



SM_AF_R32_INV_IN_NA_2009

FOREST INVERTER SERIES

SERVICE MANUAL

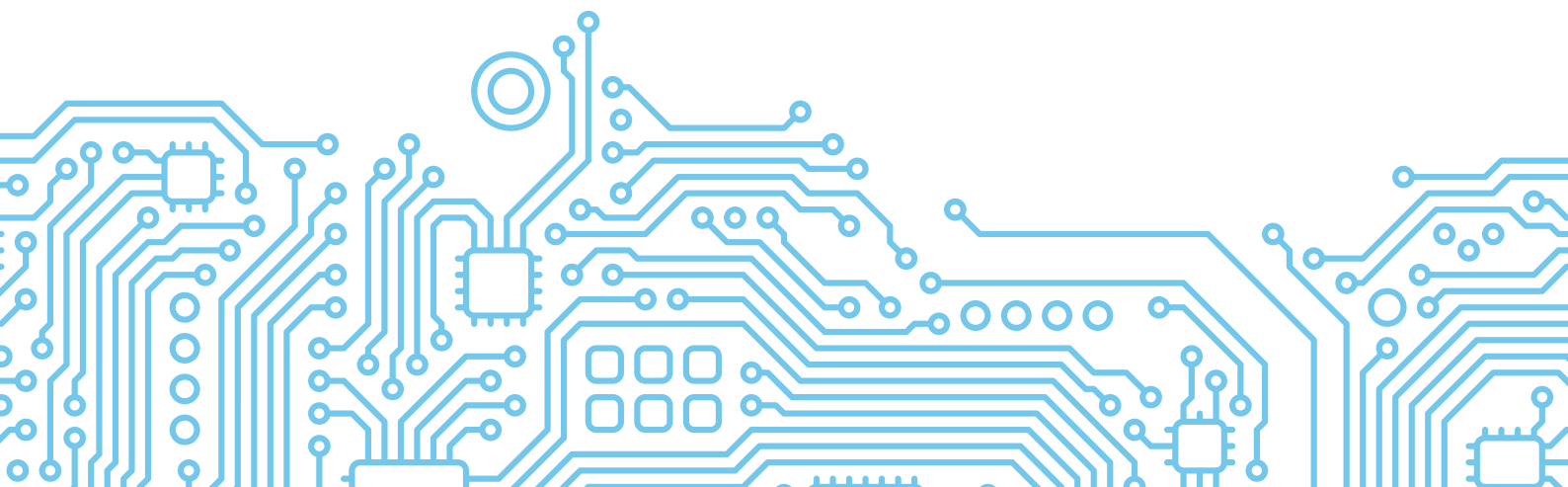
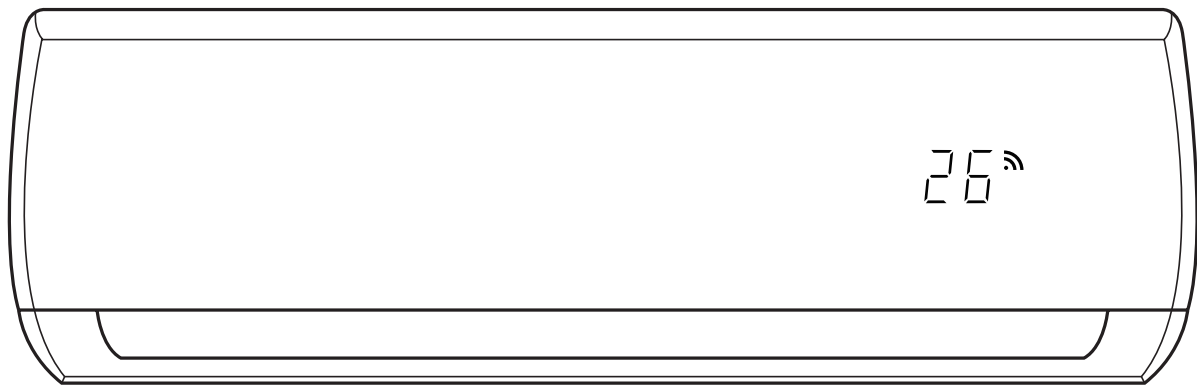


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Caution: Risk of fire
(Required for R32/R290
units only)

Safety Precautions


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1. Precautions


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

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


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

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

1.1 In case of Accidents or Emergency


 **WARNING**

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


 **CAUTION**

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

1.2 Pre-Installation and Installation


 **WARNING**

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


 **CAUTION**

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

1.3 Operation and Maintenance

 **WARNING**

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

 **CAUTION**

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

2. Information servicing(For flammable materials)

2.1 Checks to the area

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

2.2 Work procedure

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

2.3 Work procedure

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

2.4 Checking for presence of refrigerant

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

2.5 Presence of fire extinguisher

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

2.6 No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.

- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.
- NO SMOKING signs shall be displayed.

2.7 Ventilated area

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

2.8 Checks to the refrigeration equipment

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

2.9 Checks to electrical devices

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

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

2.10 Repairs to sealed components

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

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

2.11 Repair to intrinsically safe components

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

2.12 Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check

shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

2.13 Detection of flammable refrigerants

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

2.14 Leak detection methods

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

2.15 Removal and evacuation

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

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

2.16 Charging procedures

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

2.17 Decommissioning

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

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

- Become familiar with the equipment and its operation.
- Isolate system electrically.

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

2.18 Labelling

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

2.19 Recovery

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

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

Specifications

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1. Model Reference

Refer to the following table to determine the specific indoor and outdoor unit model.

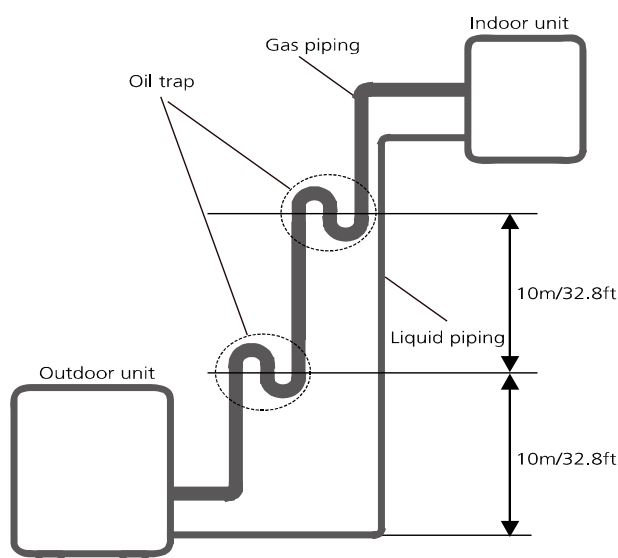
| Indoor Unit Model | Outdoor Unit Model | Capacity (Btu/h) | Power Supply |
|---------------------|---------------------|------------------|----------------------------|
| MSAFA-09CRDN8-QC6 | MOX130-09CDN8-QD6GA | 9k | 220-240V~, 50Hz, 1Phase |
| MSAFB-12CRDN8-QC0*1 | MOX130-12CDN8-QC0 | 12k | |
| | MOX130-12CDN8-QD6GA | | |
| MSAFB-12CRDN8-QC0*2 | MOX130-12CFN8-QC2 | | |
| MSAFC-17CRDN8-QC0*1 | MOB30-17CDN8-QC0 | 17k | |
| | MOX230-18CDN8-QD0GA | | |
| MSAFC-17CRDN8-QC0*2 | MOX230-17CDN8-QC0 | | |
| MSAFD-21CRDN8-QC0 | MOX330-21CDN8-QC0 | 21k | |

2. Pipe Length and Drop Height

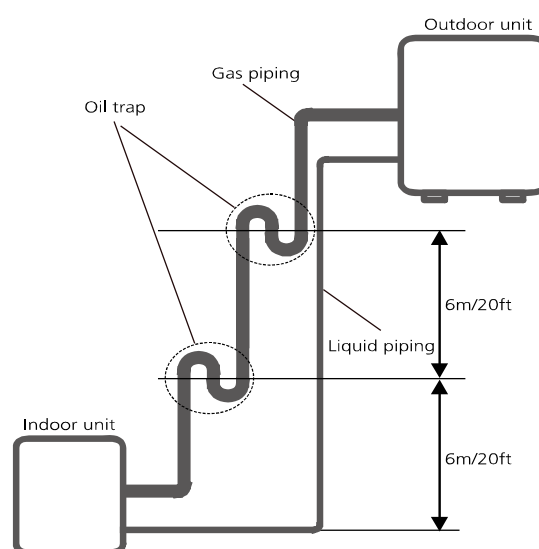
The length and elevation of connection pipe are shown in the table below. If the pipe length exceeds max pipe length, additional refrigerant should be charged to ensure nominal cooling/heating capacity.

| Capacity(Btu) | Standard Length | Max Pipe Length | Max Elevation | Additional Refrigerant |
|---------------|-----------------|-----------------|---------------|------------------------|
| 9k/12k | 5m (16.4ft) | 25m (82.0ft) | 10m (32.8ft) | 12g/m (0.13oz/ft) |
| 17k | | 30m (98.4ft) | 20m (65.6ft) | |
| 21k | | 30m (98.4ft) | 20m (65.6ft) | |

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 pipe can prevent this.



1. Indoor unit is installed higher than outdoor unit



2. Outdoor unit is installed higher than indoor unit

If indoor unit is installed higher than outdoor unit, oil trap should be set every 10m(32.8ft) of vertical distance.

If the outdoor unit is installed higher than the indoor unit, proper oil should return to the compressor along with the suction of refrigerant to keep lubrication of compressor. If the suction flow velocity drops below 7.62m/s(1500fpm (feet per minute)), oil won't return to the compressor. An oil trap should be installed every 6m(20ft) of vertical distance.

3. Electrical Wiring Diagrams

Indoor and outdoor unit wiring diagram

| Indoor Unit | | Outdoor Unit | |
|---------------------|--------------------|---------------------|--------------------|
| IDU Model | IDU Wiring Diagram | ODU Model | ODU Wiring Diagram |
| MSAFA-09CRDN8-QC6 | 16022000024176 | MOX130-09CDN8-QD6GA | 16022000019573 |
| MSAFB-12CRDN8-QC0*1 | | MOX130-12CDN8-QC0 | |
| | | MOX130-12CDN8-QD6GA | |
| MSAFB-12CRDN8-QC0*2 | | MOX130-12CFN8-QC2 | |
| MSAFC-17CRDN8-QC0*1 | | MOB30-17CDN8-QC0 | 16022000019583 |
| | | MOX230-18CDN8-QD0GA | |
| MSAFC-17CRDN8-QC0*2 | | MOX230-17CDN8-QC0 | |
| MSAFD-21CRDN8-QC0 | | MOX330-21CDN8-QC0 | |

Outdoor unit printed circuit board diagram

| Outdoor Unit | |
|---------------------|---------------------------|
| ODU Model | ODU Printed Circuit Board |
| MOX130-09CDN8-QD6GA | 17122000048121 |
| MOX130-12CDN8-QC0 | 17122000044714 |
| MOX130-12CDN8-QD6GA | 17122000048121 |
| MOX130-12CFN8-QC2 | |
| MOB30-17CDN8-QC0 | 17122000041117 |
| MOX230-18CDN8-QD0GA | 17122000048064 |
| MOX230-17CDN8-QC0 | |
| MOX330-21CDN8-QC0 | |

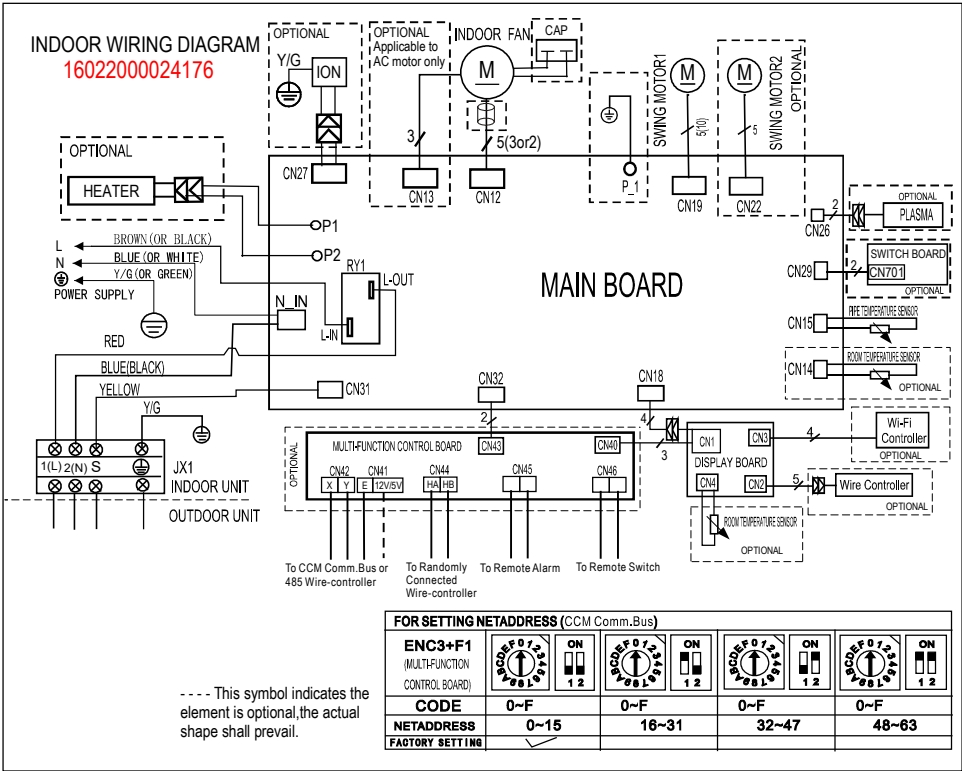
Indoor unit abbreviations

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

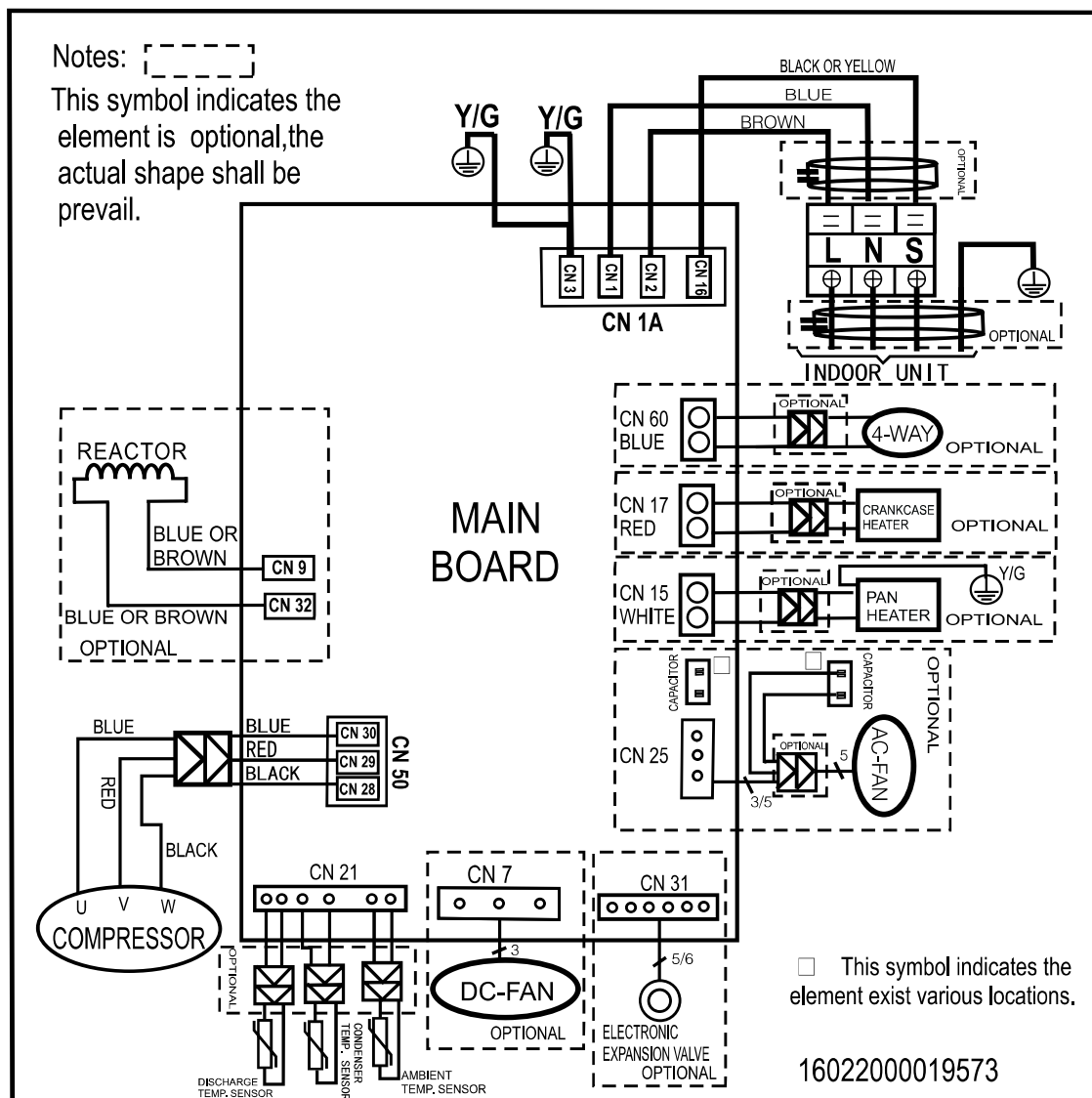
Outdoor unit abbreviations

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

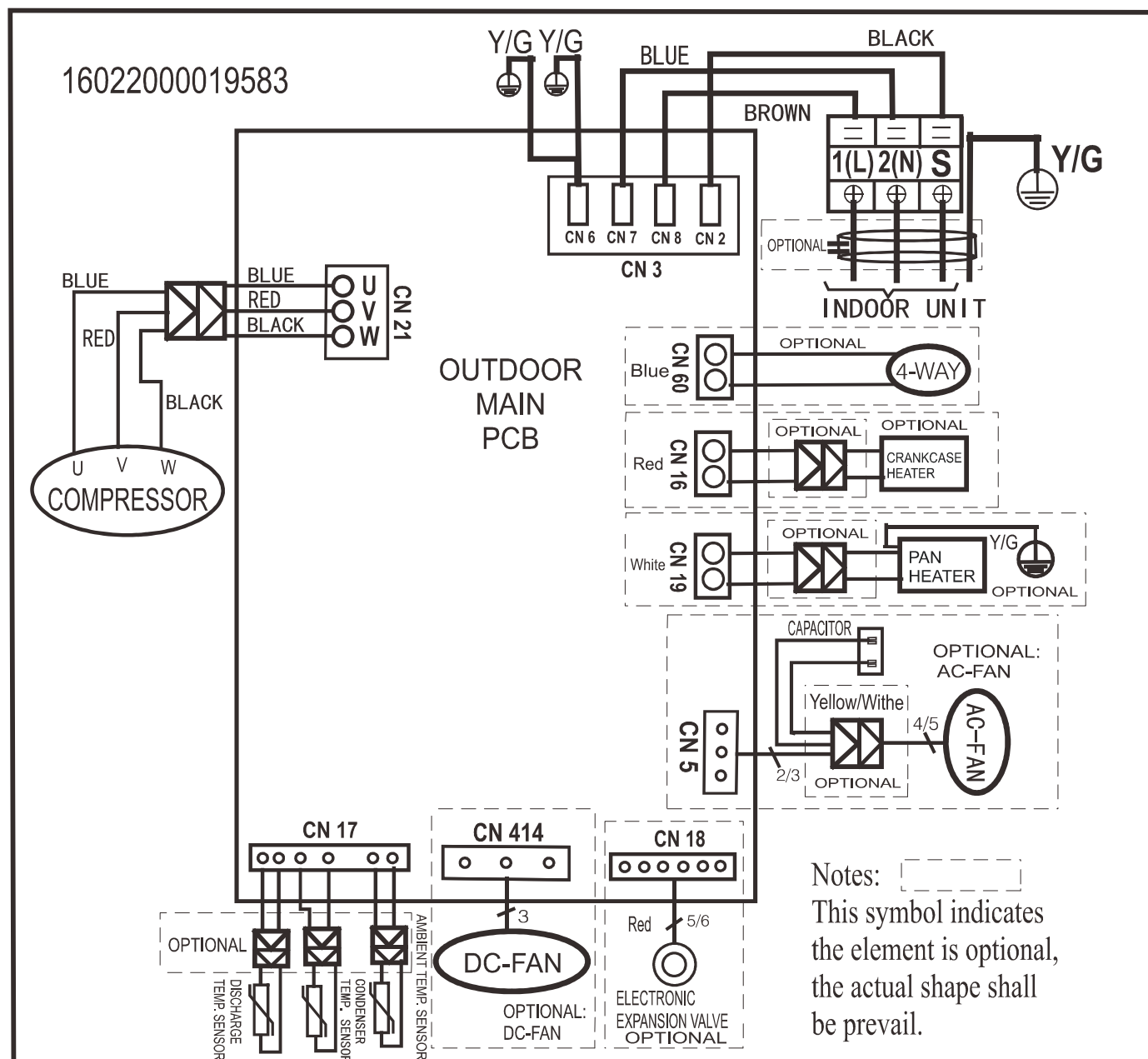
Indoor unit wiring diagram: 16022000024176



Outdoor unit wiring diagram: 16022000019573



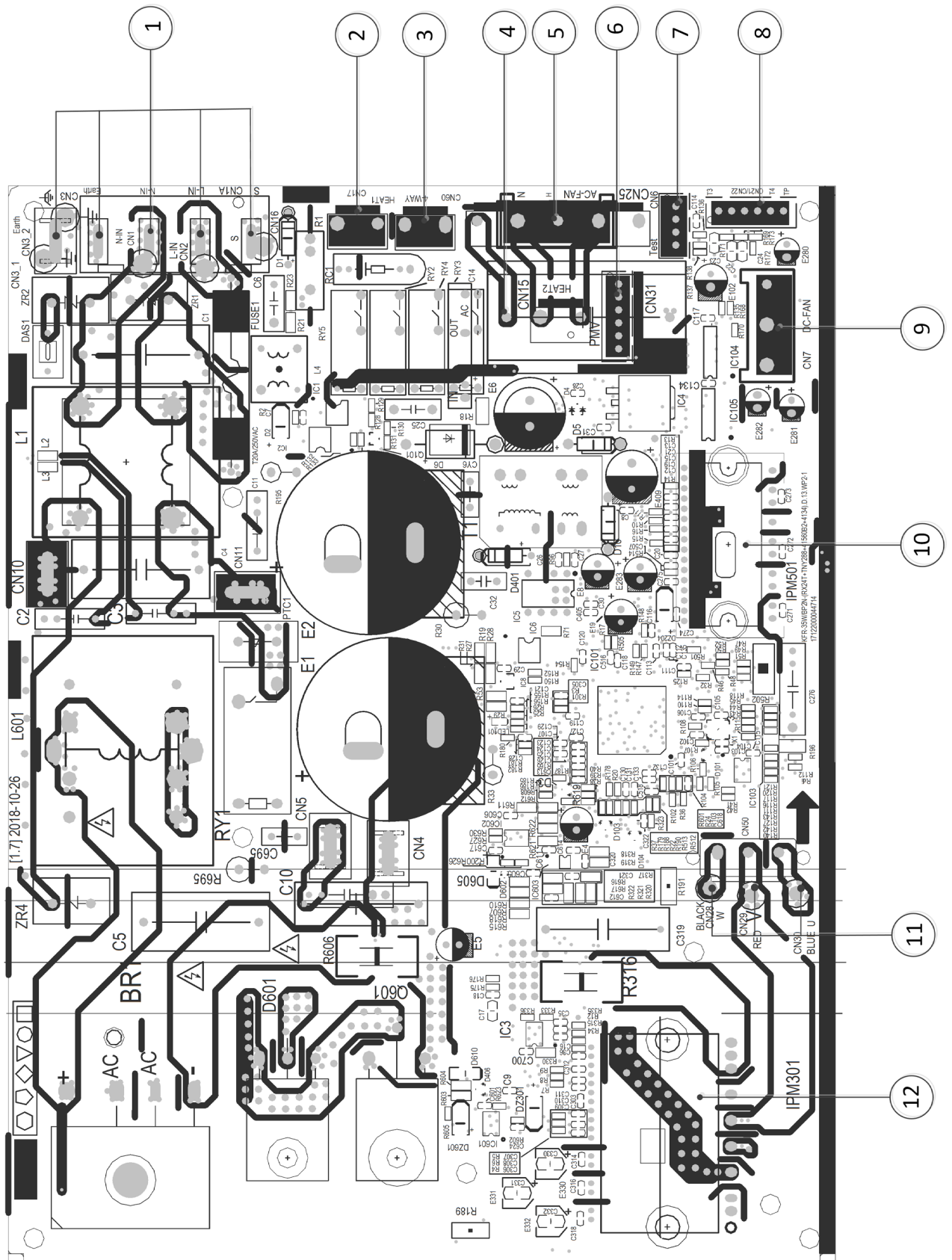
Outdoor unit wiring diagram: 16022000019583



| No. | Name | CN# | Meaning |
|-----|--------------|-------|---|
| 1 | Power Supply | CN6 | Earth: connect to Ground |
| | | CN7 | N_in: connect to N-line (208-230V AC input) |
| | | CN8 | L_in: connect to L-line (208-230V AC input) |
| 2 | S | CN2 | S: connect to indoor unit communication |
| 3 | 4-WAY | CN60 | connect to 4 way valve, 208-230V AC when is ON. |
| 4 | HEAT1 | CN16 | connect to compressor heater, 208-230V AC when is ON |
| 5 | AC-FAN | CN5 | connect to AC fan |
| 6 | HEAT2 | CN19 | connect to chassis heater, 208-230V AC when is ON |
| 7 | PMV | CN18 | connect to Electric Expansion Valve |
| 8 | TP T4 T3 | CN17 | connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP |
| 9 | DC-FAN | CN41 | connect to DC fan |
| 10 | TESTPORT | CN23 | used for testing |
| 11 | FAN_IPM | IPM2 | IPM for DC fan |
| 12 | EE_PORT | CN505 | EEPROM programmer port |
| 13 | U | CN27 | connect to compressor |
| | V | CN28 | 0V AC (standby) |
| | W | CN29 | 200-300V AC (running) |
| 14 | COMP_IPM | IPM1 | IPM for compressor |

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

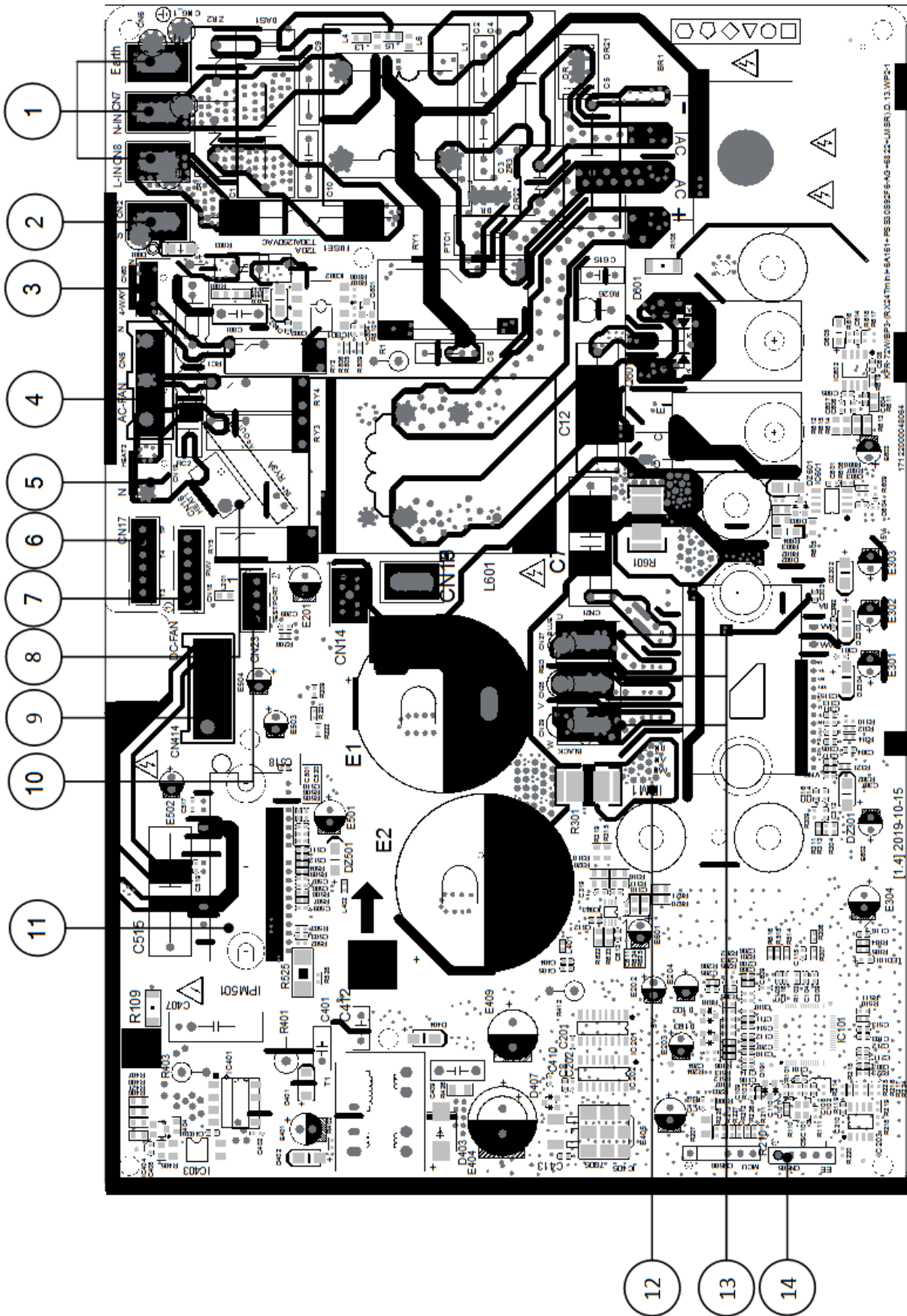
Outdoor unit printed circuit board diagram: 17122000044714, 17122000048121, 17122000046453



| No. | Name | CN# | Meaning |
|-----|----------|-----------|---|
| 1 | CN1A | CN3 | Earth: connect to Ground |
| | | CN1 | N_in: connect to N-line (208-230V AC input) |
| | | CN2 | L_in: connect to L-line (208-230V AC input) |
| | | CN16 | S: connect to indoor unit communication |
| 2 | HEAT1 | CN17 | connect to compressor heater, 208-230V AC when is ON |
| 3 | 4-WAY | CN60 | connect to 4 way valve, 208-230V AC when is ON. |
| 4 | HEAT2 | CN15 | connect to chassis heater, 208-230V AC when is ON |
| 5 | AC-FAN | CN25 | connect to AC fan |
| 6 | PMV | CN31 | connect to Electric Expansion Valve |
| 7 | TESTPORT | CN6 | used for testing |
| 8 | TP T4 T3 | CN21/CN22 | connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP |
| 9 | DC-FAN | CN7 | connect to DC fan |
| 10 | FAN_IPM | IPM 501 | IPM for DC fan |
| 11 | W | CN28 | connect to compressor |
| | V | CN29 | 0V AC (standby) |
| | U | CN30 | 10-200V AC (running) |
| 12 | COMP_IPM | IPM 301 | IPM for compressor |

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

Outdoor unit printed circuit board diagram: 17122000048064



| No. | Name | CN# | Meaning |
|-----|--------------|--------|---|
| 1 | Power Supply | CN6 | Earth: connect to Ground |
| | | CN7 | N_in: connect to N-line (208-230V AC input) |
| | | CN8 | L_in: connect to L-line (208-230V AC input) |
| 2 | S | CN2 | S: connect to indoor unit communication |
| 3 | 4-WAY | CN60 | connect to 4 way valve, 208-230V AC when is ON. |
| 4 | AC-FAN | CN5 | connect to AC fan |
| 5 | HEAT2 | CN19 | connect to chassis heater, 208-230V AC when is ON |
| 6 | TP T4 T3 | CN17 | connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP |
| 7 | PMV | CN18 | connect to Electric Expansion Valve |
| 8 | HEAT1 | CN16 | connect to compressor heater, 208-230V AC when is ON |
| 9 | DC-FAN | CN414 | connect to DC fan |
| 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 |
| | V | CN28 | 0V AC (standby) |
| | W | CN29 | 200-300V AC (running) |
| 14 | EE_PORT | CN505 | EEPROM programer port |

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

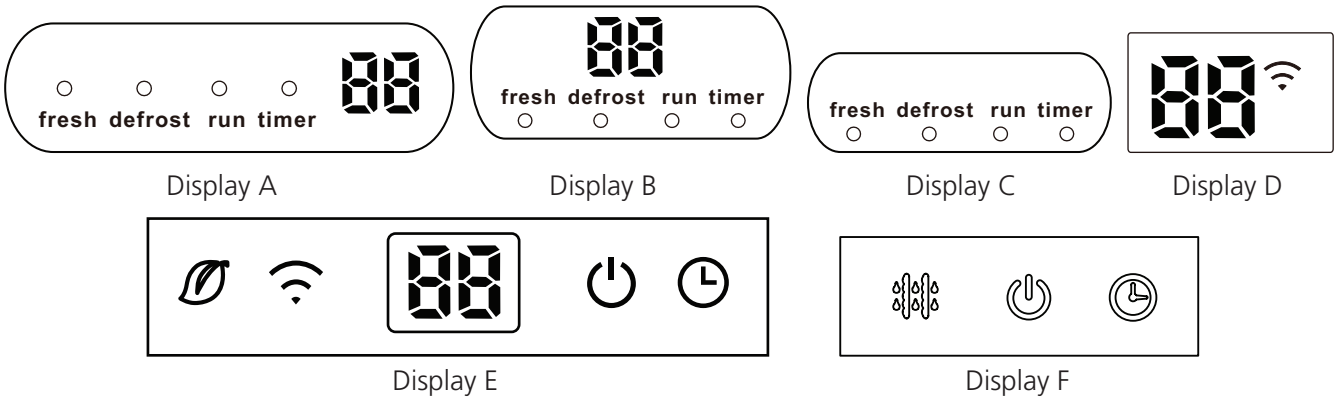
Product Features

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1. Display Function

Unit display functions



| Display | | Function |
|---|-------------------|---|
| fresh or | | Fresh(available on select units only) |
| defrost or | | Defrost |
| run or | | When the unit is on |
| timer or | | When TIMER is on |
| | | WiFi control (available on select units only) |
| | Temperature value | Temperature |
| | 00 (3s) | Activation of Timer ON, Fresh, Swing, Turbo, or Silent |
| | 0F (3s) | Cancellation of Timer OFF, Fresh, Swing, Turbo, or Silent |
| | dF | Defrost |
| | cF | Warming in heating mode |
| | SC | Self-clean (available on select units only) |
| | FP | Heating in room temperature under 8°C |
| E→C→0→set temperature→E gradually illuminates to 00 in one second intervals | | ECO function (available on select units only) |

Note: Please select the display function according to your purchase product.

2. Safety Features

Compressor three-minute delay at restart

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

Zero crossing detection error protection(Except for DC fan units)

If AC can not detect zero crossing signal for 4 minutes or the zero crossing signal time interval is not correct, the unit will stop and the LED will display the failure. The correct zero crossing signal time interval should be between 6-13ms.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds a certain level for a period of time, the compressor ceases operation.

Automatic shutoff based on fan speed

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

Inverter module protection

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

Indoor fan delayed operation

- When the unit starts, the louver is automatically activated and the indoor fan will operate after a period of 7 seconds.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold wind function.

Sensor redundancy and automatic shutoff

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

Refrigerant leakage detection

This function is active only when cooling mode is selected. It will detect if the compressor is being damaged by refrigerant leakage or by compressor overload. This is measured using the coil temperature of evaporator T2 when the compressor is in operation.

3. Basic Functions

3.1 Table

| Functions | | Cooling Mode&Heating mode | | Auto Mode |
|-----------|-------------------|-------------------------------------|-----------|---------------------------------|
| | | Outdoor Fan Control | | |
| Cases | | Case 1: Compressor Frequency and T4 | Case 2:T4 | A=2°C(3.6°F), B=-2°C(-3.6°F) |
| Models | MSAFA-09CRDN8-QC6 | ✓ | | ✓ |
| | MSAFB-12CRDN8-QC0 | ✓ | | ✓ |
| | MSAFC-17CRDN8-QC0 | ✓ | | ✓ |
| | MSAFD-21CRDN8-QC0 | ✓ | | ✓ |

Note: The detailed description of case 1 or case 2 is shown in the following function sections 3.4 & sections 3.6.

3.2 Abbreviation

Unit element abbreviations

| Abbreviation | Element |
|--------------|----------------------------------|
| T1 | Indoor room temperature |
| T2 | Coil temperature of evaporator |
| T3 | Coil temperature of condenser |
| T4 | Outdoor ambient temperature |
| TS | Set temperature |
| Td | Control target temperature |
| TP | Compressor discharge temperature |

In this manual, such as TCE1, TCE2...etc., they are well-setting parameter of EEPROM.

3.3 Fan Mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to high, medium, low, or auto.
- The louver operations are identical to those in cooling mode.
- Auto fan: In fan-only mode, AC operates the same as auto fan in cooling mode with the temperature set at 24°C(75.2°F).

3.4 Cooling Mode

3.4.1 Compressor Control

Cooling temperature compensation($\Delta T5$) is a well-setting parameter of EEPROM. It's value ranges from -2°C to 2°C. The default value is 0.

- When $T1-Ts < \Delta T5-2^{\circ}\text{C}$ (3.6°F), the compressor ceases operation.
- When $T1-Ts > \Delta T5+3^{\circ}\text{C}$ (5.4°F), the compressor continues operation.
- When the AC is operating in mute mode, the compressor operates at a low frequency.
- When the current exceeds the preset value, the current protection function activates and the compressor ceases operation.

3.4.2 Indoor Fan Control

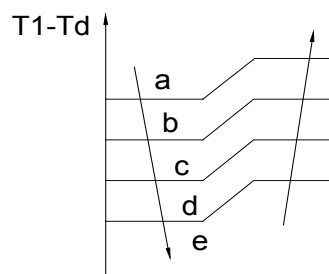
- In cooling mode, the indoor fan operates continuously. The fan speed can be set to high, medium, low, or

auto.

- If the compressor ceases operation when the configured temperature is reached, the indoor fan motor operates at the minimum or configured speed.
- The indoor fan is controlled as below:

| Setting fan speed | T1-Td °C(°F) | Actual fan speed |
|-------------------|--------------|------------------|
| H | A | H+ (H+=H+G) |
| | B | H (=H) |
| | C | H- (H-=H-G) |
| M | D | M+ (M+=M+Z) |
| | E | M (M=M) |
| | F | M- (M-=M-Z) |
| L | G | L+ (L+=L+D) |
| | H | L (L=L) |
| | I | L- (L-=L-D) |

- The auto fan acts as below rules:



3.4.3 Outdoor Fan Control

Case 1:

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

Case 2:

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

3.4.4 Condenser Temperature Protection

When condenser temperature is more than setting value, the compressor ceases operation..

3.4.5 Evaporator Temperature Protection

When evaporator temperature drops below a configured value, the compressor and outdoor fan cease operation.

3.5 Heating Mode(Heat pump units)

3.5.1 Compressor Control

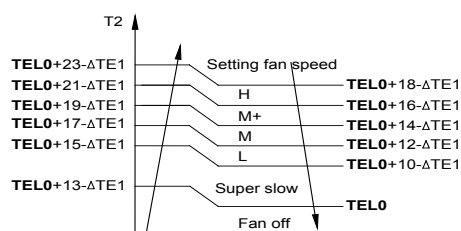
Heating temperature compensation($\Delta T3$) is a well-setting

parameter of EEPROM. It's value ranges from -6°C to 6°C.

- When $T1-Ts > -\Delta T3$, the compressor ceases operation.
- When $T1-Ts < -\Delta T3 - 1.5^\circ\text{C} (2.7^\circ\text{F})$, the compressor continues operation.
- When the AC is operating in mute mode, the compressor operates at a low frequency.
- When the current exceeds the preset value, the current protection function activates and the compressor ceases operation.

3.5.2 Indoor Fan Control:

- When the compressor is on, the indoor fan speed can be set to high, medium, low, or auto. And the anti-cold wind function has the priority.
- Anti-cold air function
 - The indoor fan is controlled by the indoor temperature $T1$ and indoor unit coil temperature $T2$.

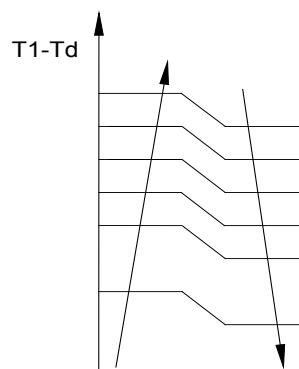


| | |
|--|---|
| $T1 \geq 19^\circ\text{C} (66.2^\circ\text{F})$ | $\Delta TE1=0$ |
| $15^\circ\text{C} (59^\circ\text{F}) \leq T1 \leq 18^\circ\text{C} (64.4^\circ\text{F})$ | $\Delta TE1=19^\circ\text{C}-T1$ ($34.2^\circ\text{F}-T1$) |
| $T1 < 15^\circ\text{C} (59^\circ\text{F})$ | $\Delta TE1=4^\circ\text{C} (7.2^\circ\text{F})$ |

- When the indoor temperature $T1$ reaches the setting temperature, the compressor continues operation, the indoor fan motor runs at the minimum speed or setting speed. (The anti-cold air function is valid).
- The indoor fan is controlled as below:

| Setting fan speed | $T1-Td$ ($^\circ\text{F}$) | Actual fan speed |
|-------------------|------------------------------|------------------|
| H | \uparrow | H- (H=H-G) |
| | \rightarrow | H (=H) |
| | \downarrow | H+ (H+=H+G) |
| M | \uparrow | M- (M=M-Z) |
| | \rightarrow | M (M=M) |
| | \downarrow | M+ (M+=M+Z) |
| L | \uparrow | L- (L=L-D) |
| | \rightarrow | L (L=L) |
| | \downarrow | L+ (L+=L+D) |

- Auto fan action in heating mode:



3.5.3 Outdoor Fan Control:

Case 1:

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

Case 2:

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

3.5.4 Defrosting mode

Case 1:

- The unit enters defrosting mode according to the temperature value of $T3$ and $T4$ 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:
 - $T3$ rises above $TCDE1$.
 - $T3$ maintained above $TCDE2$ for 80 seconds.
 - Unit runs for 15 minutes consecutively in defrosting mode.

Case 2:

- The unit enters defrosting mode according to the temperature value of $T3$ 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:
 - T3 rises above TCDE1.
 - T3 maintained above TCDE2 for 80 seconds.
 - Unit runs for 10 minutes consecutively in defrosting mode.

3.5.5 Evaporator Temperature Protection

When the evaporator temperature exceeds a preset protection value, the compressor ceases operation.

3.6 Auto-mode

- This mode can be selected with the remote controller and the setting temperature can be changed between 17°C~30°C(62°F~86°F).
- In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of ΔT ($\Delta T = T1 - TS$).

| | |
|--------------------------|--------------|
| ΔT | Running mode |
| $\Delta T > A$ | Cooling |
| $B \leq \Delta T \leq A$ | Fan-only |
| $\Delta T < B$ | Heating* |

Heating*: In auto mode, cooling only models run the fan

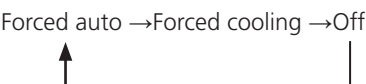
- Indoor fan will run at auto fan speed.
- The louver operates same as in relevant mode.
- If the machine switches mode between heating and cooling, the compressor will keep stopping for certain time and then choose mode according to ΔT .

3.7 Drying mode

- Indoor fan speed is fixed at breeze and can't be changed. The louver angle is the same as in cooling mode.
- All protections are active and the same as that in cooling mode.

3.8 Forced operation function

Press the AUTO/COOL button, the AC will run as below sequence:



- Forced cooling mode:

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

- Forced auto mode:

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

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

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

3.9 Sleep function

- The sleep function is available in cooling, heating, or auto mode.
- The operational process for sleep mode is as follows:
 - When cooling, the temperature rises 1°C(2°F) (to not higher than 30°C(86°F)) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
 - When heating, the temperature decreases 1°C(2°F) (to not lower than 17°C(62.6°F)) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits this mode and does not switch off.

3.10 Auto-Restart function

- The indoor unit has an auto-restart module that allows the unit to restart automatically. The module automatically stores the current settings (not including the swing setting) and, in the case of a sudden power

failure, will restore those setting automatically within 3 minutes after power returns.

- If the unit was in forced cooling mode, it will run in this mode for 30 minutes and turn to auto mode with temperature set to 24°C(76°F).
- If there is a power failure while the unit is running, the compressor starts 3 minutes after the unit restarts. If the unit was already off before the power failure, the compressor starts 1 minute after the unit restarts.

3.11 Refrigerant Leakage Detection

With this new technology, the display area will show “EC” when the outdoor unit detects refrigerant leakage.

3.12 Ionizer/Plasma (for some models)

Press “Fresh” for at least 2 seconds on the remote control to enable the IONIZER function. While this function is active, the Ionizer/Plasma Dust Collector(depending on models) is energized and will help to remove pollen and impurities from the air.

4. Optional Functions

4.1 8°C Heating

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

4.2 Self clean

- If you press “Self Clean” when the unit is in cooling or drying mode:
 - For cooling models, the indoor unit will run in low fan mode for a certain time, then ceases operation.
 - For heat pump models, the indoor unit will run in fan-only mode, then low heat, and finally in fan-only mode.
- Self Clean keeps the indoor unit dry and prevents mold growth.
- When match with multi outdoor unit, this function is disabled.

4.3 Follow me

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

4.4 Silence

- Press “Silence” on the remote control to enable the SILENCE function. While this function is active, the compressor frequency is maintained at a lower level than F3. The indoor unit will run at faint breeze, which reduces noise to the lowest possible level.
- When match with multi outdoor unit, this function is disabled.

Maintenance

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1. First Time Installation Check

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

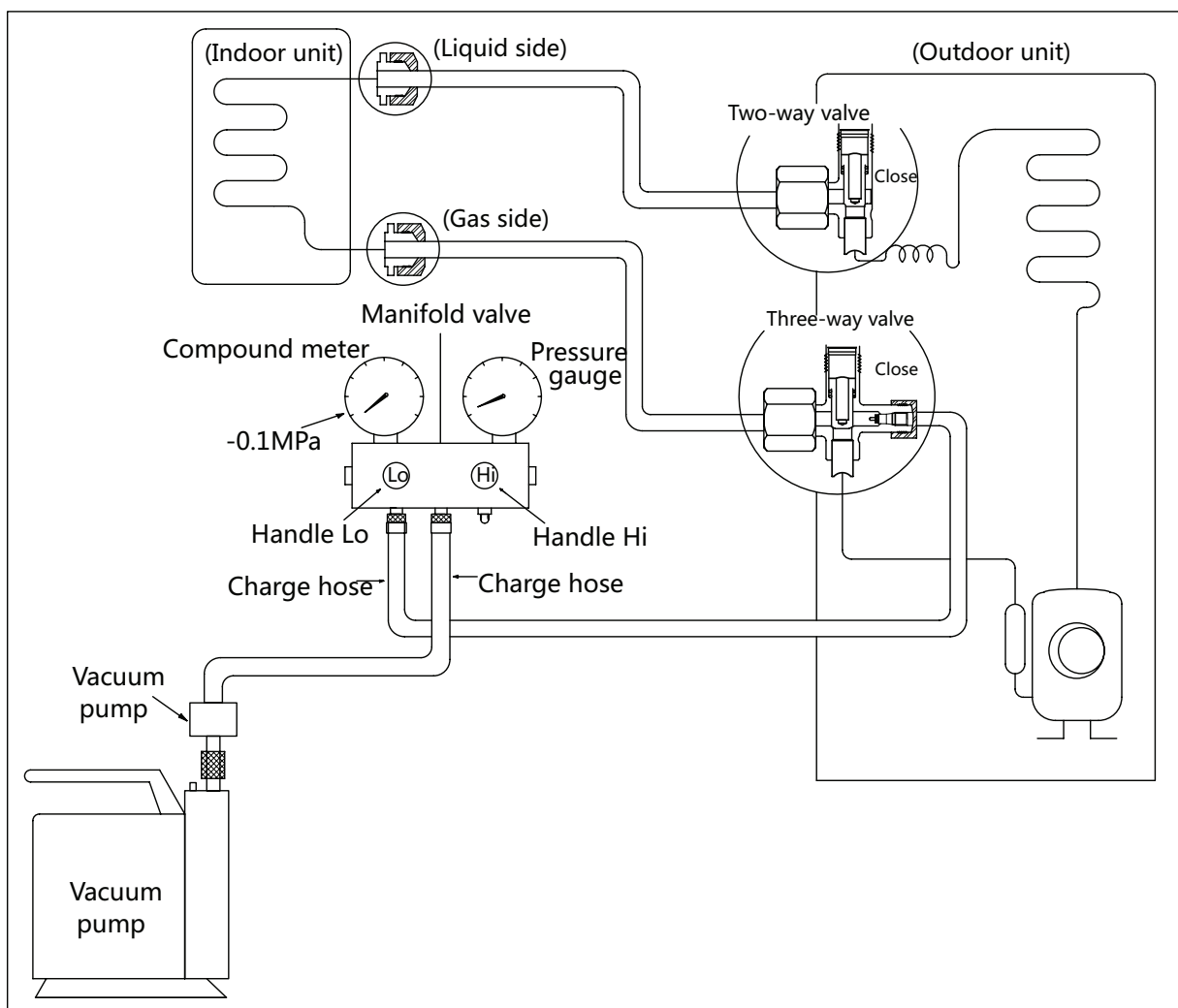
- Increasing pressure in the system.
- Increasing the operating current.
- Decreasing the cooling or heating efficiency.
- Congesting the capillary tubing due to ice build-up in the refrigerant circuit.
- Corroding the refrigerant system.

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

Leak test (soap water method)

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

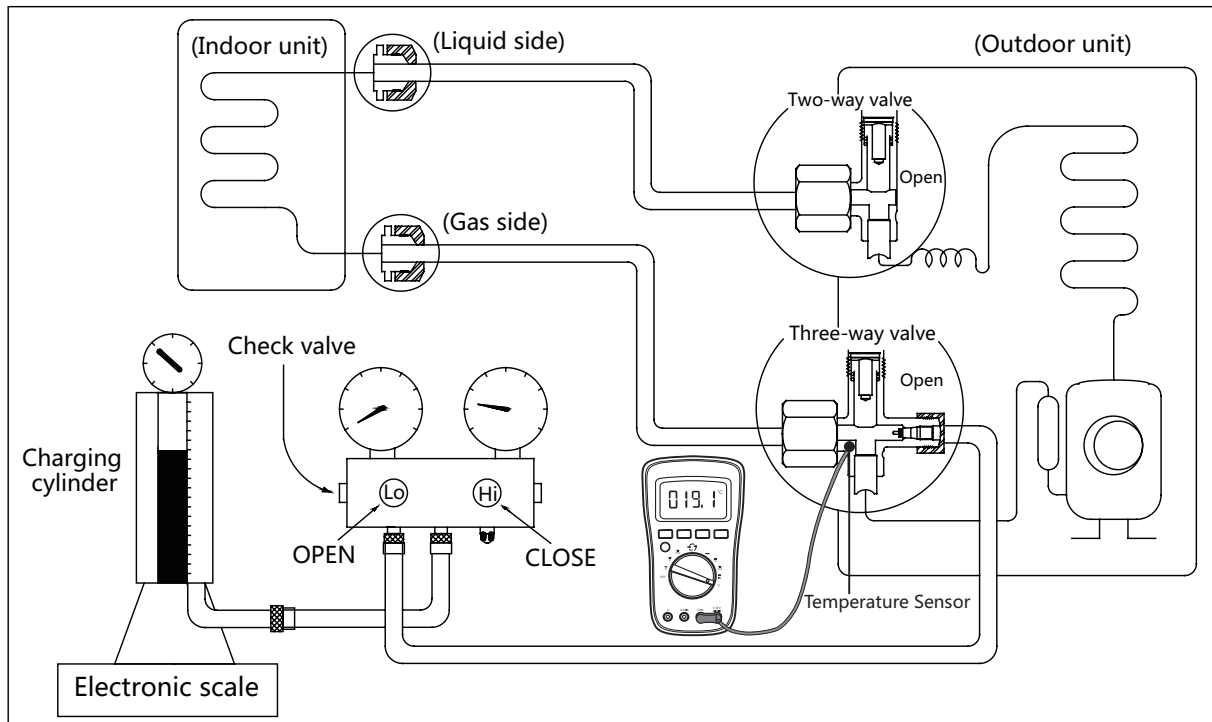
Air purging with vacuum pump



Procedure:

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

2. Refrigerant Recharge



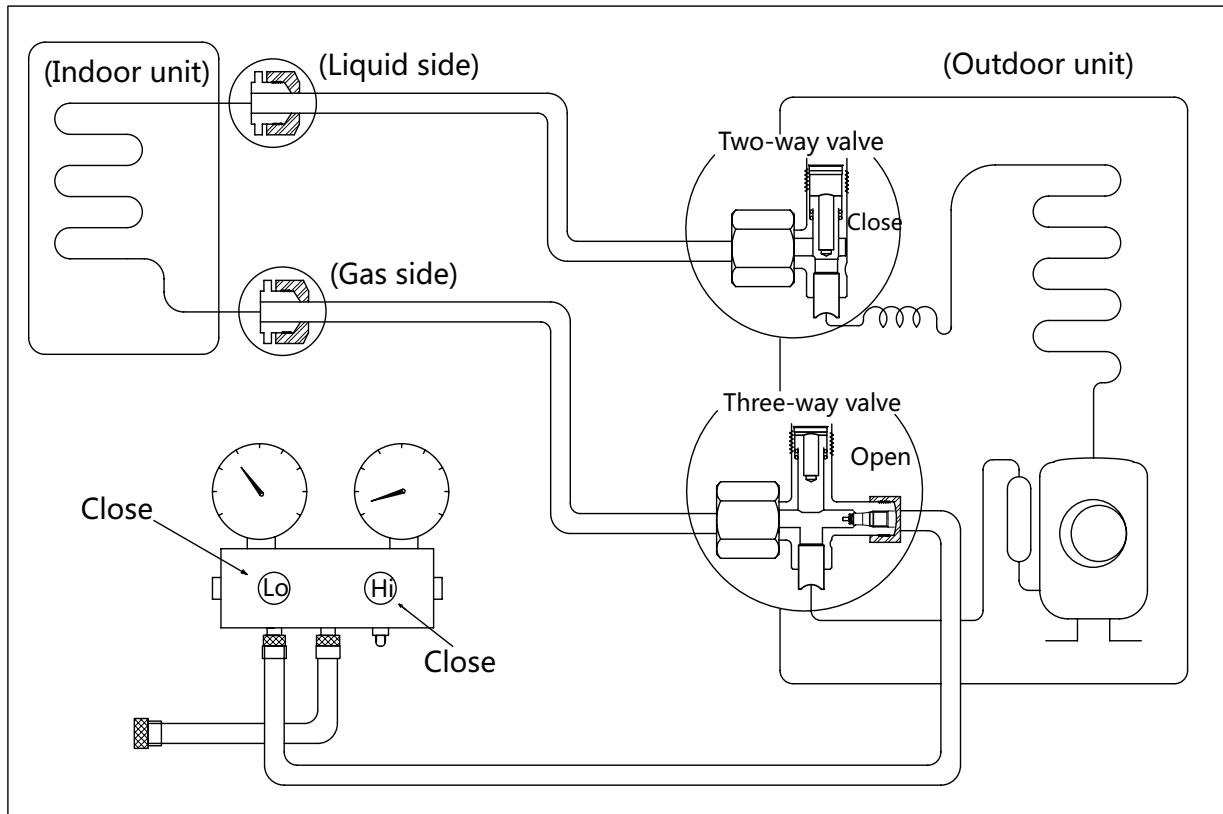
Procedure:

1. Close both 2- and 3-way valves.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.
4. If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18 N.m.
12. Check for gas leakage.

