



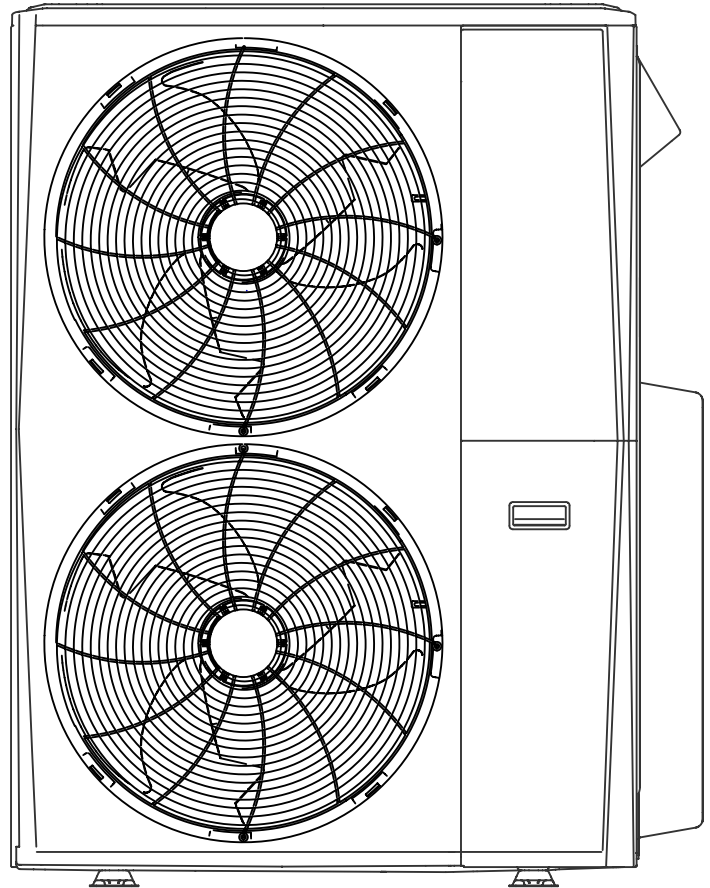
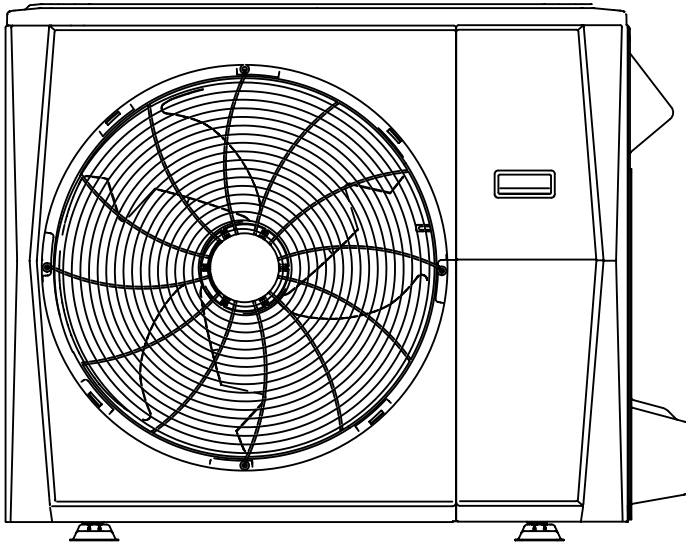
Service Manual Outdoor Unit



For 18,000 - 60,000 BTU Systems

Regular Heat Units Covered In This Manual

SYSTEM TONS	BTUH	VOLTAGE/ PHASE	OUTDOOR MODEL
1.5	18,000	208/230-1	MO1BE-H18B-2A
2.0	24,000	208/230-1	MO1BE-H24B-2A
2.5	30,000	208/230-1	MO1BE-H30B-2A
3.0	36,000	208/230-1	MO1BE-H36B-2A
4.0	48,000	208/230-1	MO1BE-H48B-2A
5.0	60,000	208/230-1	MO1BE-H60B-2A



Extreme Heat Units Covered In This Manual

SYSTEM TONS	BTUH	VOLTAGE/ PHASE	OUTDOOR MODEL
1.5	18,000	208/230-1	MO1HE-H18B-2A
2.0	24,000	208/230-1	MO1HE-H24B-2A
2.5	30,000	208/230-1	MO1HE-H30B-2A
3.0	36,000	208/230-1	MO1HE-H36B-2A
3.0	36,000	208/230-1	MO1SE-H36B-2A
3.5	42,000	208/230-1	MO1HE-H42B-2A
4.0	48,000	208/230-1	MO1HE-H48B-2A
5.0	60,000	208/230-1	MO1HE-H60B-2A



A2L

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Safety Precautions

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

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

WARNING

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

CAUTION

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

NOTE

A property-damage-only hazard, meaning no personal injury is possible.

WARNING

In Case Of Accidents Or Emergencies

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

CAUTION

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

WARNING

Pre-Installation And Installation

- Use this unit only on a dedicated circuit.
- Damage to the installation area could cause the unit to fall, potentially resulting in personal injury, property damage, or product failure.
- Only qualified personnel should disassemble, install,

remove, or repair the unit.

- Only a qualified electrician should perform electrical work. For more information, contact your dealer, seller, or an authorized service center.

CAUTION

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

WARNING

Operation And Maintenance

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

CAUTION

- Do not install or operate the unit for an extended period in areas of high humidity or in an environment directly exposed 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 where noise or air discharge created by the outdoor unit will negatively impact the environment or nearby residences.
- Do not expose skin directly to the air discharged by the unit for prolonged periods.
- Ensure the unit does not operate in areas with water or other liquids.
- Ensure the drain hose is installed correctly to ensure proper water drainage.
- When lifting or transporting the unit, it is recommended that two or more people are used for this task.
- When the unit is not to be used for an extended time, disconnect the power supply or turn off the breaker.

WARNING

Information servicing (For flammable materials)

1. Installation (where refrigerant pipes are allowed)

- Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry-recognized assessment specification.
- Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- That the installation of pipework shall be kept to a minimum.
- That pipework shall be protected from physical damage.
- Where refrigerant pipes shall comply with national gas regulations.
- That mechanical connections shall be accessible for maintenance purposes.
- Be more careful that foreign matter (oil, water, etc.) does not enter the piping. Also, when storing the piping, securely seal the opening by pinching, taping, etc.
- All working procedures that affect safety means shall only be carried out by competent technicians.
- Appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- Joints shall be tested with detection equipment with a capability of 5 g/year of refrigerant or better, with the equipment in a standstill and under operation or under pressure of at least these standstill or operation conditions after installation. Detachable joints should NOT be used on the indoor side of the unit (brazed, welded joints could be used).
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction.

2. When a **FLAMMABLE REFRIGERANT** is used, the requirements for installation space of appliance and/or ventilation requirements are determined according to

- the mass charge amount (M) used in the appliance,
- the installation location,
- the type of ventilation of the location or the appliance.
- piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and comply with national and local codes and standards, such as ASHRAE 15, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection before being covered or enclosed.
- that protection devices, piping, and fittings shall be protected as far as possible against adverse environmental effects, for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris;
- that piping in refrigeration systems shall be so designed and installed to minimize the likelihood of hydraulic shock damaging the system;

- that steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation;
- that precautions shall be taken to avoid excessive vibration or pulsation;
- the minimum floor area of the room shall be mentioned in the form of a table or a single figure without reference to a formula;
- after completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested before refrigerant charging, according to the following requirements:
 - a. The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system can not be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
 - b. The test pressure after removal of the pressure source shall be maintained for at least 1 h with no decrease of pressure indicated by the test gauge, with test gauge resolution not exceeding 5% of the test pressure.
 - c. During the evacuation test, after achieving a vacuum level specified in the manual or less, the refrigeration system shall be isolated from the vacuum pump and the pressure shall not rise above 1500 microns within 10 min. The vacuum pressure level shall be specified in the manual and shall be the lessor of 500 microns or the value required for compliance with national and local codes and standards, which may vary between residential, commercial, and industrial buildings.
- field-made refrigerant joints indoors shall be tightness tested according to the following requirements: The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.

3. Qualification of workers

Any maintenance, service, and repair operations must require the qualification of the working personnel. Every working procedure that affects safety means shall only be carried out by competent technicians who joined the training and achieved competence should be documented by a certificate. The training of these procedures is 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 shall follow the ANNEX HH requirements of UL 60335-2-40 4th Edition.

Examples of such working procedures are:

- breaking into the refrigerating circuit;
- opening of sealed components;
- opening of ventilated enclosures.

4. Checks to the area

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

5. Work procedure

Works shall be undertaken under a controlled procedure to minimize the risk of flammable gas or vapor being present while the work is being performed.

6. General work area

All maintenance staff and others working in the local area should be instructed on the nature of the work being carried out. Work in confined spaces shall be avoided.

7. Checking for the presence of refrigerant

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

8. Presence of fire extinguisher

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

9. No ignition sources

No person carrying out work on a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of a fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repair, removal, and disposal, during which refrigerant can be released into the surrounding space. Before work takes place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.

"No Smoking" signs shall be displayed.

10. Ventilated area

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

11. Check the refrigeration equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- the actual refrigerant charge is in accordance with the room size within which the refrigerant-containing parts are installed;
- the ventilation machinery and outlets are operating adequately and are not obstructed;
- if an indirect refrigerating circuit is being used, the secondary circuits shall be checked for the presence of refrigerant;
- marking to the equipment continues to be visible and legible, marking and illegible signs shall be corrected;
- refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance

that may corrode refrigerant-containing components unless the components are constructed of materials that are inherently resistant to being corroded or are suitably protected against being so corroded.

12. Checks to electrical devices

Repair and maintenance of electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately it is necessary to continue operation, and adequate temporary solution shall be used.

This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

that capacitors are discharged: this shall be done safely to avoid the possibility of sparking;

that no live electrical components and wiring are exposed while charging, recovering, or purging the system;

that there is continuity of earth bonding;

Sealed electrical components shall be replaced if it's damaged; Intrinsically safe components must be replaced if it's damaged.

Sealed electrical components shall be replaced.

Intrinsically safe components must be replaced.

13. Wiring

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

14. Detection of flammable refrigerants

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

The following leak detection methods are deemed acceptable for refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE

Examples of leak-detection fluids are

- bubble method,
- fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/ extinguished.

If leakage of refrigerant is found which requires brazing,

all of the refrigerant shall be recovered from the system, or isolated (using shut-off valves) in a part of the system remote from the leak. See the following instructions for the removal of refrigerant.

15. Removal and evacuation

When breaking into the refrigerant circuit to make repairs - or for any other purpose conventional procedures shall be used. However, for flammable refrigerants best practice must be followed since flammability is a consideration.

The following procedure shall be adhered to:

- 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; and open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to the atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

16. Charging procedures

In addition to conventional charging procedures, the following requirements shall be followed:

- Works shall be undertaken with appropriate tools only (In case of uncertainty, please consult the manufacturer of the tools for use with flammable refrigerants) Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Ensure that the refrigeration system is earthed before charging the system with refrigerant.
- Label the system when charging is complete (if not already). Extreme care shall be taken not to overfill the refrigeration system.
- Before recharging the system, it shall be pressure tested with oxygen-free nitrogen (OFN). The system shall be leak tested on completion of charging but before commissioning. A follow-up leak test shall be carried out before leaving the site.

17. Decommissioning

Before carrying out this procedure, the technician must be completely familiar with the equipment and all its details. It is recommended good practice that all refrigerants are recovered safely. Before the task is carried out, an oil and refrigerant sample shall be taken in case analysis is required before the re-use of recovered refrigerant. Electrical power must be available before the task commences.

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

18. Labelling

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

19. Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valves and associated shut-off valves in good working order. Empty recovery

cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

20. Transportation, marking, and storage for units that employ flammable refrigerants

- a. **Transport of equipment containing flammable refrigerants:**
Compliance with the transport regulations.
- b. **Marking of equipment using signs:**
Compliance with local regulations.
- c. **Disposal of equipment using flammable refrigerants**
Compliance with national regulations.
- d. **Storage of equipment/appliances**
The storage of equipment should follow the manufacturer's instructions.
- e. **Storage of packed (unsold) equipment**
Storage package protection should be constructed such that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge. The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

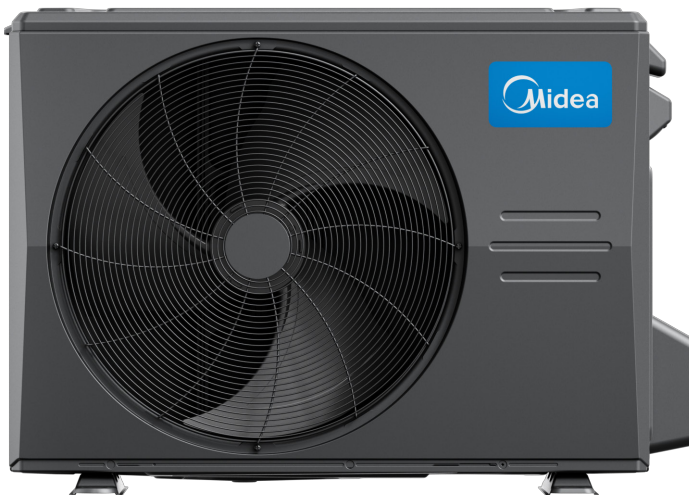
External Appearance



18k Regular Heat



36k Extreme Heat/48k & 60k Regular Heat



18k & 24k Extreme Heat/24k Regular Heat



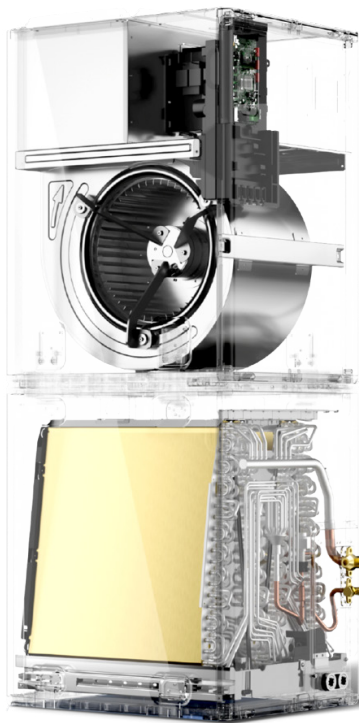
60k Extreme Heat



30k & 36k Regular Heat/36k Extreme Heat

Features

Smaller Outdoor Condensers for 24V Heat Pump Systems
Reduced Size, Enhanced Efficiency



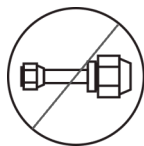
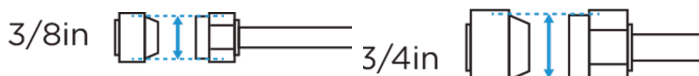
Symmetric Fan Blower Design
Enhanced Airflow circulation

M-Shaped Coil
High Efficiency Heat Exchanger

High Efficiency Electrical Control

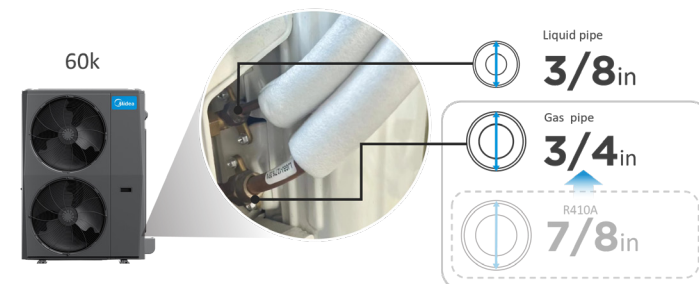
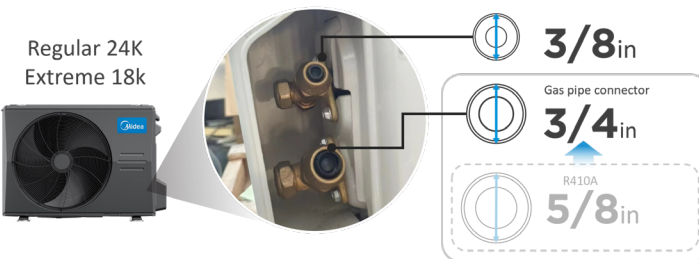
High Efficiency Compressor

Unified Connection Pipes and Valves for 24V Heat Pump
Easier and lower-cost installation



Pipe diameters = Connector diameters

The connectors of the stop valves of the gas pipe and liquid pipe are separately unified to 3/8 in and 3/4 in, which are the same as the diameters of the gas pipe and liquid pipe, so there's no need for a flare-to-flare adaptor.



Match with the industry common size



With a smaller diameter, it's easier for the installer to bend the gas pipe when handling the pipe connection.



The industry's common-size pipes are easier to buy in the market, and this helps to reduce the number of pipe types the installers need to store.

Reduced Cabinet Size, Increased Loading Quantity, and More Flexible Installation



Dimension Drawing

All Units: inch (mm)

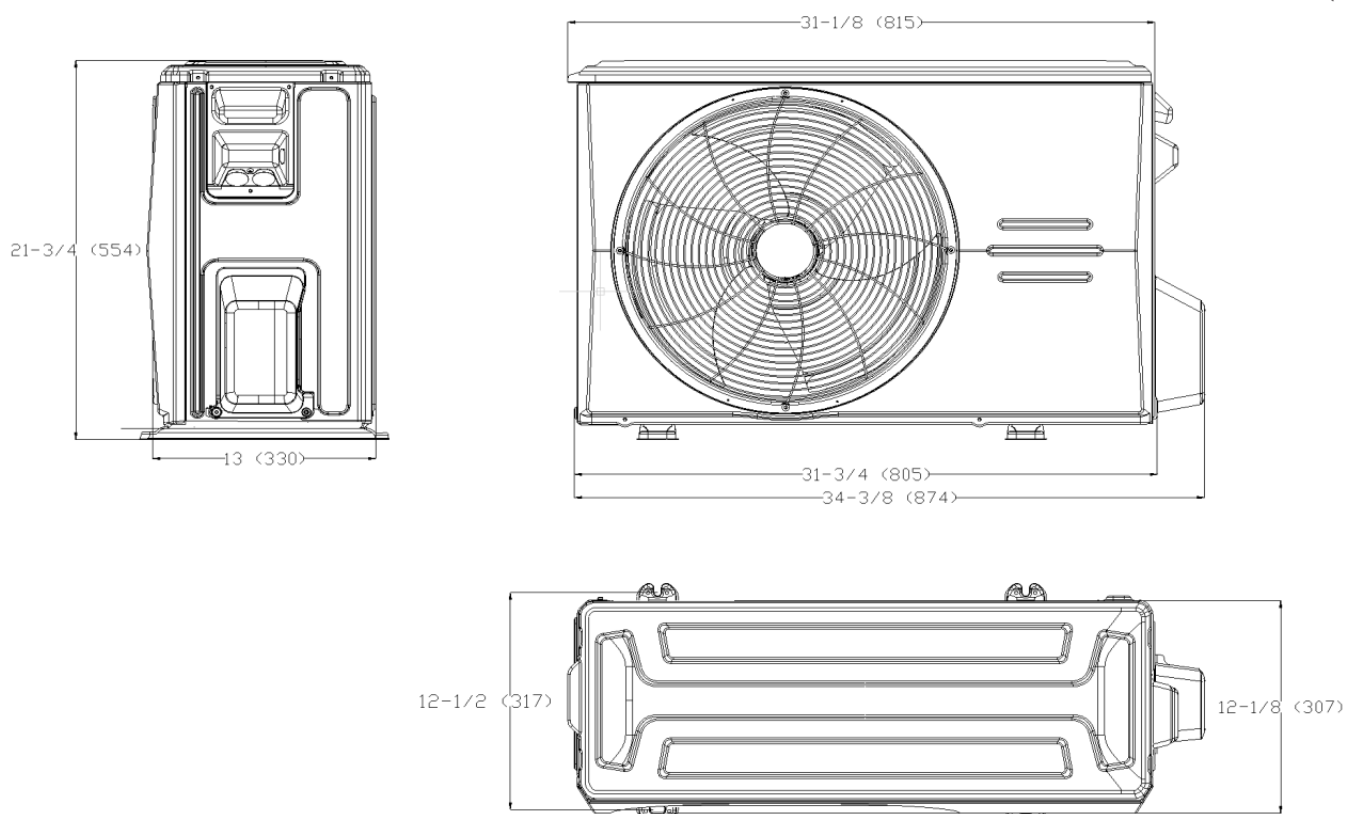


Fig. D-1: 18k Regular Heat

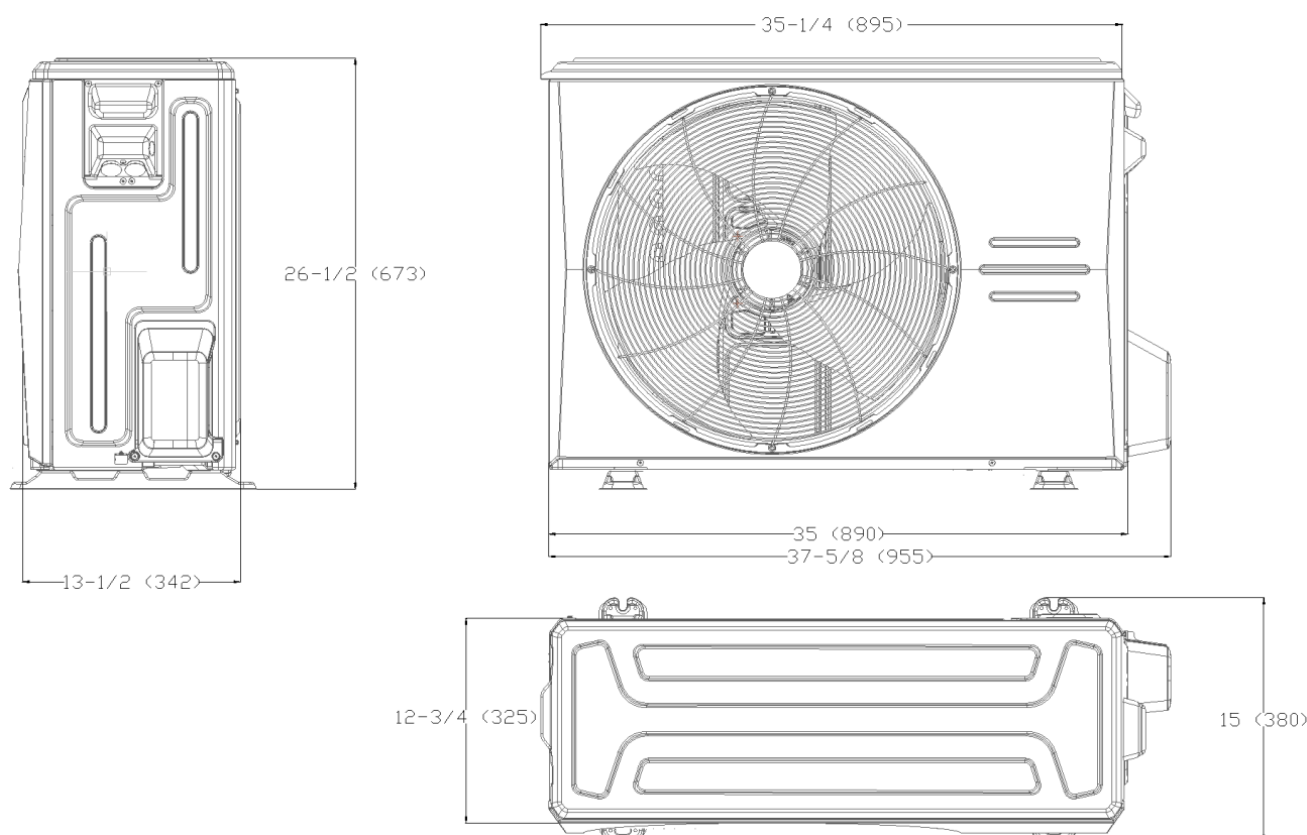


Fig. D-2: 18k & 24k Extreme Heat/24k Regular Heat

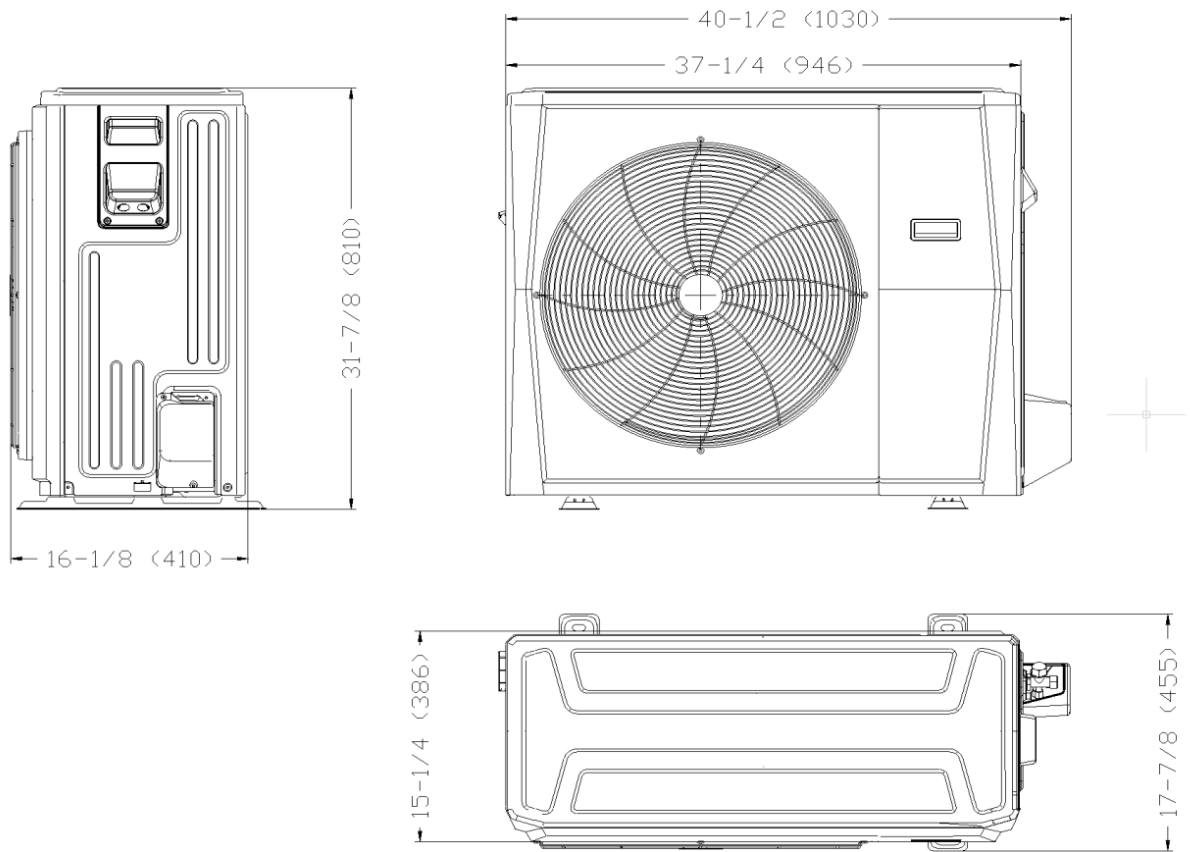


Fig. D-3: 30k & 36k Regular Heat/36k Extreme Heat

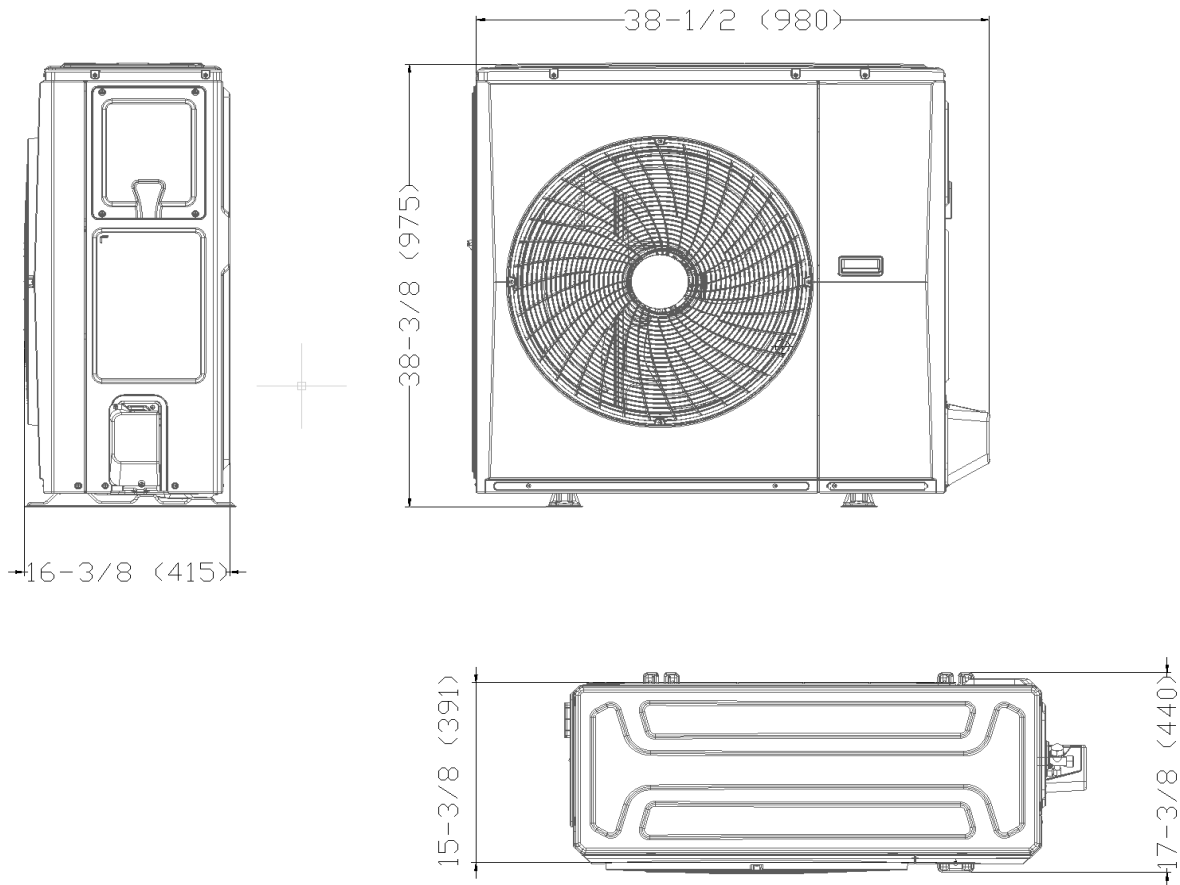


Fig. D-4: 36k Extreme Heat/48k & 60k Regular Heat
Outdoor Unit Inverter Series Service Manual

