipe joint insulation into the gap of the existing insulation.

Ensure the pipe joint insulation is securely fastened to the suction and liquid pipes to prevent gaps.

Use glue to paste together the linking part.

Do not over-tighten the insulation material. This may compress the air out of the material, causing poor insulation and early aging.

Installation

3

5.2. Drainage Pipe Insulation

Operational Procedure for the Drainage Pipe Insulation

1. Cut the suitable pipe.
2. Insulation (except the joint section).
3. Piping layout and connection.
4. Drainage test.
5. Insulate the joint parts.

Purpose of the Drainage Pipe Insulation

The temperature of the condensate drainage water is very low. If insulation is not enough, dew will form and cause leakage damage.

Select the Insulation Material for the Drainage Pipe

The insulation material must be made of flame retardant material. Select the flame retardant material according to the local law.

The thickness of the insulation layer should be above ⅜ of an inch (10 mm).

Apply specialized adhesive to the insulation seems, then secure them with tape. Ensure the width of the tape is at least 2 inches (50.8 mm). Make sure the tape is firm and can prevent dew.

Notes

Insulate the single pipe before connecting it to another pipe. Insulate the joint part after the drainage test.

Ensure that there is no insulation gap between the insulation material.

Installation

3

6. Engineering of Electrical Wiring

Notes for Electrical Wiring Installation

- A qualified electrician should complete all field wiring construction.
- Ground the air conditioning equipment according to the local electrical regulations.
- Install the current leakage protection switch.
- Do not connect the power wire to the terminal of the signal wire.
- When the power wire is parallel with signal wire, put the wires in their own wire tube and ensure a gap of at least 11-¾ inches (300 mm).
- Choose the wiring according to the specification of the power table.
- Select different colors for different wires according to relevant regulations.
- Do not use metal wire tubes in locations with acid or alkali corrosion. Adopt plastic wire tubes to replace it.
- The wire connect joint should not be in the wire tube. If a wire connect joint is necessary, set a connection box at the location.
- Wiring with different voltages should not be in one wire tube.
- Ensure that the color of the wires for the outdoor unit and terminal are the same as those for the indoor unit.

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

Product Features

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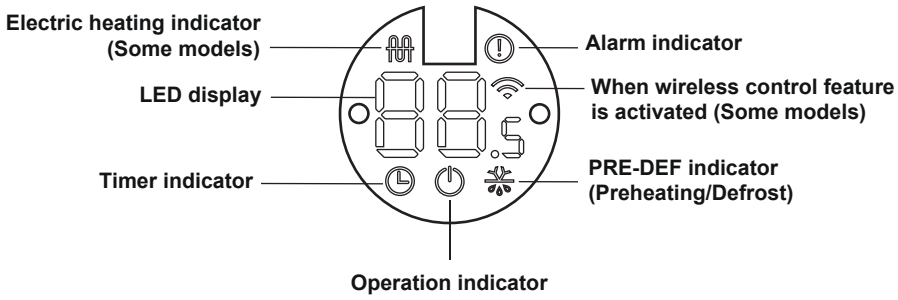
Contents

Product Features

4

1. Display Function



Product Features

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2. Safety Features

Compressor 3-Minute Delay at Restart

Compressor functions are delayed for up to 10 seconds upon the first startup of the unit. The functions are delayed for up to three minutes after each unit restart.

Automatic Shutoff Based on Discharge Temperature

If the compressor discharge temperature exceeds a certain level for 9 seconds, the compressor stops operating.

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 triggered, the corresponding error code appears on the indoor unit and the system stops operating.

Indoor Fan Delayed Operation

When the unit starts, the louver activates automatically. The indoor fan will then start after a set delay or once the louver is in position.

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 the T4 sensor is lower than the setting temperature.

Sensor Redundancy and Automatic Shutoff

If one temperature sensor malfunctions, the air conditioner continues operating and displays the corresponding error code, allowing for emergency use.

When more than one temperature sensor malfunctions, the air conditioner stops operating.

Product Features

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3. Basic Functions

3.1. Table

Functions		Element		
Cases		Case 1	Case 2	Case 3
Models	9k~48k		✓	

3.2. Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature
Tsc	Adjusted setting temperature
CDIFTEMP	Cooling shutdown temperature
HDIFTEMP2	Heating shutdown temperature

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

3.3. Fan Mode

When Fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to 1%-100% and Auto mode.
- The louver operations are identical to those in Cooling mode.
- Auto fan: In fan-only mode, the AC operates the same as auto fan in Cooling mode with the temperature set at 75°F (24°C).

Product Features

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3.4. Cooling Mode

Indoor Fan 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%.

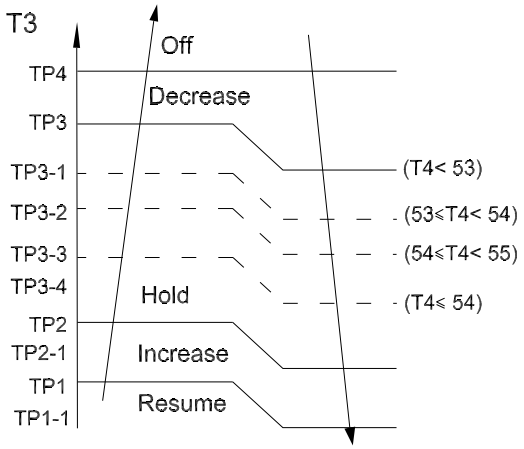
-- When T1-Tsc is higher than or equal to 0.9°F (0.5°C), the fan speed increases to 40%.

-- 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%.

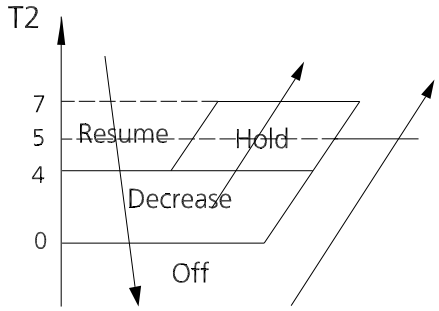
-- When T1-Tsc is higher than or equal to 7.2°F (4°C), the fan speed increases to 100%.

Condenser Temperature Protection



When the condenser temperature exceeds a configured value, the compressor stops operating.

Evaporator Temperature Protection



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

Product Features

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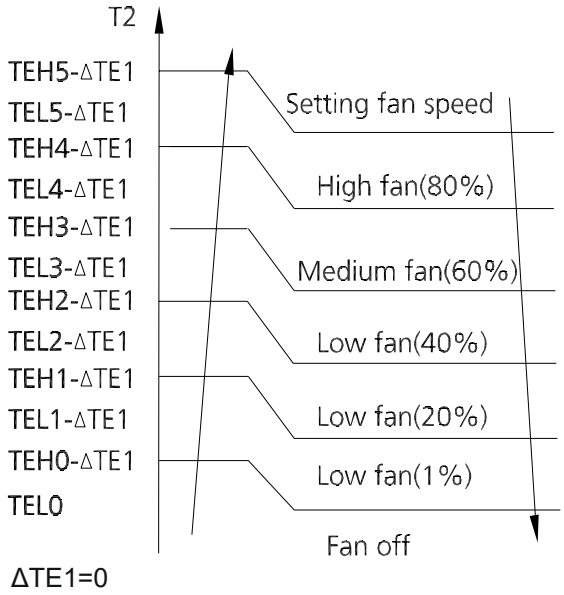
3.5. Heating Mode

Indoor Fan Control

1) In Heating mode, the indoor fan operates continuously. The fan speed can be set to 1%-100% and Auto mode.

Anti-cold air function.

If the T2 temperature difference changes during auto-fan mode and triggers a speed change, maintain the current fan speed for 30 seconds first. The default interval is the interval before the fan speed changes, then judge T2 according to the current interval after 30 seconds to get the final anti-cold air interval.



ΔTE1=0

2 Auto fan action in Heating mode:

Rise Curve

-- When T1-Tsc is higher than -2.7°F (-1.5°C, the fan speed reduces to 80%.

-- When T1-Tsc is higher than 0°F (0°C, the fan speed reduces to 60%.

-- When T1-Tsc is higher than 0.9°F (0.5°C, the fan speed reduces to 40%.

-- When T1-Tsc is higher than 1.8°F (1°C, the fan speed reduces to 20%.

Descent Curve

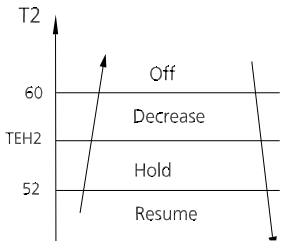
-- When T1-Tsc is lower than or equal to 0.9°F (0.5°C), the fan speed increases to 40%.

-- When T1-Tsc is lower than or equal to 0°F (0°C), the fan speed increases to 60%.

-- When T1-Tsc is lower than or equal to -2.7°F (-1.5°C), the fan speed increases to 80%.

-- When T1-Tsc is lower than or equal to -5.4°F (-3°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.

Product Features

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3.6. Auto Mode

This mode is selectable via the remote controller, with an adjustable temperature range of 60.8-86°F (16-30°C.

Case 1:
In Auto mode, the machine selects Cooling, Heating, or Fan-Only mode on the basis of ΔT (ΔT=T1-TS).

ΔT	Running mode
ΔT > 3.6°F (2°C)	Cooling
-5.4°F (-3°C) ≤ ΔT≤ 3.6°F (2°C)	Fan-only
ΔT < -5.4°F (-3°C)	Heating*

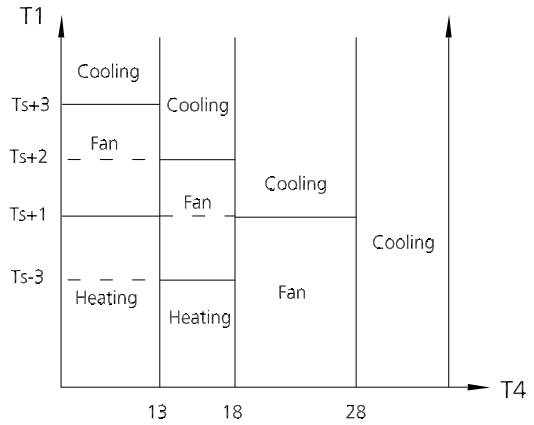
Heating*: In Auto mode, cooling-only models run the fan.

The indoor fan will run at the auto fan speed.

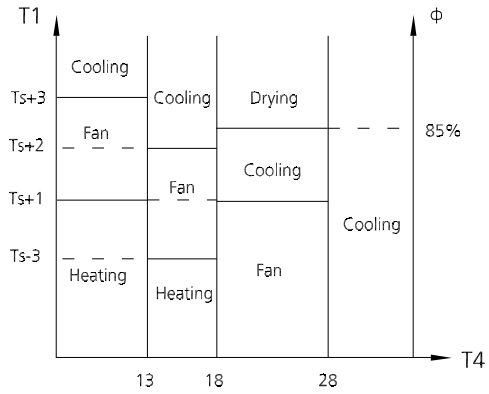
The louver functions identically in this mode.

If the appliance switches modes between heating and cooling, the compressor will stop for a certain time and then choose the mode according to ΔT.

Case 2:
In Auto mode, the appliance selects Cooling, Heating, or Fan-Only mode on the basis of T1, Ts, and the outdoor ambient temperature (T4).



Case 3:
In Auto mode, the appliance select Cooling, Heating, or Fan-Only mode on the basis of T1, Ts, outdoor ambient temperature (T4), and relative humidity (φ).



3.7. Drying Mode

In Drying mode, the AC 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 stops operating and does not resume until the room temperature exceeds 53.6°F (12°C.

Product Features

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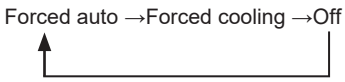
3.8. Forced Operation Function

Press the Auto/Cool button and the AC will run in the sequence below:



Forced Cooling Mode: The compressor and outdoor fan continue to run, while the indoor fan operates at breeze speed. After running for 30 minutes, the AC will switch to Auto mode with a preset temperature of 76°F (24°C).

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

The unit exits from this forced operation when it receives the following signals:

- Switch off
- Changes in:
    - Mode
    - Fan speed
    - Sleep mode
    - Follow me

3.9. Timer Function

- The timing range is 24 hours.
- Timer On: The appliance turns on automatically at the preset time.
- Timer Off: The appliance turns off automatically at the preset time.
- Timer On/Off: The appliance turns on automatically at the preset On Time, and then turns off automatically at the preset Off Time.
- Timer Off/On: The appliance turns off automatically at the preset Off Time, and then turns on automatically at the preset On Time.
- The timer does not change the unit's operation mode. If the unit is off, 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's running mode remains unchanged.
- The timer uses relative time, not clock time.

3.10. Sleep Function

The Sleep function is available in Cooling, Heating, or Auto mode.

When cooling, the temperature rises 1.8°F (1° every hour (not higher than 86°F/30°C). After 2 hours, the temperature stops rising and the indoor fan fixes at low speed.

When heating, the temperature decreases 1.8°F (1°C) every hour (not lower than 60.8°F/16°C). After 2 hours, the temperature stops decreasing and the indoor fan fixes at low speed. The Anti-Cold Wind function takes priority.

The operating time for Sleep mode is 8 hours. After the duration of the operating time, the unit exits from this mode.

The timer setting is available in this mode.

Product Features

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3.11. 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. In the case of a sudden power failure, it will restore those settings automatically within 3 minutes after the power returns.

3.12. 8°C Heating (Heat Pump Units)

In Heating mode, the temperature can be set as low as 46.4°F (8°C), preventing the indoor area from freezing while unoccupied during severe cold weather.

3.13. Follow Me

Once the Follow Me function is active, the remote controller will send a signal every 3 minutes, with no beeps. The unit automatically sets the temperature according to the measurements from the remote controller.

The unit only changes modes based on the remote control's input, regardless of its own temperature setting.

If the unit does not receive a signal for 7 minutes or the user presses "Follow Me", the function turns off. The unit regulates temperatures based on its own sensor and settings.

