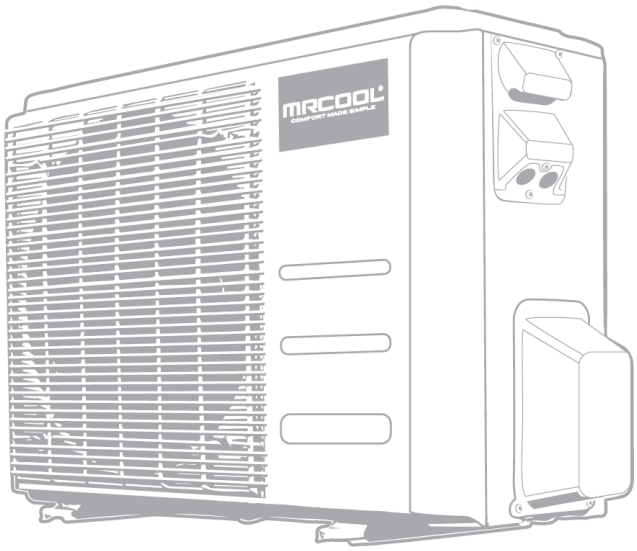
MRCOOL®

COMFORT MADE SIMPLE

4TH GENERATION MULTI-ZONE

SERVICE MANUAL



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Safety Precautions

Contents

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 systemremote 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 Labeling

- 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

Contents

1. Model Reference

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

Outdoor Unit Model	Capacity (Btu/h)	Power Supply
DIY-MULTI2-18HP230C	18k	208/230V~, 60Hz, 1Phase
DIY-MULTI3-27HP230C	27k	
DIY-MULTI4-36HP230C	36k	
DIY-MULTI5-48HP230C	48k	

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.

	1 drive 2	1 drive 3	1 drive 4	1 drive 5
Max. length for all rooms (m)	30	45	60	75
Max. length for one IU (m)	15	15	15	15
Max. height difference between IU and OU (m)	10	10	10	10
Max. height difference between IUs (m)	10	10	10	10

Additional refrigerant charge

Connective Pipe Length(m)	Additional Refrigerant
Pre-charge pipe length (ft/m) (pre-charge pipe length xN)	NA
More than (pre-charge pipe lengthxN) ft/m	(Total pipe length - pre-charge pipe lengthxN) x15g/m
	(Total pipe length - pre-charge pipe lengthxN) x0.16oZ/ft

Caution:

- Refrigerant pipe diameter is different according to indoor unit to be connected. When using the extension pipe, refer to the tables below.
- When refrigerant pipe diameter is different from that of outdoor unit union , additional transfer connector needs to be used on outdoor unit.

Indoor unit			Extension pipe diameter (mm/inch)	
Model	Pipe diameter (mm/inch)			
9k,12k	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	9.52(3/8)	Gas	9.52(3/8)
18k	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	12.7(1/2)	Gas	12.7(1/2)
24k	Liquid	9.52(3/8)	Liquid	9.52(3/8)
	Gas	15.9(5/8)	Gas	15.9(5/8)
30k,36k	Liquid	9.52(3/8)	Liquid	9.52(3/8)
	Gas	19(3/4)	Gas	19(3/4)
Outdoor unit union diameter (mm/inch)				
1 drive 2			Liquid	6.35(1/4)*2
			Gas	9.52(3/8)*2
1 drive 3			Liquid	6.35(1/4)*3
			Gas	9.52(3/8)*3
1 drive 4			Liquid	6.35(1/4)*4
			Gas	9.52(3/8)*3
			Gas	12.7(1/2)*1
1 drive 5			Liquid	6.35(1/4)*5
			Gas	9.52(3/8)*3
			Gas	12.7(1/2)*2

3. Indoor units combination

3.1 Indoor unit combination for M2OA-18HFN1-MQ1

One unit	Two units
9	9+9
12	9+12
	12+12

3.2 Indoor unit combination for M3OH-27HFN1-MQ1

One unit	Two units	Three units
9	9+9	9+9+9
12	9+12	9+9+12
18	9+18	9+9+18
	12+12	9+12+12
	12+18	12+12+12
	18+18	

3.3 Indoor unit combination for M4OH-36HFN1-MQ1

One unit	Two units	Three units		Four units
9	9+18	9+9+9	9+12+24	9+9+9+9
12	9+24	9+9+12	9+18+18	9+9+9+12
18	12+12	9+9+18	12+12+12	9+9+9+18
24	12+18	9+9+24	12+12+18	9+9+12+12
	12+24	9+12+12	12+18+18	9+9+12+18
	18+18	9+12+18	12+12+24	9+12+12+12
				12+12+12+12

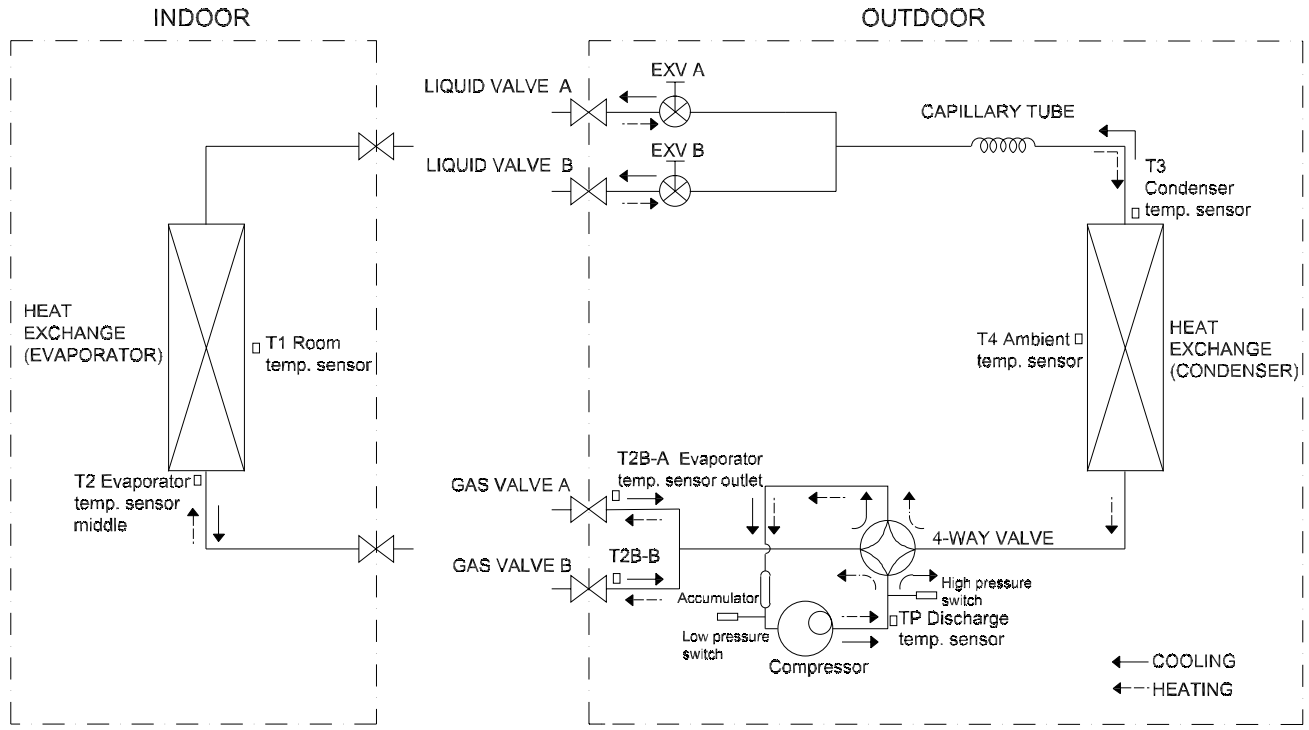
3.4 Indoor unit combination for M5OF-48HFN1-MQ1

One unit	Two units		Three units			
9	9+24	18+24	9+9+18	9+12+30	9+24+30	12+18+24
12	9+30	18+30	9+9+24	9+12+36	12+12+12	12+18+30
18	9+36	18+36	9+9+30	9+18+18	12+12+18	12+24+24
24	12+24	24+30	9+9+36	9+18+24	12+12+24	18+18+18
30	12+30	24+36	9+12+12	9+18+30	12+12+30	18+18+24
36	12+36	30+30	9+12+18	9+18+36	12+12+36	
	18+18		9+12+24	9+24+24	12+18+18	

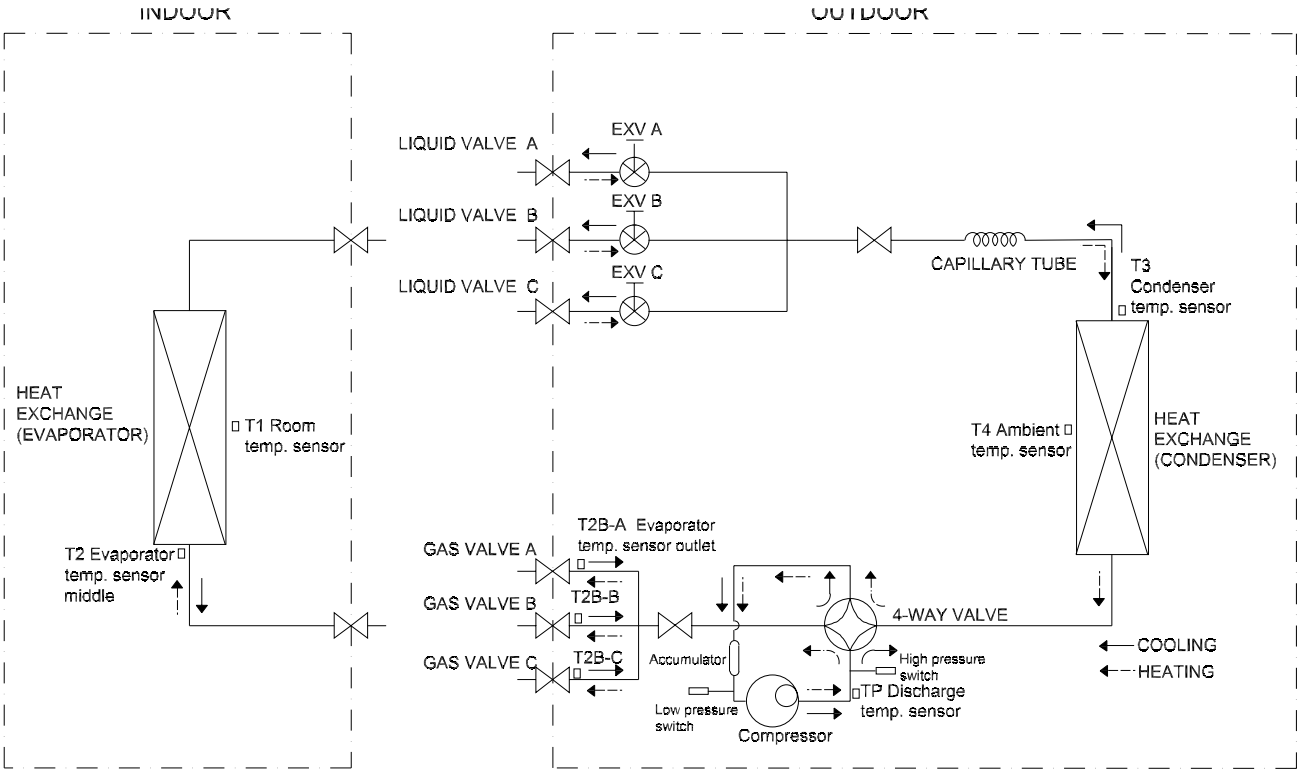
Four units				Five units	
9+9+9+9	9+9+12+12	9+12+12+12	12+12+12+12	9+9+9+9+9	9+9+9+12+24
9+9+9+12	9+9+12+18	9+12+12+18	12+12+12+18	9+9+9+9+12	9+9+12+12+12
9+9+9+18	9+9+12+24	9+12+12+24	12+12+12+24	9+9+9+9+18	9+9+12+12+18
9+9+9+24	9+9+12+30	9+12+12+30	12+12+18+18	9+9+9+9+24	9+12+12+12+12
9+9+9+30	9+9+18+18	9+12+18+18		9+9+9+12+12	12+12+12+12+12
9+9+9+36	9+9+18+24	9+12+18+24		9+9+9+12+18	

4. Refrigeration Cycle Diagrams

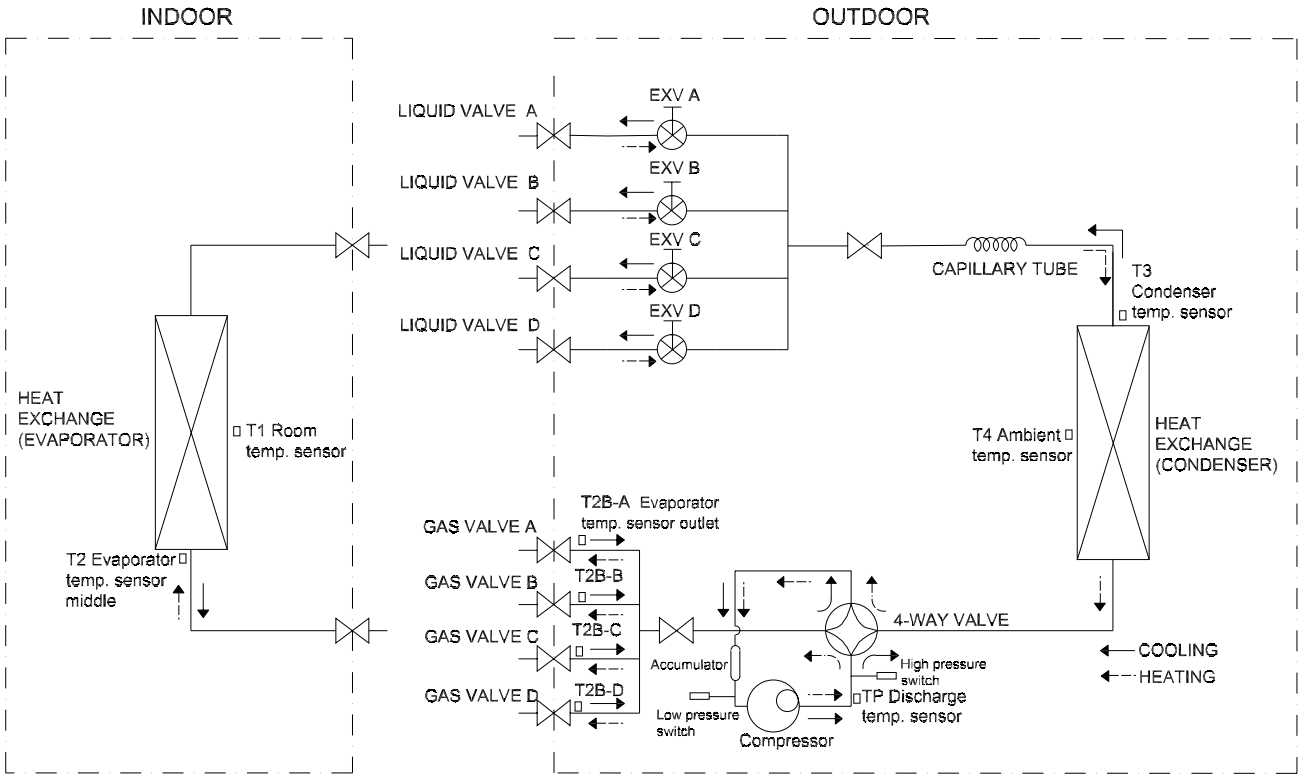
4.1 Refrigeration Cycle Diagram of inverter 1 drive 2 type