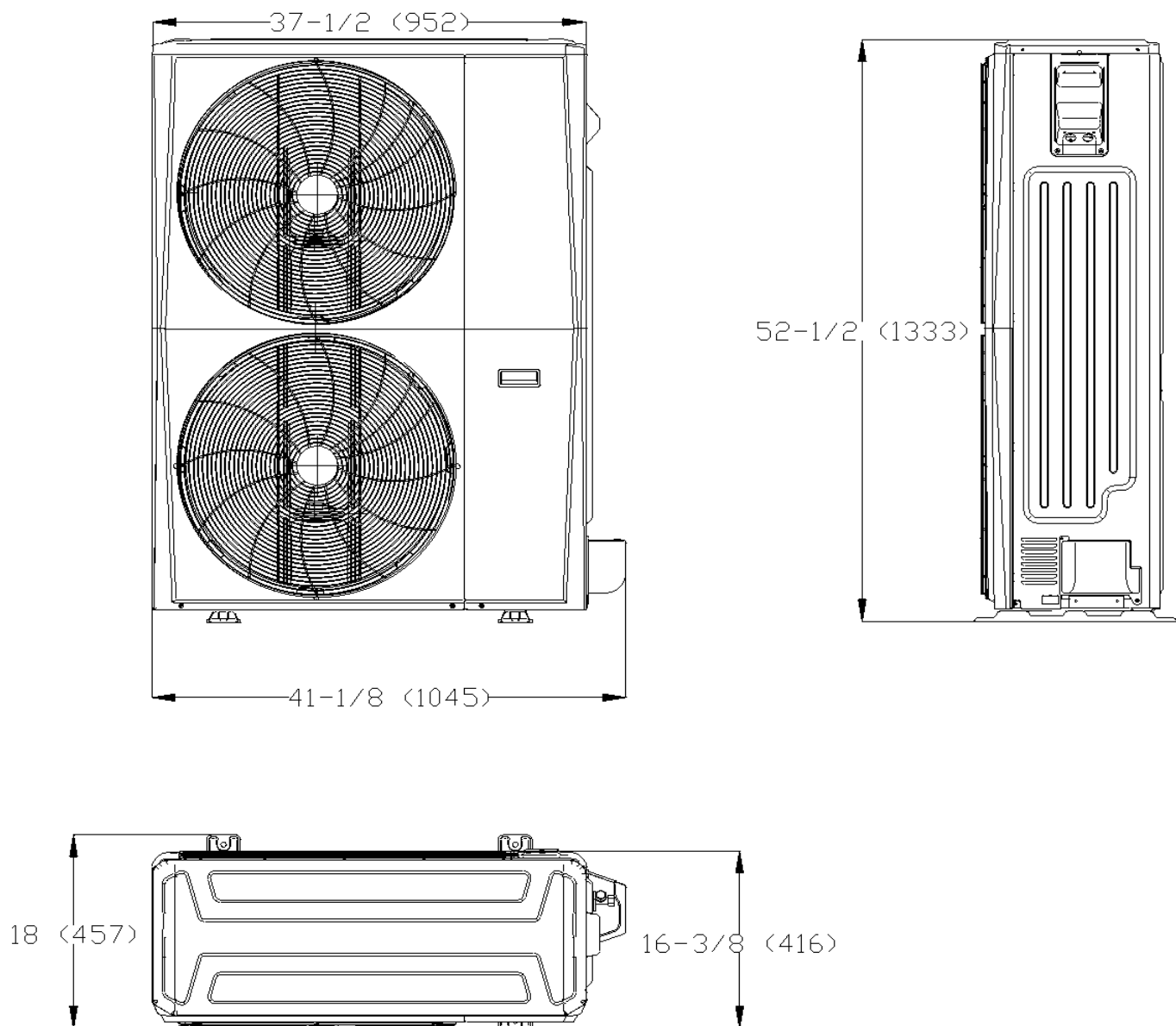


Fig. D-5: 60k Extreme Heat

Service Clearances

The distance between the mounted outdoor unit should meet the specifications illustrated in the following diagrams.

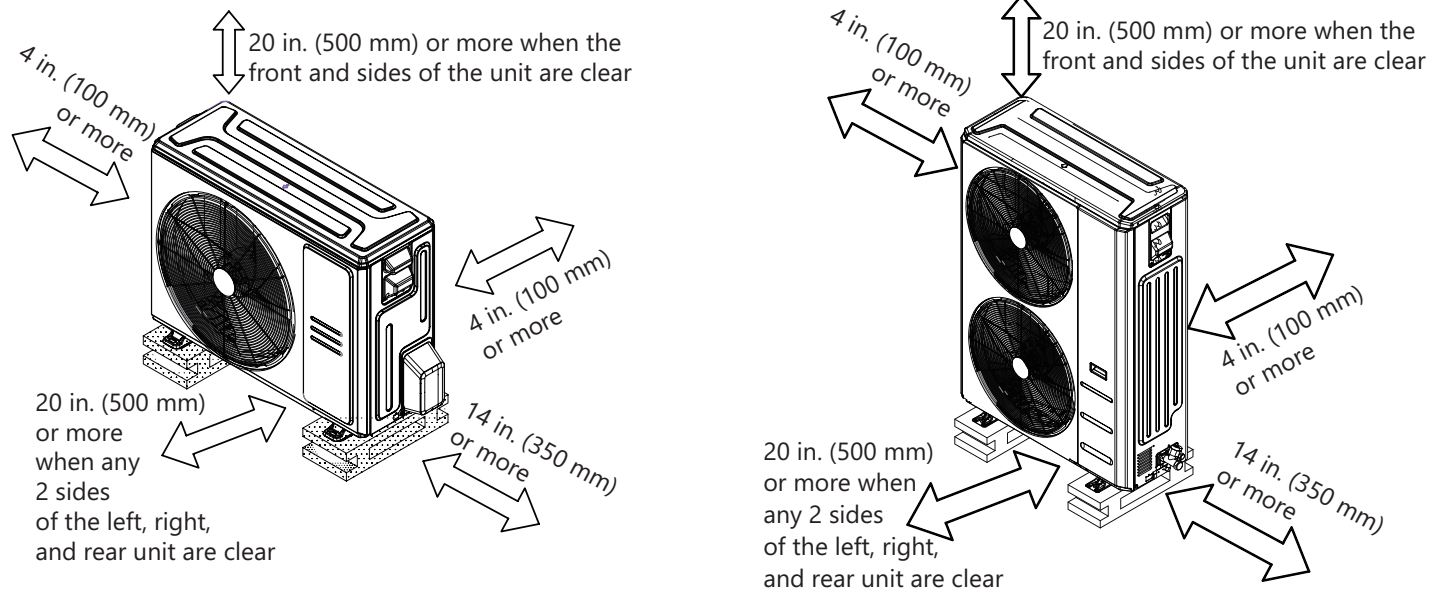


Fig. SC-1: Single Unit Clearance Dimensions

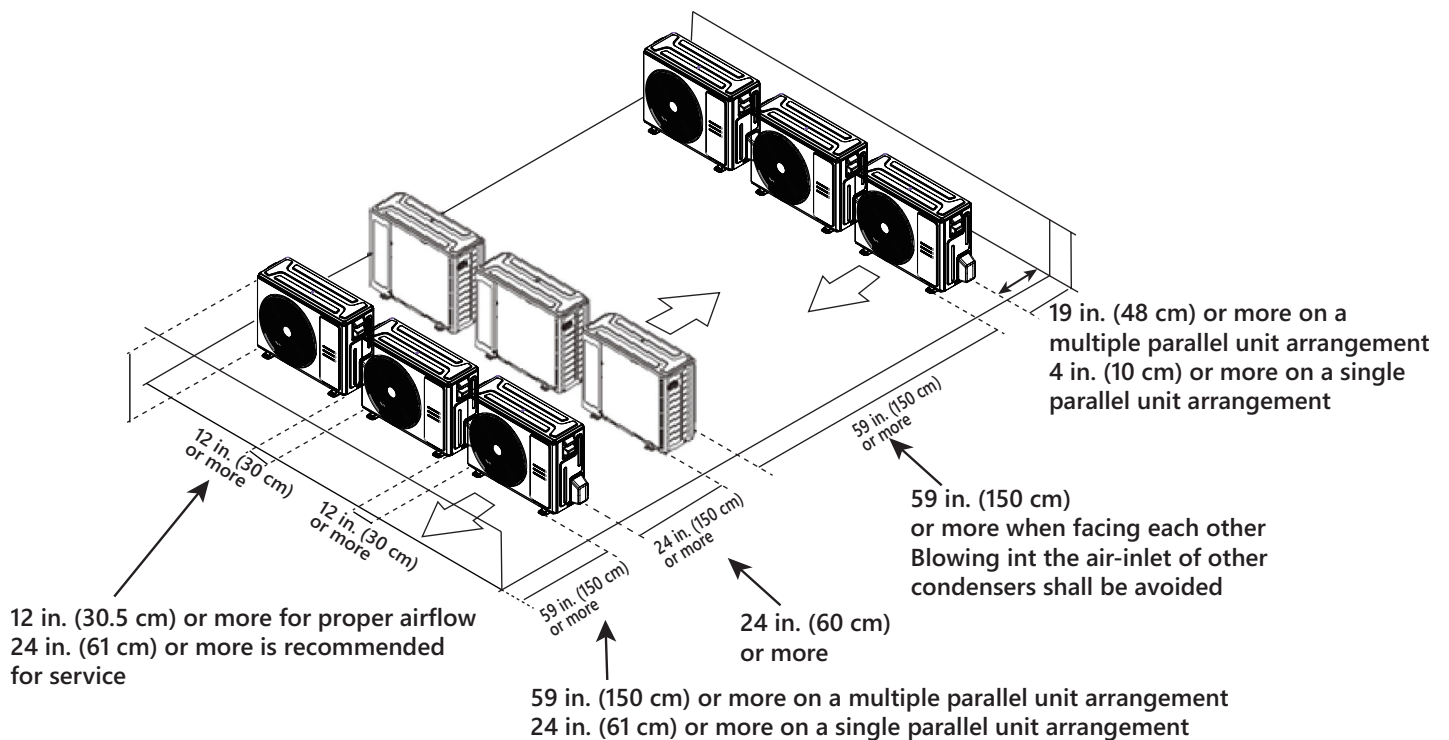
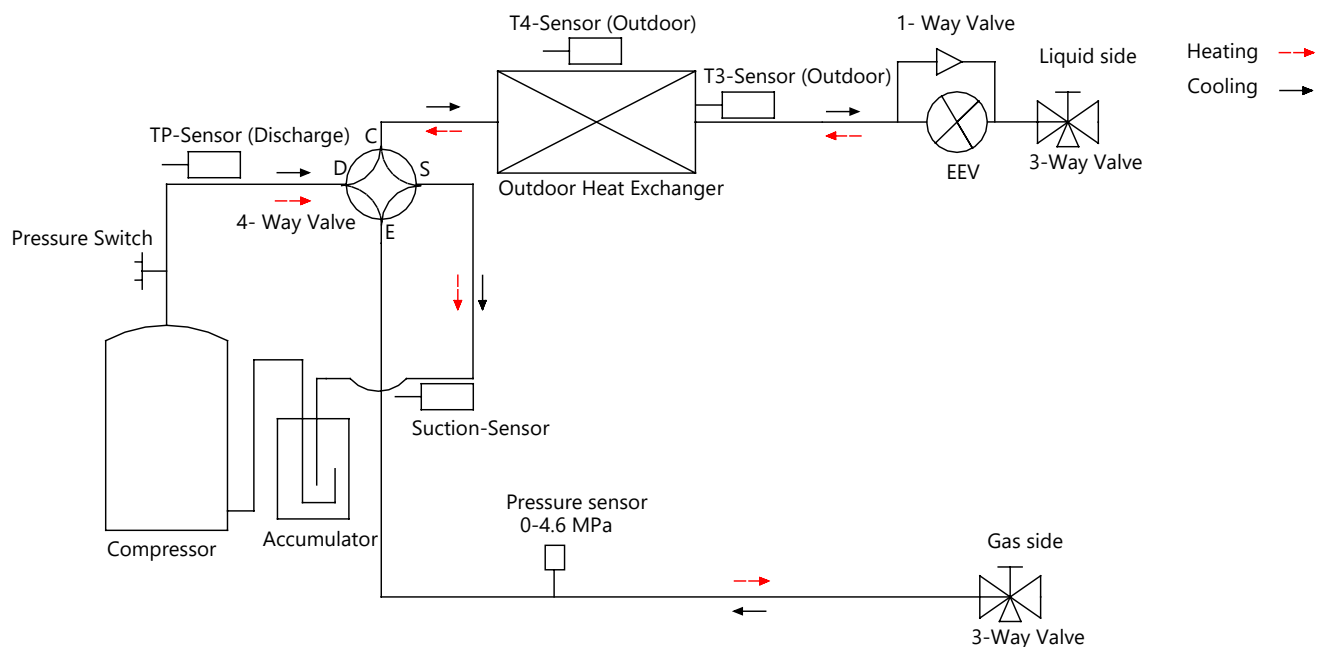
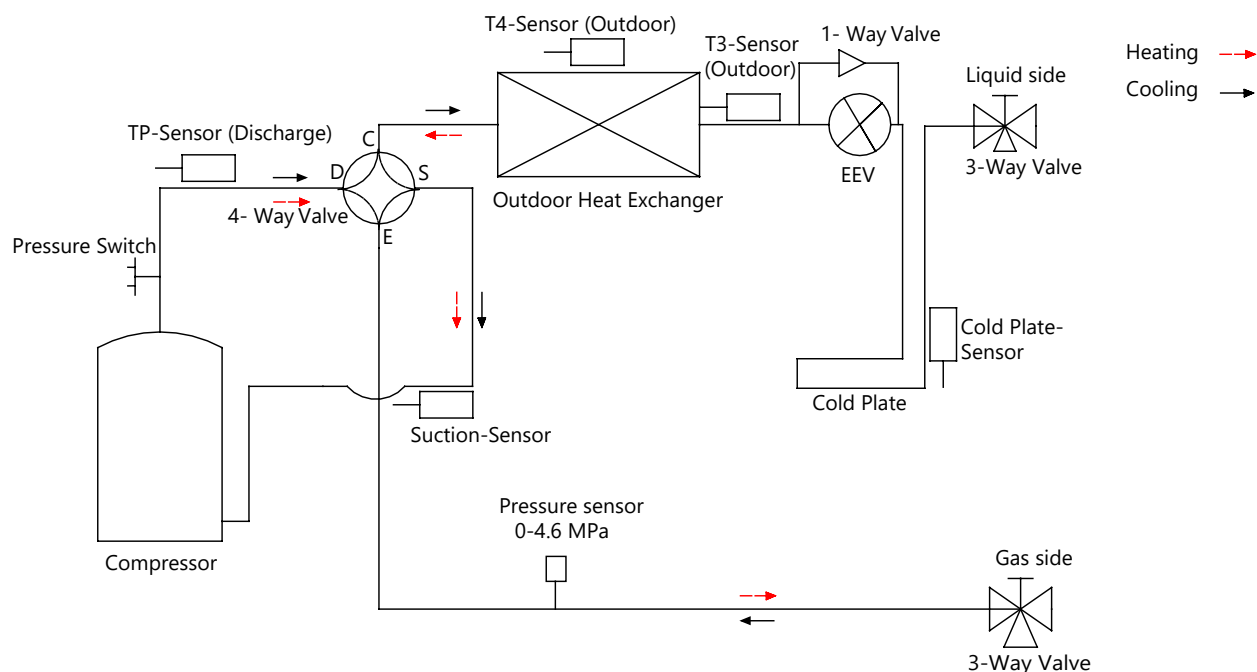


Fig. SC-2: Clearances for Multiple Units

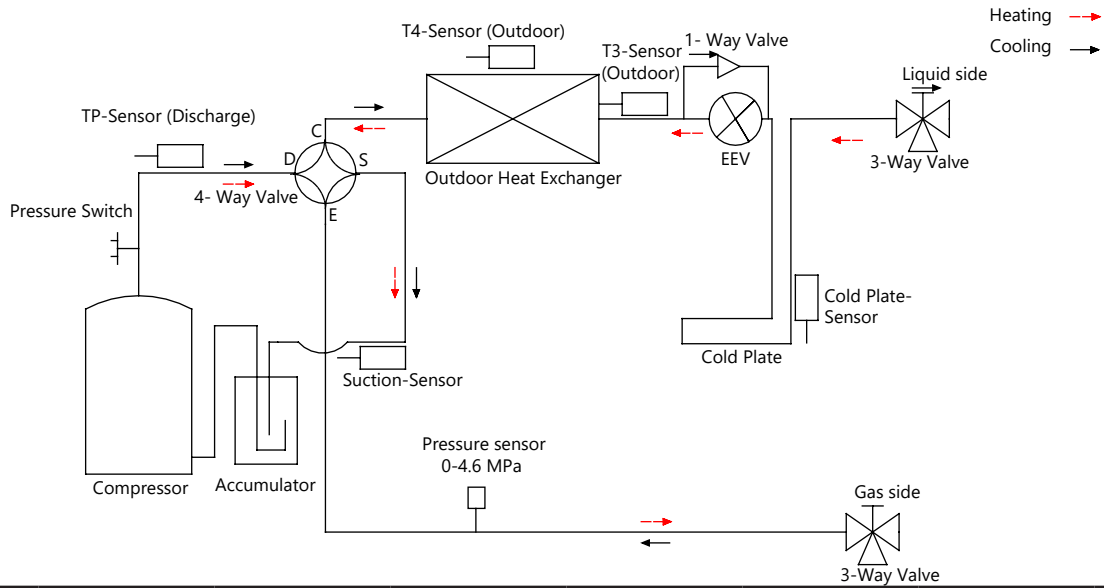
Refrigerant Cycle Diagrams



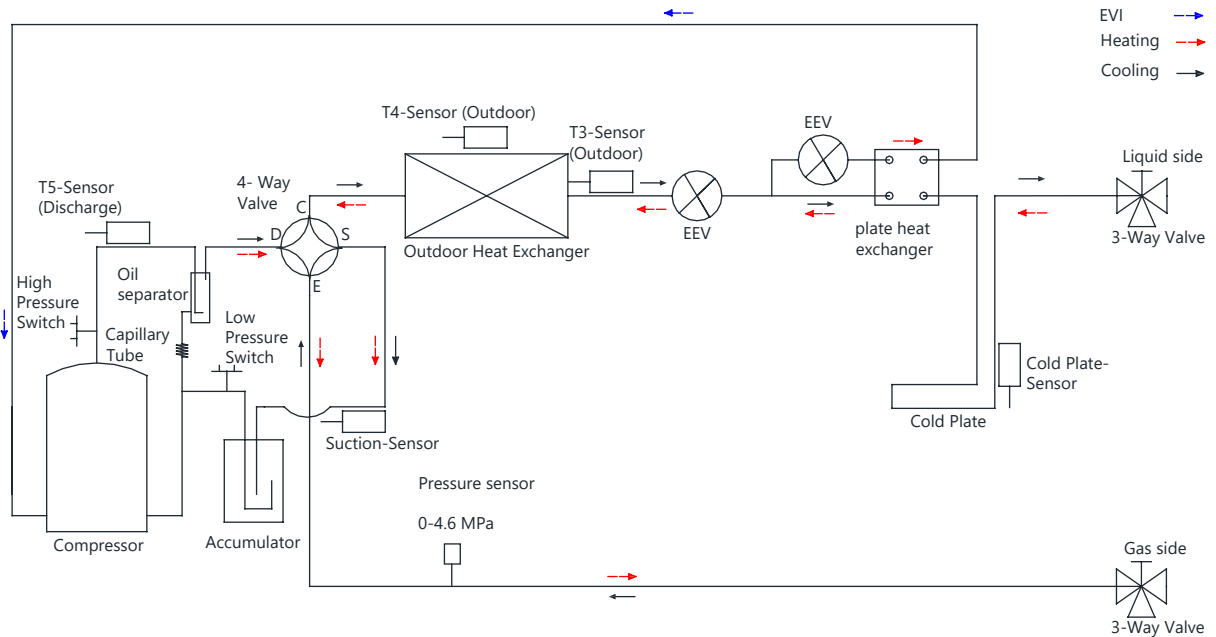
Model No.	Pipe Size (Diameter: \varnothing) in. (mm)		Piping length (ft./m)		Elevation (ft./m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MO1BE-H18B-2A	3/4 (19)	3/8 (9.52)	24.6/7.5	98.4/30	0	65.6/20	0.7 oz./ft. (65 g/m)



Model No.	Pipe Size (Diameter: \varnothing) in. (mm)		Piping length (ft./m)		Elevation (ft./m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MO1BE-H30B-2A	3/4 (19)	3/8 (9.52)	24.6/7.5	164/50	0	82/25	0.7 oz./ft. (65 g/m)



Model No.	Pipe Size (Diameter: ϕ) in. (mm)		Piping length (ft./m)		Elevation (ft./m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MO1HE-H18B-2A	3/4 (19)	3/8 (9.52)	24.6/7.5	98.4/30	0	65.6/20	0.7 oz./ft. (65 g/m)
MO1BE-H24B-2A				164/50		82/25	
MO1HE-H24B-2A				164/50		82/25	
MO1BE-H36B-2A				246/75		98.4/30	
MO1HE-H30B-2A				164/50		82/25	
MO1HE-H36B-2A				246/75		98.4/30	
MO1BE-H48B-2A				246/75		98.4/30	
MO1HE-H48B-2A				246/75		98.4/30	
MO1BE-H60B-2A				246/75		98.4/30	

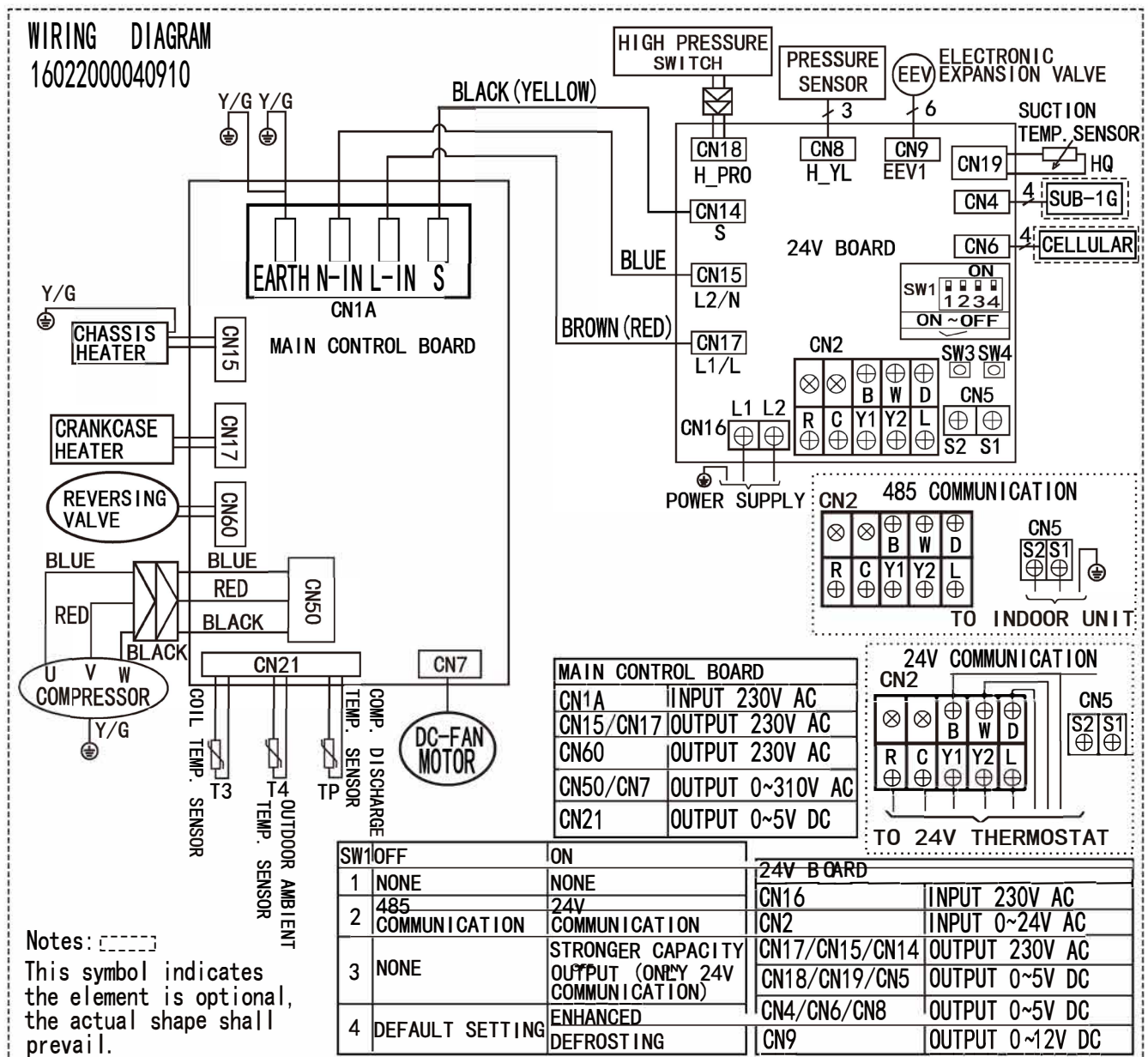


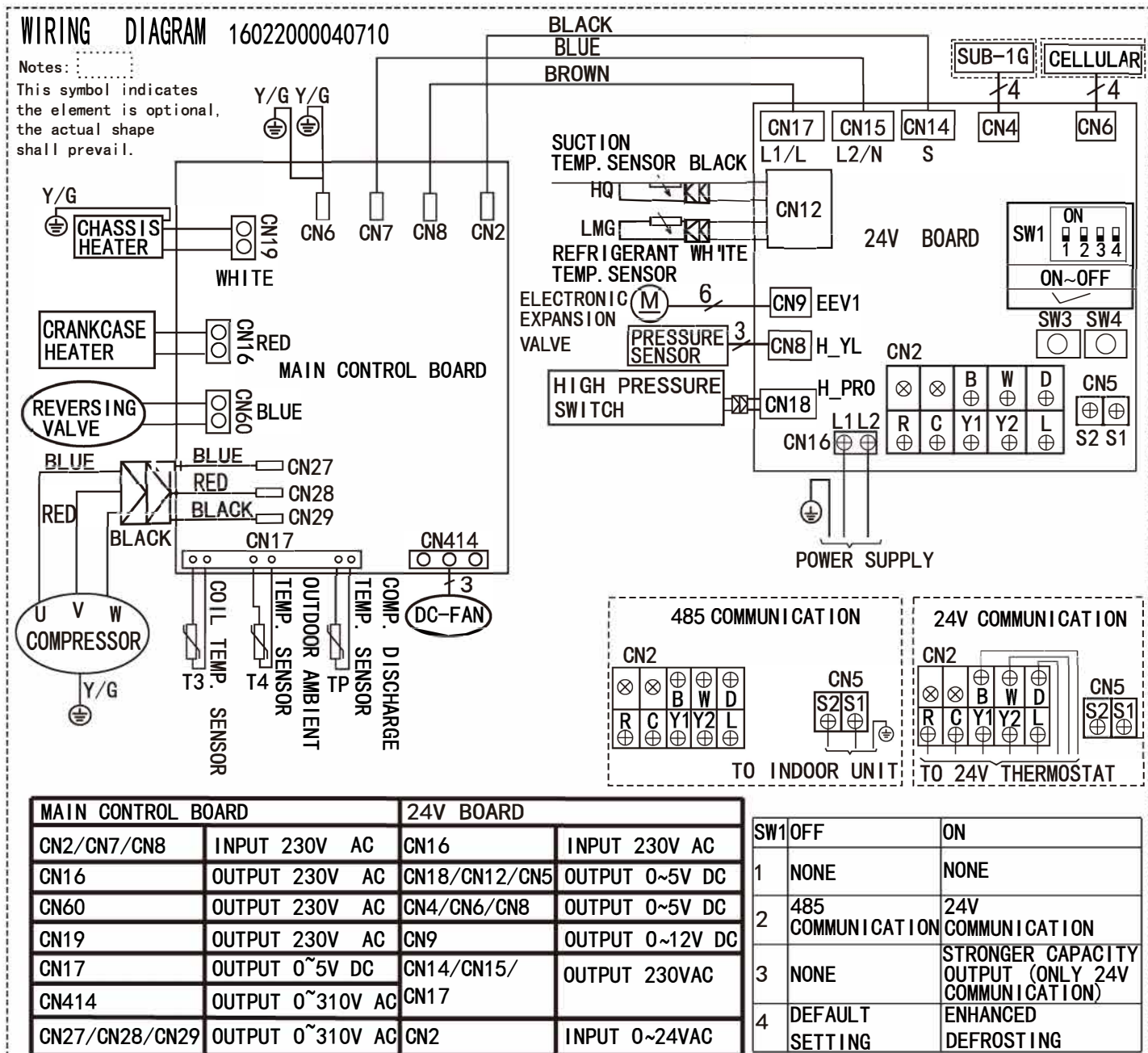
Model No.	Pipe Size (Diameter: ϕ) in. (mm)		Piping length (ft./m)		Elevation (ft./m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MO1SE-H36B-2A	3/4 (19)	3/8 (9.52)	24.6/7.5	246/75	0	98.4/30	0.7 oz./ft. (65 g/m)
MO1HE-H60B-2A							