3. Re-Installation

3.1 Indoor Unit

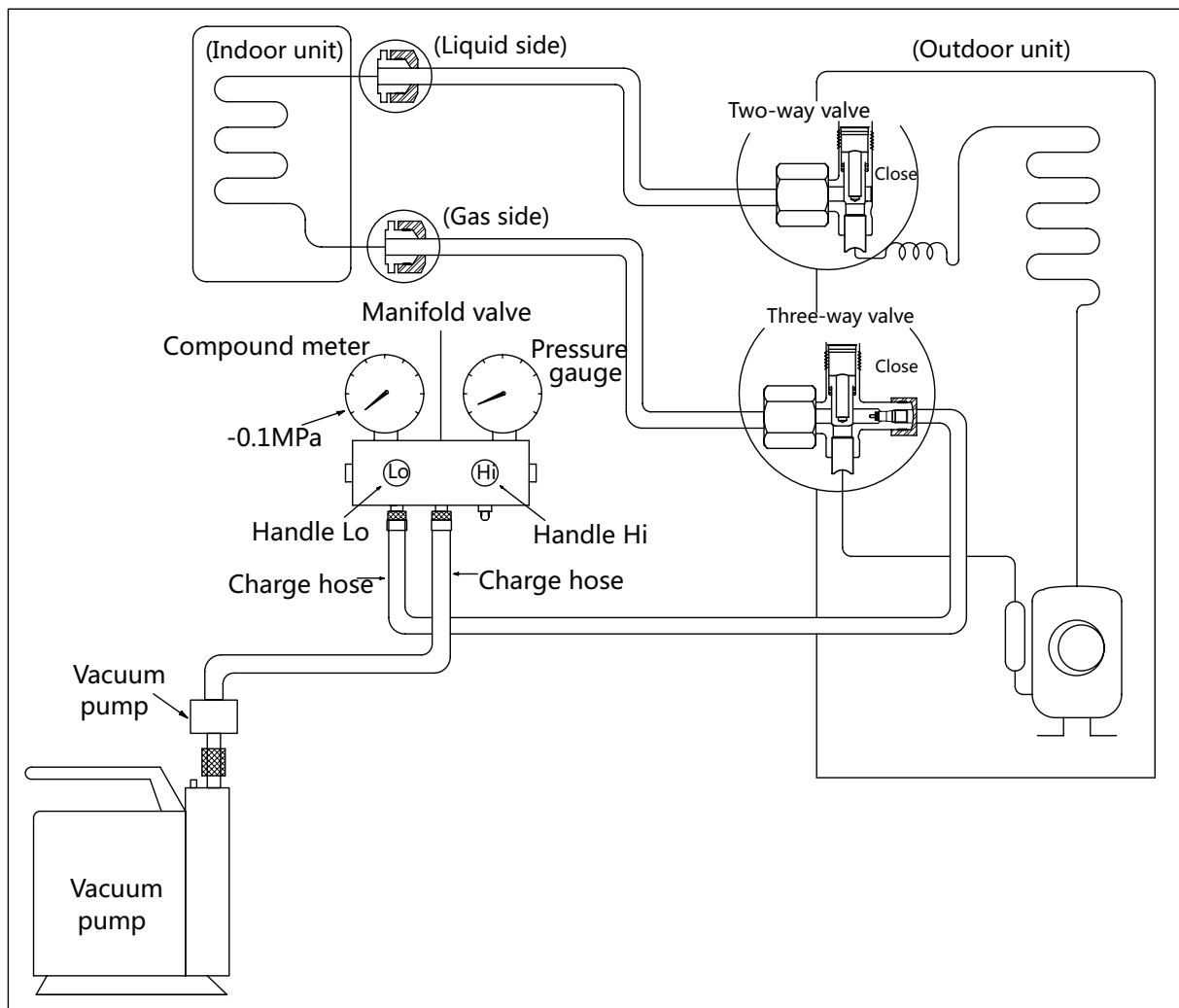
Collecting the refrigerant into the outdoor unit



Procedure:

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

Air purging with vacuum pump

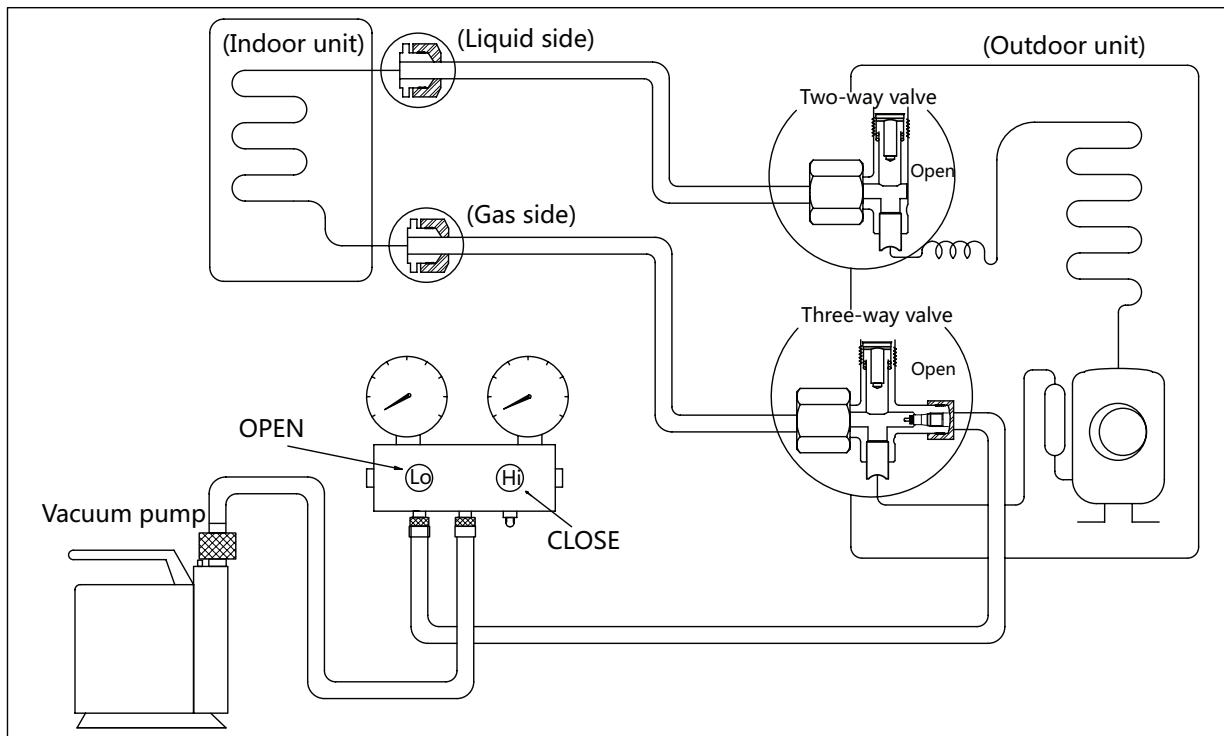


Procedure:

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

3.2 Outdoor Unit

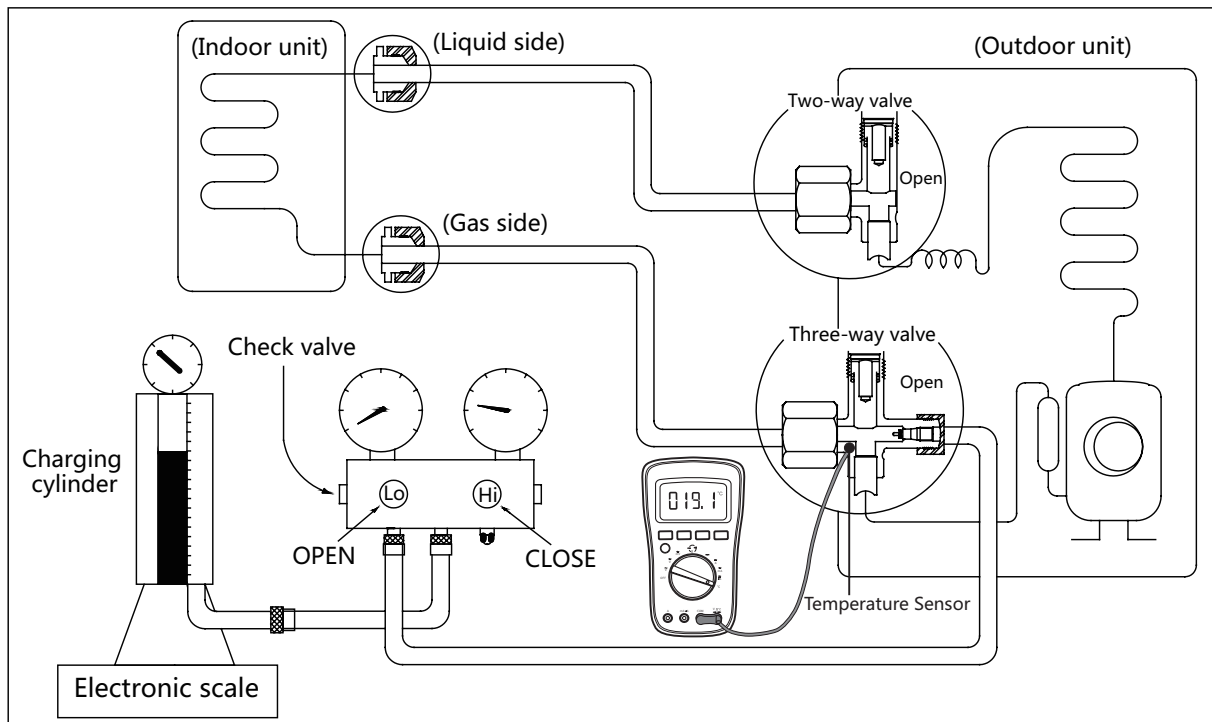
Evacuation for the whole system



Procedure:

1. Confirm that the 2- and 3-way valves are opened.
2. Connect the vacuum pump to the 3-way valve's service port.
3. Evacuate the system for approximately one hour. Confirm that the compound meter indicates -0.1 MPa (14.5Psi).
4. Close the valve (Low side) on the charge set and turn off the vacuum pump.
5. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check whether there is gas leakage.
6. Disconnect the charge hose from the vacuum pump.
7. Mount the caps of service port and 2- and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 18 N.m.

Refrigerant charging



Procedure:

1. Close both 2- and 3-way valves.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.
4. If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18 N.m.
12. Check for gas leakage.

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

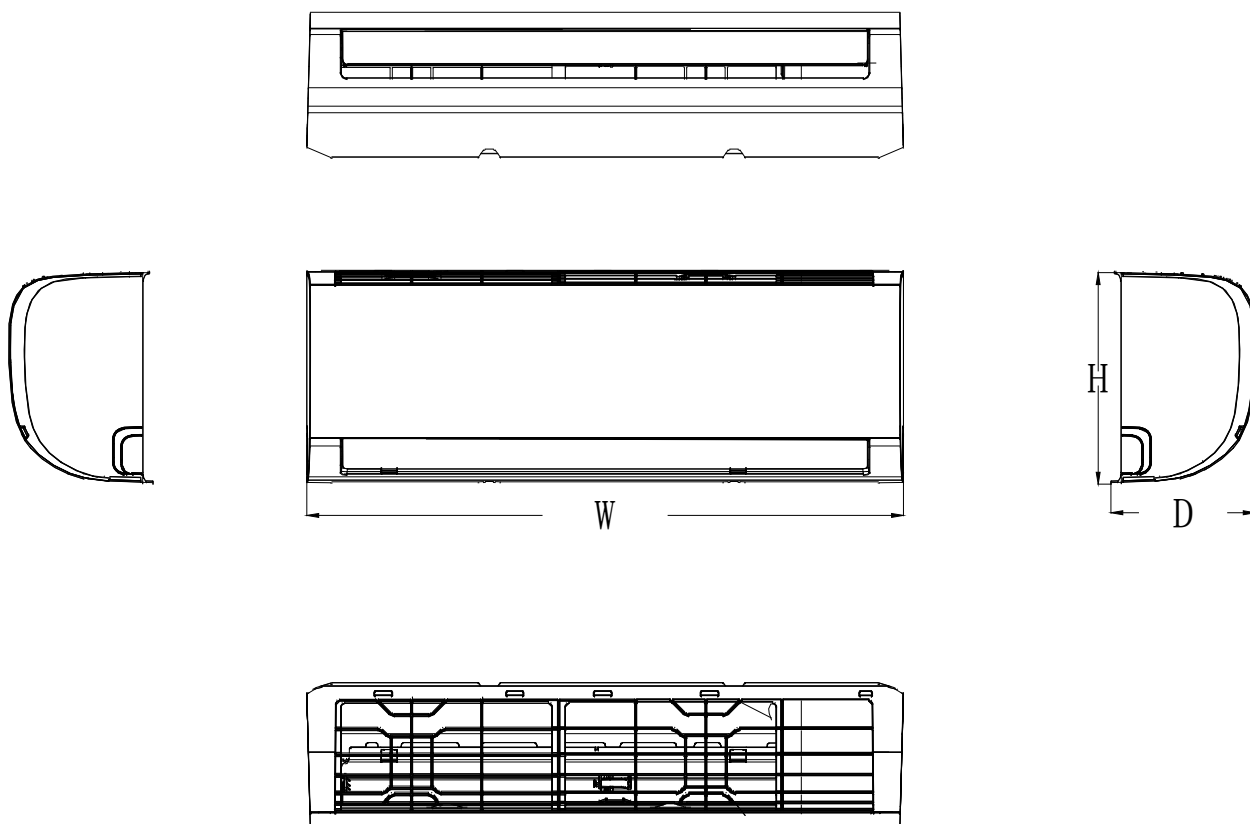
2. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.

Indoor Unit Disassembly

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1. Dimension

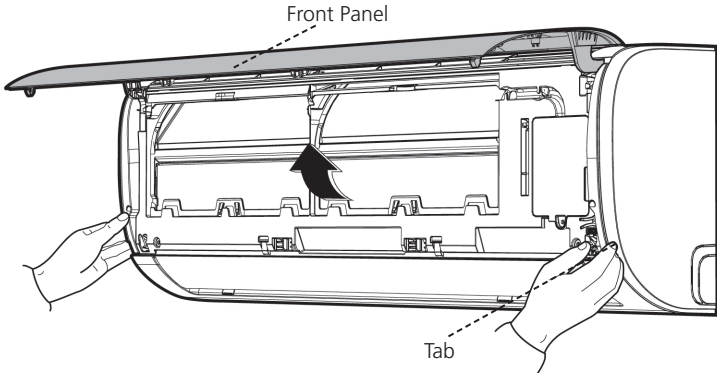
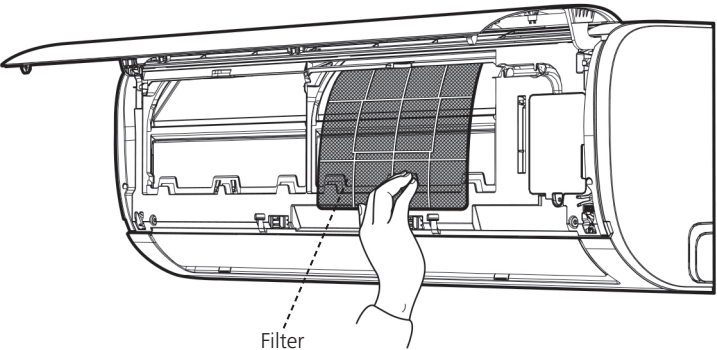


| Capacity | Body Code | W(mm) | D(mm) | H(mm) |
|----------|-----------|-------|-------|-------|
| 5K~11K | A | 715 | 194 | 285 |
| 9K~14K | B | 805 | 194 | 285 |
| 17K~18K | C | 957 | 213 | 302 |
| 18K~24K | D | 1040 | 220 | 327 |

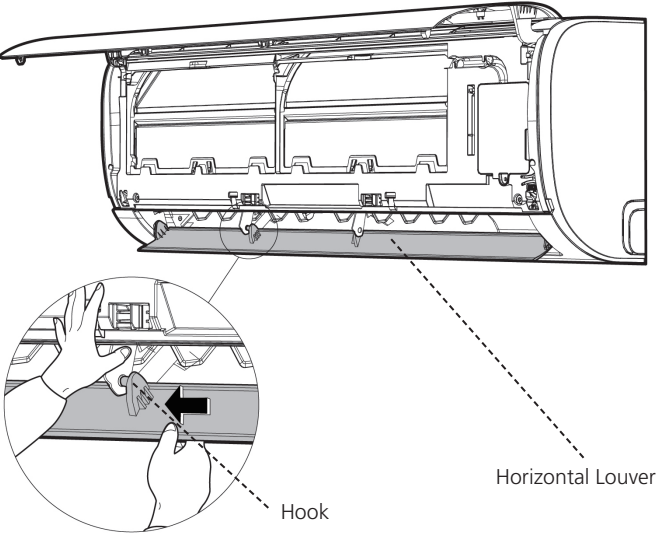
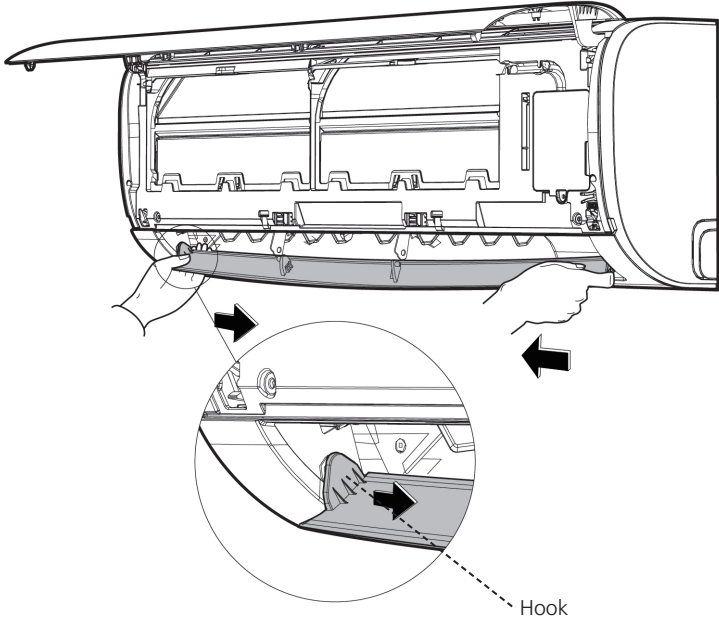
2. Disassembly

2.1 Indoor unit

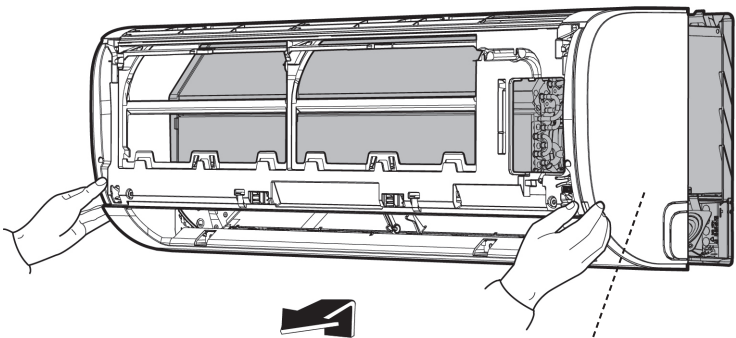
1. Front Panel

| Procedure | Illustration |
|---|---|
| 1) Hold the front panel by the tabs on the both sides and lift it (see CJ_AF_001). |  <p>CJ_AF_001</p> |
| 2) Push up the bottom of an air filter, and then pull it out downwards (see CJ_AF_002). |  <p>CJ_AF_002</p> |

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

| Procedure | Illustration |
|--|--|
| <p>3) Open the horizontal louver and push the hook towards left to open it (see CJ_AF_003).</p> |  <p style="text-align: center;">CJ_AF_003</p> |
| <p>4) Bend the horizontal louver lightly by both hands to loosen the hooks, then remove the horizontal louver (see CJ_AF_004).</p> |  <p style="text-align: center;">CJ_AF_004</p> |

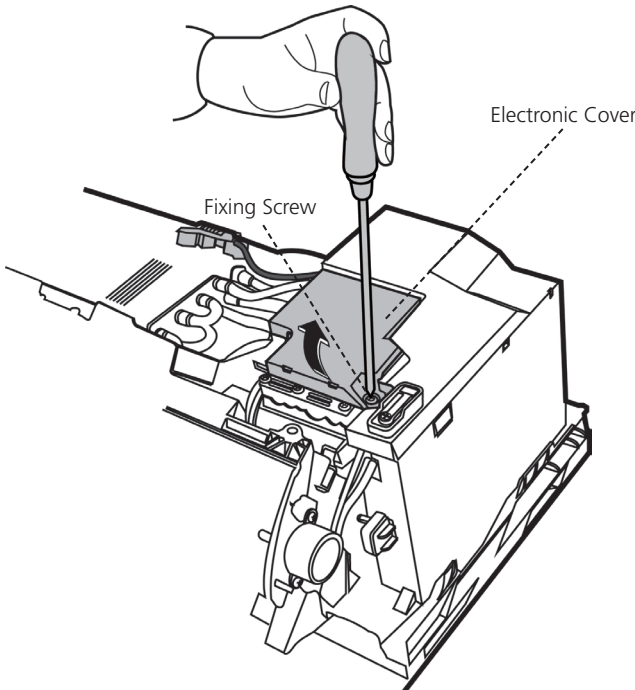
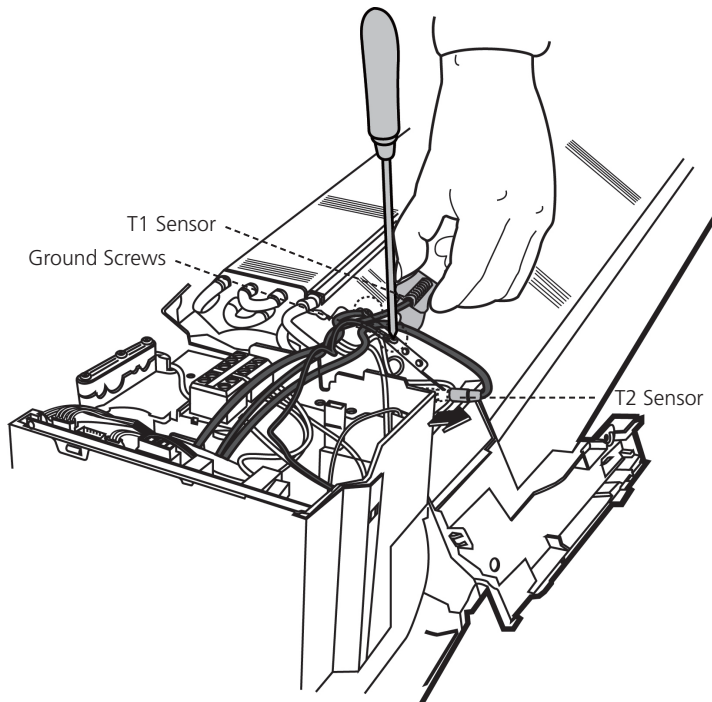
Note: This section is for reference only. Actual unit appearance may vary.

| Procedure | Illustration |
|--|---|
| <p>11) Pull out the panel frame while pushing the hook through a clearance between the panel frame and the heat exchanger (see CJ_AF_008).</p> |  <p>CJ_AF_008 Panel Frame</p> |

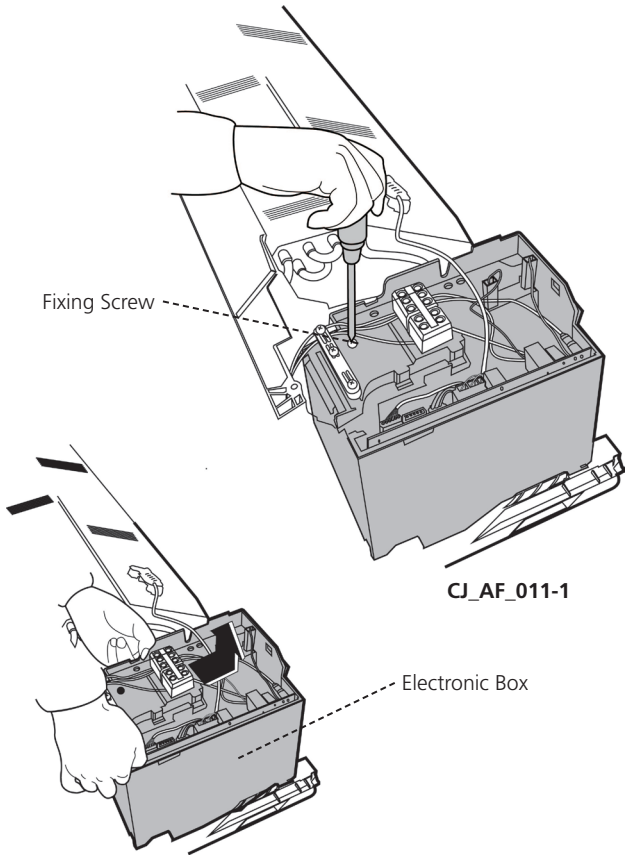
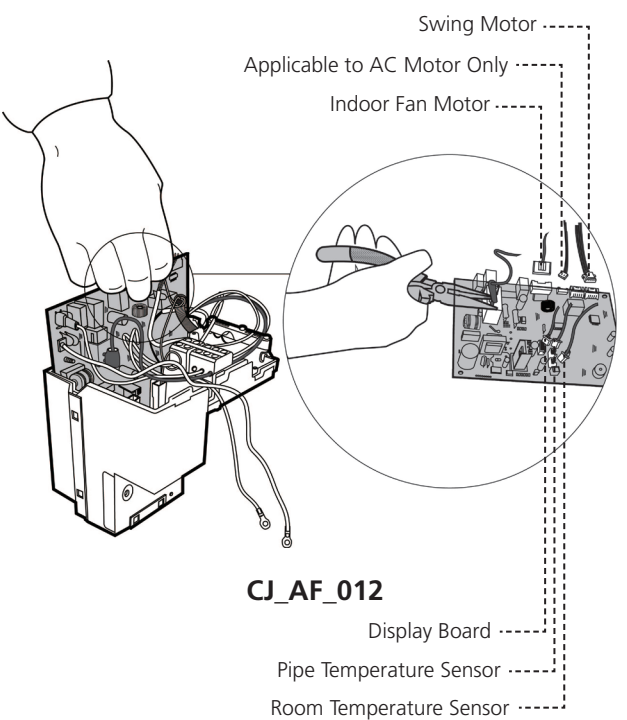
Note: This section is for reference only. Actual unit appearance may vary.

2. Electrical parts

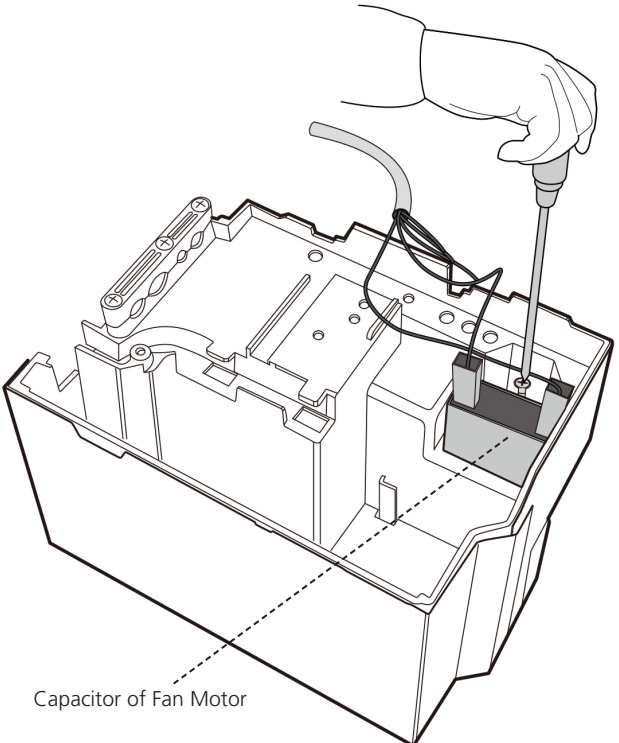
Note: Remove the front panel (refer to 1. Front panel) before disassembling electrical parts.

| Procedure | Illustration |
|--|---|
| 1) Remove the fixing screw and then remove the cover of electronic box and the terminal cover (see CJ_AF_009). |  <p>CJ_AF_009</p> |
| 2) Pull out the room temperature sensor (T1) and the coil temperature sensor (T2) (see CJ_AF_010). 3) Remove the two screws used for the ground connection (see CJ_AF_010). |  <p>CJ_AF_010</p> |

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

| Procedure | Illustration |
|--|--|
| <p>4) Remove the fixing screw (see CJ_AF_011-1).</p> <p>5) Pull out the Electrical control box along the direction indicated in right image. to remove it (CJ_AF_011-2).</p> |  <p>Fixing Screw</p> <p>CJ_AF_011-1</p> <p>Electronic Box</p> <p>CJ_AF_011-2</p> |
| <p>6) Disconnect the wires. Then remove the electronic main board (CJ_AF_012).</p> |  <p>Swing Motor</p> <p>Applicable to AC Motor Only</p> <p>Indoor Fan Motor</p> <p>CJ_AF_012</p> <p>Display Board</p> <p>Pipe Temperature Sensor</p> <p>Room Temperature Sensor</p> |

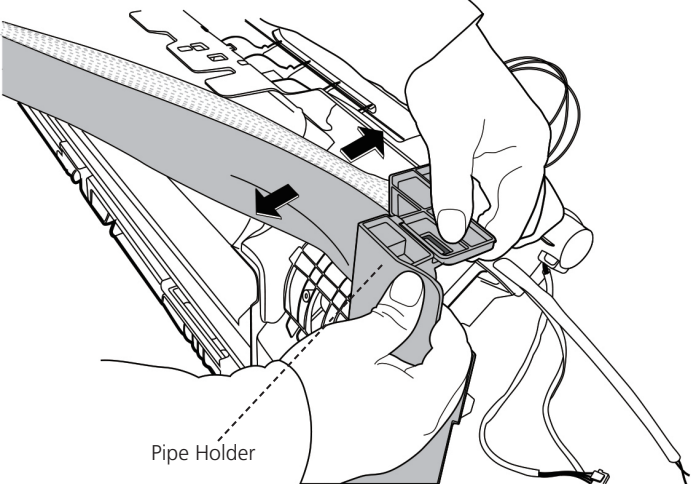
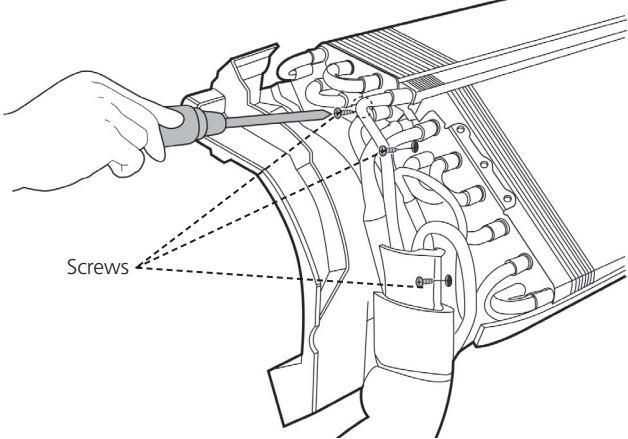
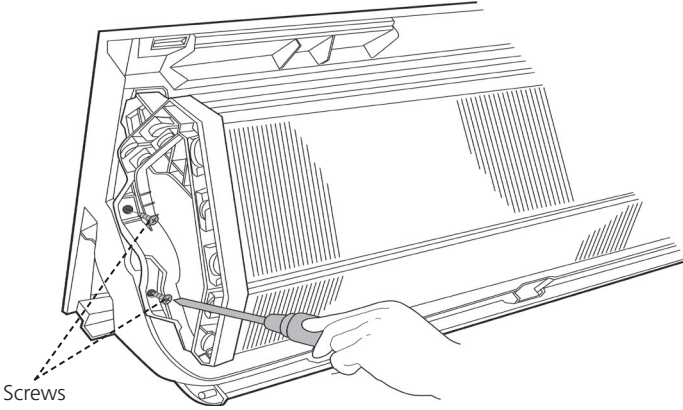
Note: This section is for reference only. Actual unit appearance may vary.

| Procedure | Illustration |
|--|--|
| <p>7) Remove the fixing screw, then remove the capacitor of fan motor (see CJ_AF_013).</p> |  <p>The diagram illustrates the process of removing the fan motor capacitor. A hand is shown using a screwdriver to remove a screw from the capacitor, which is mounted on the back of the indoor unit. A dashed line points to the capacitor with the label 'Capacitor of Fan Motor'. The unit is shown in a perspective view, with the back panel partially open.</p> <p>CJ_AF_013</p> |

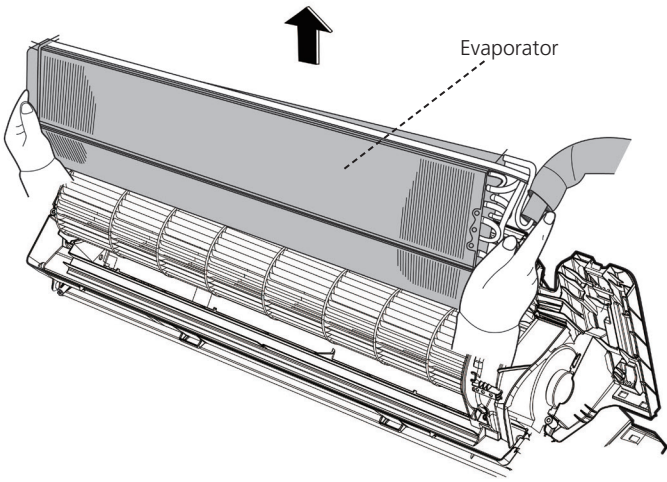
Note: This section is for reference only. Actual unit appearance may vary.

3. Evaporator

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

| Procedure | Illustration |
|---|---|
| 1) Disassemble the pipe holder located at the rear of the unit (see CJ_AF_014). |  <p>Pipe Holder</p> <p>CJ_AF_014</p> |
| 2) Remove the screws on the evaporator located at the fixed plate (see CJ_AF_015). |  <p>Screws</p> <p>CJ_AF_015</p> |
| 3) Remove the two screws on the evaporator located at the base of the bearing side (see CJ_AF_016). |  <p>Screws</p> <p>CJ_AF_016</p> |

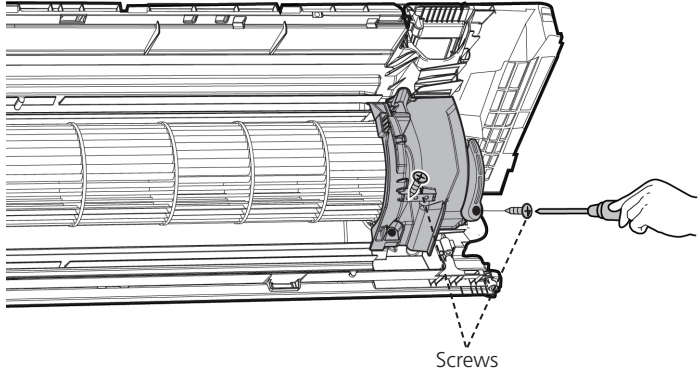
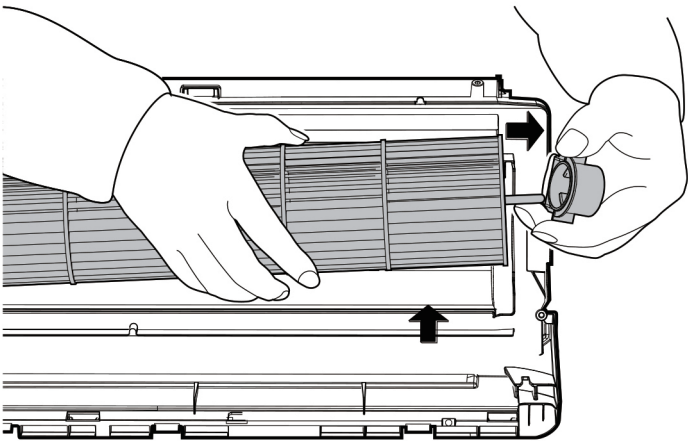
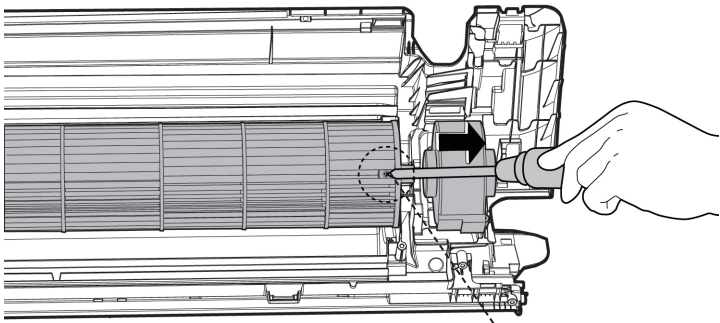
Note: This section is for reference only. Actual unit appearance may vary.

| Procedure | Illustration |
|--|---|
| <p>4) Pull out the evaporator (see CJ_AF_017).</p> |  <p style="text-align: center;">CJ_AF_017</p> |

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

4. Fan motor and fan

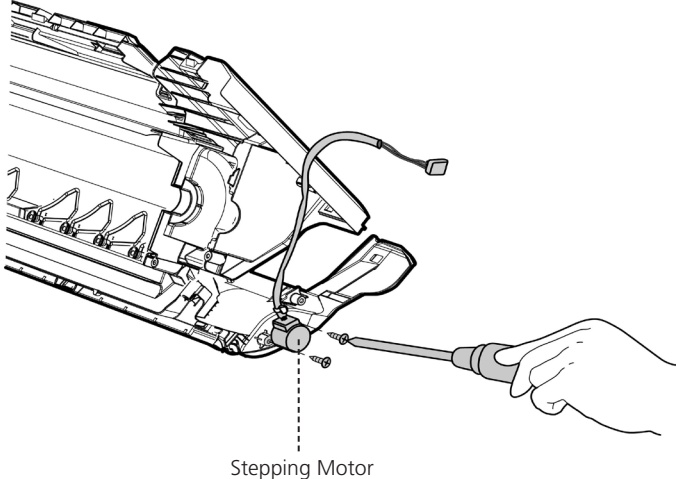
Note: Remove the front panel, electrical parts and evaporator (refer to 1. Front panel, 2. Electrical parts, and 3. Evaporator). before disassembling fan motor and fan.

| Procedure | Illustration |
|--|---|
| 1) Remove the two screws and remove the fixing board of the fan motor (see CJ_AF_018). |  <p>CJ_AF_018</p> |
| 2) Remove the Bearing sleeve(see CJ_AF_019). |  <p>CJ_AF_019</p> |
| 3) Remove the fixing screw (see CJ_AF_020). 4) Pull out the fan motor and fan assembly from the side. |  <p>CJ_AF_020</p> |

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

5. Step motor

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

| Procedure | Illustration |
|---|---|
| 1) Remove the two screws, then remove the stepping motor (see CJ_AF_021). |  <p>Stepping Motor</p> <p>CJ_AF_021</p> |

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

Outdoor Unit Disassembly

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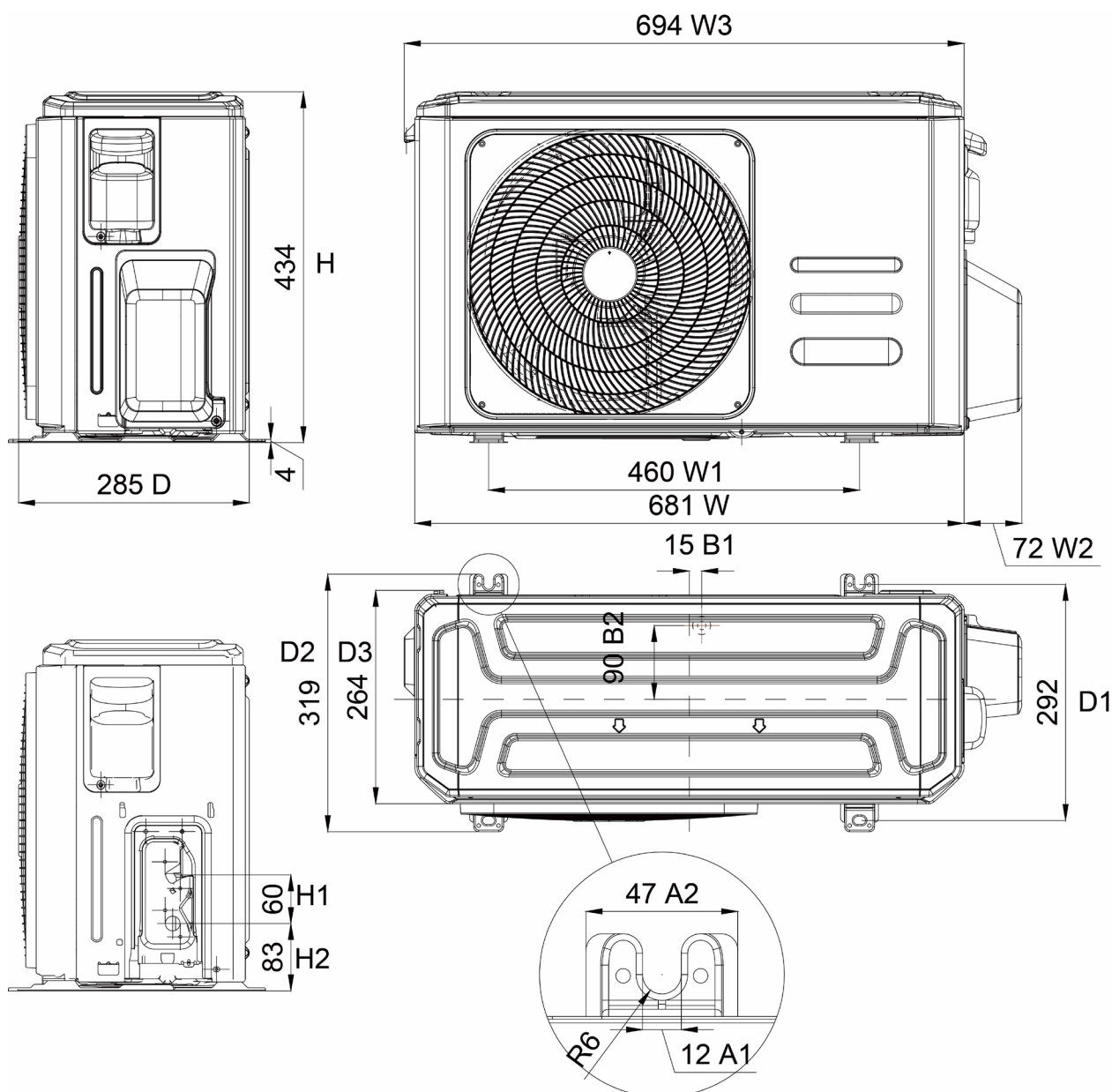
1. Outdoor Unit Disassembly

1.1 Outdoor Unit Table

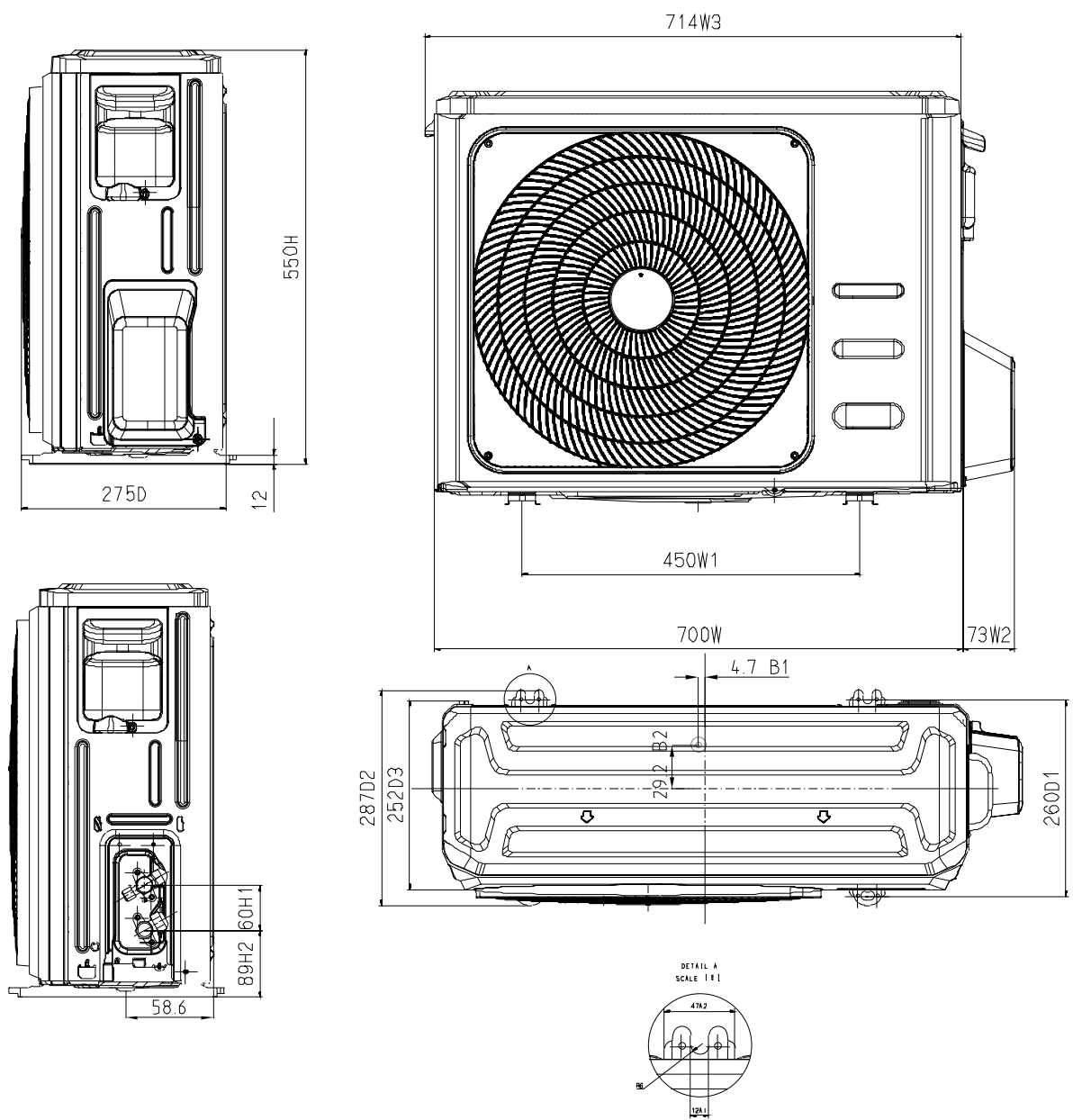
| Outdoor Unit Model | Panel Plate | PCB Board |
|---------------------|-------------|-------------|
| MOX130-09CDN8-QD6GA | X130 | PCB Board 9 |
| MOX130-12CDN8-QC0 | X130 | PCB Board 9 |
| MOX130-12CDN8-QD6GA | X130 | PCB Board 9 |
| MOX130-12CFN8-QC2 | X130 | PCB Board 9 |
| MOB30-17CDN8-QC0 | B30 | PCB Board 6 |
| MOX230-18CDN8-QD0GA | X230 | PCB Board 6 |
| MOX230-17CDN8-QC0 | X230 | PCB Board 6 |
| MOX330-21CDN8-QC0 | X330 | PCB Board 6 |