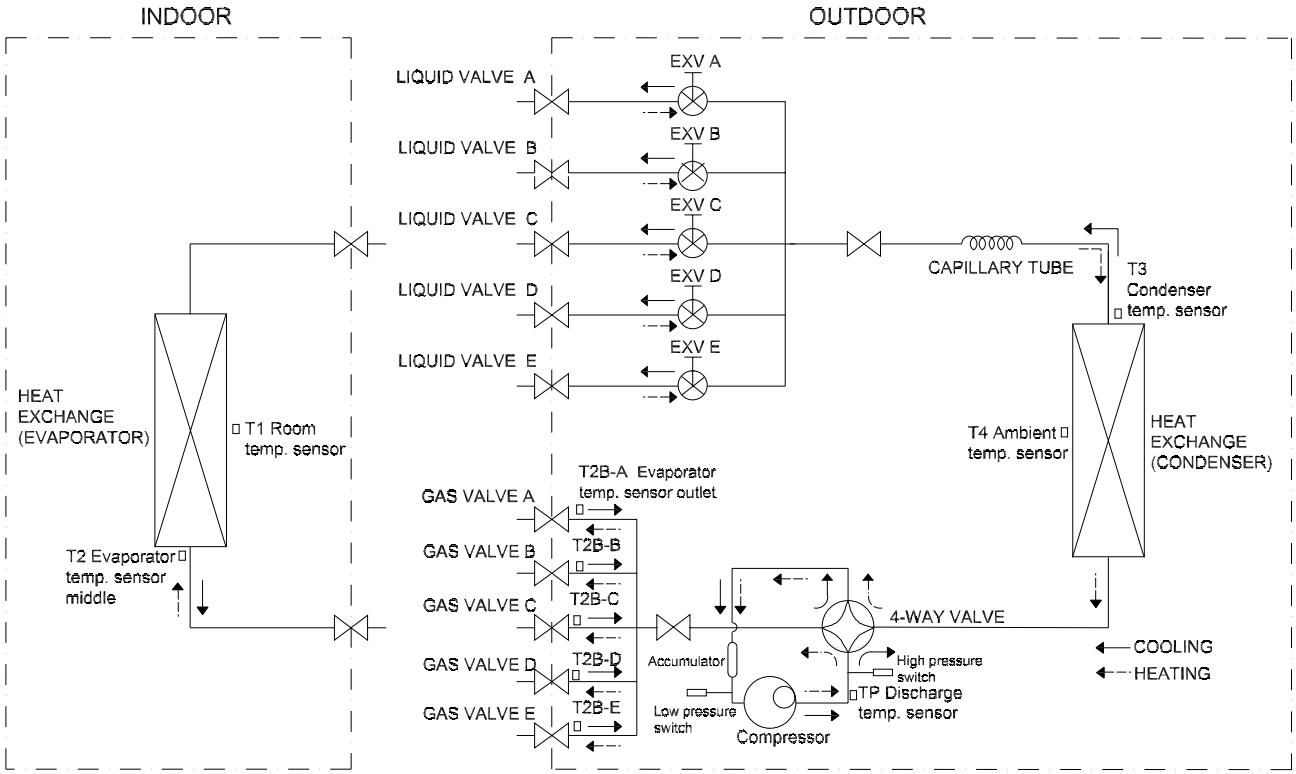
4.2 Refrigeration Cycle Diagram of inverter 1 drive 3 type



4.3 Refrigeration Cycle Diagram of inverter 1 drive 4 type



4.4 Refrigeration Cycle Diagram of inverter 1 drive 5 type



5. Electrical Wiring Diagrams

Outdoor unit wiring diagram

Outdoor Unit	
ODU Model	ODU Wiring Diagram
DIY-MULTI2-18HP230C	16022000035644
DIY-MULTI3-27HP230C	16022300002514
DIY-MULTI4-36HP230C	16022300002633
DIY-MULTI5-48HP230C	16022000036851

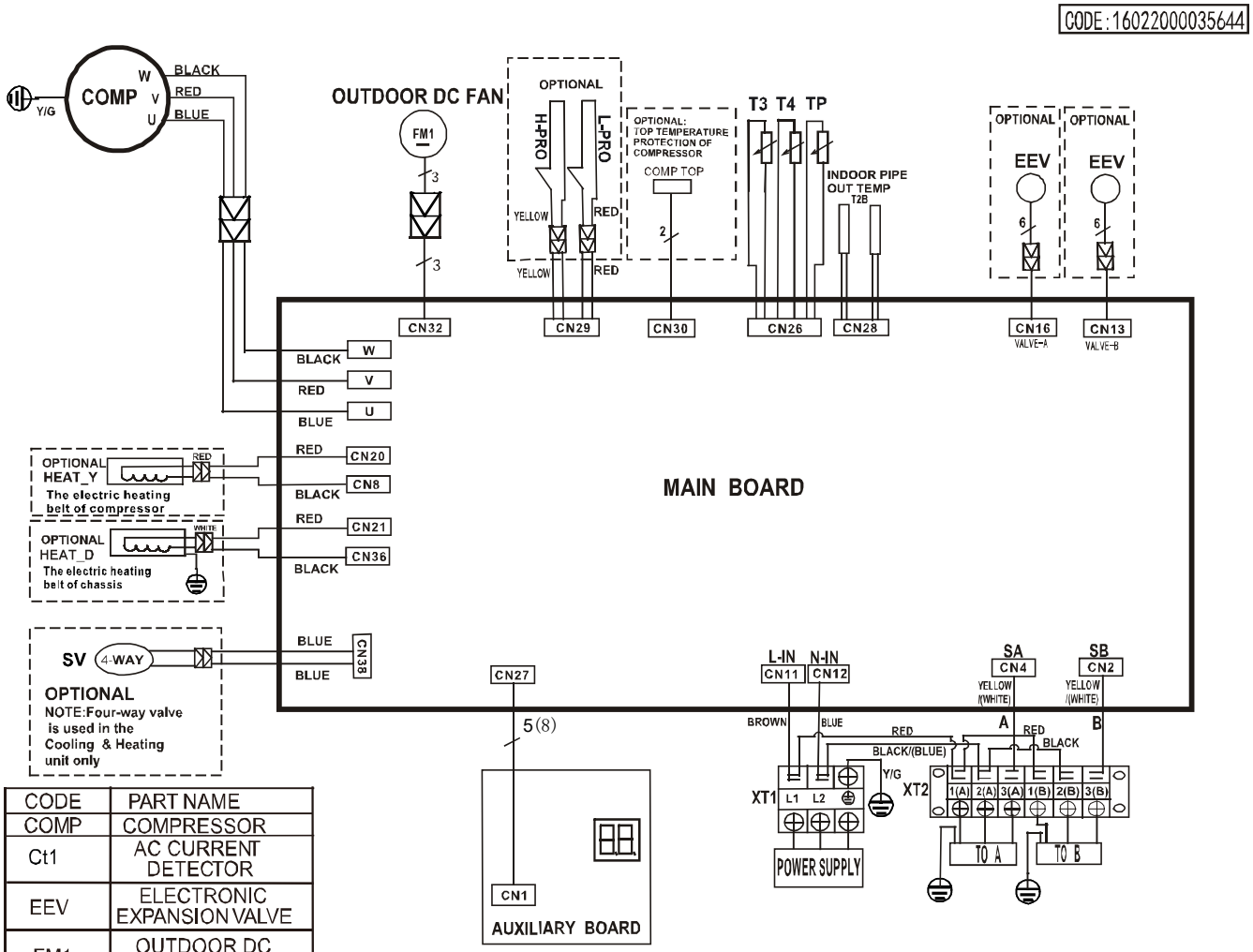
Outdoor unit printed circuit board diagram

Outdoor Unit		
ODU Model	ODU Printed Circuit Board	IPM Printed Circuit Board
DIY-MULTI2-18HP230C	17122000051368	/
DIY-MULTI3-27HP230C	17122300001076	17122000018251
DIY-MULTI4-36HP230C	17122300001076	17122000018251
DIY-MULTI5-48HP230C	17122300004873	/

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
L-PRO	Low Pressure Switch
H-PRO	High Pressure Switch
EEV	Electronic Expansion Valve

Outdoor unit wiring diagram:16022000035644

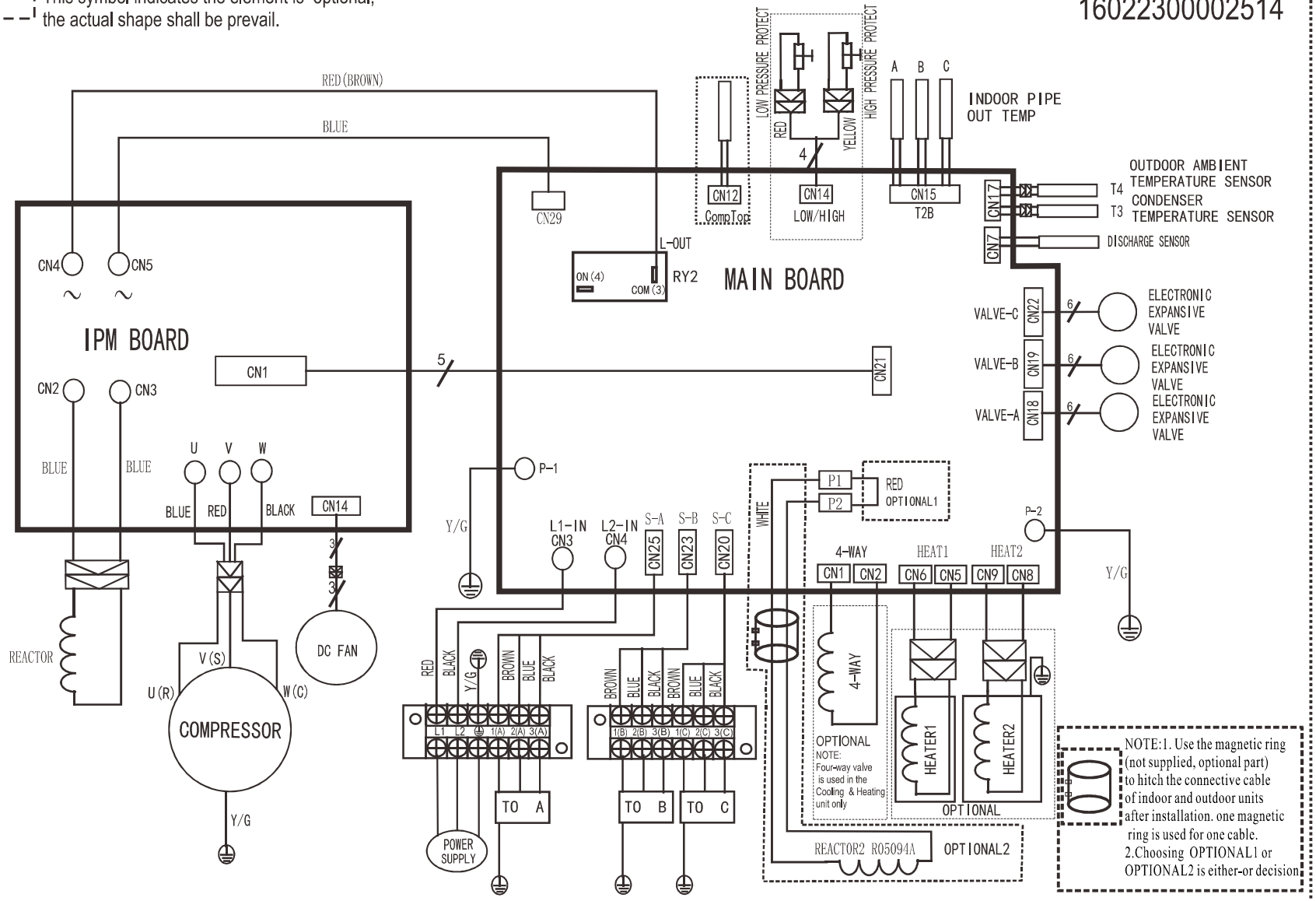


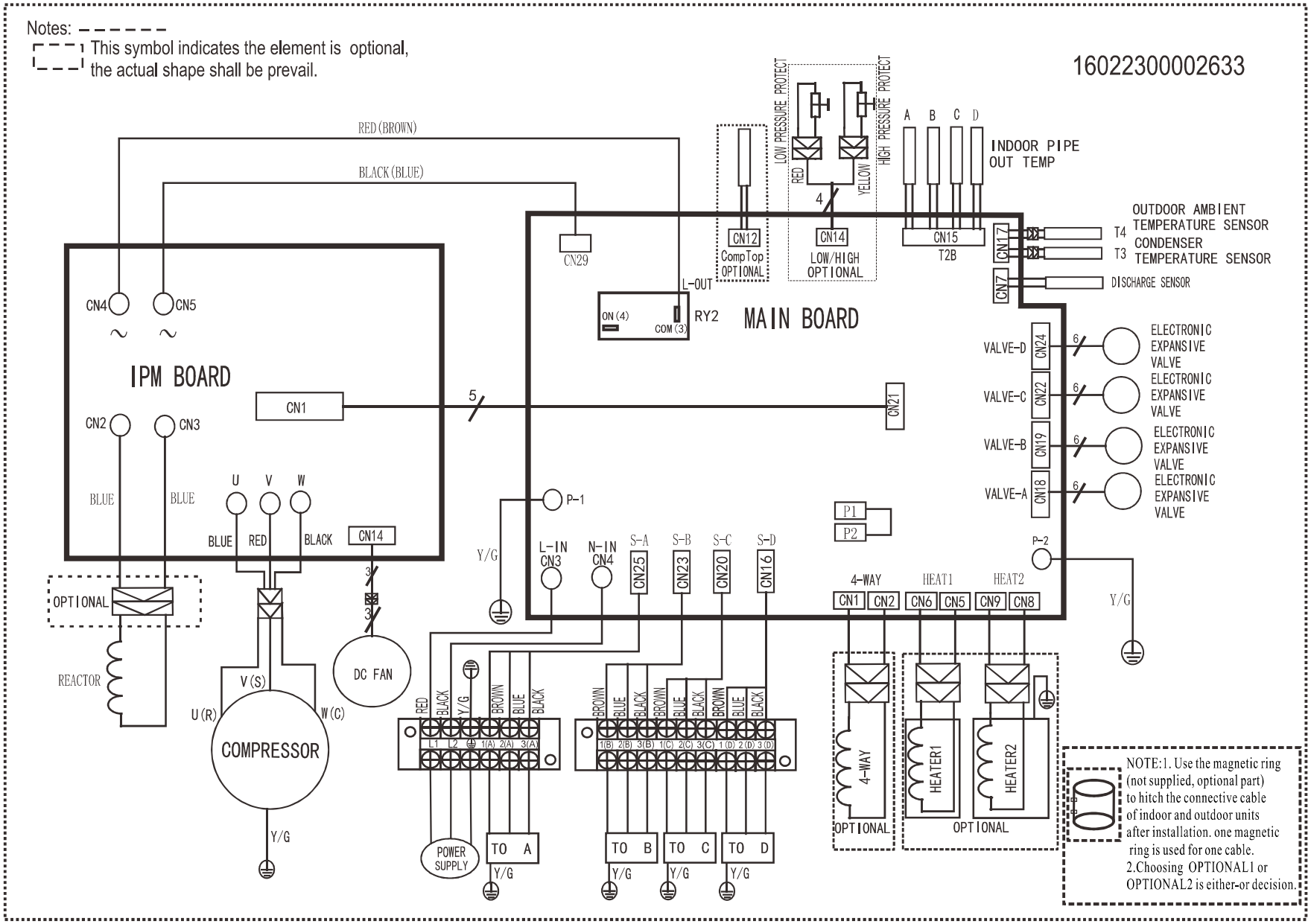
CODE	PART NAME
COMP	COMPRESSOR
Ct1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSION VALVE
FM1	OUTDOOR DC FAN MOTOR
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSE VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR

Notes: [ ]
This symbol indicates
the element is optional,
the actual shape shall
be prevail.