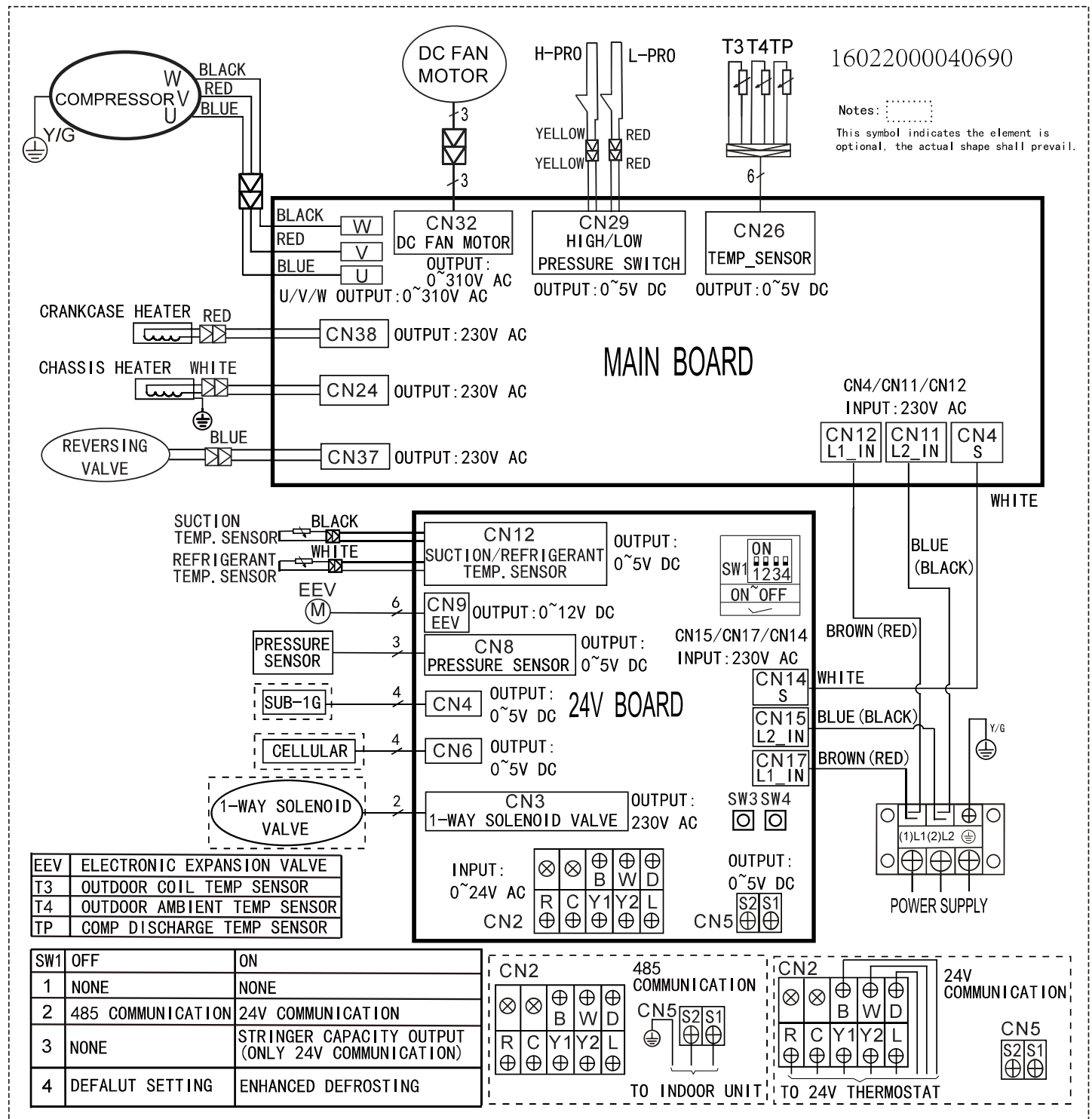
Electrical Wiring Diagrams

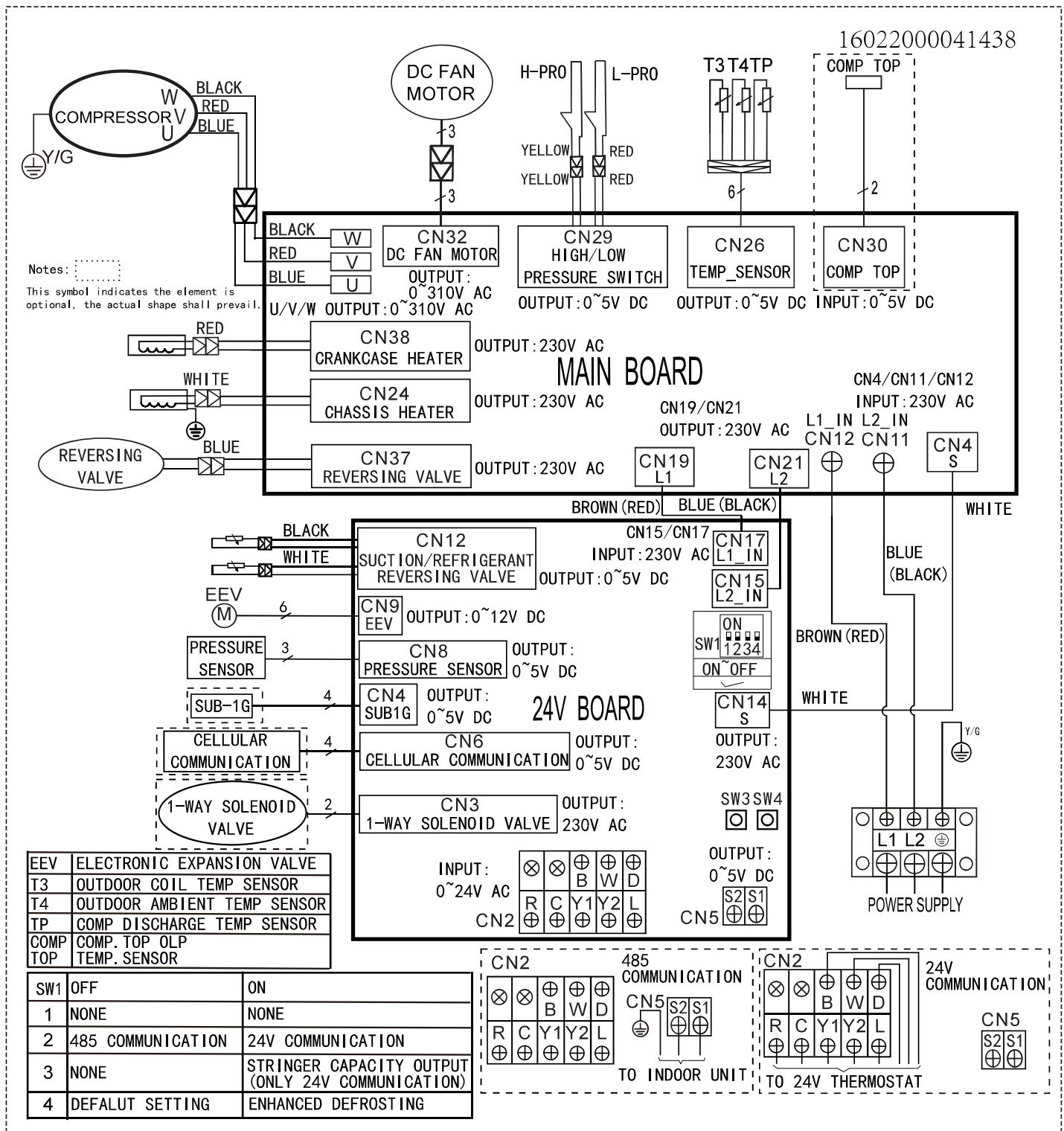
ODU Model	ODU Wiring Diagram	ODU Main Printed Circuit Board	24V Printed Board
MO1BE-H18B-2A	16022000040910	17122000057661	17122000062325
MO1HE-H18B-2A	16022000040710	17122000048064	
MO1BE-H24B-2A	16022000040710		
MO1HE-H24B-2A	16022000040710		
MO1BE-H30B-2A	16022000040690		
MO1BE-H36B-2A	16022000041438	17122300007152	
MO1HE-H30B-2A	16022000041438		
MO1SE-H36B-2A	16022000041477		
MO1HE-H36B-2A	16022000041438		
MO1BE-H48B-2A	16022000041477		
MO1HE-H48B-2A	16022000041477		
MO1BE-H60B-2A	16022000041438		
MO1HE-H60B-2A	16022000041440		

Outdoor Unit Wiring Diagram: 16022000040910





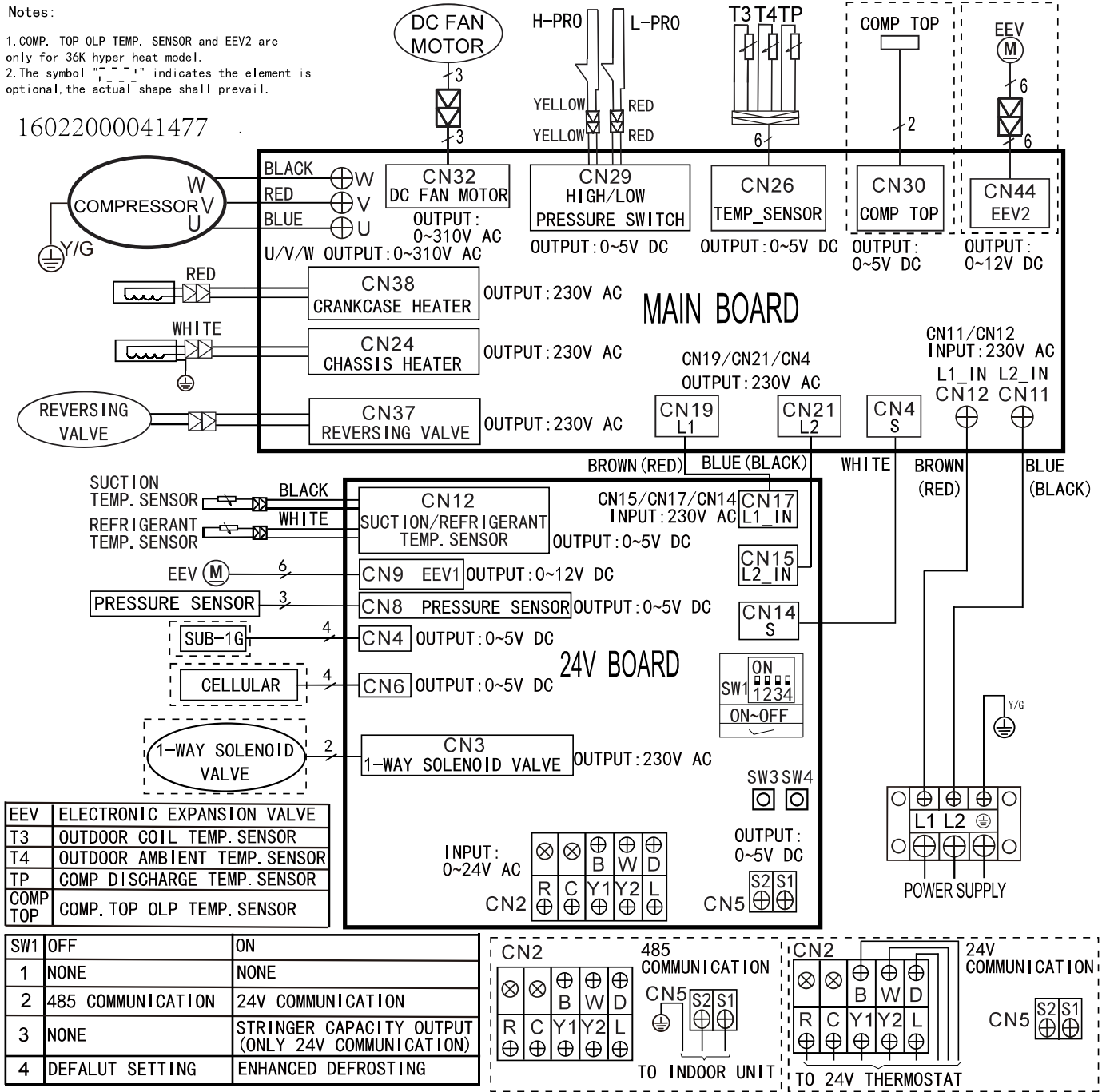




Notes:

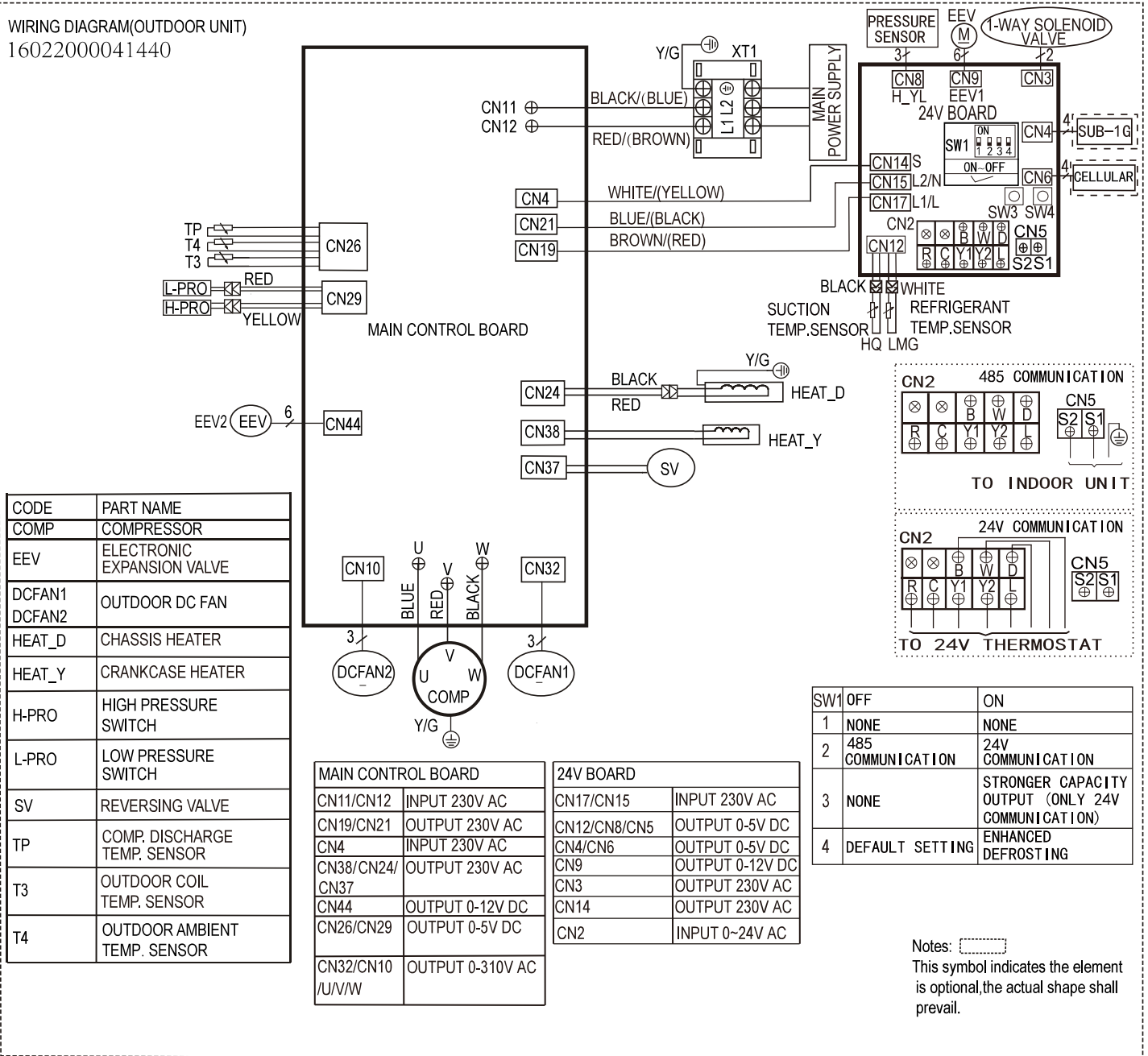
1. COMP. TOP OLP TEMP. SENSOR and EEV2 are only for 36K hyper heat model.
2. The symbol "—" indicates the element is optional, the actual shape shall prevail.

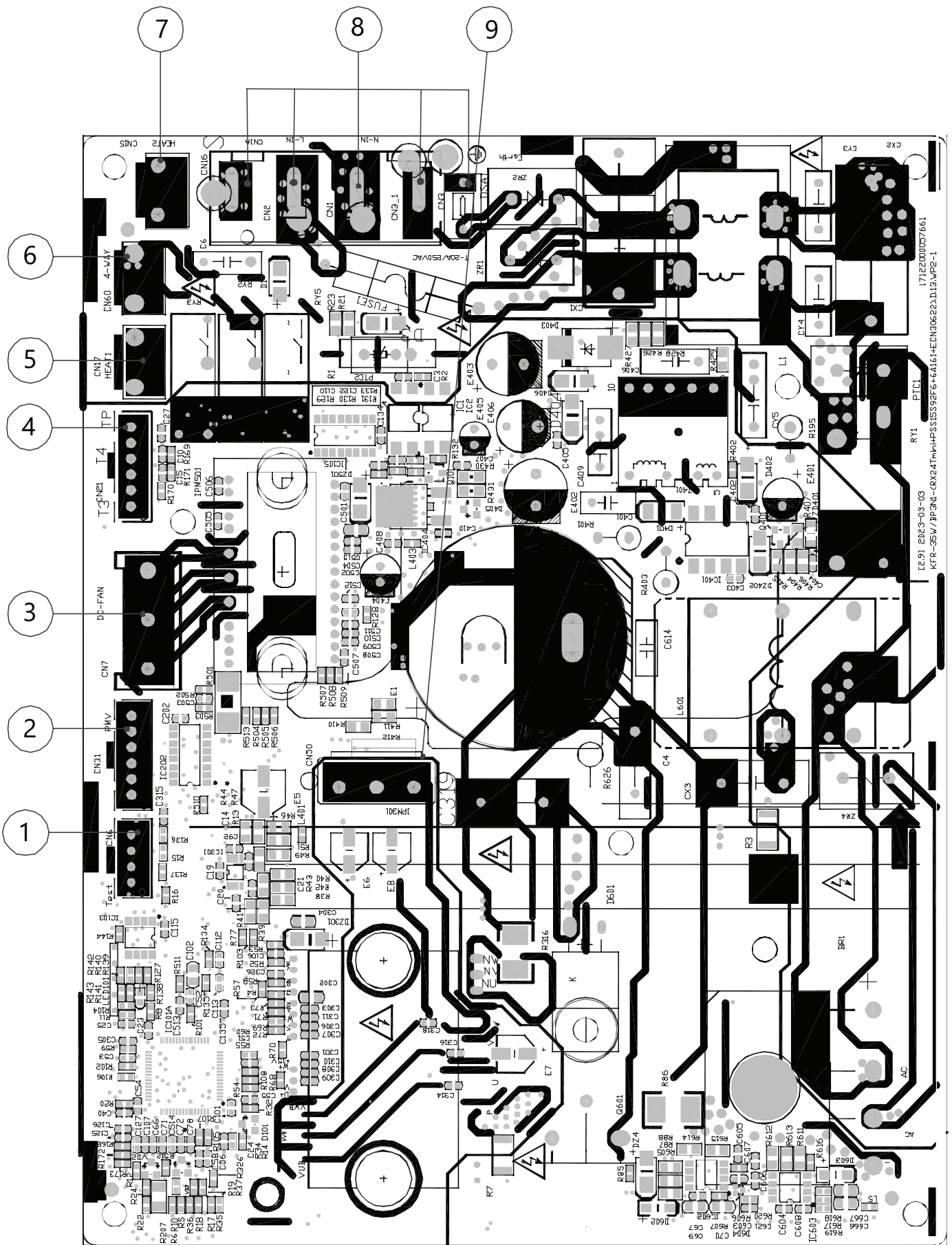
16022000041477



Outdoor Unit Wiring Diagram: 16022000041440

WIRING DIAGRAM(OUTDOOR UNIT)
16022000041440



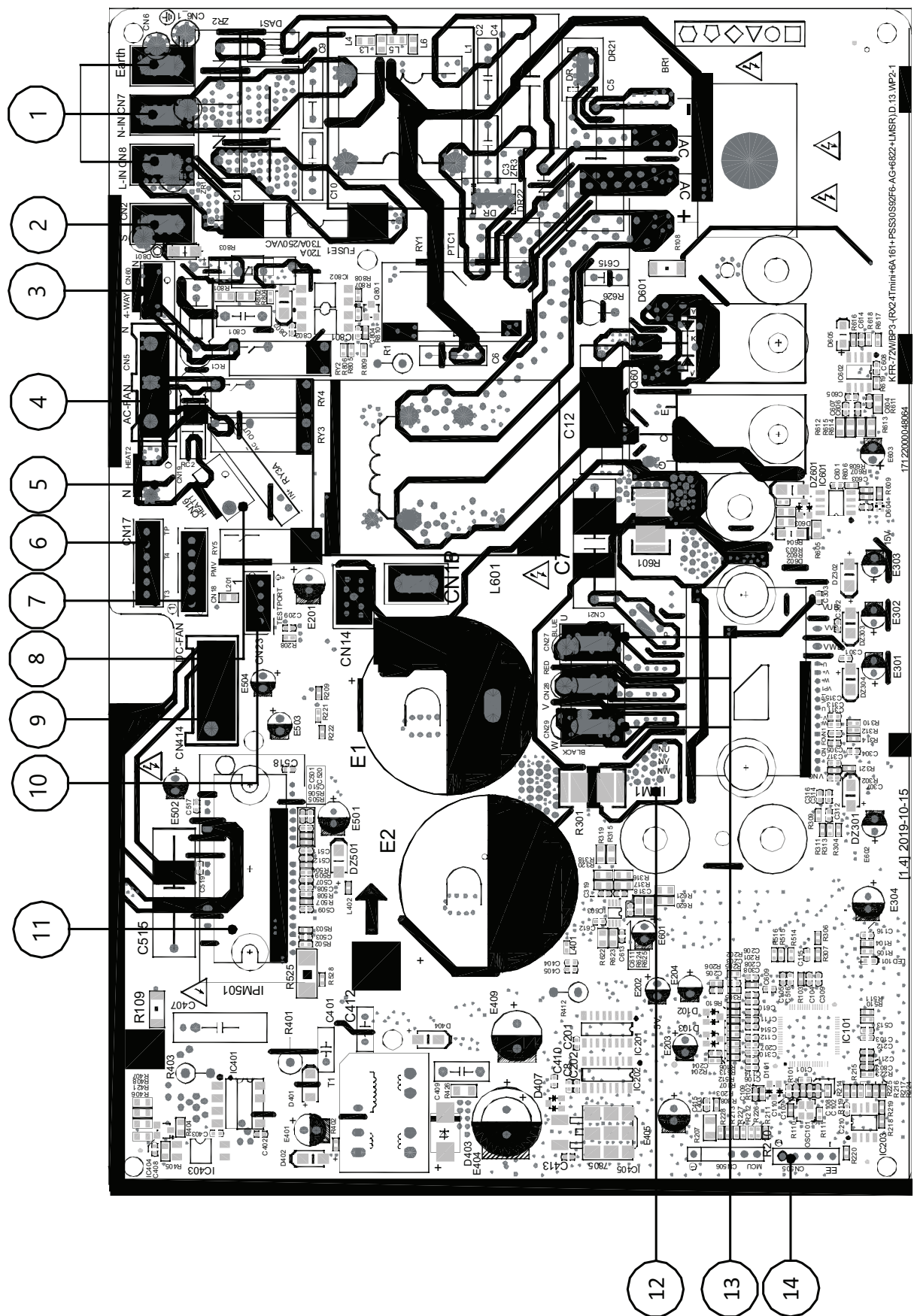


Outdoor Unit Printed Circuit Board Table: 17122000057661

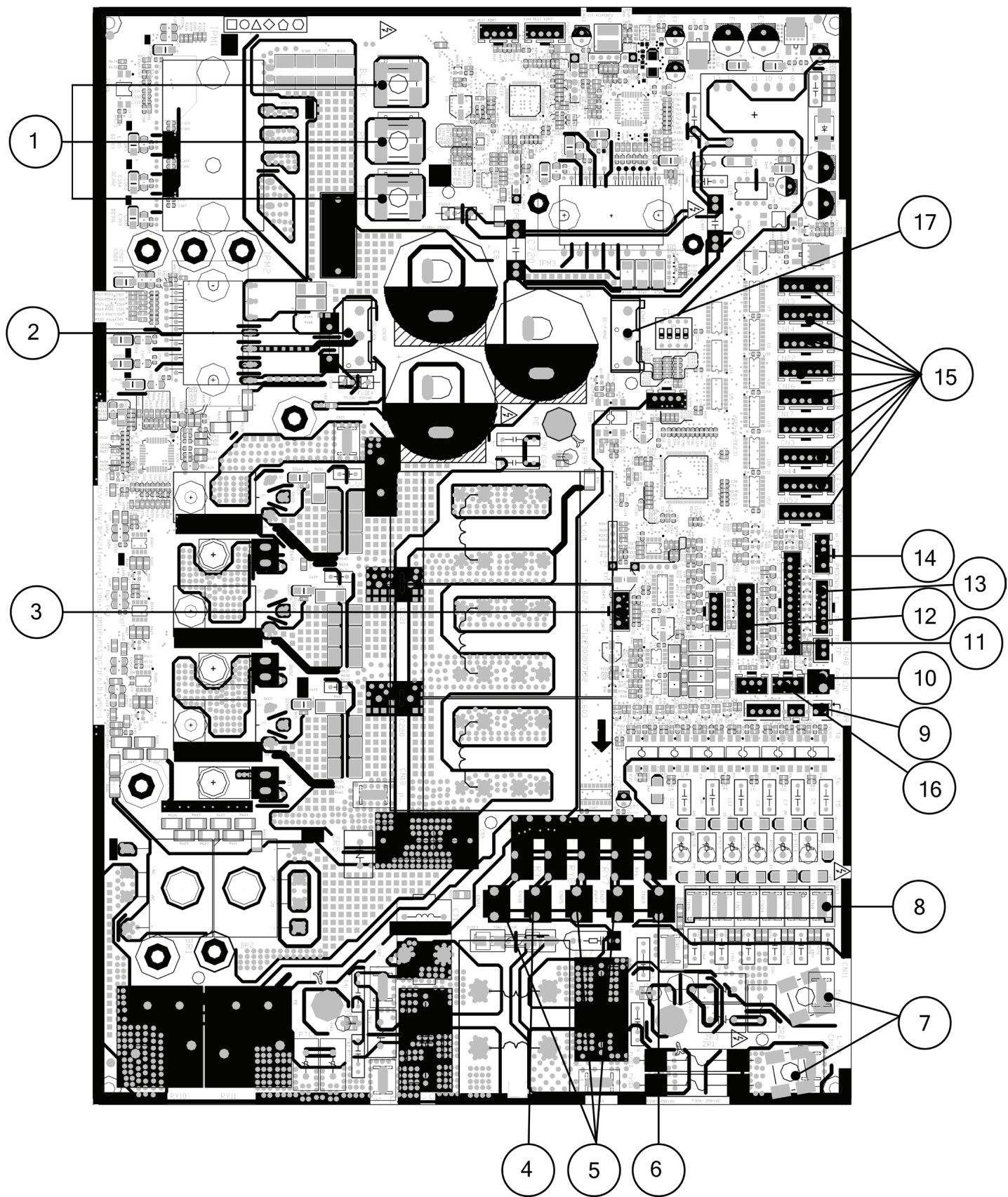
Callout No.	Name	CN#	Meaning
1	TESTPORT	CN6	Used for testing
2	PMV	CN31	Connect to electric expansion valve (Output: 0~2 V DC)
3	DC-FAN	CN7	Connect to DC fan (Output: 0~310 V AC).
4	TP T4 T3	CN21	Connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5 V DC)
5	HEAT1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