2. Dimension

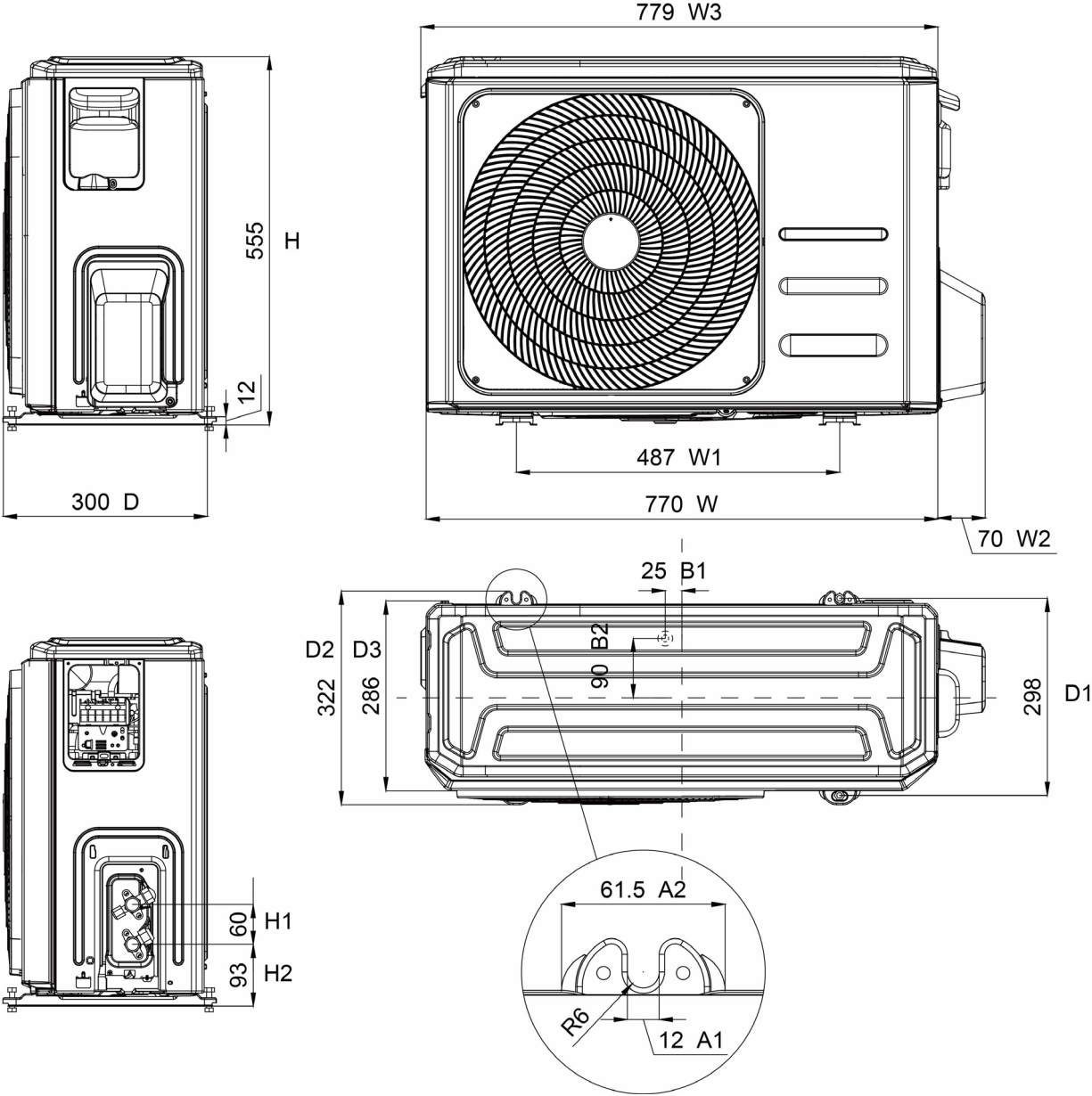
1. Panel Plate AA30



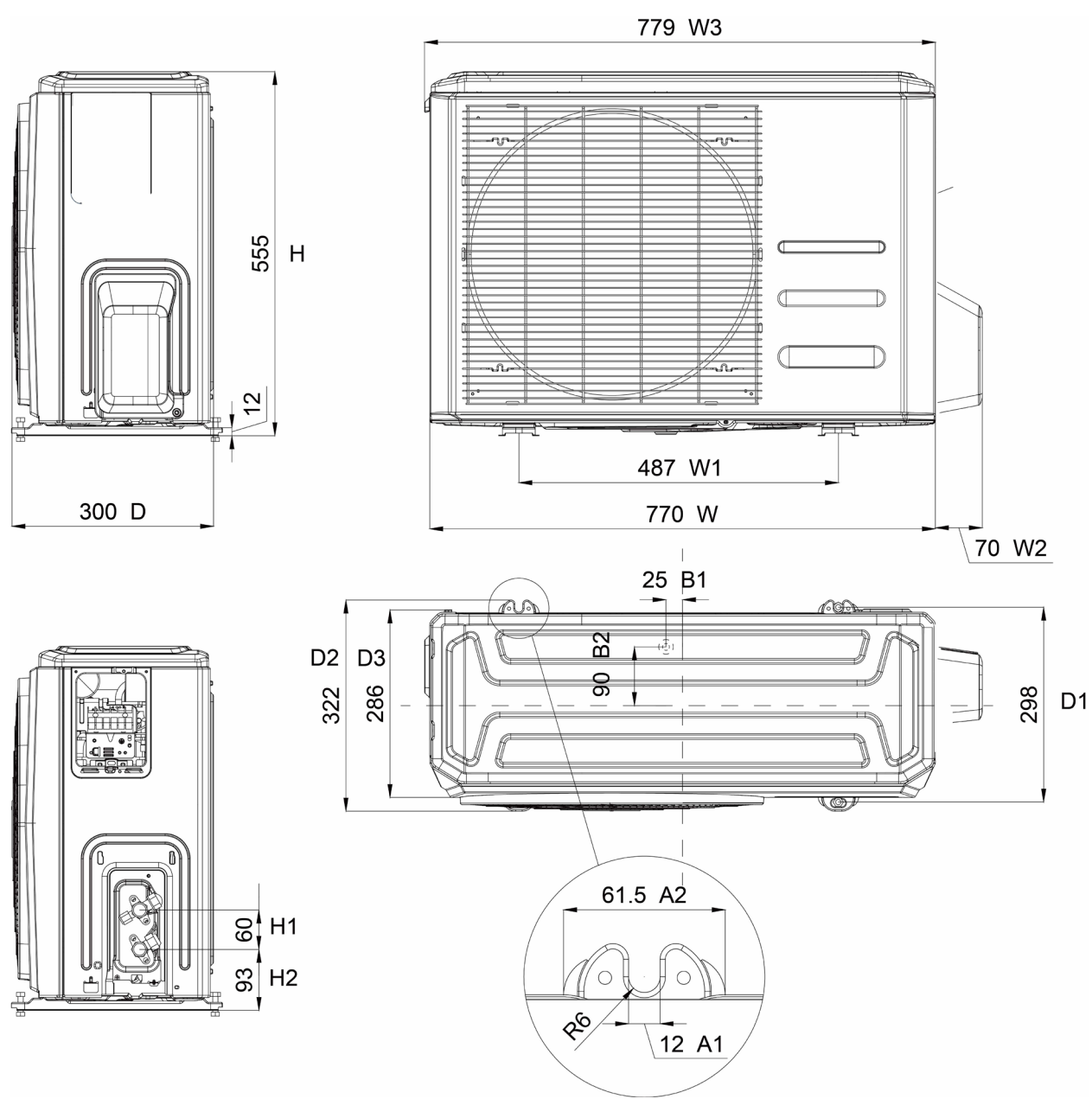
2. Panel Plate AB30



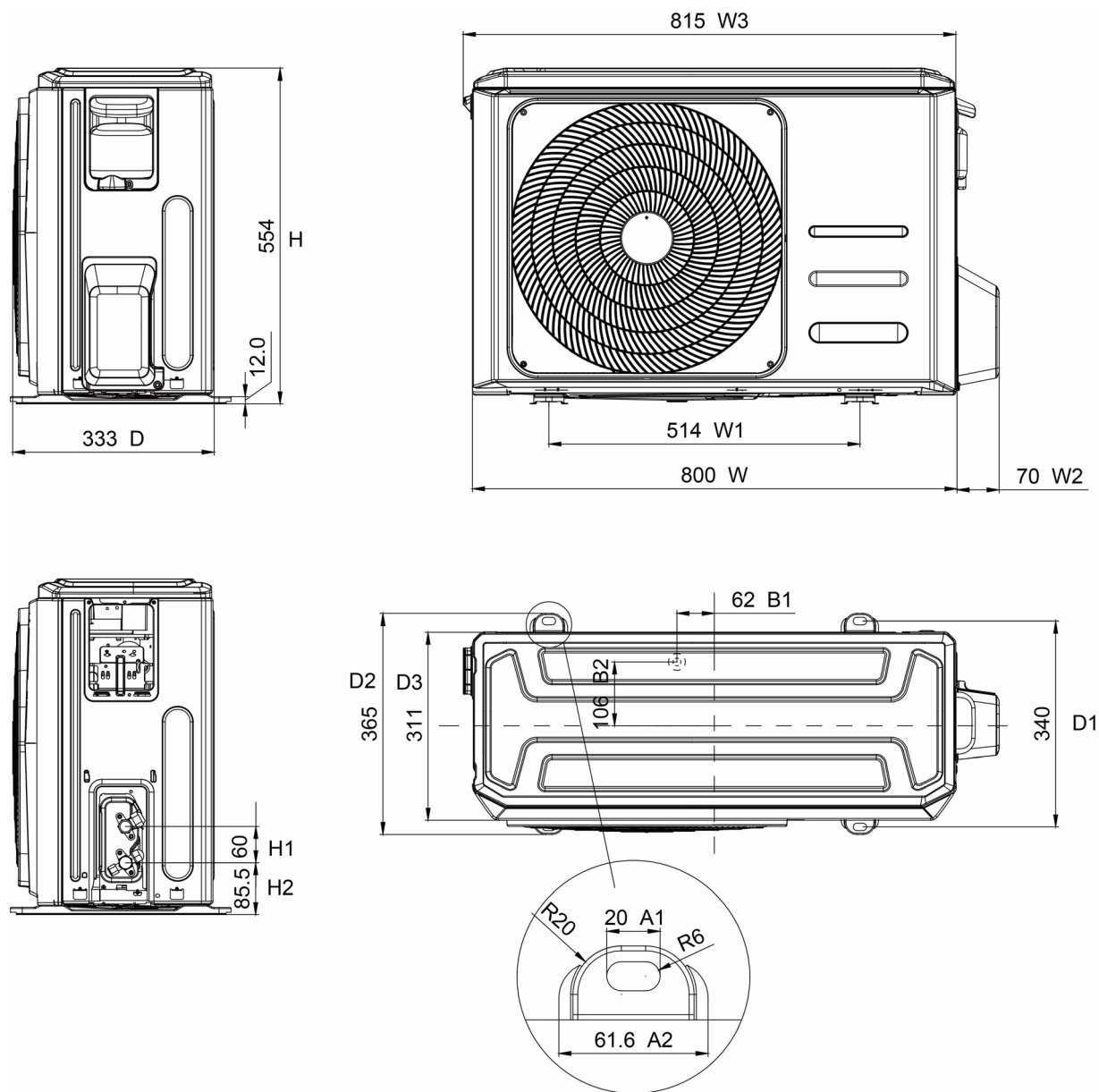
3. Panel Plate BA30



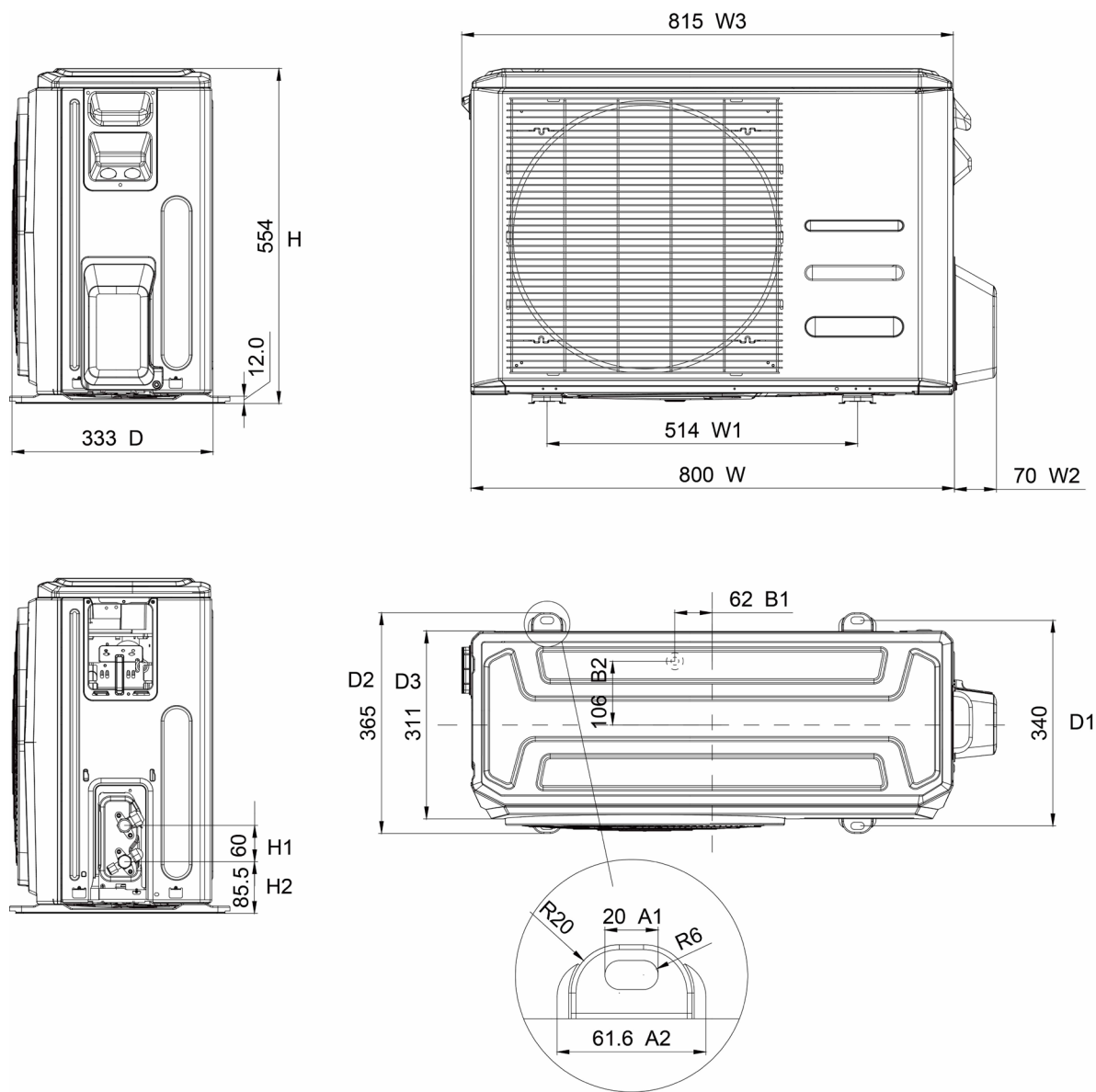
For US models:



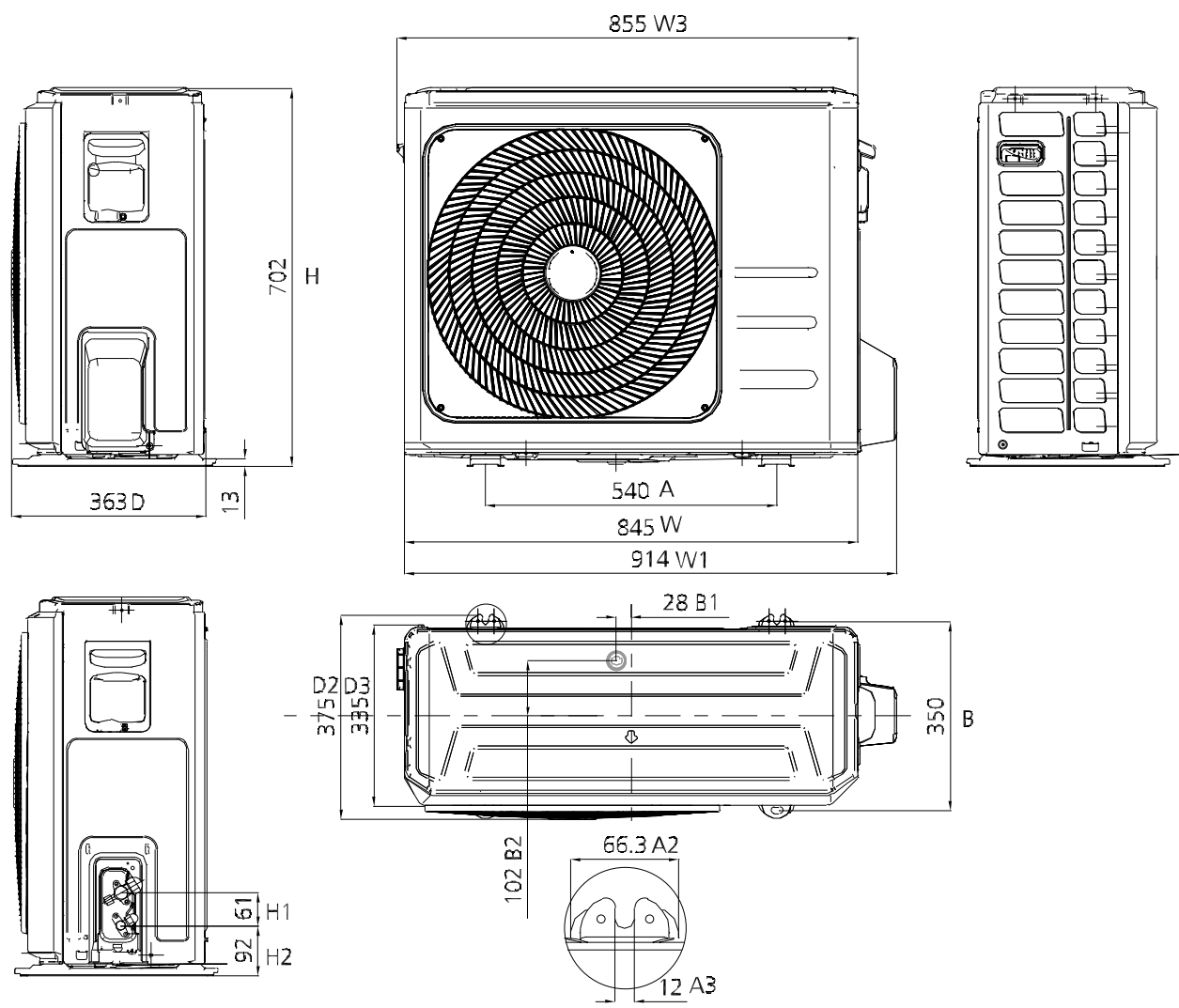
4. Panel Plate B30



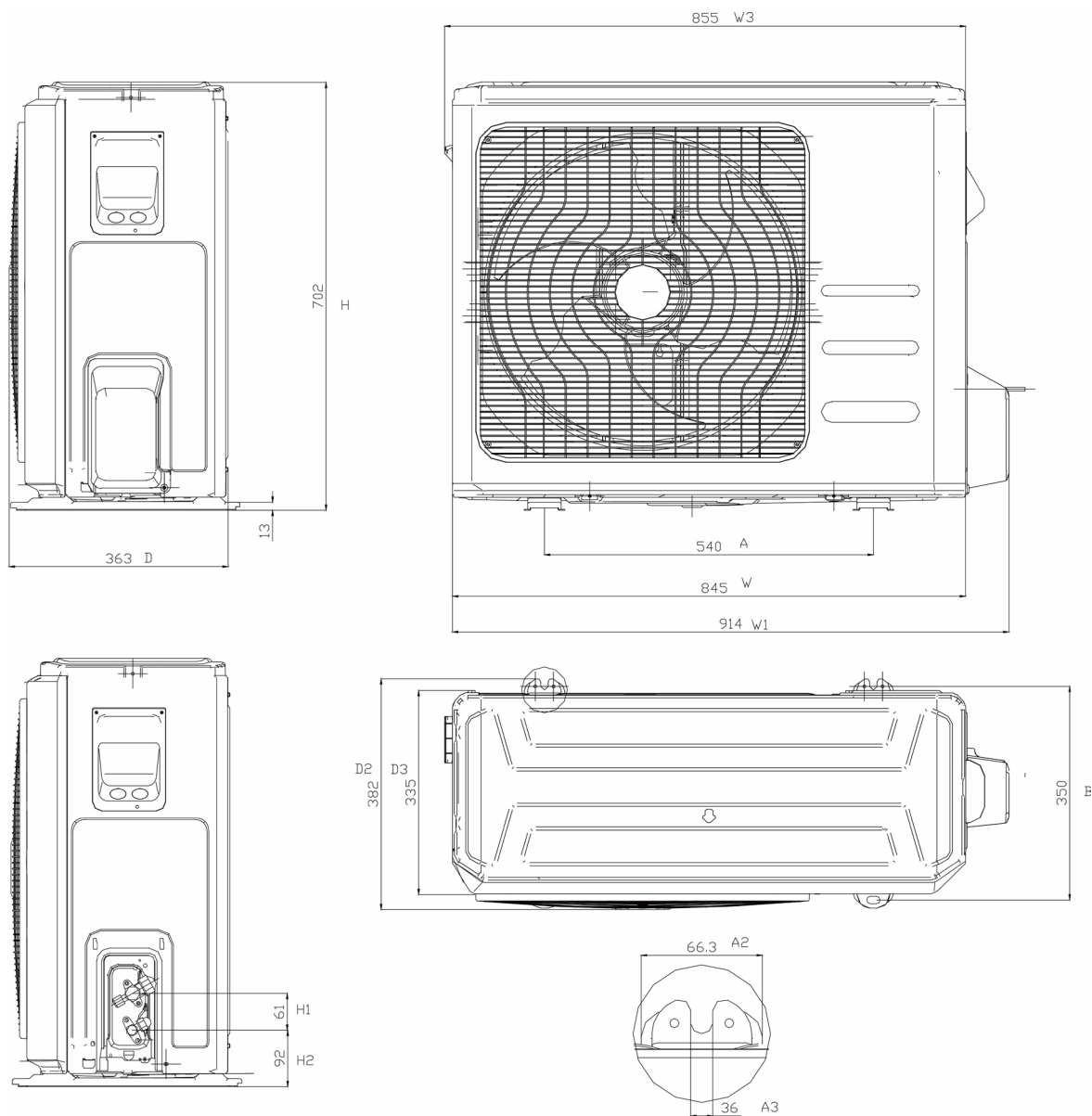
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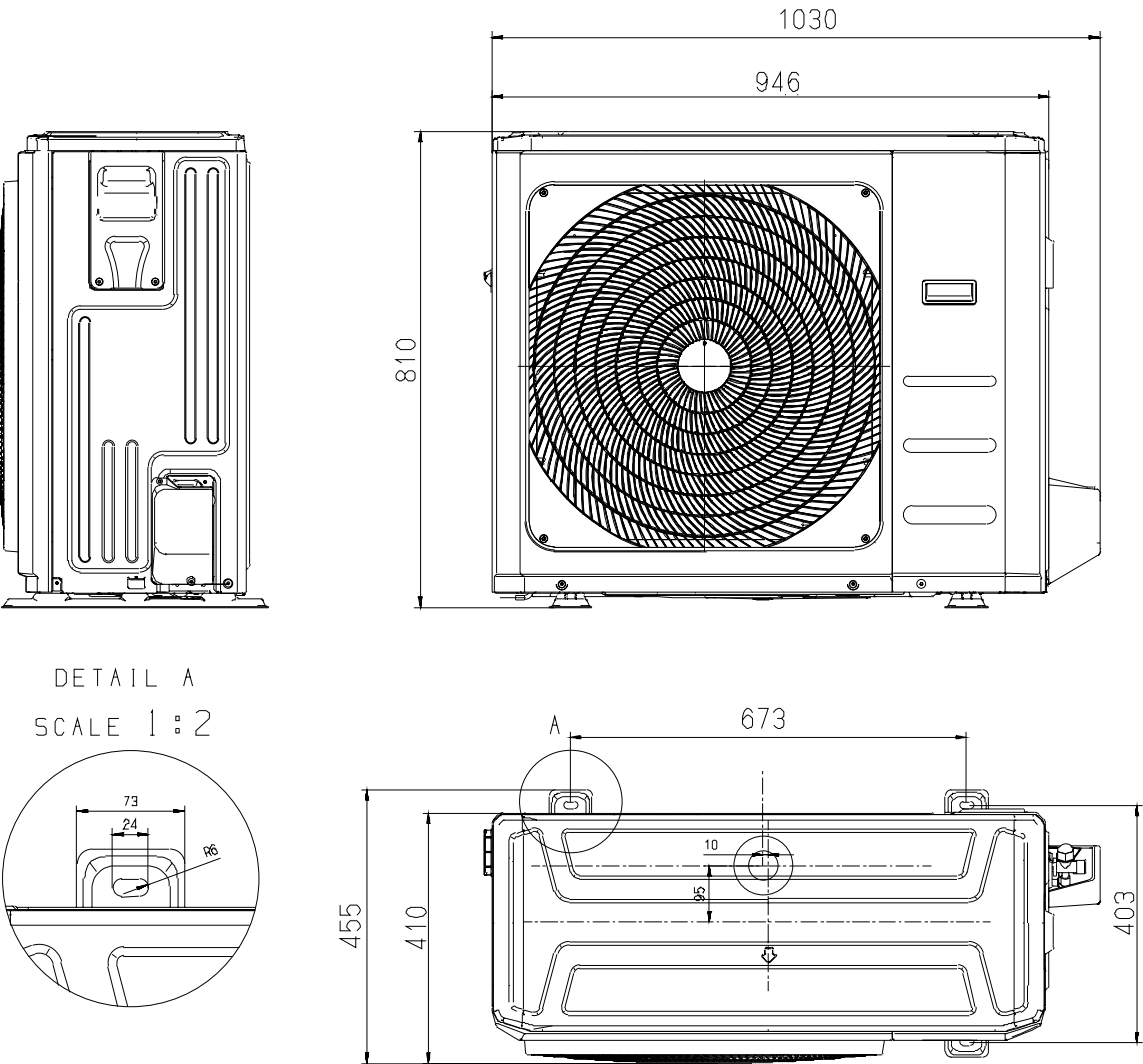
5. Panel Plate CA30



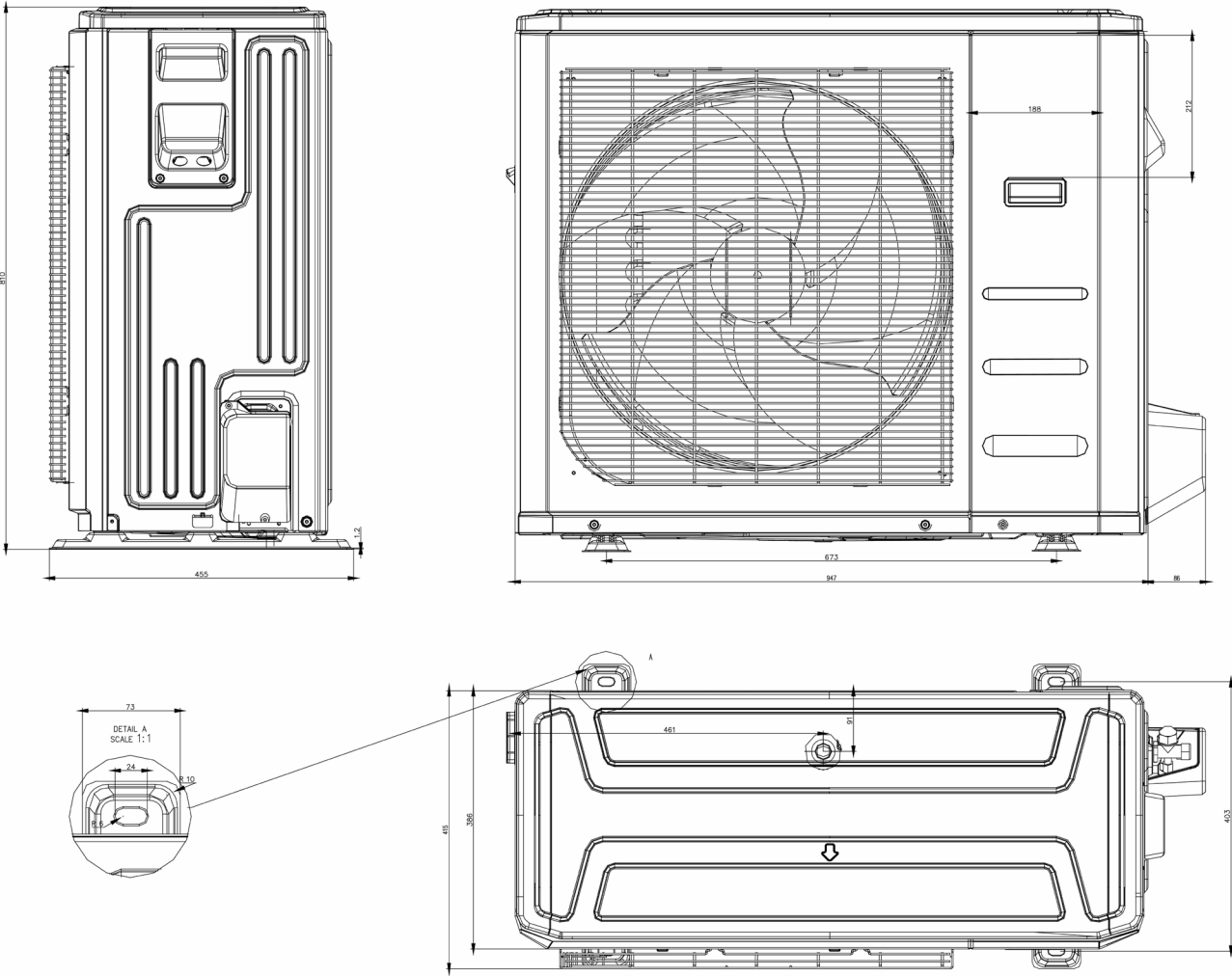
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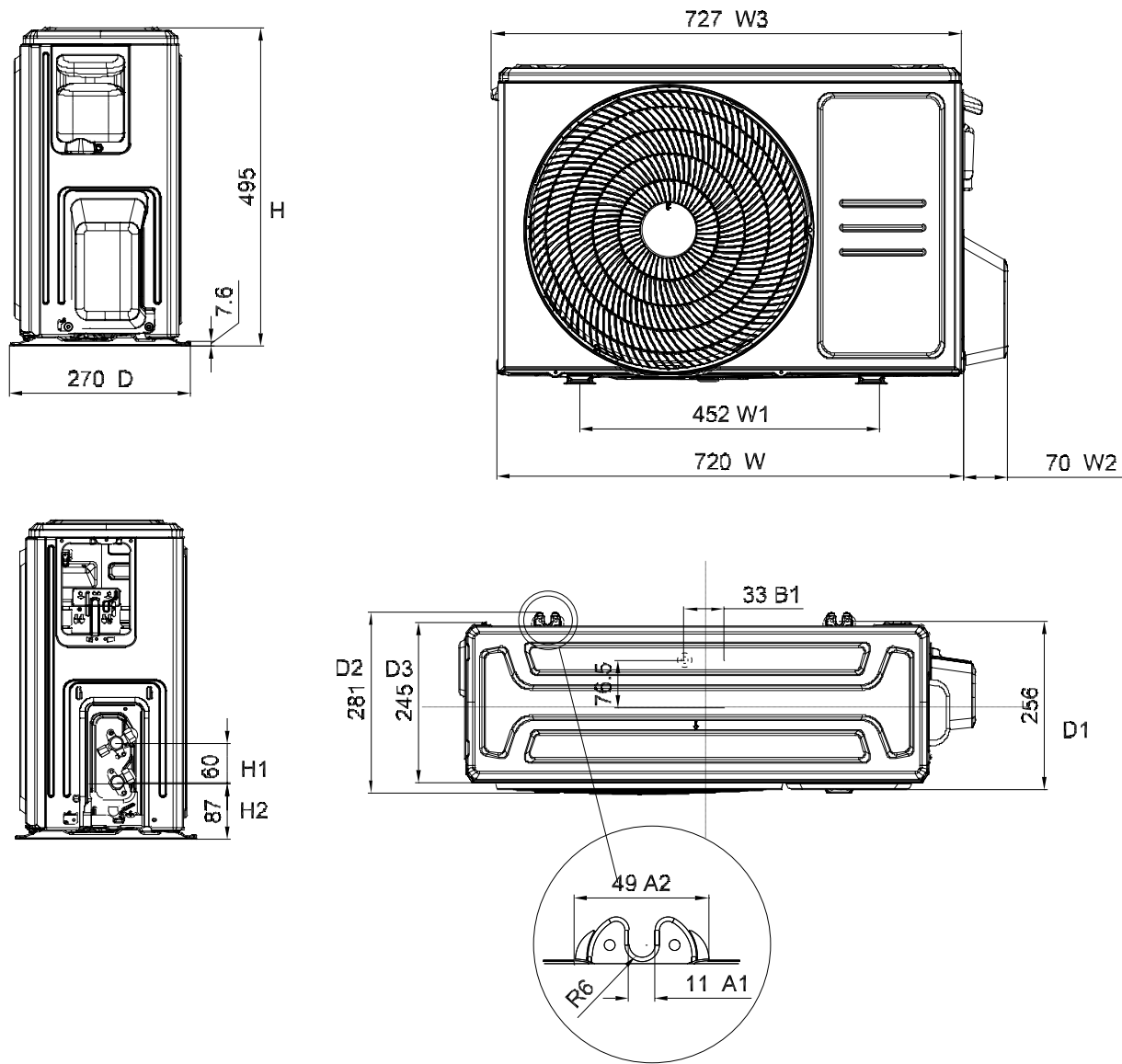
6. Panel Plate D30



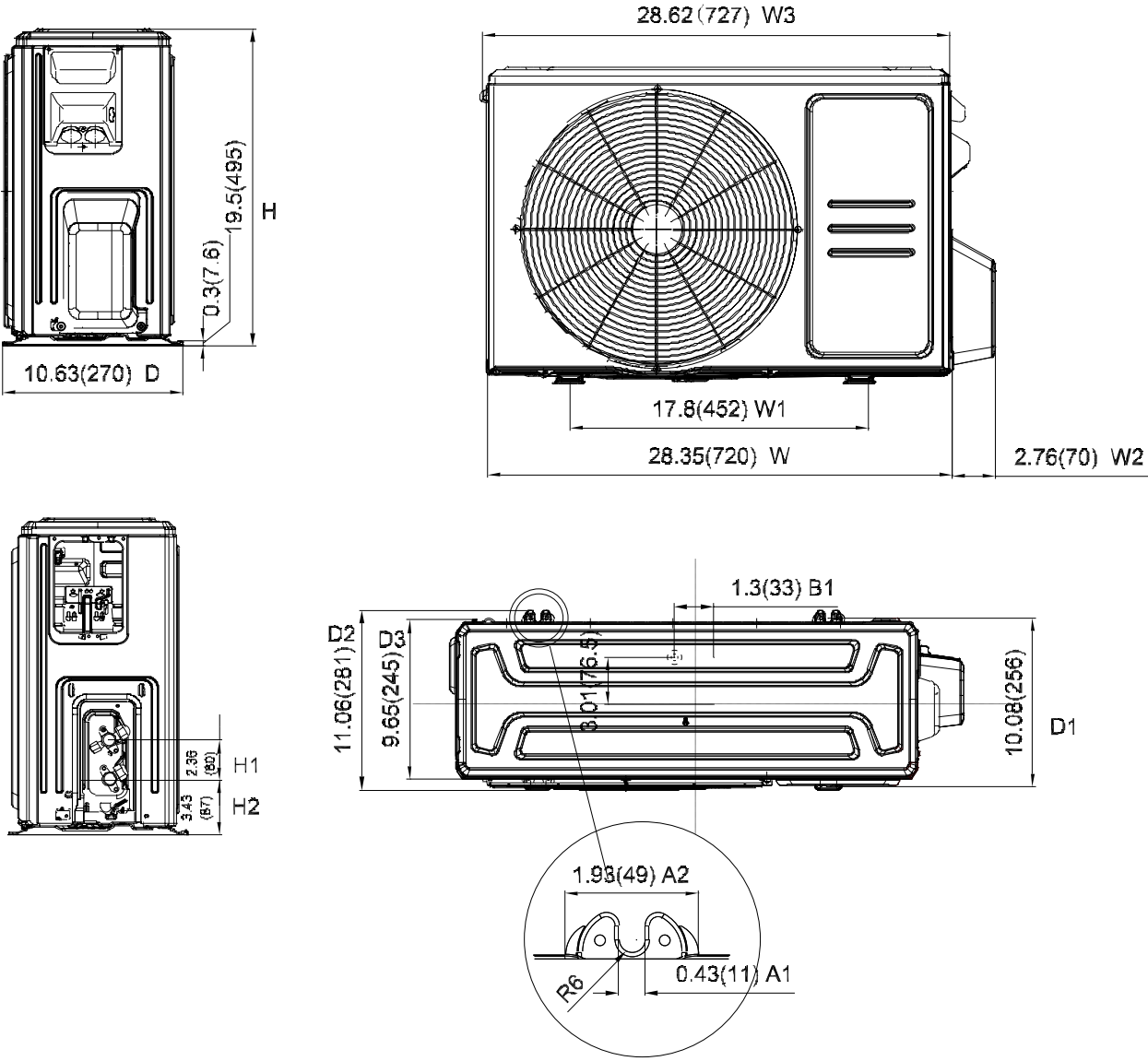
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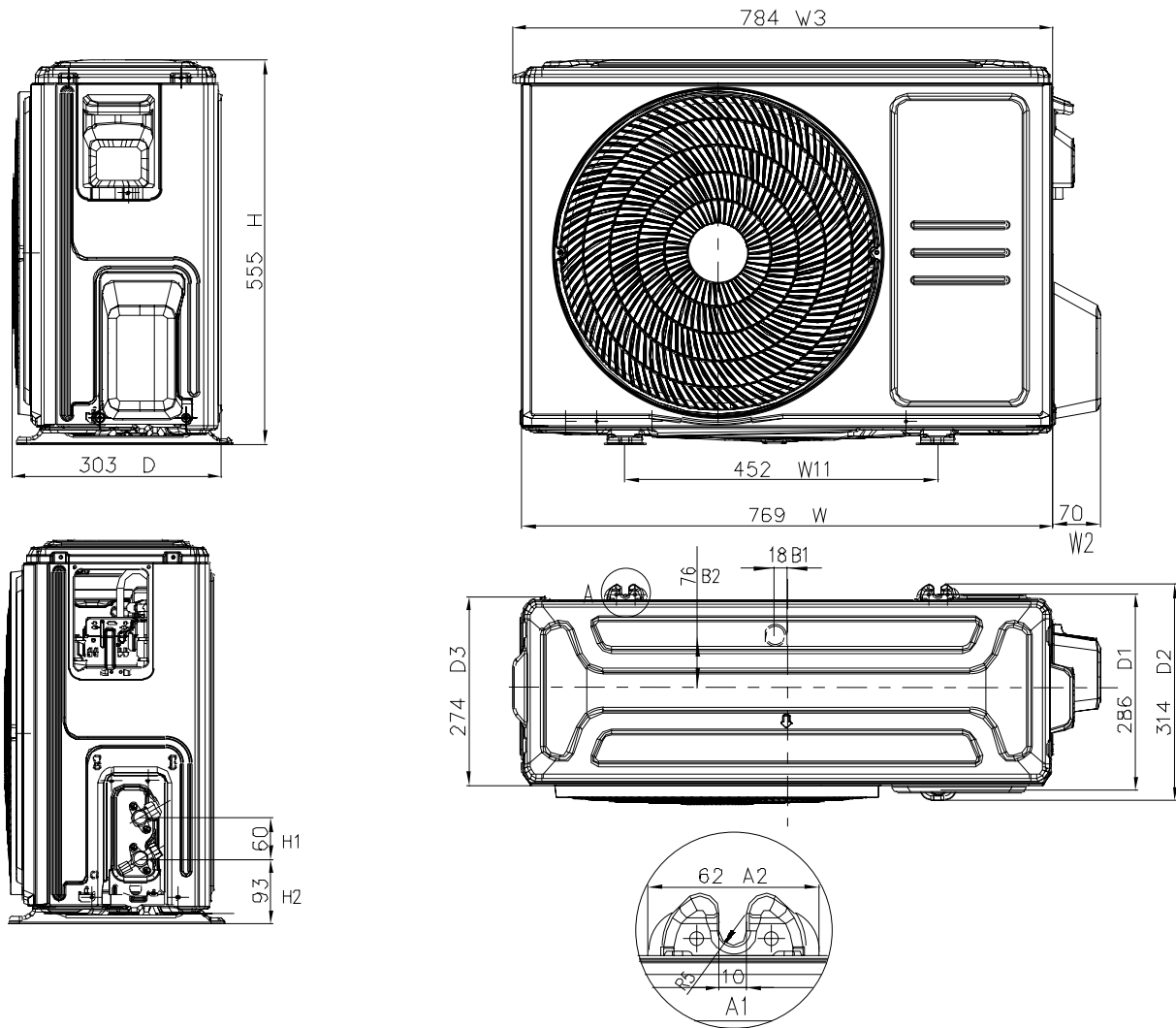
7. Panel Plate X130



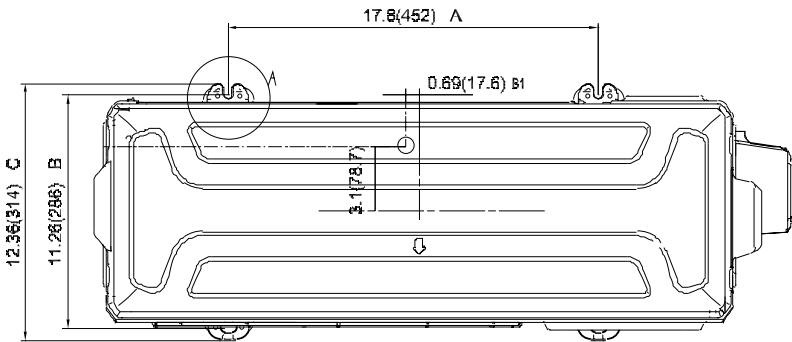
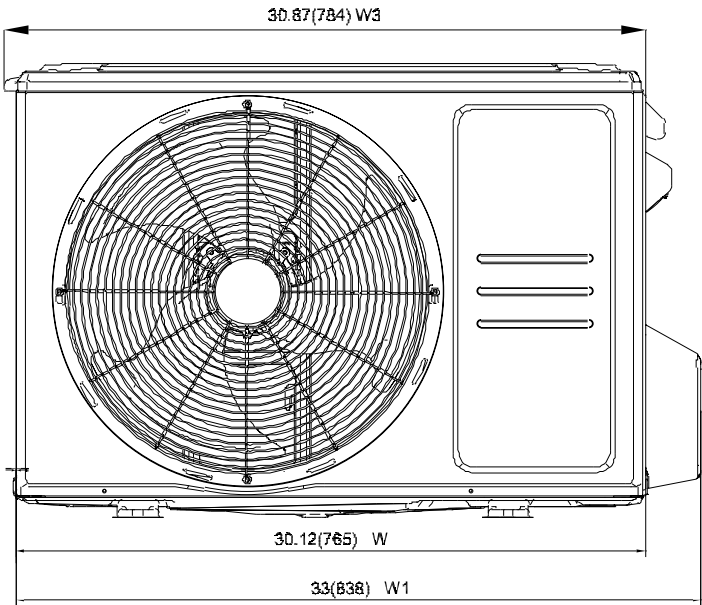
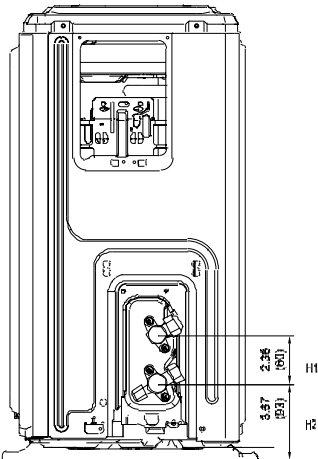
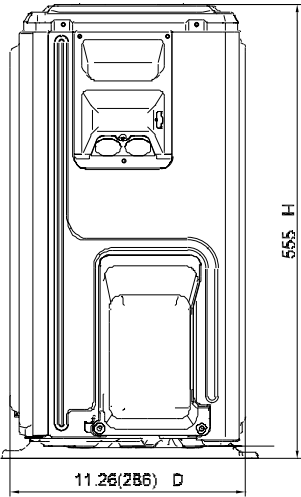
For US models:



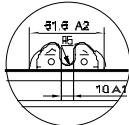
8. Panel Plate X230



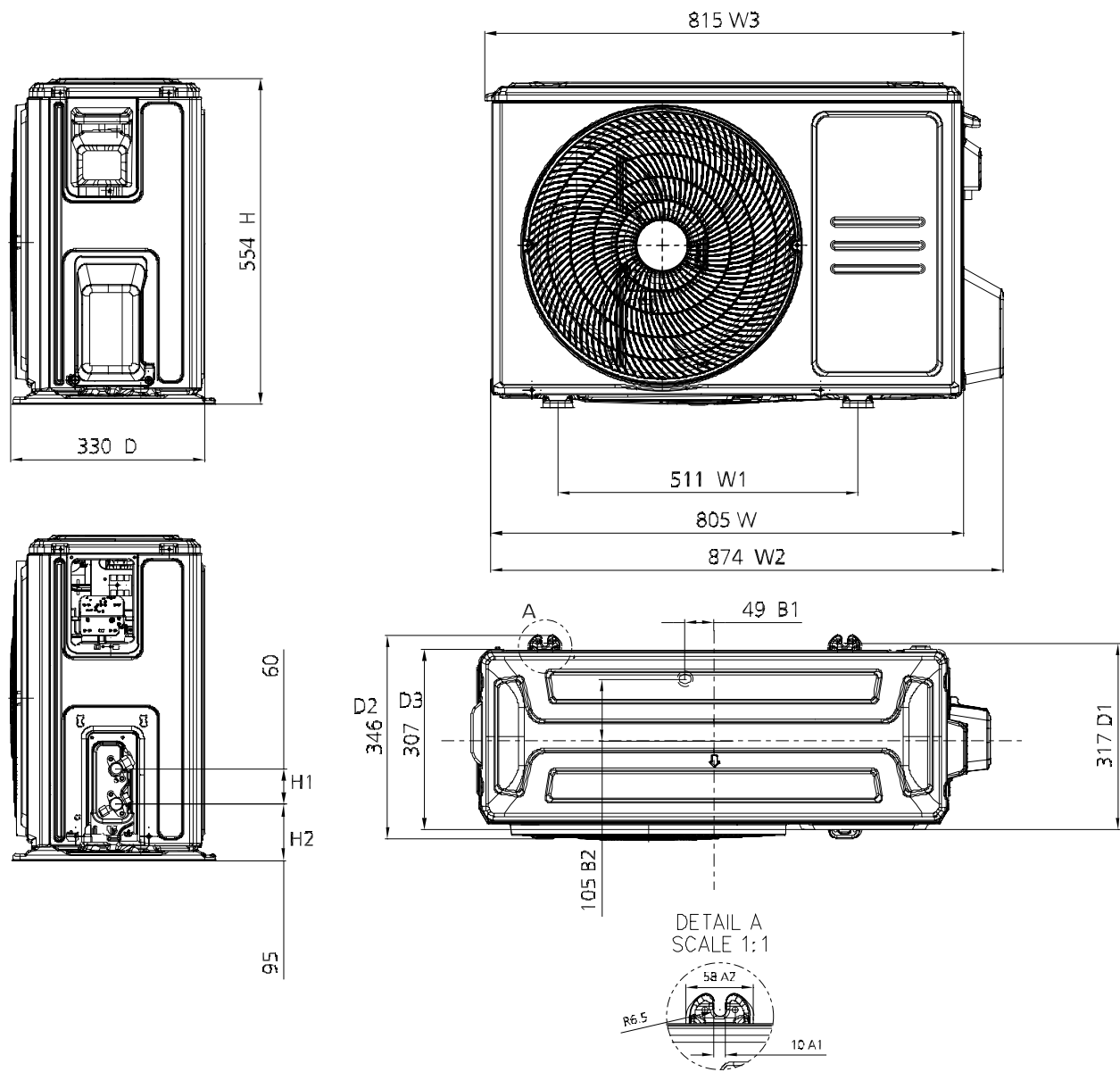
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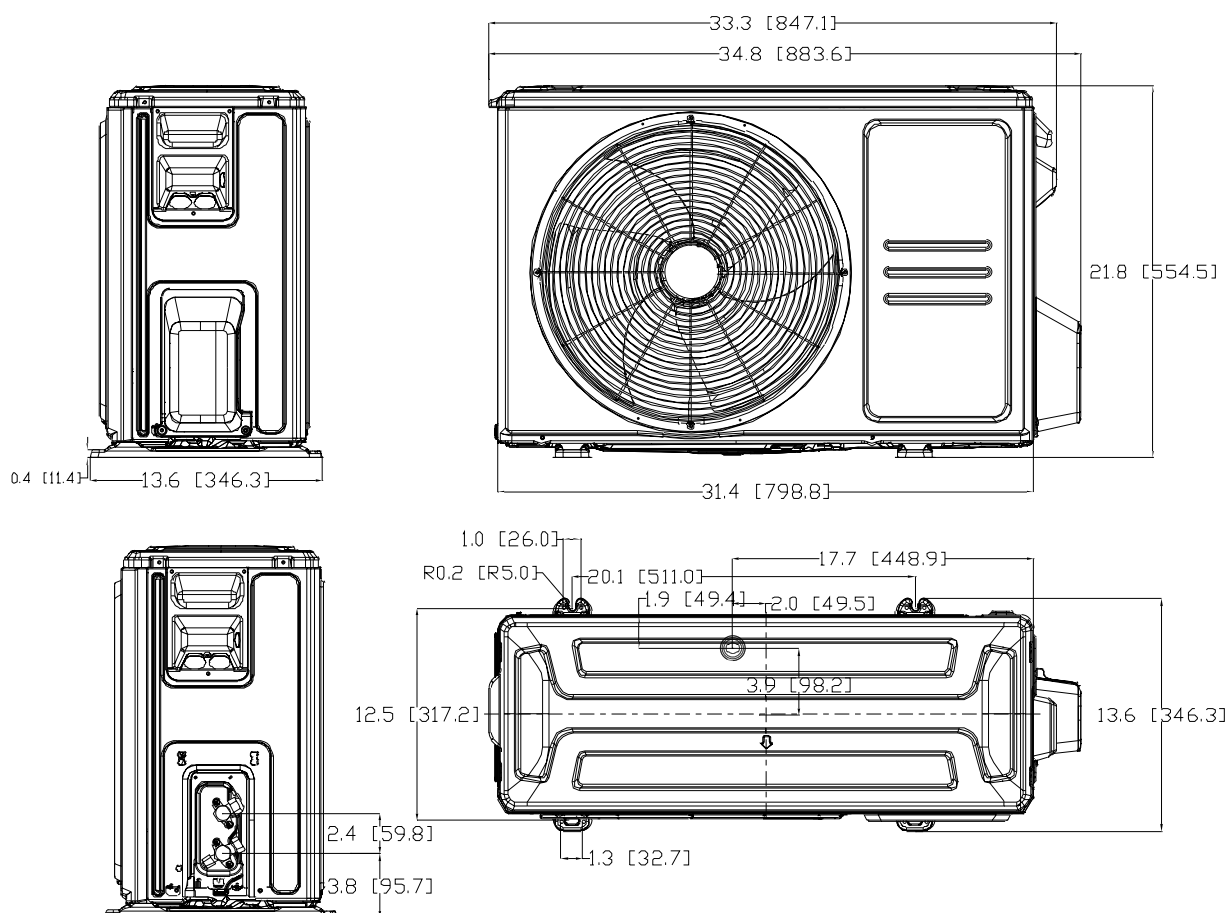
DETAIL A
SCALE 1:2



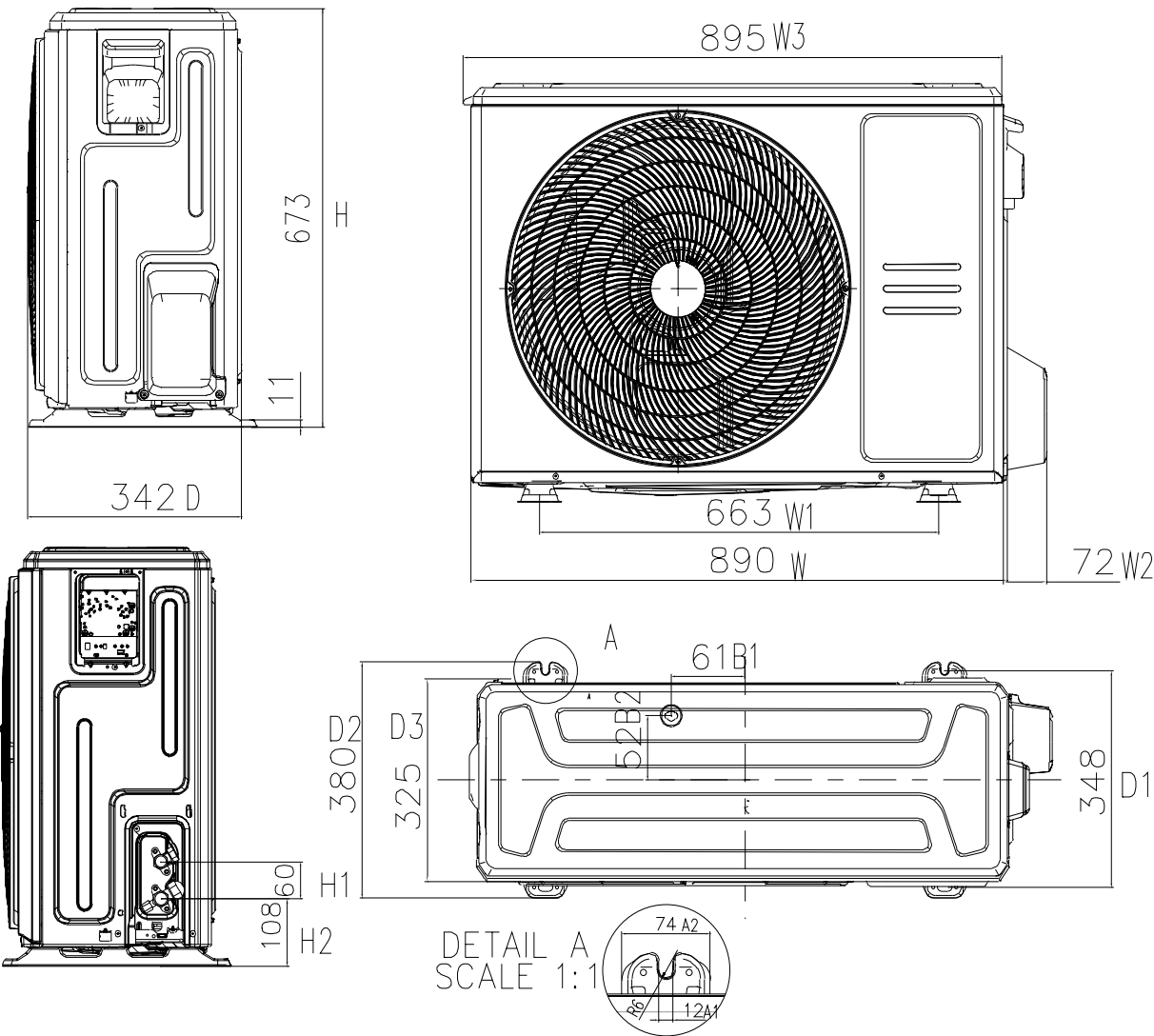
9. Panel Plate X330



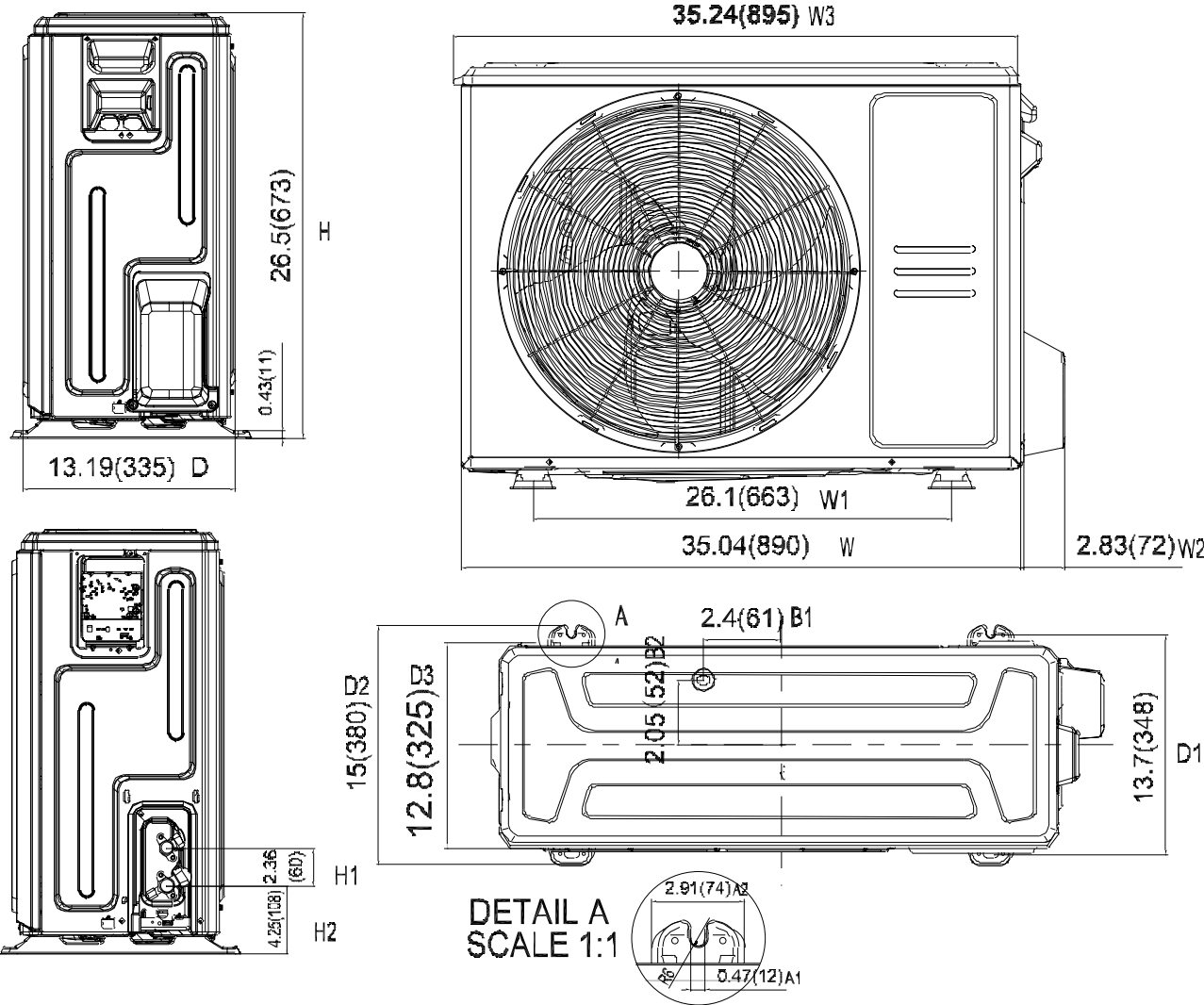
For US models:



10. Panel Plate X430



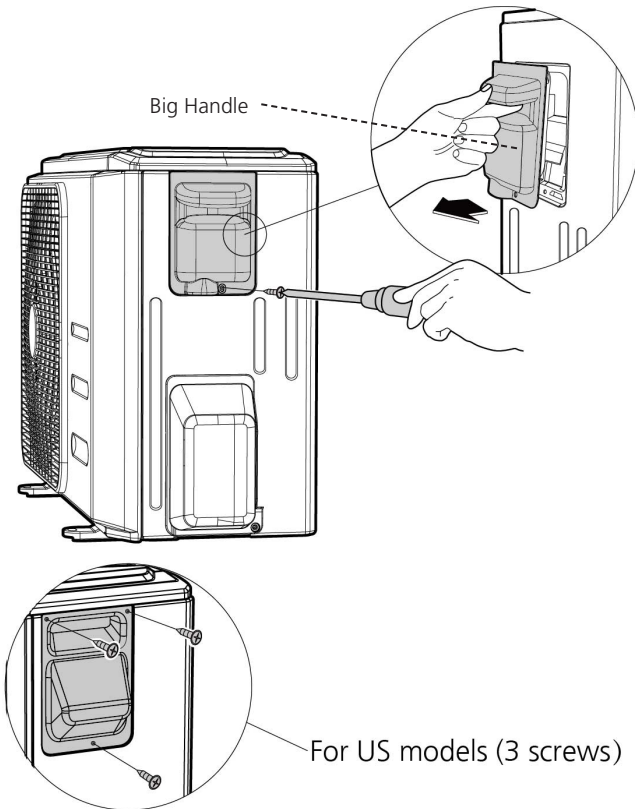
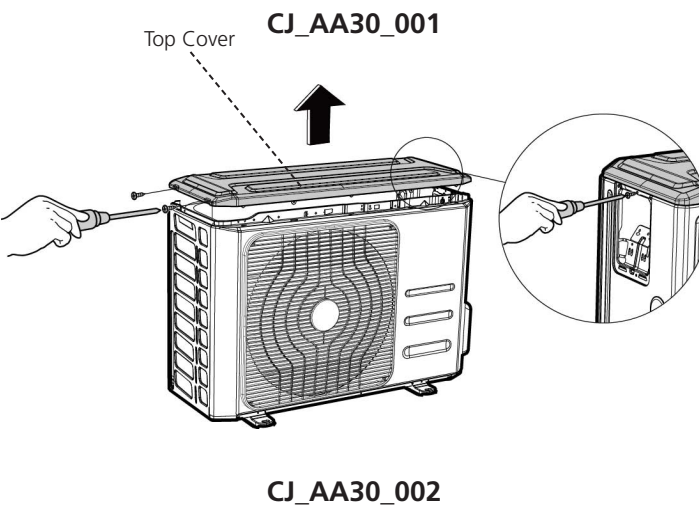
For US models:



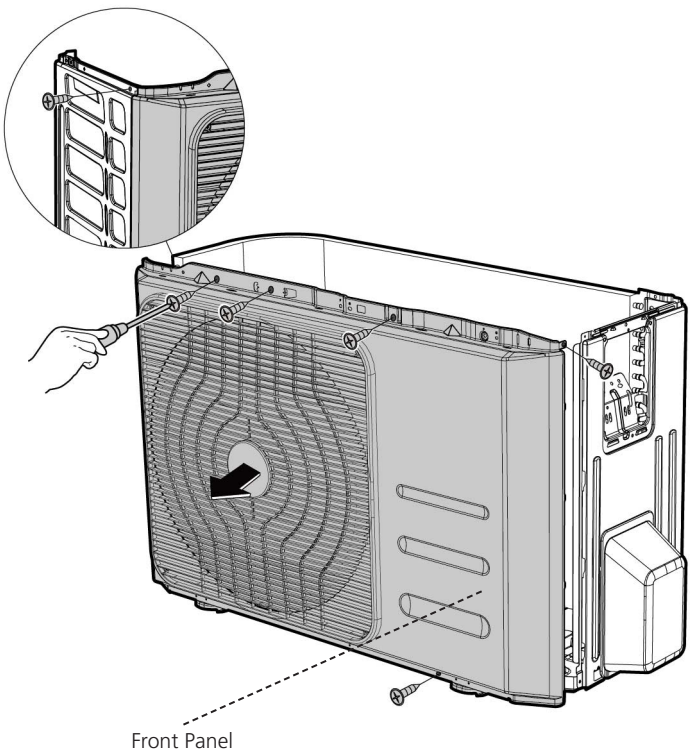
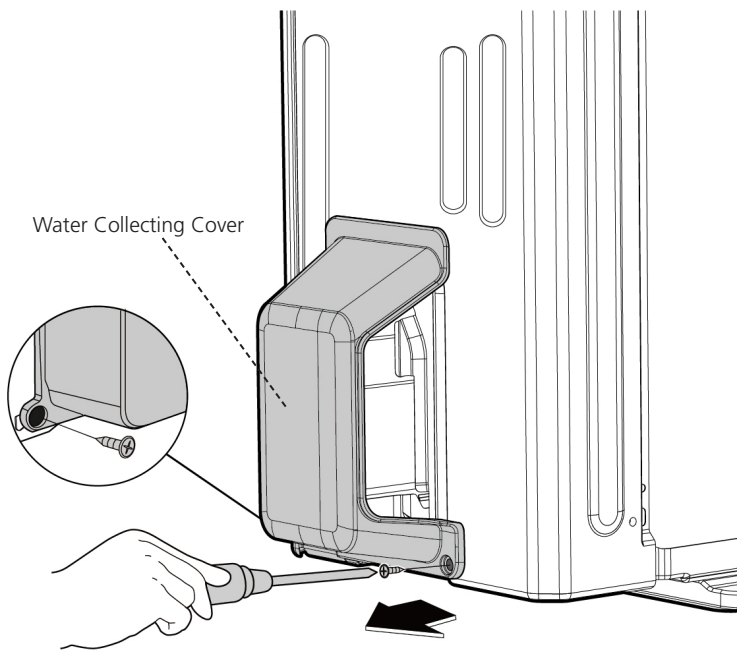
3. Outdoor Unit Disassembly

3.1 Panel Plate

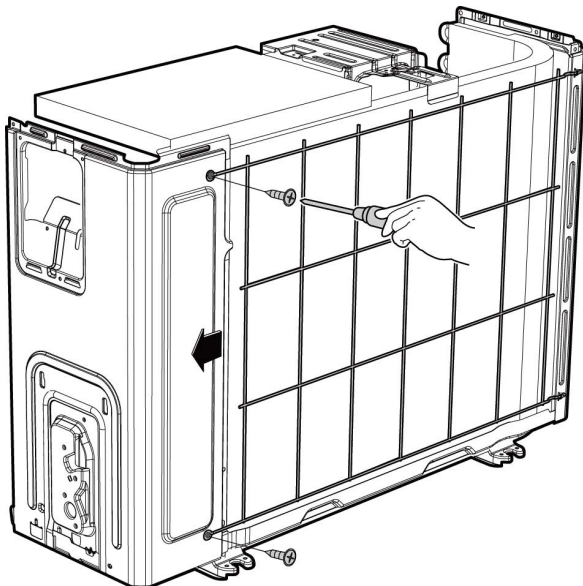
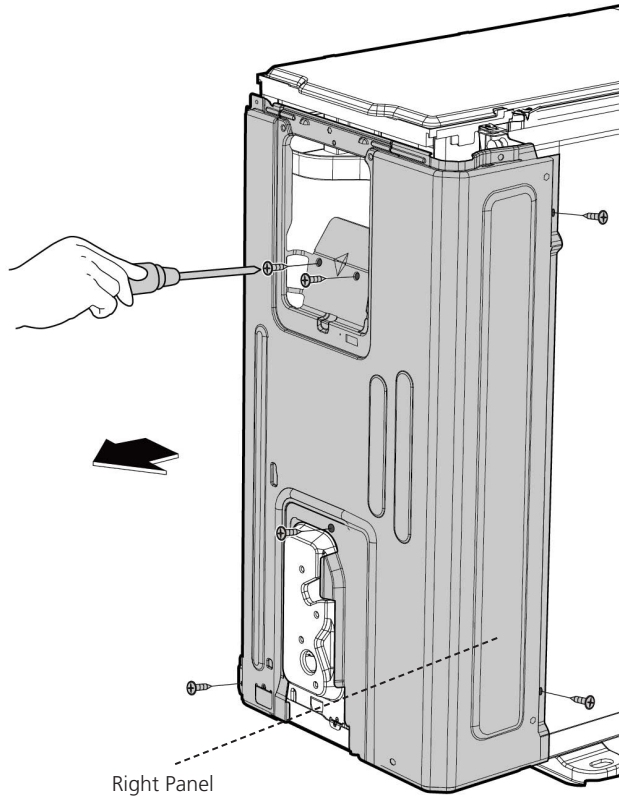
1. AA30 / AB30

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screws of the big handle and then remove the big handle (1 screws) (see CJ_AA30_001).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> |
| <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_AA30_002).</p> |  <p>Top Cover</p> <p>CJ_AA30_001</p> <p>CJ_AA30_002</p> |

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

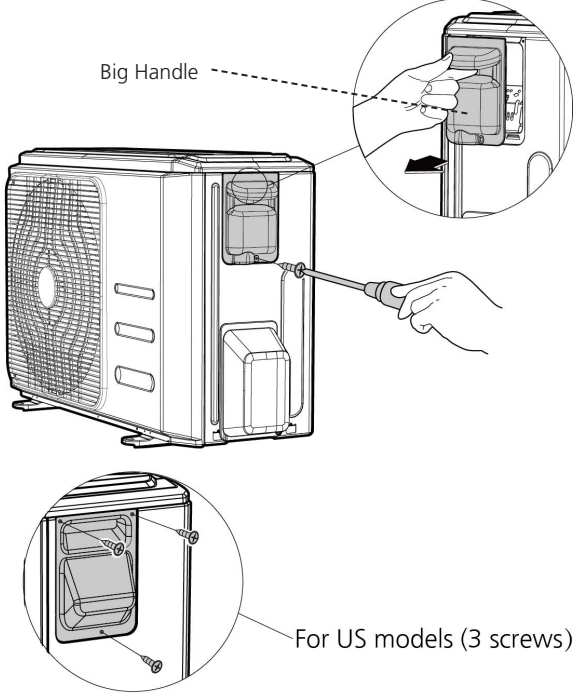
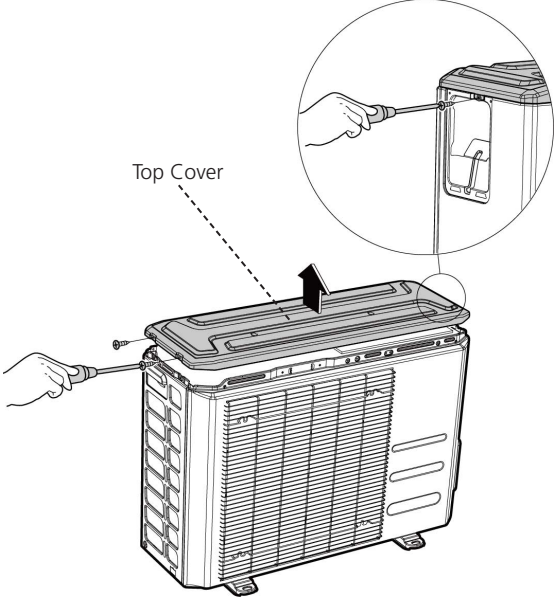
| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of the front panel and then remove the front panel (6 screws) (see CJ_AA30_003).</p> |  <p>Front Panel</p> <p>CJ_AA30_003</p> |
| <p>5) Remove the screws of water collecting cover (2 screws) (see CJ_AA30_004).</p> |  <p>Water Collecting Cover</p> <p>CJ_AA30_004</p> |

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

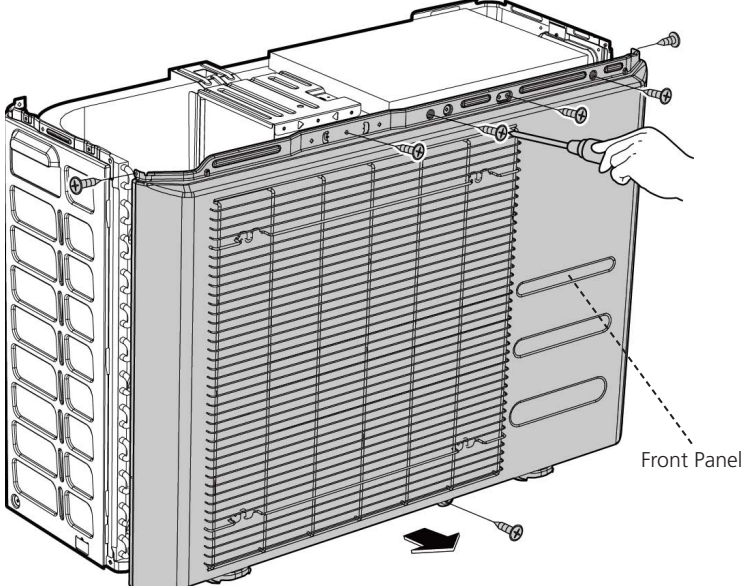
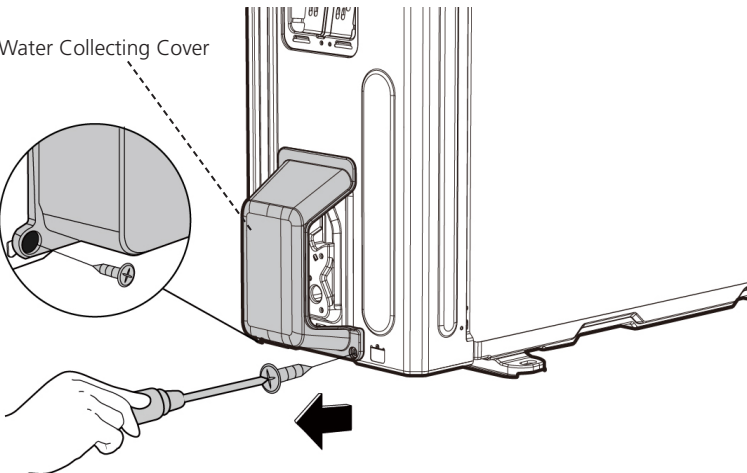
| Procedure | Illustration |
|--|--|
| <p>6) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_AA30_005). (for some models)</p> |  <p>CJ_AA30_005</p> |
| <p>7) Remove the screws of the right panel and then remove the right panel (6 screws) (see CJ_AA30_006).</p> |  <p>Right Panel</p> <p>CJ_AA30_006</p> |

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

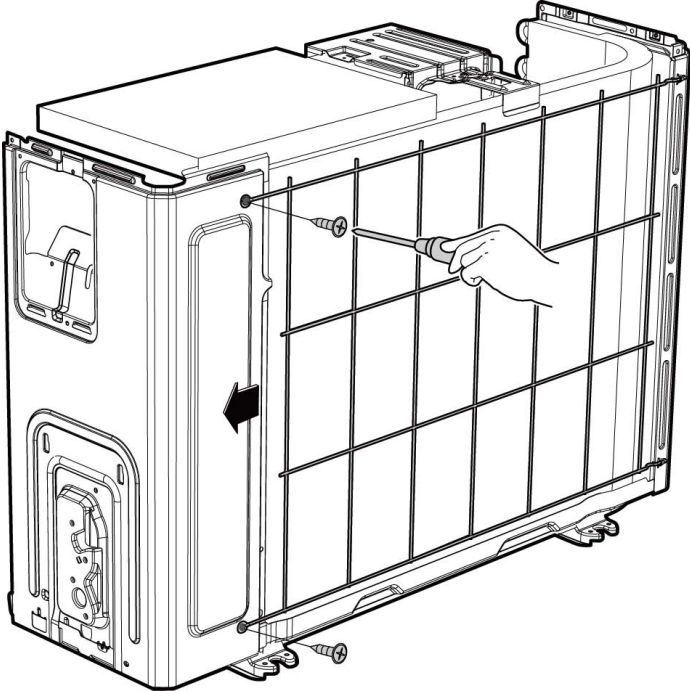
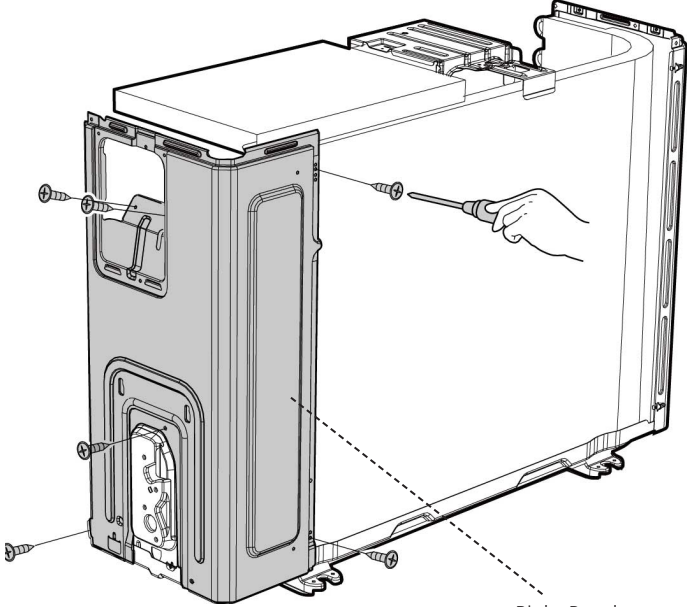
2. BA30

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screws of the big handle and then remove the big handle (1 screws) (see CJ_BA30_001).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_BA30_001</p> |
| <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_BA30_002).</p> |  <p>Top Cover</p> <p>CJ_BA30_002</p> |

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

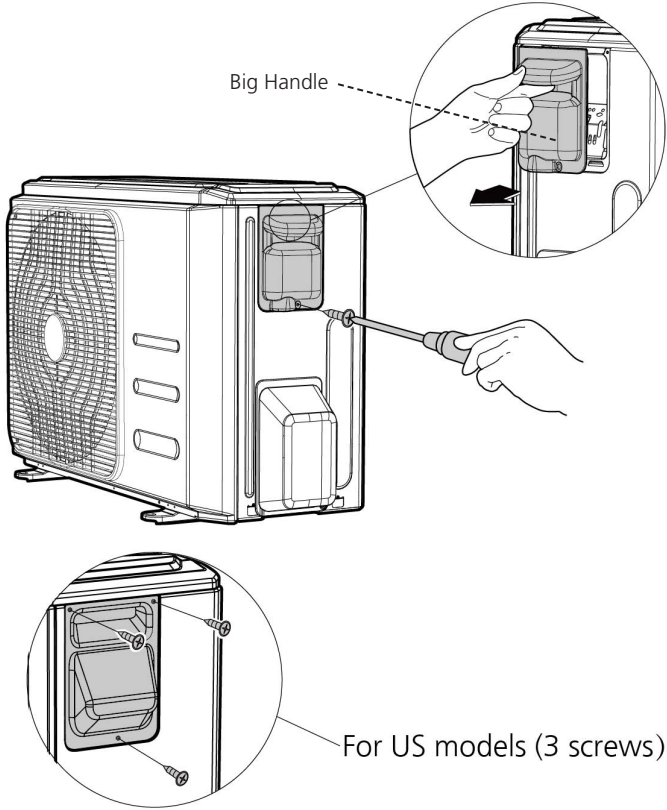
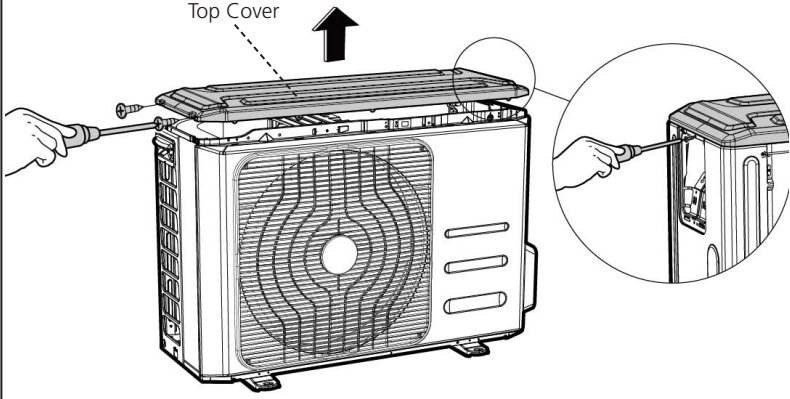
| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of the front panel and then remove the front panel (7 screws) (see CJ_BA30_003).</p> |  <p style="text-align: center;">CJ_BA30_003</p> |
| <p>5) Remove the screws of water collecting cover (2 screws) (see CJ_BA30_004).</p> |  <p style="text-align: center;">CJ_BA30_004</p> |

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

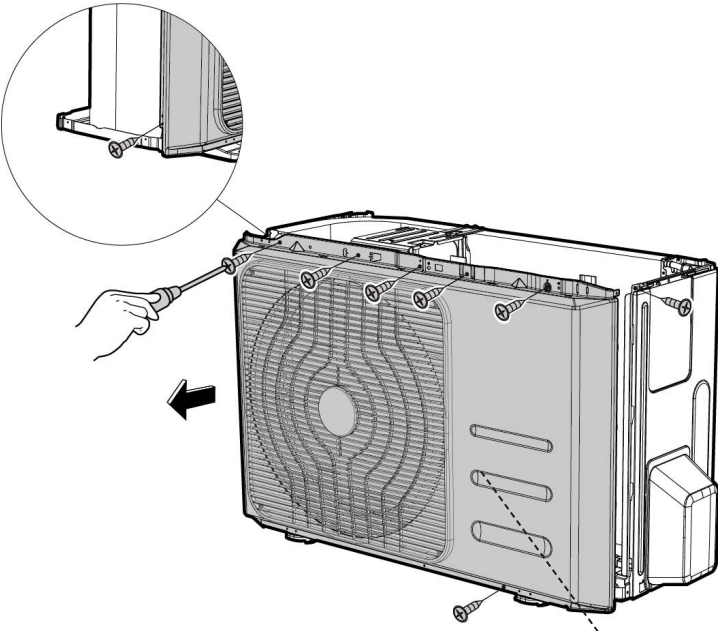
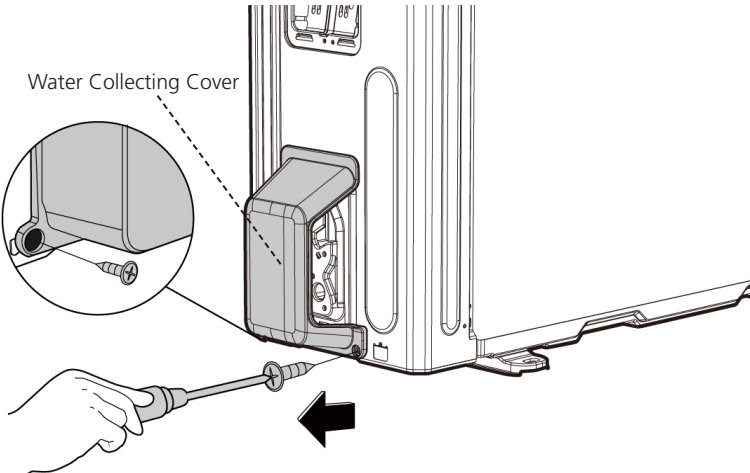
| Procedure | Illustration |
|--|---|
| <p>6) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_BA30_005). (for some models)</p> |  <p style="text-align: center;">CJ_BA30_005</p> |
| <p>7) Remove the screws of the right panel and then remove the right panel (6 screws) (see CJ_BA30_006).</p> |  <p style="text-align: center;">CJ_BA30_006</p> <p style="text-align: right;">Right Panel</p> |

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

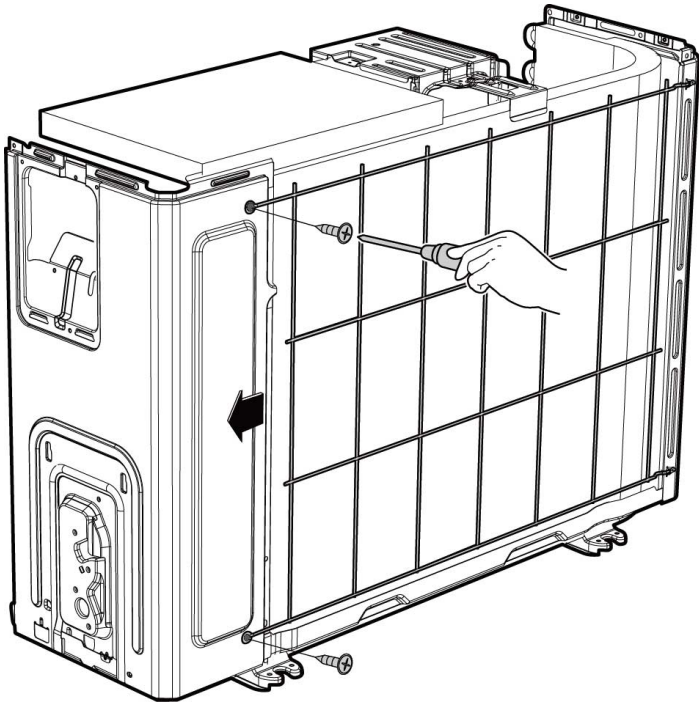
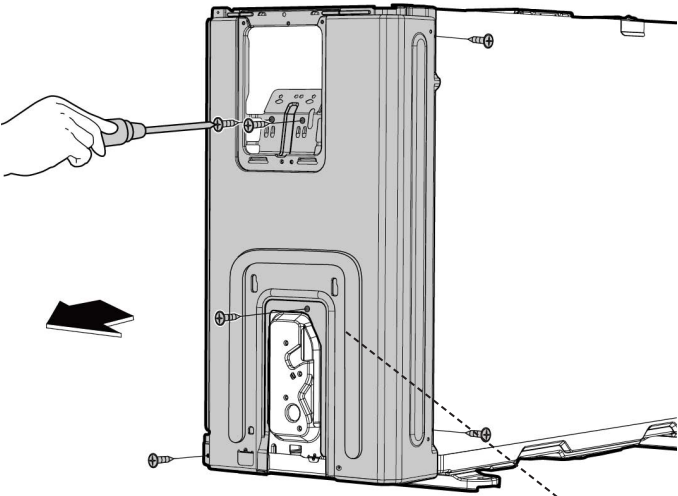
3. B30

| Procedure | Illustration |
|---|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screws of the big handle and then remove the big handle (1 screws) (see CJ_B30_001).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_B30_001</p> |
| <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_B30_002).</p> |  <p>Top Cover</p> <p>CJ_B30_002</p> |

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

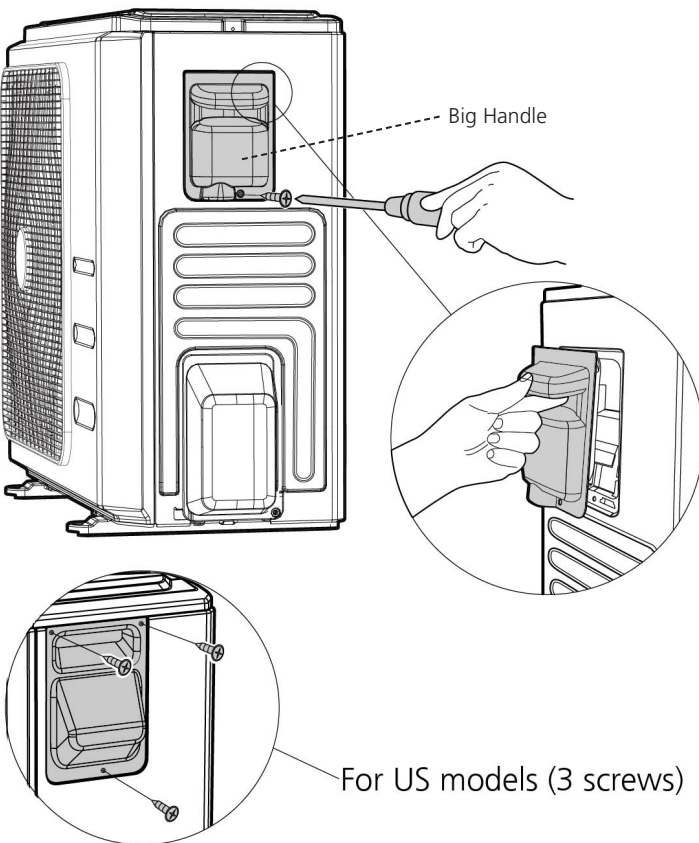
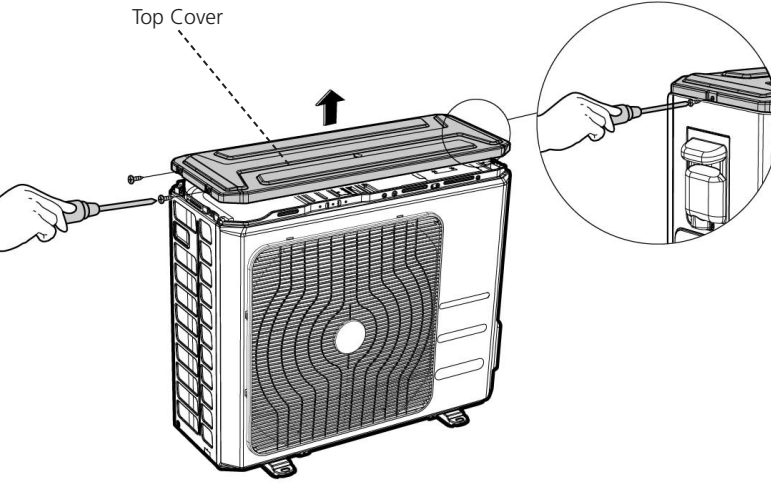
| Procedure | Illustration |
|---|---|
| <p>4) Remove the screws of the front panel and then remove the front panel (8 screws) (see CJ_B30_003).</p> |  <p>CJ_B30_003</p> |
| <p>5) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_B30_004).</p> |  <p>CJ_B30_004</p> |

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

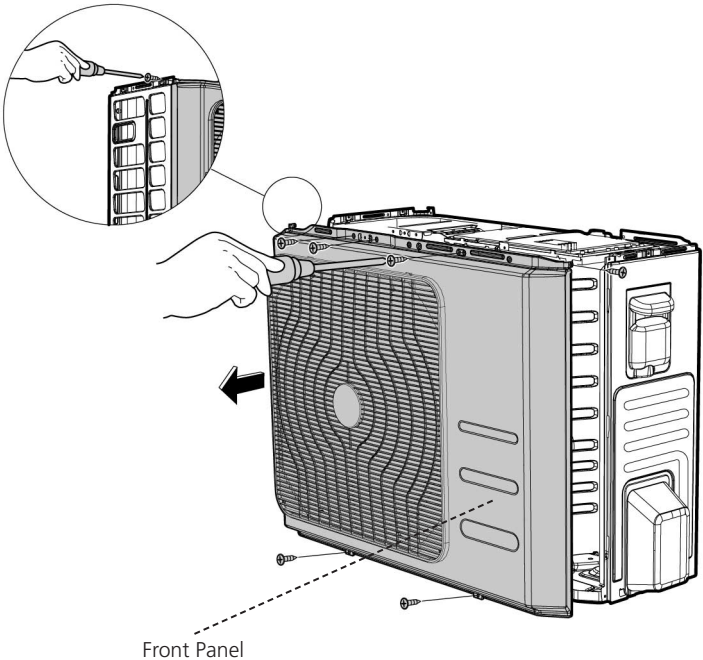
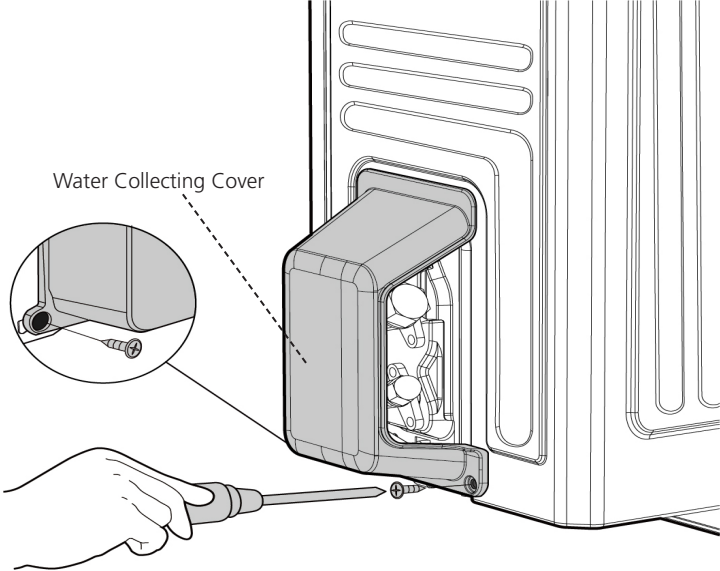
| Procedure | Illustration |
|---|---|
| <p>6) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_B30_005). (for some models)</p> |  <p>CJ_B30_005</p> |
| <p>7) Remove the screws of the right panel and then remove the right panel (5 screws) (see CJ_B30_006).</p> |  <p>CJ_B30_006</p> <p>Right Panel</p> |

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

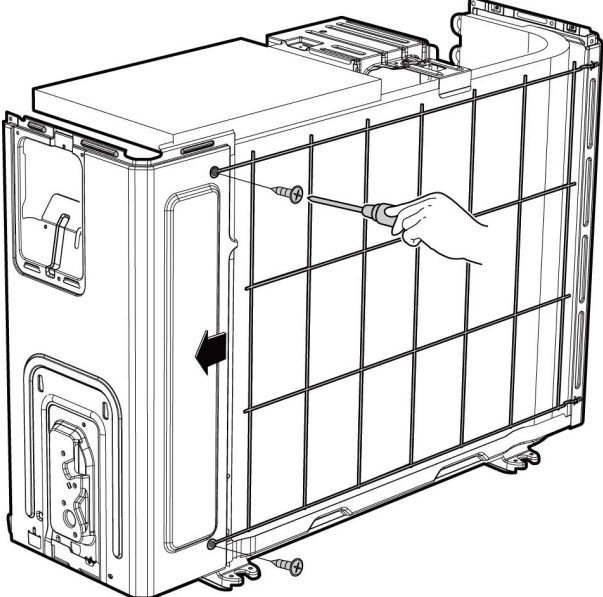
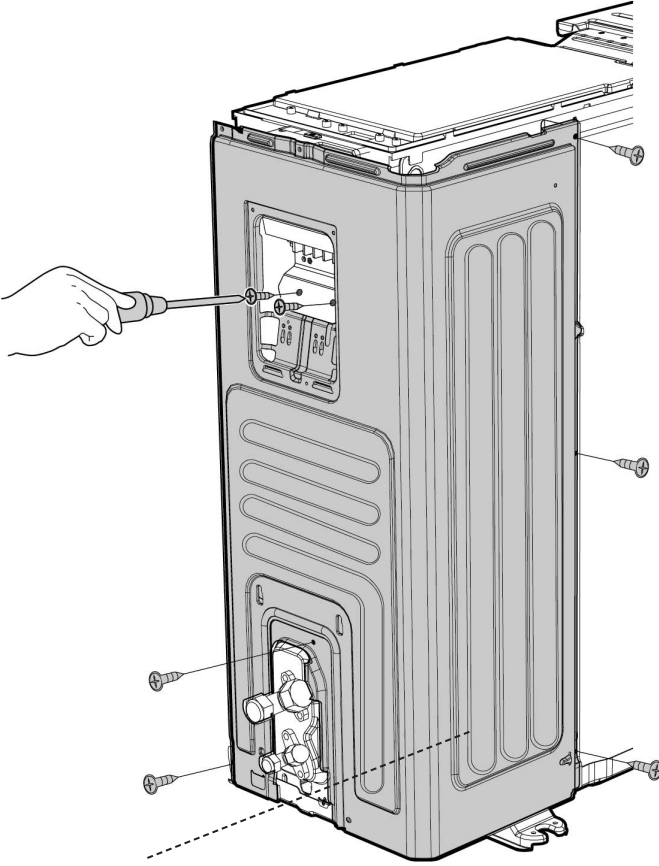
4. CA30

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screws of the big handle and then remove the big handle (1 screws) (see CJ_CA30_001).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_CA30_001</p> |
| <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_CA30_002).</p> |  <p>Top Cover</p> <p>CJ_CA30_002</p> |

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

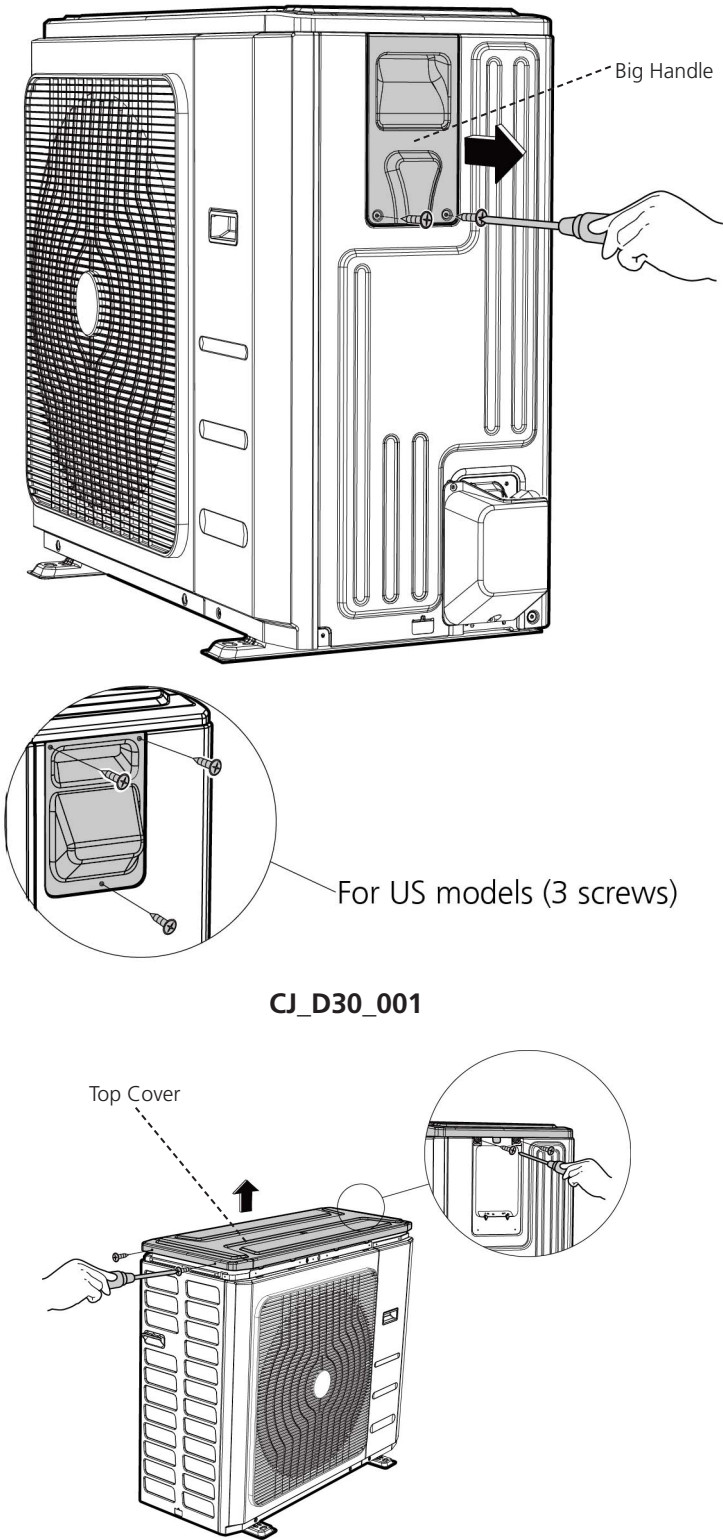
| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of the front panel and then remove the front panel (7 screws) (see CJ_CA30_003).</p> |  <p>Front Panel</p> <p>CJ_CA30_003</p> |
| <p>5) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_CA30_004).</p> |  <p>Water Collecting Cover</p> <p>CJ_CA30_004</p> |

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

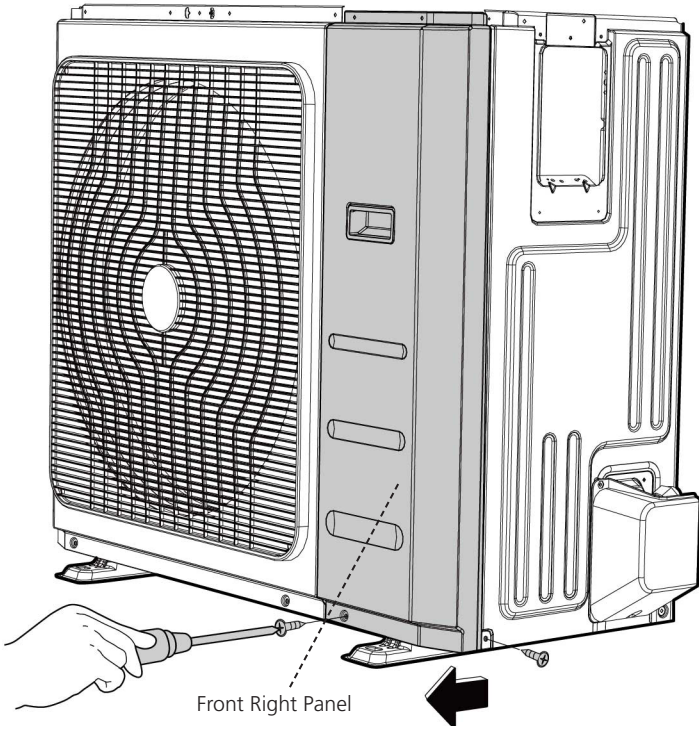
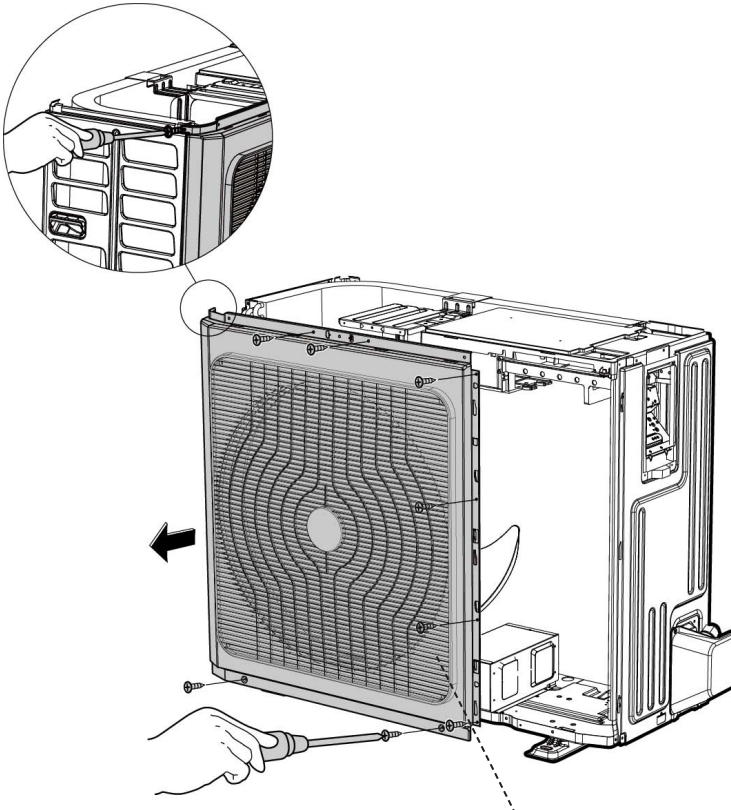
| Procedure | Illustration |
|--|--|
| <p>6) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_CA30_005). (for some models)</p> |  <p>CJ_CA30_005</p> |
| <p>7) Remove the screws of the right panel and then remove the right panel (7 screws) (see CJ_CA30_006).</p> |  <p>Right Panel</p> <p>CJ_CA30_006</p> |

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

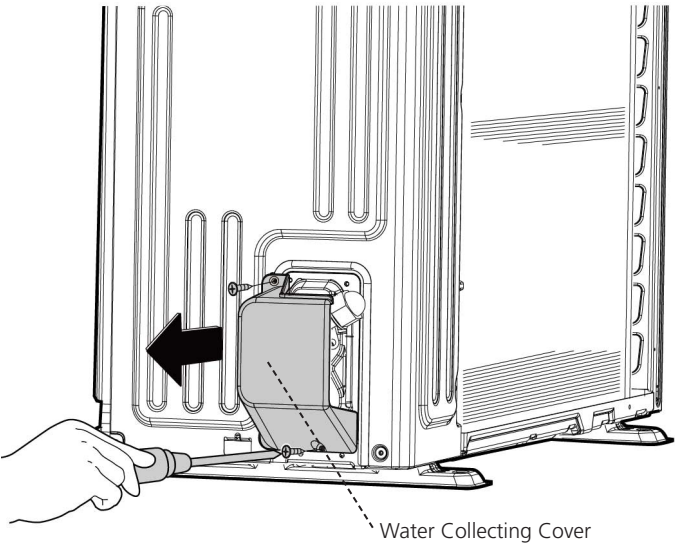
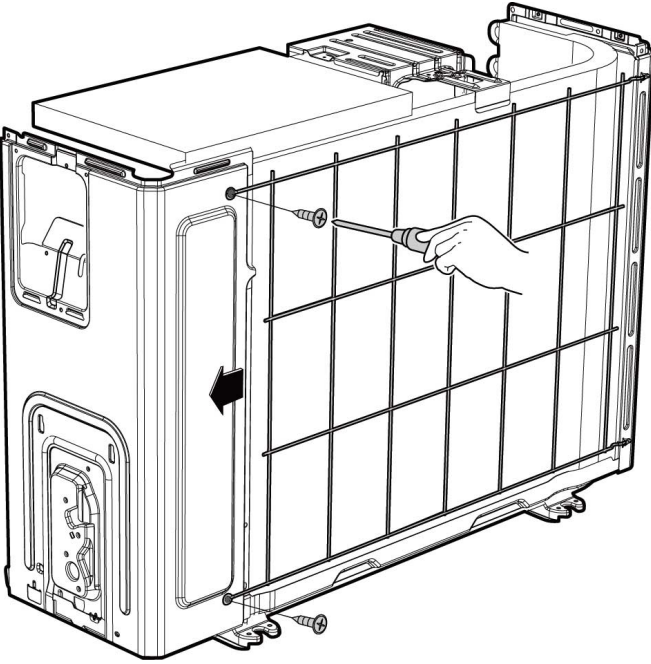
5. D30

| Procedure | Illustration |
|---|--|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screws of the big handle and then remove the big handle (2 screws) (see CJ_D30_001).</p> <p>3) Remove the screws of the top cover and then remove the top cover (4 screws). Two of the screws is located underneath the big handle (see CJ_D30_002).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_D30_001</p> <p>Top Cover</p> <p>CJ_D30_002</p> |

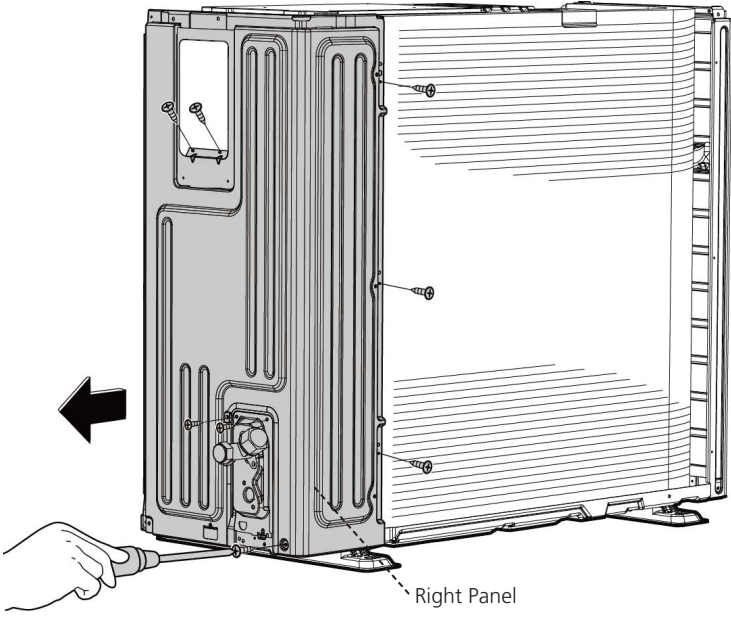
Note: This section is for reference only. Actual unit appearance may vary.

| Procedure | Illustration |
|---|---|
| <p>4) Remove the screws of the front right panel and then remove the front right panel (2 screws) (see CJ_D30_003).</p> |  <p>Front Right Panel</p> <p>CJ_D30_003</p> |
| <p>5) Remove the screws of the front panel and then remove the front panel (9 screws) (see CJ_D30_004).</p> |  <p>Front Panel</p> <p>CJ_D30_004</p> |

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

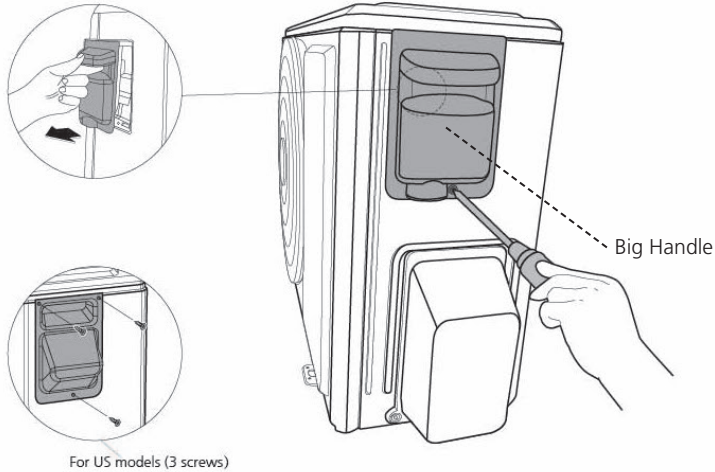
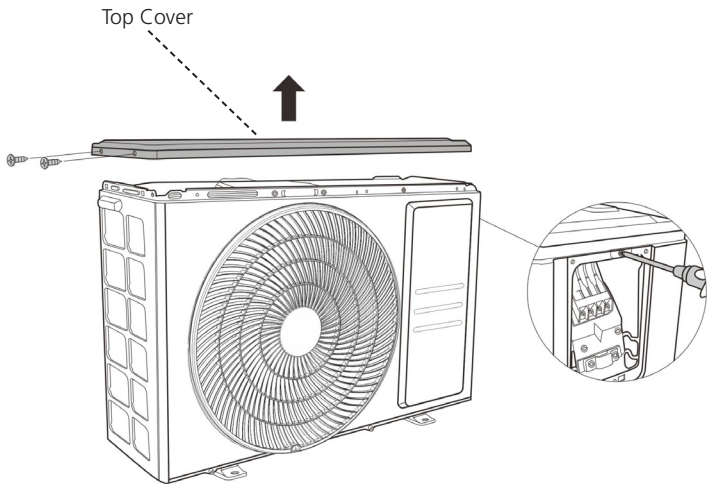
| Procedure | Illustration |
|--|---|
| <p>6) Remove the screws of water collecting cover and then remove the water collecting cover (2 screw) (see CJ_D30_005).</p> |  <p>Water Collecting Cover</p> <p>CJ_D30_005</p> |
| <p>7) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_D30_006). (for some models)</p> |  <p>CJ_D30_006</p> |