Product Features

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4. Optional Functions

4.1. Silence (Multi-Zone systems do not have this function)

Press and hold the "Silence" or "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 matching with the multi-zone outdoor units, this function is disabled.

4.2. Eco Function (Multi-Zone systems do not have this function)

This function is used to enter the energy efficient mode.

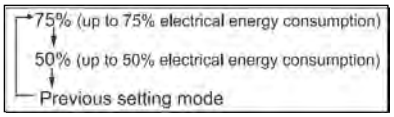
Pressing the "Eco" button in Cooling mode enables the remote controller to automatically adjust the temperature to 75°F (24°C) and set the fan speed to Auto mode to save energy (this only occurs if the set temperature is above 75°F (24°C). If the set temperature is above 75°F (24°C) and 86°F (30°C), press the "Eco" button to enable the fan speed to change to Auto mode. The set temperature will remain unchanged.

The AC will exit the Eco operation when the "Eco" button is pressed, the mode is modified, or the set temperature is adjusted to less than 75°F (24°C).

Operation time in Eco mode is 8 hours. After 8 hours, the AC exits from this mode.

4.3. 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:



To exit this function, turn off the unit or activate the Eco, Sleep, Super Cool, 8°C Heating, Silence or Self-Clean function.

4.4. Breeze Away Function (For some models; Multi-Zone systems do not have this function)

This feature prevents direct airflow from blowing on the body, making users feel like they're indulging in silky coolness.

This feature is available in Cooling, Fan-Only, and Drying mode.

4.5. Active Clean Function (For some models; Multi-Zone systems do not have this function)

To prevent odors, the active clean technology automatically freezes and thaws frost to wash away dust, mold, and grease adhering to the heat exchanger. The internal wind wheel then keeps operating to blow-dry the evaporator, preventing the growth of mold and keeping the inside clean.

When this function is turned on, the indoor unit displays "CL". After 20-45 minutes, the unit will turn off automatically and exit from the Active Clean function.

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1. Safety Caution

⚠ WARNING

Be sure to turn off all power supplies and disconnect all wires to avoid electric shock.
While checking the indoor/outdoor PCB, equip oneself with anti-static gloves or wrist straps to avoid damage to the board.

⚠ WARNING

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

Note: When using the inverter test tool for maintenance, remove the main handle, pull out the detection cable's female connector, and connect the test tool. After the maintenance is complete, insert the female end back into the port.

Note: These photos are for reference only. The actual appearance may vary.

Troubleshooting 5

2. General Troubleshooting

2.1. Error Display (Indoor Unit)

When the indoor unit encounters a recognized error, the operation lamp will flash in a corresponding series, the timer lamp may turn on or begin flashing, and an error code will be displayed. These error codes are described in the following table:

Display	Error Information	Solution
FC	Forced cooling (Not an error code)	--
EC07	ODU fan speed out of control	TS23
EC51	ODU EEPROM parameter error	TS19
EC52	ODU coil temp. sensor (T3) error	TS25
EC53	ODU ambient temp. sensor (T4) error	TS25
EC54	COMP. discharge temp. sensor (TP) error	TS25
EC56	IDU coil outlet temp. sensor (T2B) error (Multi-zone)	TS25
ECC1	Other IDU refrigerant sensor detects leakage (Multi-zone)	TS39
EH00	IDU EEPROM malfunction	TS19
EH03	IDU fan speed out of control	TS23
EH0A	IDU EEPROM parameter error	TS19
EH0E	Water-level alarm malfunction	TS27
EH12	Main unit or secondary units malfunction	TS40
EH3A	External fan DC bus voltage is too low protection	TS37
EH3b	External fan DC bus voltage is too high fault	TS37
EH60	IDU room temp. sensor (T1) error	TS25
EH61	IDU evaporator coil temp. sensor (T2) error	TS25
EHbA	Communication error between the indoor unit and the external fan module	TS37
EHC1	Refrigerant sensor detects leakage	TS39
EHC2	Refrigerant sensor is out of range and leakage is detected	TS39
EHC3	Refrigerant sensor is out of range	TS38

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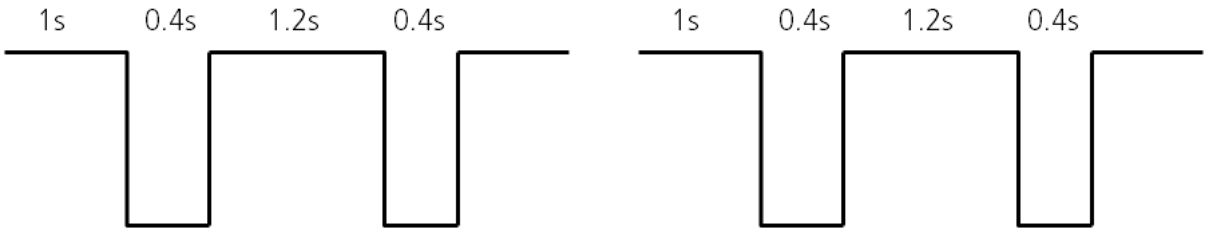
EL01	Communication error between the indoor unit and outdoor unit	TS20
EL0C	System lacks refrigerant	TS26
EL11	Communication malfunction between the main unit and secondary units	TS40
FHCC	Refrigerant sensor error	TS38
PC00	Outdoor unit IPM module protection	TS28
PC01	Outdoor unit voltage protection	TS29
PC02	Compressor top (or IPM) temperature protection	TS34
PC03	Pressure protection (low or high pressure) (for some models)	TS31
PC04	Inverter compressor drive error	TS30
PC0L	Low ambient temperature protection (for some models)	TS35
----	Indoor units mode conflict (Multi-zone)	--

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

Troubleshooting:
Test the unit using the remote controller. If the unit does not respond to the remote, the indoor PCB needs to be replaced. If the unit responds to the remote, the display board requires needs to be replaced.

LED flash frequency:



Display	Malfunction or Protection	Solution
EHb3	Communication malfunction between wire and master control (for KJR-120X/KJR-120M/KJR-120N series wired controller)	TS37

The other error codes that display on the wired controller are the same for those on the unit.

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3. Engineering Mode

3.1. Information Inquiry

In order to enter Engineering mode and check the data of the system, follow these steps:

- Make sure that the AC is in standby status, or operating normally in non-locked conditions.
- Press and hold the "Power" and "Fan" buttons together for 7 seconds until the remote controller screen displays "0". The Auto, Cool, Dry, Heat, and Battery icons will display at the same time.
- Press the "Up" or "Down" button to choose different channel numbers (from 0-30) on the remote controller. The display will show the parameter value.

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Channel	Code	Meaning	Remark
0		Error code	Refer to next list of error code Empty means no error
1		Room temperature	Actual data, °C
2		Indoor coil temperature	Actual data,°C
3		Outdoor coil temperature	Actual data, °C
4		Ambient temperature	Actual data, °C
5		Discharge temperature	Actual data,°C
6		Targeted frequency	Actual data
7		Actual frequency	Actual data
8		Running current	3.2A=3
9		AC voltage	
10		Reserved	
11		Indoor operating mode	0-Off; 1-Cooling; 2-Heating; 3-Fan only; 4-Drying; 5-Auto; 7-defrosting; 12-Active clean
12		Outdoor fan speed	Actual data / 8
13		EXV opening steps	Actual data / 8
14		Indoor fan speed	Actual data / 8
15		Humidity (if a sensor there)	Actual data, %
16		Set temperature including compensation	Actual data, °C
17		Reserved	
18		Reserved	
19		Outdoor DC bus voltage	
20		Target Frequency calculated by indoor	Without limitation
21~30		Reserved	

Note that:

1. The channel number indicates a certain parameter value (check the table below).

2. The indoor unit display will show the code for 2 seconds, and then the parameter value.

3. In 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 Engineering mode, press and hold the "Power" and "Fan" buttons together for 2 seconds.

5. Engineering mode will exit if there is no valid input data for 1 minute.

Troubleshooting

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Display	Error Code Information for Engineering Mode
EH00	Indoor unit EEPROM malfunction
EH0A	Indoor unit EEPROM parameter error
EL01	Communication error between the indoor unit and outdoor unit
EHbA	Communication error between the indoor unit and external fan module
EH30	Parameters error of the indoor external fan
EH35	Phase failure of the indoor external fan
EH36	Indoor external fan current sampling bias fault
EH37	Indoor external fan zero speed failure
EH38	Indoor external fan stall failure
EH39	Out of step failure of indoor external fan
EH3A	Low voltage protection of the indoor external fan DC bus
EH3b	Indoor external fan DC bus voltage is too high fault
EH3E	Indoor external fan overcurrent fault
EH3F	Indoor external fan module protection/hardware overcurrent protection
EH03	Indoor unit fan speed out of control
EC51	Outdoor unit EEPROM parameter error
EC52	Outdoor coil temperature sensor (T3) error
EC53	Outdoor unit ambient temperature sensor (T4) error
EC54	COMP. discharge temperature sensor (TP) error
EC55	IGBT temperature sensor TH is in open circuit or short circuit
EC0d	Outdoor unit malfunction
EH60	Indoor unit room temperature sensor (T1) error
EH61	Indoor unit evaporator coil temperature sensor (T2) error
EC71	Outdoor external fan overcurrent fault
EC75	Outdoor external fan module protection/hardware overcurrent protection
EC72	Outdoor external fan phase failure
EC74	Outdoor external fan current sampling bias fault
EC73	Zero speed failure of outdoor unit DC fan
EC07	Outdoor unit fan speed out of control
EHb5	Intelligent eye communication failure
EL0C	Refrigerant leak detected
EH0E	Water-level alarm malfunction
EH0F	Intelligent eye malfunction
FH07	Communication malfunction between the indoor unit and auto-lifting panel
PC00	Outdoor unit IPM module protection
PC10	Over low voltage protection
PC11	Over voltage protection
PC12	DC voltage protection
PC02	Top temperature protection of the compressor or high temperature protection of the IPM module

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Display	Error Code Information for Engineering Mode
PC40	Communication error between the outdoor main chip and compressor driven chip
PC41	Current input detection protection
PC42	Compressor start error
PC43	Lack of phase (3 phase) protection
PC44	Outdoor unit zero speed protection
PC45	341PWM error
PC46	Compressor speed malfunction
PC49	Compressor over current protection
PC06	Compressor discharge temperature protection
PC08	Outdoor current protection
PH09	Anti-cold air in heating mode
PC0F	PFC module malfunction
PC30	System overpressure protection
PC31	System pressure is too low protection
PC03	Pressure protection
PC0L	Outdoor low ambient temperature protection
PH90	Evaporator coil temperature over high protection
PH91	Evaporator coil temperature over low Protection
PC0A	Condenser high temperature protection
PH0C	Indoor unit humidity sensor failure
LH00	Frequency limit caused by T2
LH30	Indoor external fan current limit
LH31	Indoor external fan voltage limit
LC01	Frequency limit caused by T3
LC02	Frequency limit caused by TP
LC05	Frequency limit caused by voltage
LC03	Frequency limit caused by current
LC06	Frequency limit caused by PFC
LC30	Frequency limit caused by high pressure
LC31	Frequency limit caused by low pressure
LH07	Frequency limit caused by remote controller
----	Indoor units mode conflict (match with multi outdoor unit)
nA	No malfunction and protection

Troubleshooting 5

3.2. Advanced Function Setting

In order to enter Engineering mode and check the advanced function settings, follow these

steps: **If users want to check the current function's set value (Presetting Page):**

1. Disconnect the power supply from the unit, then wait 1 minute.

2. Connect the power supply again to the unit. The unit should be under the standby state.

3. Press and hold the "Power" and "Fan" buttons together for 7 seconds until the remote controller screen shows "0". The Auto, Cool, Dry, Heat, and Battery icons will also display at the same time.

4. Press the "Up" or "Down" button to choose different channel numbers (from 0-30) on the remote controller.

5. Press and hold the "Power" button for 2 seconds until the remote controller screen displays "CH".

6. Press the "OK" button to query the current function set value while the remote controller displays "CH". The set value will be down on the indoor unit display.

If users want to change the current function's set value:

1. Disconnect the power supply from the unit, then wait 1 minute.

2. Connect the power supply again to the unit. The unit should be under the standby state.

3. Press and hold the "Power" and "Fan" buttons together for 7 seconds until the remote controller's screen shows "0". The Auto, Cool, Dry, Heat, and Battery icons will display at the same time.

4. Press the "Up" or "Down" button to choose different channel numbers (from 0-30) on the remote controller.

5. Press and hold the "Power" button for 2 seconds until the remote controller screen displays "CH".

6. Press the "Up" or "Down" button to choose the desired set value on the remote controller's screen.

7. Press "OK" to send the new set value to the indoor unit. The indoor unit will display "CS", which means that the new set value uploaded successfully.

8. Disconnect the power supply again from the unit. Wait 10 minutes, then connect it again.

Note that:

1. The channel number indicates a certain function, and each number that shows on the indoor unit screen indicates the current function's set value. Check the table below.

2. In Engineering mode, the other keys or operations are invalid except for the following buttons: "Power", "Up", "Down", and "OK".

3. In order to set a new set value correctly, users must finish the steps (from 2 to 7) within 1 minute only.

4. Engineering mode will exit if there is no valid input data for 1 minute.

5. In order to exit from Engineering mode, follow these steps:
   - Press and hold the "Power" button for 2 seconds or until the remote controller screen shows "0".
   - Press and hold the "Power" and "Fan" buttons together for 2 seconds.

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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	The remote controller will change as well.
4	Lowest setting temperature	16-24	The remote controller will change as well.
5	Highest setting temperature	25-30	The 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	10, 11, 12, …, 49, 50, -- (Cancel)	
13	Max frequency selection in T4 limitation of Zone 6	20, 21, 22, …, 149, 150, -- (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	N/A	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, 84, -- (Cancel)	
20	Max. frequency selection in heating mode	40, 41, 42, …, 83, 84, -- (Cancel)	Without limitation

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Channel	Function	Parameter Value Meaning	Remark
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)	
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	The remote controller will change as well.
29	Reserved	Nothing to set	
30	Reserved	Nothing to set	

Troubleshooting

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4. Error Diagnosis & Troubleshooting without Error Code

⚠ WARNING

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

4.1. Remote Maintenance

Suggestion: When problems occur, check the following points with customers before performing field maintenance.