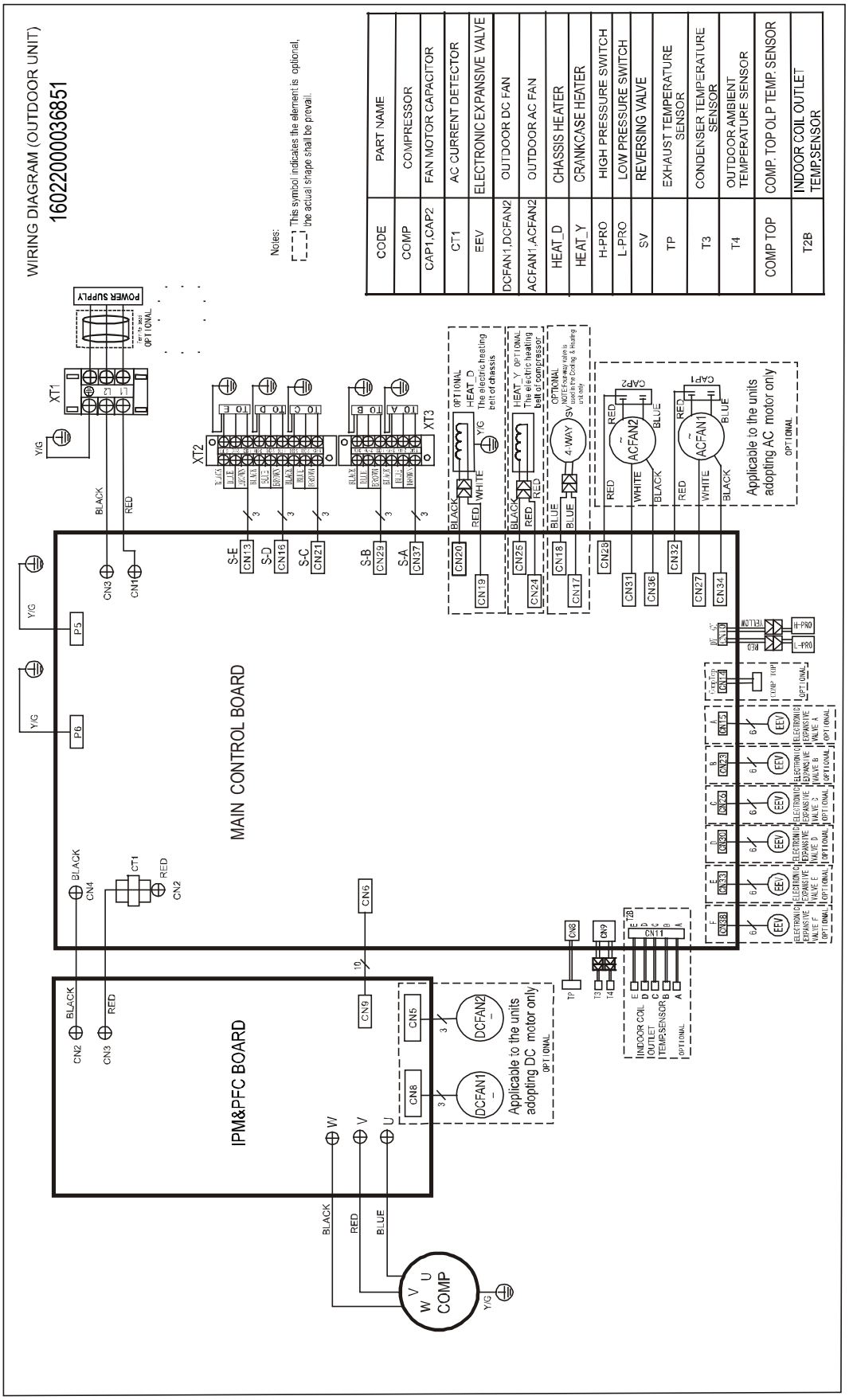
Notes:
This symbol indicates the element is optional, the actual shape shall be prevail.

16022300002514

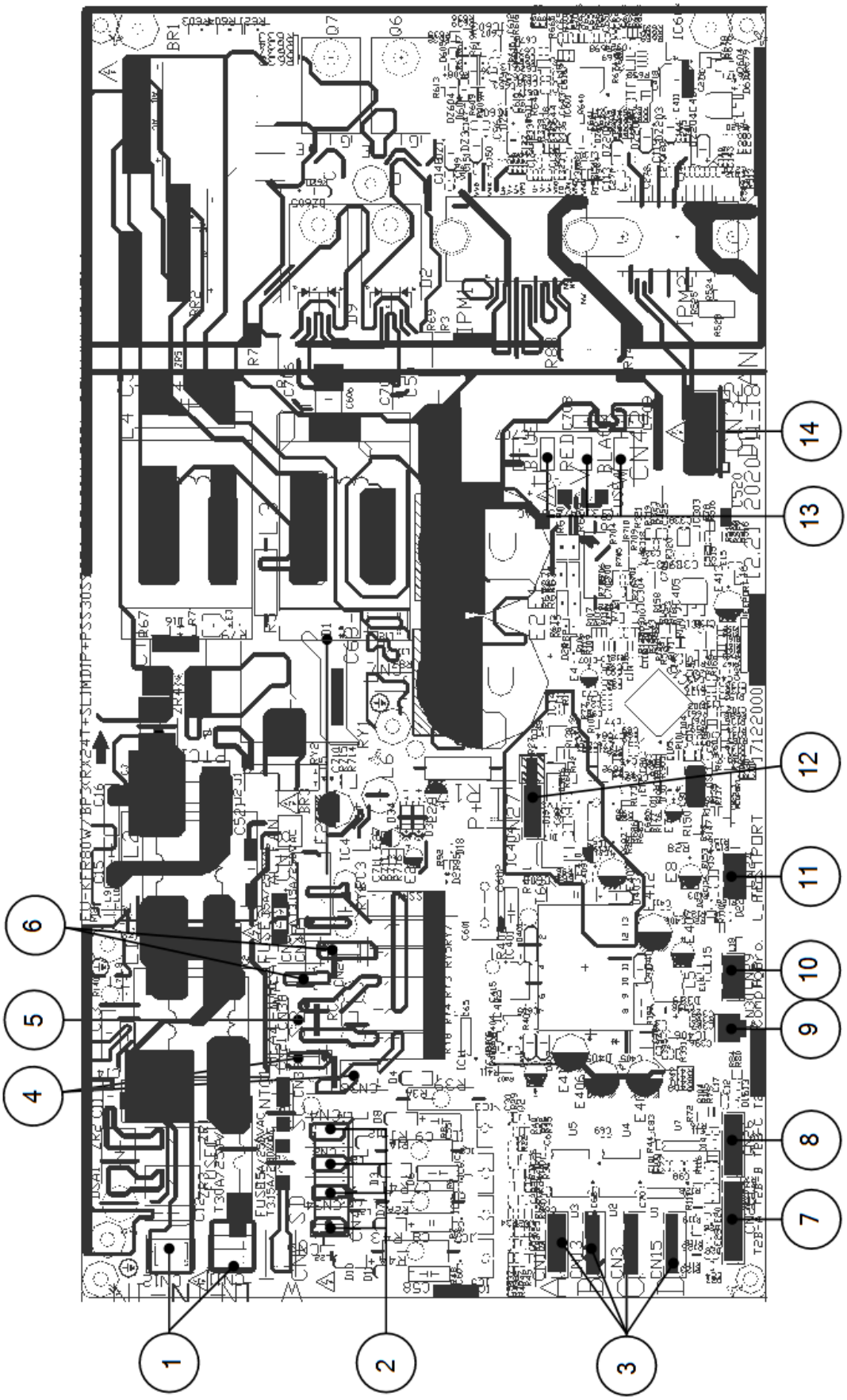



Notes:
This symbol indicates the element is optional, the actual shape shall be prevail.
16022300002633
RED (BROWN)
BLACK (BLUE)
LOW PRESSURE PROTECT
HIGH PRESSURE PROTECT
RED
YELLOW
A B C D
INDOOR PIPE OUT TEMP
OUTDOOR AMBIENT TEMPERATURE SENSOR
T4
CONDENSER TEMPERATURE SENSOR
T3
DISCHARGE SENSOR
CN12 CompTop OPTIONAL
CN14 LOW/HIGH OPTIONAL
CN15 T2B
CN17
CN7
CN29
L-OUT
ON (4)
COM (3)
RY2
MAIN BOARD
CN4
CN5
IPM BOARD
CN1
CN21
CN2
CN3
BLUE
BLUE
U V W
BLUE RED BLACK
CN14
VALVE-D CN24
VALVE-C CN22
VALVE-B CN19
VALVE-A CN18
ELECTRONIC EXPANSIVE VALVE
P-1
P1
P2
P-2
Y/G
L-IN CN3
N-IN CN4
S-A CN25
S-B CN23
S-C CN20
S-D CN16
4-WAY CN1 CN2
HEAT1 CN6 CN5
HEAT2 CN9 CN8
OPTIONAL
REACTOR
V (S)
U (R)
W (C)
COMPRESSOR
DC FAN
RED BLACK Y/G BROWN BLUE BLACK
L1 L2 1(A) 2(A) 3(A)
BROWN BLUE BLACK BROWN BLUE BLACK BROWN BLUE BLACK
1(B) 2(B) 3(B) 1(C) 2(C) 3(C) 1(D) 2(D) 3(D)
POWER SUPPLY
TO A
TO B
TO C
TO D
4-WAY
HEATER1
HEATER2
OPTIONAL
OPTIONAL
NOTE:1. Use the magnetic ring (not supplied, optional part) to hitch the connective cable of indoor and outdoor units after installation. one magnetic ring is used for one cable.
2.Choosing OPTIONAL1 or OPTIONAL2 is either-or decision.

Outdoor unit wiring diagram:16022000036851



Outdoor unit printed circuit board diagram: 17122000051368

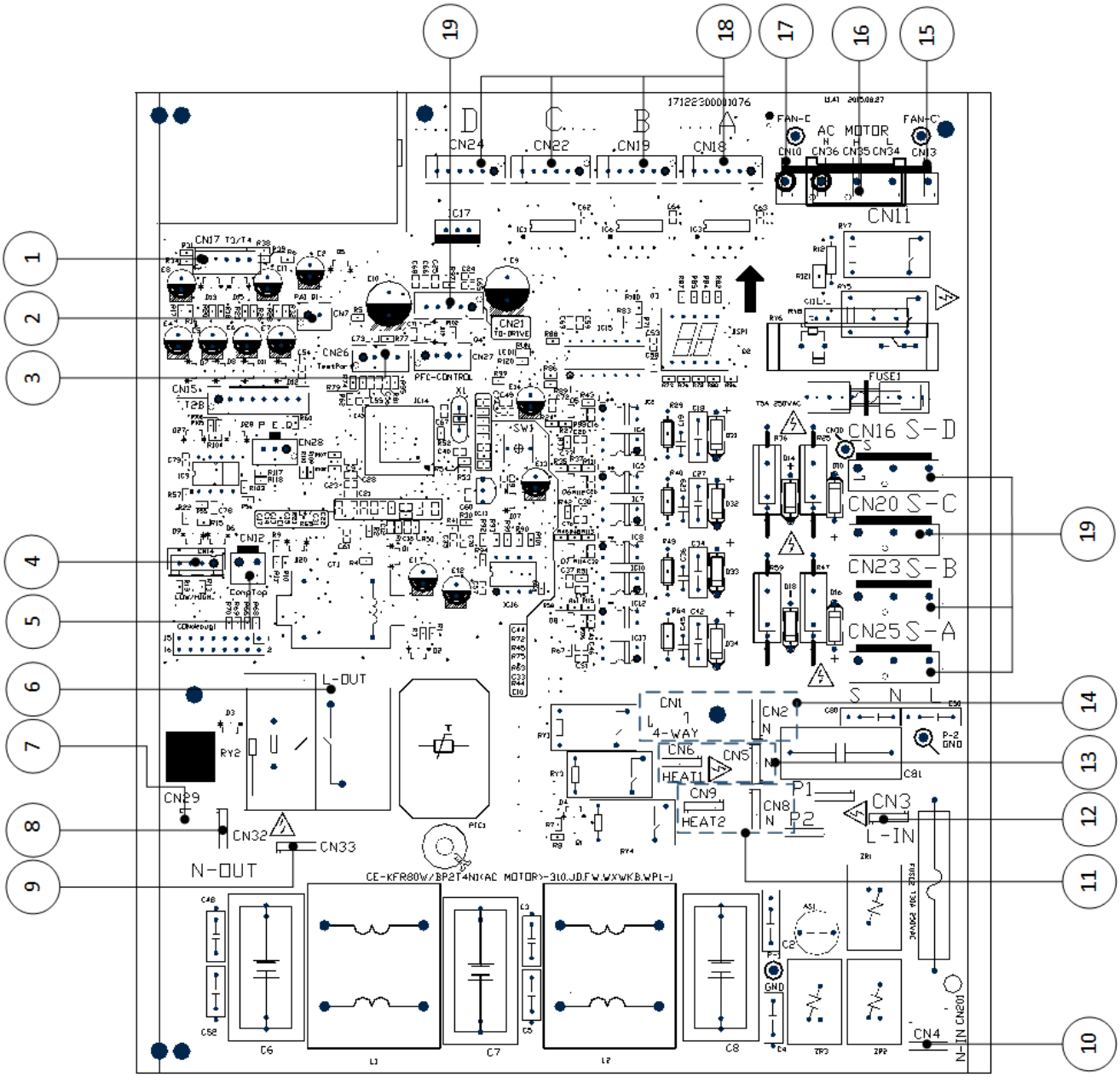


No.	Name	CN#	Meaning
1	Power Supply	CN11	L_in: connect to N-line (208-230V AC input)
		CN12	N_in: connect to L-line (208-230V AC input)
2	EEV-A	CN4	connect to electric expansion valve
	EEV-B	CN2	
	EEV-C	CN34	
	EEV-D	CN5	
3	S-A	CN10	S: connect to indoor unit communication(pin1-pin2: 24VDC Pulse wave; pin2-pin3: 208-230V AC input)
	S-B	CN13	
	S-C	CN3	
	S-D	CN15	
4	HEAT_D	CN21	connect to chassis heater, 208-230V AC when is ON
		CN36	
5	4-WAY	CN38	connect to 4 way valve, 208-230V AC when is ON.
6	HEAT_Y	CN8	connect to compressor heater, 208-230V AC when is ON
		CN20	
7	T2B	CN28	connect to evaporator coil outlet temperature sensor T2B
8	T3 T4 TP	CN26	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
9	OLP TEMP. SENSOR	CN30	connect to compressor top temp. sensor (5VDC Pulse wave)
10	H-PRO,L-RPO	CN29	connect to high and low pressure swtich(pin1-pin2&pin3-pin4:5VDC pulse wave)
11	TESTPORT	CN24	used for testing
12	/	CN27	connect to key board CN1