NOTE

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



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



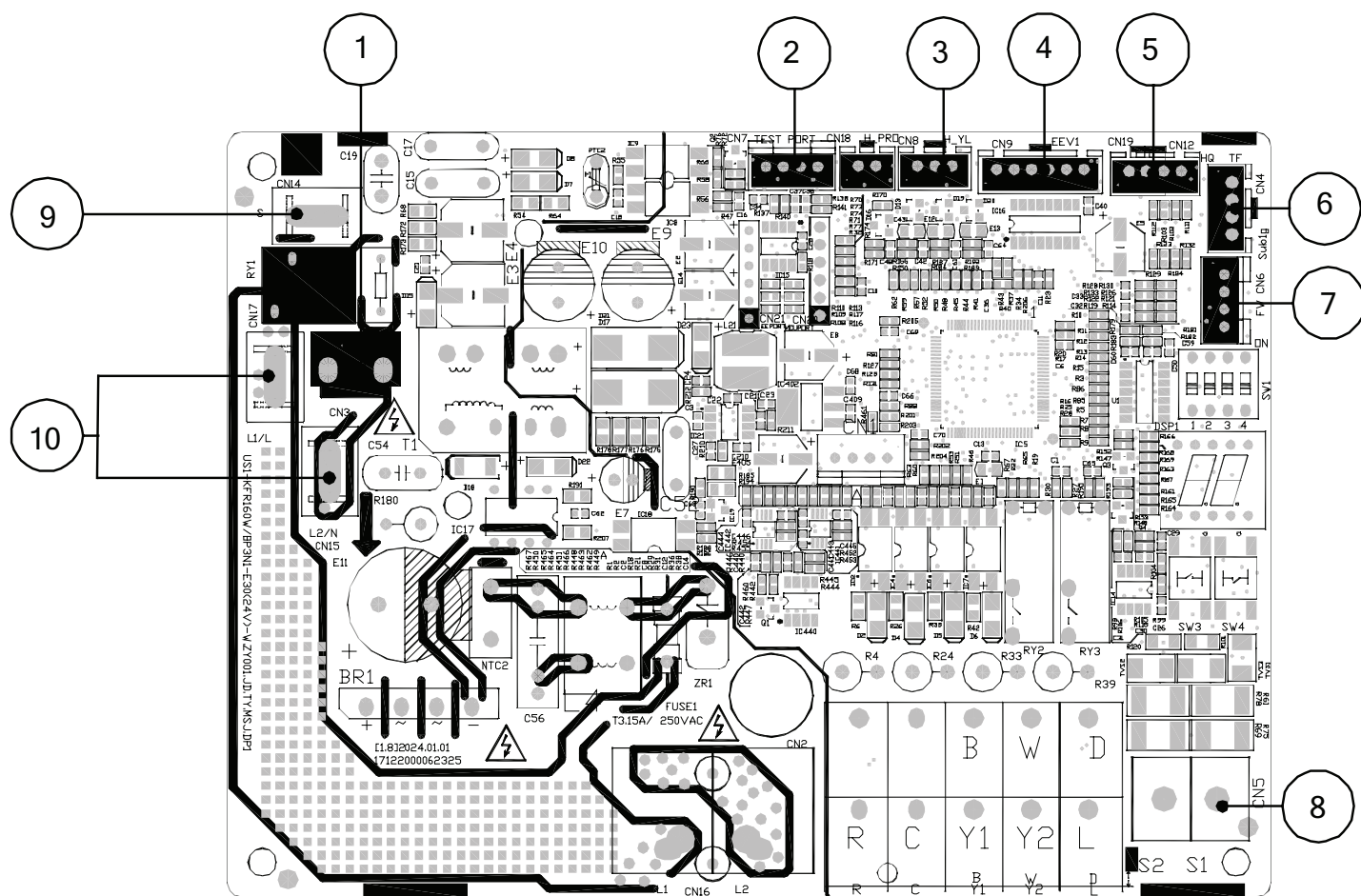
Outdoor Unit Printed Circuit Board Table: 17122300007152

Callout No.	Name	CN#	Meaning
1	COMPRESSOR	W	Connect to compressor (Output: 0~310 V AC)
		V	
		U	
2	DC-FAN1	CN32	Connect to DC fan (Output: 0~310 V AC)
3	TESTPORT	CN45	Used for testing
4	HEAT_Y	CN38	Connect to compressor heater (Output: 230 V AC)
5	4-WAY	CN37	Connect to 4 way valve 1 (Output: 230 V AC)
		CN25	Connect to 4 way valve 2 (Output: 230 V AC)
		CN42	Connect to 4 way valve 3 (Output: 230 V AC)
6	HEAT_D	CN24	Connect to chassis heater (Output: 230 V AC)
7	Power Supply	CN11	N_in: connect to N-line (230 V AC input)
		CN12	L_in: connect to L-line (230 V AC input)
8	S-A	CN43	S: connect to indoor unit communication(230V AC input)
	S-B		
	S-C		
	S-D		
	S-E		
	S-F		
9	TBH-IN TBH-OUT T3B TF	CN9	Connect to the cold plate inlet temp. sensor TBH-IN, cold plate outlet temp. sensor TBH-OUT, condenser coil middle temp. sensor T3B, refrigerant tube inlet temp. sensor TF
10	OLP TEMP. SENSOR	CN30	Connect to compressor top temp. sensor (Output: 0~5 V DC)
11	T2B	CN28	Connect to evaporator coil outlet temperature sensor T2B
12	/	CN27	Connect to key board CN1
13	T3 T4 TP	CN26	Connect to the condenser coil temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5 V DC)
14	H-PRO, L-RPO	CN29	Connect to high and low pressure switch (pin1-pin2 & pin3-pin4:5VDC pulse wave)
15	EEVA	CN17	Connect to the electric expansion valve (Output: 0~12 V DC)
	EEVB	CN16	
	EEVC	CN22	
	EEVD	CN14	
	EEVE	CN13	
	EEVF	CN1	
	EEV1	CN53	
	EEV2	CN44	
	EEV3	CN3	
16	H_YL	CN49	Connect to high-pressure sensor
17	DC-FAN2	CN10	Connect to DC fan (Output: 0~310 V AC)

NOTE

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

Outdoor Unit Printed Circuit Board Diagram: 17122000062325

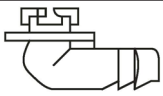



Outdoor Unit Printed Circuit Board Table: 17122000062325

Callout No.	Name	CN#	Meaning
1	/	CN3	Connect to one-way solenoid valve (Output: 230 VAC)
2	TESTPORT	CN7	Used for testing (Output: 5 VDC)
3	/	CN8	Connect to pressure sensor (Output: 0~5 VDC)
4	/	CN9	Connect to electric expansion valve (Output: 0~12 VDC)
5	/	CN12	Connect to suction temp. sensor, cold plate temp. sensor (Output: 0~5 VDC)
6	/	CN4	Connect to SUB-1G (Output: 0~5 VDC)
7	/	CN6	Connect to CELLULAR (Output: 0~5 VDC)
8	S1+S2	SW5	Connect to indoor unit communication (Output: 0~5 VDC)
9	S	CN14	Connect to main board S (Input: 230 VAC)
10	Power Supply	CN17	Connect to main board L1-IN (Input: 230 VAC)
		CN15	Connect to main board L2/N-IN (Input: 230 VAC)

Installation

Accessories

QTY.	Part Name	Part Image
1	Drain joint	
1	Seal	

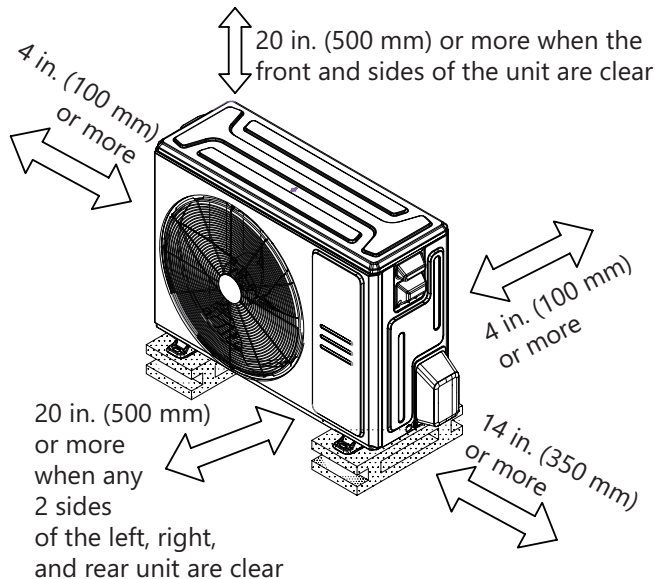
Location Selection

Unit location selection can be referred to in the installation manual.

DO NOT install the unit in the following locations:

- Near an obstacle that will block air inlets and outlets.
- Near a public street, crowded areas, or where noise from the unit will disturb others.
- Near animals or plants that will be harmed by hot air discharge.
- Near any source of combustible gas.
- In a location that is exposed to large amounts of dust
- In a location exposed to excessive amounts of salty air.

Meets all spatial requirements shown in Installation Clearance Requirements below.



Clearances for Multiple Units

The relations between H, A, and L are as follows.

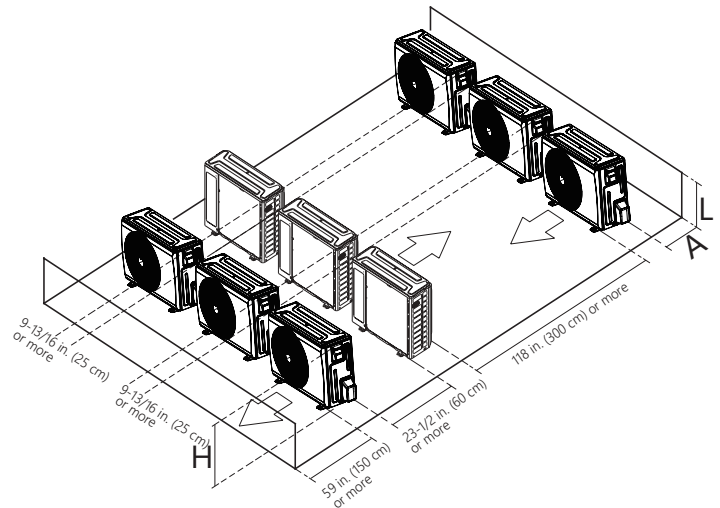
	L	A
L ≤ H	$L \leq 1/2 H$	9-13/16 in. (25 cm) or more
	$1/2 H < L \leq H$	11-13/16 in. (30 cm) or more
L > H	Cannot be installed	

NOTE

H: Unit height

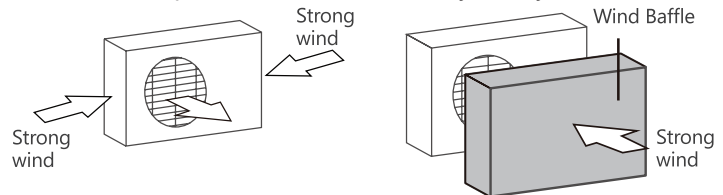
L: Height of the wall behind the unit

A: Distance between the unit and the wall



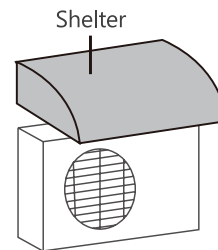
If The Unit Is Exposed To Heavy Wind:

Install the unit so that the air outlet fan is at a 90° angle to the direction of the wind. If needed, build a barrier in front of the unit to protect it from extremely heavy winds.



If The Unit Is Frequently Exposed To Heavy Rain Or Snow:

Build a shelter above the unit to protect it from the rain or snow. Be careful not to obstruct air flow around the unit



If The Unit Is Frequently Exposed To Salty Air (Seaside):

Use an outdoor unit that is specially designed to resist corrosion.

Outdoor Unit Installation

Install drain joint (Heat pump unit only)

Before bolting the outdoor unit in place, you must install the drain joint at the bottom of the unit.

Note that there are two different types of drain joints depending on the type of outdoor unit.

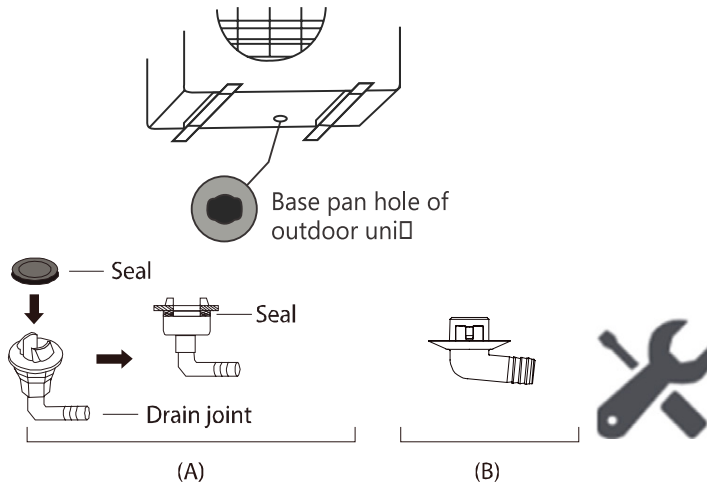
If the drain joint comes with a rubber seal (see Fig. A), do the following:

1. Fit the rubber seal on the end of the drain joint that will connect to the outdoor unit.
2. Insert the drain joint into the hole in the base pan of the unit.
3. Rotate the drain joint 90° until it clicks in place, facing the front of the unit. **For some panel plates, you need to use a tool.**

4. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.

If the drain joint doesn't come with a rubber seal (see Fig. B), do the following:

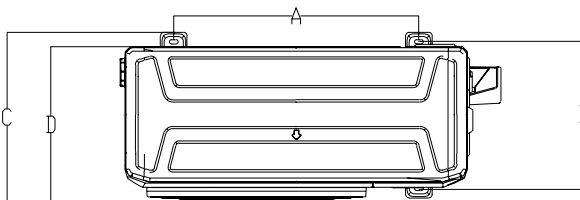
1. Insert the drain joint into the hole in the base pan of the unit. The drain joint will click into place.
2. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.



Anchor Outdoor Unit

The outdoor unit can be anchored to the ground or a wall-mounted bracket with a bolt (M10). Prepare the installation base of the unit according to the dimensions below.

The following is a list of different outdoor unit sizes and the distance between their mounting feet.



Platform	Unit	D	A	B	C
18k Regular Heat	in.	13	20-3/32	12-1/2	13-5/8
	mm	330	511	317	346
18k & 24k Extreme Heat 24k Regular Heat	in.	13-1/2	26-3/32	13-15/16	15-1/2
	mm	342	663	354	394
30k & 36k Regular Heat 36k Extreme Heat	in.	14-3/4	24-1/4	15-5/8	17-5/16
	mm	375	615	397	440
36k Extreme Heat 48k & 60k Regular Heat	in.	16-1/8	26-1/2	15-7/8	17-7/8
	mm	410	673	403	455
60k Extreme Heat	in.	16.34	24.96	15.9	18
	mm	415	634	404	457

Refrigerant Pipe Installation

Maximum Length And Drop Height

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

Capacity (Btu/h)	Max. Length (ft./m)	Max. Elevation (ft./m)
18K	98.4/30	65.6/20
24k/30k	164/50	82/25
36k/48k/60k	246/75	98.4/30

CAUTION

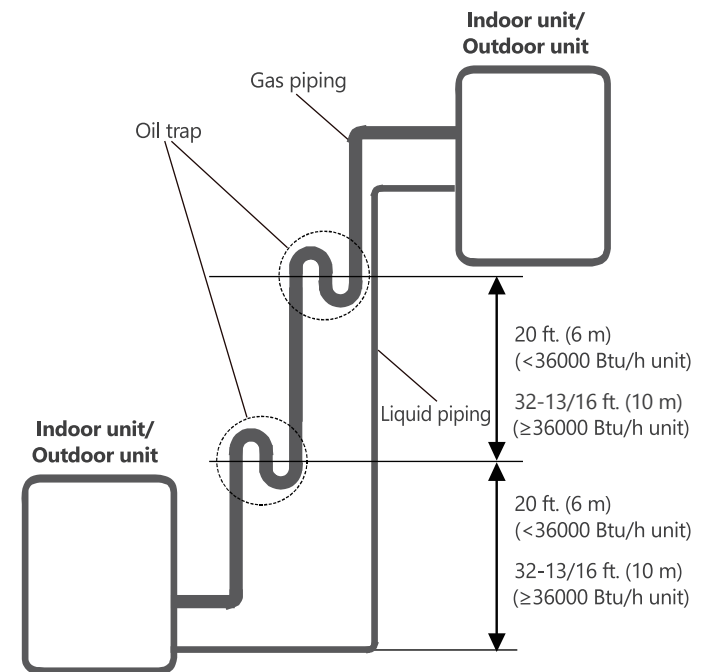
The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.

CAUTION

Oil traps

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

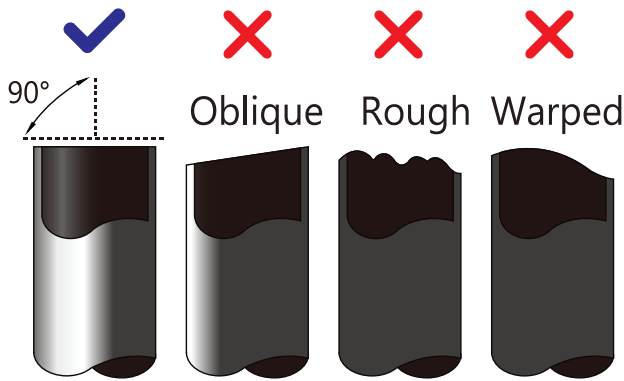
- An oil trap should be installed every 20 ft. (6 m) of the vertical suction line riser (for units with a capacity of less than 36,000 Btu/h).
- An oil trap should be installed every 32-13/16 ft. (10 m) of vertical suction line riser (≥ 36000 Btu/h unit).



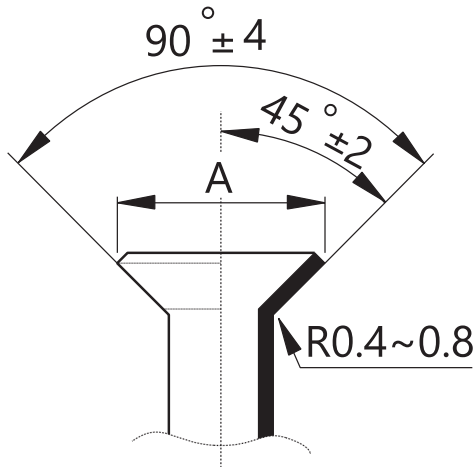
The Procedure Of Connecting Pipes

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

- Make the section flat and smooth.



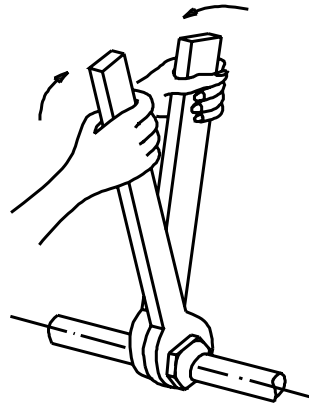
5. Insulate the copper pipe
 - Before test operation, the joint parts should not be heat-insulated.
6. Flare the pipe.
 - Insert a flare nut into the pipe before flaring the pipe.
 - According to the following table to flare the pipe.



Pipe diameter (in. (mm))	Flare dimension A (in./mm)	
	Min.	Max.
Ø3/8 (Ø9.52)	0.52/13.2	0.53/13.5
Ø5/8 (Ø15.9)	0.76/19.2	0.78/19.7
Ø3/4 (Ø19)	0.91/23.2	0.93/23.7

- After flaring the pipe, the opening part must be sealed by an end cover or adhesive tape to avoid duct or exogenous impurities from coming into the pipe.
7. Drill holes if the pipes need to pass through the wall.
 8. According to the field conditions to bend the pipes so that they can pass the wall smoothly.
 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 fix it with a supporter.
 - For horizontal refrigerant pipe, the distance between supporters should not exceed 3.28 ft. (1 m).
 - For vertical refrigerant pipe, the distance between supporters should not exceed 5 ft. (1.5 m).
 13. Connect the pipe to the indoor unit and outdoor unit by using two spanners.
 - Be sure to use two spanners and proper torque

to fasten the nut; too large torque will damage the bell mouthpiece, and too small torque may cause leakage. Refer to the following table for different pipe connections.



Pipe Size Outside Diameter	Tightening Torque
in. (mm)	ft. - lbs. (N.m)
Ø3/8 (9.52)	24.6 - 30.4 (32~39)
Ø5/8 (15.9)	45.4 - 59.3 (57~71)
Ø3/4 (19)	7.15 - 87.5 (67~101)

Vacuum Drying & Leak Check

Purpose Of Vacuum Drying

- Eliminating moisture in the system to prevent the phenomena of ice-blockage and copper oxidation.
- Ice-blockage will cause abnormal operation of the system, while copper oxide will damage the compressor.
- Eliminating the non-condensable gas (air) in the system to prevent the components from oxidizing, pressure fluctuation, and poor heat exchange during the operation of the system.

Selection Of Vacuum Pump

- The ultimate vacuum degree of the vacuum pump shall be -756 mmHg or above.
- The precision of the vacuum pump shall reach 0.02 mmHg or above.

Operation Procedure For Vacuum Drying

Due to different construction environments, two kinds of vacuum drying methods could be chosen, namely ordinary vacuum drying and special vacuum drying.

Ordinary Vacuum Drying

1. When conducting the first vacuum drying, connect the pressure gauge to the infusing mouth of the gas pipe and the liquid pipe, and keep the vacuum pump running for 1 hour (the vacuum degree of the vacuum pump shall be reached 500 psi).
2. If the vacuum degree of the vacuum pump could not be reached 500 psi after 1 hour of drying, it indicates that there is moisture or leakage in the pipeline system and needs to go on with drying for half an hour.
3. If the vacuum degree of the vacuum pump still could not reach 500 psi after 1.5 hours of drying, check whether there is a leakage source.
4. Leakage test: After the vacuum degree reaches 500 psi, stop vacuum drying and keep the pressure for 1 hour. If the indicator of the vacuum gauge does not go up, it is

qualified. If it goes up, it indicates that there is moisture or a leak source.

Special Vacuum Drying

The special vacuum drying method shall be adopted when:

1. Finding moisture during flushing the refrigerant pipe.
2. Conducting construction on a rainy day, because rainwater might penetrate the pipeline.
3. The construction period is long, and rainwater might penetrate the pipeline.
4. Rainwater might penetrate the pipeline during construction.

Procedures for special vacuum drying are as follows:

1. Vacuum dry for 1 hour.
2. Vacuum damage, filling nitrogen to reach 0.5 Kgf/cm².
Because nitrogen is a dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention should be drawn to prevent the entry of water and the formation of condensate water.
3. Vacuum drying again for half an hour.
If the pressure reaches 500 psi, start the pressure leakage test. If it cannot reach the value, repeat vacuum damage and vacuum drying again for 1 hour.
4. Leakage test: After the vacuum degree reaches 500 psi, stop vacuum drying and keep the pressure for 1 hour. If the indicator of the vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or a leak source.

Additional Refrigerant Charge

- After the vacuum drying process is carried out, the additional refrigerant charge process needs to be performed.
- The outdoor unit is factory-charged with refrigerant. The additional refrigerant charge volume is decided by the diameter and length of the liquid pipe between the indoor and outdoor units. Refer to the following formula to calculate the charge volume.

Refrigerant Type	Liquid Side Diameter	Formula
R454B	Ø1/4 (Ø6.35)	$V=0.32 \text{ (30 oz./ft.(g/m)} \times (\text{L-standard pipe length})$
	Ø3/8 (Ø9.52)	$V=0.7(65)\text{oz/ft(g/m)} \times (\text{L-standard pipe length})$

V: Additional refrigerant charge volume.

L: The length of the liquid pipe.

NOTE

- Refrigerant may only be charged after performed the vacuum drying process.
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use an electronic scale or a fluid infusion apparatus to weigh refrigerant to be recharged. Be sure to avoid extra refrigerant charged, it may cause liquid hammer of the compressor or the protection.
- After finishing the refrigerant recharge process,

check whether there is refrigerant leakage at the connection joint. (Using gas leakage detector or soap water to detect).

Engineering Of Insulation

Insulation Of Refrigerant Pipe

1. Operational Procedure Of Refrigerant Pipe Insulation

Cut the suitable pipe → insulation (except joint section) → flare the pipe → piping layout and connection → vacuum drying → insulate the joint parts.