No.	Problem	Solution
1	The unit will not start	TS14 - TS15
2	The power switch is on but the fans will not start	TS14 - TS15
3	The temperature on the display board cannot be set	TS14 - TS15
4	The unit is on but the wind is not cold (hot)	TS14 - TS15
5	The unit runs, but shortly stops	TS14 - TS15
6	The unit starts up and stops frequently	TS14 - TS15
7	The unit runs continuously but offers insufficient cooling (heating)	TS14 - TS15
8	Cool cannot change to heat	TS14 - TS15
9	The unit is too noisy	TS14 - TS15

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4.2 Field Maintenance

No.	Problem	Solution
1	The unit will not start	TS16 - TS17
2	The compressor will not start but the fans run	TS16 - TS17
3	The compressor & condenser (outdoor) fan will not start	TS16 - TS17
4	The evaporator (indoor) fan will not start	TS16 - TS17
5	The condenser (outdoor) fan will not start	TS16 - TS17
6	The unit runs, but shortly stops	TS16 - TS17
7	The compressor short-cycles due to overload	TS16 - TS17
8	High discharge pressure	TS16 - TS17
9	Low discharge pressure	TS16 - TS17
10	High suction pressure	TS16 - TS17
11	Low suction pressure	TS16 - TS17
12	The unit runs continuously but offers insufficient cooling	TS16 - TS17
13	Too cool	TS16 - TS17
14	The compressor is too noisy	TS16 - TS17
15	The horizontal louver cannot revolve	TS16 - TS17

Troubleshooting

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

Troubleshooting

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1. Remote Maintenance	Others					
Possible causes of trouble	Heavy load condition	Loosen hold down bolts and / 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
The unit will not start						
The power switch is on but fans will not start					☆	
The temperature on the display board cannot be set						
The unit is on but the wind is not cold (hot)						
The unit runs, but shortly stops						
The unit starts up and stops frequently				☆		
The unit runs continuously but insufficient cooling (heating)	☆		☆	☆		
Cool can not change to heat						
The unit is noisy		☆				☆
Test method / remedy	Check heat load	Tighten bolts or screws	Close all the windows and doors	Remove the obstacles	Reconnect the power or press **ON/OFF** button on remote control to restart operation	Remove them

Troubleshooting

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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 closed 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
The unit will not start																							
The compressor will not start but the fans run	☆																						
The compressor/condenser (outdoor) fan will not start																							
The evaporator (indoor) fan will not start																							
The condenser (outdoor) fan will not start																							
The unit runs, but shortly stops		☆	☆				☆	☆								☆	☆						
The compressor short-cycles due to overload		☆					☆	☆															
High discharge pressure							☆	☆	☆	☆	☆	☆											
Low discharge pressure		☆												☆									
High suction pressure							☆							☆				☆	☆				
Low suction pressure		☆	☆	☆	☆	☆									☆	☆	☆						
The unit runs continuously but insufficient cooling		☆	☆	☆	☆	☆		☆	☆	☆				☆					☆			☆	
Too cool																							
The compressor is noisy							☆						☆							☆	☆		☆
The horizontal louver can not revolve																							
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 AC of lager capacity or add the number of AC	Rectify piping so as not to contact each other or with external plate

Troubleshooting

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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
The unit will not start	☆	☆	☆	☆	☆			☆							
The compressor will not start but the fans run				☆		☆			☆	☆				☆	
The compressor/condenser (outdoor) fan will not start				☆		☆				☆					
The evaporator (indoor) fan will not start				☆					☆		☆				☆
The condenser (outdoor) fan will not start				☆		☆			☆		☆				☆
The unit runs, but shortly stops										☆		☆			
The compressor short-cycles due to overload										☆		☆			
High discharge pressure															
Low discharge pressure															
High suction pressure															
Low suction pressure															
The unit runs continuously but insufficient cooling															
Too cool						☆	☆								
The compressor is noisy															
The horizontal louver can not revolve			☆	☆									☆		
Test method / remedy	Test voltage	Inspect fuse type & size	Inspect connections - tighten	Test circuits with tester	Test continuity of safety device	Test continuity of thermostat / sensor & wiring	Place the temperature sensor at the center 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

Troubleshooting

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5. Quick Maintenance by Error Code

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

Users can find the parts to replace using the error codes in the following tables:

Part Requiring Replacement	EH00/ EH0A	EL01	EH03	EH60	EH61	EL0C	EHC1/ EHC2	EH0E	EC53	EH0b
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	✓

Troubleshooting

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Part Requiring Replacement	EC54	EC51	EC52	EC56	EC07	PC00	PC01	PC02	PC04	PC03	FHCC/ EHC3
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

Troubleshooting

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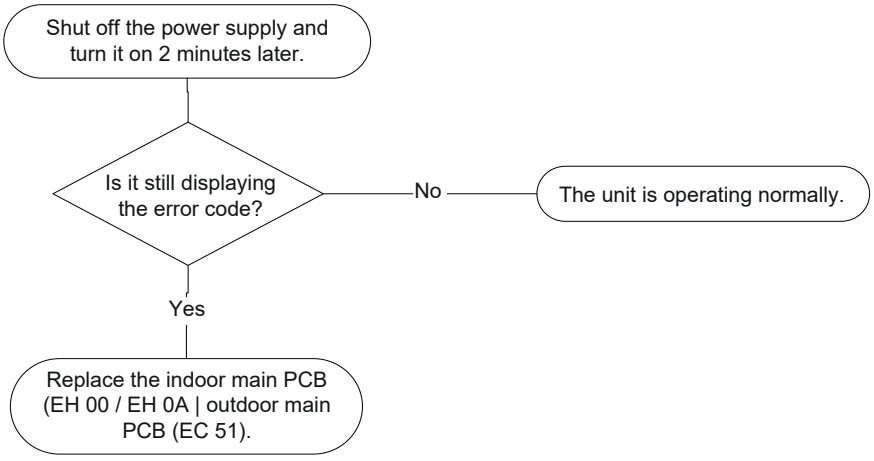
6. Troubleshooting by Error Code

6.1. EH00/EH0A/EC51 - EEPROM Malfunction Error

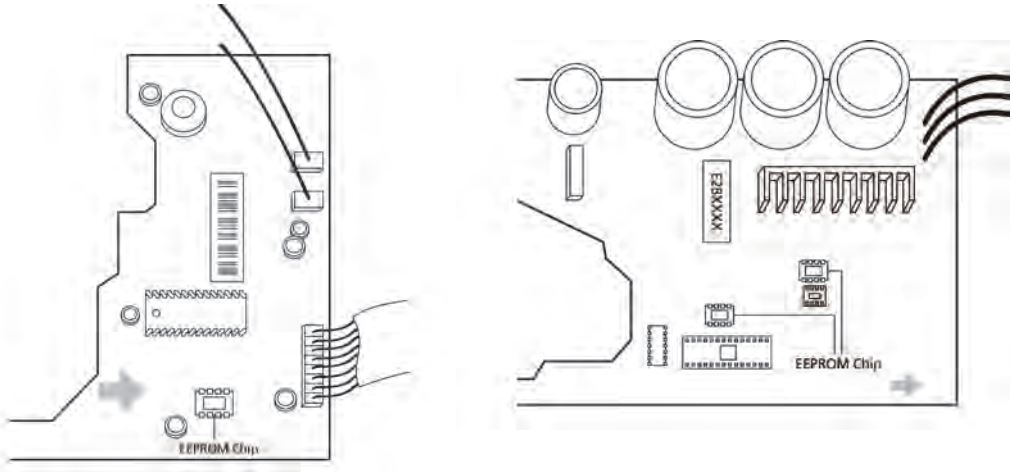
Description: The indoor or outdoor PCB main chip does not receive feedback from the EEPROM chip.

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB



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 and outdoor PCB is shown in the following two images:



The pictures are for reference only. The actual appearance may vary.

Troubleshooting and repairing compressor-driven chip EEPROM parameter errors and communication errors between the outdoor main chip and the compressor-driven chip are handled the same as for EC51.

Troubleshooting

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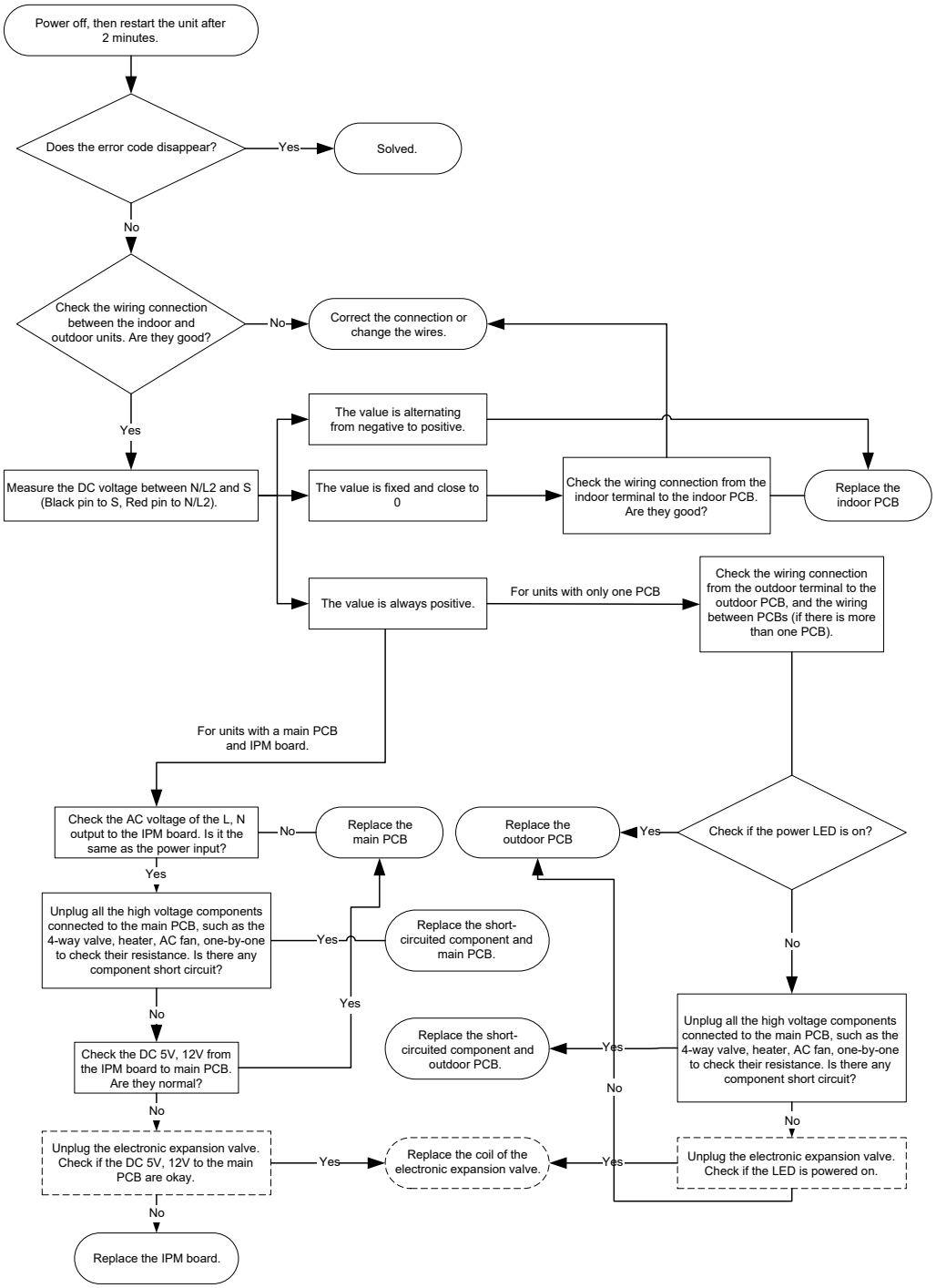
6.2. EL01 - Indoor Unit & Outdoor Unit Communication Error (Continued)

Description: The indoor unit cannot communicate with the outdoor unit.

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB
- Reactor



Troubleshooting

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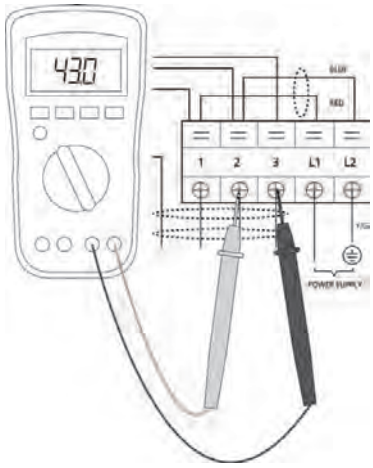
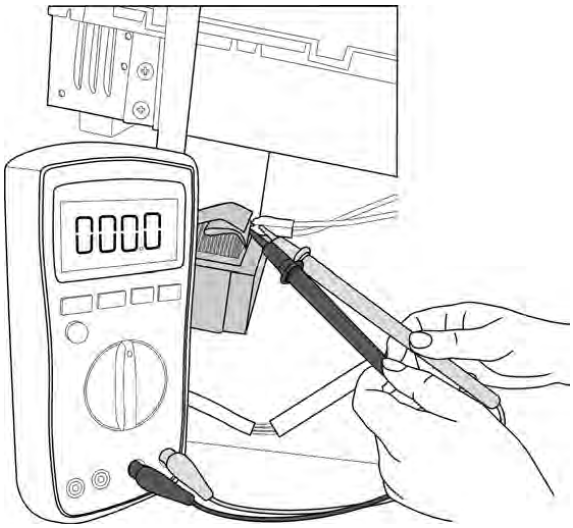
6.2. EL01 - Indoor Unit & Outdoor Unit Communication Error (Continued)

Remarks:

- Use a multimeter to test the DC voltage between the 2 port (or S or L2 port) and 3 port (or N or S port) of the outdoor unit. The red pin of the multimeter connects with the 2 port (or S or L2 port) while the black pin is for the 3 port (or N or S port).
- When the AC is operating normally, the voltage is moving alternately as positive and negative values.
- If the outdoor unit is malfunctioning, the voltage has always been the positive value.
- If the indoor unit is malfunctioning, the voltage has always been a certain value.