No.	Name	CN#	Meaning
13	COMPRESSOR	U	connect to compressor
		V	0V AC (standby)
		W	10-200V AC (running)
14	DC-FAN	CN32	connect to DC fan

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

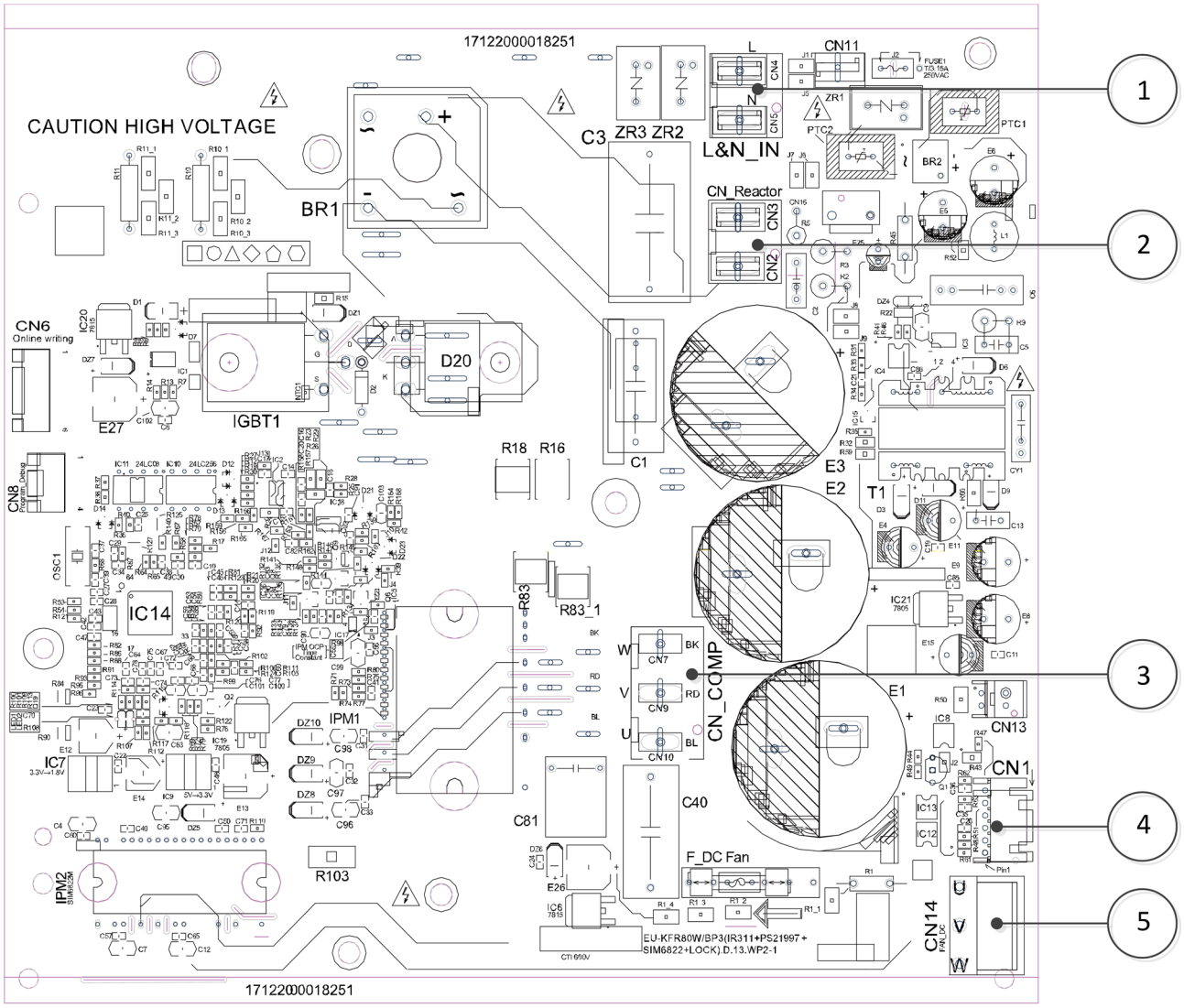
Outdoor unit printed circuit board diagram: 17122300001076



No.	Name	CN#	Meaning
1	T3/T4	CN17	T3: condenser temperature sensor T4: outdoor ambient temperature sensor
2	CN7	CN7	connect to discharge sensor
3	Test Port	CN26	connect to DR board CN1
4	LOW/HIGH	CN14	Red: low pressure protect Yellow: high pressure protect
5	Comp Top	CN12	compressor top temperature sensor
6	L-OUT	L-OUT	connect to IPM board CN4
7	N-OUT	N-OUT	connect to IPM board CN5
8	CN32	CN32	connect to DR board CN5
9	CN33	CN33	connect to DR board CN5
10	N-in	CN4	N_in: connect to N-line (208-230V AC input)
11	HEAT2	CN8	connect to chassis heater, 208-230V AC when is ON
		CN9	
12	L-in	CN3	L_in: connect to L-line (208-230V AC input)
13	HEAT1	CN5	connect to compressor heater, 208-230V AC when is ON
		CN6	
14	4-way	CN1	connect to 4 way valve, 208-230V AC when is ON.
		CN2	
15	Fan-C	CN13	connect to fan capacitor
16	Outdoor AC Fan	CN11	connect to outdoor AC fan
17	Fan-C	CN10	connect to fan capacitor
18	Electronic Expansion valve	CN18	connect to Electric Expansion Valve A
		CN19	connect to Electric Expansion Valve B
		CN22	connect to Electric Expansion Valve C
		CN24	connect to Electric Expansion Valve D
19	S-A	CN25	Current loop communication A, signal wire, connect to the terminal (24V DC Pulse wave)
	S-B	CN23	Current loop communication B, signal wire, connect to the terminal (24V DC Pulse wave)
	S-C	CN20	Current loop communication C, signal wire, connect to the terminal (24V DC Pulse wave)
	S-D	CN16	Current loop communication D, signal wire, connect to the terminal (24V DC Pulse wave)

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

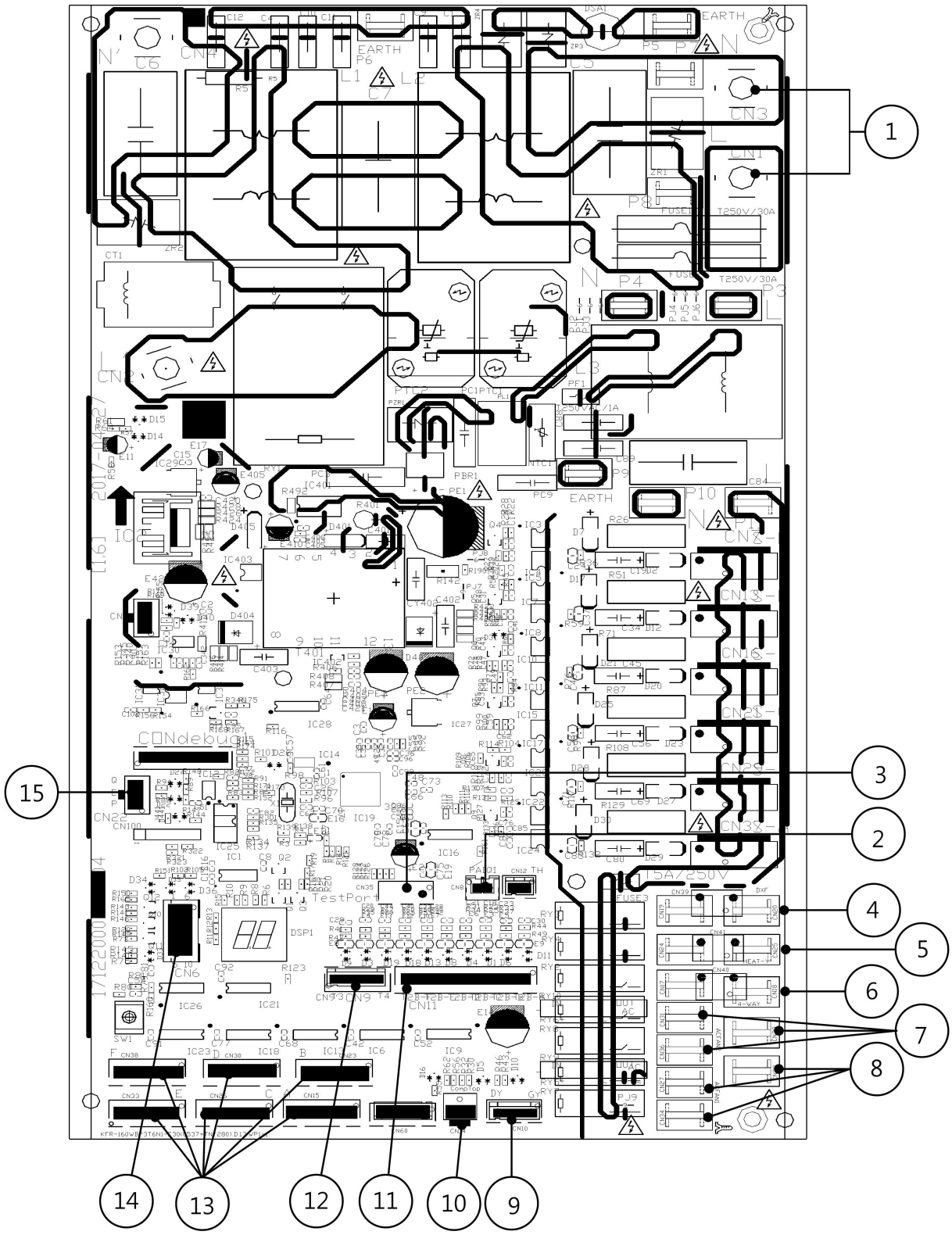
Outdoor unit IPM board diagram: 17122000018251



No.	Name	CN#	Meaning
1	CN4	CN4	connect to main board L-Out
	CN5	CN5	connect to main board N-Out
2	CN_Reactor	CN2/CN3	connect to reactor
3	CN_COMP	CN_COMP	connect to compressor
4	CN1	CN1	connect to main board CN21
5	FAN_DC	CN14	connect to outdoor DC fan

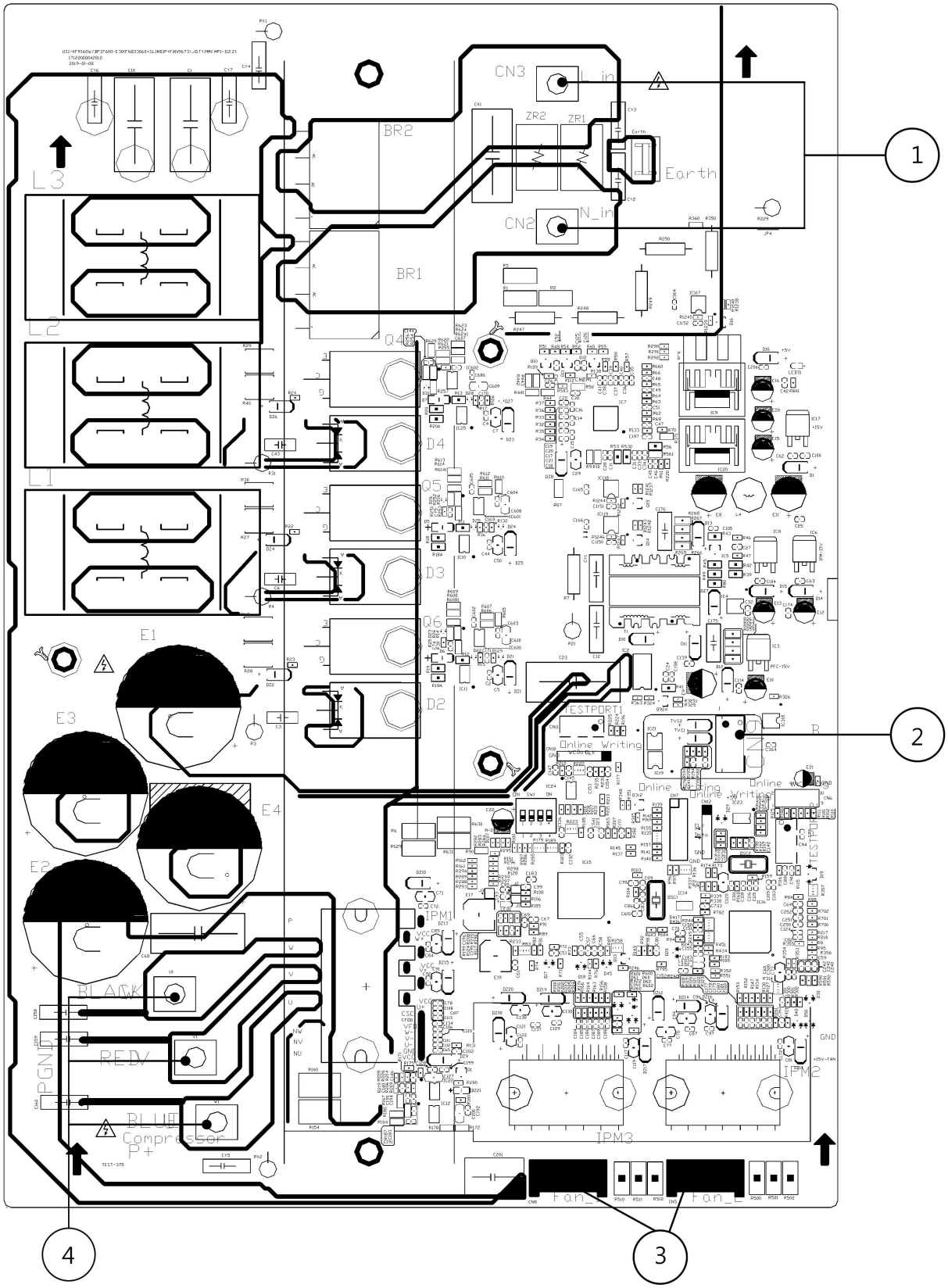
Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122000037804



No.	Name	CN#	Meaning
1	Power Supply	CN1	L1_in: connect to L1-line (230V AC input)
		CN3	L2_in: connect to L2-line (230V AC input)
2	TP	CN8	Exhaust temp. sensor TP
3	TESTPORT	CN35	used for testing
4	HEAT1	CN19/CN20	connect to chassis heater, 208-230V AC when is ON
5	HEAT2	CN24/CN25	connect to compressor heater, 208-230V AC when is ON
6	4-WAY	CN17/CN18	connect to 4 way valve, 208-230V AC when is ON.
7	AC-FAN2	CN31/CN36/CN28	connect to AC fan2
8	AC-FAN1	CN27/CN34/CN32	connect to AC fan1
9	H-PRO/L-PRO	CN10	connect to low&high pressure switch
10	Compressor Top	CN14	connect to compressor top temperature sensor
11	T2B	CN11	connect to pipe temp. sensor T2B
12	T4 T3	CN9	connect to pipe temp. sensor T3, ambient temp. sensor T4
13	PMV	CN15/CN23/CN26/ CN30/CN33/CN38	connect to Electric Expansion Valve(A~F)
14	/	CN6	connect to IPM&PFC board CN9
15	PQE	CN22	Communication to indoor unit

Outdoor unit IPM board diagram: 17122000042012



No.	Name	CN#	Meaning
1	Power Supply	CN3	connect to main board L-Out
		CN2	connect to main board N-Out
2	/	CN9	connect to main board CN6
3	FAN_DC	FAN_1/FAN_2	connect to outdoor DC fan 1& DC fan 2
4	CN_COMP	U1	connect to compressor
		V1	
		W1	

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

Electronic Functions

Contents

1. Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Middle indoor heat exchanger coil temperature
T2B	Indoor heat exchanger exhaust coil temperature (located on the outdoor unit)
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature

2. Electric Control Working Environment

- Input voltage: 198V~264V.
- Input power frequency: 50/60Hz.
- Indoor fan standard working amp.: <1A
- Outdoor fan standard working amp.: <1.5A.
- Four-way valve standard amp.: <1A.