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

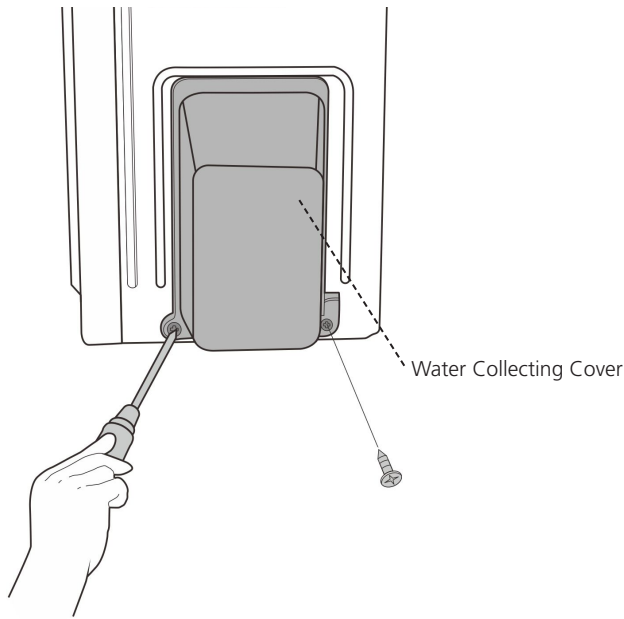
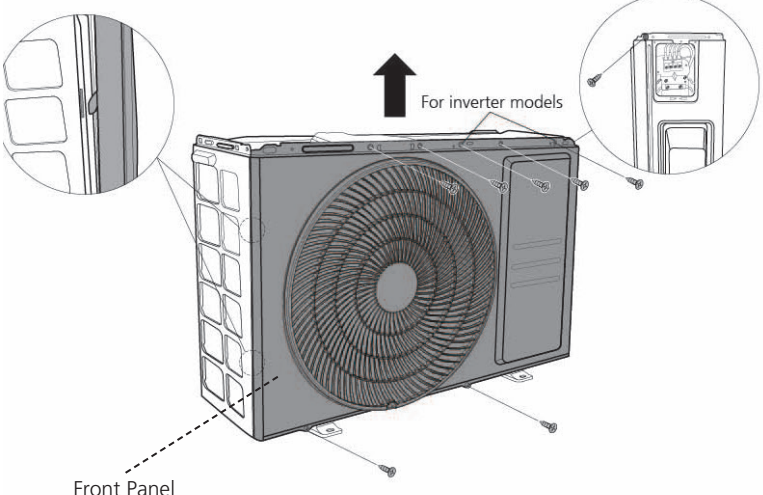
| Procedure | Illustration |
|---|---|
| <p>8) Remove the screws of the right panel and then remove the right panel (8 screws) (see CJ_D30_007).</p> |  <p style="text-align: center;">CJ_D30_007</p> |

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

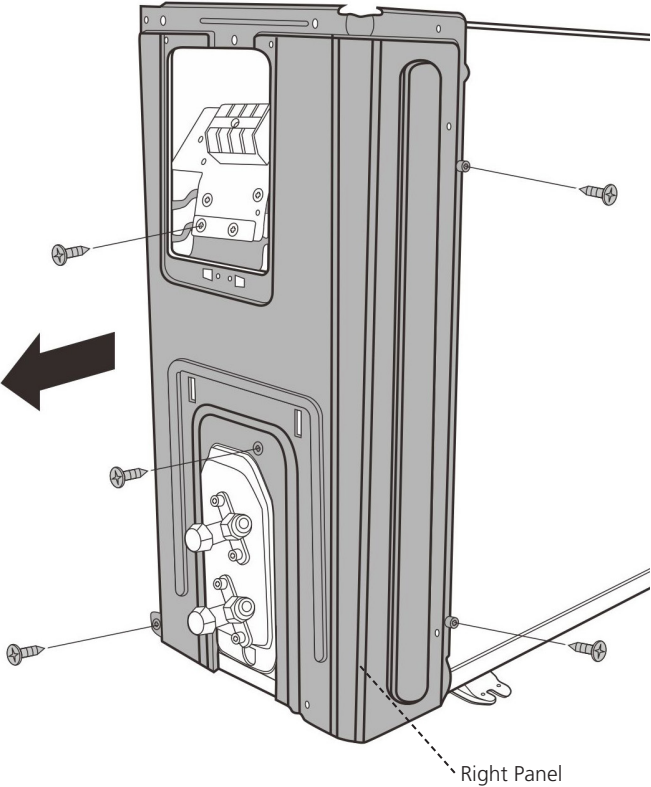
6. X130

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screw of the big handle and then remove the big handle (1 screw) (see CJ_X130_001).</p> <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_X130_002).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_X130_001</p>  <p>Top Cover</p> <p>CJ_X130_002</p> |

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

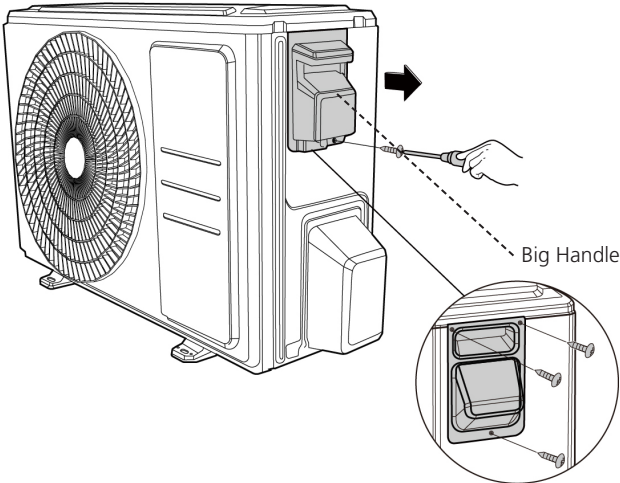
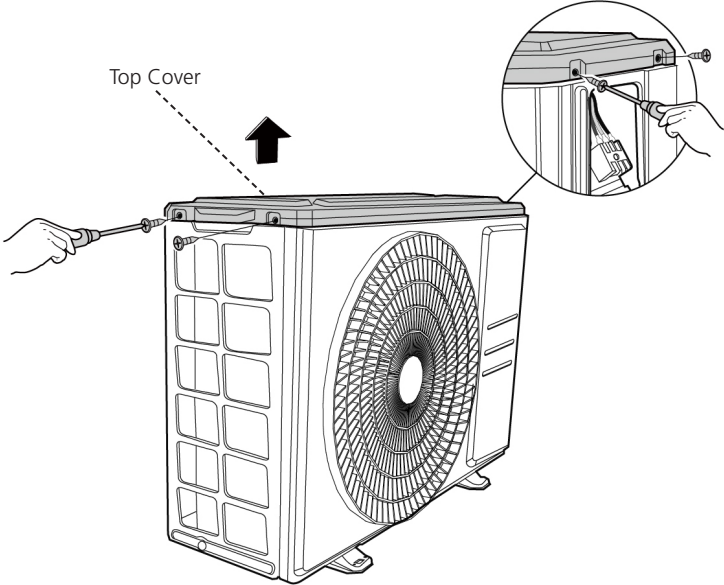
| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X130_003).</p> |  <p style="text-align: center;">CJ_X130_003</p> |
| <p>5) Remove the screws of the front panel and then remove the front panel (6 screws(onoff models) or 8 screws(inverter models) (see CJ_X130_004).</p> |  <p style="text-align: center;">CJ_X130_004</p> |

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

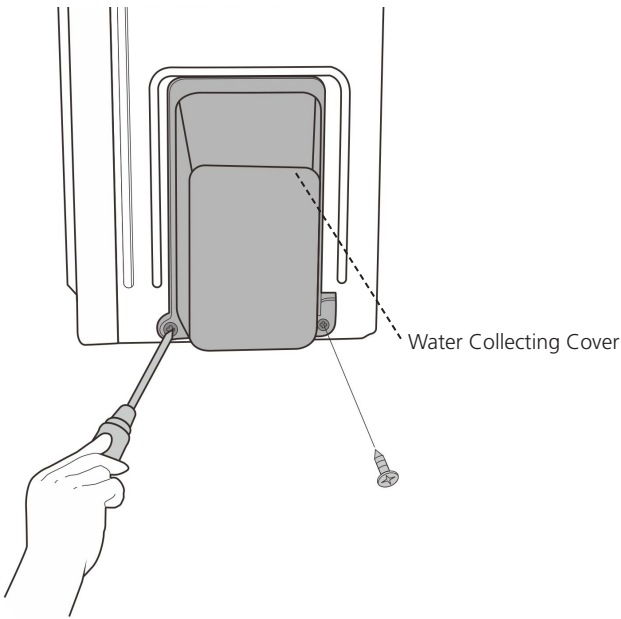
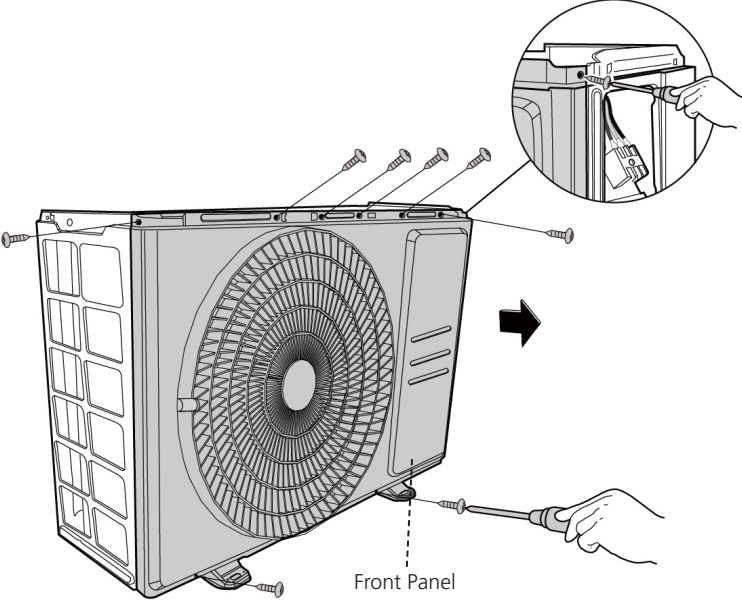
| Procedure | Illustration |
|--|---|
| <p>6) Remove the screws of the right panel and then remove the right panel (5 screws) (see CJ_X130_005).</p> |  <p style="text-align: center;">CJ_X130_005</p> |

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

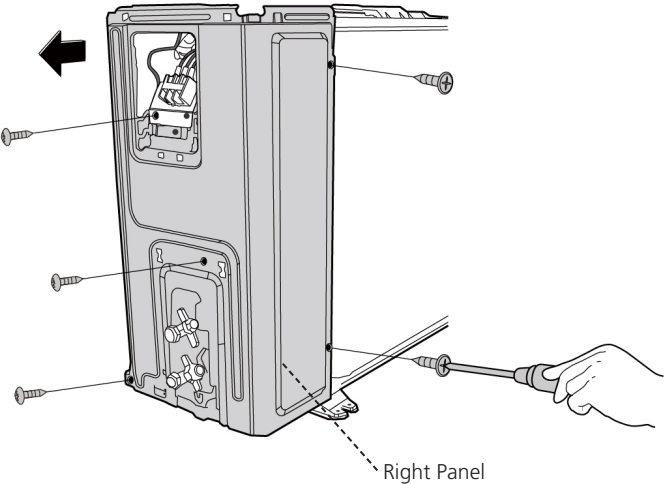
7. X230/X330

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screw of the big handle and then remove the big handle (1 screws) (see CJ_X230_001).</p> <p>3) Remove the screws of the top cover and then remove the top cover (4 screws). One of the screws is located underneath the big handle (see CJ_X230_002).</p> |  <p data-bbox="932 1025 1098 1055">CJ_X230_001</p>  <p data-bbox="932 1731 1098 1760">CJ_X230_002</p> |

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

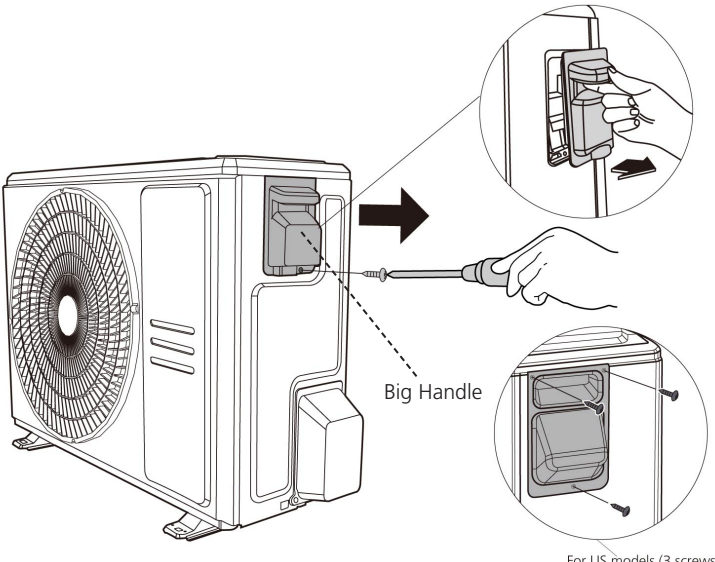
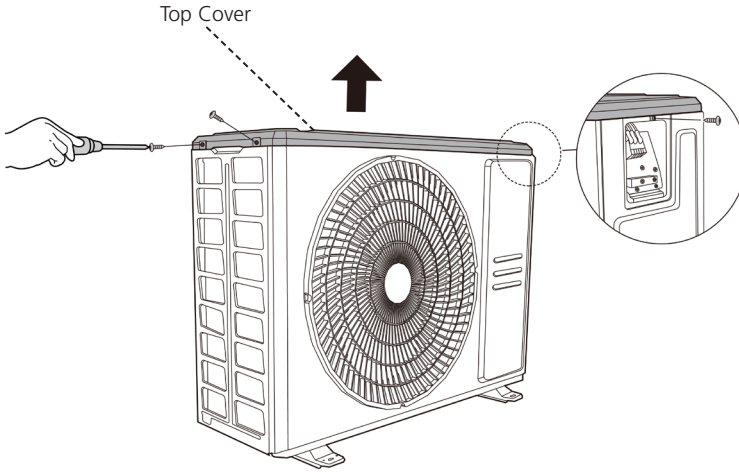
| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X230_003).</p> |  <p style="text-align: center;">CJ_X230_003</p> |
| <p>5) Remove the screws of the front panel and then remove the front panel (7 screws(onoff models) or 9 screws(inverter models) (see CJ_X230_004).</p> |  <p style="text-align: center;">CJ_X230_004</p> |

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

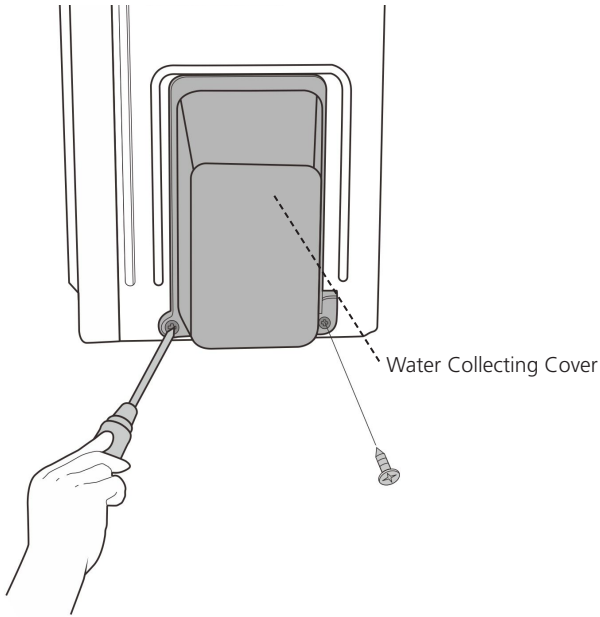
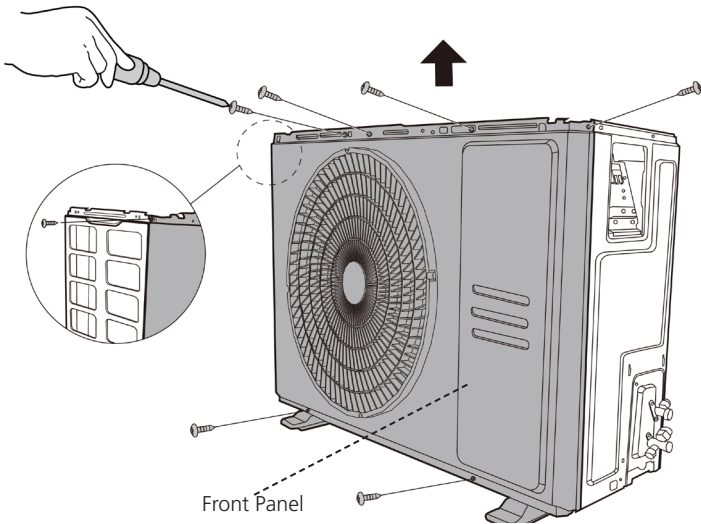
| Procedure | Illustration |
|--|--|
| <p>6) Remove the screws of the right panel and then remove the right panel (5 screws) (see CJ_X230_005).</p> |  <p style="text-align: center;">CJ_X230_005</p> |

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

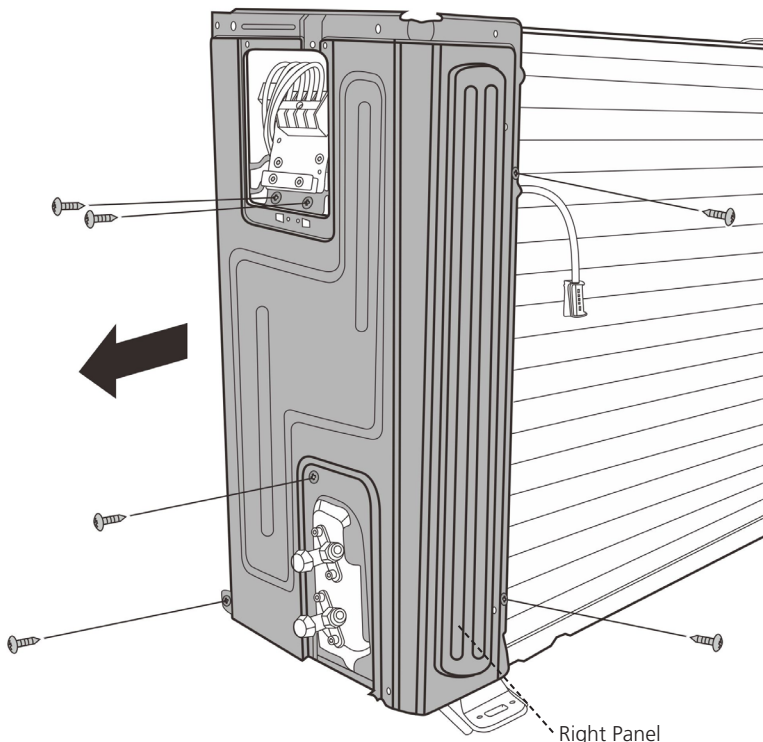
8. X430

| Procedure | Illustration |
|--|---|
| <p>1) Turn off the air conditioner and the power breaker.</p> <p>2) Remove the screw of the big handle and then remove the big handle (1 screw) (see CJ_X430_001).</p> <p>3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_X430_002).</p> |  <p>Big Handle</p> <p>For US models (3 screws)</p> <p>CJ_X430_001</p>  <p>Top Cover</p> <p>CJ_X430_002</p> |

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

| Procedure | Illustration |
|--|--|
| <p>4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X430_003).</p> |  <p style="text-align: center;">CJ_X430_003</p> |
| <p>5) Remove the screws of the front panel and then remove the front panel (7 screws(onoff models) or 9 screws(inverter models) (see CJ_X430_004).</p> |  <p style="text-align: center;">CJ_X430_004</p> |

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

| Procedure | Illustration |
|--|---|
| <p>6) Remove the screws of the right panel and then remove the right panel (6 screws) (see CJ_X430_005).</p> |  <p style="text-align: center;">CJ_X430_005</p> |

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

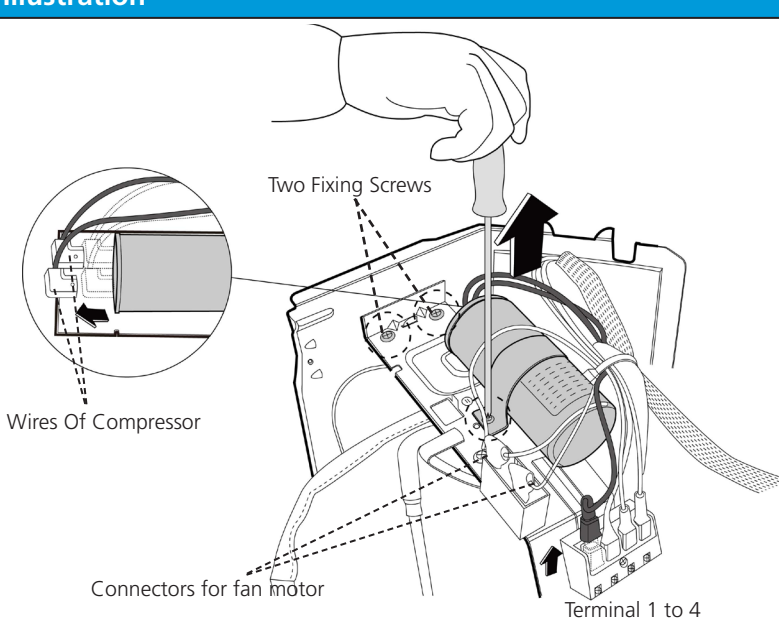
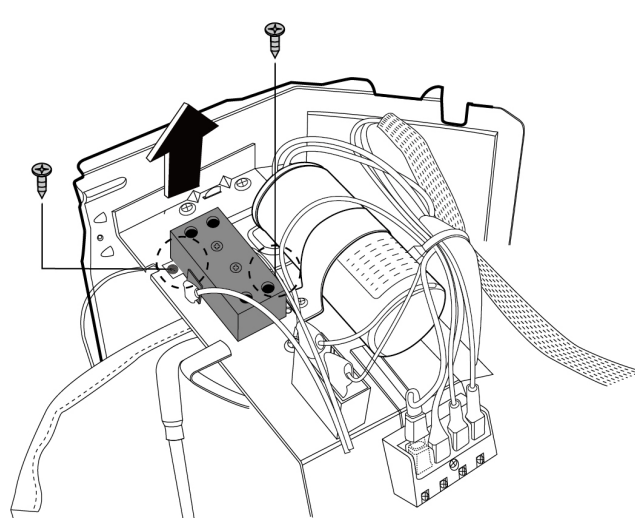
3.2 Electrical parts

⚠ WARNING: Antistatic gloves must be worn when you disassemble the electronic box.

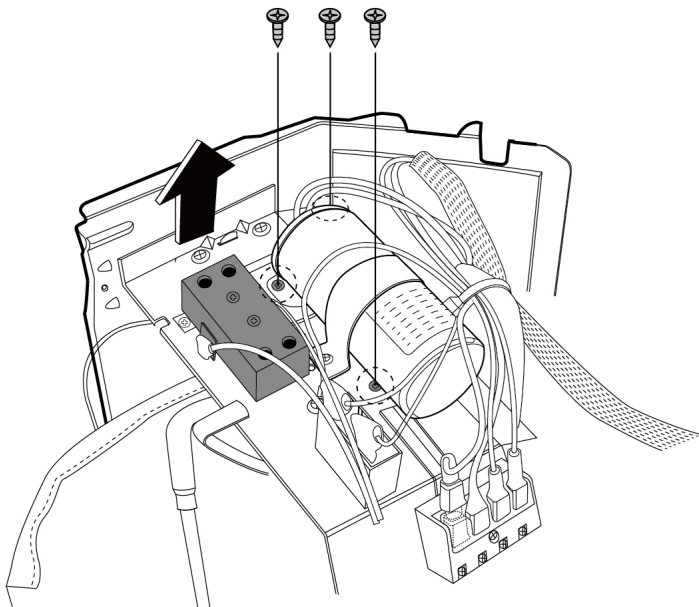
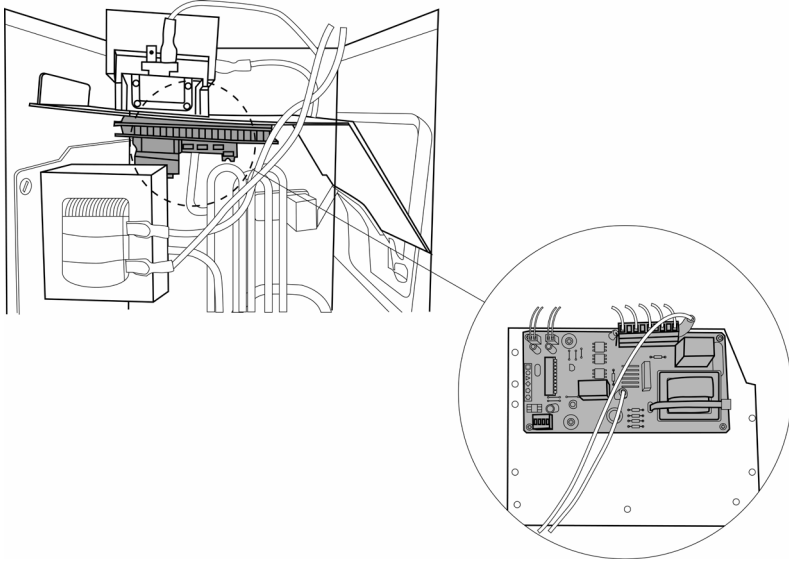
Note: Remove the air outlet grille(refer to 3.1 Panel Plate) before disassembling electrical parts.

i) PCB for ON-OFF Models

1. PCB board 1

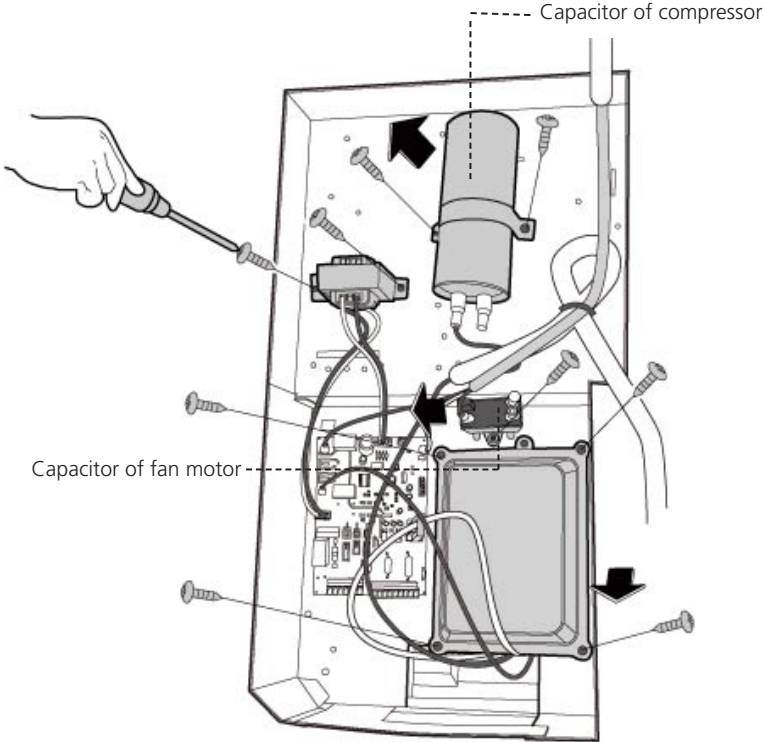
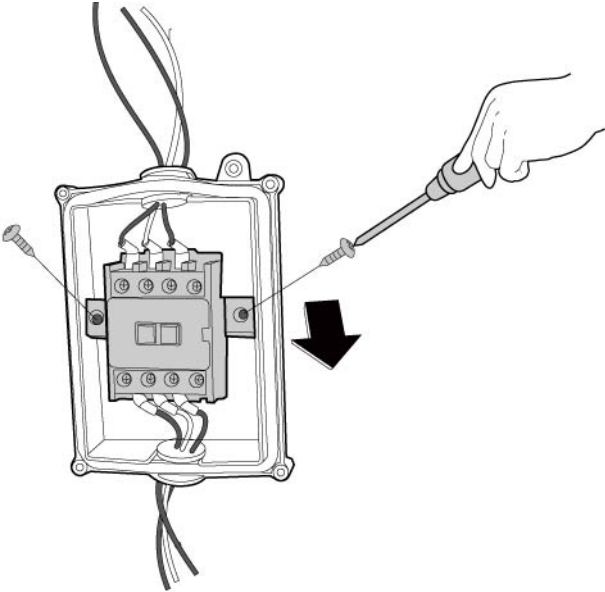
| Procedure | Illustration |
|--|--|
| <ol style="list-style-type: none"> 1) Remove the two screws fixed the electronic control board (see CJ_ODU_PCB_001). 2) Disconnect the connectors for fan motor. (Blue wire, yellow wire, red wire, brown wire and black wire. The blue wire and red wire are on the capacitor. The black wire connects with terminal 4.) (see CJ_ODU_PCB_001) 3) Disconnect the wires connected to the compressor. (Black wire connects with terminal 1, blue wire and red wire connect with the compressor capacitor) (see CJ_ODU_PCB_001) 4) Disconnect the wires connected to 4-way valve. (Blue wires on terminal 2&3) (see CJ_ODU_PCB_001) 5) Remove the fixing screw of the compressor capacitor, then pull it out (see CJ_ODU_PCB_001) 6) Remove the electrical parts (see CJ_ODU_PCB_001) 7) For models with AC conductor, remove 2 screws of it showed in the figure. |  <p>CJ_ODU_PCB_001-01</p>  <p>CJ_ODU_PCB_001-02</p> |

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

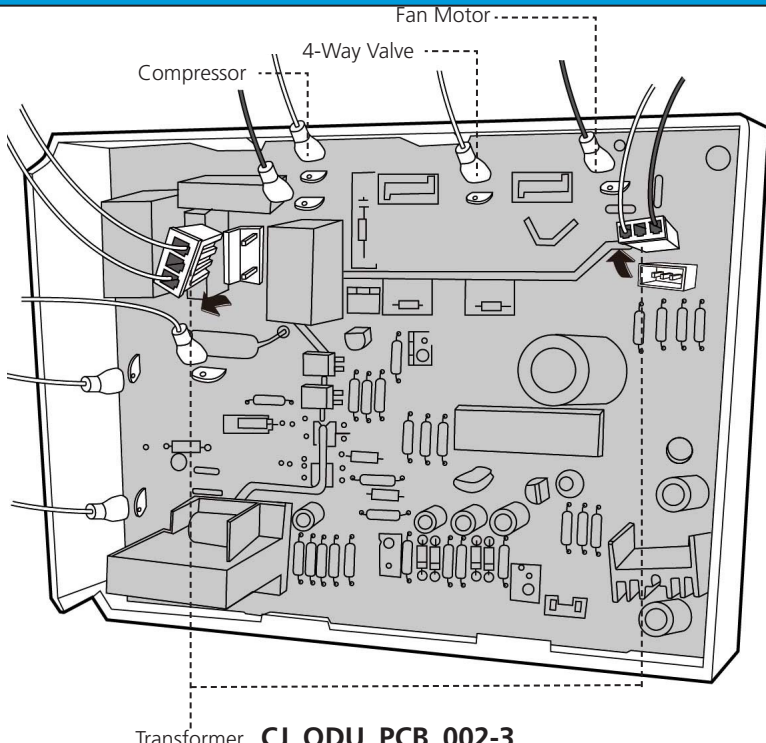
| Procedure | Illustration |
|--|--|
| <p>8) For models with subzero refrigeration control board, remove 3 screws of it showed in the figure.</p> |  <p>CJ_ODU_PCB_001-03</p> |
| <p>9) The subzero refrigeration control board is in the back of the medal sheet.</p> |  <p>CJ_ODU_PCB_001-04</p> |

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

2. PCB board 2

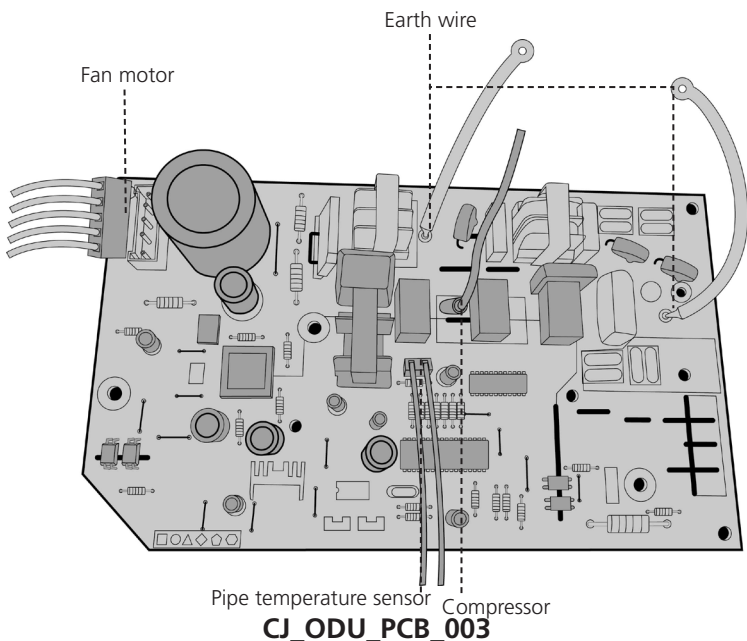
| Procedure | Illustration |
|--|--|
| <ol style="list-style-type: none"> 1) Remove the fixing screws of the compressor capacitor, then pull it out (see CJ_ODU_PCB_002-1) 2) Remove 2 screws of the transformer and then remove it. (see CJ_ODU_PCB_002-1) 3) Remove the fixing screws of the fan motor capacitor, then remove it. (see CJ_ODU_PCB_002-1) 4) Remove the 4 screws of the electronic installing box and then remove it. (see CJ_ODU_PCB_002-1) (for some models) |  <p style="text-align: center;">CJ_ODU_PCB_002-1</p>  <p style="text-align: center;">CJ_ODU_PCB_002-2</p> |
| | |

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

| Procedure | Illustration |
|---|---|
| <p>6) Disconnect the wires connected to the compressor. (Red wire connects with PCB board, others connects with terminals) (see CJ_ODU_PCB_002-3) (For some models)</p> <p>7) Disconnect the connectors for fan motor. (Blue wire, red wire, brown wire and black wire. The blue wire and brown wire are on the capacitor. The black wire connects with a terminal. And the red wire is on the board.) (see CJ_ODU_PCB_002-3)(For some models)</p> <p>8) Disconnect the wires connected to 4-way valve. (see CJ_ODU_PCB_002-3)(For some models)</p> <p>9) Disconnect the wires connected to the transformer. (see CJ_ODU_PCB_002-3)(For some models)</p> <p>10) Disconnect the other wires connected to terminals. (see CJ_ODU_PCB_002-3)(For some models)</p> <p>11) Remove the PCB board. (see CJ_ODU_PCB_002-3)(For some models)</p> |  <p>The illustration shows a top-down view of the CJ_ODU_PCB_002-3 PCB board. It is populated with various electronic components including capacitors, resistors, and integrated circuits. Four specific components are highlighted with dashed lines and labels: 'Compressor' at the top left, 'Fan Motor' at the top right, '4-Way Valve' in the upper center, and 'Transformer' at the bottom center. Wires are shown connected to various terminals and components on the board.</p> |

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

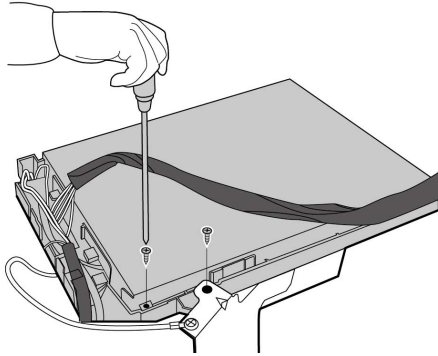
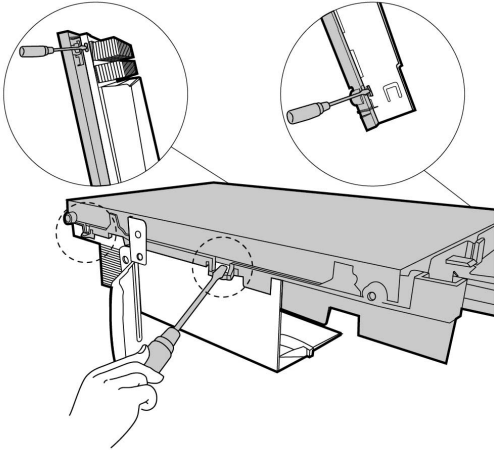
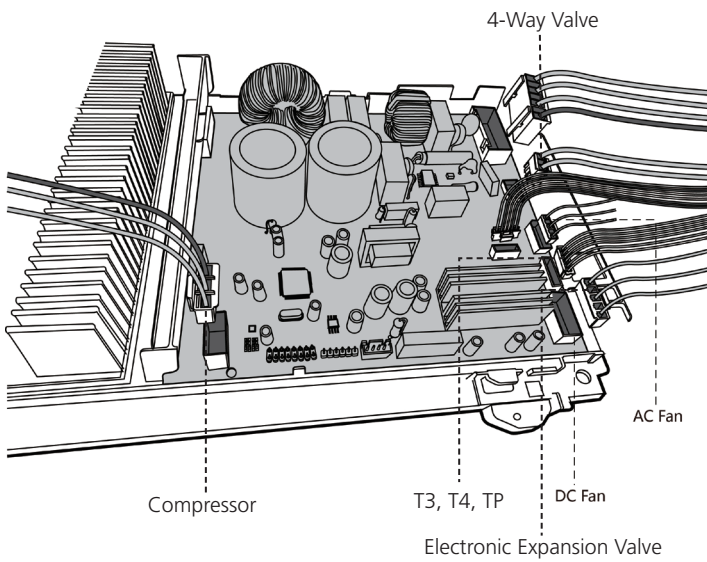
3. PCB board 3

| Procedure | Illustration |
|---|--|
| <p>1) Disconnect the connectors for fan motor (see CJ_ODU_PCB_003).</p> <p>2) Disconnect the wires connected to the compressor (see CJ_ODU_PCB_003).</p> <p>3) Disconnect the wires connected to Pipe temperature sensor (see CJ_ODU_PCB_003).</p> <p>4) Disconnect the earth wire (see CJ_ODU_PCB_003).</p> <p>5) Remove the PCB board (see CJ_ODU_PCB_003).</p> |  <p>The illustration shows a top-down view of the CJ_ODU_PCB_003 PCB board. It features a large circular component on the left, several smaller components, and a complex wiring layout. Four components are labeled with dashed lines: 'Fan motor' at the top left, 'Earth wire' at the top right, 'Pipe temperature sensor' at the bottom left, and 'Compressor' at the bottom right. The board is densely packed with electronic components and has multiple connection points for external wiring.</p> |

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

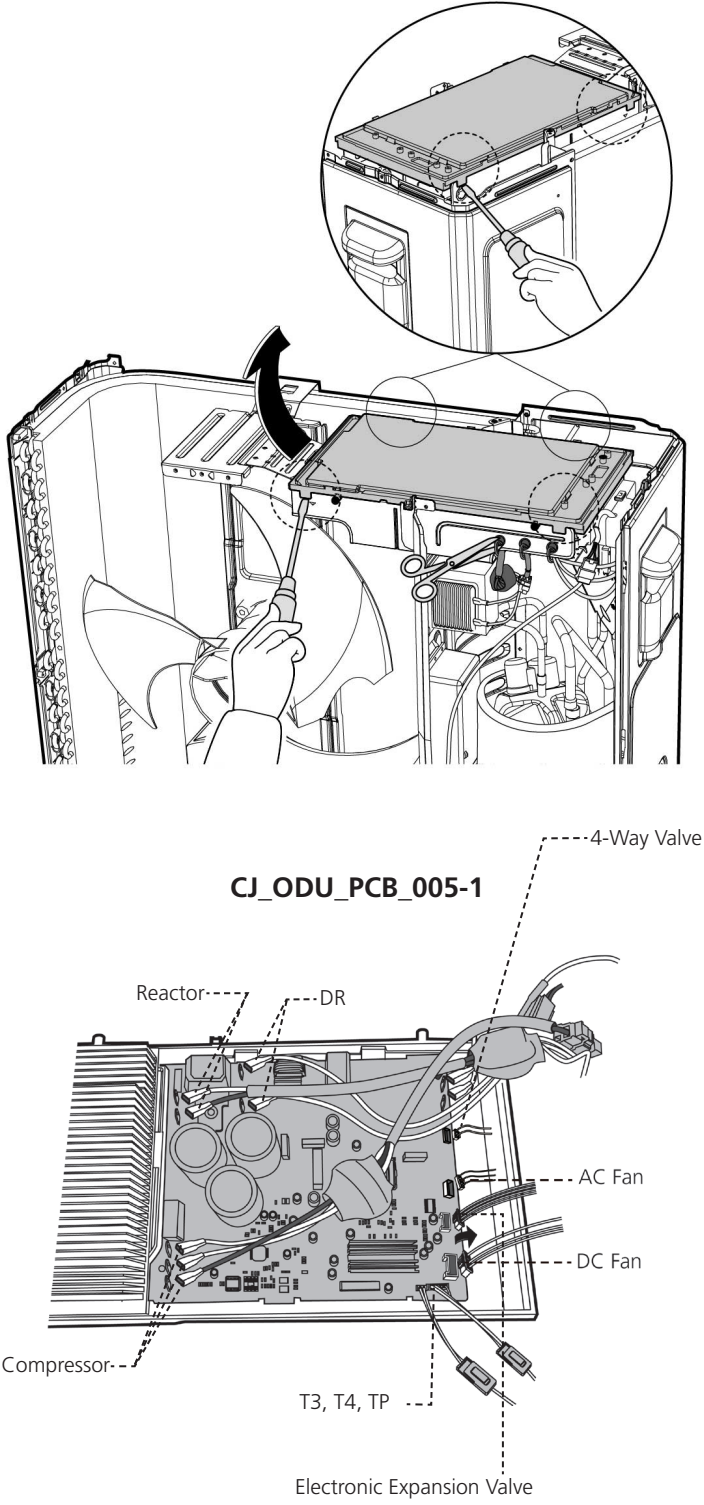
ii) PCB for Inverter Models

4. PCB board 4

| Procedure | Illustration |
|---|--|
| <ol style="list-style-type: none"> 1) Remove the screws of the top cover. (2 screws) (see CJ_ODU_PCB_004-1). 2) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_004-2). 3) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_PCB_004-3). 4) Remove the connector for the compressor (see CJ_ODU_PCB_004-3). 5) Pull out the two blue wires connected with the four way valve (CJ_ODU_PCB_004-3). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (CJ_ODU_PCB_004-3). 7) Disconnect the electronic expansion valve wire (CJ_ODU_PCB_004-3). 8) Then remove the electronic control board. |  <p style="text-align: center;">CJ_ODU_PCB_004-1</p>  <p style="text-align: center;">CJ_ODU_PCB_004-2</p>  <p style="text-align: center;">CJ_ODU_PCB_004-3</p> <p>Labels in illustration: Compressor, T3, T4, TP, DC Fan, AC Fan, Electronic Expansion Valve, 4-Way Valve.</p> |

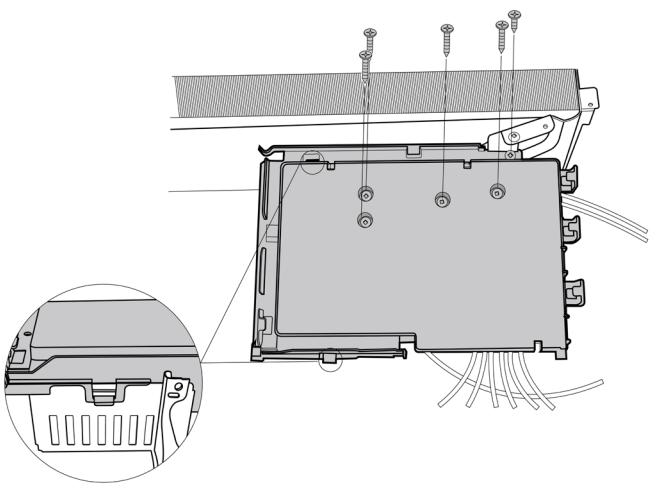
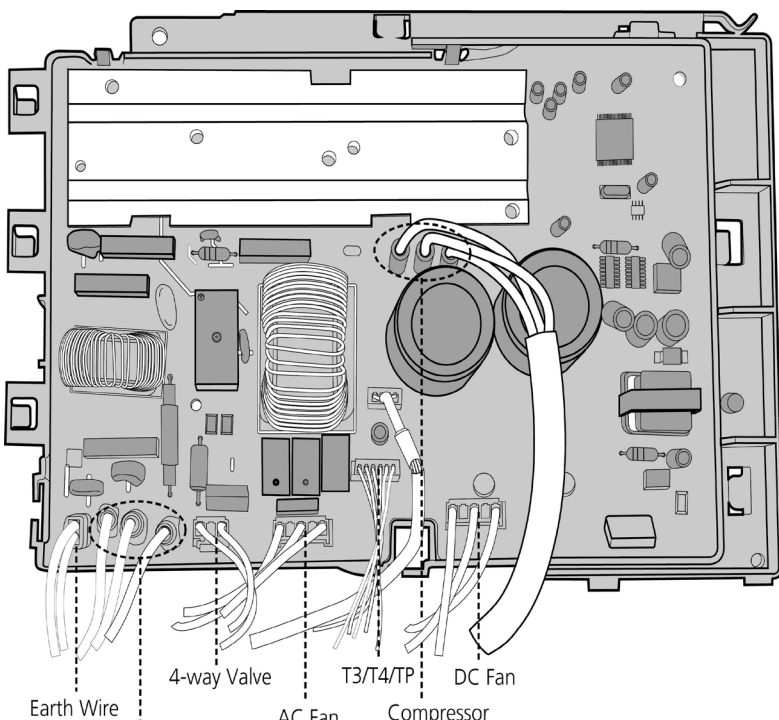
Note: This section is for reference only. Actual unit appearance may vary.

5. PCB board 5

| Procedure | Illustration |
|--|--|
| <ol style="list-style-type: none"> 1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_005-1). 2) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_PCB_005-2). 3) Remove the connector for the compressor (see CJ_ODU_PCB_005-2). 4) Pull out the two blue wires connected with the four way valve (see CJ_ODU_PCB_005-2). 5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_005-2). 6) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_005-2). 7) Then remove the electronic control board. |  <p>The illustration is divided into two parts. The top part shows a hand using a screwdriver to remove a hook from the electronic control box cover. A circular inset shows a close-up of the cover being lifted. The bottom part shows the electronic control board (CJ_ODU_PCB_005-2) with various components labeled: Reactor, DR, 4-Way Valve, AC Fan, DC Fan, Compressor, T3, T4, TP, and Electronic Expansion Valve. The board is shown with its connectors and wires.</p> |

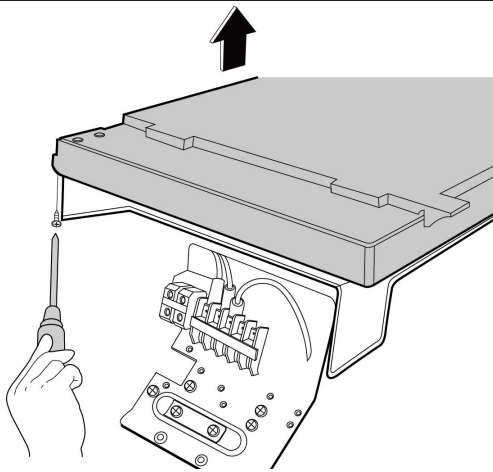
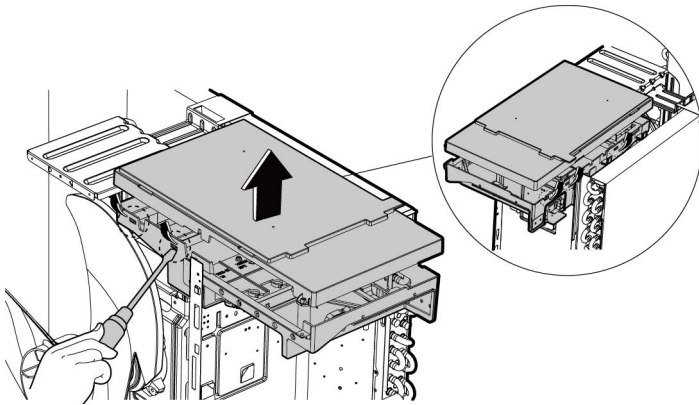
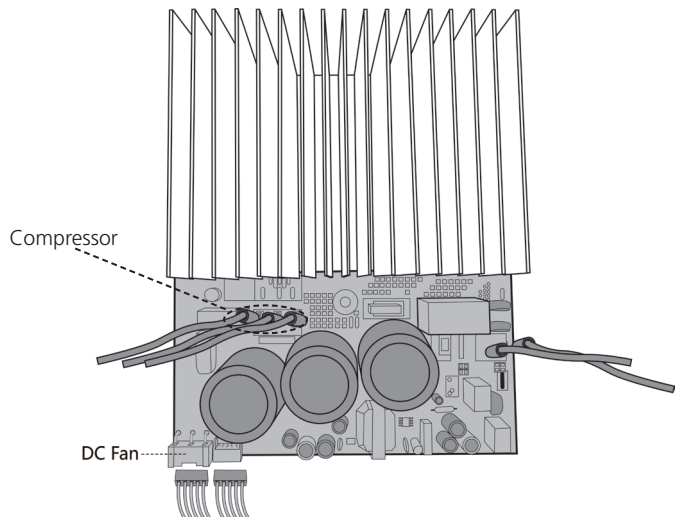
Note: This section is for reference only. Actual unit appearance may vary.