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



This picture and the value are for reference only. The actual appearance and value may vary.

Troubleshooting

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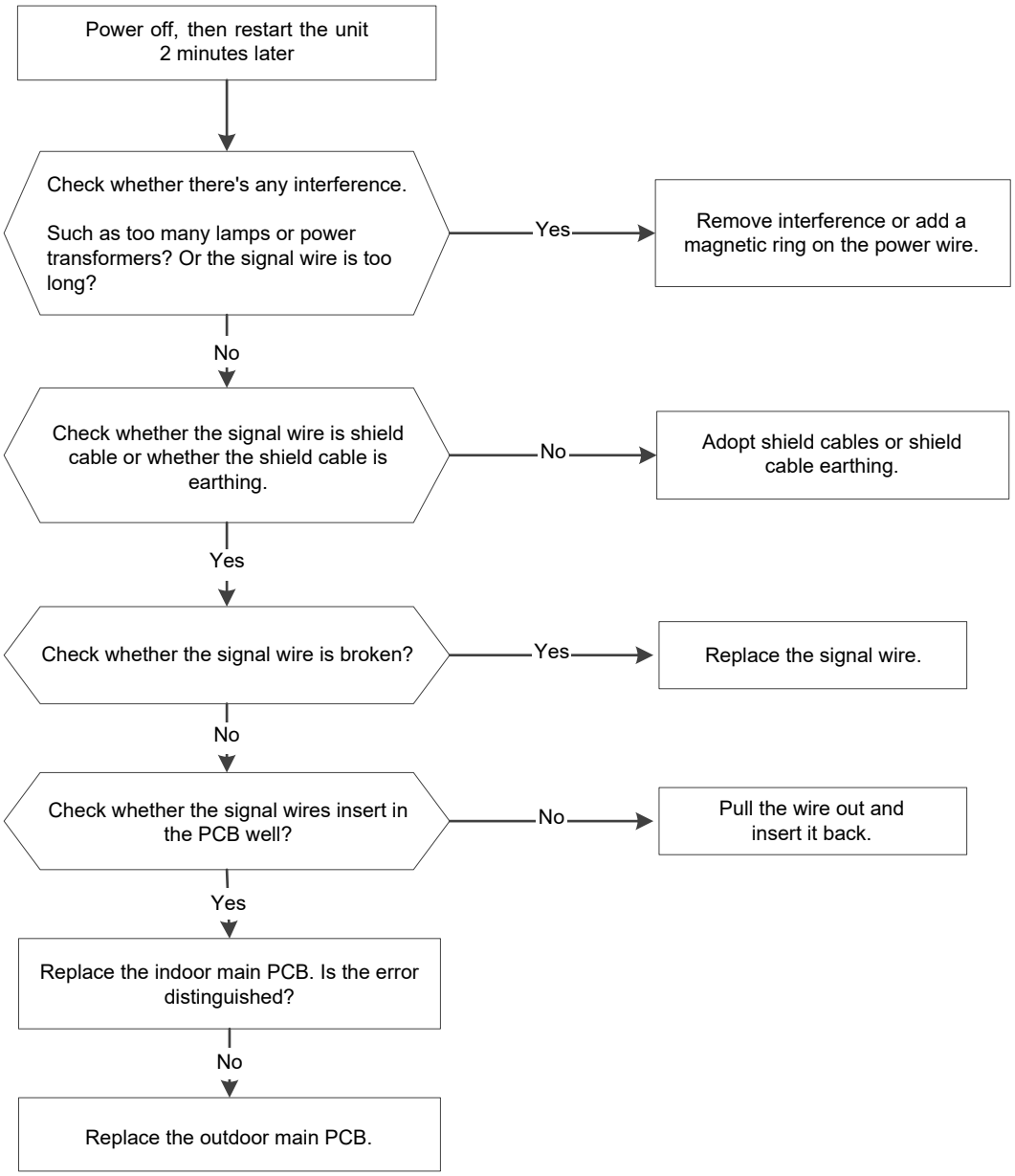
6.2. EL01 - Indoor Unit & Outdoor Unit Communication Error (Continued)

485 Communication (S1, S2 Communication)

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB
- Reactor



Troubleshooting

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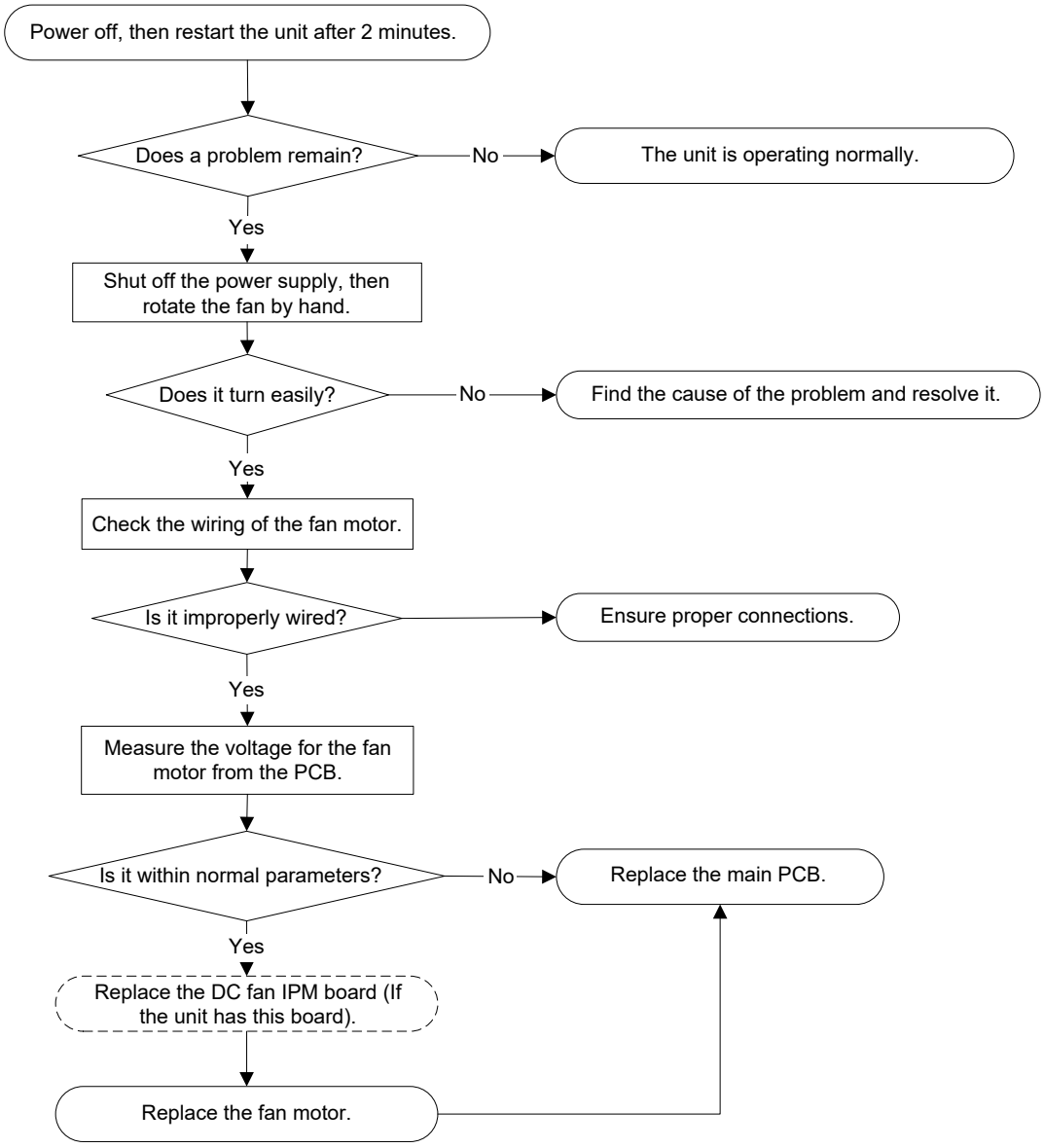
6.3. EH03/EC07 - Fan Speed Out of Control

Description: When the indoor or outdoor fan speed remains too low or too high for a certain time, the unit stops operating and the LED shows the failure.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB



Troubleshooting

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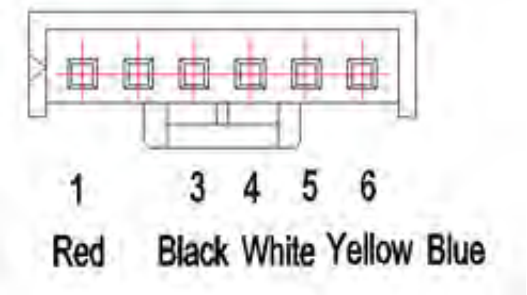
6.3. EH03/EC07 - Fan Speed Out of Control (Continued)

Index:

Indoor or Outdoor DC Fan Motor (Control Chip is in Fan Motor)

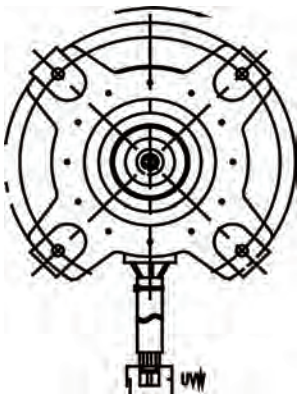
Power on and when the unit is in standby, measure the voltage of pin1-pin3 and pin4-pin3 in the fan motor connector. If the value of the voltage is not in the range shown in the table below, the PCB must have problems and needs to be replaced.

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



Outdoor DC Fan Motor (Control Chip is in Outdoor PCB)

Release the UVW connector. Measure the resistance of U-V, U-W, and V-W. If the resistance is not equal to each other, the fan motor must have problems and needs to be replaced. Otherwise, the PCB must have problems and needs to be replaced.



Troubleshooting

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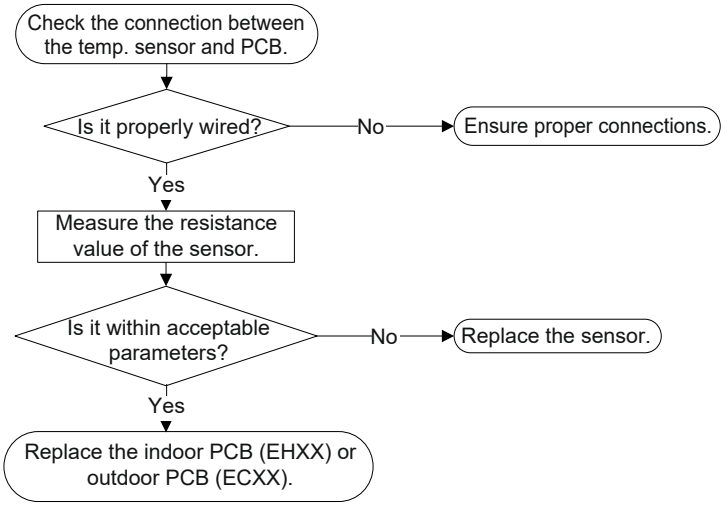
6.4. EH60/EH61/EC53/EC52/EC54/EC56 - Open Circuit or Short Circuit of the Temperature Sensor

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

Recommended parts to prepare:

- Connection wires
- Sensors
- PCB



This picture and the value are for reference only. The actual appearance and value may vary.

Troubleshooting

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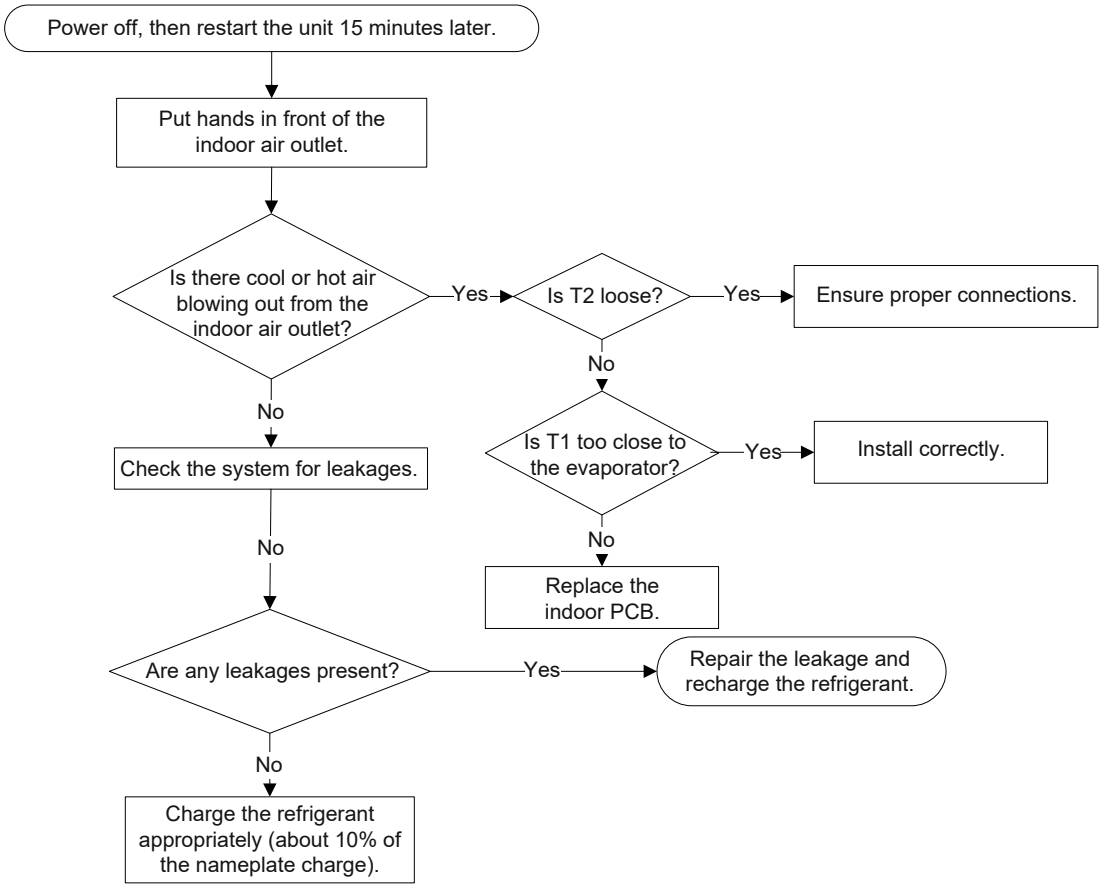
6.5. EL0C - System Lacks Refrigerant

Description: Judge the system's health based on the number of compressor stops and any operational changes resulting from excessive exhaust temperatures.