3. Main Protection

3.1 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.

3.2 Automatic shutoff based on fan speed

If the outdoor fan speed registers below 100RPM or above 2400RPM for an extended period of time, the unit ceases operation and the corresponding error code is displayed on the outdoor unit.

3.3 Temperature Protection of Compressor Discharge

When the discharge temperature of the compressor rises, the running frequency is limited according to the following rules:

- If TA≤TP<TB maintain the current frequency.
- If the temperature increase and TP≥TB, decrease the frequency to a lower level every 2 minutes till to F1.
- If TP≥TC for 10 seconds, the compressor stops and then restart untill TP<90°C (194°F).

R32 models:TA=100°C (212°F), TB=103°C (217.4°F), 108°C (226.4°F)

Other models: TA=105°C (221°F), TB=110°C (230°F), 115°C (239°F)

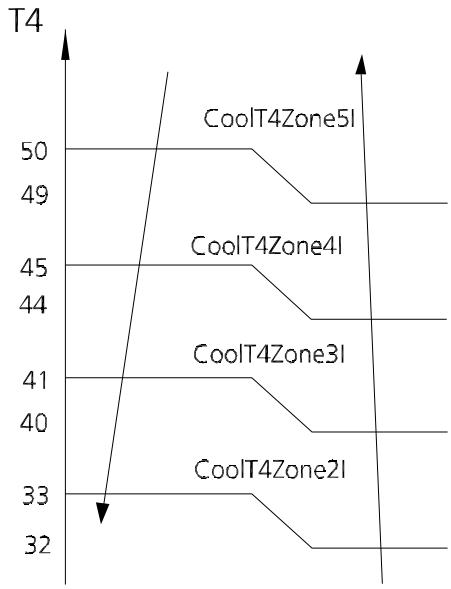
3.4 Voltage Limit Protection

If AC voltage registers below stop value for an extended period of time, the corresponding error code is displayed on the indoor unit and the unit ceases operation. After 30 seconds, if AC voltage is greater than the restart value.

3.4 Compressor Current Limit Protection

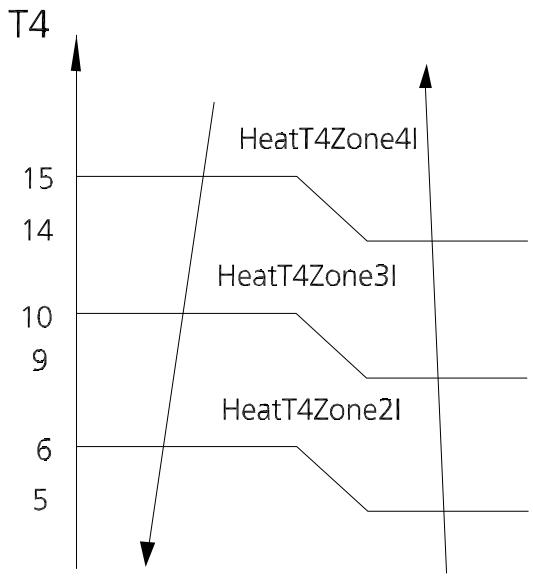
The temperature interval for the current limit is the same as the range of the T4 frequency limit.

3.4.1 Cooling mode:



CoolReturnI	The difference between current limit and shutdown current
CoolT4Zone5I	Cooling T4≥50°C current limit value
CoolT4Zone4I	Cooling 49°C>T4≥45°C current limit value
CoolT4Zone3I	Cooling 44°C>T4≥41°Ccurrent limit value
CoolT4Zone2I	Cooling 40°C>T4≥33°C current limit value
CoolT4Zone1I	Cooling 32°C>T4current limit value
CoolStopI	Cooling stop protection current value

3.4.2 Heating mode:



HeatReturnI	The difference between current limit and shutdown current
HeatT4Zone4I	Heating T4≥15°C current limit value
HeatT4Zone3I	Heating 14°C>T4≥10°C current limit value
HeatT4Zone2I	Heating 9°C>T4≥6°C current limit value
HeatT4Zone1I	Heating 5°C>T4 current limit value
HeatStopI	Heating stop protection current value

3.5 Indoor / Outdoor Units Communication Protection

If the indoor units do not receive the feedback signal from the outdoor units for 2 consecutive minutes or the outdoor units do not receive the feedback signal from any one of indoor units for 3 consecutive minutes, the unit ceases operation. The unit displays the failure code.

3.6 Outdoor Unit Anti-Freezing Protection

When T2<4°C for 250 seconds or T2<0°C, the indoor unit capacity demand is zero and resumes normal operation when T2>8°C and the protection time is no less than 3 minutes.

3.7 Oil Return

Rules for Operation

1. If the compressor frequency continues to be lower than the frequency set for setting time, the unit raises the frequency to the frequency set for setting time and then resumes with the former frequency.

2. The EXV continues at 300p while indoor units maintain their operation.

If the outdoor ambient temperature is higher than the set frequency during oil return, the unit stops the oil return process.

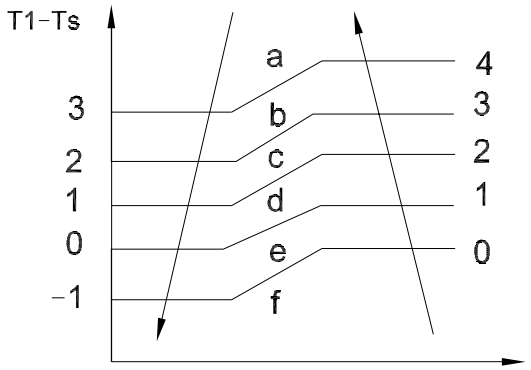
3.8 Low Outdoor Ambient Temperature Protection

- When the compressor is off and T4 is lower than -35°C for 10 seconds, the unit stops and displays "LP" or "PC 0L".
- When the compressor is on and T4 remains lower than -40°C for 10 seconds, the unit stops and displays "LP" or "PC 0L".
- When T4 is no lower than -32°C for 10 seconds, the unit exits protection.

4. Control and Functions

4.1 Capacity Request Calculation

4.1.1 Cooling Mode:



Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Capacity request of each indoor unit = reference value * HP * K_ fan

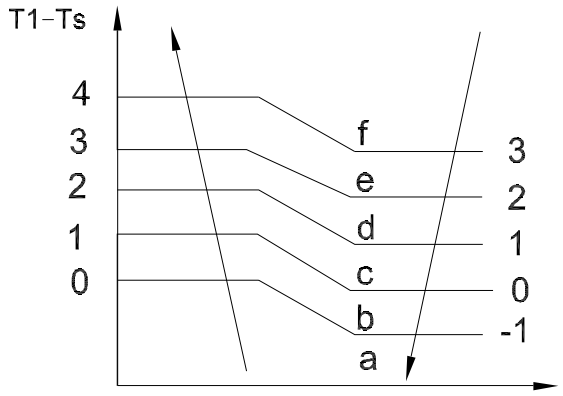
K_ fan: fan speed correction factor of indoor unit(Effective for some models)

Indoor mode	K_fan
Turbo	C_AIR_S
High	C_AIR_H
Medium	C_AIR_M
Low	C_AIR_L

Total capacity Request=∑Capacity request of indoor unit /40× modify rate(ucOutHP)

Note: The final result is an integer. If ucOutHP <1, round down, otherwise round up.

4.1.2 Heating Mode:



Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Note: The final result is an integer.

Capacity request of each indoor unit = reference value * HP * K_fan

K_fan: fan speed correction factor of indoor unit(Effective for some models)

Indoor mode	K_fan
Turbo	H_AIR_S
High	H_AIR_H
Medium	H_AIR_M
Low	H_AIR_L

T4	HeatT4OutHP
T4≥10°C(50°F)	1
10°C(50°F)>T4≥5°C(41°F)	EE_HEAT_T4OUT_HP1
5°C(41°F)>T4≥0°C(32°F)	EE_HEAT_T4OUT_HP2
0°C(32°F)>T4≥-5°C(23°F)	EE_HEAT_T4OUT_HP3
-5°C(23°F)>T4≥-10°C(14°F)	EE_HEAT_T4OUT_HP4
-10°C(14°F)>T4≥-17°C(1.4°F)	EE_HEAT_T4OUT_HP5
-17°C(1.4°F)>T4	EE_HEAT_T4OUT_HP6

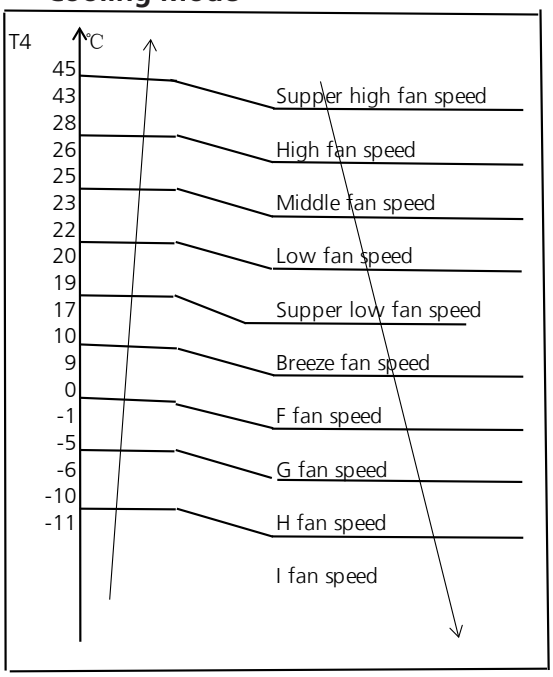
Total capacity Request=∑Capacity request of indoor unit /40× modify rate(ucOutHP)x HeatT4OutHP

(HeatT4OutHP is effective for some models)

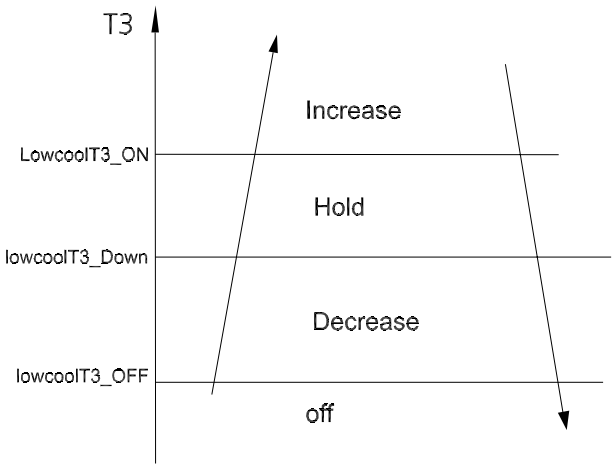
Note: The final result is an integer. If ucOutHP <1, round down, otherwise round up.

4.2 Outdoor Fan Control

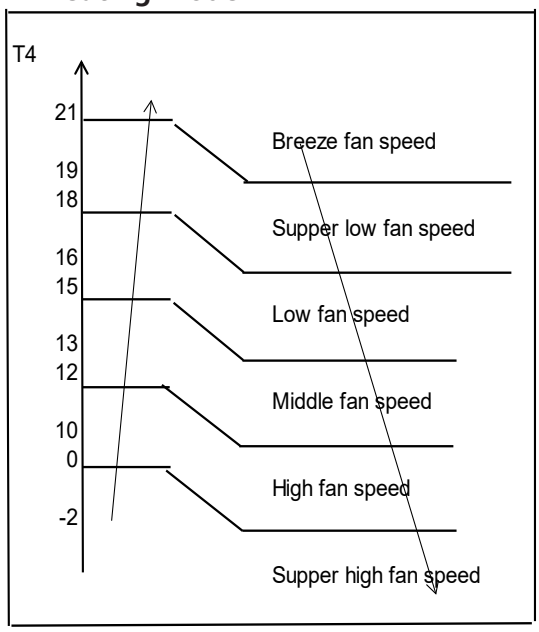
4.2.1 Cooling Mode



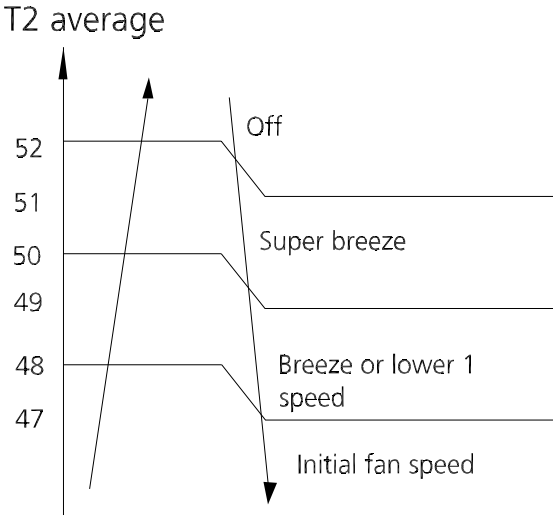
When the compressor is started, the initial fan speed is determined according to the current T4 temperature range. At other times, the T4 temperature range is invalid. After holding for 30 seconds, adjust the fan speed according to the T3 temperature: in the fan speed increase zone, the fan speed increases by one gear, and the maximum is high fan. In the holding zone, the fan speed remains unchanged. In the decrease zone, the fan speed drops by one gear, and the lowest is I gear. When the fan speed is I gear, if it enters the fan stop zone, the fan will stop.



4.2.2 Heating Mode



To meet T4>T4HeatLimit_ADD_3, first determine the initial fan based on T4. After the initial fan runs for 30s, correct the outdoor fan based on the average temperature of T2 (when the temperature enters the critical point, it takes 10s to reach the critical point to be effective). Select a lower gear for the first gear or (super) breeze speed.