5. PCB board 6

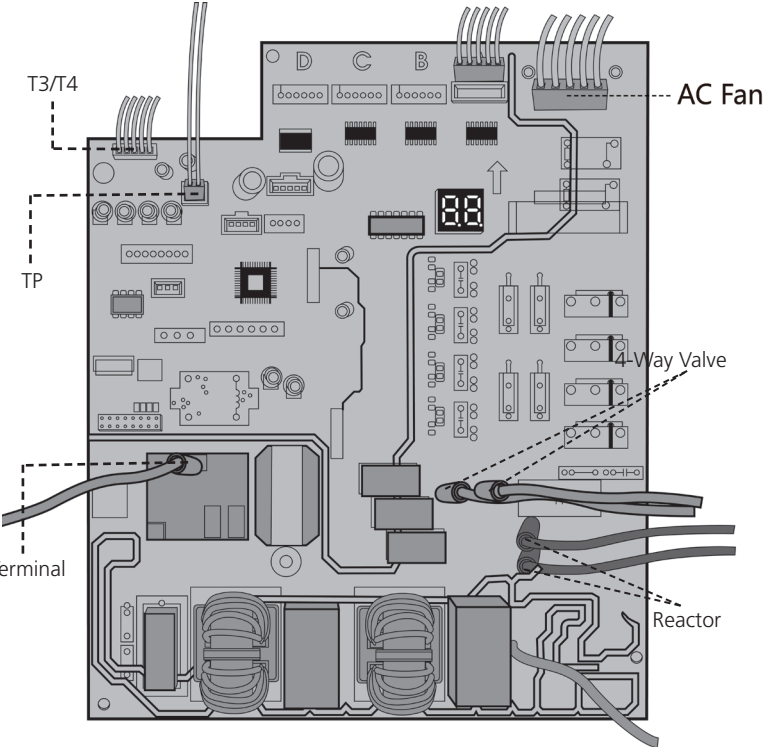
| Procedure | Illustration |
|--|---|
| <p>1) Remove the screws and unfix the hooks, then open the electronic control box cover (5 screws and 2 hooks)(see CJ_ODU_PCB_006-1).</p> |  <p style="text-align: center;">CJ_ODU_PCB_006-1</p> |
| <p>2) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_PCB_006-2).</p> <p>3) Remove the connector for the compressor (see CJ_ODU_PCB_006-2).</p> <p>4) Pull out the two blue wires connected with the four way valve (see CJ_ODU_PCB_006-2).</p> <p>5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_006-2).</p> <p>6) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_006-2).</p> <p>7) Remove the connector for the DR and reactor (see Fig CJ_ODU_PCB_006-2).</p> <p>8) Then remove the electronic control board.</p> |  <p style="text-align: center;">CJ_ODU_PCB_006-2</p> |

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

6. PCB board 7

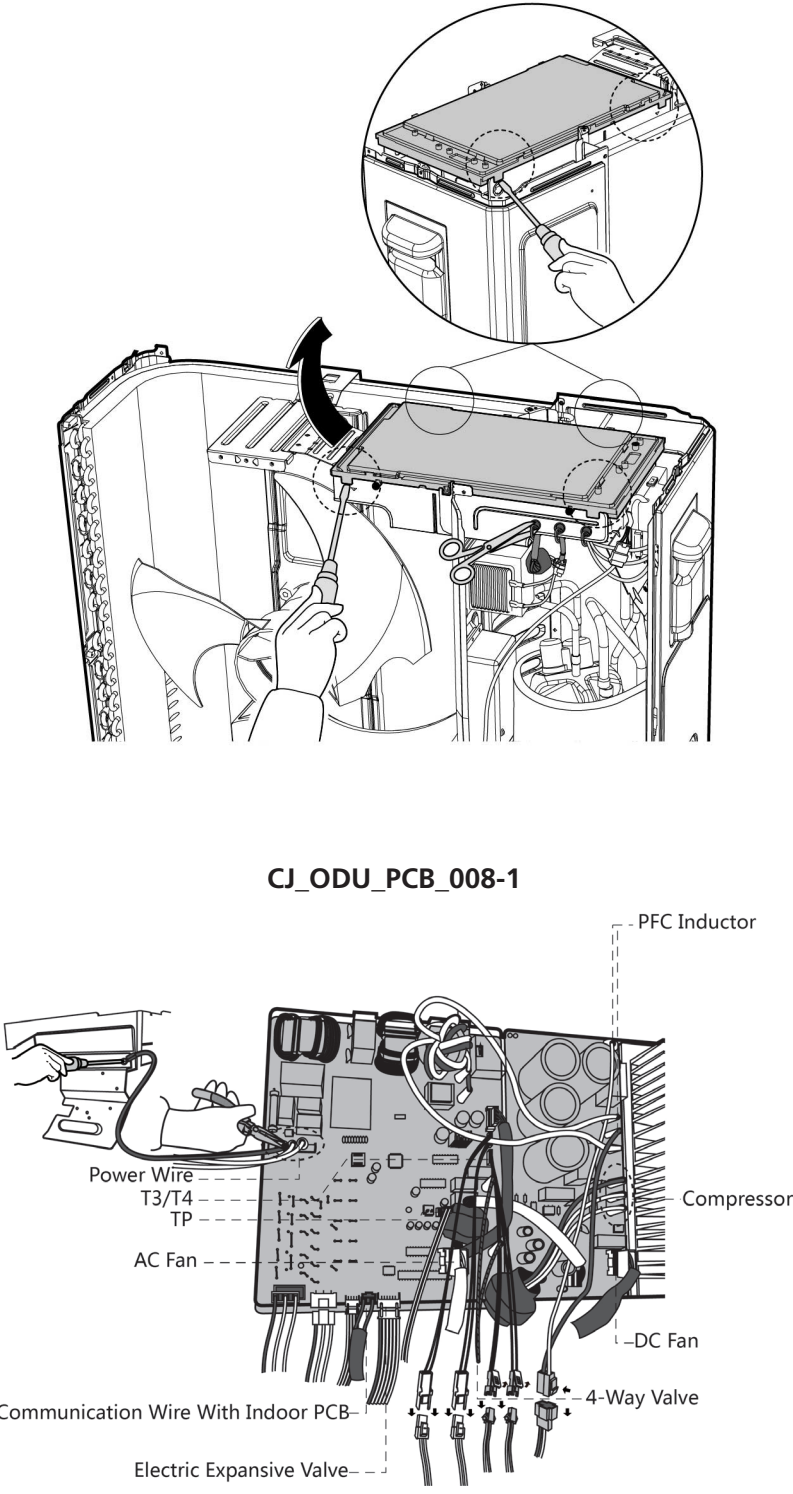
| Procedure | Illustration |
|---|--|
| <p>1) Remove the screws of the top cover. (1 screws) (see CJ_ODU_PCB_007-1).</p> |  <p>CJ_ODU_PCB_007-1</p> |
| <p>2) Unfix the hooks and then open the electronic control box cover (5 hooks) (see CJ_ODU_PCB_007-2).</p> |  <p>CJ_ODU_PCB_007-2</p> |
| <p>3) Disconnect the connector for fan motor from the IPM board (see CJ_ODU_PCB_007-3).</p> <p>4) Remove the connector for the compressor (see CJ_ODU_PCB_007-3).</p> |  <p>CJ_ODU_PCB_007-3</p> |

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

| Procedure | Illustration |
|---|---|
| <ol style="list-style-type: none"> 5) Pull out the wire connected with the terminal. (see CJ_ODU_PCB_007-4). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_007-4). 7) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_007-4). 8) Remove the connector for 4-way valve. (see Fig CJ_ODU_PCB_007-4). 9) Remove the connector for the reactor (see Fig CJ_ODU_PCB_007-4). 10)Then remove the electronic control box (see Fig CJ_ODU_PCB_007-4). |  <p>The diagram illustrates the internal components of the CJ_ODU_PCB_007-4 electronic control board. Key components and their locations are labeled with dashed lines and text:</p> <ul style="list-style-type: none"> T3/T4: Points to the condenser coil temperature and outdoor ambient temperature sensor connectors at the top left. TP: Points to the discharge temperature sensor connector below T3/T4. AC Fan: Points to the fan motor connector at the top right. 4-Way Valve: Points to the electronic expansion valve connector on the right side. Reactor: Points to the reactor connector at the bottom right. Terminal: Points to a wire terminal on the left side. <p>The board features a central microcontroller, various resistors, capacitors, and a digital display showing '88'. It is populated with numerous integrated circuits and connectors for different system components.</p> <p style="text-align: center;">CJ_ODU_PCB_007-4</p> |

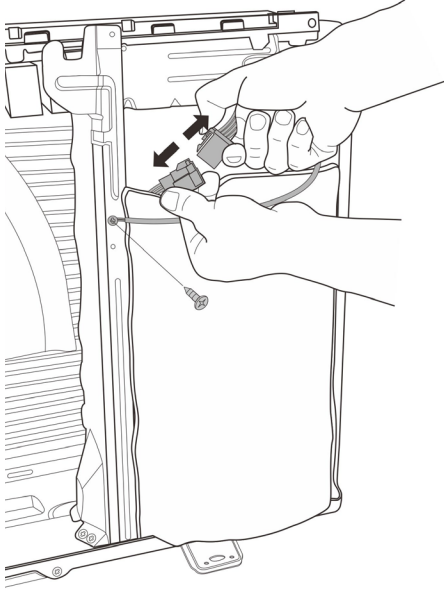
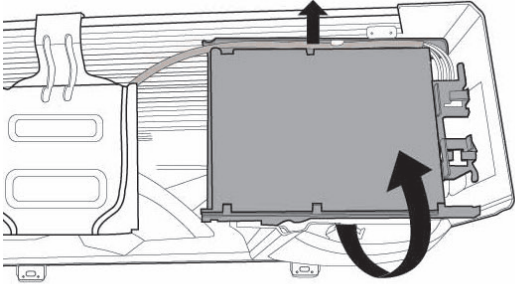
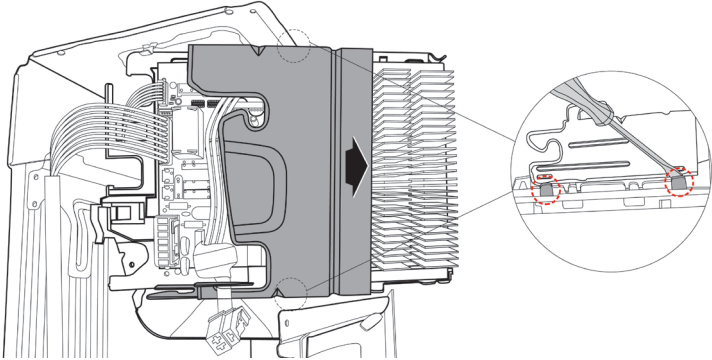
Note: This section is for reference only. Actual unit appearance may vary.

7. PCB board 8

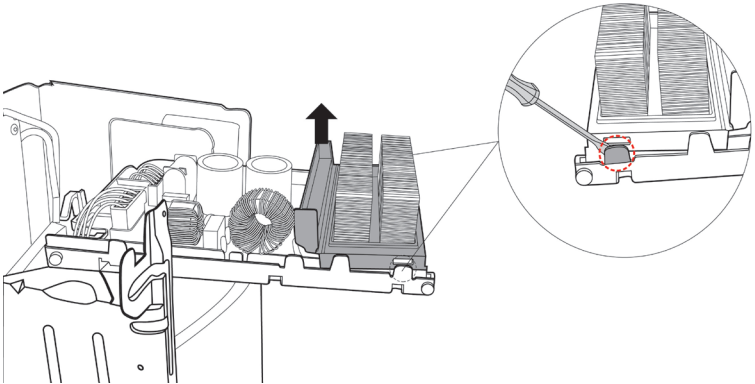
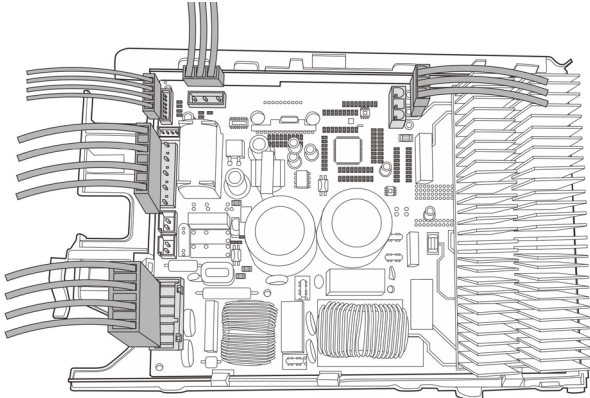
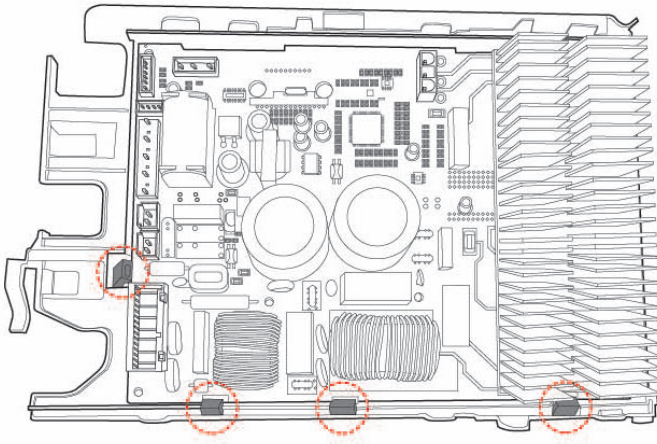
| Procedure | Illustration |
|---|---|
| <ol style="list-style-type: none"> 1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_008-1). 2) Disconnect the connector for outdoor DC fan from the electronic control board (see CJ_ODU_PCB_008-2). 3) Remove the connector for the compressor (see CJ_ODU_PCB_008-2). 4) Pull out the two blue wires connected with the four way valve (see CJ_ODU_PCB_008-2). 5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_008-2). 6) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_008-2). 7) Disconnect the communication wire indoor PCB (see Fig CJ_ODU_PCB_008-2). 8) Disconnect the PFC inductor (see Fig CJ_ODU_PCB_008-2). 9) Then remove the electronic control box (see CJ_ODU_PCB_008-2). |  <p>The illustration is divided into two parts. The top part, labeled CJ_ODU_PCB_008-1, shows a hand using a screwdriver to remove the cover of the electronic control box. The bottom part, labeled CJ_ODU_PCB_008-2, shows the PCB board being removed from the unit. Various components are labeled with dashed lines pointing to them: Power Wire, T3/T4, TP, AC Fan, PFC Inductor, Compressor, DC Fan, 4-Way Valve, Electric Expansive Valve, and Communication Wire With Indoor PCB.</p> |

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

9. PCB board 9

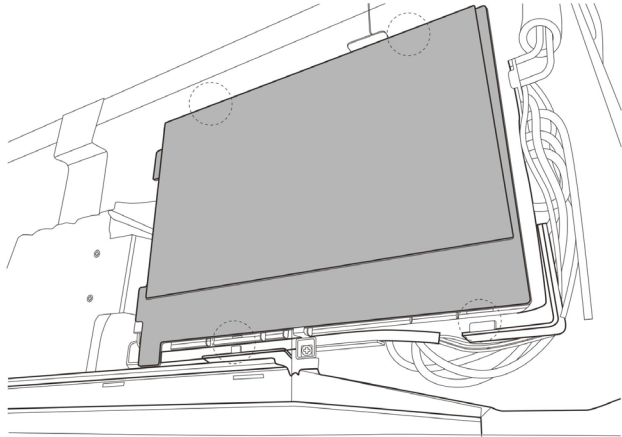
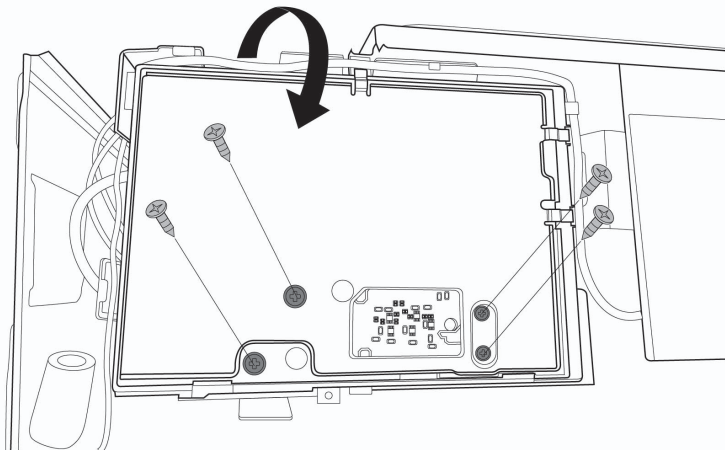
| Procedure | Illustration |
|---|---|
| <p>1) Disconnect the connector for compressor and release the ground wire(1 screw). (see CJ_ODU_PCB_009-1).</p> <p>2) Pull out the wires from electrical supporting plate and turn over the electronic control assembly. (see CJ_ODU_PCB_009-2).</p> <p>3) Remove the electronic installing box subassembly (4 hooks) (see CJ_ODU_PCB_009-3).</p> |  <p>CJ_ODU_PCB_009-1</p>  <p>CJ_ODU_PCB_009-2</p>  <p>CJ_ODU_PCB_009-3</p> |

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

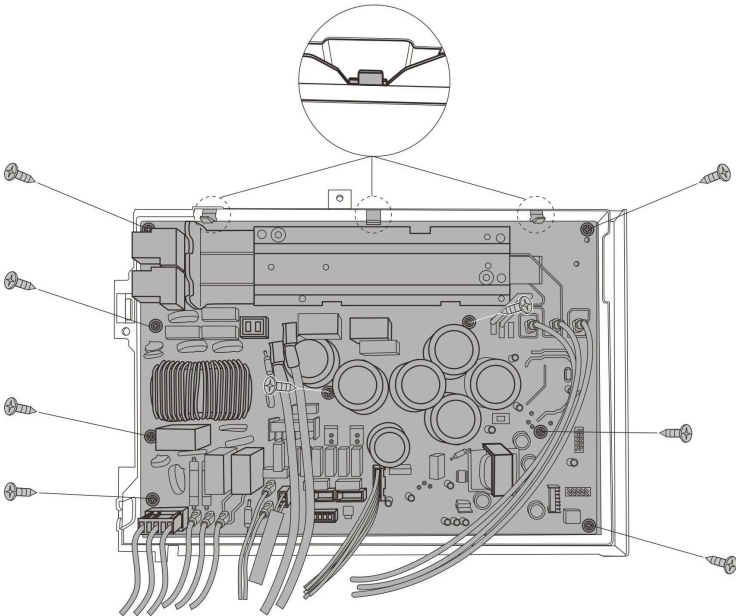
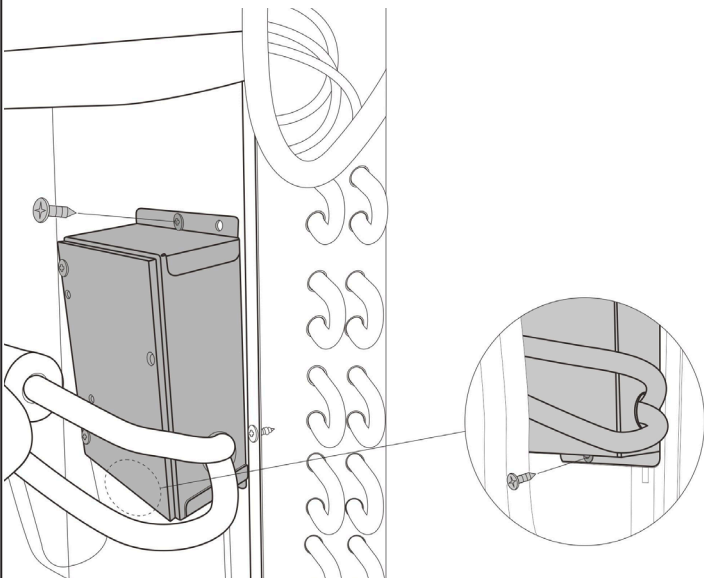
| Procedure | Illustration |
|---|---|
| <p>4) Remove the fixing board (2 hooks) (see CJ_ODU_PCB_009-4).</p> |  <p style="text-align: center;">CJ_ODU_PCB_009-4</p> |
| <p>5) Disconnect the connectors from the electronic control board (see CJ_ODU_PCB_009-5).</p> |  <p style="text-align: center;">CJ_ODU_PCB_009-5</p> |
| <p>6) Then remove the electronic control board (4 hooks).(see CJ_ODU_PCB_009-6).</p> |  <p style="text-align: center;">CJ_ODU_PCB_009-6</p> |

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

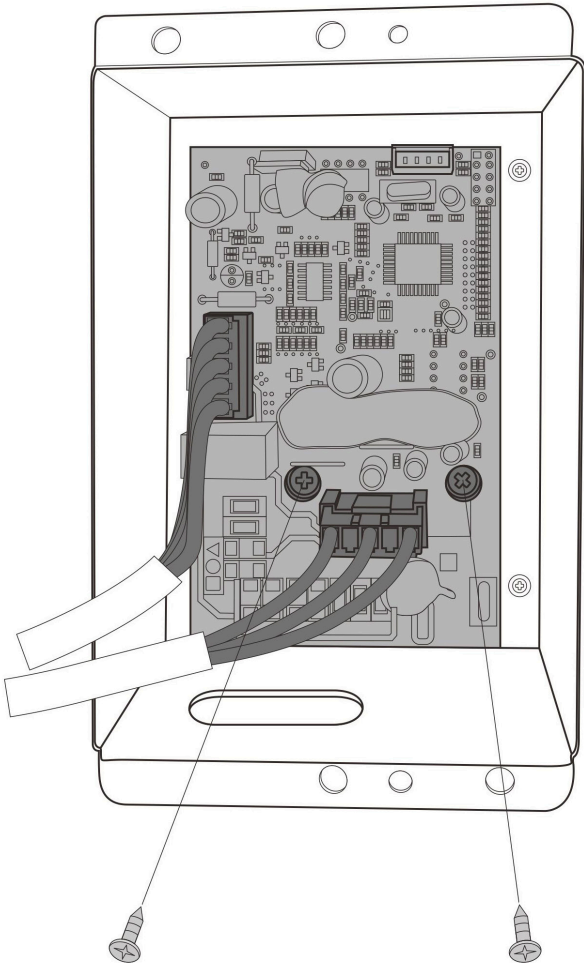
10. PCB board 10

| Procedure | Illustration |
|---|--|
| <p>1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_010-1).</p> |  <p>CJ_ODU_PCB_010-1</p> |
| <p>2) Remove 4 screws on the electronic control board and then turn over the electronic control board (see CJ_ODU_PCB_010-2).</p> |  <p>CJ_ODU_PCB_010-2</p> |

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

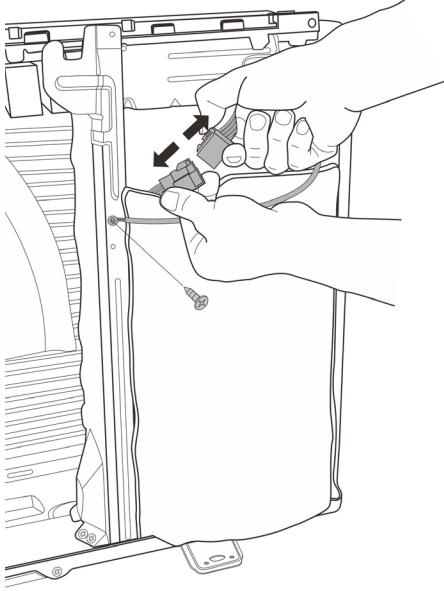
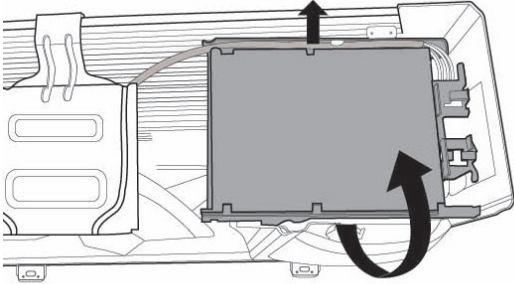
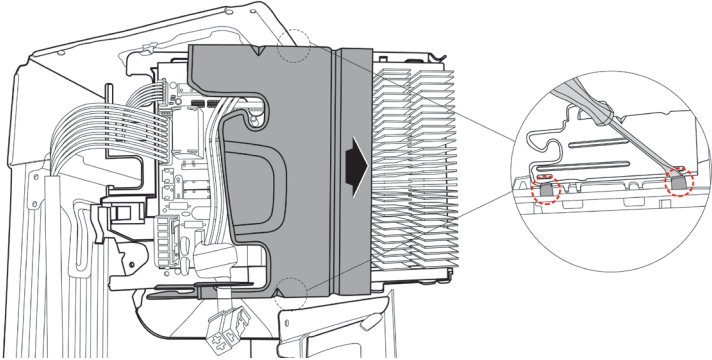
| Procedure | Illustration |
|---|--|
| <p>3) Pull out the connectors (see CJ_ODU_PCB_010-3).</p> <p>4) Remove the 9 screws and unfix the 3 hooks and then remove the electronic control board(see CJ_ODU_PCB_010-3).</p> |  <p>The diagram shows the electronic control board (CJ_ODU_PCB_010-3) with 9 screws and 3 hooks marked for removal. A circular inset shows a close-up of one of the hooks.</p> <p style="text-align: center;">CJ_ODU_PCB_010-3</p> |
| <p>5) Remove two screws and then remove the electronic control box subassembly on partition board assembly. (see CJ_ODU_PCB_010-4).</p> |  <p>The diagram shows the electronic control box subassembly (CJ_ODU_PCB_010-4) mounted on a partition board assembly. Two screws are marked for removal. A circular inset shows a close-up of one of the screws.</p> <p style="text-align: center;">CJ_ODU_PCB_010-4</p> |

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

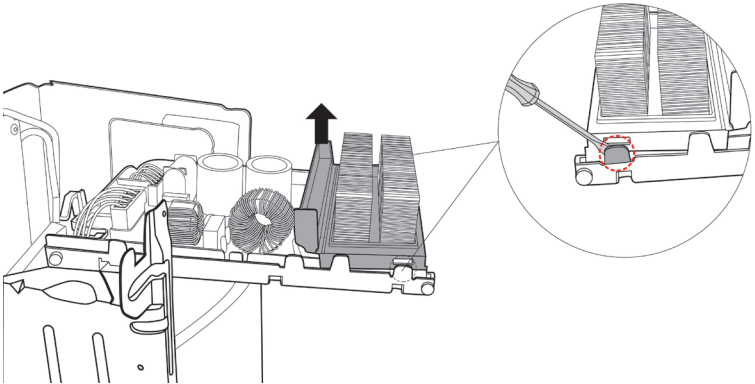
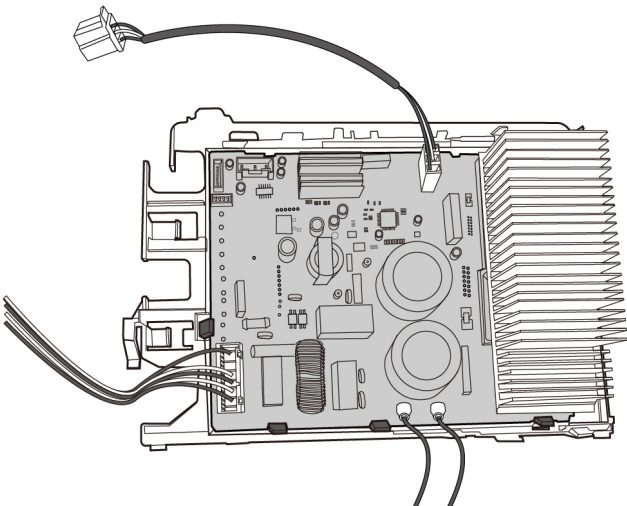
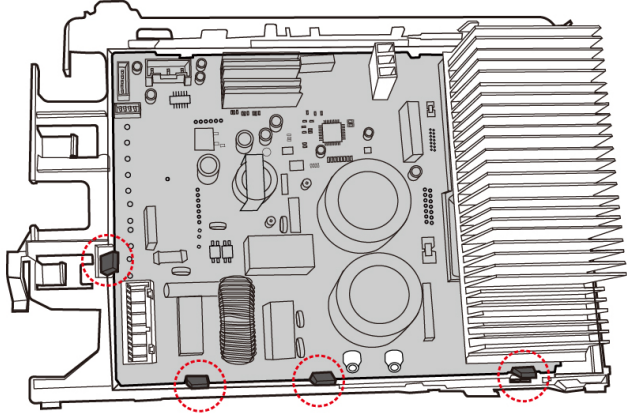
| Procedure | Illustration |
|---|--|
| <p>6) Remove two screws and two connectors and then remove the inverter control board (see CJ_ODU_PCB_010-5).</p> |  <p style="text-align: center;">CJ_ODU_PCB_010-5</p> |

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

11. PCB board 11

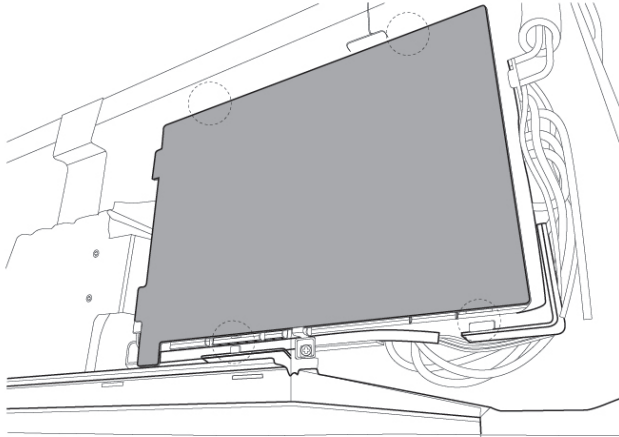
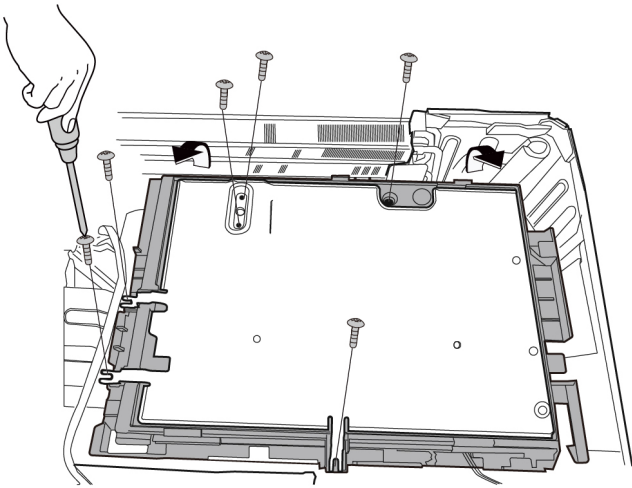
| Procedure | Illustration |
|--|--|
| <p>1) Disconnect the connector for compressor and release the ground wire(1 screw). (see CJ_ODU_PCB_0011-1).</p> |  <p>CJ_ODU_PCB_011-1</p> |
| <p>2) Pull out the wires from electrical supporting plate and turn over the electronic control assembly. (see CJ_ODU_PCB_011-2).</p> |  <p>CJ_ODU_PCB_011-2</p> |
| <p>3) Remove the electronic installing box subassembly (4 hooks) (see CJ_ODU_PCB_011-3).</p> |  <p>CJ_ODU_PCB_011-3</p> |

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

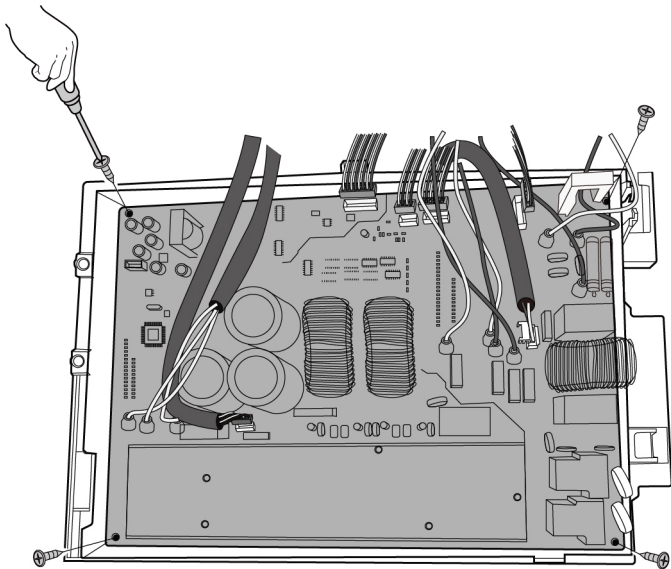
| Procedure | Illustration |
|---|---|
| <p>4) Remove the fixing board (2 hooks) (see CJ_ODU_PCB_011-4).</p> |  <p style="text-align: center;">CJ_ODU_PCB_011-4</p> |
| <p>5) Disconnect the connectors from the electronic control board (see CJ_ODU_PCB_011-5).</p> |  <p style="text-align: center;">CJ_ODU_PCB_011-5</p> |
| <p>6) Then remove the electronic control board (4 hooks).(see CJ_ODU_PCB_011-6).</p> |  <p style="text-align: center;">CJ_ODU_PCB_011-6</p> |

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

12. PCB board 12

| Procedure | Illustration |
|--|---|
| <p>1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_012-1).</p> <p>2) Remove 6 screws on the electronic control board and then turn over the electronic control board (see CJ_ODU_PCB_012-2).</p> |  <p style="text-align: center;">CJ_ODU_PCB_012-1</p>  <p style="text-align: center;">CJ_ODU_PCB_012-2</p> |

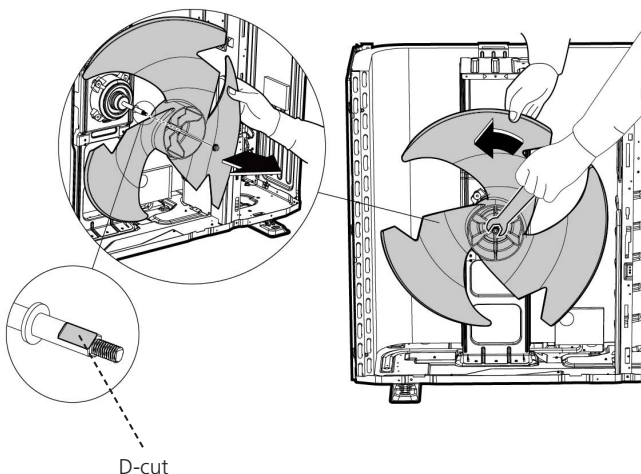
Note: This section is for reference only. Actual unit appearance may vary.

| Procedure | Illustration |
|---|---|
| <p>3) Pull out the connectors (see CJ_ODU_PCB_012-3).</p> <p>4) Remove the 4 screws and then remove the electronic control board(see CJ_ODU_PCB_012-3).</p> |  <p style="text-align: center;">CJ_ODU_PCB_012-3</p> |

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

3.3 Fan Assembly

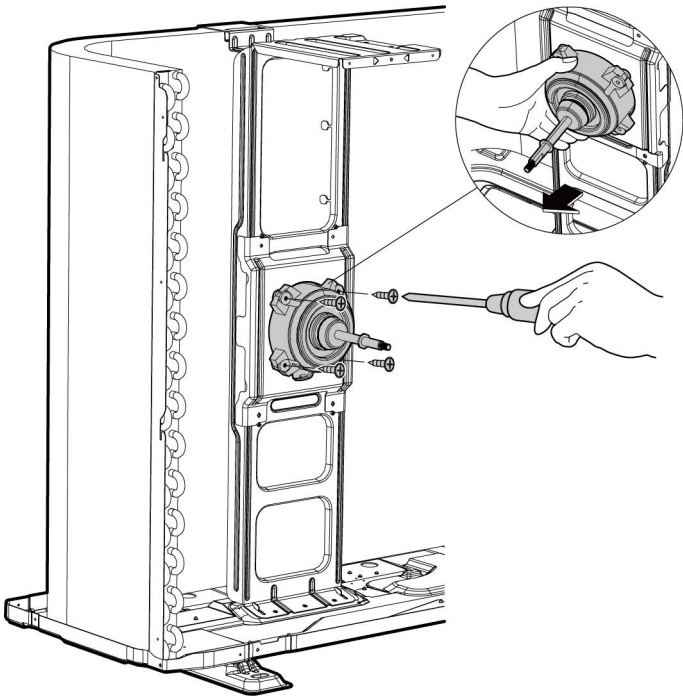
Note: Remove the panel plate (refer to 3.1 Panel Plate) before disassembling fan.

| Procedure | Illustration |
|--|--|
| <ol style="list-style-type: none">1) Remove the nut securing the fan with a spanner (see CJ_ODU_FAN_001).2) Remove the fan. |  <p>CJ_ODU_FAN_001</p> |

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

3.4 Fan Motor

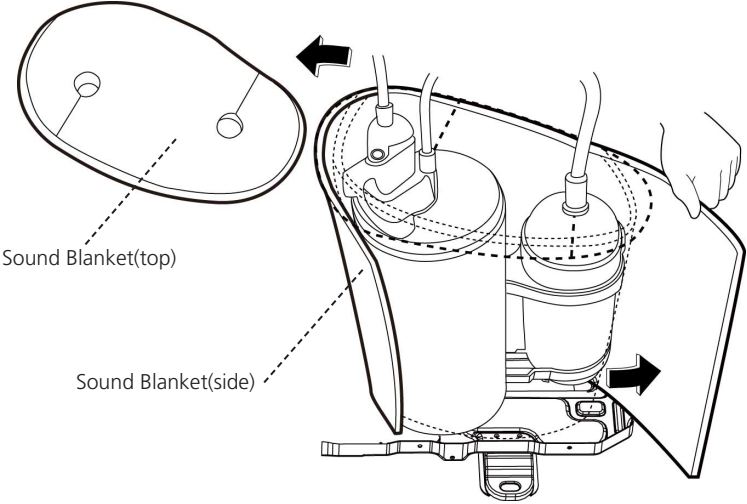
Note: Remove the panel plate and the connection of fan motor on PCB (refer to 3.1 Panel Plate and 3.2 Electrical parts) before disassembling fan motor.

| Procedure | Illustration |
|--|---|
| <p>3) Remove the fixing screws of the fan motor (4 screws) (see CJ_ODU_MOTOR_001).</p> <p>4) Remove the fan motor.</p> |  <p>CJ_ODU_MOTOR_001</p> |

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

3.5 Sound blanket

Note: Remove the panel plate (refer to 3.1 Panel plate) before disassembling sound blanket.

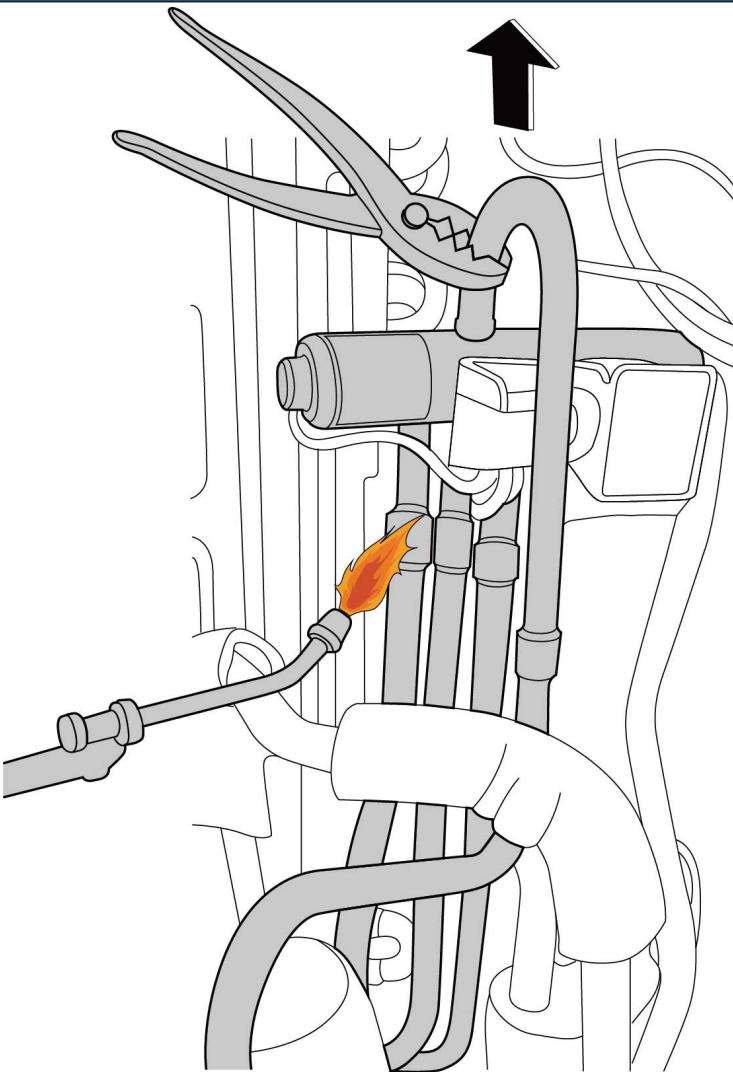
| Procedure | Illustration |
|--|---|
| 1) Remove the sound blanket (side and top) (see CJ_ODU_BLANKET_001). |  <p>Sound Blanket(top)</p> <p>Sound Blanket(side)</p> <p>CJ_ODU_BLANKET_001</p> |

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

3.6 Four-way valve (for heat pump models)

⚠ WARNING: Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve and the compressor. (For R32 & R290, you should evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.)

Note: Remove the panel plate, connection of four-way valve on PCB (refer to 3.1 Panel plate and 3.2 Electrical parts) before disassembling sound blanket.

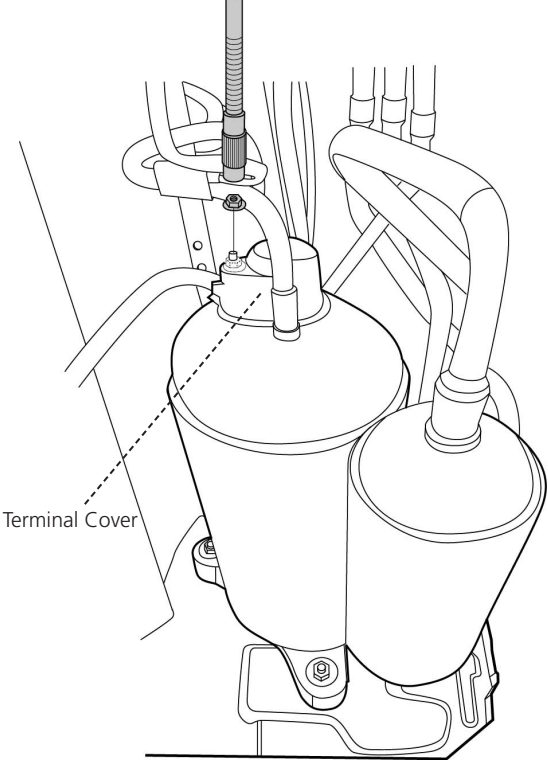
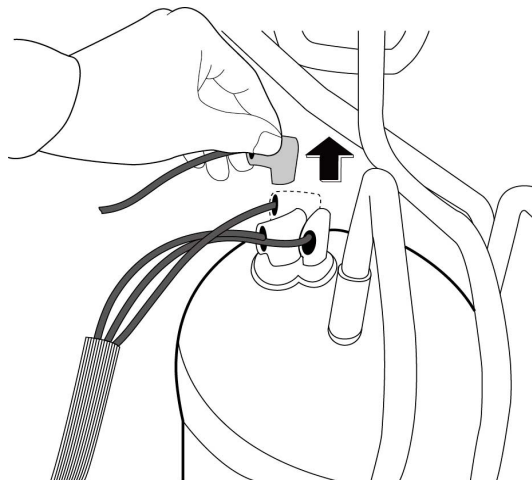
| Procedure | Illustration |
|--|---|
| <ol style="list-style-type: none">1) Heat up the brazed parts and then detach the the four-way valve and the pipe (see CJ_ODU_VALVE_001).2) Remove the four-way valve assembly with pliers. |  <p>CJ_ODU_VALVE_001</p> |

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

3.7 Compressor

⚠ WARNING: Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve and the compressor. (For R32 & R290, you should evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.)

Note: Remove the panel plate, connection of compressor on PCB (refer to 3.1 Panel plate and 3.2 Electrical parts) before disassembling sound blanket.

| Procedure | Illustration |
|---|---|
| 1) Remove the flange nut of terminal cover and remove the terminal cover (see CJ_ODU_COMP_001). |  <p>CJ_ODU_COMP_001</p> |
| 2) Disconnect the connectors (see CJ_ODU_COMP_002). |  <p>CJ_ODU_COMP_002</p> |

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

Troubleshooting

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Troubleshooting

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1. Safety Caution

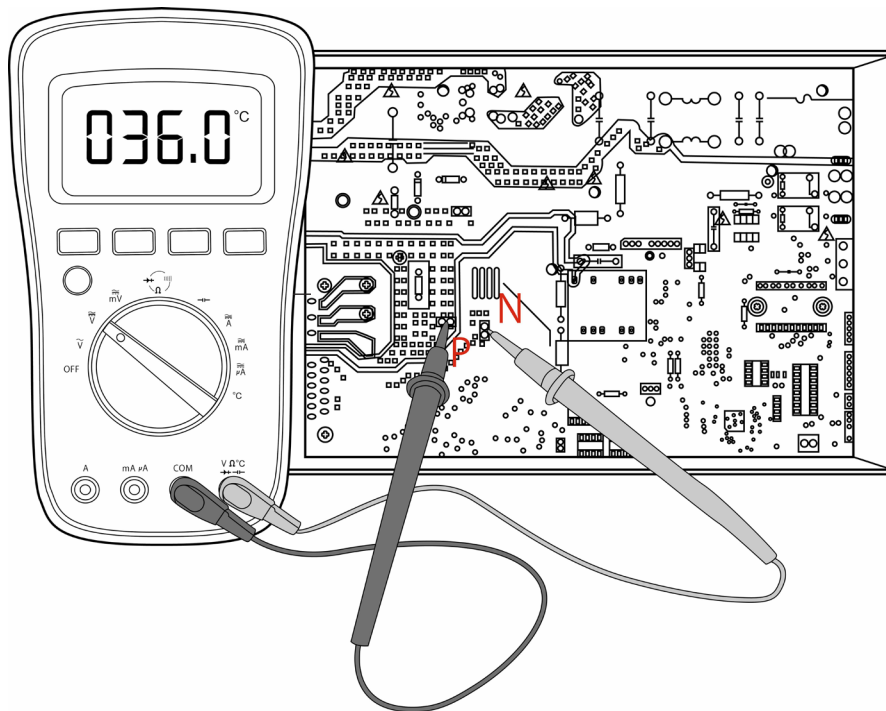
WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking indoor/outdoor PCB, please equip oneself 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.

Test the voltage between P and N on back of the main PCB with multimeter. If the voltage is lower than 36V, the capacitors are fully discharged.



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

2. General Troubleshooting

2.1 Error Display (Indoor Unit)

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

| Operation Lamp | Timer Lamp | LED Display | Error Information | Solution |
|----------------|------------|-------------|--|----------|
| 1 time | OFF | E400 | Indoor unit EEPROM parameter error | TS18 |
| 2 times | OFF | E401 | Indoor / outdoor unit communication error | TS19 |
| 3 times | OFF | E402 | Zero-crossing signal detection error(for some models) | TS21 |
| 4 times | OFF | E403 | The indoor fan speed is operating outside of the normal range | TS22 |
| 5 times | OFF | E451 | Outdoor unit EEPROM parameter error(for some models) | TS18 |
| 5 times | OFF | E452 | Condenser coil temperature sensor T3 is in open circuit or has short circuited | TS25 |
| 5 times | OFF | E453 | Outdoor room temperature sensor T4 is in open circuit or has short circuited | TS25 |
| 5 times | OFF | E454 | Compressor discharge temperature sensor TP is in open circuit or has short circuited | TS25 |
| 5 times | OFF | E456 | Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited(for free-match indoor units) | TS25 |
| 6 times | OFF | E460 | Indoor room temperature sensor T1 is in open circuit or has short circuited | TS25 |
| 6 times | OFF | E461 | Evaporator coil temperature sensor T2 is in open circuit or has short circuited | TS25 |
| 12 times | OFF | E407 | The outdoor fan speed is operating outside of the normal range(for some models) | TS22 |
| 9 times | OFF | E40b | Indoor PCB / Display board communication error | TS26 |
| 8 times | OFF | E40c | Refrigerant leak detected | TS27 |
| 7 times | FLASH | P400 | IPM malfunction or IGBT over-strong current protection | TS29 |
| 2 times | FLASH | P401 | Over voltage or over low voltage protection | TS30 |
| 3 times | FLASH | P402 | High temperature protection of IPM module or High pressure protection(for some models) | TS31 |
| 5 times | FLASH | P404 | Inverter compressor drive error | TS33 |
| 1 time | FLASH | P408 | Current overload protection(for some models) | TS28 |
| 7 times | FLASH | P403 | Low pressure protection(for some models) | TS34 |
| 1 times | ON | -- | Indoor units mode conflict(match with multi outdoor unit) | -- |

For other errors:

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

Troubleshooting:

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

LED flash frequency:



2.2 Error Display (For Some Outdoor Units)

There are 2 LED lights (RED color and GREEN color) welded in outdoor main board. After power on, LED show different actions when encounter different problems.

| No. | Problem | LED(GREEN) | LED(RED) | Solution |
|-----|--|------------|----------|----------|
| 1 | Standby normally | ON | OFF | - |
| 2 | Operate normally | OFF | ON | - |
| 3 | Compressor driven chip EEPROM parameter error | ON | FLASH | TS19 |
| 4 | IPM malfunction or IGBT over-strong current protection | FLASH | OFF | TS30 |
| 5 | Over voltage or too low voltage protection | ON | ON | TS31 |
| 6 | Inverter compressor drive error | OFF | FLASH | TS34 |
| 7 | Inverter compressor drive error | FLASH | LIGHT | TS34 |
| 8 | Communication error between outdoor main chip and compressor driven chip | FLASH | FLASH | TS19 |

3. Complain Record Form

Complain Record Form

Request No.:

Date:

Installation Date:

Service Date:

| Customer Information | | | |
|--|--|---|--|
| Name | | Telephone No. | |
| Home Address | | | |
| Email | | | |
| | | | |
| Product Information | | | |
| Indoor Unit Model | | Outdoor Unit Model | |
| Serial No. of indoor unit | | | |
| Serial No. of outdoor unit | | | |
| Working Mode | <input type="checkbox"/> Cooling <input type="checkbox"/> Heating <input type="checkbox"/> Fan only <input type="checkbox"/> Dry | | |
| Setting temperature | _____°C / °F | Fan speed | <input type="checkbox"/> Turbo <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> Auto |
| Temperature of air inlet | _____°C / °F | Temperature of air outlet | _____°C / °F |
| | | | |
| Installation / Condition Information | | | |
| Indoor temperature | _____°C / °F | Indoor humidity | _____ %RH |
| Outdoor temperature | _____°C / °F | Outdoor humidity | _____ %RH |
| Length of Connecting pipe | | Pipe diameter | Gas pipe: Liquid pipe: |
| Length of Wiring | | wire diameter | |
| System Running Pressure | _____MPa or _____Bar or _____PSI | | |
| Room size (L*W*H) | | | |
| Photo of Installation of Indoor unit (Photo #1) | | Photo of Installation of Outdoor unit (Photo #2) | |
| | | | |
| Failure Description | | | |
| Error Code of Indoor unit | | Code of Outdoor PCB | |
| Unit does not start | | | |
| Remote control does not work | | | |
| Indoor display shows nothing | | | |
| No cooling or heating at all | | | |
| Less cooling or heating | | | |
| Unit starts but stops shortly | | | |
| High noise | | | |
| High vibration | | | |
| | | | |

| Parameter Checking information by Remote controller | | | |
|--|------------------------------------|---------------|-----------------------|
| Displaying code | Displaying code meaning | Display value | Display value meaning |
| T1 | Room temperature | | |
| T2 | Indoor coil temperature | | |
| T3 | Outdoor coil temperature | | |
| T4 | Ambient temperature | | |
| Tb | Outlet temperature of indoor coil | | |
| TP | Discharge temperature | | |
| TH | Suction temperature | | |
| FT | Targeted Frequency | | |
| Fr | Actual Frequency | | |
| IF | Indoor fan speed | | |
| OF | Outdoor fan speed | | |
| LA | EXV opening steps | | |
| CT | Compressor continuous running time | | |
| ST | Causes of compressor stop. | | |
| A0, A1, b0, b1, b2, b3, b4, b5, b6, dL, Ac, Uo, Td, dA, dS, dT | Reserved | | |

| Approval from Manufacturer | |
|--|--|
| <input type="checkbox"/> Approved | |
| <input type="checkbox"/> More Proof needed | |
| <input type="checkbox"/> Rejected | |

4. Information Inquiry

- To enter information inquiry status, complete the following procedure within ten seconds:
 - Press LED(or DO NOT DISTURB) 3 times.
 - Press SWING(or AIR DIRECTION) 3 times.
- Finish 1 and 2 within 10 seconds, you will hear beeps for two seconds, which means the unit goes into parameter checking mode.
- Use the LED(or DO NOT DISTURB) and SWING(or AIR DIRECTION) buttons to cycle through information displayed.
- Pressing LED(or DO NOT DISTURB) will display the next code in the sequence. Pressing SWING(or AIR DIRECTION) will show the previous.
- The following table shows information codes. The screen will display this code for two seconds, then the information for 25 seconds.

| Displayed code | Explanation | Displayed value | Meaning | Additional Notes |
|----------------|------------------------------------|---|---|--|
| T1 | Room temperature | -1F,-1E,-1d,-1c,-1b,-1A -19—99 A0,A1,...A9 b0,b1,...b9 c0,c1,...c9 d0,d1,...d9 E0,E1,...E9 F0,F1,...F9 | -25,-24,-23,-22,-21,-20 -19—99 100,101,...109 110,111,...119 120,121,...129 130,131,...139 140,141,...149 150,151,...159 | <ol style="list-style-type: none"> 1. All displayed temperatures use actual values. 2. All temperatures are displayed in °C regardless of remote used. 3. T1, T2, T3, T4, and T2B display ranges from -25 to 70 °C. TP display ranges from -20 to 130 °C. 4. The frequency display ranges from 0 to 159HZ. 5. If the actual values exceed or fall short of the defined range, the values closest to the maximum and minimum values will be displayed. |
| T2 | Indoor coil temperature | | | |
| T3 | Outdoor coil temperature | | | |
| T4 | Ambient temperature | | | |
| TB | Outlet temperature of indoor coil | | | |
| TP | Discharge temperature | | | |
| TH | Suction temperature | | | |
| FT | Targeted frequency | | | |
| FR | Actual frequency | | | |
| IF | Indoor fan speed | 0 1,2,3,4 | OFF Low speed, Medium speed, High speed, Turbo. | N/A Used for some large capacity motors. |
| OF | Outdoor fan speed | 14-FF | Actual fan speed is equal to the display value converted to decimal value and multiplied by 10. This is measured in RPM. | Used for some small capacity motors. The display value is 14-FF (hexadecimal). The corresponding fan speed ranges from 200 to 2550RPM. |
| LR | EXV opening angle | 0-FF | Actual EXV opening value is equal to the display value converted to decimal value and then multiplied by 2. | - |
| CT | Compressor continuous running time | 0-FF | 0-255 minutes | If the actual value exceeds or falls short of the defined range, the value closest to the maximum and minimum will be displayed. |
| ST | Causes of compressor stop | 0-99 | For a detailed explanation, contact technical support. | - |

| Displayed code | Explanation | Displayed value | Meaning | Additional Notes |
|----------------|-------------|------------------------------|---------|------------------|
| R0 | Reserved | 0-FF 2-28 5-20 5-25 | - | - |
| R1 | | | | |
| b0 | | | | |
| b1 | | | | |
| b2 | | | | |
| b3 | | | | |
| b4 | | | | |
| b5 | | | | |
| b6 | | | | |
| dL | | | | |
| Rc | | | | |
| Uo | | | | |
| Td | | | | |
| dR | | | | |
| dS | | | | |
| dT | | | | |

5. Error Diagnosis and Troubleshooting Without Error Code



WARNING

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

5.1 Remote maintenance

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

| No. | Problem | Solution |
|-----|--|-------------|
| 1 | Unit will not start | TS13 - TS14 |
| 2 | The power switch is on but fans will not start | TS13 - TS14 |
| 3 | The temperature on the display board cannot be set | TS13 - TS14 |
| 4 | Unit is on but the wind is not cold(hot) | TS13 - TS14 |
| 5 | Unit runs, but shortly stops | TS13 - TS14 |
| 6 | The unit starts up and stops frequently | TS13 - TS14 |
| 7 | Unit runs continuously but insufficient cooling(heating) | TS13 - TS14 |
| 8 | Cool can not change to heat | TS13 - TS14 |
| 9 | Unit is noisy | TS13 - TS14 |

5.2 Field maintenance

| | Problem | Solution |
|----|---|-------------|
| 1 | Unit will not start | TS15 - TS16 |
| 2 | Compressor will not start but fans run | TS15 - TS16 |
| 3 | Compressor and condenser (outdoor) fan will not start | TS15 - TS16 |
| 4 | Evaporator (indoor) fan will not start | TS15 - TS16 |
| 5 | Condenser (Outdoor) fan will not start | TS15 - TS16 |
| 6 | Unit runs, but shortly stops | TS15 - TS16 |
| 7 | Compressor short-cycles due to overload | TS15 - TS16 |
| 8 | High discharge pressure | TS15 - TS16 |
| 9 | Low discharge pressure | TS15 - TS16 |
| 10 | High suction pressure | TS15 - TS16 |
| 11 | Low suction pressure | TS15 - TS16 |
| 12 | Unit runs continuously but insufficient cooling | TS15 - TS16 |
| 13 | Too cool | TS15 - TS16 |
| 14 | Compressor is noisy | TS15 - TS16 |
| 15 | Horizontal louver can not revolve | TS15 - TS16 |

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

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

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

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

6. 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 replace by error code in the following table.

| Part requiring replacement | Error Code | | | | | | | | |
|----------------------------|------------|------|------|------|------|------|------|------|------|
| | EH00 | EL01 | EH02 | EH03 | EH60 | EH61 | EH0b | EL0C | PC08 |
| Indoor PCB | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x |
| Outdoor PCB | x | ✓ | x | x | x | x | x | x | ✓ |
| Display board | x | x | x | x | x | x | ✓ | x | x |
| Indoor fan motor | x | x | x | ✓ | x | x | x | x | x |
| T1 sensor | x | x | x | x | ✓ | x | x | x | x |
| T2 Sensor | x | x | x | x | x | ✓ | x | ✓ | x |
| Reactor | x | ✓ | x | x | x | x | x | x | x |
| Compressor | x | x | x | x | x | x | x | x | ✓ |
| Additional refrigerant | x | x | x | x | x | x | x | ✓ | x |

| Part requiring replacement | EC53 | EC52 | EC54 | EC56 | EC51 | EC07 | PC00 | PC01 | PC02 | PC03 | PC04 |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Indoor PCB | x | x | x | x | x | x | x | x | x | x | x |
| Outdoor PCB | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Indoor fan motor | x | x | x | x | x | x | x | x | x | x | x |
| Outdoor fan motor | x | x | x | x | x | ✓ | ✓ | x | ✓ | x | ✓ |
| T3 Sensor | x | ✓ | x | x | x | x | x | x | x | x | x |
| T4 Sensor | ✓ | x | x | x | x | x | x | x | x | x | x |
| TP Sensor | x | x | ✓ | x | x | x | x | x | x | x | x |
| T2B Sensor | x | x | x | ✓ | x | x | x | x | x | x | x |
| Reactor | x | x | x | x | x | x | x | ✓ | x | x | x |
| Compressor | x | x | x | x | x | x | ✓ | x | x | x | ✓ |
| IPM module board | x | x | x | x | x | x | ✓ | ✓ | ✓ | x | ✓ |
| High pressure protector | x | x | x | x | x | x | x | x | ✓ | x | x |
| Low pressure protector | x | x | x | x | x | x | x | x | x | ✓ | x |
| Additional refrigerant | x | x | x | x | x | x | x | x | x | ✓ | x |

Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

7. Troubleshooting by Error Code

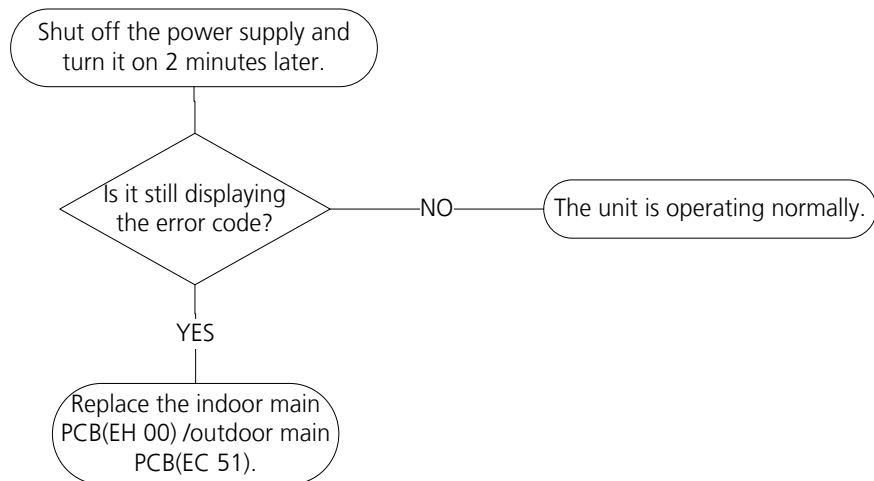
7.1 EH 00 / EC 51 (EEPROM parameter error diagnosis and solution)

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

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB

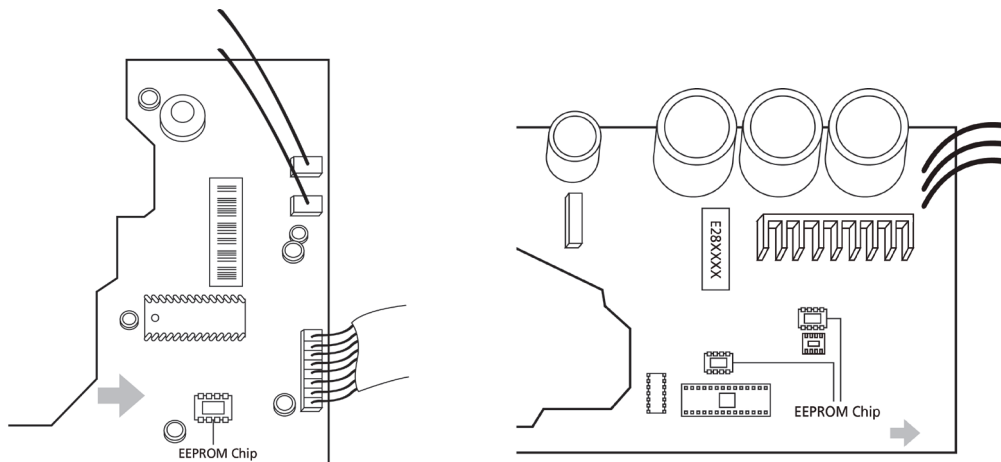
Troubleshooting and repair:



Remarks:

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

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



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole. This pictures are only for reference, actual appearance may vary.