Recommended parts to prepare:

- Indoor PCB
- Additional refrigerant



Troubleshooting

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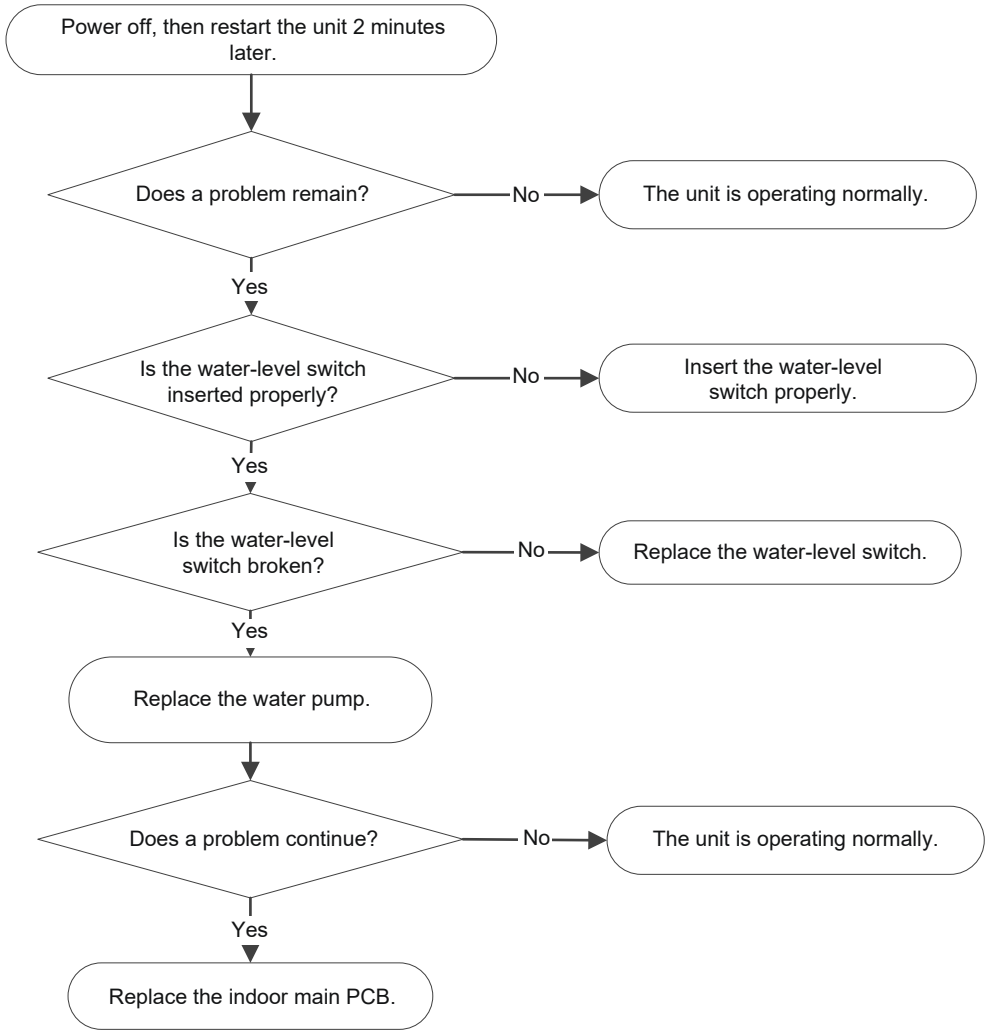
6.6. EH0E - Water-Level Alarm Malfunction

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

Recommended parts to prepare:

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



Troubleshooting

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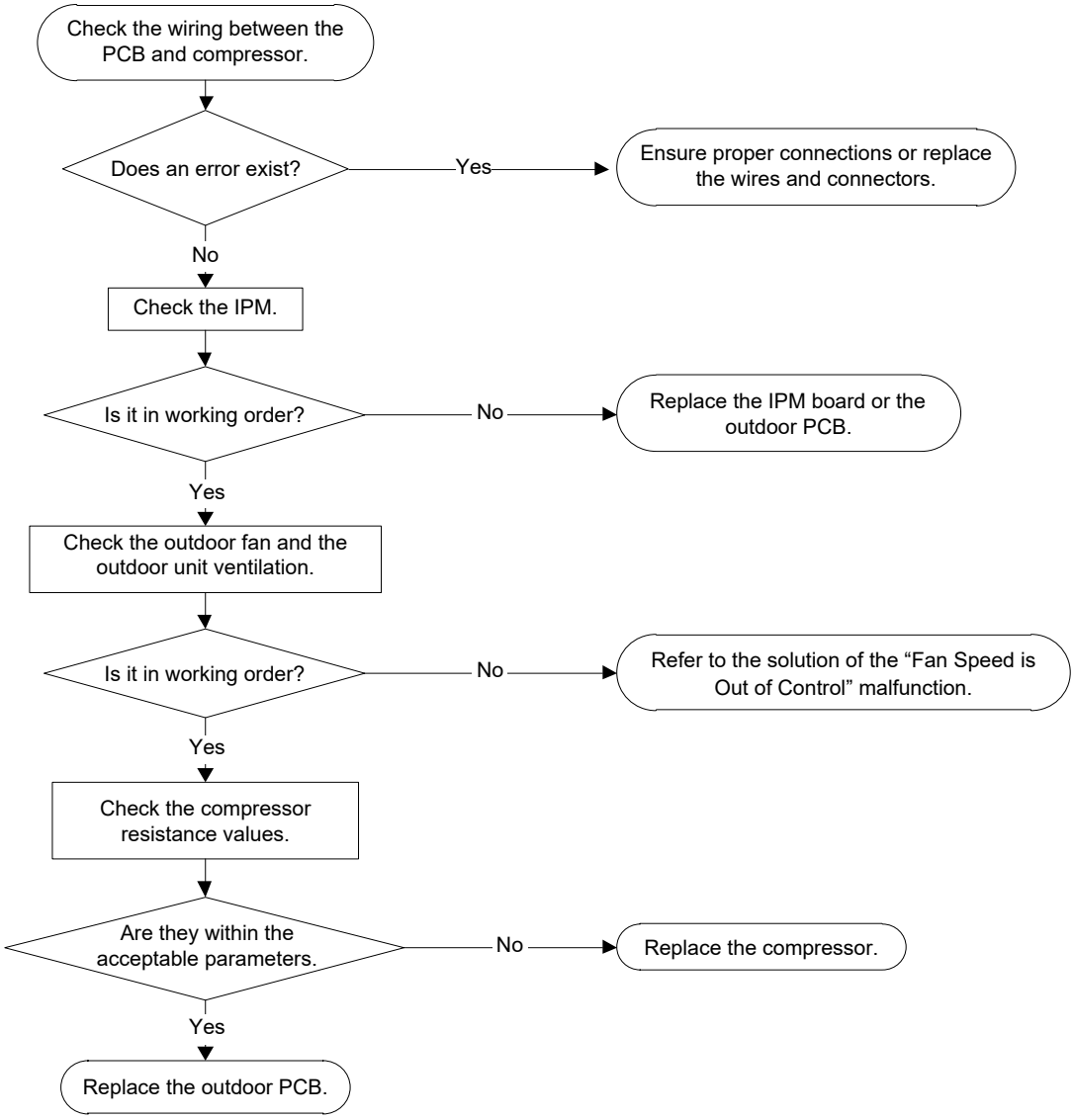
6.7. PC00 - Outdoor Unit IPM Module Protection

Description: When the IPM sends an abnormal voltage signal to the compressor drive chip, the LED display shows "PC00" and the AC shuts down.

Recommended parts to prepare:

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



Troubleshooting

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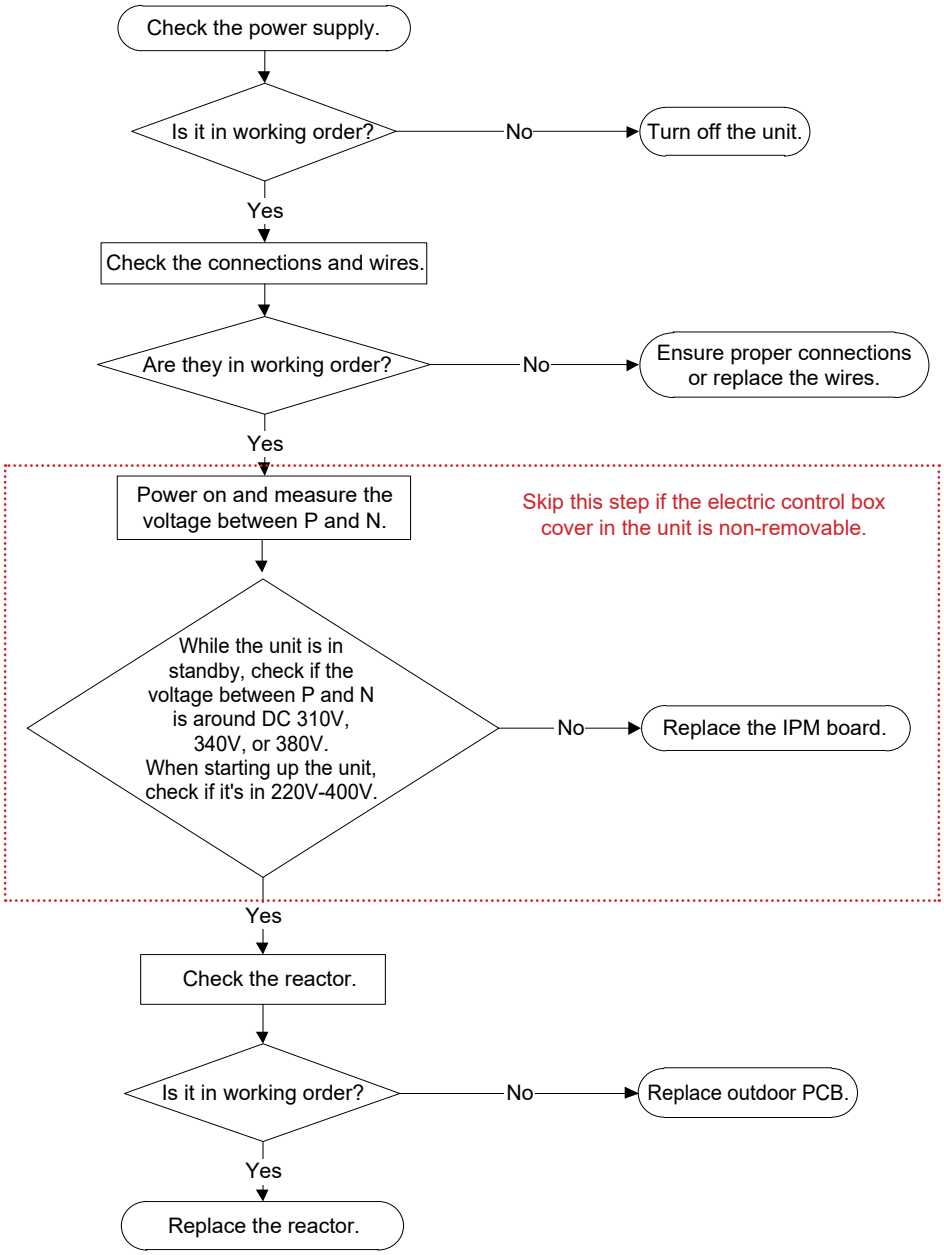
6.8. PC01 - Outdoor Unit Voltage Protection

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

Recommended parts to prepare:

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



Troubleshooting

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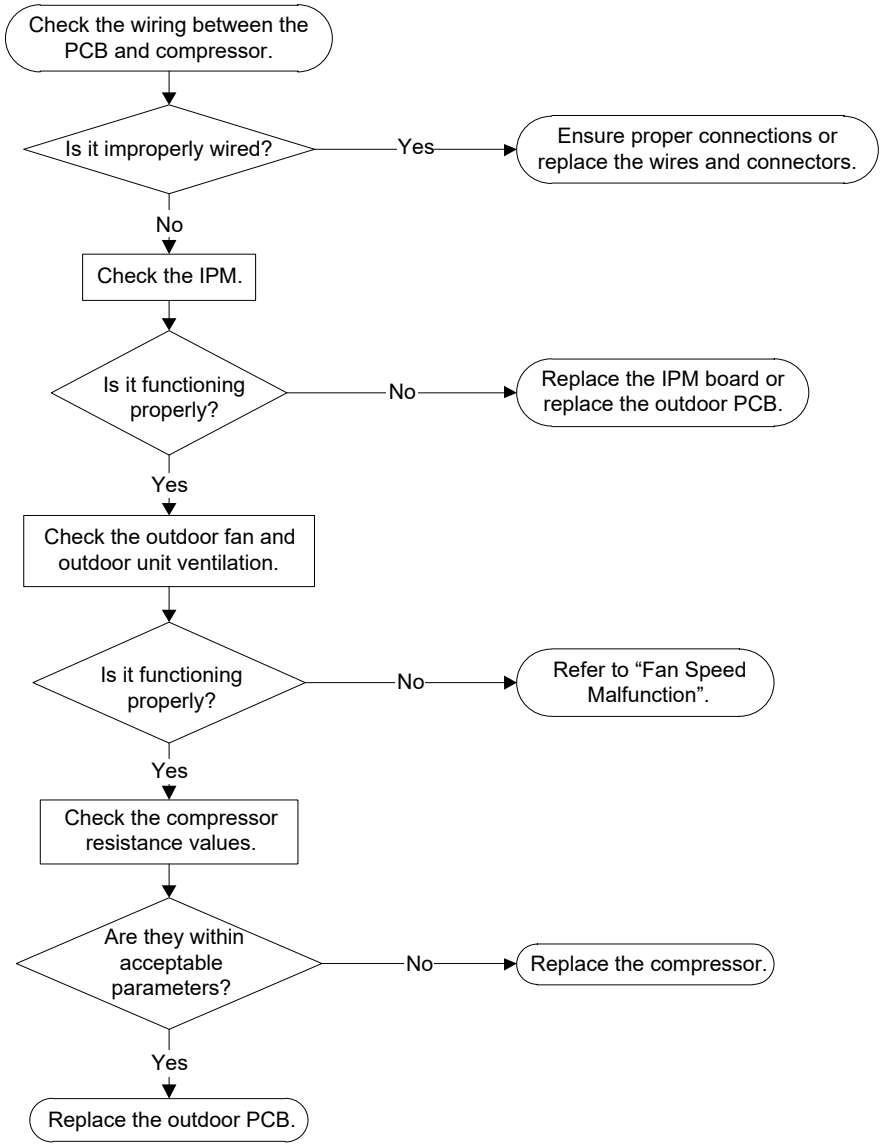
6.9. PC04 - Inverter Compressor Drive Error

Description: An abnormal inverter compressor drive is detected via a specialized circuit that monitors communication, voltage, and rotation speed signals.