4.3 Four-Way Valve Control

- In heating mode, a four-way valve is opened.
- In defrosting, a four-way valve operates according to the current defrosting action.
- In other modes, a four-way valve is closed.
- When the unit is switched from heating to other modes, the four-way valve turns off after the compressor has been off for 2 consecutive minutes.
- Failure or protection (excluding discharge temperature protection and high/low pressure protection) causes the four-way valve to immediately shut down.

Outdoor Unit Disassembly

Contents

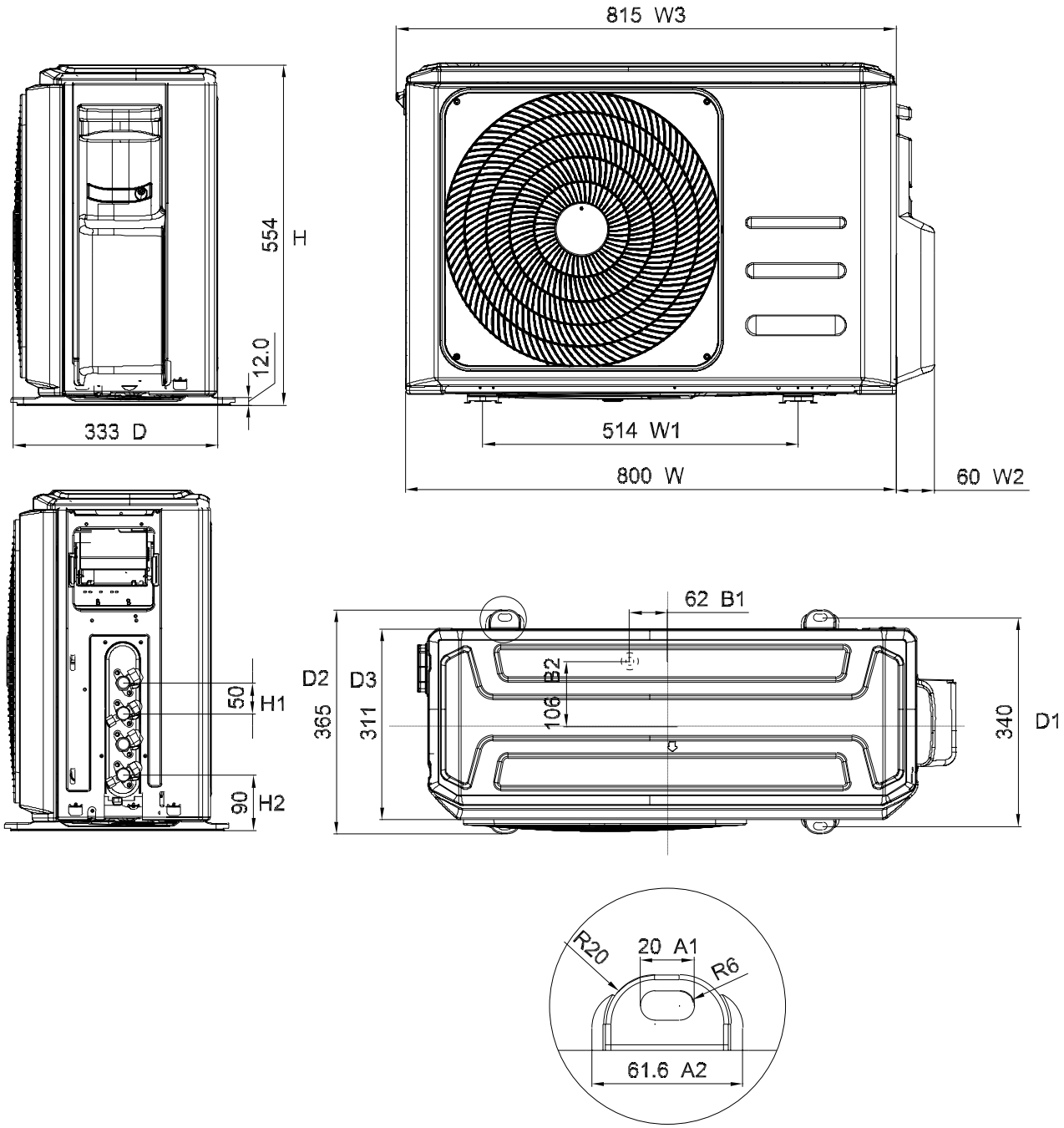
1. Outdoor Unit Disassembly

1.1 Outdoor Unit Table

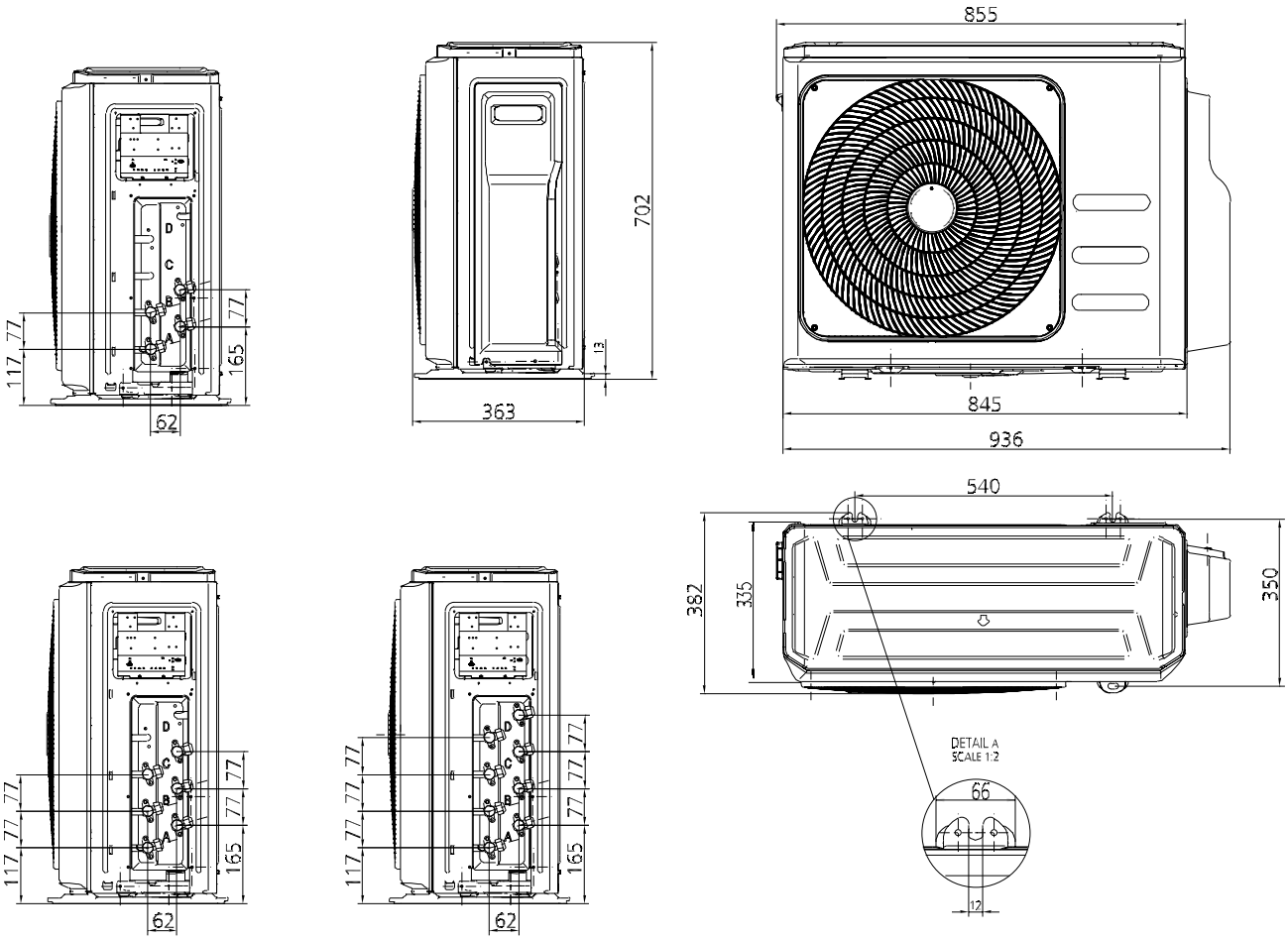
Outdoor Unit Model	Panel Plate	PCB Board
DIY-MULTI2-18HP230C	X430	PCB board 6
DIY-MULTI3-27HP230C	D30	PCB board 2
DIY-MULTI4-36HP230C	D30	PCB board 2
DIY-MULTI5-48HP230C	E30	PCB board 7

2. Dimension

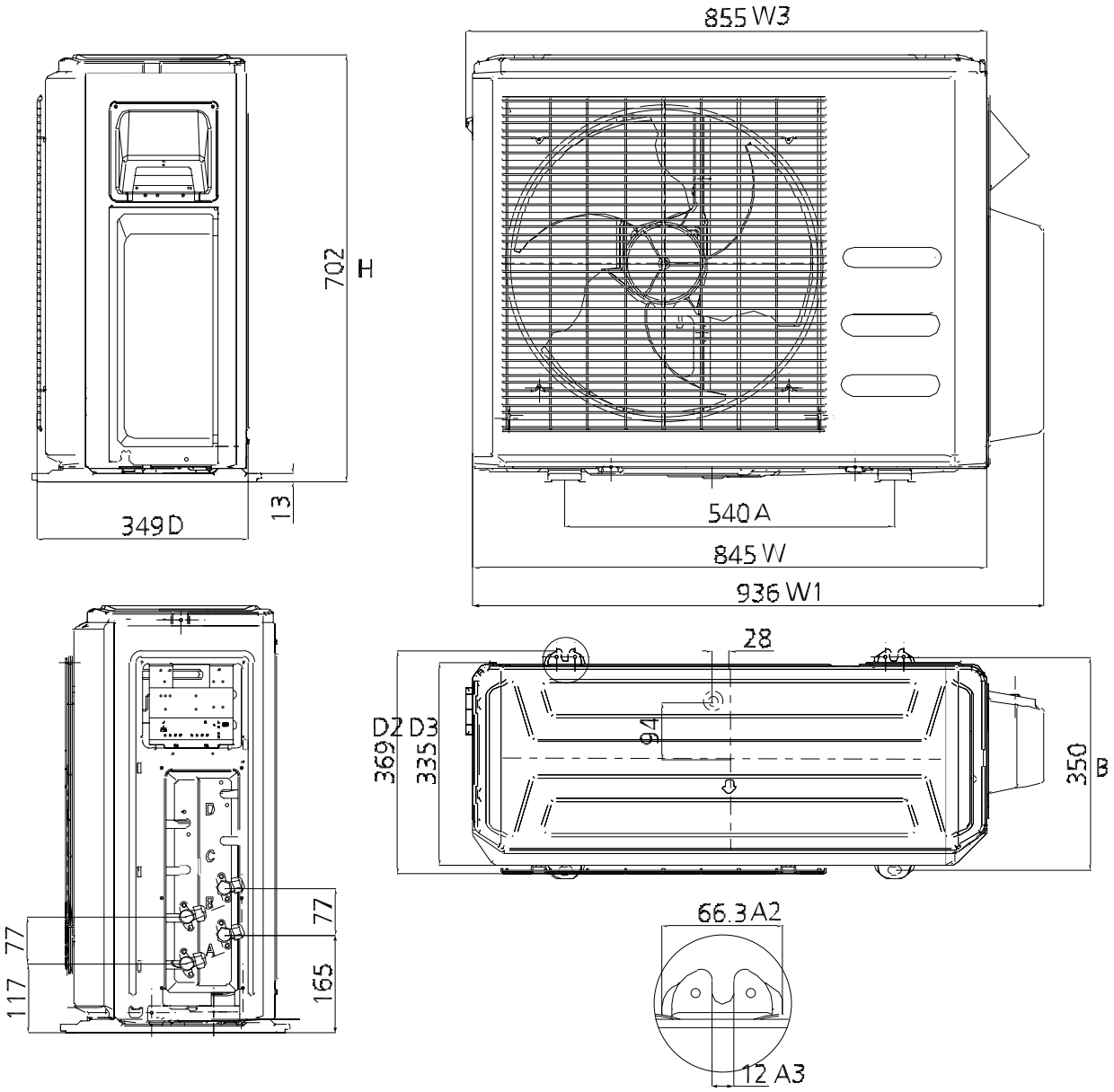
2.1. Panel Plate B30(1 drive 2)



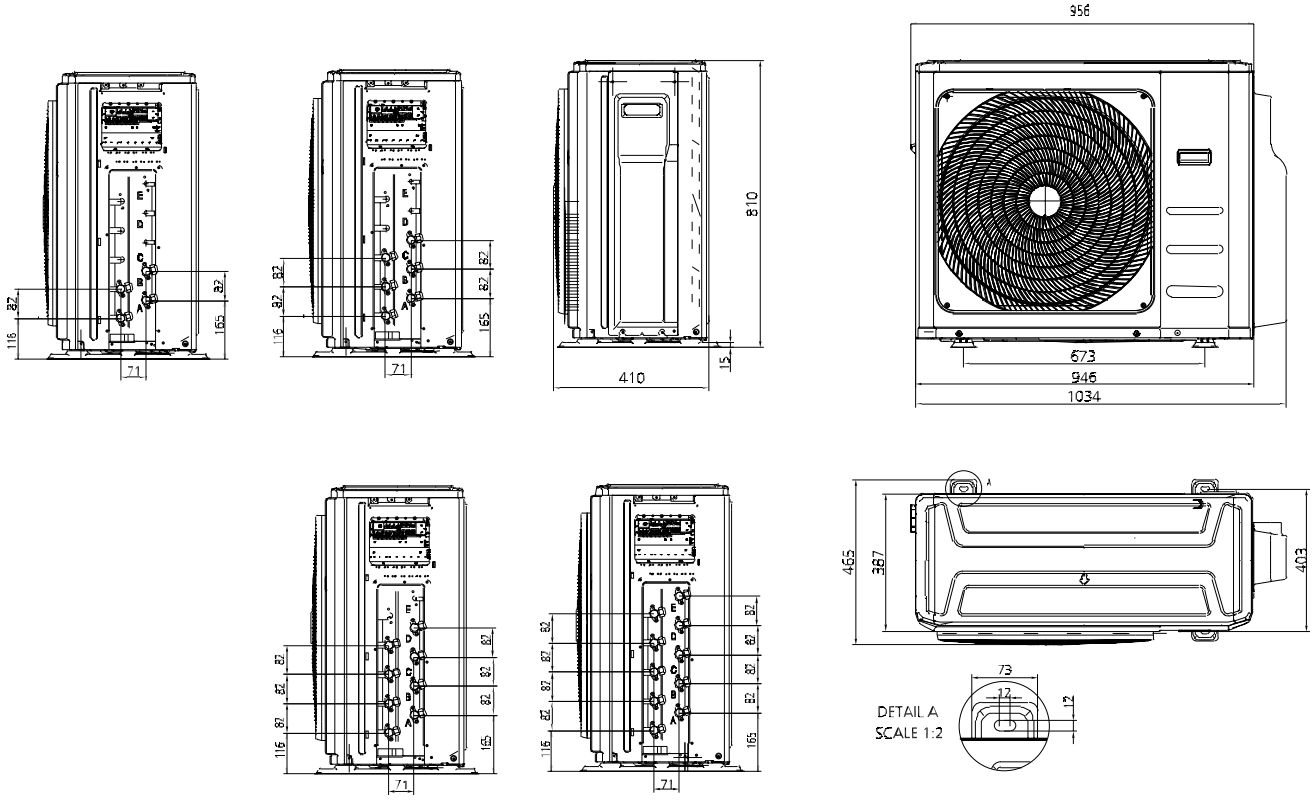
2.2. Panel Plate CA30 (1 drive 2 &1 drive 3 &1 drive 4)