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

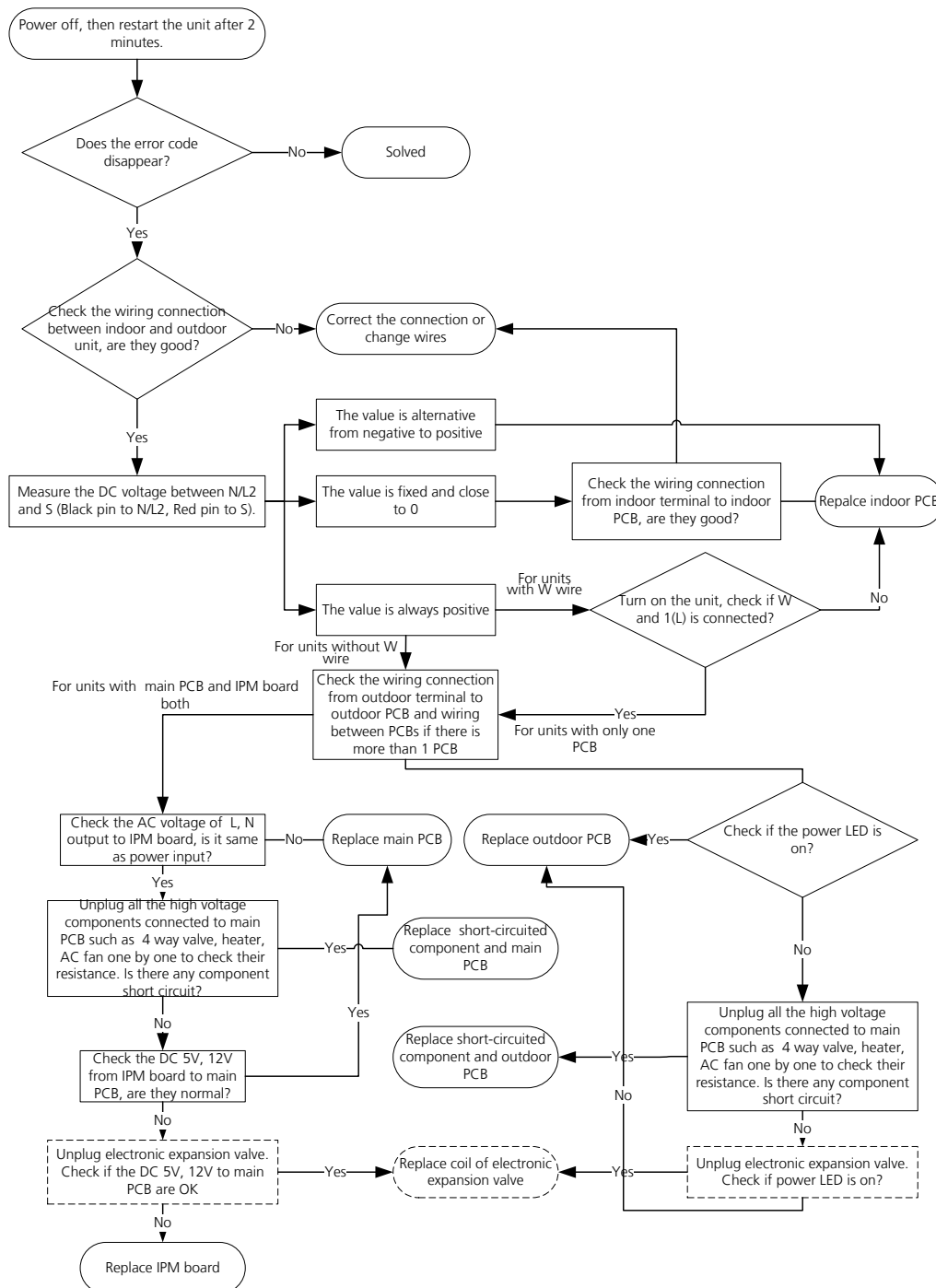
7.2 EL 01 (Indoor and outdoor unit communication error diagnosis and solution)

Description: Indoor unit can not communicate with outdoor unit

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB
- Short-circuited component

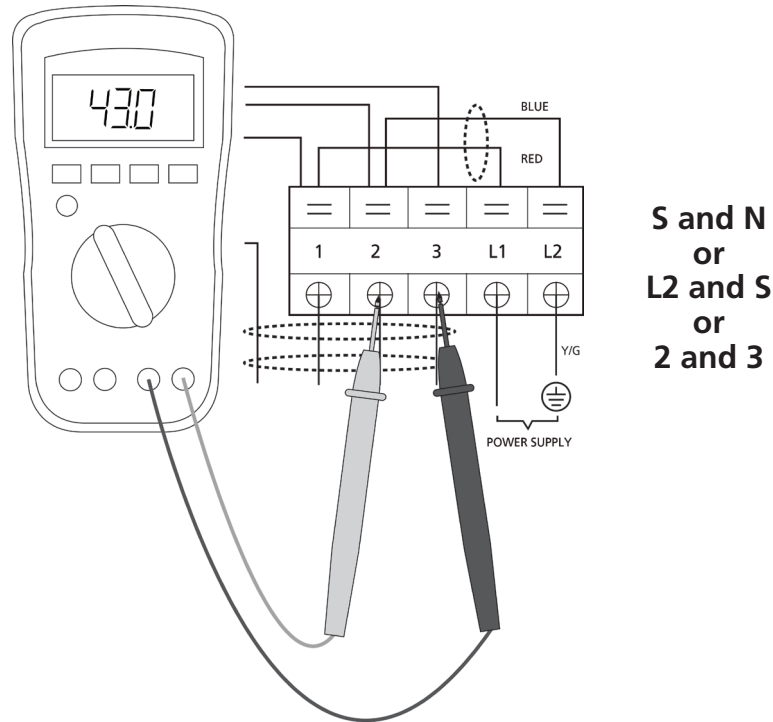
Troubleshooting and repair:



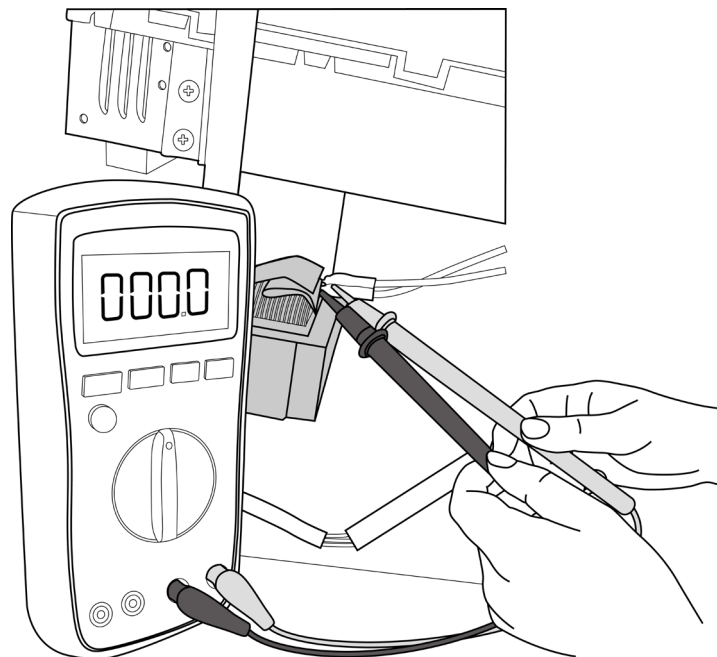
Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Remarks:

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



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



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

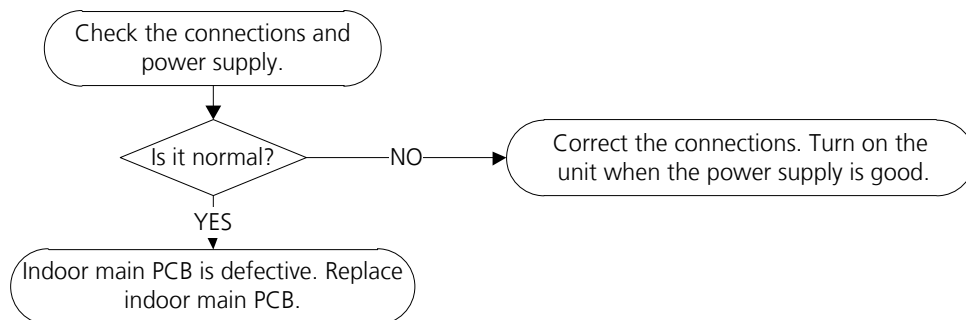
7.3 EH 02 (Zero crossing detection error diagnosis and solution)

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

Recommended parts to prepare:

- Connection wires
- PCB

Troubleshooting and repair:



Note: EH 02 zero crossing detection error is only valid for the unit with AC fan motor, for other models, this error is invalid.

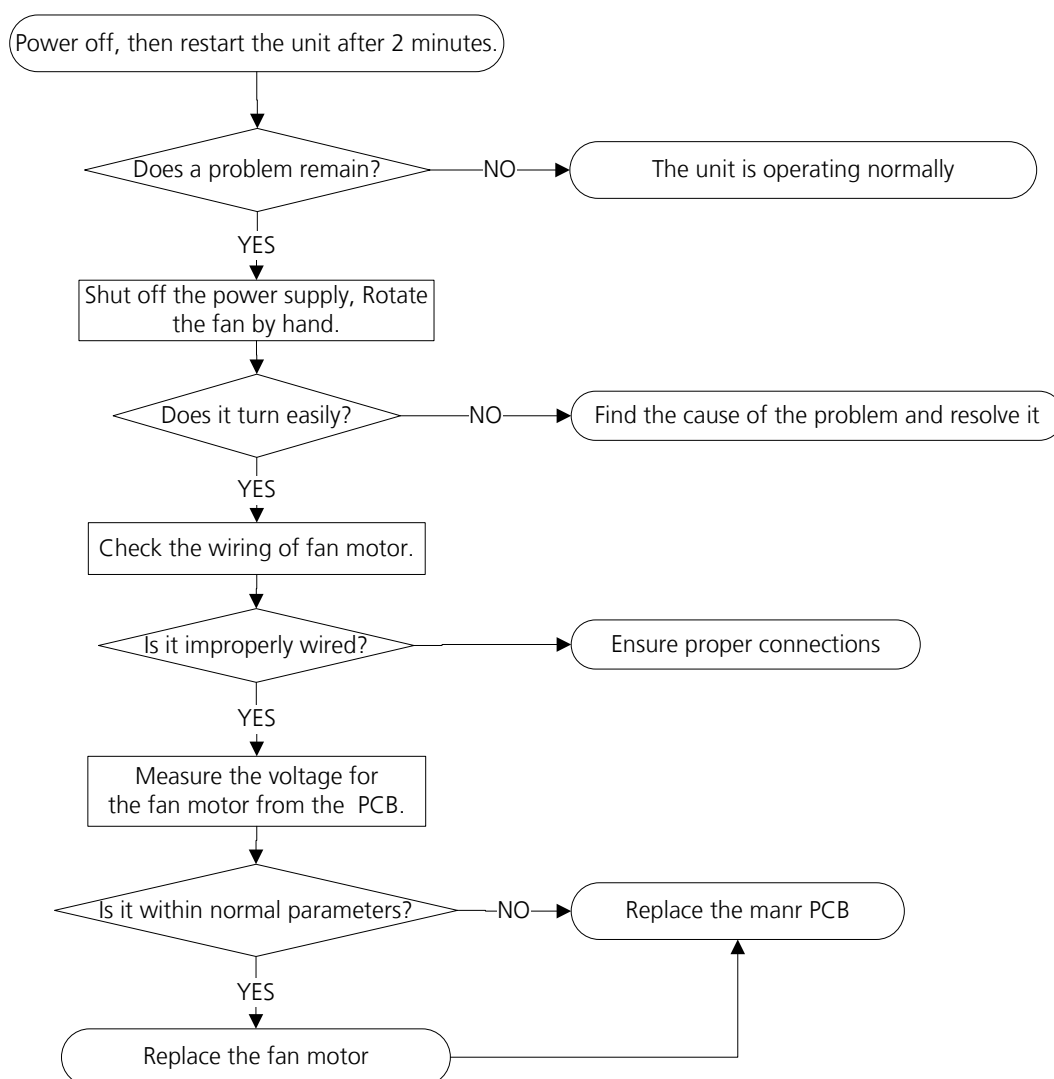
7.4 EH 03 / EC 07 (Fan speed is operating outside of normal range diagnosis and solution)

Description: When indoor / outdoor fan speed keeps 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:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Index:

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

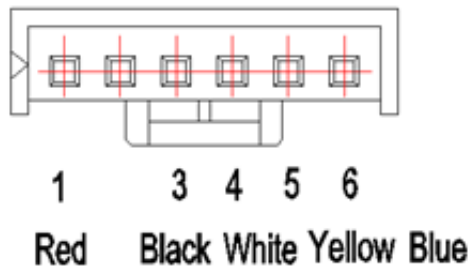
Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must has problems and need to be replaced.

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

| No. | Color | Signal | Voltage |
|-----|--------|--------|-----------|
| 1 | Red | Vs/Vm | 280V~380V |
| 2 | --- | --- | --- |
| 3 | Black | GND | 0V |
| 4 | White | Vcc | 14-17.5V |
| 5 | Yellow | Vsp | 0~5.6V |
| 6 | Blue | FG | 14-17.5V |

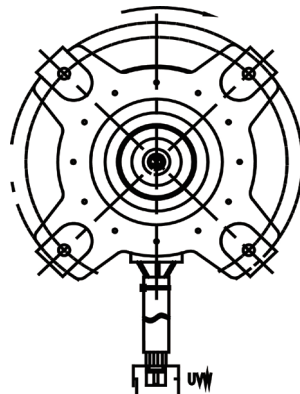
- DC motor voltage input and output (voltage: 115V~):

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



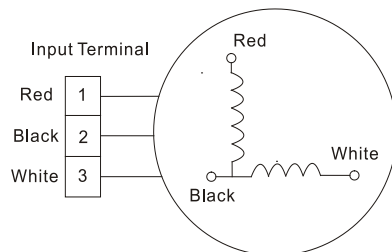
2. Outdoor DC Fan Motor (control chip is in outdoor PCB)

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



3. Indoor AC Fan Motor

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



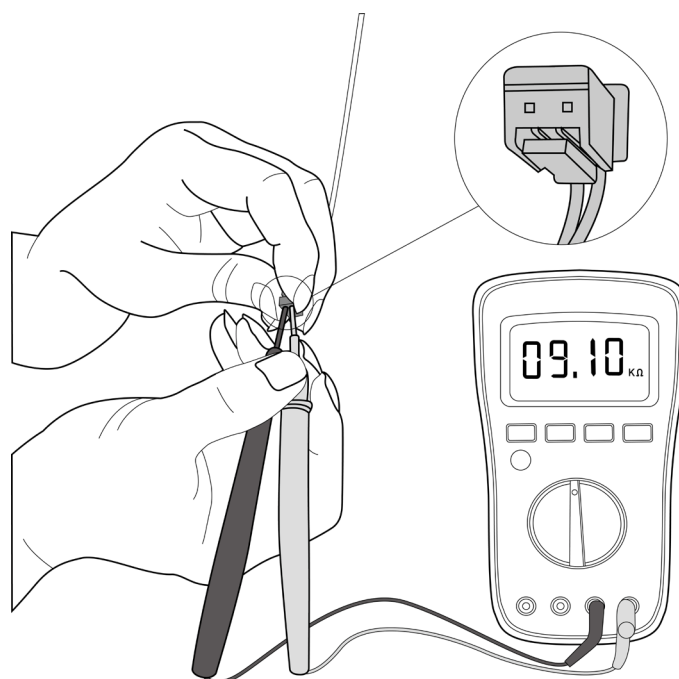
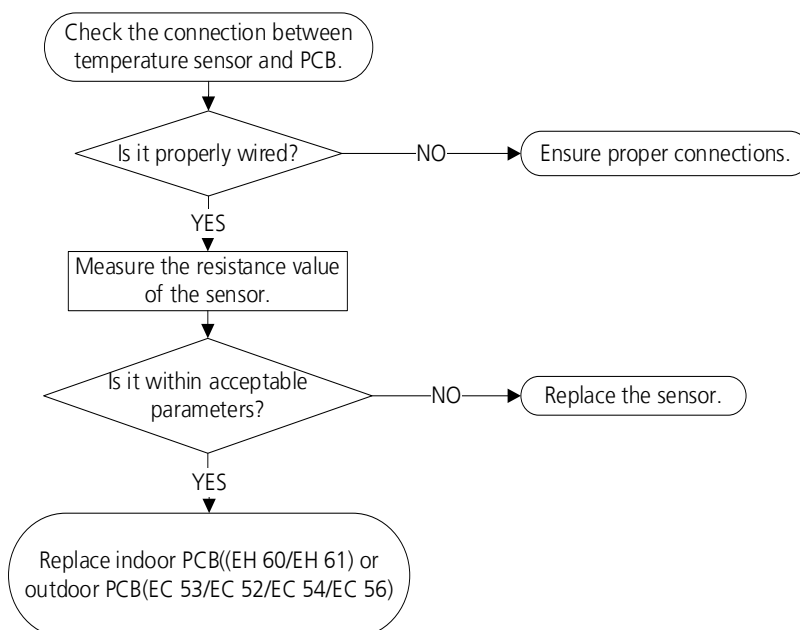
7.5 EH 60/EH 61/EC 53/EC 52/EC 54/EC 56 (Open circuit or short circuit of temperature sensor diagnosis and solution)

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

Recommended parts to prepare:

- Connection wires
- Sensors
- PCB

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole. This picture and the value are only for reference, actual appearance and value may vary

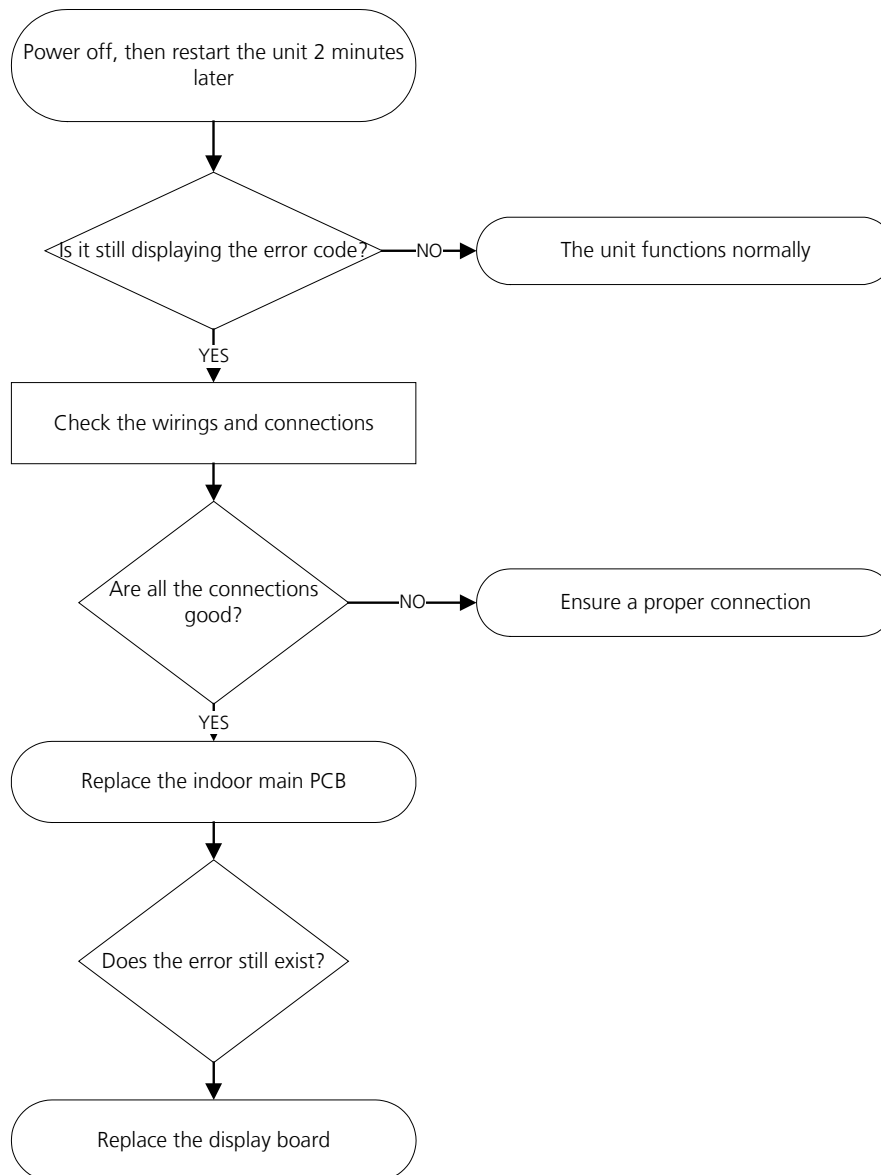
7.6 EH 0b (Indoor PCB / Display board communication error diagnosis and solution)

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

Recommended parts to prepare:

- Communication wire
- Indoor PCB
- Display board

Troubleshooting and repair:



7.7 EL 0C (Refrigerant Leakage Detection diagnosis and solution)

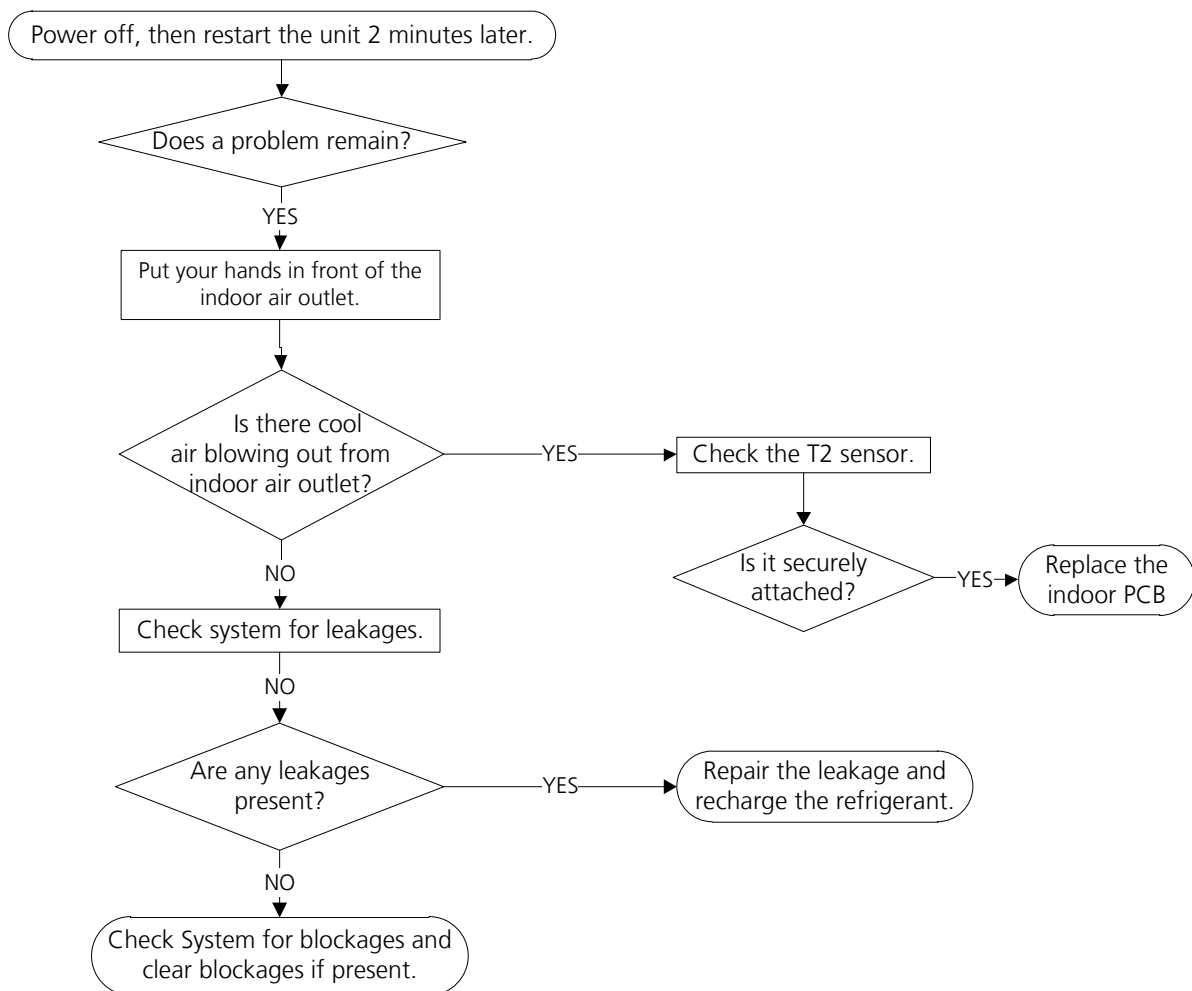
Description: Define the evaporator coil temperature T2 of the compressor just starts running as Tcool.

In the beginning 5 minutes after the compressor starts up, if $T2 < T_{cool} - 1^{\circ}\text{C}$ (1.8°F) does not keep continuous 4 seconds and compressor running frequency higher than 50Hz does not keep for 3 minutes, and this situation happens 3 times, the LED displays the failure code and AC turns off.

Recommended parts to prepare:

- T2 sensor
- Indoor PCB
- Additional refrigerant

Troubleshooting and repair:



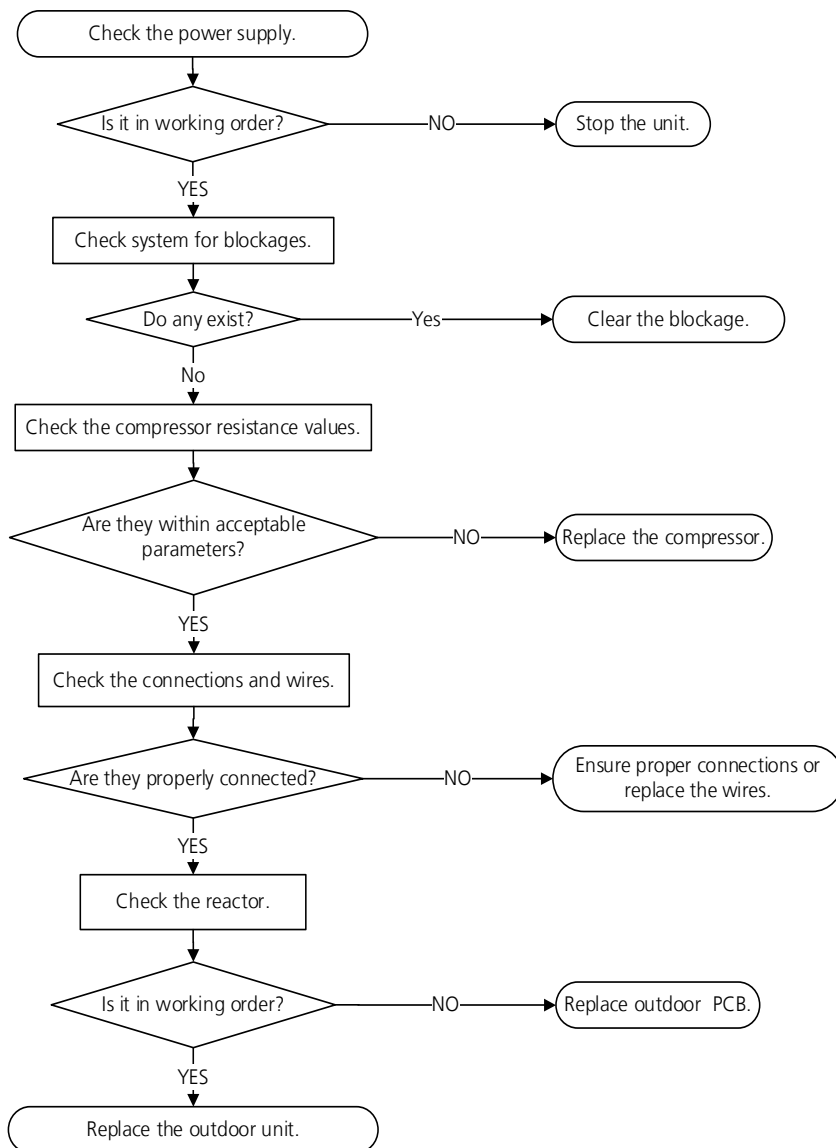
7.8 PC 08 (Overload current protection diagnosis and solution)

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

Recommended parts to prepare:

- Outdoor PCB
- Connection wires
- Compressor

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

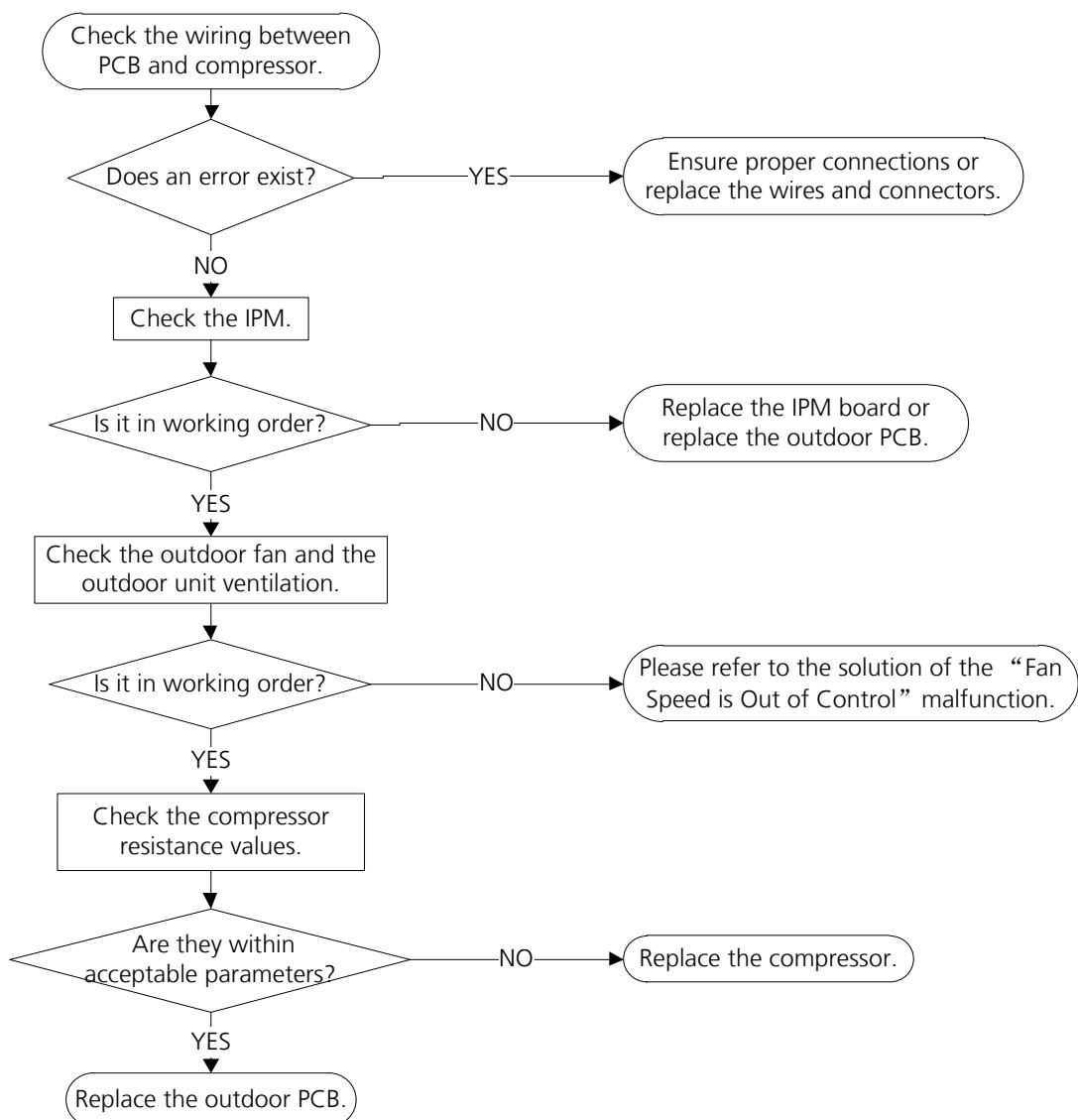
7.9 PC 00(IPM malfunction or IGBT over-strong current protection diagnosis and solution)

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the 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

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

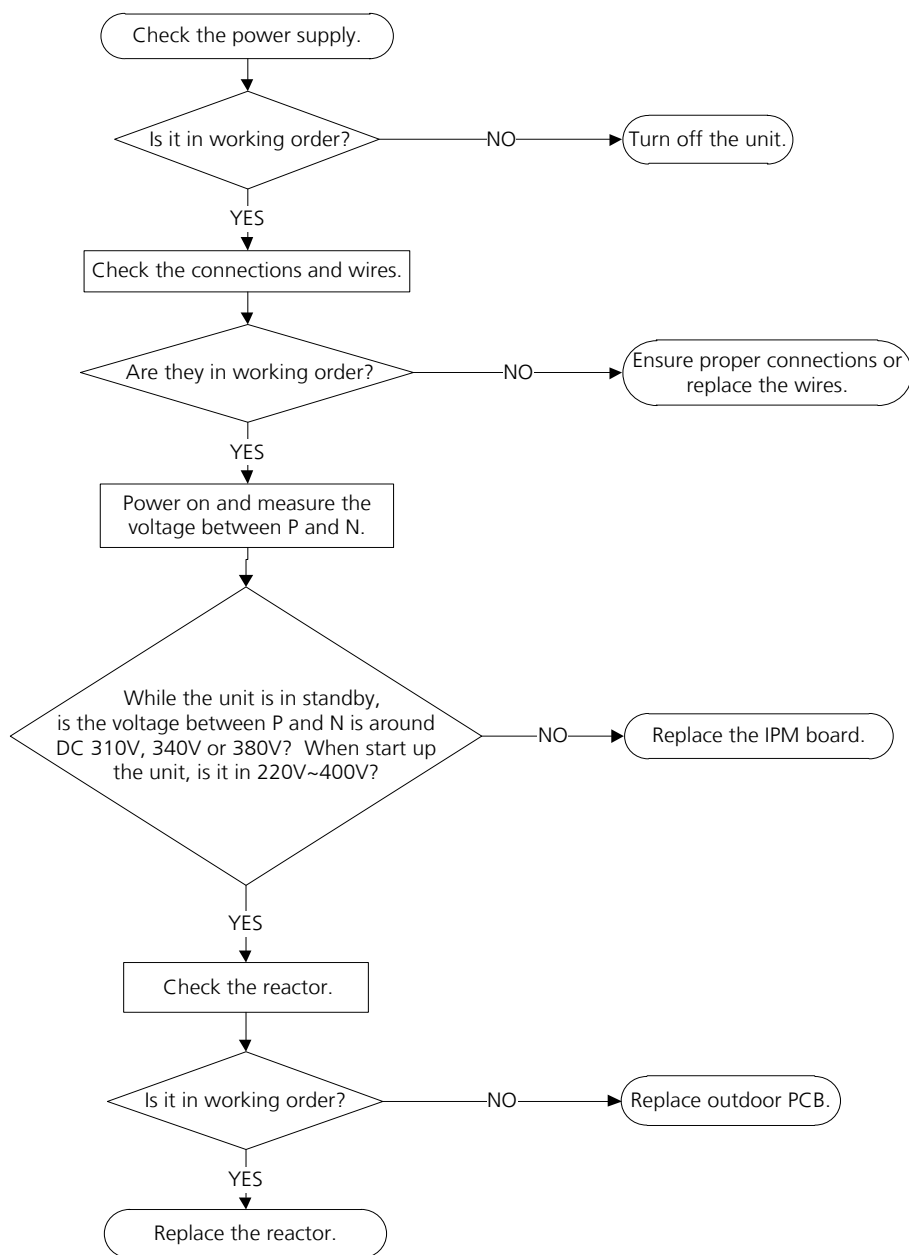
7.10 PC 01(Over voltage or too low voltage protection diagnosis and solution)

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

Recommended parts to prepare:

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

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

7.11 PC 02(High temperature protection of IPM module or High pressure protection diagnosis and solution)

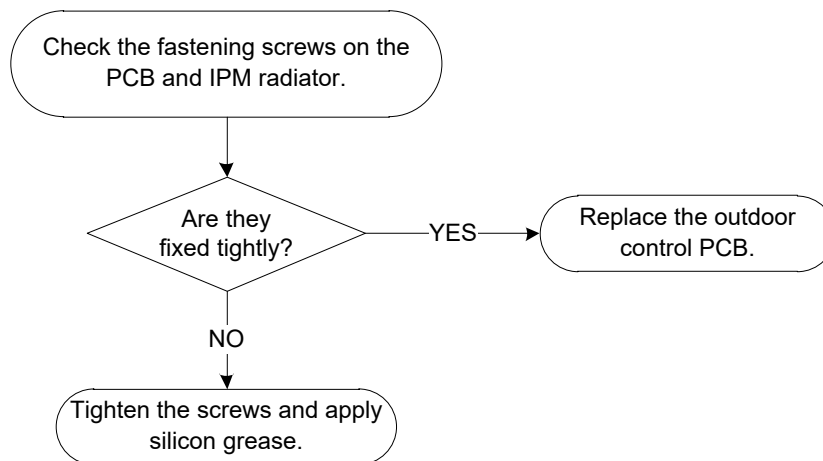
Description: If the temperature of IPM module is higher than a certain value, the LED displays the failure code.

For some models with high pressure switch, outdoor pressure switch cut off the system because high pressure is higher than 4.4 MPa, the LED displays the failure code.

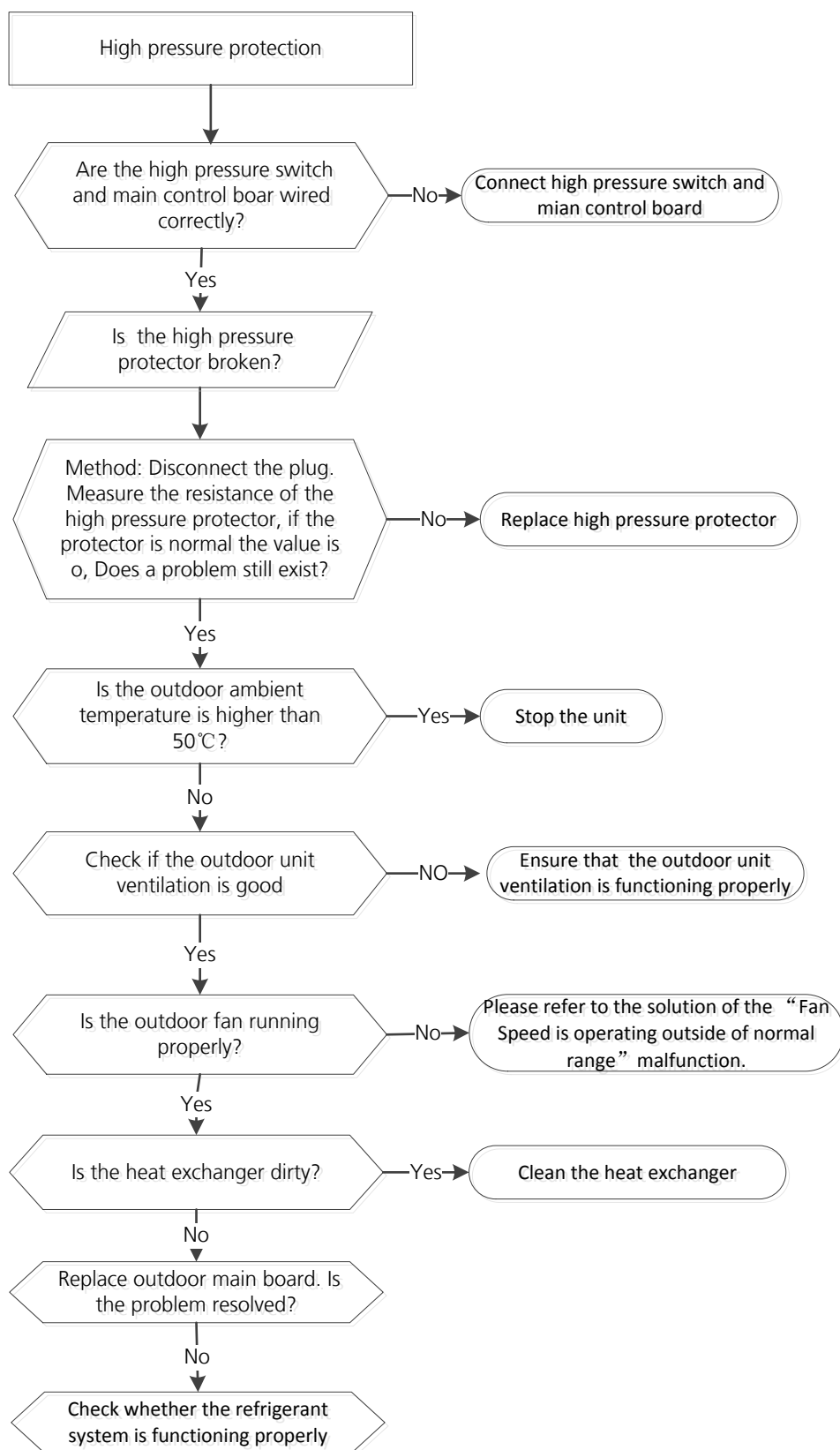
Recommended parts to prepare:

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

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.



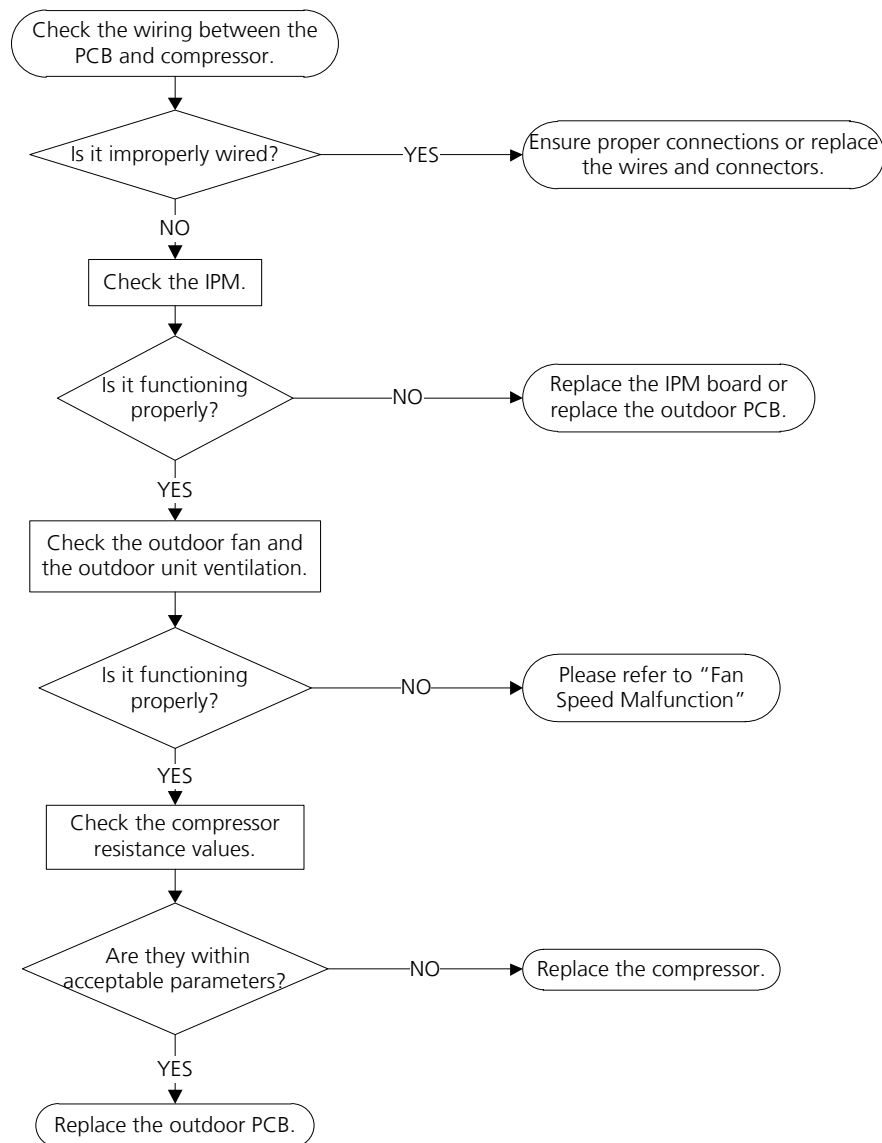
7.12 PC 04(Inverter compressor drive error diagnosis and solution)

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

Recommended parts to prepare:

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

Troubleshooting and repair:



Note: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

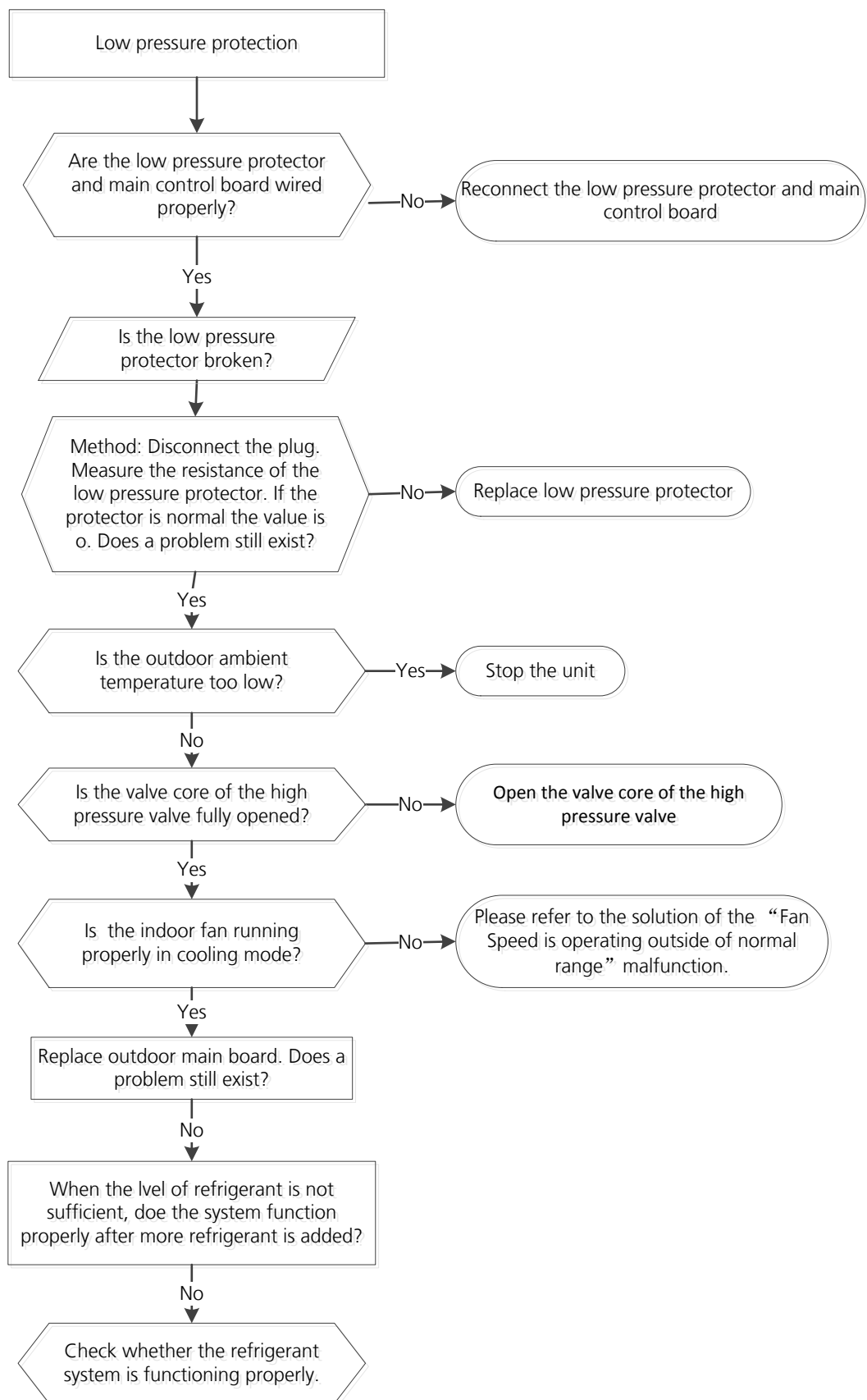
7.13 PC 03(Low pressure protection diagnosis and solution)

Description: Outdoor pressure switch cut 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:



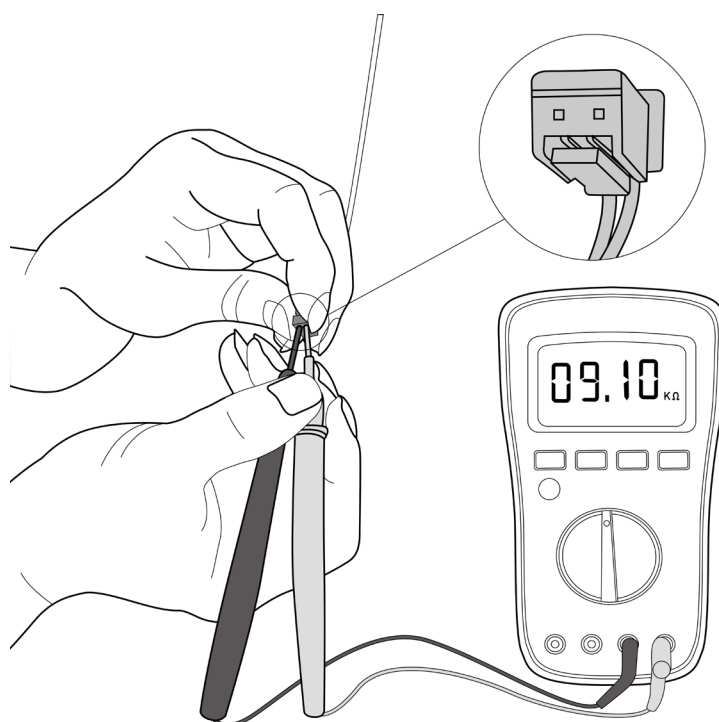
8. Check Procedures

8.1 Temperature Sensor Check

WARNING

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

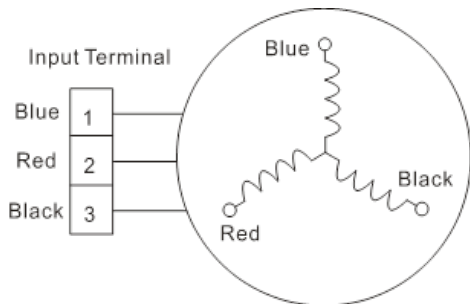
1. Disconnect the temperature sensor from PCB (Refer to Chapter 5&6. Indoor&Outdoor Unit Disassembly).
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table (Refer to Chapter 8. Appendix).