2. Purpose of refrigerant pipe insulation

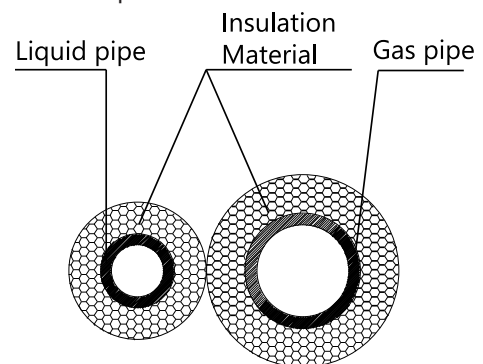
- During operation, the temperature of the gas pipe and liquid pipe can get extremely hot or cold. Therefore, it is necessary to carry out insulation; otherwise, it will degrade the performance of the unit and burn the compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- The temperature of the gas pipe is very high (generally 122-212°F (50-100°C)) during heating. Insulation work must be carried out to prevent injury from accidental touching.

3. Insulation material selection for refrigerant pipe

- The burning performance should be over 248°F (120°C)
- Choose insulation materials according to local regulations.
- The thickness of the insulation layer shall be above 3/8 in. (10 mm). If in a hot or wet environment, the layer of insulation should be thicker accordingly.

4. Installation highlights of insulation construction

- Gas pipe and liquid pipe shall be insulated separately, if the gas pipe and liquid pipe were insulated together; it will decrease the performance of air conditioner.



- The insulation material at the joint pipe shall be 2~4 in. (5~10 cm) longer than the gap of the insulation material.
- The insulation material at the joint pipe shall be inserted into the gap of the insulation material.
- The insulation material at the joint pipe shall be banded to the gas pipe and the liquid pipe tightly.
- Use glue to paste the linking part together.
- Be sure not to bind the insulation material too tightly; it may extrude air from the material, leading to poor insulation and accelerated aging of the material.

Engineering Of Electrical Wiring

WARNING

Electrical Wiring Installation

- All wiring must comply with local and national electrical codes and regulations and must be installed by a licensed electrician.
- All electrical connections must be made according to the Electrical Connection Diagram located on the panels of the indoor and outdoor units.
- If there is a serious safety issue with the power supply, stop work immediately. Explain your reasoning to the client and refuse to install the unit until the safety issue is properly resolved.
- Power voltage should be within 90-110% of rated voltage. Insufficient power supply can cause malfunction, electrical shock, or fire.
- Installation of an external surge suppressor at the outdoor disconnect is recommended.
- If connecting power to fixed wiring, a switch or circuit breaker that disconnects all poles and has a contact separation of at least 1/8 in. (3 mm) must be incorporated in the fixed wiring. The qualified technician must use an approved circuit breaker or switch.
- Only connect the unit to an individual branch circuit. Do not connect another appliance to that outlet.
- Make sure to properly ground the air conditioner.
- Every wire must be firmly connected. Loose wiring can cause the terminal to overheat, resulting in product malfunction and possible fire.
- Do not let wires touch or rest against refrigerant tubing, the compressor, or any moving parts within the unit.
- If the unit has an auxiliary electric heater, it must be installed at least 40 in. (1 m) away from any combustible materials.
- To avoid getting an electric shock, never touch the electrical components soon after the power supply has been turned off. After turning off the power, always wait 10 minutes or more before you touch the electrical components.
- Make sure that you do not cross your electrical wiring with your signal wiring.
- This may cause distortion, interference, or possibly damage to circuit boards.
- No other equipment should be connected to the same power circuit.
- Connect the outdoor wires before connecting the indoor wires.

Power and Communication Wire Sizes

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

Outdoor Unit Wiring

WARNING

BEFORE PERFORMING ANY ELECTRICAL OR WIRING WORK, TURN OFF THE MAIN POWER TO THE SYSTEM.

1. Prepare the cable for connection
 - a. You must first choose the right cable size. Choose the cable type according to the local electrical codes and regulations.
 - b. The size of the power supply cable, signal cable, fuse, and switch needed is determined by the Minimum Circuit Ampacity of the unit. The Minimum Circuit Ampacity is indicated on the nameplate located on the side panel of the unit. Refer to this nameplate to choose the right cable, fuse, or switch.
 - c. Using wire strippers, strip the rubber jacket from both ends of the signal cable to reveal approximately 6 in. (150 mm) of wire.
 - d. Strip the insulation from the ends.
 - e. Using a wire crimper, crimp U-lugs on the ends.

NOTE

When connecting the wires, follow the wiring diagram found inside the electrical box cover.

2. Remove the 2 screws fixed the front right panel, then take it down to perform wire connection. (for double fan outdoor units)
Unscrew the big handle and remove it. (for single fan outdoor units)
3. Connect the u-lugs to the terminals. Match the wire colors/labels with the labels on the terminal block. Firmly screw the u-lug of each wire to its corresponding terminal.
4. Clamp down the cable with the cable clamp.
5. Insulate unused wires with electrical tape. Keep them away from any electrical or metal parts.
6. Reinstall the cover of the electric control box.

Test Operation

CAUTION

The test operation must be carried out after the entire installation has been completed.

Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Piping and wiring are properly connected.
- Ensure that there are no obstacles near the inlet and

outlet of the unit that might cause poor performance or product malfunction.

- The refrigeration system does not leak.
- The drainage system is unimpeded and draining to a safe location.
- The heating insulation is properly installed.
- The grounding wires are properly connected
- The length of the piping and the added refrigerant have been recorded.
- The power voltage is the correct voltage for the air conditioner.

CAUTION

Failure to perform the test run may result in unit damage, property damage, or personal injury.

Test Run Instructions

1. Open both the liquid and gas stop valves.
2. Turn on the main power switch and allow the unit to warm up.
3. Set the air conditioner to COOL mode and check the following points.

Indoor unit

- Double-check to see if the room temperature is being registered correctly.
- Ensure the manual buttons on the indoor unit work properly.
- Check to see that the drainage system is unimpeded and draining smoothly.
- Ensure there is no vibration or abnormal noise during operation.

Outdoor unit

- Check to see if the refrigeration system is leaking.
- Make sure there is no vibration or abnormal noise during operation.
- Ensure the wind, noise, and water generated by the unit do not disturb your neighbors or pose a safety hazard.

Drainage Test

1. Ensure the drainpipe flows smoothly. New buildings should perform this test before finishing the ceiling.
2. Turn on the main power switch and run the air conditioner in COOL mode.
3. Check to see that the water is discharged. It may take up to one minute before the unit begins to drain, depending on the drainpipe.
4. Make sure that there are no leaks in any of the piping.
5. Stop the air conditioner. Turn off the main power switch and reinstall the test cover.

Basic Functions

Abbreviation

Unit Element Abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of the evaporator
T3	Coil temperature of the condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature
Tsc	Adjusted setting temperature
TCDE1	Exits defrost temperature1
TCDE2	Exits defrost temperature2 (maintain for a period of time)
TIMING_DEFROST_TIME_ADD	Enter defrost time
EE_TIME_DE-FROST7_STRONG	Enter enhanced defrost time
TCDE1_ADD_STRONG	Exits enhanced defrost temperature1
TCDE2_ADD_STRONG	Exits enhanced defrost temperature2 (maintain for a period of time)

In this manual, abbreviations like TCDE1, TCDE2, TIMING_DEFROST_TIME_ADD...etc., are well-setting parameters of the EEPROM.

Fan Mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.

Cooling Mode

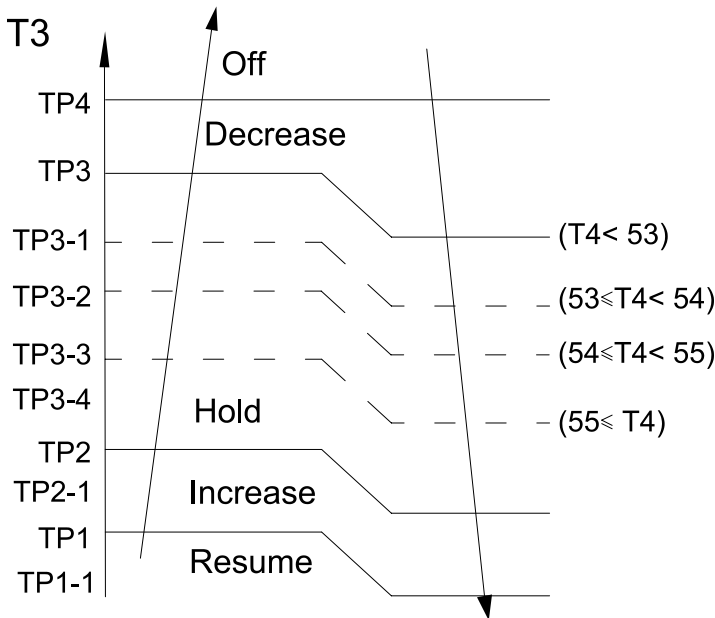
Compressor Control

1. Reach the configured temperature:
 - If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency (fb) is less than 0 Hz.
 - The reach temperature stop protective time is more than 10 minutes.
 - Indoor room temperature (T1) is lower than or equal to (Tsc-1°F/0.5°C)
2. If one of the following conditions is satisfied, do not judge protective time.
 - The compressor running frequency is more than the test frequency.
 - When the compressor running frequency is equal to the test frequency, outdoor ambient temperature (T4) is more than 59°F/ 15°C or the outdoor ambient sensor (T4) fault.
 - Change the temperature setting.
 - Turning on/off the turbo or sleep function
 - Various frequency limit shutdown occurs.

Outdoor Fan Control

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

Condenser Temperature Protection



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

Heating Mode (Heat Pump Units)

Compressor Control

1. Reach the configured temperature
 - If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency(fb) is less than 0Hz.
 - The reach temperature stop protective time is more than 10 minutes.
 - T1 is higher than or equal to Tsc+ 1°F/0.5°C.
2. If one of the following conditions is satisfied, do not judge protective time.
 - The compressor running frequency is more than the test frequency.
 - Compressor running frequency is equal to test frequency, outdoor ambient temperature (T4) is more than 59°F (15°C), or Outdoor ambient sensor (T4) fault.
 - Change temperature setting.
 - Turning on/off turbo or sleep function.
3. When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

Outdoor Fan Control:

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

Defrosting mode

- The unit enters defrosting mode according to the temperature value of the condenser temperature (T3) and outdoor ambient temperature (T4), as well as the compressor running time.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will cease operation, the defrost light of the indoor unit will turn on, and the "dF" symbol is displayed.

- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
 - Condenser temperature (T3) rises above TCDE1.
 - Condenser temperature (T3) maintained above TCDE2 for 80 seconds.
 - The unit runs for 15 minutes consecutively in defrosting mode.
- If Outdoor ambient temperature (T4) is lower than or equal to -8°F/-22°C and compressor running time is more than TIMING_DEFROST_TIME, if any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
 - The unit runs for 10 minutes consecutively in defrosting mode.
 - Condenser temperature (T3) rises above 50°F/10°C.
- If any one of the following conditions is satisfied, the unit enters defrosting mode:
 - If condenser temperature (T3) or the outdoor ambient temperature (T4) is lower than -27°F/-3°C for 30 seconds, Ts-T1 is lower than 9°F/5°C and compressor running time is more than EE_TIME_DEFROST7_ADD.
 - If condenser temperature (T3) or outdoor ambient temperature (T4) is lower than -27°F/-3°C for 30 seconds and compressor running time is more than EE_TIME_DEFROST7_ADD+30 minutes.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
 - The condenser temperature (T3) rises above TCDE1+7°F/ 4°C.
 - The condenser temperature (T3) is maintained above TCDE2+7°F/ 4°C for 80 seconds.
 - The unit runs for 15 minutes consecutively in defrosting mode.

Enhanced defrosting parameter selection entrance:

1. 24 V ODU: Determined by the SW1-4 DIP on the 24 V transfer board, the DIP code selection OFF uses the default defrosting parameter, and the DIP code selection ON to adjust the following defrosting parameter values.
2. AHU: Enter the engineering mode, select the 27th channel, and set the enhanced defrost.

Once you choose enhanced defrosting:

Defrost exit temperature 1: Replace TCDE1 with TCDE1_ADD_STRONG.

Defrost exit temperature 2: Replace TCDE2 with TCDE2_ADD_STRONG.

Defrosting enter condition 7: Compressor Cumulative Running Time: Replace EE_TIME_DEFROST7_ADD with EE_TIME_DEFROST7_STRONG.

Troubleshooting

WARNING

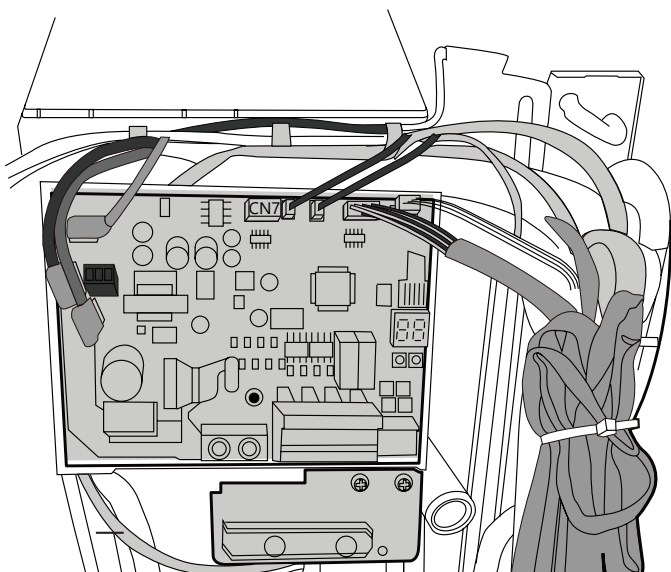
Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking indoor/outdoor PCBs, please equip yourself with antistatic gloves or wrist strap to avoid damage to the board.

WARNING

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

NOTE

If using the inverter test tool for maintenance, remove the big handle and connect the inverter test tool to TESTPORT(CN7).



NOTE

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

General Troubleshooting

Error Display (For models with auxiliary boards)

Display	Malfunction or Protection	Solution
dF	Defrosting	Normal Display, not error code
FC	Forced cooling	
EC07	ODU fan speed out of control	page 42
EC51	ODU EEPROM parameter error	page 40
EC52	ODU coil temp. sensor(T3) error	page 44
EC53	ODU ambient temp. sensor(T4) error	
EC54	COMP. discharge temp. sensor(TP) error	
EC55	ODU IPM module temperature sensor malfunction	page 59
EC57	Refrigerant pipe temperature sensor error	page 44
EC5C	Pressure sensor failure	page 59
EL01	IDU & ODU communication error	page 41
EL16	Communication malfunction between adapter board and ODU main board	page 61
PC00	IPM module protection	page 47
PC02	Compressor top(or IPM) temp. protection/ Refrigerant sensor error	page 54
PC06	Discharge temperature protection of compressor	page 52
PC08	Outdoor overcurrent protection	page 45
PC0A	High temperature protection of condenser	page 53
PC0F	PFC module protection	page 53
PC10	ODU low AC voltage protection	page 49
PC11	ODU main control board DC bus high voltage protection	
PC12	ODU main control board DC bus low voltage protection /341 MCE error	
PC30	System high pressure protection	page 55
PC31	System low pressure protection	page 56
PC40	Communication error between ODU main chip and compressor driven chip	page 50
PC41	Compressor current sampling failure	page 58
PC42	Compressor start failure of outdoor unit	page 45
PC43	ODU compressor lack phase protection	page 57
PC44	ODU zero speed protection	page 45
PC45	ODU IR chip drive failure	page 57
PC46	Compressor speed has been out of control	page 45
PC49	Compressor overcurrent failure	
LC06	High temperature protection of Inverter module (IPM)	page 54
PH90	High temperature protection of evaporator	page 60
PH91	Low temperature protection of evaporator	page 60

Outdoor Unit Point Check Function

- A check switch is included on the adapter board.
- Push SW4 to check the unit's status while running. The digital display shows the following codes each time the SW4 is pushed.

Number of Presses	Display	Remark		
00	Normal display	Displays running frequency, running state, or malfunction code Defrosting mode: "dF" or alternative displays between running frequency and "dF" (each appears for 0.5s.) Forced cooling mode: the LED displays "FC" or alternative displays between running frequency and "FC" (each appears for 0.5s).		
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, light the decimal point of the high digit tube. (For example, the digital display tube show "5.0", so 5.0 multiplied by 10 to become 50, then added to 100 to become 150, so actual capacity demand=150/10=15. The digital display tube show "60",so actual capacity demand=60/10=6.0) GA algorithm models display "--"		
02	The frequency after the capacity requirement adapter	If the value is higher than 99, light the decimal point of the high digit tube.		
03	Room temperature (T1)	If the temp. is lower than 32°F (0°C), the digital display tube will show "0". If the temp. is higher than 158°F (70°C), the digital display tube will show "70".		
04	Indoor unit evaporator temperature (T2)	If the temp. is lower than 15.8°F (-9°C), the digital display tube will show "-9".If the temp. is higher than 158°F (70°C), the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show: "--"		
05	Condenser pipe temp. (T3)			
06	Outdoor ambient temp. (T4)			
07	Compressor discharge temp. (TP)	The display value is between 32~ 390.2 °F (0~199°C). If the temp. is lower than 32°F (0°C), the digital display tube will show "0".If the temp. is higher than 210.2°F (99°C), light the decimal point of the high digit tube. (For example, the digital display tube show "0.5",so 0.5 multiplied by 10 to become 5, then added to 100 to become 221°F (105°C).)		
08	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", so C*161+d*160=12*16+13=205, it means AD value is 205.		
09	AD value of voltage			
10	Indoor unit running mode code	Standby:0;Cooling: 1; Heating:2; Fan only 3; Drying:4; Forced cooling:6; Defrost:7; ECO:9; Forced defrosting: A; Self clean:B		
11	Outdoor unit running mode code			
12	EXV open angle	Actual data/4. If the value is higher than 99, light the decimal point of the high digit tube. For example, the digital display tube show "2.0",so 2.0 multiplied by 10 to become 20, then added to 100 to become 120,it means the EXV open angle is 120×4=480p.)		
13	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is a hex number. For example, the digital display show 2A, the corresponding binary is 101010, so Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by T3 or the current.
		Bit6	Reserved	
		Bit5	Reserved	
		Bit4	Frequency limit caused by low temperature of T2.(LH00)	
		Bit3	Frequency limit caused by T3.(LC01)	
		Bit2	Frequency limit caused by TP.(LC02)	
		Bit1	Frequency limit caused by current(LC03)	
		Bit0	Frequency limit caused by voltage (LC05)	
14	Outdoor unit fan speed	If it is higher than 99, light the decimal point of the high digit tube. (For example, the digital display tube show "2.0", so 2.0 multiplied by 10 to become 20, then added to 100 to become 120. This value is multiplied by 8, and it is the current fan speed: 120*8=960		

Number of Presses	Display	Remark
15	The average value of the temperature values detected by the high and low pressure sensors in the last 10 seconds of the compressor frequency calculation period	The displayed value is the actual value plus 60 (that is, when the displayed value is 10, the actual value is -50). When the displayed value is higher than 99, light the decimal point of the high digit tube. (If it displays 2.0, so 2.0 multiplied by 10 to become 20, then added to 100 to become 120, the actual value is 60) When there is no pressure sensor, it is displayed as --
16	The temperature value detected by the high and low pressure sensor	
17	AD value detected by the high and low pressure sensor	The display value is a hex number. For example, the digital display tube shows "Cd", so $C*161+d*160=12*16+13=205$, it means AD value is 205. When there is no pressure sensor, it is displayed as --
18	The currently running communication protocol version	00-99

Quick Maintenance by Error Code

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

Part requiring replacement	Error Code							
	EL01	EC51	EC52	EC53	EC54	EC55	EC5C	EC57
Indoor PCB	√	x	x	x	x	x	x	x
Outdoor PCB	√	√	√	√	√	√	√	√
ODU coil temp. sensor	x	x	√	x	x	x	x	x
ODU ambient temp. sensor	x	x	x	√	x	x	x	x
COMP. discharge temp. sensor	x	x	x	x	√	x	x	x
IPM module temperature sensor	x	x	x	x	x	√	x	x
Pressure sensor	x	x	x	x	x	x	√	x
Refrigerant pipe temperature sensor	x	x	x	x	x	x	x	√
Condenser temperature sensor	x	x	x	x	x	x	x	x
Reactor	√	x	x	x	x	x	x	x
IPM module board	√	x	x	x	x	x	x	x

Part requiring replacement	Error Code								
	EC07	PC00	PC10/ PC11/ PC12	PC02	PC08 / PC42/ PC44/ PC46/ PC49	PC0F	PC41	PH90	PH91
Outdoor PCB	√	√	√	√	√	√	√	x	x
Outdoor fan motor	√	√	x	x	√	x	x	x	x
Reactor or inductance	x	√	√	x	√	√	x	x	x
Compressor	x	√	x	x	x	x	x	x	x
IPM module board	x	√	√	x	√	x	x	x	x
Bridge rectifier	x	√	√	x	√	x	x	x	x
Evaporator coil temperature sensor	x	x	x	x	x	x	x	√	√
PFC module	x	x	x	x	x	√	x	x	x
Additional refrigerant	x	x	x	x	x	x	x	x	x
Over load protector	x	x	x	√	x	x	x	x	x
ODU ambient temp. sensor	x	x	x	x	x	x	x	x	x
Refrigerant pipe temperature sensor	x	x	x	x	x	x	x	x	x
Indoor fan	x	x	x	x	x	x	x	√	x
Indoor PCB	x	x	x	x	x	x	x	√	√

Part requiring replacement	Error Code							
	PC40	PC43	PC45	PC06	PC0a	PC30	PC31	EL16
Outdoor PCB	√	√	x	√	√	√	√	√
Outdoor fan motor	x	x	x	x	√	√	√	x
ODU coil temp. sensor	x	x	x	x	√	x	x	x
COMP. discharge temp. sensor	x	x	x	√	x	x	x	x
Compressor	x	√	x	x	x	x	x	x
IPM module board	x	x	√	x	x	x	x	x
Additional refrigerant	x	x	x	√	√	x	√	x
Electric control box	√	x	x	x	x	x	x	x
High pressure switch	x	x	x	x	x	√	x	x
Low pressure switch	x	x	x	x	x	x	√	x
Adapter board	x	x	x	x	x	x	x	√

Troubleshooting by Error Code

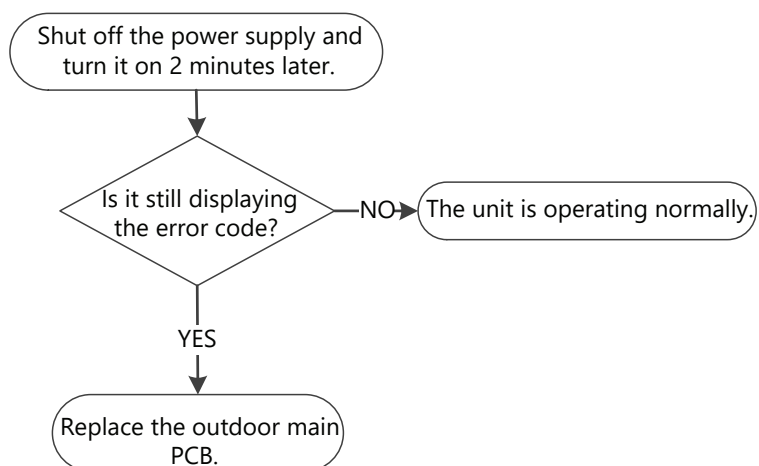
EC51 (ODU EEPROM parameter error diagnosis and solution)

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

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB

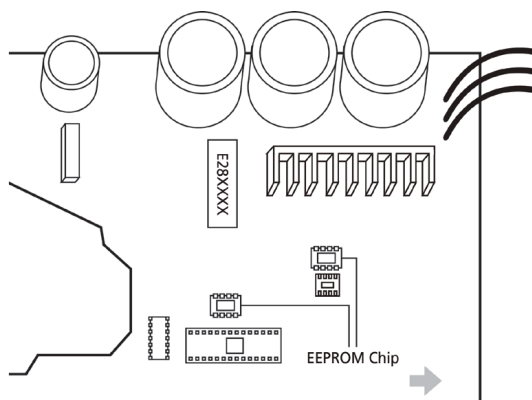
Troubleshooting and repair:



Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage.

The location of the EEPROM chip on the outdoor PCB is shown in the following image:



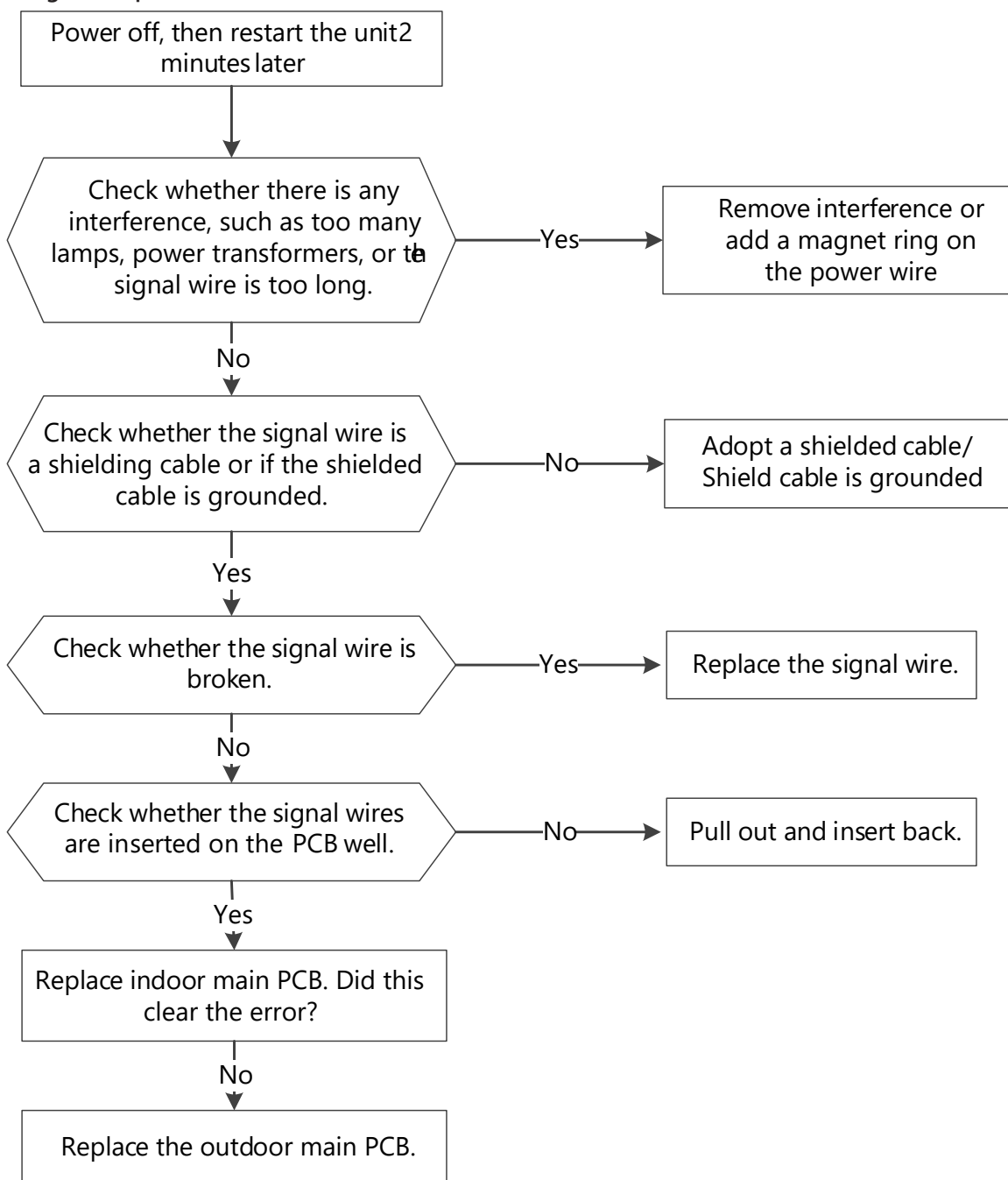
These pictures are only for reference; actual appearance may vary.