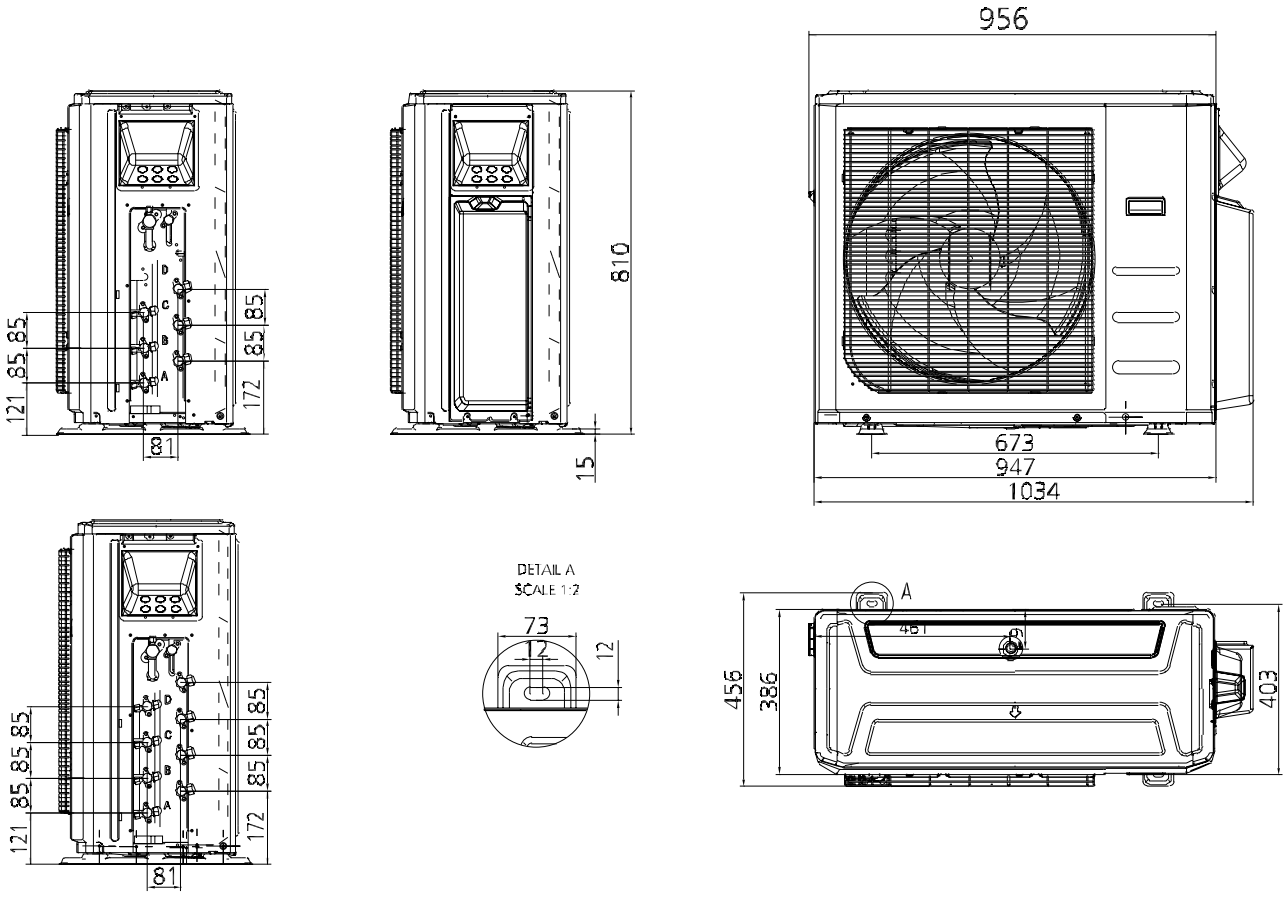
2.3. Panel Plate CA30 (1 drive 2, for US models)



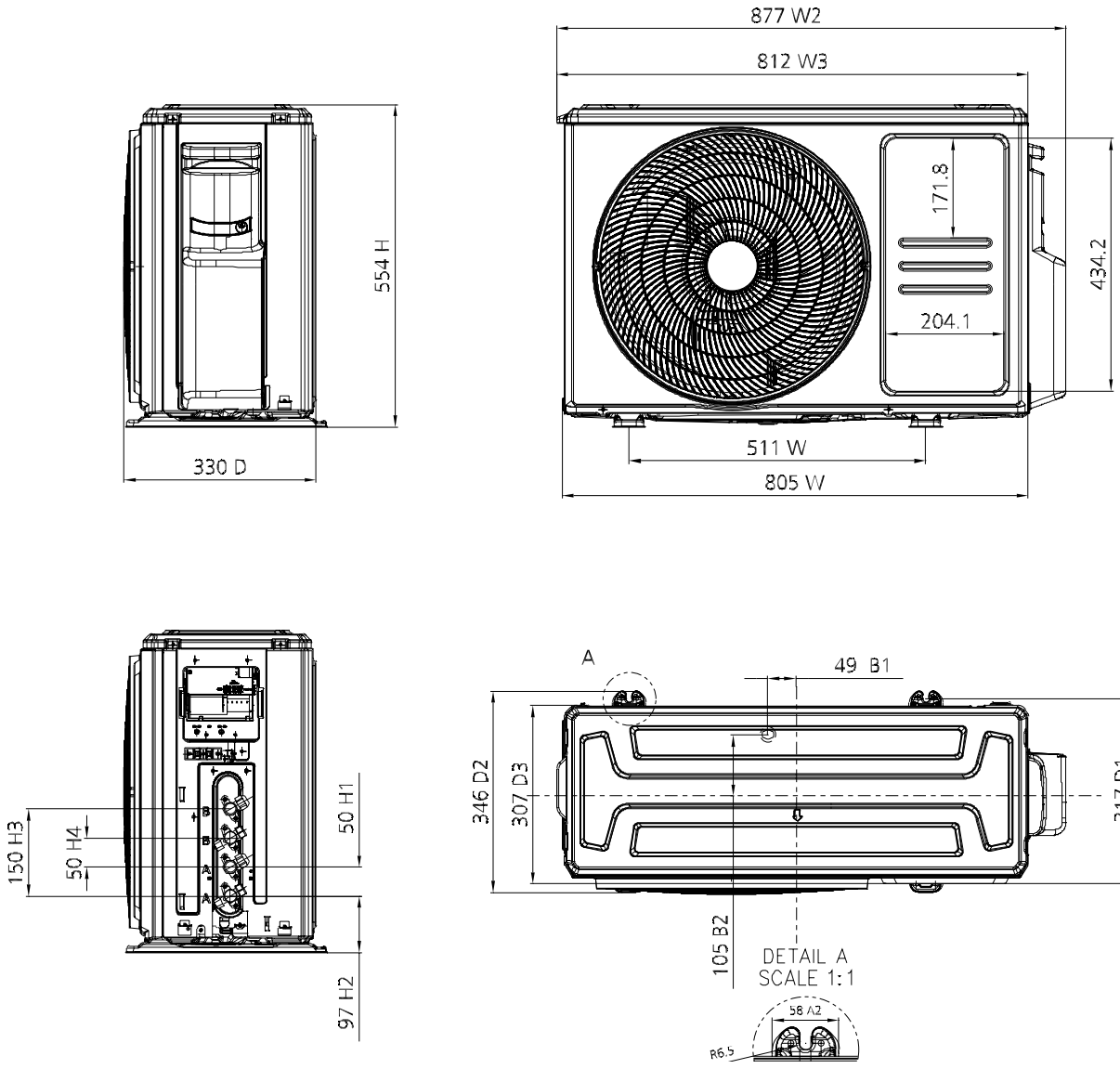
2.4. Panel Plate D30 (1 drive 2 &1 drive 3 &1 drive 4 &1 drive 5)



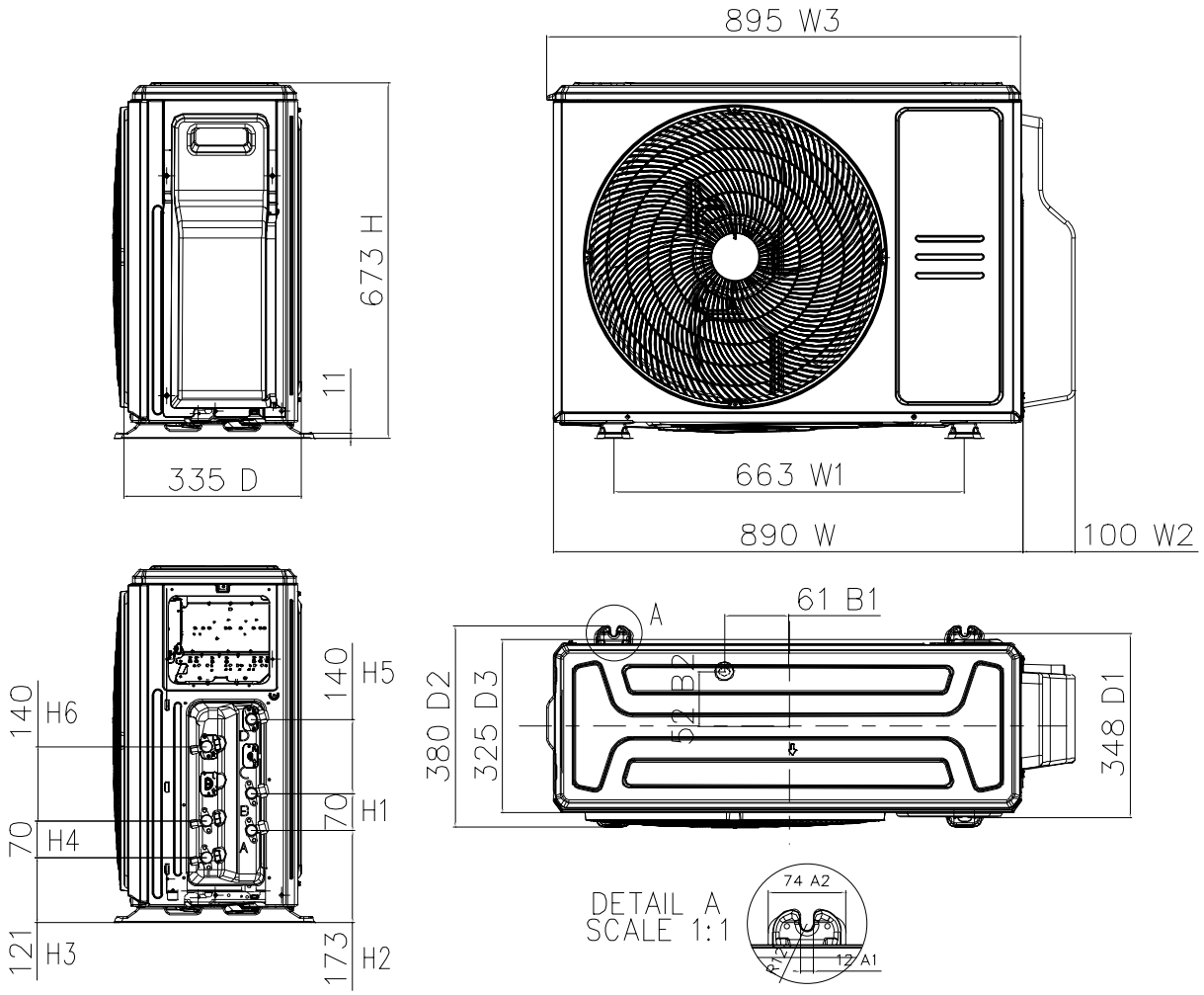
2.5. Panel Plate D30 (1 drive 3 &1 drive 4, for US models)



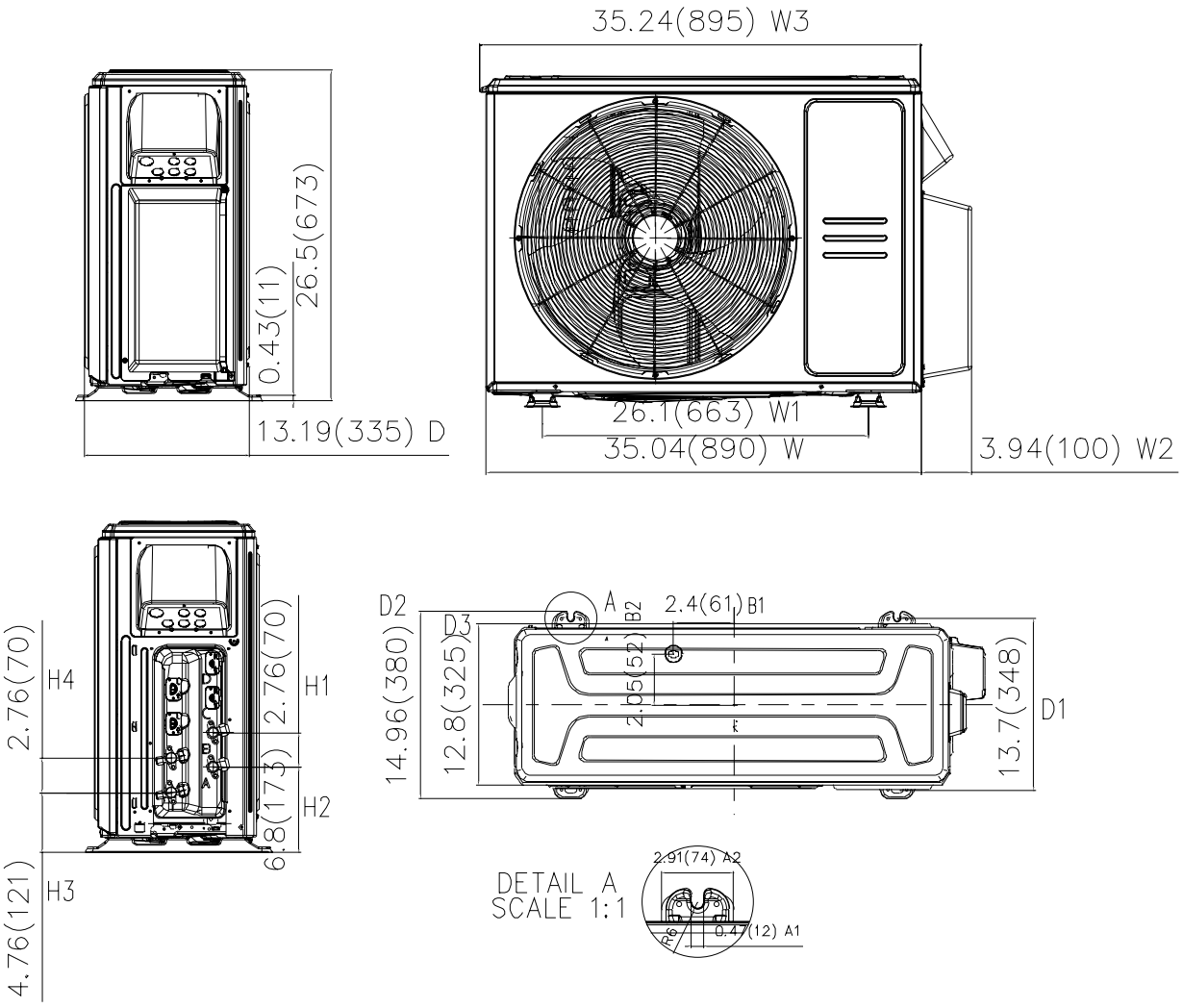
2.6. Panel Plate X330 (1 drive 2)