Recommended parts to prepare:

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



Troubleshooting

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6.10. PC03 - Pressure Protection (Low or High Pressure)

Description: If the outdoor pressure switch cuts off the system because the high pressure is higher than 4.4 MPa or the outdoor pressure switch cuts off the system because the low pressure is lower than 0.13 MPa, the LED displays the failure code.

Recommended parts to prepare:

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

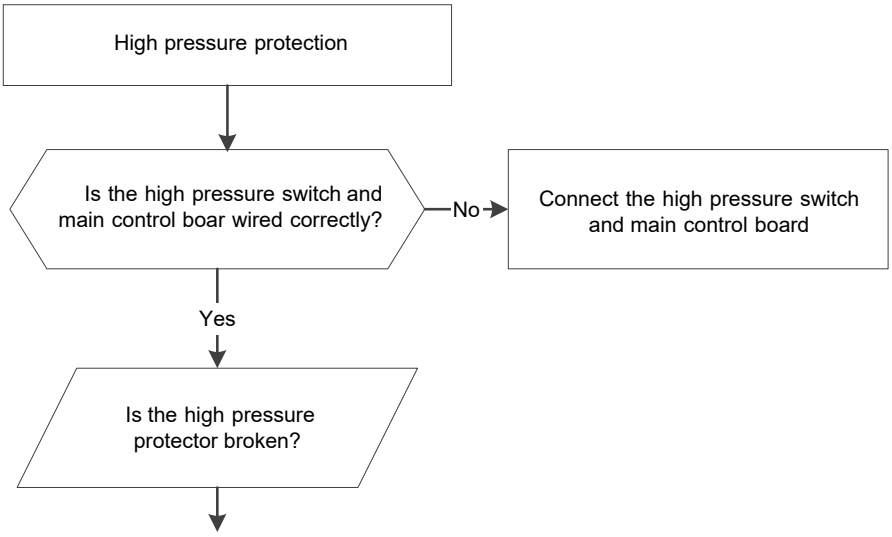

Diagram continues on the next page.

Troubleshooting

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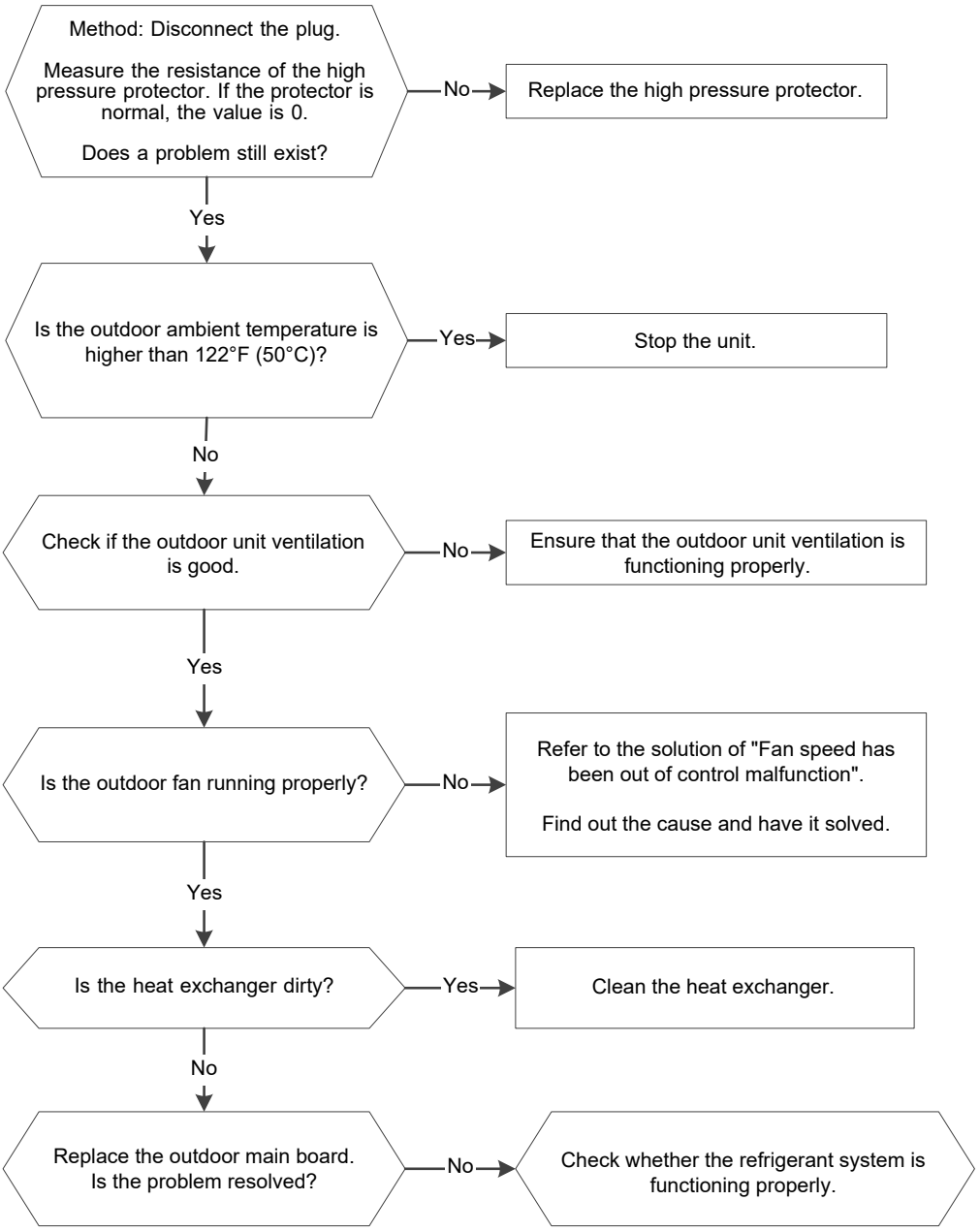
6.10. PC03 - Pressure Protection (Low or High Pressure) - Continued



Troubleshooting

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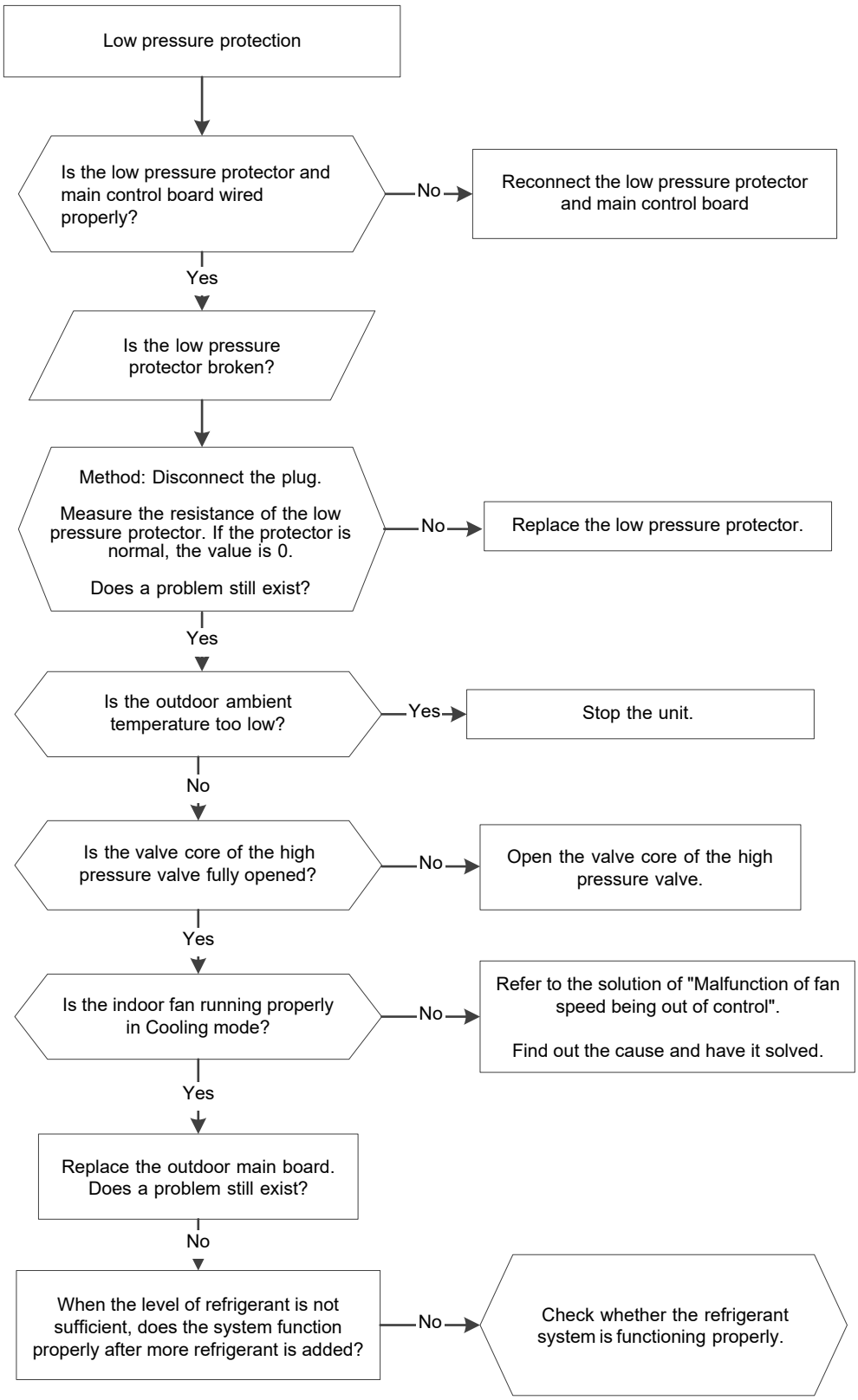
6.10. PC03 - Pressure Protection (Low or High Pressure) - Continued



Troubleshooting

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6.11. PC02 - Compressor Top or IPM Temperature Protection

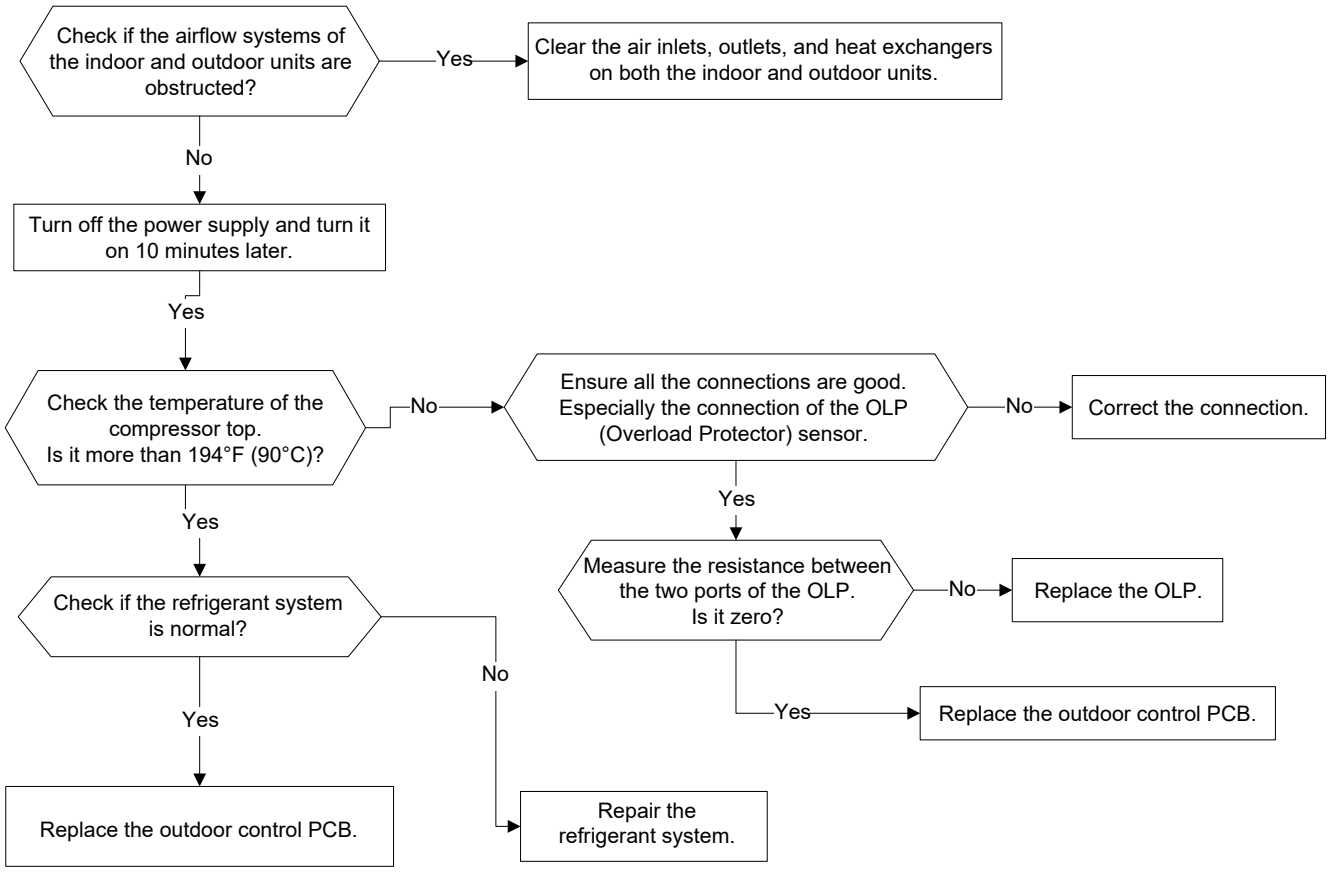
Description: For some models with overload protection, if the sampling voltage is not 5V, the LED will display the failure.