EL01 (IDU & ODU communication error diagnosis and solution)

Recommended parts to prepare:

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

Troubleshooting and repair:



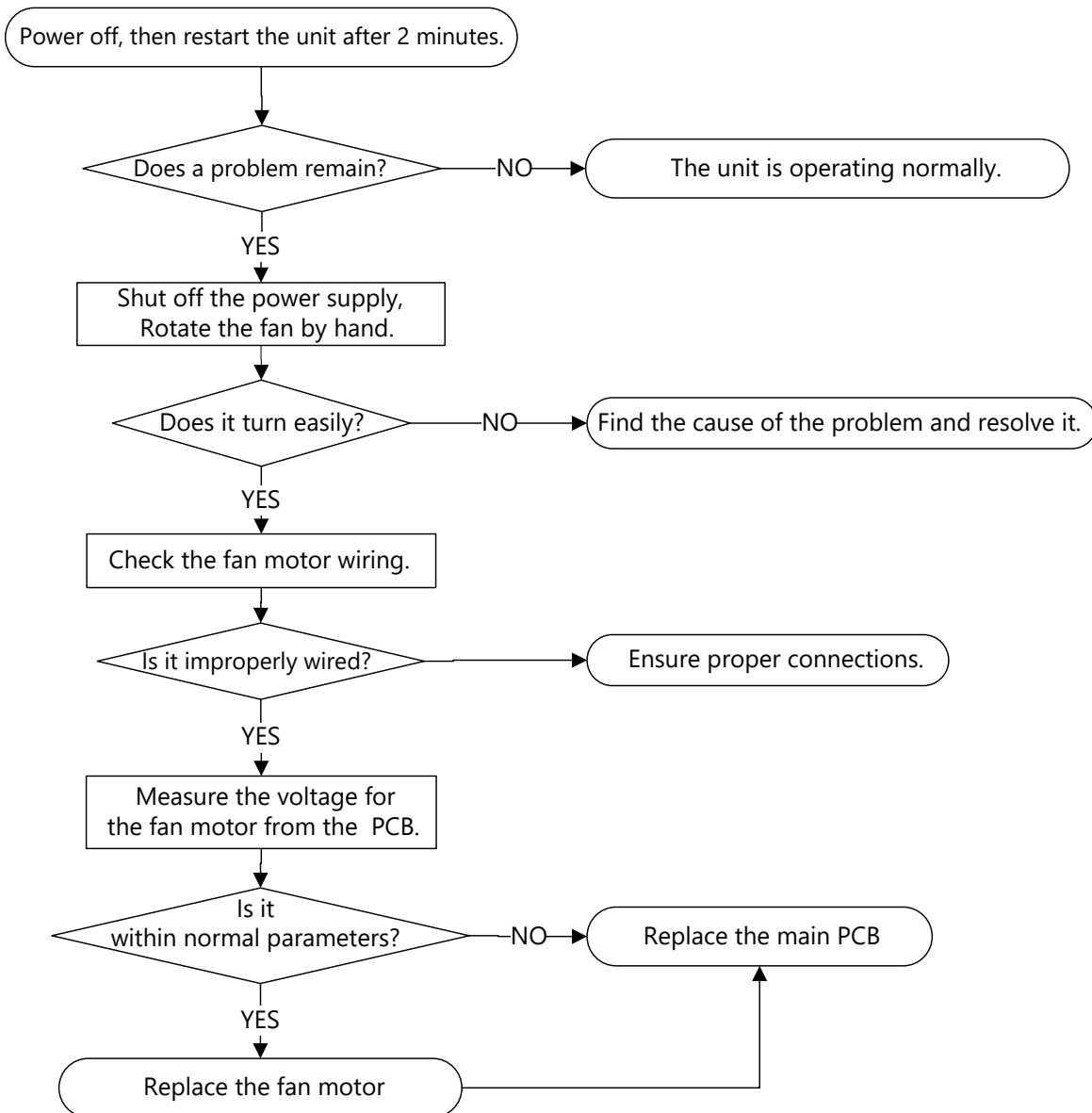
EC07 (ODU fan speed out of control) Diagnosis and Solution

Description: When the indoor/outdoor fan speed is kept too low or too high for a certain time, the LED displays the failure code, and the AC turns off.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB

Troubleshooting and repair:

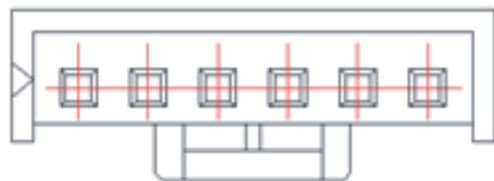


Index:**Outdoor DC Fan Motor (control chip is in the fan motor)**

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

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

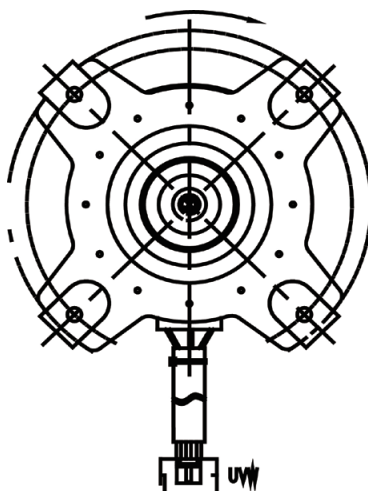
No.	Color	Signal	Voltage
1	Red	VS/VM	192 V~380 V
2	---	---	---
3	Black	GND	0 V
4	White	VCC	13.5~16.5 V
5	Yellow	VSP	0~6.5 V
6	Blue	FG	13.5~16.5 V



1 3 4 5 6
Red Black White Yellow Blue

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

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



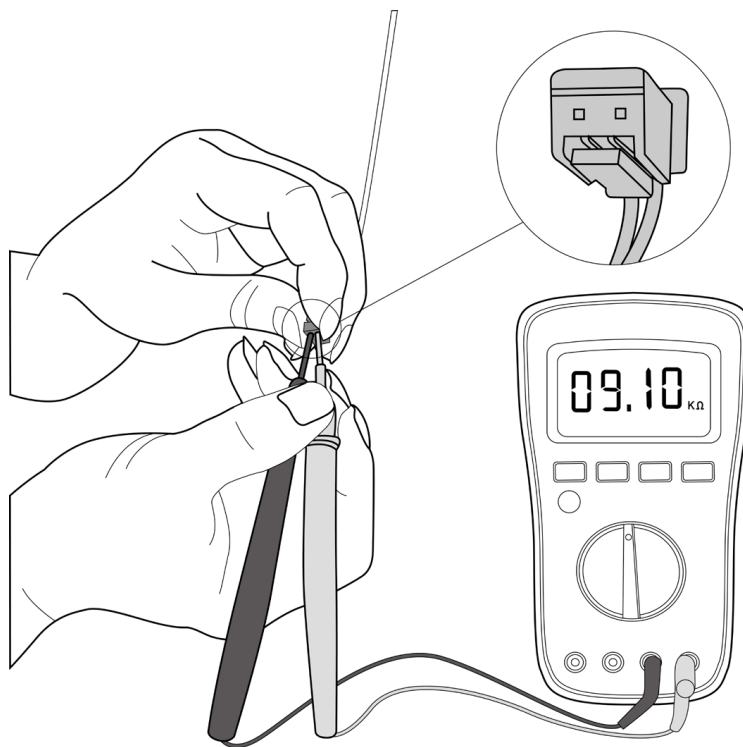
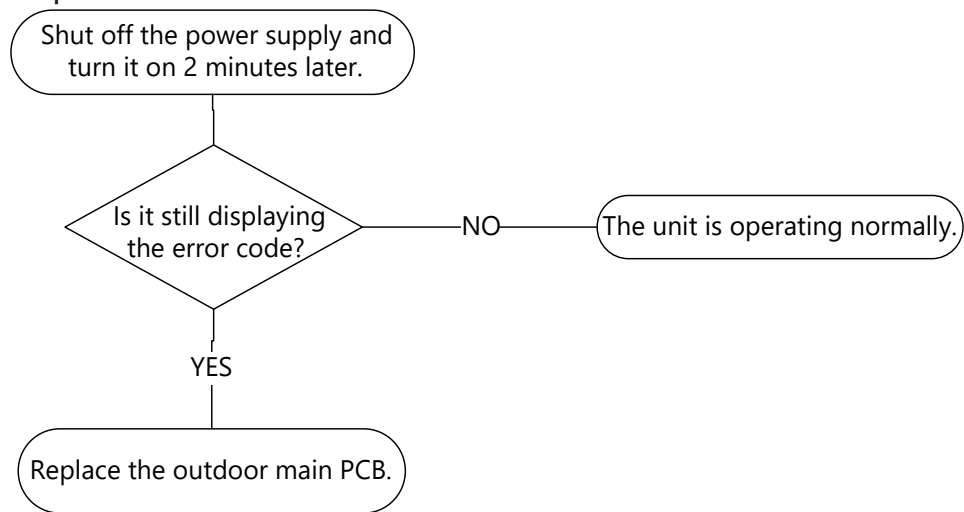
EC52/EC53/EC54/EC57 (Open circuit or short circuit of temperature sensor diagnosis and solution)

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

Recommended parts to prepare:

- Connection wires
- Sensors
- Outdoor PCB

Troubleshooting and repair:



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

PC08 (Current overload protection)

PC42 (Compressor start failure of outdoor unit)

PC44 (ODU zero speed protection)

PC46 (Compressor speed has been out of control)

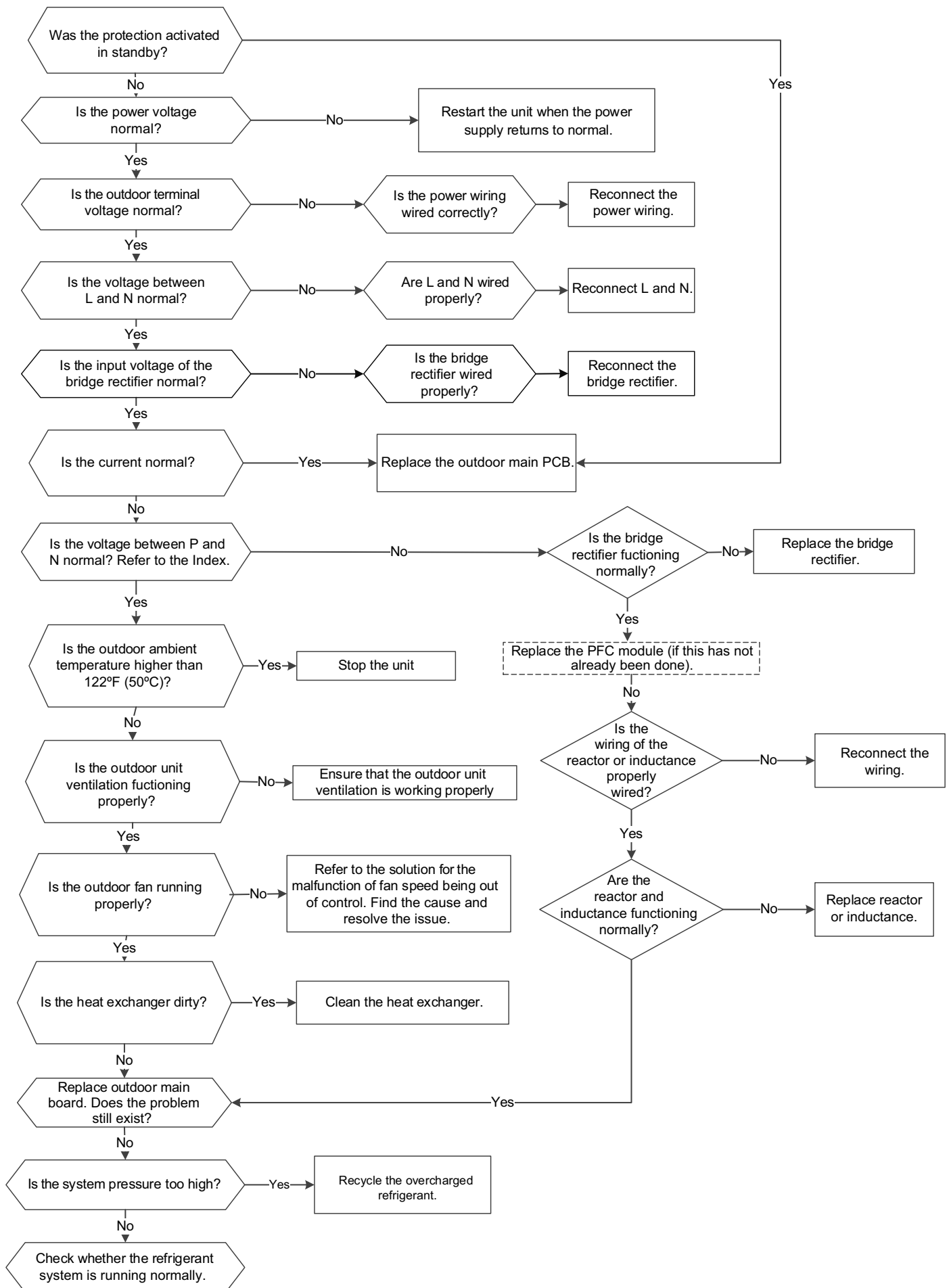
PC49 (Compressor overcurrent failure)

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

Recommended parts to prepare:

- Outdoor PCB
- Connection wires
- Bridge rectifier
- PFC circuit or reactor
- Refrigeration piping system
- Pressure switch
- Outdoor fan
- IPM module board

Troubleshooting and repair:



PC00 (IPM malfunction diagnosis and solution)

Description: When the voltage signals the IPM sends to the compressor drive chip are abnormal, the LED displays the failure code, and the AC turns off.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB
- Reactor or inductance
- Bridge rectifier

Troubleshooting and repair:

First, test the resistance between every two ports of U, V, W of IPM, and P, N. If any result of them is 0 or close to 0, the IPM is defective. Otherwise, please use the following procedure:



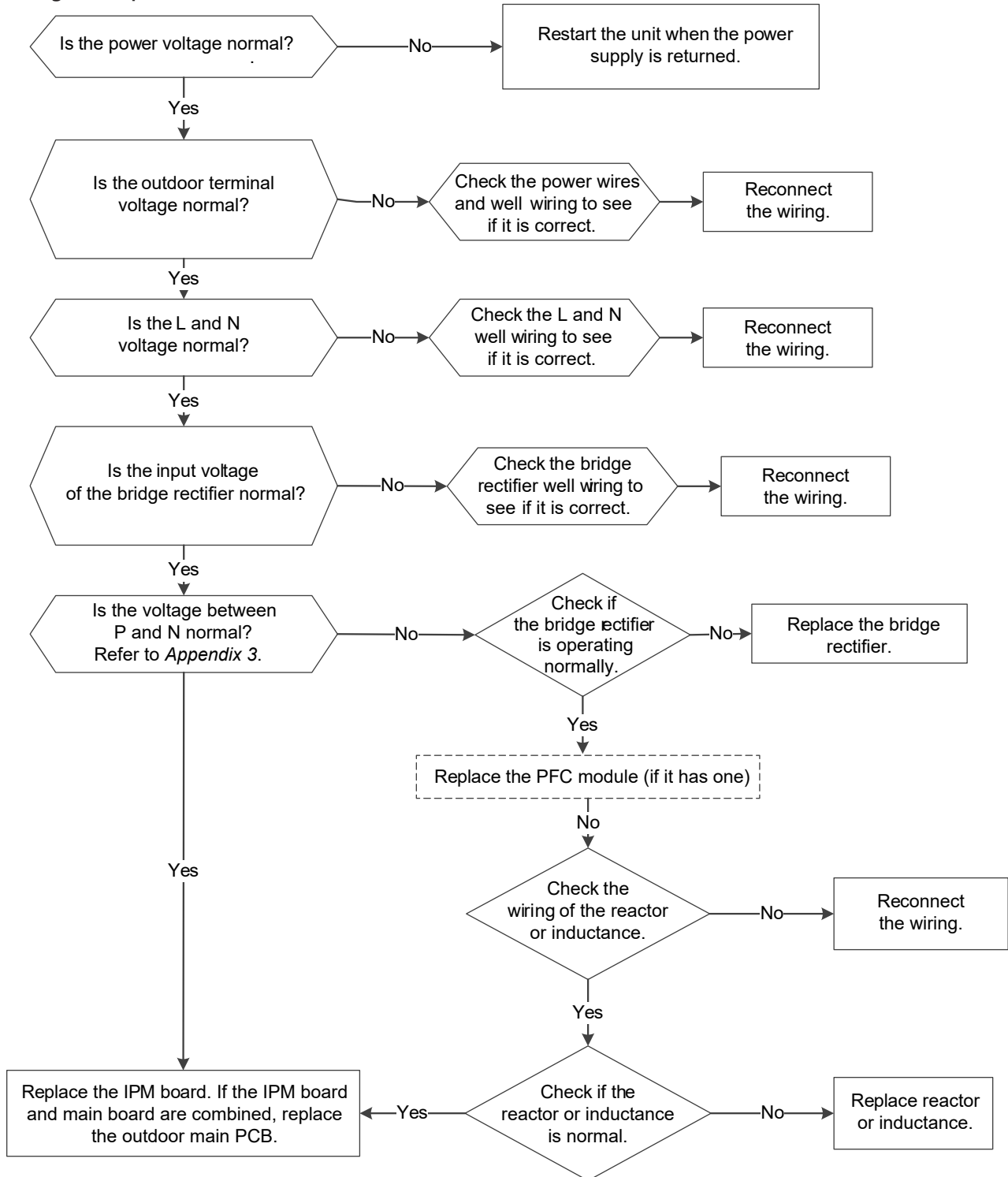
PC10 (ODU low AC voltage protection)**PC11 (ODU main control board DC bus high voltage protection)****PC12 (ODU main control board DC bus low voltage protection)****341 MCE error Diagnosis and Solution**

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

Recommended parts to prepare:

- Power supply wires
- IPM module board
- Outdoor PCB
- Bridge rectifier
- PFC circuit or reactor

Troubleshooting and repair:



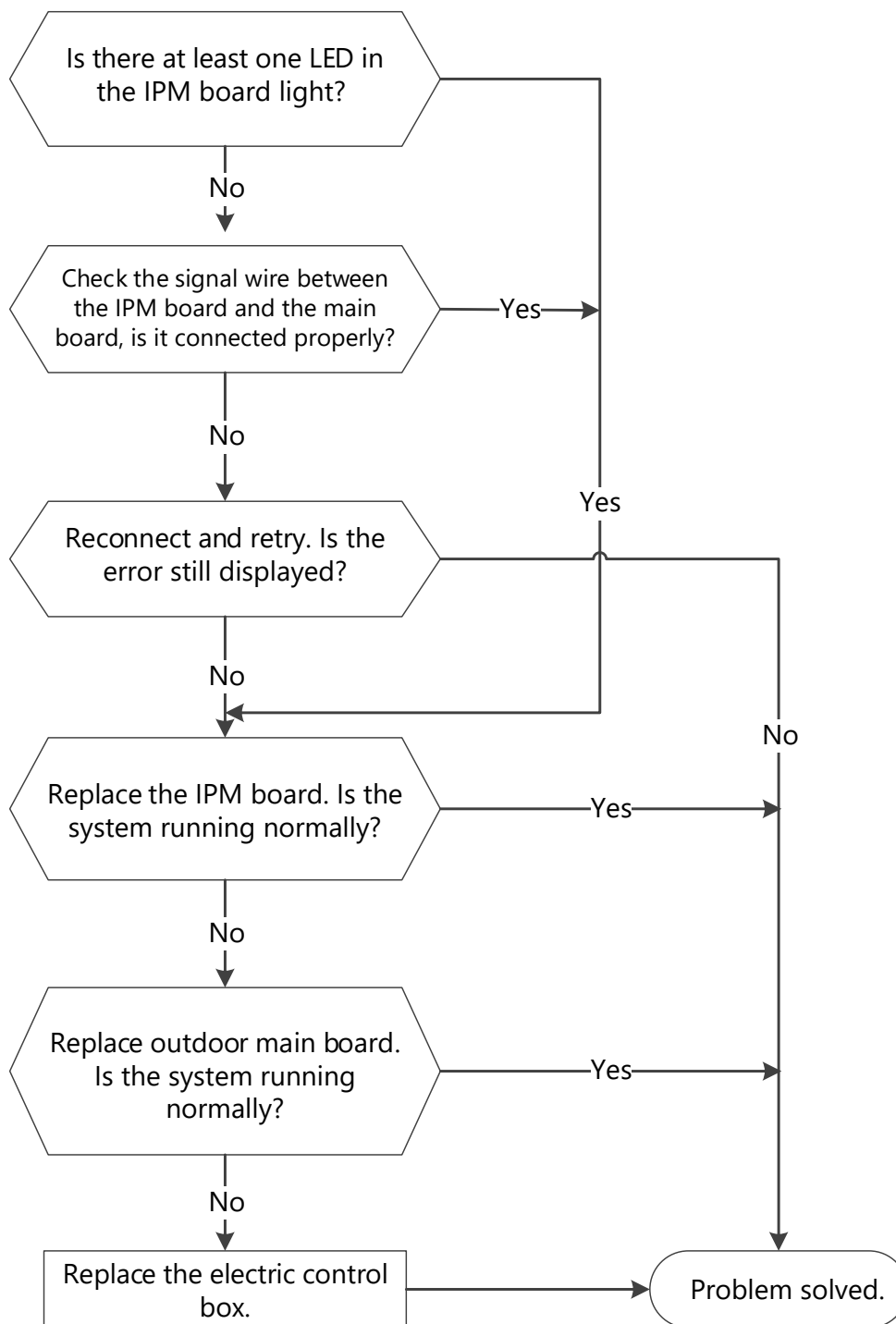
PC40 (Communication error between ODU main chip and compressor driven chip diagnosis and solution)

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

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

Troubleshooting and repair:



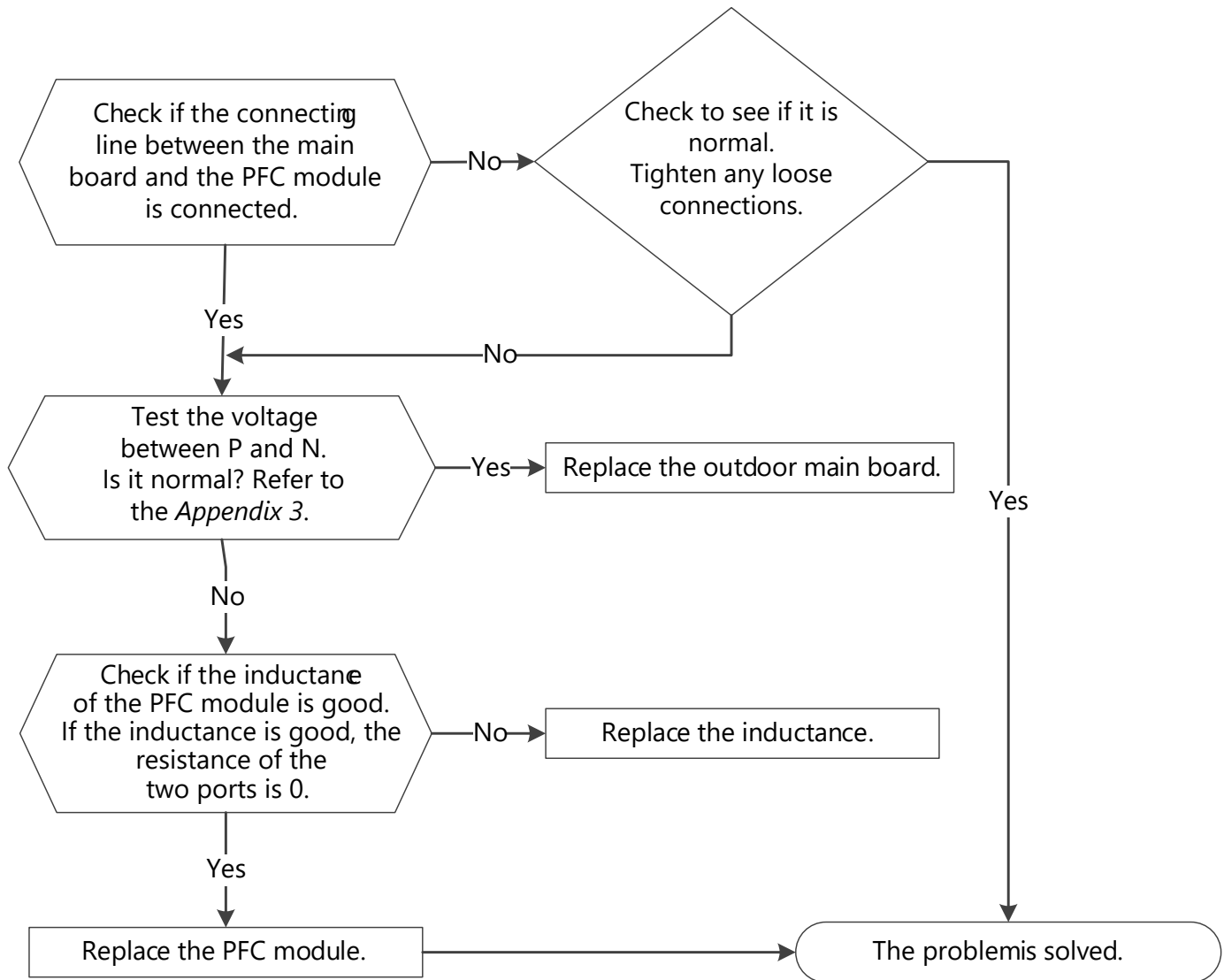
PC0F (PFC module protection diagnosis and solution)

Description: Outdoor PCB detects PFC signal is low voltage or DC voltage is lower than 340V for 6s when quick check.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Inductance
- PFC circuit or IPM module board

Troubleshooting and repair:



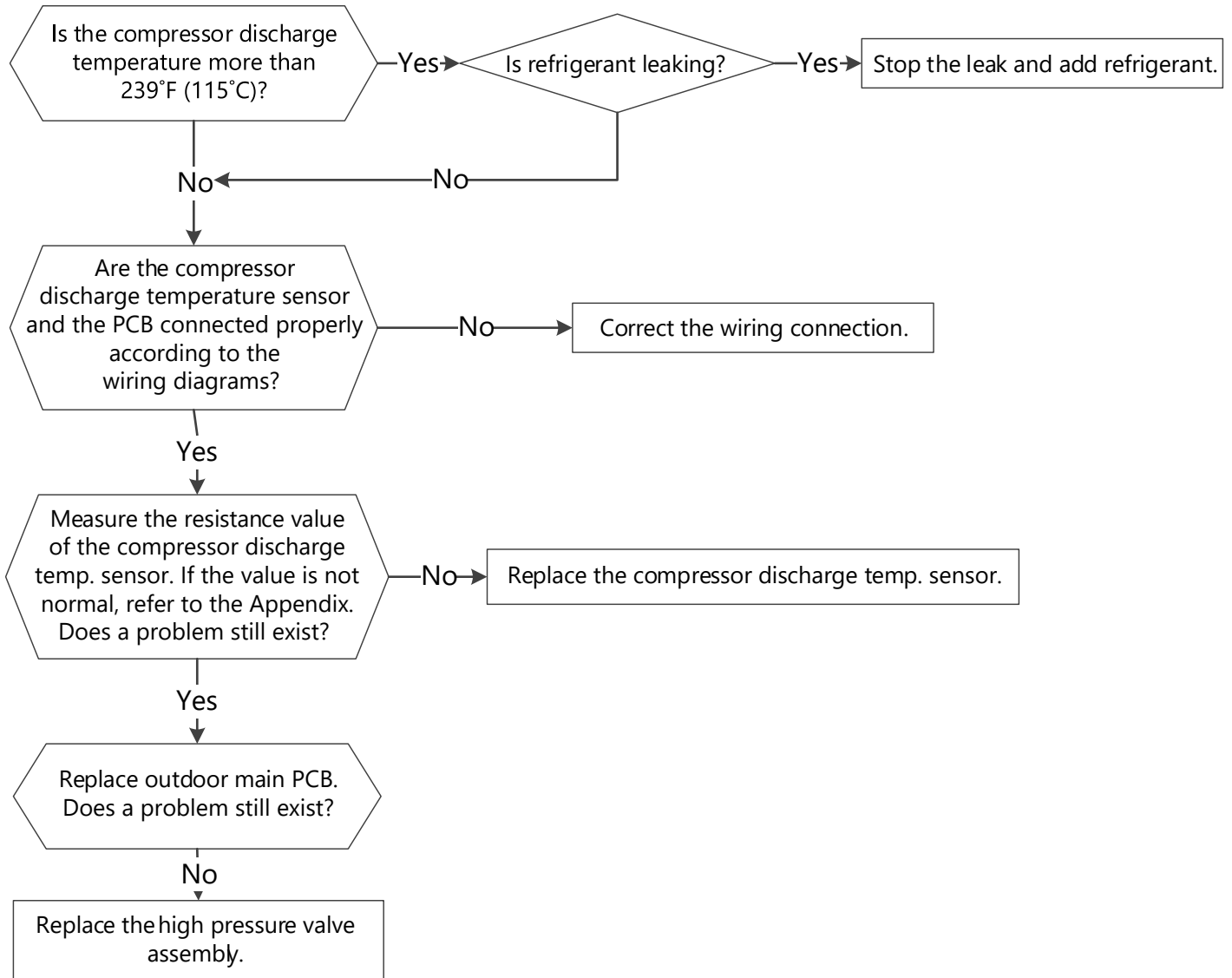
PC06 (Discharge temperature protection of compressor diagnosis and solution)