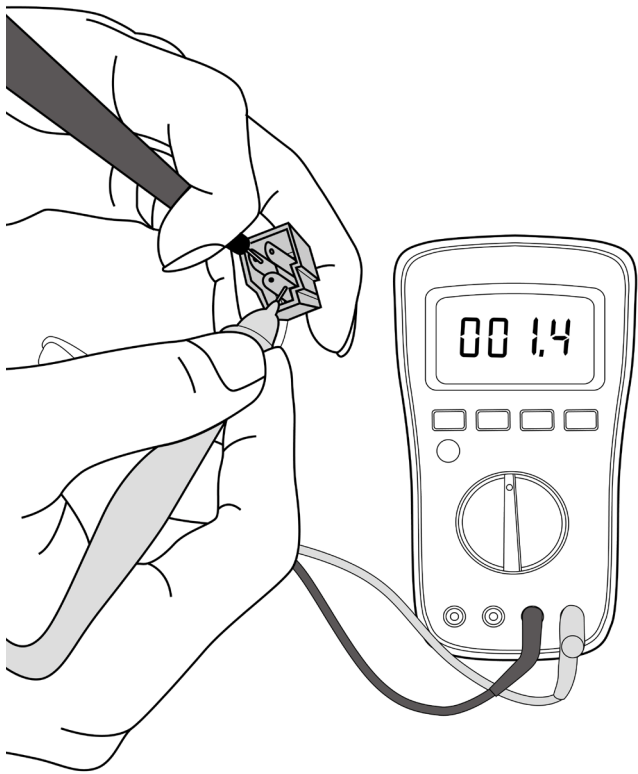
Note: The picture and the value are only for reference, actual condition and specific value may vary.

8.2 Compressor Check

1. Disconnect the compressor power cord from outdoor PCB (Refer to Chapter 6. Outdoor Unit Disassembly)).
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



| Resistance Value | KSK89D53UEZ | KSK103D33UEZ3 | KSM135D23UFZ | KSN140D21UFZ | KTF235D22UMT |
|------------------|-------------|---------------|--------------|--------------|--------------|
| Blue-Red | 2.35Ω | 2.02Ω | 1.72Ω | 1.28Ω | 0.75Ω |
| Blue-Black | | | | | |
| Red-Black | | | | | |



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

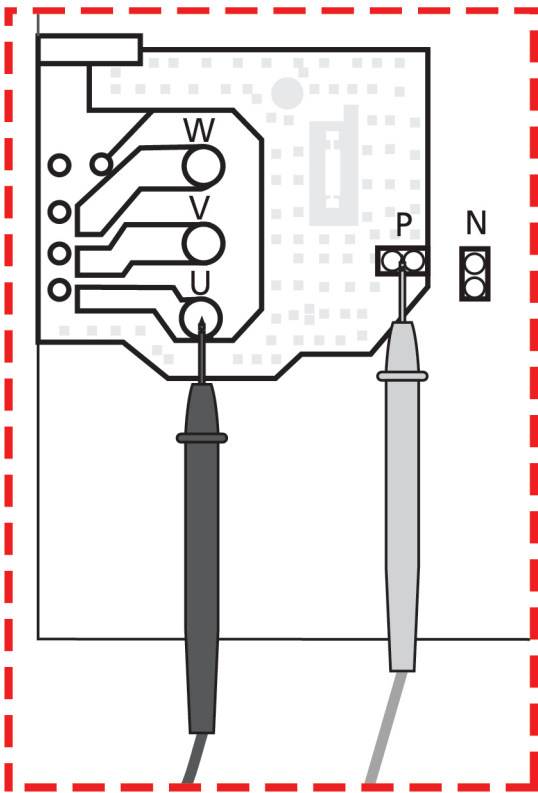
8.3 IPM Continuity Check

 **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 unit has 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 M Ω) | (+)Red | (-)Black | ∞ (Several M Ω) |
| P | N | | U | N | |
| | U | | V | | |
| | V | | W | | |
| | W | | - | | |



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

8.4 Fan Motor Check

1. Turn off outdoor unit and disconnect power supply
2. Disconnect outdoor fan motor power cord from outdoor PCB
3. Measure the resistance value between each windings.

The normal value of different motor show as follows:

| Model | YKFG-13-4-38L YKFG-13-4-38L-4 | YKFG-15-4-28-1 | YKFG-20-4-10L | YKFG-20-4-5-11 |
|------------------|----------------------------------|----------------|---------------|----------------|
| Brand | Welling | Welling | Welling | Welling |
| Black – Red Main | 345Ω | 75Ω | 269Ω | 388Ω |
| Blue – Black AUX | 348Ω | 150Ω | 224Ω | 360Ω |

| Model | YKFG-20-4-5-19 | YKFG-25-4-6-14 | YKFG-28-4-3-7 YKFG-28-4-3-14 | YKFG-28-4-6-5 |
|------------------|----------------|----------------|---------------------------------|---------------|
| Brand | Welling | Welling | Welling | Welling |
| Black – Red Main | 444Ω | 287Ω | 231Ω | 183.6Ω |
| Blue – Black AUX | 470Ω | 409Ω | 414Ω | 206Ω |

| Model | YKFG-45-4-13 | YKFG-45-4-22 YKFG-45-4-22-13 | YKFG-60-4-2-6 |
|------------------|--------------|---------------------------------|---------------|
| Brand | Dongfang | Welling | Welling |
| Black – Red Main | 125.2Ω | 168Ω | 96Ω |
| Blue – Black AUX | 83.8Ω | 141Ω | 96Ω |

Appendix

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| ii) | Temperature Sensor Resistance Value Table for TP (for some units)(°C --K) | 3 |
| iii) | Pressure On Service Port | 4 |

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

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

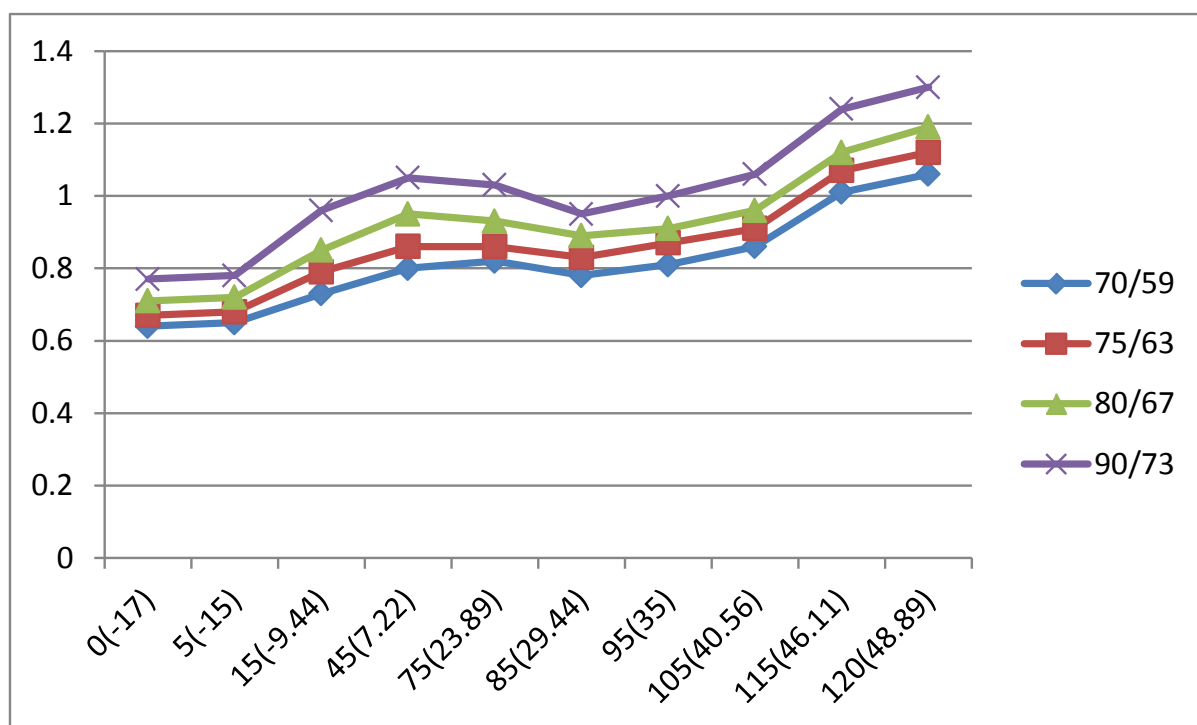
ii) Temperature Sensor Resistance Value Table for TP(for some units) (°C --K)

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

iii) Pressure On Service Port

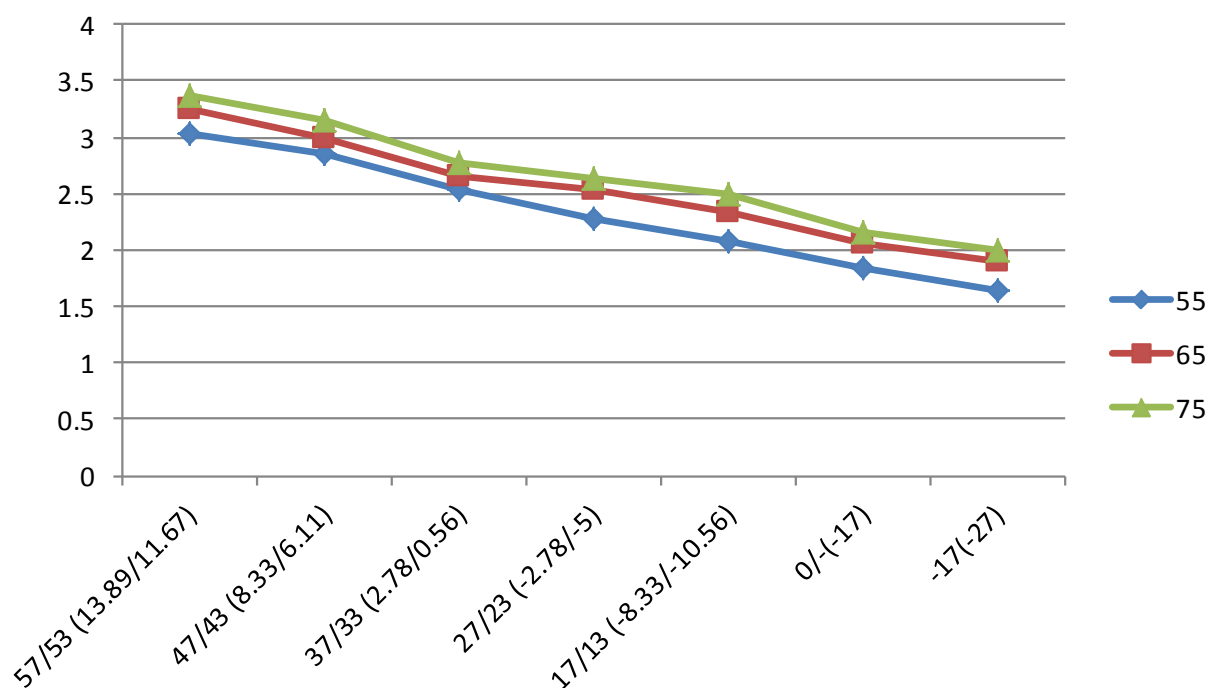
Cooling chart(R410A):

| °F(°C) | ODU(DB) IDU(DB/WB) | 0(-17) | 5(-15) | 15 (-9.44) | 45 (7.22) | 75 (23.89) | 85 (29.44) | 95 (35) | 105 (40.56) | 115 (46.11) | 120 (48.89) |
|--------|-----------------------|--------|--------|---------------|--------------|---------------|---------------|---------|----------------|----------------|----------------|
| | | | | | | | | | | | |
| BAR | 70/59 (21.11/15) | 6.4 | 6.5 | 7.3 | 8.0 | 8.2 | 7.8 | 8.1 | 8.6 | 10.1 | 10.6 |
| | 75/63 (23.89/17.22) | 6.7 | 6.8 | 7.9 | 8.6 | 8.6 | 8.3 | 8.7 | 9.1 | 10.7 | 11.2 |
| | 80/67 (26.67/19.44) | 7.1 | 7.2 | 8.5 | 9.5 | 9.3 | 8.9 | 9.1 | 9.6 | 11.2 | 11.9 |
| | 90/73 (32.22/22.78) | 7.7 | 7.8 | 9.6 | 10.5 | 10.3 | 9.5 | 10.0 | 10.6 | 12.4 | 13.0 |
| PSI | 70/59 (21.11/15) | 93 | 94 | 106 | 116 | 119 | 113 | 117 | 125 | 147 | 154 |
| | 75/63 (23.89/17.22) | 97 | 99 | 115 | 125 | 124 | 120 | 126 | 132 | 155 | 162 |
| | 80/67 (26.67/19.44) | 103 | 104 | 123 | 138 | 135 | 129 | 132 | 140 | 162 | 173 |
| | 90/73 (32.22/22.78) | 112 | 113 | 139 | 152 | 149 | 138 | 145 | 154 | 180 | 189 |
| MPa | 70/59 (21.11/15) | 0.64 | 0.65 | 0.73 | 0.8 | 0.82 | 0.78 | 0.81 | 0.86 | 1.01 | 1.06 |
| | 75/63 (23.89/17.22) | 0.67 | 0.68 | 0.79 | 0.86 | 0.86 | 0.83 | 0.87 | 0.91 | 1.07 | 1.12 |
| | 80/67 (26.67/19.44) | 0.71 | 0.72 | 0.85 | 0.95 | 0.93 | 0.89 | 0.91 | 0.96 | 1.12 | 1.19 |
| | 90/73 (32.22/22.78) | 0.77 | 0.78 | 0.96 | 1.05 | 1.03 | 0.95 | 1 | 1.06 | 1.24 | 1.3 |



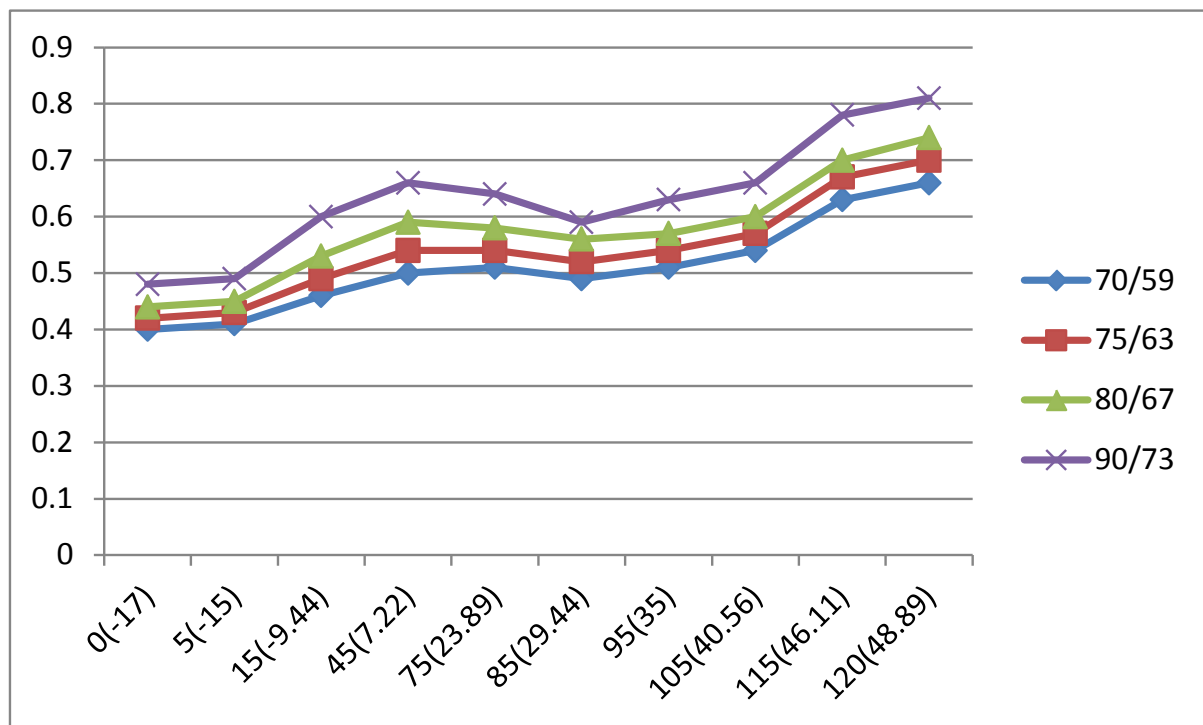
Heating chart(R410A):

| °F(°C) | ODU(DB/WB) IDU(DB) | 57/53 (13.89/11.67) | 47/43 (8.33/6.11) | 37/33 (2.78/0.56) | 27/23 (-2.78/-5) | 17/13 (-8.33/- 10.56) | 0/-2 (-17/-19) | -17/-18 (-27/-28) |
|--------|-----------------------|------------------------|----------------------|----------------------|---------------------|--------------------------|-------------------|----------------------|
| BAR | 55(12.78) | 30.3 | 28.5 | 25.3 | 22.8 | 20.8 | 18.5 | 16.5 |
| | 65(18.33) | 32.5 | 30.0 | 26.6 | 25.4 | 23.3 | 20.5 | 19.0 |
| | 75(23.89) | 33.8 | 31.5 | 27.8 | 26.3 | 24.9 | 21.5 | 20.0 |
| PSI | 55(12.78) | 439 | 413 | 367 | 330 | 302 | 268 | 239 |
| | 65(18.33) | 471 | 435 | 386 | 368 | 339 | 297 | 276 |
| | 75(23.89) | 489 | 457 | 403 | 381 | 362 | 312 | 290 |
| MPa | 55(12.78) | 3.03 | 2.85 | 2.53 | 2.28 | 2.08 | 1.85 | 1.65 |
| | 65(18.33) | 3.25 | 3.00 | 2.66 | 2.54 | 2.33 | 2.05 | 1.90 |
| | 75(23.89) | 3.38 | 3.15 | 2.78 | 2.63 | 2.49 | 2.15 | 2.00 |



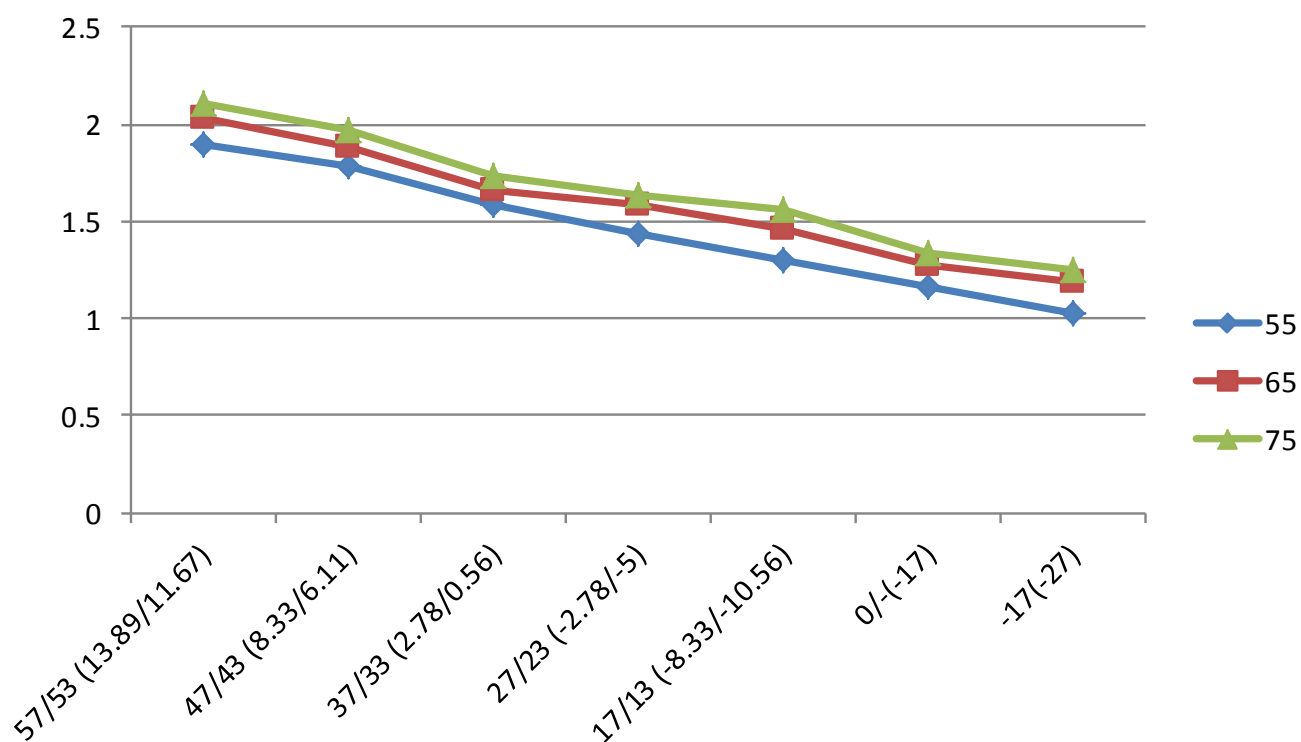
Cooling chart(R22):

| °F(°C) | ODU(DB) IDU(DB/WB) | 0(-17) | 5(-15) | 15 (-9.44) | 45 (7.22) | 75 (23.89) | 85 (29.44) | 95 (35) | 105 (40.56) | 115 (46.11) | 120 (48.89) |
|--------|-----------------------|--------|--------|---------------|--------------|---------------|---------------|---------|----------------|----------------|----------------|
| BAR | 70/59 (21.11/15) | 4.0 | 4.1 | 4.6 | 5.0 | 5.1 | 4.9 | 5.1 | 5.4 | 6.3 | 6.6 |
| | 75/63 (23.89/17.22) | 4.2 | 4.3 | 4.9 | 5.4 | 5.4 | 5.2 | 5.4 | 5.7 | 6.7 | 7.0 |
| | 80/67 (26.67/19.44) | 4.4 | 4.5 | 5.3 | 5.9 | 5.8 | 5.6 | 5.7 | 6.0 | 7.0 | 7.4 |
| | 90/73 (32.22/22.78) | 4.8 | 4.9 | 6.0 | 6.6 | 6.4 | 5.9 | 6.3 | 6.6 | 7.8 | 8.1 |
| PSI | 70/59 (21.11/15) | 58 | 59 | 67 | 73 | 74 | 71 | 74 | 78 | 91 | 96 |
| | 75/63 (23.89/17.22) | 61 | 62 | 71 | 78 | 78 | 75 | 78 | 83 | 97 | 102 |
| | 80/67 (26.67/19.44) | 64 | 65 | 77 | 86 | 84 | 81 | 83 | 87 | 102 | 107 |
| | 90/73 (32.22/22.78) | 70 | 71 | 87 | 96 | 93 | 86 | 91 | 96 | 113 | 117 |
| MPa | 70/59 (21.11/15) | 0.40 | 0.41 | 0.46 | 0.50 | 0.51 | 0.49 | 0.51 | 0.54 | 0.63 | 0.66 |
| | 75/63 (23.89/17.22) | 0.42 | 0.43 | 0.49 | 0.54 | 0.54 | 0.52 | 0.54 | 0.57 | 0.67 | 0.70 |
| | 80/67 (26.67/19.44) | 0.44 | 0.45 | 0.53 | 0.59 | 0.58 | 0.56 | 0.57 | 0.60 | 0.70 | 0.74 |
| | 90/73 (32.22/22.78) | 0.48 | 0.49 | 0.60 | 0.66 | 0.64 | 0.59 | 0.63 | 0.66 | 0.78 | 0.81 |



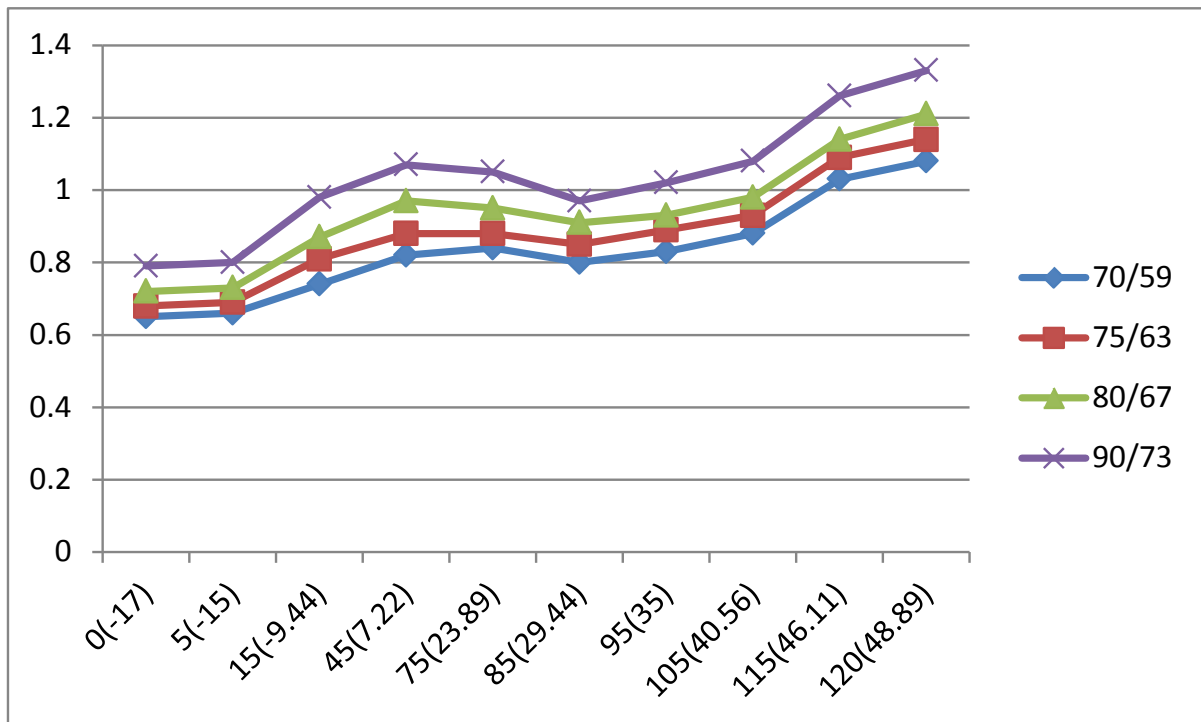
Heating chart(R22):

| °F(°C) | ODU(DB/WB) IDU(DB) | 57/53 (13.89/11.67) | 47/43 (8.33/6.11) | 37/33 (2.78/0.56) | 27/23 (-2.78/-5) | 17/13 (-8.33/- 10.56) | 0/-2 (-17/-19) | -17/-18 (-27/-28) |
|--------|-----------------------|------------------------|----------------------|----------------------|---------------------|--------------------------|-------------------|----------------------|
| BAR | 55(12.78) | 18.9 | 17.8 | 15.8 | 14.3 | 13.0 | 11.6 | 10.3 |
| | 65(18.33) | 20.3 | 18.8 | 16.6 | 15.9 | 14.6 | 12.8 | 11.9 |
| | 75(23.89) | 21.1 | 19.7 | 17.3 | 16.4 | 15.6 | 13.4 | 12.5 |
| PSI | 55(12.78) | 274 | 258 | 229 | 207 | 189 | 168 | 149 |
| | 65(18.33) | 294 | 273 | 241 | 231 | 212 | 186 | 172.6 |
| | 75(23.89) | 306 | 286 | 251 | 238 | 226 | 194 | 181 |
| MPa | 55(12.78) | 1.89 | 1.78 | 1.58 | 1.43 | 1.30 | 1.16 | 1.03 |
| | 65(18.33) | 2.03 | 1.88 | 1.66 | 1.59 | 1.46 | 1.28 | 1.19 |
| | 75(23.89) | 2.11 | 1.97 | 1.73 | 1.64 | 1.56 | 1.34 | 1.25 |



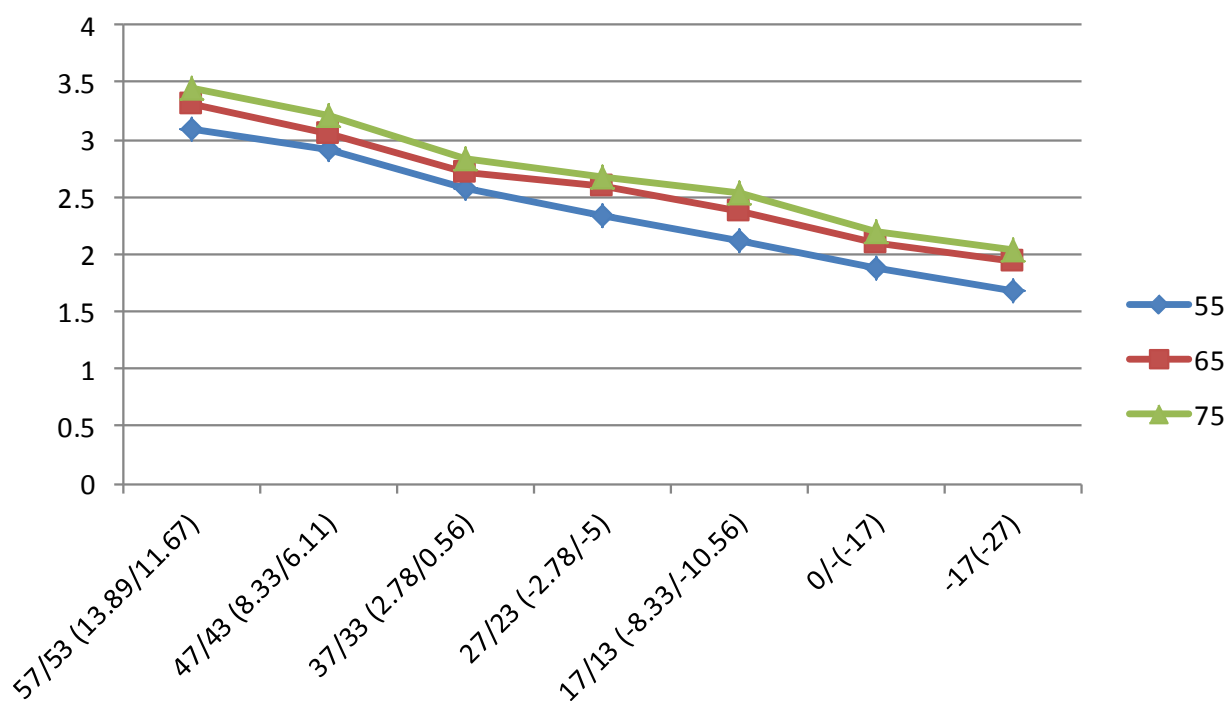
Cooling chart(R32):

| °F(°C) | ODU(DB) IDU(DB/WB) | 0(-17) | 5(-15) | 15 (-9.44) | 45 (7.22) | 75 (23.89) | 85 (29.44) | 95 (35) | 105 (40.56) | 115 (46.11) | 120 (48.89) |
|--------|-----------------------|--------|--------|---------------|--------------|---------------|---------------|---------|----------------|----------------|----------------|
| | | | | | | | | | | | |
| BAR | 70/59 (21.11/15) | 6.5 | 6.6 | 7.4 | 8.2 | 8.4 | 8.0 | 8.3 | 8.8 | 10.3 | 10.8 |
| | 75/63 (23.89/17.22) | 6.8 | 6.9 | 8.1 | 8.8 | 8.8 | 8.5 | 8.9 | 9.3 | 10.9 | 11.4 |
| | 80/67 (26.67/19.44) | 7.2 | 7.3 | 8.7 | 9.7 | 9.5 | 9.1 | 9.3 | 9.8 | 11.4 | 12.1 |
| | 90/73 (32.22/22.78) | 7.9 | 8.0 | 9.8 | 10.7 | 10.5 | 9.7 | 10.2 | 10.8 | 12.6 | 13.3 |
| PSI | 70/59 (21.11/15) | 95 | 96 | 108 | 118 | 121 | 115 | 119 | 128 | 150 | 157 |
| | 75/63 (23.89/17.22) | 99 | 101 | 117 | 128 | 126 | 122 | 129 | 135 | 158 | 165 |
| | 80/67 (26.67/19.44) | 105 | 106 | 125 | 141 | 138 | 132 | 135 | 143 | 165 | 176 |
| | 90/73 (32.22/22.78) | 114 | 115 | 142 | 155 | 152 | 141 | 148 | 157 | 184 | 193 |
| MPa | 70/59 (21.11/15) | 0.65 | 0.66 | 0.74 | 0.82 | 0.84 | 0.80 | 0.83 | 0.88 | 1.03 | 1.08 |
| | 75/63 (23.89/17.22) | 0.68 | 0.69 | 0.81 | 0.88 | 0.88 | 0.85 | 0.89 | 0.93 | 1.09 | 1.14 |
| | 80/67 (26.67/19.44) | 0.72 | 0.73 | 0.87 | 0.97 | 0.95 | 0.91 | 0.93 | 0.98 | 1.14 | 1.21 |
| | 90/73 (32.22/22.78) | 0.79 | 0.80 | 0.98 | 1.07 | 1.05 | 0.97 | 1.02 | 1.08 | 1.26 | 1.33 |



Heating chart(R32):

| °F(°C) | ODU(DB/WB) IDU(DB) | 57/53 (13.89/11.67) | 47/43 (8.33/6.11) | 37/33 (2.78/0.56) | 27/23 (-2.78/-5) | 17/13 (-8.33/- 10.56) | 0/-2 (-17/-19) | -17/-18 (-27/-28) |
|--------|-----------------------|------------------------|----------------------|----------------------|---------------------|--------------------------|-------------------|----------------------|
| BAR | 55(12.78) | 30.9 | 29.1 | 25.8 | 23.3 | 21.2 | 18.9 | 16.8 |
| | 65(18.33) | 33.2 | 30.6 | 27.1 | 25.9 | 23.8 | 20.9 | 19.4 |
| | 75(23.89) | 34.5 | 32.1 | 28.4 | 26.8 | 25.4 | 21.9 | 20.4 |
| PSI | 55(12.78) | 448 | 421 | 374 | 337 | 308 | 273 | 244 |
| | 65(18.33) | 480 | 444 | 394 | 375 | 346 | 303 | 282 |
| | 75(23.89) | 499 | 466 | 411 | 389 | 369 | 318 | 296 |
| MPa | 55(12.78) | 3.09 | 2.91 | 2.58 | 2.33 | 2.12 | 1.89 | 1.68 |
| | 65(18.33) | 3.32 | 3.06 | 2.71 | 2.59 | 2.38 | 2.09 | 1.94 |
| | 75(23.89) | 3.45 | 3.21 | 2.84 | 2.68 | 2.54 | 2.19 | 2.04 |



System Pressure Table-R22

| Pressure | | | Temperature | | Pressure | | | Temperature | |
|----------|------|--------|-------------|---------|----------|------|--------|-------------|---------|
| Kpa | bar | PSI | °C | °F | Kpa | bar | PSI | °C | °F |
| 100 | 1 | 14.5 | -41.091 | -41.964 | 1600 | 16 | 232 | 41.748 | 107.146 |
| 150 | 1.5 | 21.75 | -32.077 | -25.739 | 1650 | 16.5 | 239.25 | 43.029 | 109.452 |
| 200 | 2 | 29 | -25.177 | -13.319 | 1700 | 17 | 246.5 | 44.281 | 111.706 |
| 250 | 2.5 | 36.25 | -19.508 | -3.114 | 1750 | 17.5 | 253.75 | 45.506 | 113.911 |
| 300 | 3 | 43.5 | -14.654 | 5.623 | 1800 | 18 | 261 | 46.706 | 116.071 |
| 350 | 3.5 | 50.75 | -10.384 | 13.309 | 1850 | 18.5 | 268.25 | 47.882 | 118.188 |
| 400 | 4 | 58 | -6.556 | 20.199 | 1900 | 19 | 275.5 | 49.034 | 120.261 |
| 450 | 4.5 | 65.25 | -3.075 | 26.464 | 1950 | 19.5 | 282.75 | 50.164 | 122.295 |
| 500 | 5 | 72.5 | 0.124 | 32.223 | 2000 | 20 | 290 | 51.273 | 124.291 |
| 550 | 5.5 | 79.75 | 3.091 | 37.563 | 2050 | 20.5 | 297.25 | 52.361 | 126.250 |
| 600 | 6 | 87 | 5.861 | 42.550 | 2100 | 21 | 304.5 | 53.43 | 128.174 |
| 650 | 6.5 | 94.25 | 8.464 | 47.234 | 2150 | 21.5 | 311.75 | 54.48 | 130.064 |
| 700 | 7 | 101.5 | 10.92 | 51.656 | 2200 | 22 | 319 | 55.512 | 131.922 |
| 750 | 7.5 | 108.75 | 13.249 | 55.848 | 2250 | 22.5 | 326.25 | 56.527 | 133.749 |
| 800 | 8 | 116 | 15.465 | 59.837 | 2300 | 23 | 333.5 | 57.526 | 135.547 |
| 850 | 8.5 | 123.25 | 17.58 | 63.644 | 2350 | 23.5 | 340.75 | 58.508 | 137.314 |
| 900 | 9 | 130.5 | 19.604 | 67.287 | 2400 | 24 | 348 | 59.475 | 139.055 |
| 950 | 9.5 | 137.75 | 21.547 | 70.785 | 2450 | 24.5 | 355.25 | 60.427 | 140.769 |
| 1000 | 10 | 145 | 23.415 | 74.147 | 2500 | 25 | 362.5 | 61.364 | 142.455 |
| 1050 | 10.5 | 152.25 | 25.216 | 77.389 | 2550 | 25.5 | 369.75 | 62.288 | 144.118 |
| 1100 | 11 | 159.5 | 26.953 | 80.515 | 2600 | 26 | 377 | 63.198 | 145.756 |
| 1150 | 11.5 | 166.75 | 28.634 | 83.541 | 2650 | 26.5 | 384.25 | 64.095 | 147.371 |
| 1200 | 12 | 174 | 30.261 | 86.470 | 2700 | 27 | 391.5 | 64.98 | 148.964 |
| 1250 | 12.5 | 181.25 | 31.839 | 89.310 | 2750 | 27.5 | 398.75 | 65.852 | 150.534 |
| 1300 | 13 | 188.5 | 33.371 | 92.068 | 2800 | 28 | 406 | 66.712 | 152.082 |
| 1350 | 13.5 | 195.75 | 34.86 | 94.748 | 2850 | 28.5 | 413.25 | 67.561 | 153.610 |
| 1400 | 14 | 203 | 36.308 | 97.354 | 2900 | 29 | 420.5 | 68.399 | 155.118 |
| 1450 | 14.5 | 210.25 | 37.719 | 99.894 | 2950 | 29.5 | 427.75 | 69.226 | 156.607 |
| 1500 | 15 | 217.5 | 39.095 | 102.371 | 3000 | 30 | 435 | 70.042 | 158.076 |
| 1550 | 15.5 | 224.75 | 40.437 | 104.787 | | | | | |

System Pressure Table-R410A

| Pressure | | | Temperature | | Pressure | | | Temperature | |
|----------|------|--------|-------------|---------|----------|------|--------|-------------|---------|
| Kpa | bar | PSI | °C | °F | Kpa | bar | PSI | °C | °F |
| 100 | 1 | 14.5 | -51.623 | -60.921 | 2350 | 23.5 | 340.75 | 38.817 | 101.871 |
| 150 | 1.5 | 21.75 | -43.327 | -45.989 | 2400 | 24 | 348 | 39.68 | 103.424 |
| 200 | 2 | 29 | -36.992 | -34.586 | 2450 | 24.5 | 355.25 | 40.531 | 104.956 |
| 250 | 2.5 | 36.25 | -31.795 | -25.231 | 2500 | 25 | 362.5 | 41.368 | 106.462 |
| 300 | 3 | 43.5 | -27.351 | -17.232 | 2550 | 25.5 | 369.75 | 42.192 | 107.946 |
| 350 | 3.5 | 50.75 | -23.448 | -10.206 | 2600 | 26 | 377 | 43.004 | 109.407 |
| 400 | 4 | 58 | -19.953 | -3.915 | 2650 | 26.5 | 384.25 | 43.804 | 110.847 |
| 450 | 4.5 | 65.25 | -16.779 | 1.798 | 2700 | 27 | 391.5 | 44.592 | 112.266 |
| 500 | 5 | 72.5 | -13.863 | 7.047 | 2750 | 27.5 | 398.75 | 45.37 | 113.666 |
| 550 | 5.5 | 79.75 | -11.162 | 11.908 | 2800 | 28 | 406 | 46.136 | 115.045 |
| 600 | 6 | 87 | -8.643 | 16.444 | 2850 | 28.5 | 413.25 | 46.892 | 116.406 |
| 650 | 6.5 | 94.25 | -6.277 | 20.701 | 2900 | 29 | 420.5 | 47.638 | 117.748 |
| 700 | 7 | 101.5 | -4.046 | 24.716 | 2950 | 29.5 | 427.75 | 48.374 | 119.073 |
| 750 | 7.5 | 108.75 | -1.933 | 28.521 | 3000 | 30 | 435 | 49.101 | 120.382 |
| 800 | 8 | 116 | 0.076 | 32.137 | 3050 | 30.5 | 442.25 | 49.818 | 121.672 |
| 850 | 8.5 | 123.25 | 1.993 | 35.587 | 3100 | 31 | 449.5 | 50.525 | 122.945 |
| 900 | 9 | 130.5 | 3.826 | 38.888 | 3150 | 31.5 | 456.75 | 51.224 | 124.203 |
| 950 | 9.5 | 137.75 | 5.584 | 42.052 | 3200 | 32 | 464 | 51.914 | 125.445 |
| 1000 | 10 | 145 | 7.274 | 45.093 | 3250 | 32.5 | 471.25 | 52.596 | 126.673 |
| 1050 | 10.5 | 152.25 | 8.901 | 48.022 | 3300 | 33 | 478.5 | 53.27 | 127.886 |
| 1100 | 11 | 159.5 | 10.471 | 50.848 | 3350 | 33.5 | 485.75 | 53.935 | 129.083 |
| 1150 | 11.5 | 166.75 | 11.988 | 53.578 | 3400 | 34 | 493 | 54.593 | 130.267 |
| 1200 | 12 | 174 | 13.457 | 56.223 | 3450 | 34.5 | 500.25 | 55.243 | 131.437 |
| 1250 | 12.5 | 181.25 | 14.879 | 58.782 | 3500 | 35 | 507.5 | 55.885 | 132.593 |
| 1300 | 13 | 188.5 | 16.26 | 61.268 | 3550 | 35.5 | 514.75 | 56.52 | 133.736 |
| 1350 | 13.5 | 195.75 | 17.602 | 63.684 | 3600 | 36 | 522 | 57.148 | 134.866 |
| 1400 | 14 | 203 | 18.906 | 66.031 | 3650 | 36.5 | 529.25 | 57.769 | 135.984 |
| 1450 | 14.5 | 210.25 | 20.176 | 68.317 | 3700 | 37 | 536.5 | 58.383 | 137.089 |
| 1500 | 15 | 217.5 | 21.414 | 70.545 | 3750 | 37.5 | 543.75 | 58.99 | 138.182 |
| 1550 | 15.5 | 224.75 | 22.621 | 72.718 | 3800 | 38 | 551 | 59.591 | 139.264 |
| 1600 | 16 | 232 | 23.799 | 74.838 | 3850 | 38.5 | 558.25 | 60.185 | 140.333 |
| 1650 | 16.5 | 239.25 | 24.949 | 76.908 | 3900 | 39 | 565.5 | 60.773 | 141.391 |
| 1700 | 17 | 246.5 | 26.074 | 78.933 | 3950 | 39.5 | 572.75 | 61.355 | 142.439 |
| 1750 | 17.5 | 253.75 | 27.174 | 80.913 | 4000 | 40 | 580 | 61.93 | 143.474 |
| 1800 | 18 | 261 | 28.251 | 82.852 | 4050 | 40.5 | 587.25 | 62.499 | 144.498 |
| 1850 | 18.5 | 268.25 | 29.305 | 84.749 | 4100 | 41 | 594.5 | 63.063 | 145.513 |
| 1900 | 19 | 275.5 | 30.338 | 86.608 | 4150 | 41.5 | 601.75 | 63.62 | 146.516 |
| 1950 | 19.5 | 282.75 | 31.351 | 88.432 | 4200 | 42 | 609 | 64.172 | 147.510 |
| 2000 | 20 | 290 | 32.344 | 90.219 | 4250 | 42.5 | 616.25 | 64.719 | 148.494 |
| 2050 | 20.5 | 297.25 | 33.319 | 91.974 | 4300 | 43 | 623.5 | 65.259 | 149.466 |
| 2100 | 21 | 304.5 | 34.276 | 93.697 | 4350 | 43.5 | 630.75 | 65.795 | 150.431 |
| 2150 | 21.5 | 311.75 | 35.215 | 95.387 | 4400 | 44 | 638 | 66.324 | 151.383 |
| 2200 | 22 | 319 | 36.139 | 97.050 | 4450 | 44.5 | 645.25 | 66.849 | 152.328 |
| 2250 | 22.5 | 326.25 | 37.047 | 98.685 | 4500 | 45 | 652.5 | 67.368 | 153.262 |
| 2300 | 23 | 333.5 | 37.939 | 100.290 | | | | | |

System Pressure Table-R32

| Pressure | | | Temperature | | Pressure | | | Temperature | |
|----------|------|--------|-------------|---------|----------|------|--------|-------------|---------|
| Kpa | bar | PSI | °C | °F | Kpa | bar | PSI | °C | °F |
| 100 | 1 | 14.5 | -51.909 | -61.436 | 1850 | 18.5 | 268.25 | 28.425 | 83.165 |
| 150 | 1.5 | 21.75 | -43.635 | -46.543 | 1900 | 19 | 275.5 | 29.447 | 85.005 |
| 200 | 2 | 29 | -37.323 | -35.181 | 1950 | 19.5 | 282.75 | 30.448 | 86.806 |
| 250 | 2.5 | 36.25 | -32.15 | -25.87 | 2000 | 20 | 290 | 31.431 | 88.576 |
| 300 | 3 | 43.5 | -27.731 | -17.916 | 2050 | 20.5 | 297.25 | 32.395 | 90.311 |
| 350 | 3.5 | 50.75 | -23.85 | -10.93 | 2100 | 21 | 304.5 | 33.341 | 92.014 |
| 400 | 4 | 58 | -20.378 | -4.680 | 2150 | 21.5 | 311.75 | 34.271 | 93.688 |
| 450 | 4.5 | 65.25 | -17.225 | 0.995 | 2200 | 22 | 319 | 35.184 | 95.331 |
| 500 | 5 | 72.5 | -14.331 | 6.204 | 2250 | 22.5 | 326.25 | 36.082 | 96.948 |
| 550 | 5.5 | 79.75 | -11.65 | 11.03 | 2300 | 23 | 333.5 | 36.965 | 98.537 |
| 600 | 6 | 87 | -9.150 | 15.529 | 2350 | 23.5 | 340.75 | 37.834 | 100.101 |
| 650 | 6.5 | 94.25 | -6.805 | 19.752 | 2400 | 24 | 348 | 38.688 | 101.638 |
| 700 | 7 | 101.5 | -4.593 | 23.734 | 2450 | 24.5 | 355.25 | 39.529 | 103.152 |
| 750 | 7.5 | 108.75 | -2.498 | 27.505 | 2500 | 25 | 362.5 | 40.358 | 104.644 |
| 800 | 8 | 116 | -0.506 | 31.089 | 2550 | 25.5 | 369.75 | 41.173 | 106.111 |
| 850 | 8.5 | 123.25 | 1.393 | 34.507 | 2600 | 26 | 377 | 41.977 | 107.559 |
| 900 | 9 | 130.5 | 3.209 | 37.777 | 2650 | 26.5 | 384.25 | 42.769 | 108.984 |
| 950 | 9.5 | 137.75 | 4.951 | 40.911 | 2700 | 27 | 391.5 | 43.55 | 110.39 |
| 1000 | 10 | 145 | 6.624 | 43.923 | 2750 | 27.5 | 398.75 | 44.32 | 111.776 |
| 1050 | 10.5 | 152.25 | 8.235 | 46.823 | 2800 | 28 | 406 | 45.079 | 113.142 |
| 1100 | 11 | 159.5 | 9.790 | 49.621 | 2850 | 28.5 | 413.25 | 45.828 | 114.490 |
| 1150 | 11.5 | 166.75 | 11.291 | 52.324 | 2900 | 29 | 420.5 | 46.567 | 115.821 |
| 1200 | 12 | 174 | 12.745 | 54.941 | 2950 | 29.5 | 427.75 | 47.296 | 117.133 |
| 1250 | 12.5 | 181.25 | 14.153 | 57.475 | 3000 | 30 | 435 | 48.015 | 118.427 |
| 1300 | 13 | 188.5 | 15.52 | 59.936 | 3050 | 30.5 | 442.25 | 48.726 | 119.707 |
| 1350 | 13.5 | 195.75 | 16.847 | 62.325 | 3100 | 31 | 449.5 | 49.428 | 120.970 |
| 1400 | 14 | 203 | 18.138 | 64.648 | 3150 | 31.5 | 456.75 | 50.121 | 122.218 |
| 1450 | 14.5 | 210.25 | 19.395 | 66.911 | 3200 | 32 | 464 | 50.806 | 123.451 |
| 1500 | 15 | 217.5 | 20.619 | 69.114 | 3250 | 32.5 | 471.25 | 51.482 | 124.668 |
| 1550 | 15.5 | 224.75 | 21.813 | 71.263 | 3300 | 33 | 478.5 | 52.15 | 125.87 |
| 1600 | 16 | 232 | 22.978 | 73.360 | 3350 | 33.5 | 485.75 | 52.811 | 127.060 |
| 1650 | 16.5 | 239.25 | 24.116 | 75.409 | 3400 | 34 | 493 | 53.464 | 128.235 |
| 1700 | 17 | 246.5 | 25.229 | 77.412 | 3450 | 34.5 | 500.25 | 54.11 | 129.398 |
| 1750 | 17.5 | 253.75 | 26.317 | 79.371 | 3500 | 35 | 507.5 | 54.748 | 130.546 |
| 1800 | 18 | 261 | 27.382 | 81.288 | | | | | |