If the IPM module's temperature is higher than a certain value, the LED displays the failure code. Models without the overload protector should be diagnosed according to the second flowchart.

Recommended parts to prepare:

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

1.



Troubleshooting

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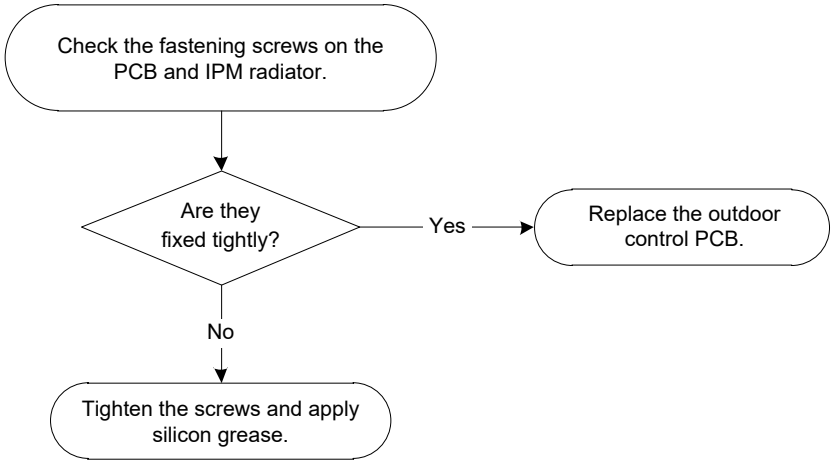
6.11. PC02 - Compressor Top or IPM Temperature Protection (Continued)

2.



Troubleshooting 5

6.12. PC0L - Low Ambient Temperature Protection

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

When the compressor is on and the outdoor ambient temperature (T4) is lower than -40°F (-40°C) for 10 seconds, the AC will stop and display the failure code.

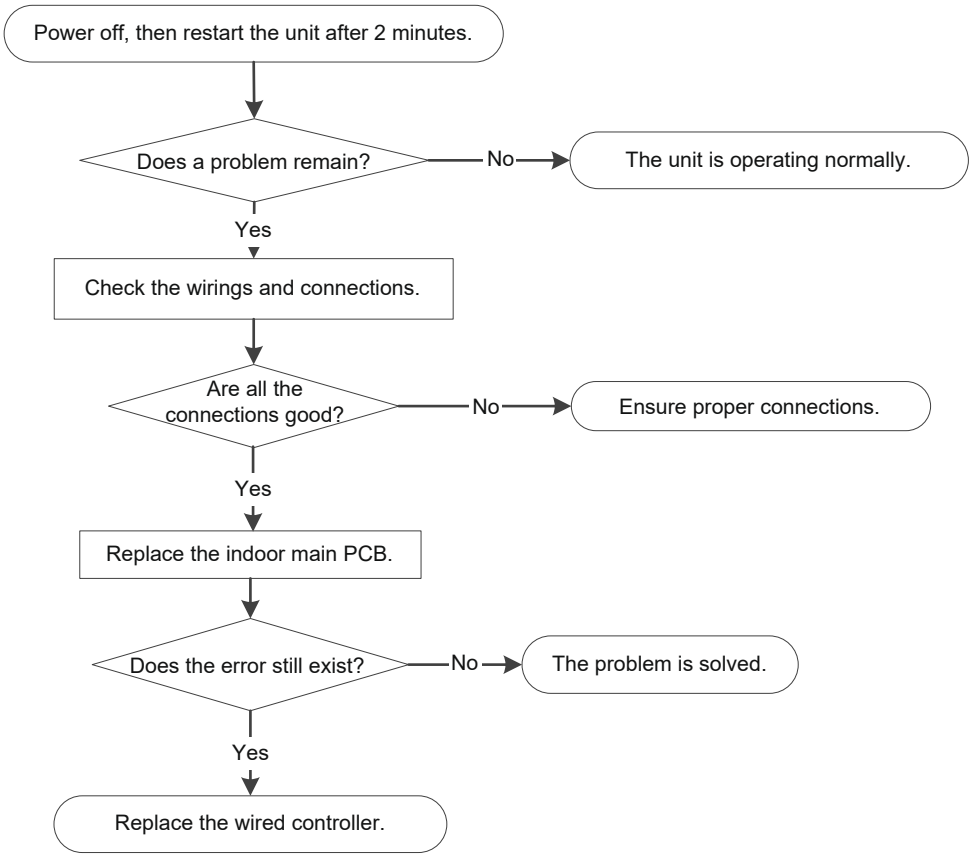
When the outdoor ambient temperature (T4) is no lower than -25.6°F (-32°C) for 10 seconds, the unit will exit from the protection.

6.13. EHb3 - Communication Malfunction Between the Wire & Master Control

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

Recommended parts to prepare:

- Connection wires
- Indoor PCB
- Wired controller



Troubleshooting

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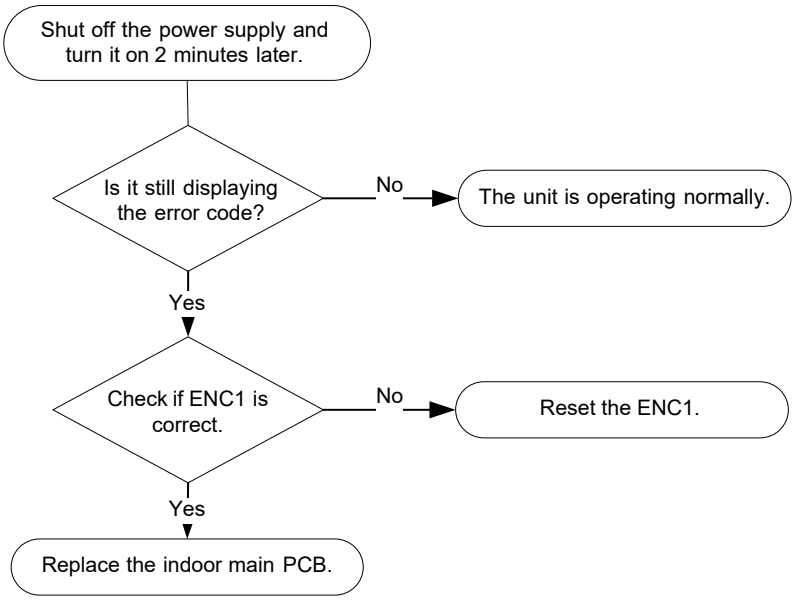
6.14. EHbA - Communication Error Between the Indoor Unit & External Fan Module / EH3A - External Fan DC Bus Voltage is Too Low Protection / EH3b - External Fan DC Bus Voltage is Too High Fault

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

Recommended parts to prepare:

- Indoor main PCB



Troubleshooting

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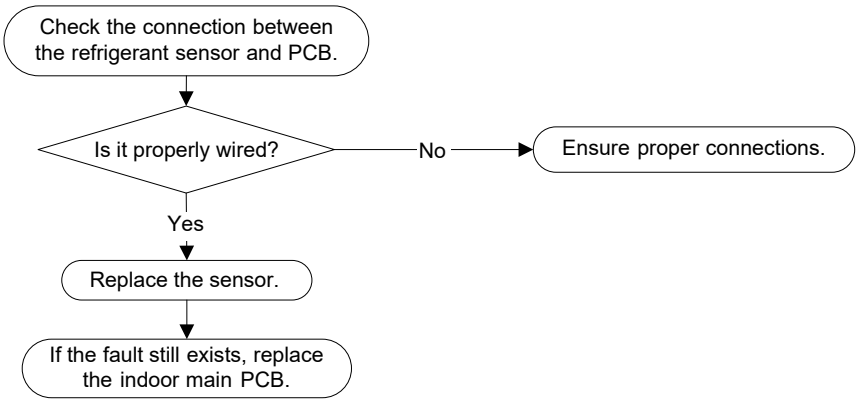
6.15. FHCC - Refrigerant Sensor Error / EHC3 - Refrigerant Sensor is Out of Range

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

Recommended parts to prepare:

- Connection wires
- Sensors
- Indoor main PCB



Troubleshooting

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6.16. EHC1 - Refrigerant Sensor Detects Leakage / EHC2 - Refrigerant Sensor is Out of Range & Leakage is Detected

Description:
Leakage protection activates under any of the following conditions:

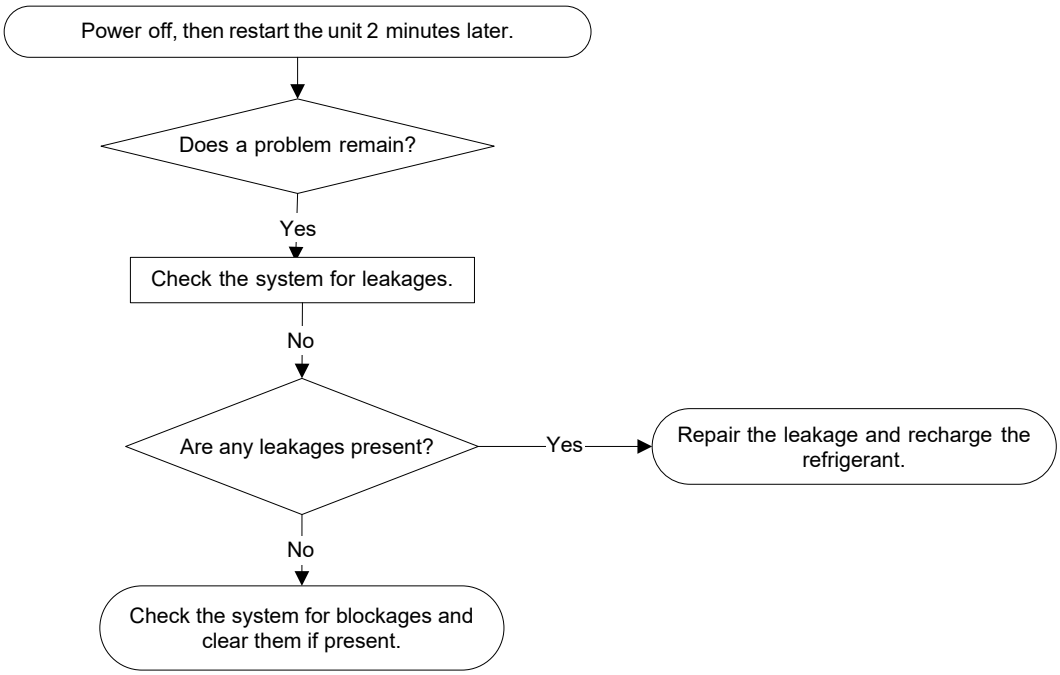
- Refrigerant concentration is more than or equal to 10% LFL for 10 seconds.
- Refrigerant concentration is more than or equal to 20% LFL.
- Multi-model receives a leakage protection fault from the outdoor unit.

Multi-zone: Only the buzzer on the indoor unit detecting a refrigerant leak is still sounding. The shortest sound is 10 seconds, while the longest sound is 5 minutes. Users can press any key on the remote or wire controller to eliminate the alarm.

For the other non-refrigerant leakage fault, the indoor unit only displays "ECC1", the buzzer does not sound.