Description: When the compressor discharge temperature (TP) is more than 115oC for 10 seconds, the compressor ceases operation and does not restart until TP is less than 90oC

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Discharge temperature sensor
- Refrigerant

Troubleshooting and repair:



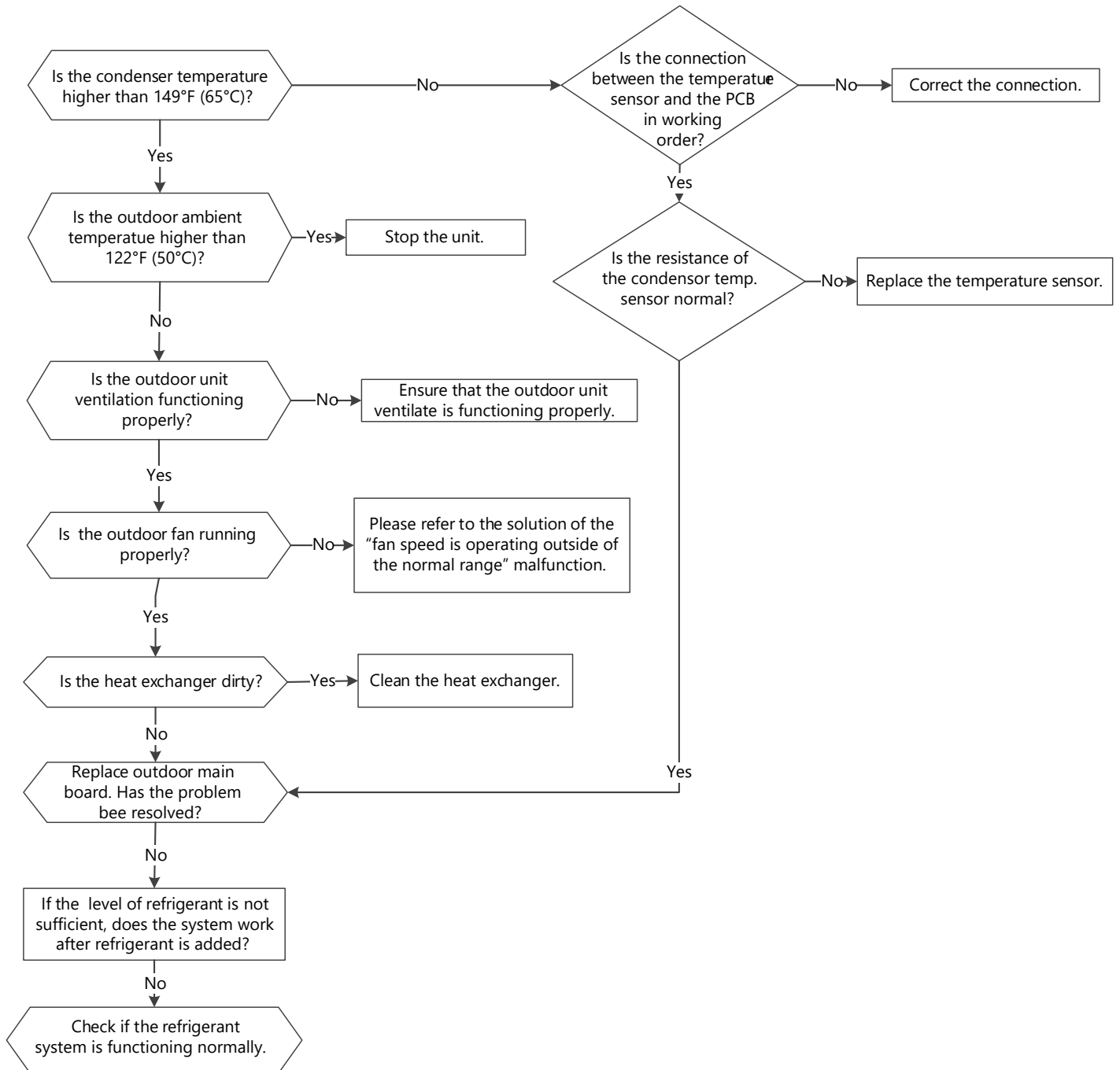
PC0A (High temperature protection of condenser diagnosis and solution)

Description: The unit will stop when the condenser temperature is higher than 149°F (65°C), and run again when it is less than 126.5°F (52°C).

Recommended parts to prepare:

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

Troubleshooting and repair:



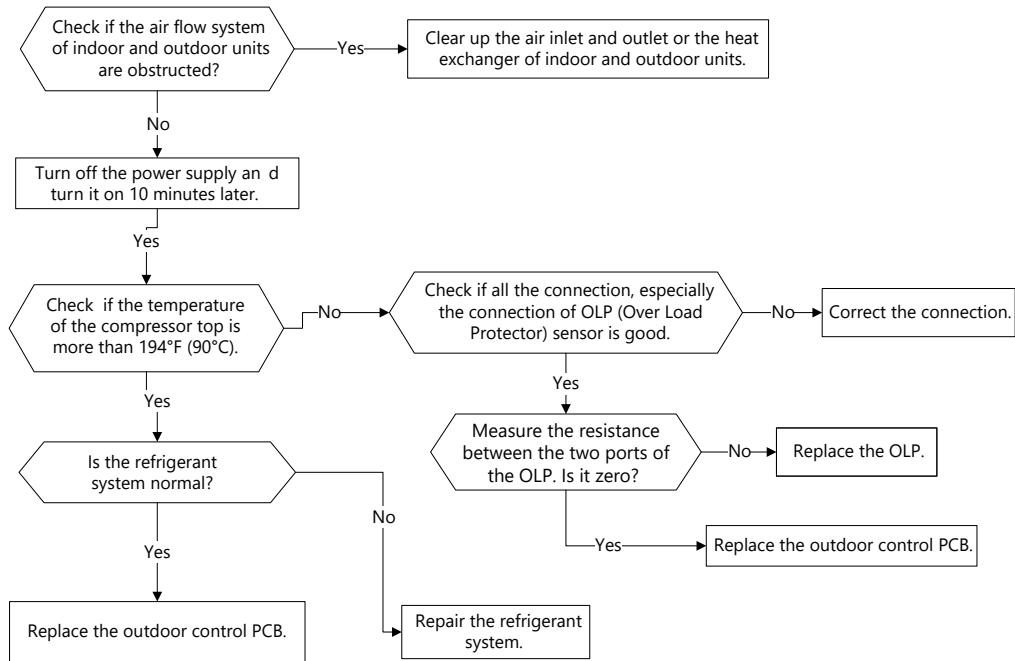
PC02/LC06 (Compressor top (or IPM) temp. protection/Refrigerant sensor error diagnosis and solution)

Description: For some models with overload protector, If the sampling voltage is not 5V, the LED will display the failure. If the temperature of IPM module is higher than a certain value, the LED displays the failure code. Models without overload protector should be diagnosed according to the second flowchart.

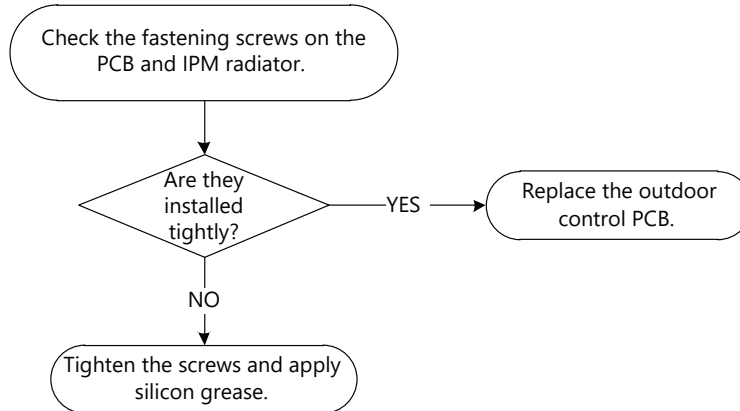
Recommended parts to prepare:

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

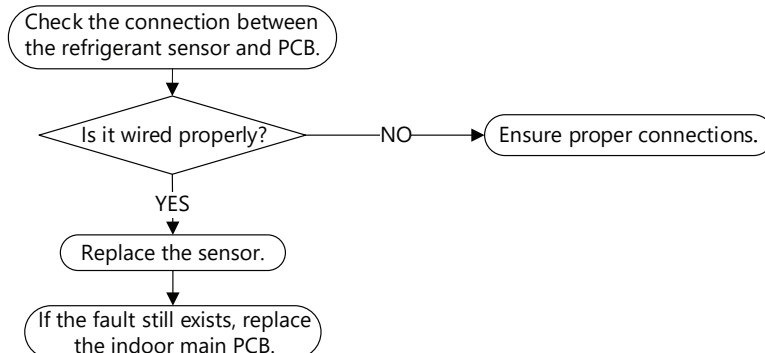
Troubleshooting and repair:



or



or



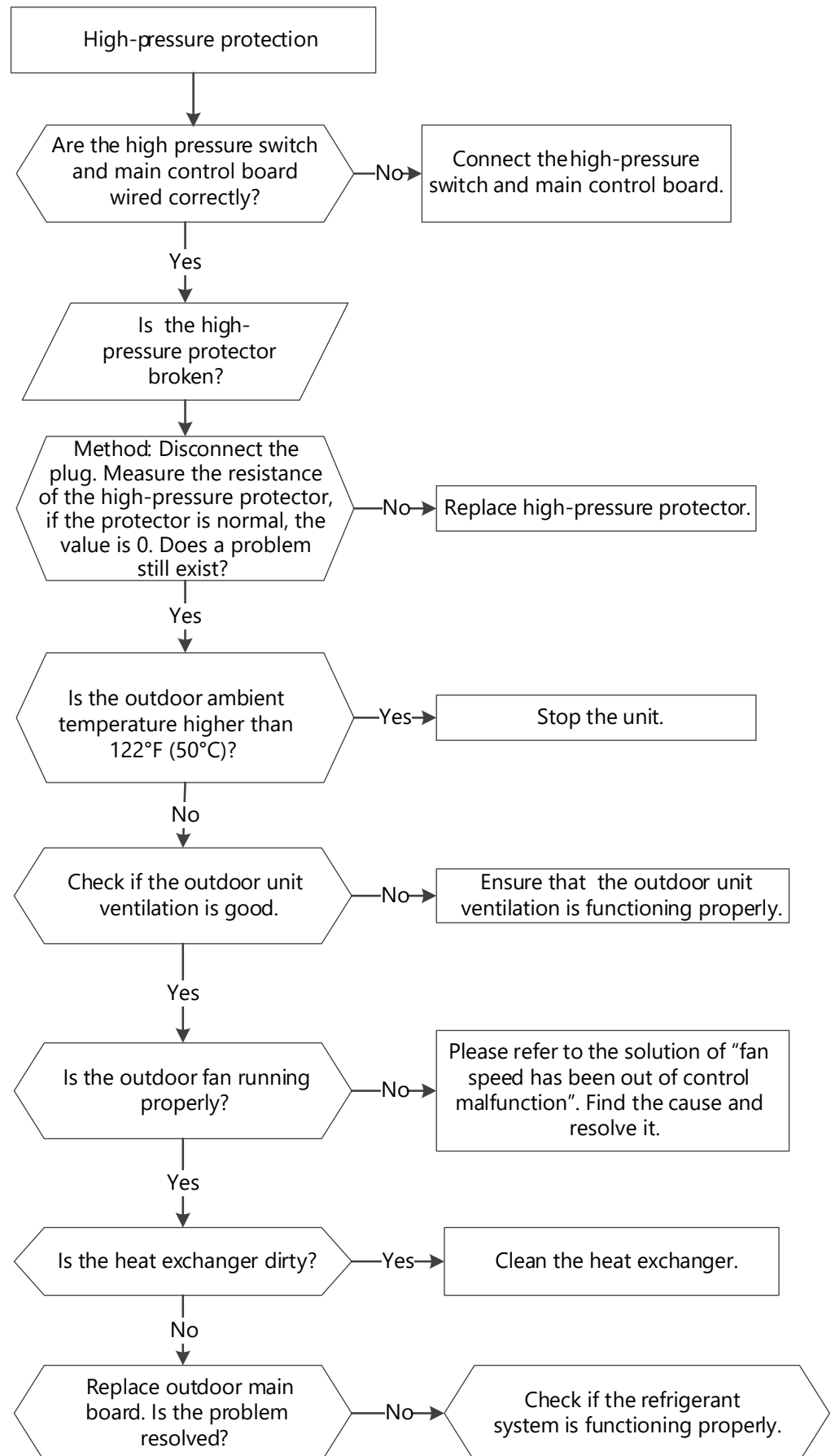
PC30 (System high-pressure protection diagnosis and solution)

Description: The Outdoor pressure switch cuts off the system because high pressure is higher than 4.4 MPa

Recommended parts to prepare:

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

Troubleshooting and repair:



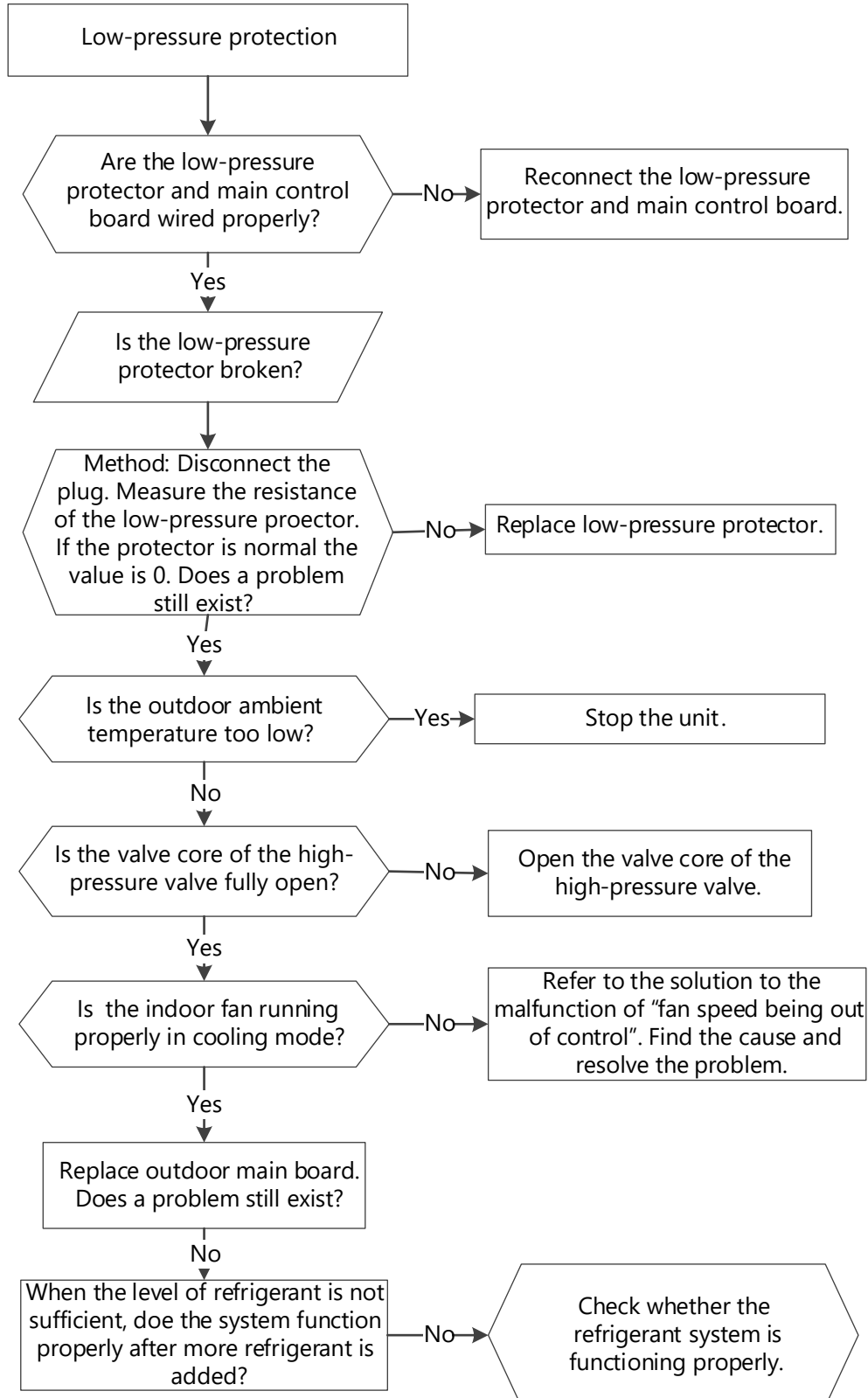
PC31 (System low-pressure protection diagnosis and solution)

Description: The Outdoor pressure switch cuts off the system because low pressure is lower than 0.13 MPa; the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Low-pressure protector
- Refrigerant

Troubleshooting and repair:



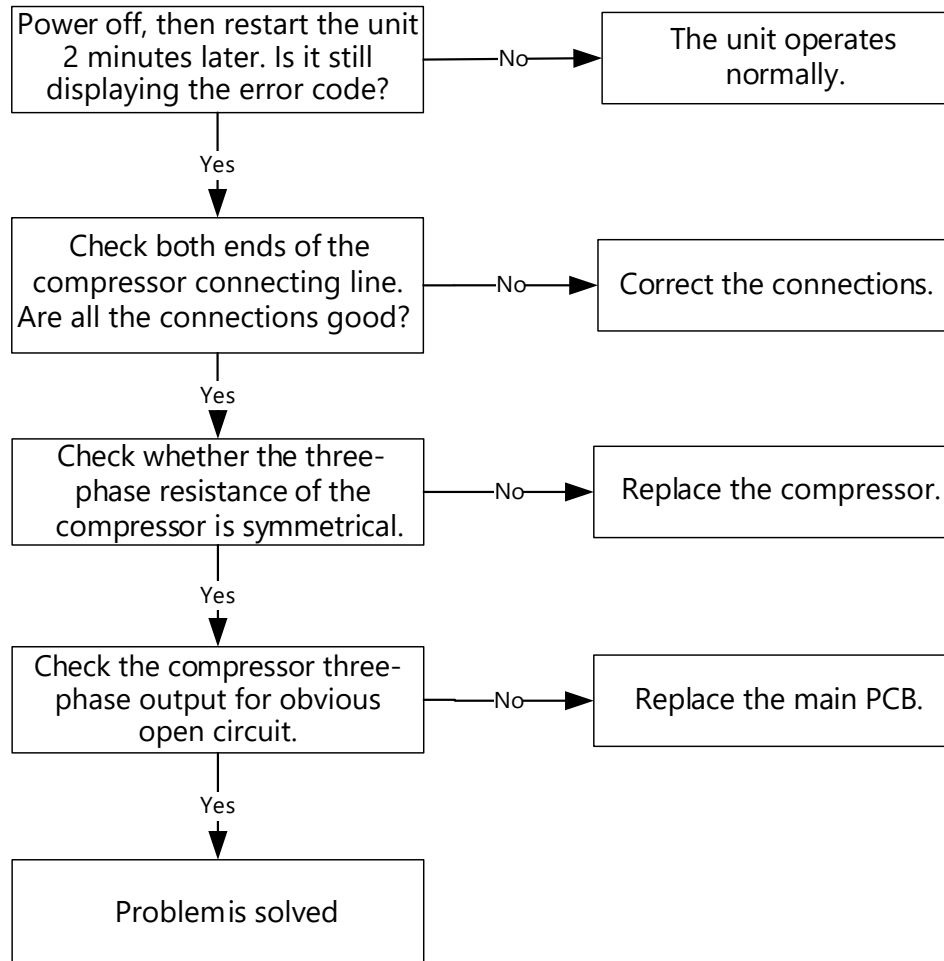
PC43 (ODU compressor lacks phase protection diagnosis and solution)

Description: When the three-phase sampling current of the compressor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code

Recommended parts to prepare:

- Connection wire
- Compressor
- Outdoor PCB

Troubleshooting and repair:



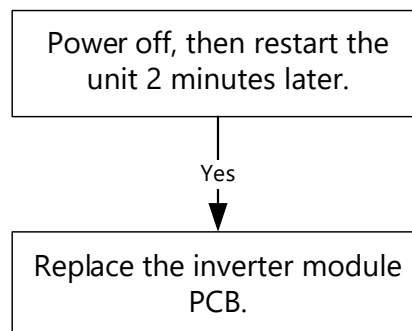
PC45 (ODU IR chip drive failure diagnosis and solution)

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

Recommended parts to prepare:

- Inverter module PCB.

Troubleshooting and repair:



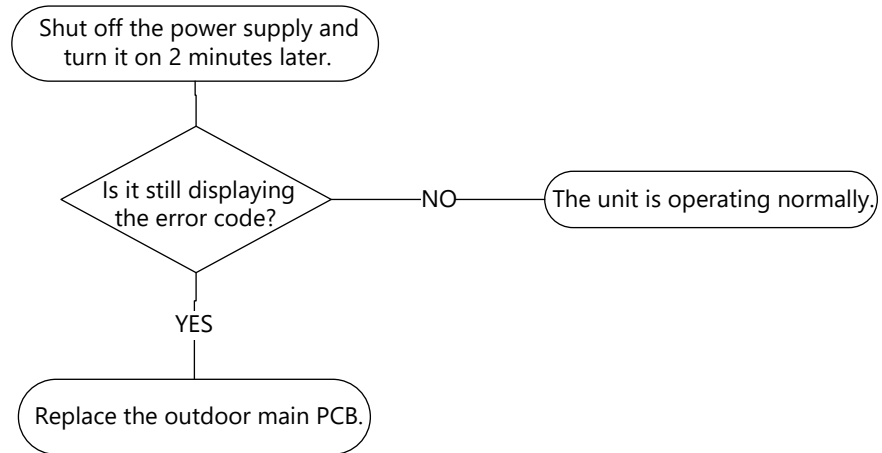
PC41 (Outdoor compressor current sampling circuit failure diagnosis and solution)

Description: Three-phase sampling offset voltage error; the static bias voltage is normally 2.5 V

Recommended parts to prepare:

- Outdoor main PCB

Troubleshooting and repair:



EC55 (ODU IPM module temperature sensor malfunction diagnosis and solution)

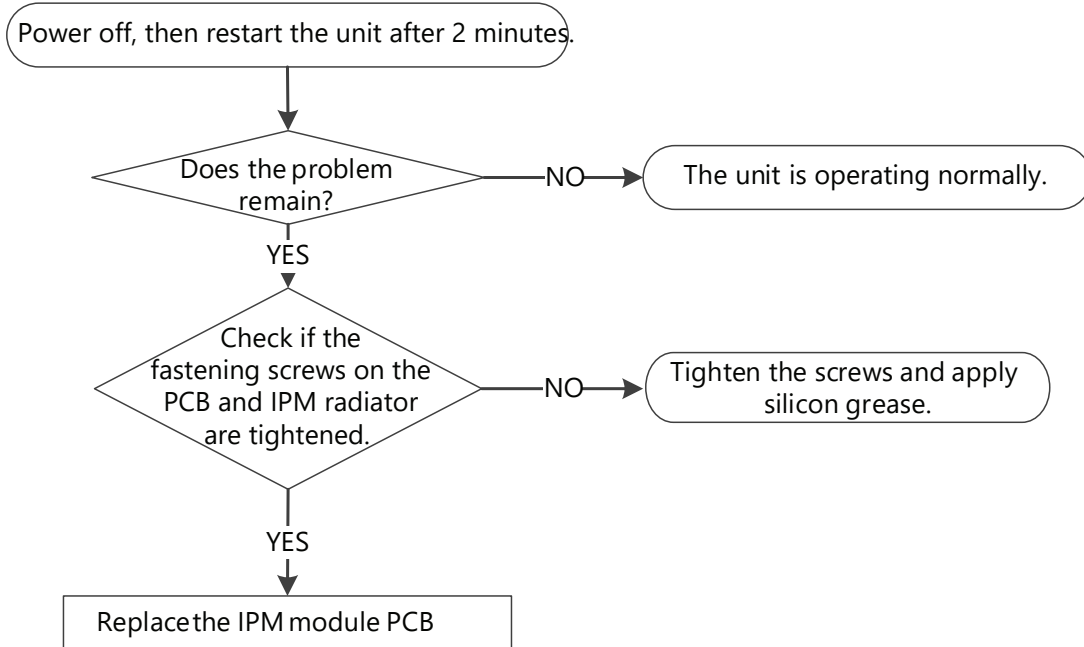
Description: If the sampling voltage is 0 V or 5 V, the LED displays the failure code.