Recommended parts to prepare:

- Additional refrigerant



Troubleshooting

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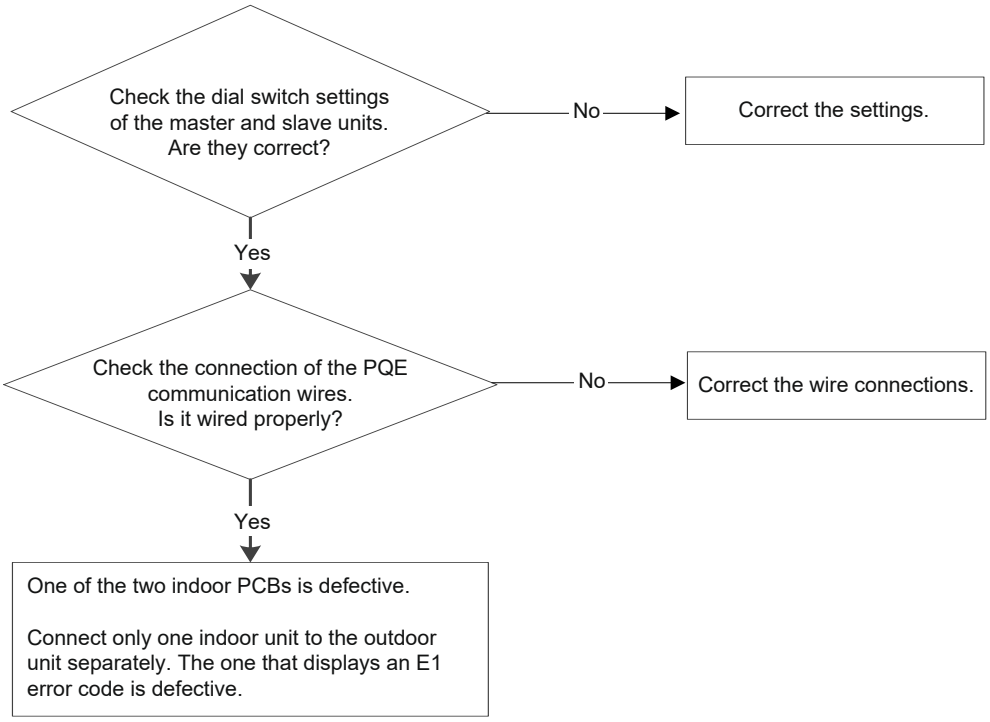
6.17. EL - Communication Malfunction Between the Main Unit & Secondary Units (For Twin Systems)

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

Recommended Parts to Prepare:

- Connection wires
- Indoor PCB



6.18. EH12 - Main Unit or Secondary Units Malfunction (For Twin Systems)

Description: In twin systems, this error code on one unit indicates that the other indoor unit is faulty. Check the other indoor unit's error code and then follow the prescribed solutions to resolve the malfunction.

Troubleshooting

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7. Check Procedures

7.1. Temperature Sensor Check

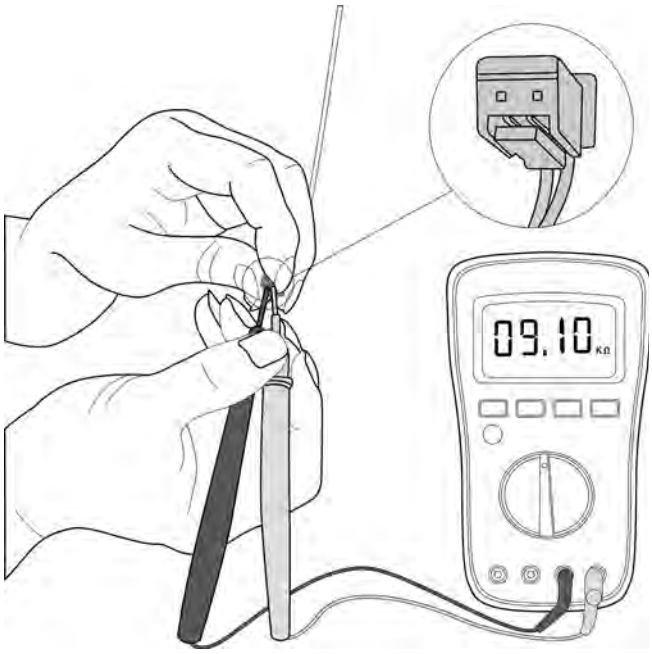
⚠ WARNING

Turn off all power supplies or disconnect all wires to avoid electric shock. Wait until the compressor and coil have returned to normal temperature.

1. Disconnect the temperature sensor from the PCB.

2. Measure the resistance value of the sensor using a multimeter.

3. Check the corresponding temperature sensor resistance value table. Refer to the Appendix.



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

Appendix

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Contents

Appendix

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1. Temperature Sensor Resistance Value Table for TP (°C - K)

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

Appendix

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2. Other Temperature Sensors Resistance Value Table (°C - K)

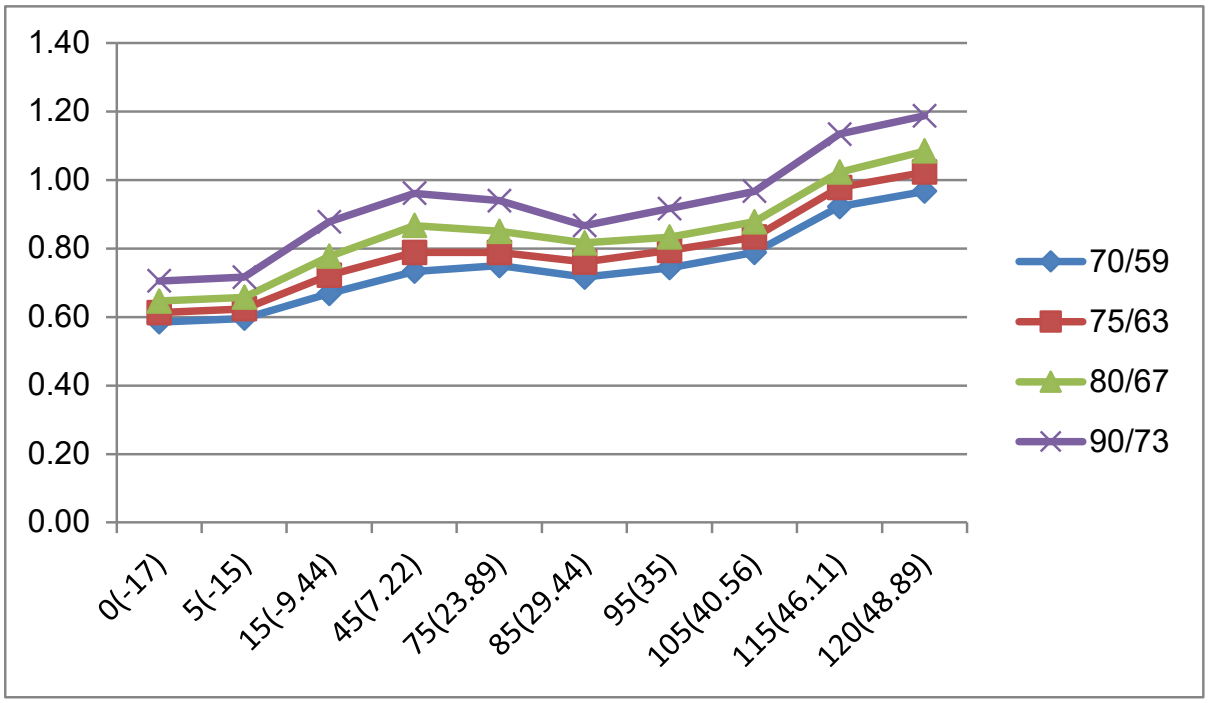
°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75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

Appendix 6

3. Pressure On Service Port

Cooling Chart (R-454B):

°F (°C)	ODU (DB/WB) / IDU (DB)	0(-17)	5(-15)	15 (-9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
BAR	70/59 (21.11/15)	5.9	6.0	6.7	7.3	7.5	7.2	7.4	7.9	9.2	9.7
	75/63 (23.89/17.22)	6.1	6.2	7.2	7.9	7.9	7.6	7.9	8.3	9.8	10.2
	80/67 (26.67/19.44)	6.5	6.6	7.8	8.7	8.5	8.2	8.3	8.8	10.2	10.8
	90/73 (32.22/22.78)	7.1	7.2	8.8	9.6	9.4	8.7	9.2	9.7	11.3	11.9
PSI	70/59 (21.11/15)	85	86	97	106	109	104	108	114	134	140
	75/63 (23.89/17.22)	89	90	105	114	114	110	115	121	142	148
	80/67 (26.67/19.44)	94	95	113	126	123	118	121	127	148	157
	90/73 (32.22/22.78)	102	104	127	139	136	126	133	140	164	172
MPa	70/59 (21.11/15)	0.59	0.60	0.67	0.73	0.75	0.72	0.74	0.79	0.92	0.97
	75/63 (23.89/17.22)	0.61	0.62	0.72	0.79	0.79	0.76	0.79	0.83	0.98	1.02
	80/67 (26.67/19.44)	0.65	0.66	0.78	0.87	0.85	0.82	0.83	0.88	1.02	1.08
	90/73 (32.22/22.78)	0.71	0.72	0.88	0.96	0.94	0.87	0.92	0.97	1.13	1.19

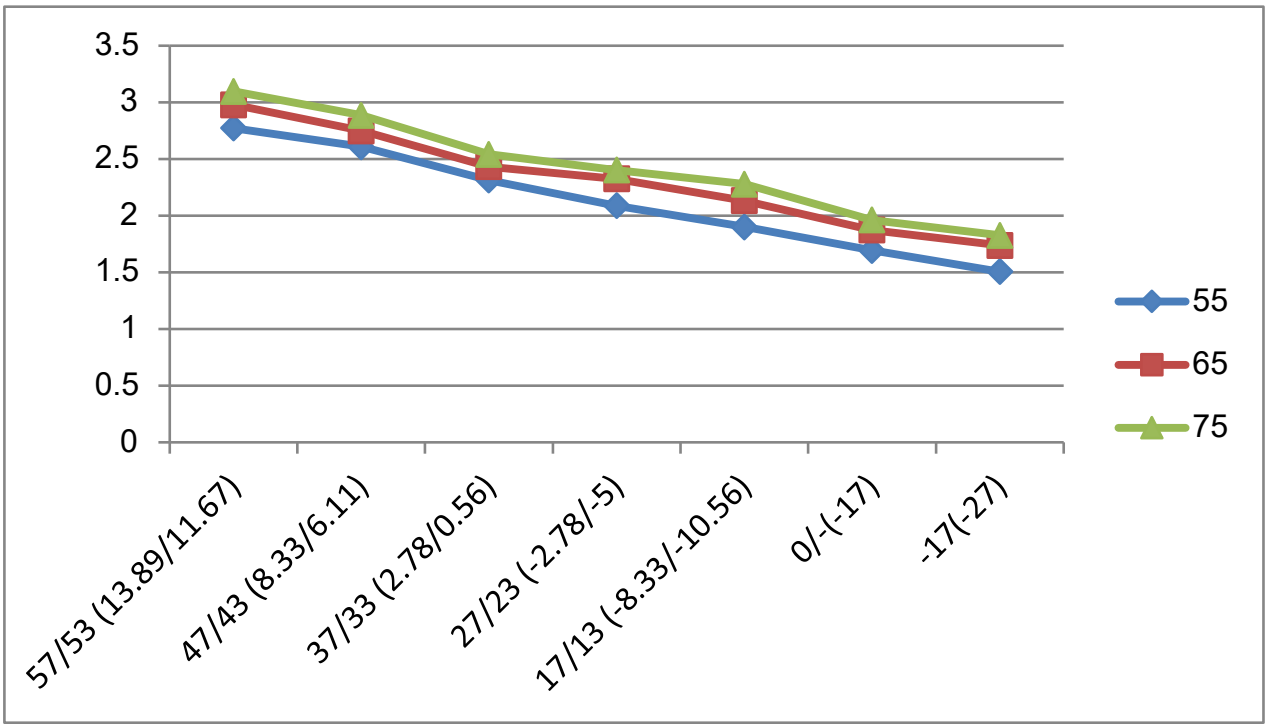


Appendix 6

3. Pressure On Service Port (Continued)

Heating Chart (R-454B):

°F (°C)	ODU (DB/WB) / IDU (DB)	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/- (-17)	-17 (-27)
BAR	55 (12.78)	27.7	26.1	23.1	20.9	19.0	16.9	15.1
	65 (18.33)	29.8	27.5	24.3	23.2	21.3	18.7	17.4
	75 (23.89)	31.0	28.8	25.4	24.0	22.8	19.6	18.3
PSI	55 (12.78)	402	378	335	303	275	245	218
	65 (18.33)	432	398	352	337	309	271	252
	75 (23.89)	449	418	368	348	330	284	265
MPa	55 (12.78)	2.77	2.61	2.31	2.09	1.90	1.69	1.51
	65 (18.33)	2.98	2.75	2.43	2.32	2.13	1.87	1.74
	75 (23.89)	3.10	2.88	2.54	2.40	2.28	1.96	1.83



Appendix

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4. System Pressure Table R-454B

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	0.72	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	314.91	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

Appendix 6

4. System Pressure Table R-454B (Continued)

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
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	2758.3	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
422.31	4.22	61.25	-16	3.2	2956.5	29.57	428.79	52	125.6
437.92	4.38	63.51	-15	5	3025	30.25	438.72	53	127.4
453.98	4.54	65.84	-14	6.8	3094.7	30.95	448.83	54	129.2
470.47	4.70	68.23	-13	8.6	3165.7	31.66	459.13	55	131
487.43	4.87	70.69	-12	10.4	3238.1	32.38	469.63	56	132.8
504.84	5.05	73.22	-11	12.2	3311.7	33.12	480.30	57	134.6
522.73	5.23	75.81	-10	14	3386.7	33.87	491.18	58	136.4
541.1	5.41	78.48	-9	15.8	3463	34.63	502.25	59	138.2
559.95	5.60	81.21	-8	17.6	3540.7	35.41	513.52	60	140
579.31	5.79	84.02	-7	19.4	3619.9	36.20	525.00	61	141.8
599.16	5.99	86.90	-6	21.2	3700.5	37.01	536.69	62	143.6
619.54	6.20	89.85	-5	23	3782.7	37.83	548.61	63	145.4
640.43	6.40	92.88	-4	24.8	3866.3	38.66	560.74	64	147.2
661.86	6.62	95.99	-3	26.6	3951.5	39.52	573.10	65	149
683.82	6.84	99.18	-2	28.4	4038.3	40.38	585.69	66	150.8
706.34	7.06	102.44	-1	30.2	4126.8	41.27	598.52	67	152.6
729.41	7.29	105.79	0	32	4217	42.17	611.60	68	154.4
753.06	7.53	109.22	1	33.8	4309	43.09	624.95	69	156.2
777.28	7.77	112.73	2	35.6	4402.9	44.03	638.56	70	158
802.08	8.02	116.33	3	37.4	4498.7	44.99	652.46	71	159.8
827.48	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	165.2
907.35	9.07	131.60	7	44.6	4904.1	49.04	711.25	75	167

The design and specifications of this product are subject to change without prior notice as development continues. Consult with the sales agency or manufacturer for details. Refer to the equipment nameplate for all other applicable specifications.

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