Recommended parts to prepare:

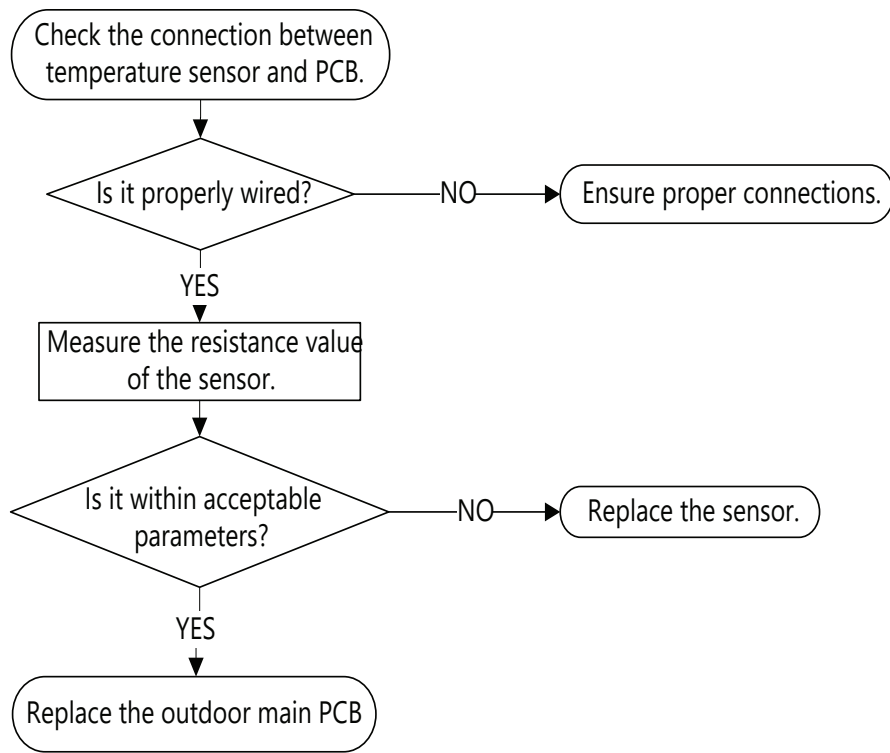
- IPM module PCB
- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting and repair:

If the radiator has no sensor, follow the steps below to resolve,



If the radiator has a sensor (TH), follow the steps below to resolve,



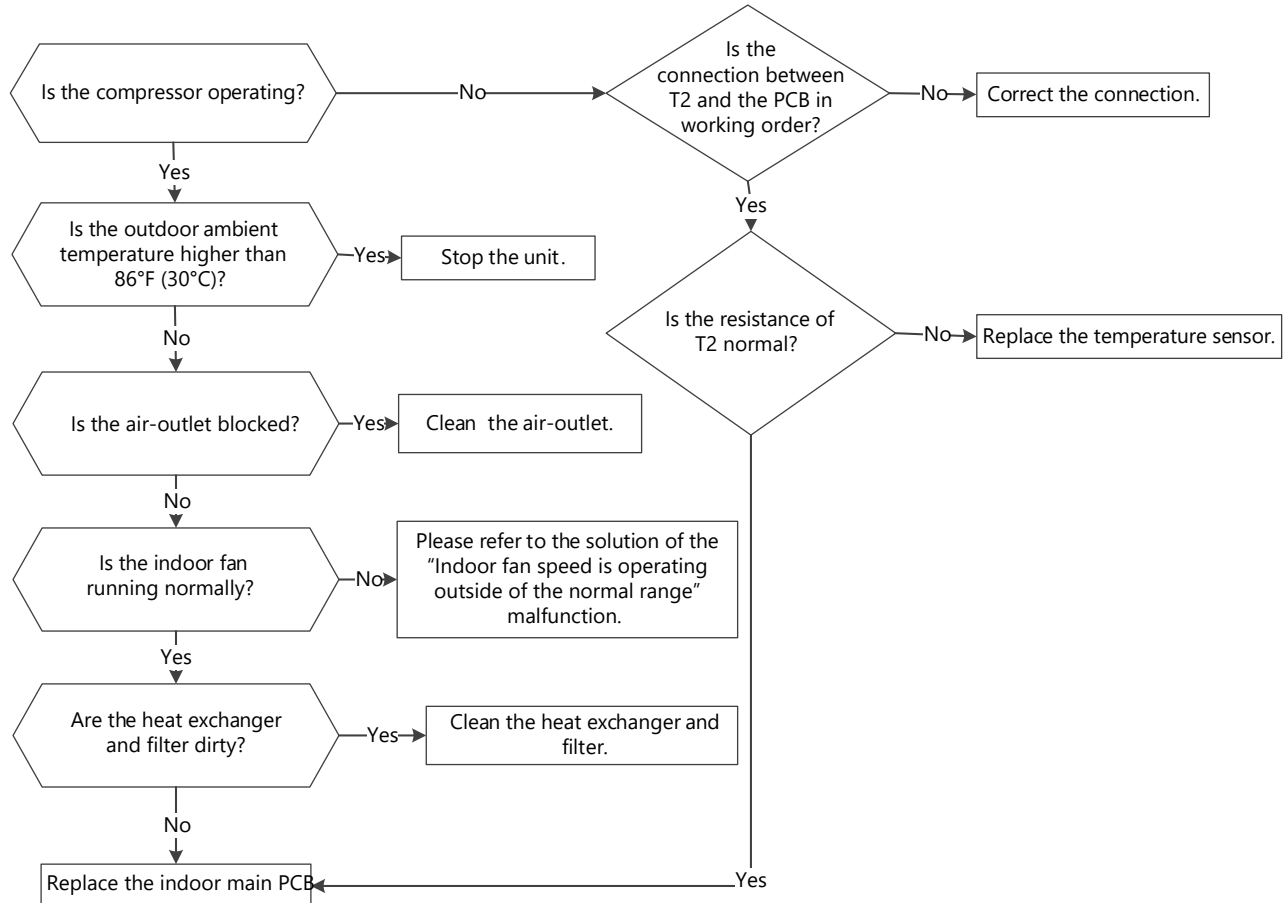
PH90 (High temperature protection of evaporator diagnosis and solution)

Description: When the evaporator coil temperature is more than 140°F (60°C) in heating mode, the unit stops. It starts again only when the evaporator coil temperature is less than 125.6°F (52°C).

Recommended parts to prepare:

- Connection wires
- Evaporator coil temperature sensor (T2)
- Indoor fan
- Indoor main PCB

Troubleshooting and repair:



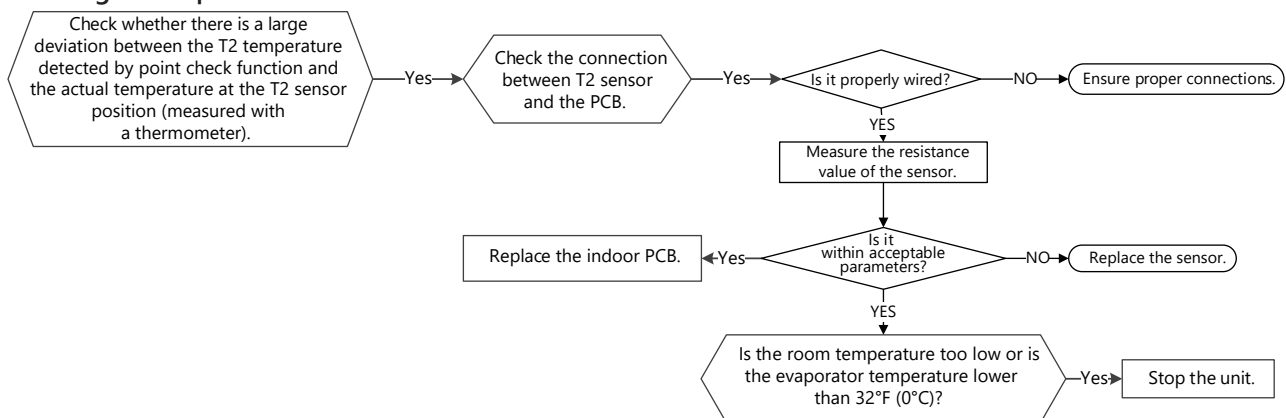
PH91 (Low temperature protection of evaporator diagnosis and solution)

Description: When the evaporator coil temperature is lower than 0°C in cooling mode or drying mode, the unit stops. It starts again only when the evaporator coil temperature is more than 5°C.

Recommended parts to prepare:

- Connection wires
- Evaporator coil temperature sensor (T2)
- Indoor main PCB

Troubleshooting and repair:



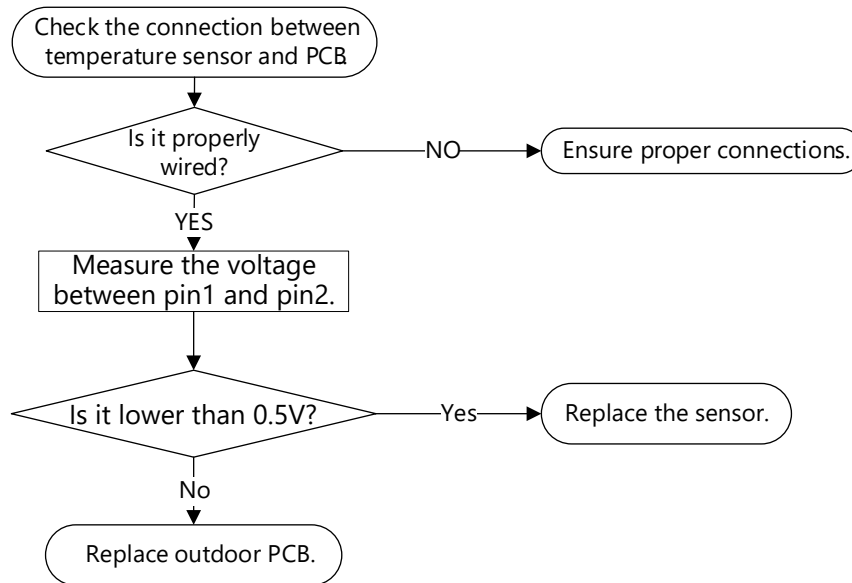
EC5C (High pressure sensor is in open circuit or has short circuited) diagnosis and solution

Description: If the sampling voltage is lower than 2V or higher than 254V, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Sensor
- Outdoor PCB

Troubleshooting and repair:



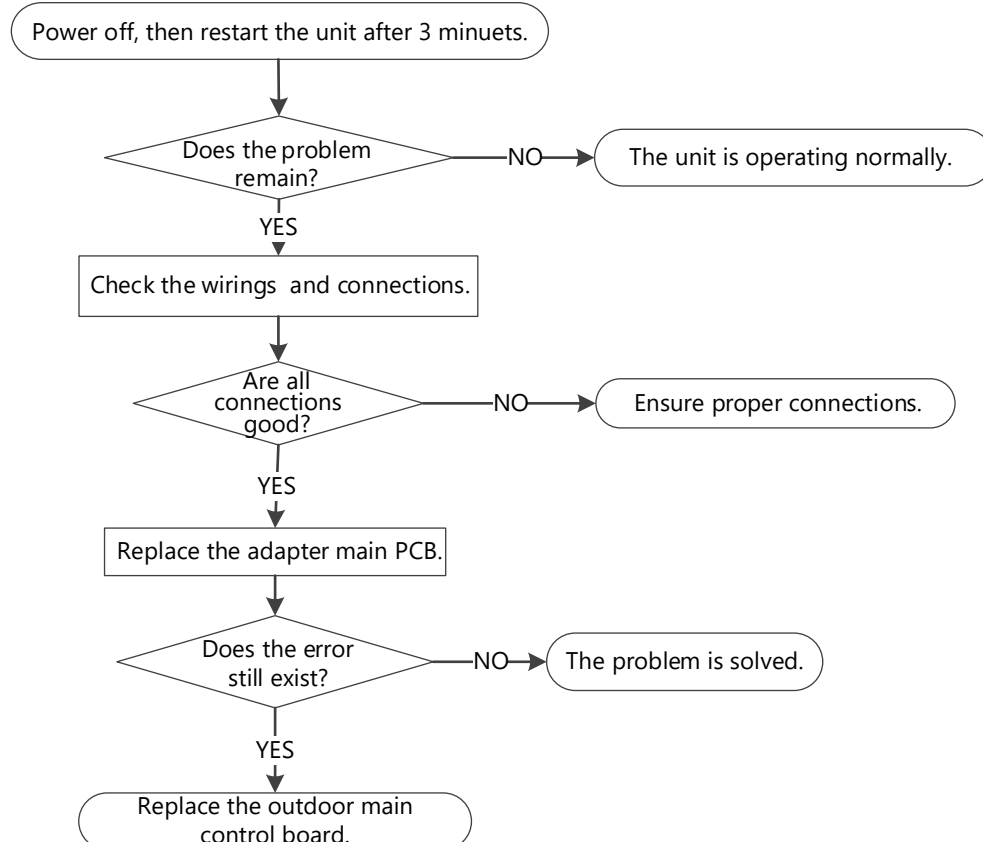
EL16 (Communication malfunction between adapter board and outdoor main board diagnosis and solution)

Description: The adapter PCB cannot detect the main control board.

Recommended parts to prepare:

- Connection wires
- Adapter board
- Outdoor main PCB

Troubleshooting and repair:



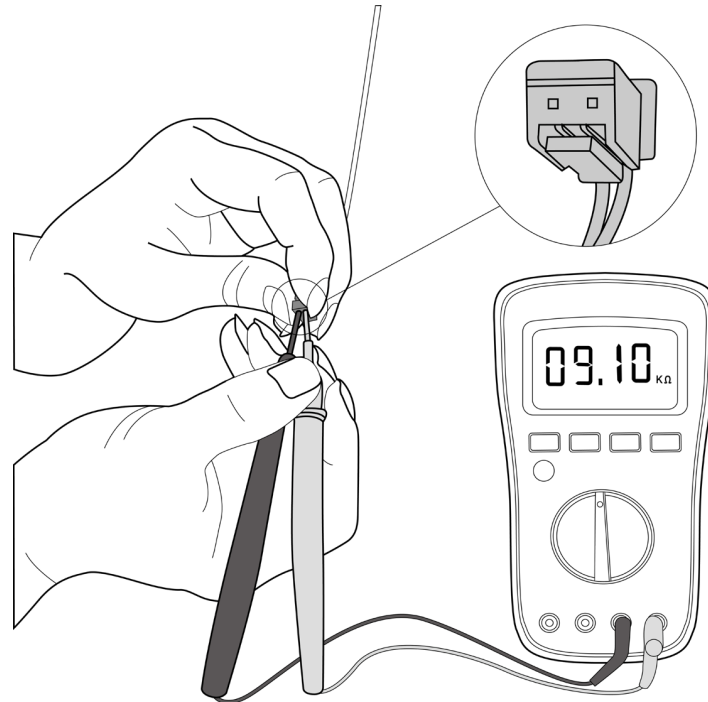
Check Procedures

Temperature Sensor Check

WARNING

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

1. Disconnect the temperature sensor from the PCB (Refer to "Indoor and Outdoor Unit Disassembly").
2. Measure the resistance value of the sensor using a multimeter.
3. Check the corresponding temperature sensor resistance value table (Refer to Chapter "Appendix").

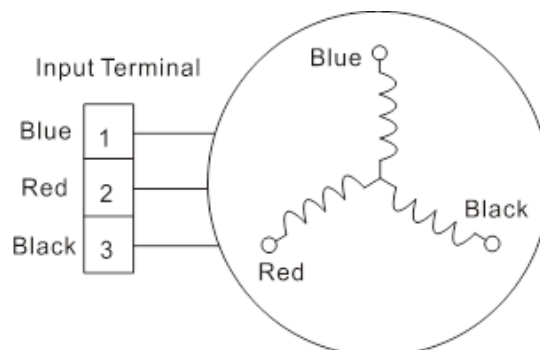


NOTE

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

Compressor Check

1. Disconnect the compressor power cord from outdoor PCB (Refer to "Outdoor Unit Disassembly").
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding on the following table.



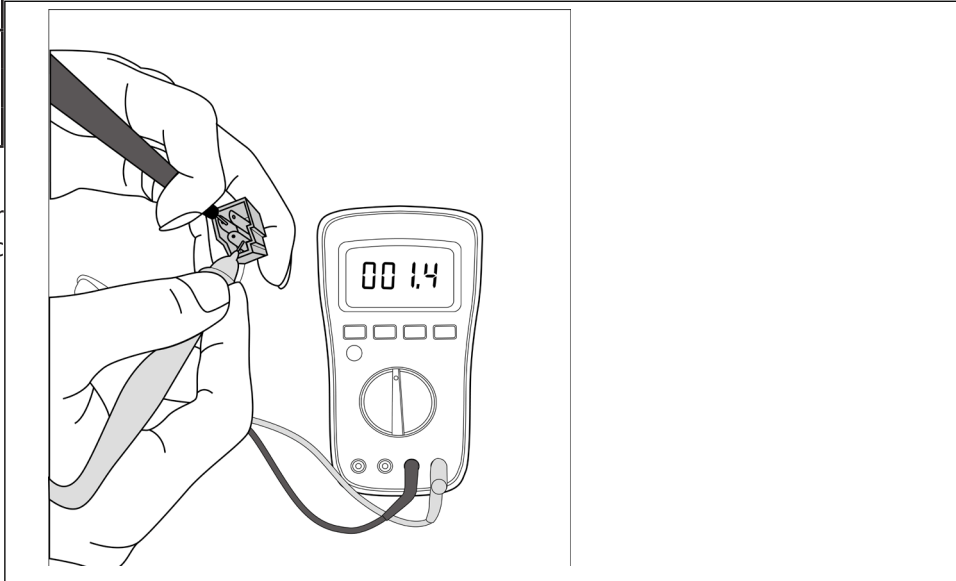
Resistance Value	KSK103D33UEZ3	KSN140D58UFZ	KTF250D22UMT	KTN110D42UFZ	KTF420D62UNT
Blue-Red	2.13Ω	1.86Ω	0.75Ω	1.82Ω	0.86Ω
Blue-Black					
Red-Black					

Resistance Value	KTN150D30UFZA	KTM240D46UKT2	KTF310D43UMT	ETPQ420D1UMUA ETPQ440D1UMUB KTQ420D1UMU EKPQ440D1UMUB	MTH356UKRC8FQL
Blue-Red	1.02Ω	1.04Ω	0.65Ω	0.37Ω	0.487Ω
Blue-Black					
Red-Black					

Resistance Value	MTH550UKPC8FU
Blue-Red	0.295Ω
Blue-Black	
Red-Black	

NOTE

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



IPM Continuity Check

⚠ WARNING

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

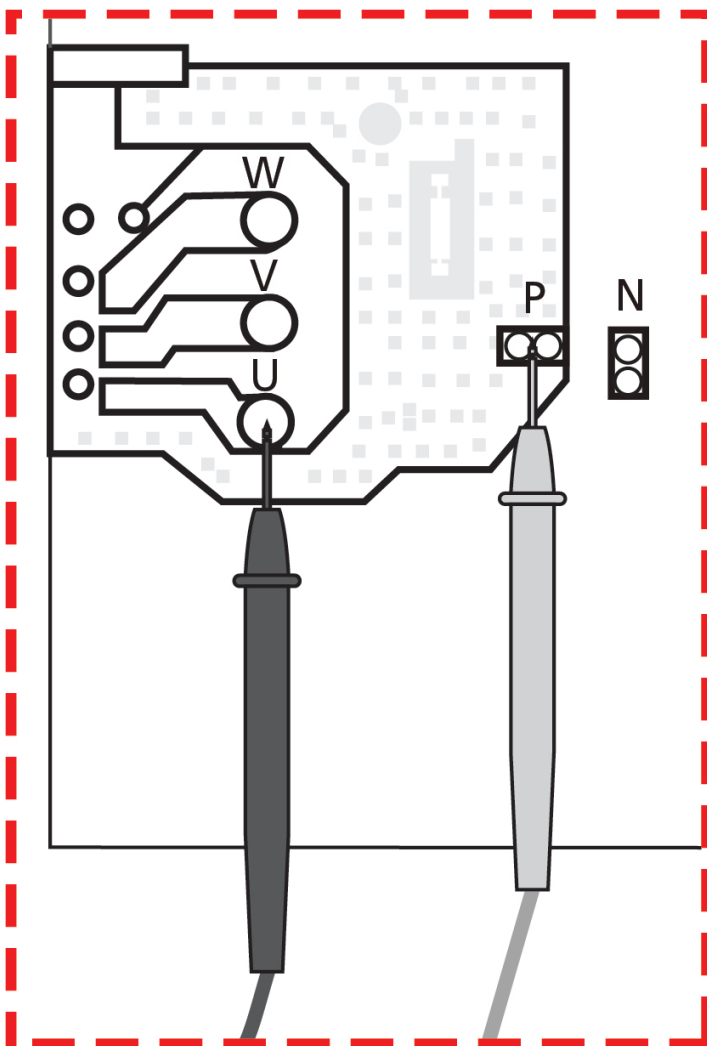
1. Turn off outdoor unit and disconnect power supply.
2. Discharge electrolytic capacitors and ensure all energy-storage units have been discharged.
3. Disassemble outdoor PCB or disassemble IPM board.
4. Measure the resistance value between P and U (V, W, N); U (V, W) and N.

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

Or test the conductivity of IPM with diode mode.

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

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



NOTE

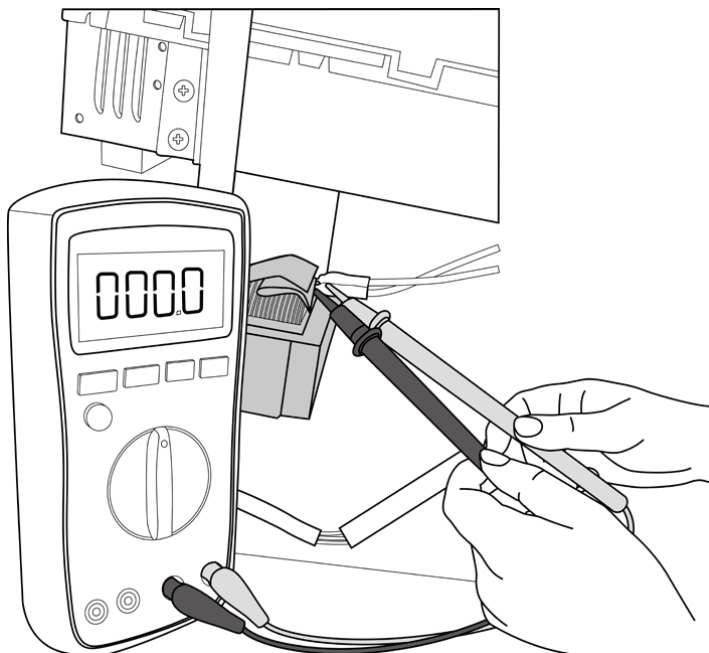
The picture and the value are only for reference, actual condition and specific value may vary.

Normal Voltage Of P And N

208-230 V (1-phase)		
In Standby		
Around 310VDC		
around 310VDC		
With passive PFC module	With partial active PFC module	With fully active PFC module
>200VDC	>200VDC	>370VDC

Reactor Check

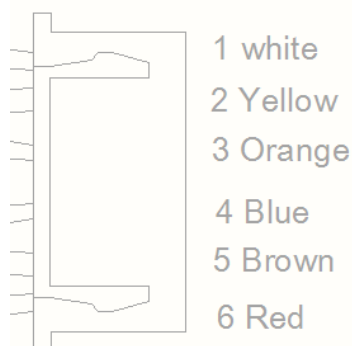
Measure the resistance and voltage (to ground) of the reactor. The normal resistance should be around 0.1 ohm. Otherwise, the reactor must have malfunction.



4-Way Valve Check

1. Power on, use a digital tester to measure the voltage, when the unit operates in cooling, it is 0V. When the unit operates in heating, it is about equal to power supply voltage.
If the value of the voltage is not in the range, the PCB must have problems and need to be replaced.
2. Turn off the power, use a digital tester to measure the resistance. The value should be 1.8~2.5 KΩ.

EXV Check



1. Turn off the outdoor unit and disconnect the power supply.
2. Disconnect the connectors of the EXV.
3. Measure the resistance value between Red and Blue (Yellow), Brown and Orange (White).

Resistance to EXV coil

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

Appendix

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			

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

System Pressure Table-R454B

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
58.196	0.58	8.44	-60	-76	935.23	9.35	135.64	8	46.4
61.517	0.62	8.92	-59	-74.2	963.75	9.64	139.78	9	48.2
64.988	0.65	9.43	-58	-72.4	992.93	9.93	144.01	10	50
68.615	0.69	9.95	-57	-70.6	1,022.8	10.23	148.34	11	51.8
72.402	0.72	10.50	-56	-68.8	1,053.3	10.53	152.76	12	53.6
76.354	0.76	11.07	-55	-67	1,084.5	10.85	157.29	13	55.4
80.478	0.80	11.67	-54	-65.2	1,116.4	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	1,182.3	11.82	171.47	16	60.8
93.923	0.94	13.62	-51	-59.8	1,216.3	12.16	176.40	17	62.6
98.781	0.99	14.33	-50	-58	1,251.1	12.51	181.45	18	64.4
103.84	1.04	15.06	-49	-56.2	1,286.6	12.87	186.60	19	66.2
109.1	1.09	15.82	-48	-54.4	1,322.8	13.23	191.85	20	68
114.56	1.15	16.61	-47	-52.6	1,359.9	13.60	197.23	21	69.8
120.25	1.20	17.44	-46	-50.8	1,397.7	13.98	202.71	22	71.6
126.15	1.26	18.30	-45	-49	1,436.3	14.36	208.31	23	73.4
132.28	1.32	19.18	-44	-47.2	1,475.7	14.76	214.02	24	75.2
138.64	1.39	20.11	-43	-45.4	1,515.9	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	1,598.9	15.99	231.89	27	80.6
159.18	1.59	23.09	-40	-40	1,641.6	16.42	238.09	28	82.4
166.54	1.67	24.15	-39	-38.2	1,685.2	16.85	244.41	29	84.2
174.15	1.74	25.26	-38	-36.4	1,729.7	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	1,821.3	18.21	264.15	32	89.6
198.65	1.99	28.81	-35	-31	1,868.4	18.68	270.98	33	91.4
207.39	2.07	30.08	-34	-29.2	1,916.5	19.17	277.95	34	93.2
216.42	2.16	31.39	-33	-27.4	1,965.6	19.66	285.08	35	95
225.76	2.26	32.74	-32	-25.6	2,015.5	20.16	292.31	36	96.8
235.41	2.35	34.14	-31	-23.8	2,066.5	20.67	299.71	37	98.6
245.37	2.45	35.59	-30	-22	2,118.4	21.18	307.24	38	100.4
255.67	2.56	37.08	-29	-20.2	2,171.3	21.71	314.91	39	102.2
266.29	2.66	38.62	-28	-18.4	2,225.2	22.25	322.73	40	104
277.25	2.77	40.21	-27	-16.6	2,280.2	22.80	330.70	41	105.8
288.56	2.89	41.85	-26	-14.8	2,336.1	23.36	338.81	42	107.6
300.22	3.00	43.54	-25	-13	2,393.2	23.93	347.09	43	109.4
312.24	3.12	45.28	-24	-11.2	2,451.3	24.51	355.52	44	111.2
324.63	3.25	47.08	-23	-9.4	2,510.4	25.10	364.09	45	113
337.39	3.37	48.93	-22	-7.6	2,570.7	25.71	372.84	46	114.8
350.54	3.51	50.84	-21	-5.8	2,632.1	26.32	381.74	47	116.6
364.08	3.64	52.80	-20	-4	2,694.7	26.95	390.82	48	118.4
378.02	3.78	54.83	-19	-2.2	2,758.3	27.58	400.04	49	120.2
392.37	3.92	56.91	-18	-0.4	2,823.2	28.23	409.46	50	122
407.13	4.07	59.05	-17	1.4	2,889.3	28.89	419.04	51	123.8
422.31	4.22	61.25	-16	3.2	2,956.5	29.57	428.79	52	125.6
437.92	4.38	63.51	-15	5	3025	30.25	438.72	53	127.4

System Pressure Table-R454B (continued)

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
453.98	4.54	65.84	-14	6.8	3,094.7	30.95	448.83	54	129.2
470.47	4.70	68.23	-13	8.6	3,165.7	31.66	459.13	55	131
487.43	4.87	70.69	-12	10.4	3,238.1	32.38	469.63	56	132.8
504.84	5.05	73.22	-11	12.2	3,311.7	33.12	480.30	57	134.6
522.73	5.23	75.81	-10	14	3,386.7	33.87	491.18	58	136.4
541.1	5.41	78.48	-9	15.8	3,463	34.63	502.25	59	138.2
559.95	5.60	81.21	-8	17.6	3,540.7	35.41	513.52	60	140
579.31	5.79	84.02	-7	19.4	3,619.9	36.20	525.00	61	141.8
599.16	5.99	86.90	-6	21.2	3,700.5	37.01	536.69	62	143.6
619.54	6.20	89.85	-5	23	3,782.7	37.83	548.61	63	145.4
640.43	6.40	92.88	-4	24.8	3,866.3	38.66	560.74	64	147.2
661.86	6.62	95.99	-3	26.6	3,951.5	39.52	573.10	65	149
683.82	6.84	99.18	-2	28.4	4,038.3	40.38	585.69	66	150.8
706.34	7.06	102.44	-1	30.2	4,126.8	41.27	598.52	67	152.6
729.41	7.29	105.79	0	32	4,217	42.17	611.60	68	154.4
753.06	7.53	109.22	1	33.8	4,309	43.09	624.95	69	156.2
777.28	7.77	112.73	2	35.6	4,402.9	44.03	638.56	70	158
802.08	8.02	116.33	3	37.4	4,498.7	44.99	652.46	71	159.8
827.48	8.27	120.01	4	39.2	4,596.5	45.97	666.64	72	161.6
853.49	8.53	123.78	5	41	4,696.5	46.97	681.15	73	163.4
880.11	8.80	127.64	6	42.8	4,798.9	47.99	696.00	74	165.2
907.35	9.07	131.60	7	44.6	4,904.1	49.04	711.25	75	167

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Important!

Product Warranty Information

The Warranty Registration below is a requirement to print a warranty certificate. You're not mandated to register your products to enjoy the Midea Standard Warranty; however, registration is highly recommended. Registering your warranty within 60 days ensures easy access to support and service when needed.

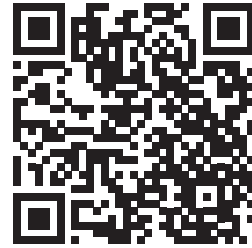
The design and specifications may change without prior notice in order to enhance the product. For detailed information, please consult your sales agency or the manufacturer. Any updates to the manual will be posted on the service website, so be sure to check for the latest version.

United States



<https://www.mideacomfort.us/registration.html>

Canada



<https://www.mideacomfortna.ca/registration.html>