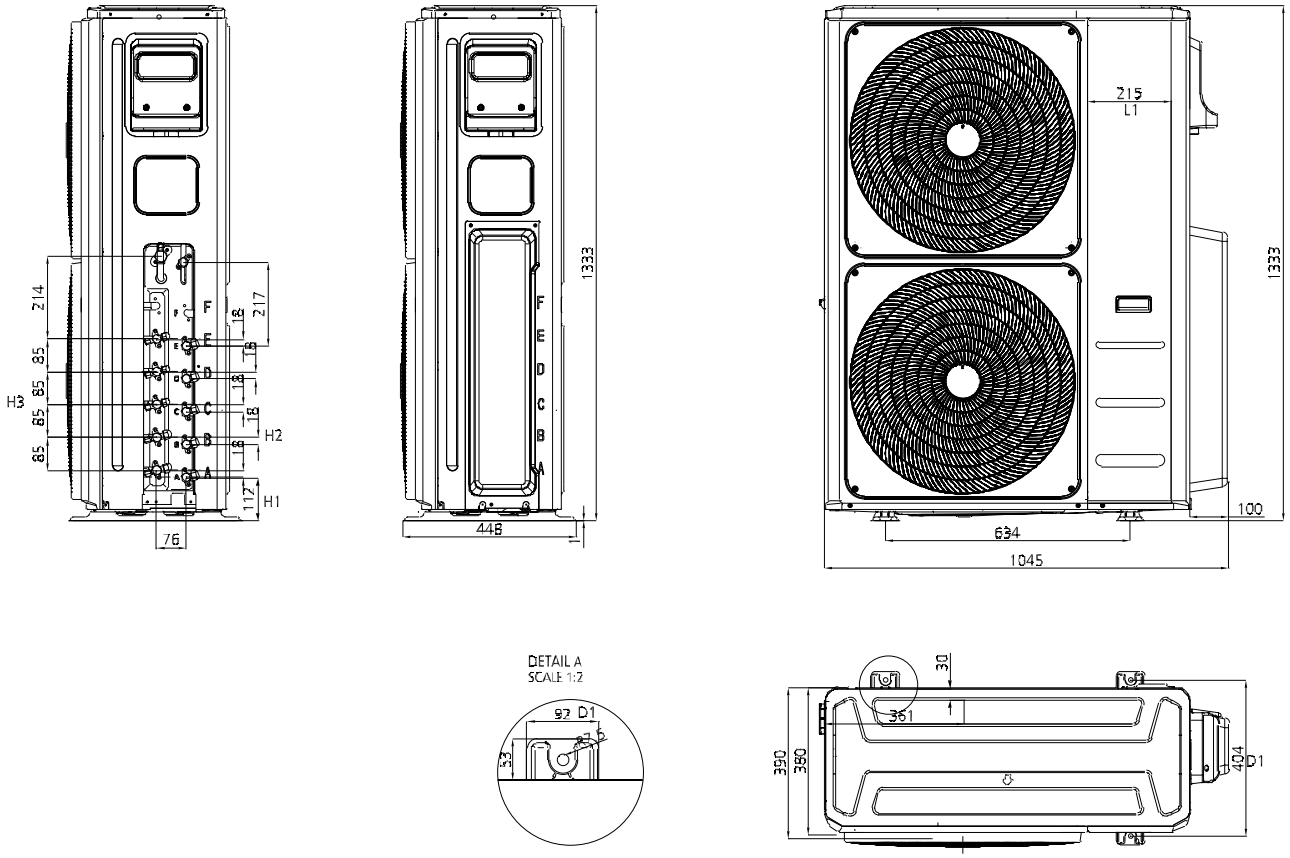
2.7. Panel Plate X430 (1 drive 3)



2.8. Panel Plate X430 (1 drive 2, for US models)



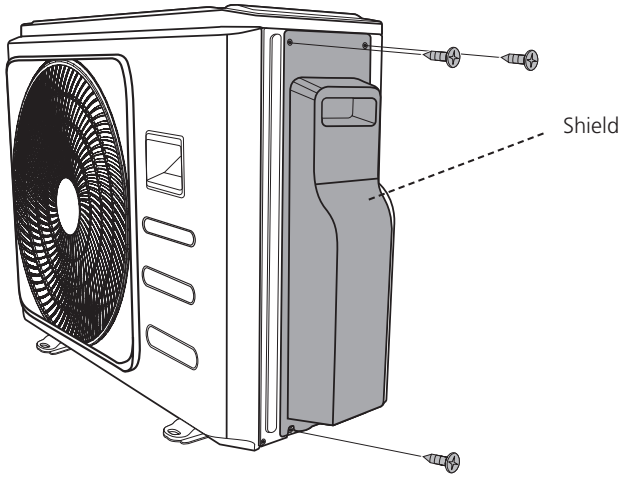
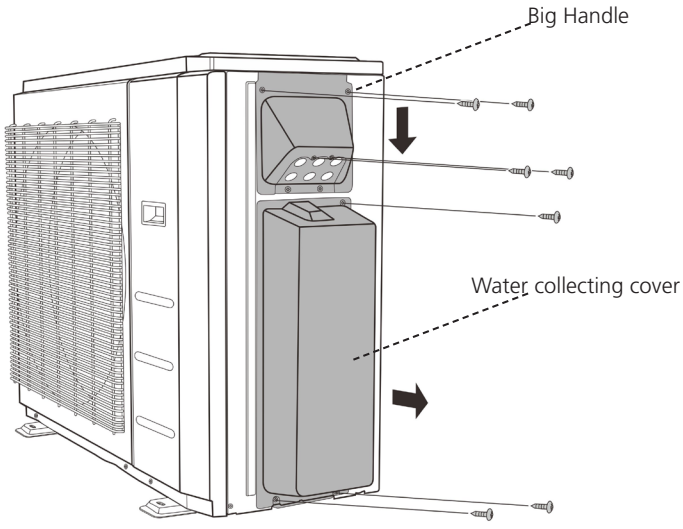
2.6. Panel Plate E30 (1 drive 5, for US models)



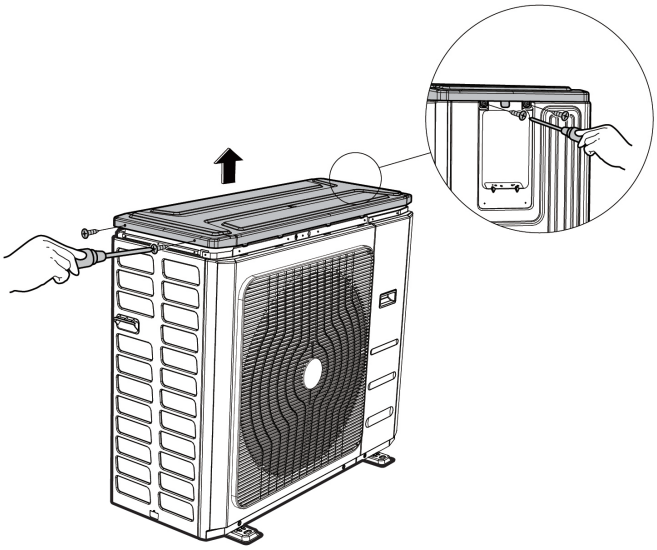
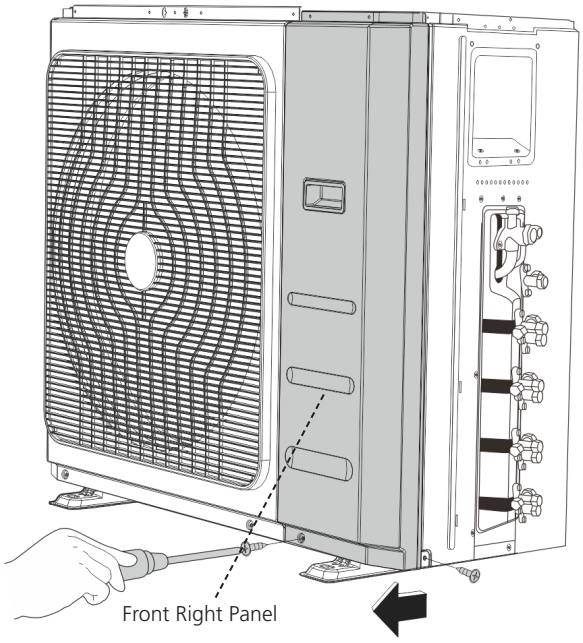
3. Outdoor Unit Disassembly

3.1 Panel Plate

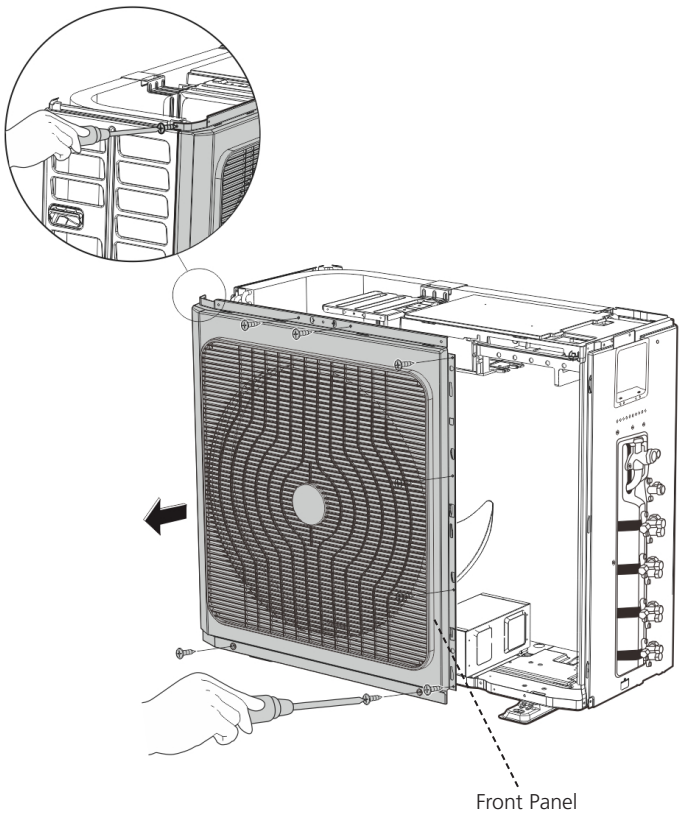
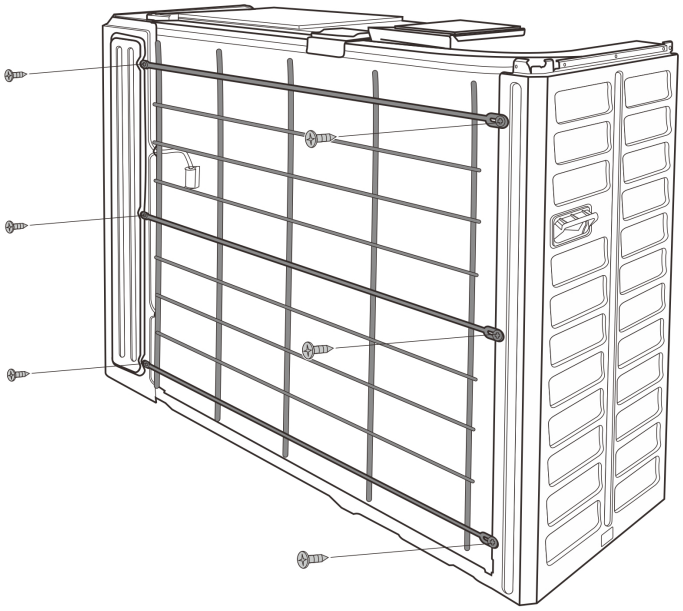
1. D30

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove three screws and then remove the shield. (see CJ_Multi_D30-001).	 **CJ_Multi_D30-001**
For US models, remove four screws and then remove the big handle. Remove three screws and then remove the water collecting cover. (see CJ_Multi_D30-001(US).	 **CJ_Multi_D30-001(US)**

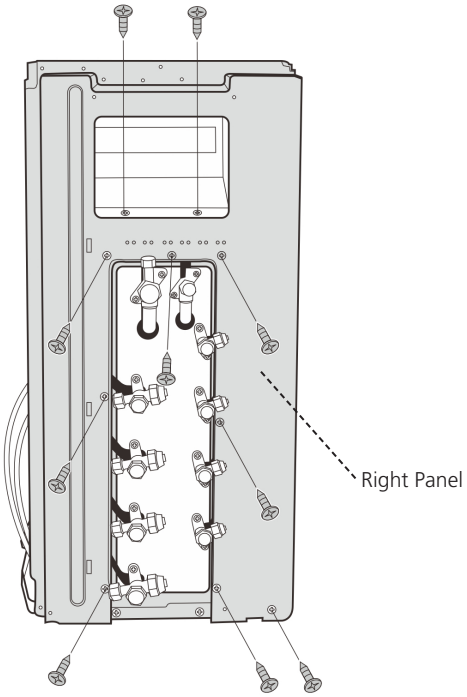
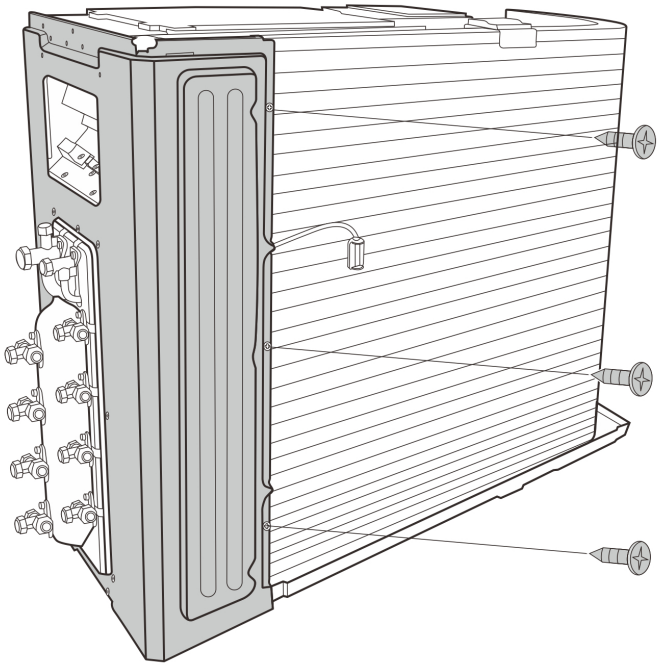
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
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_ Multi_D30-002).	 **CJ_Multi_D30-002**
4) Remove the screws of the front right panel and then remove the front right panel (2 screws) (see CJ_Multi_D30-003).	 **CJ_Multi_D30-003**

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

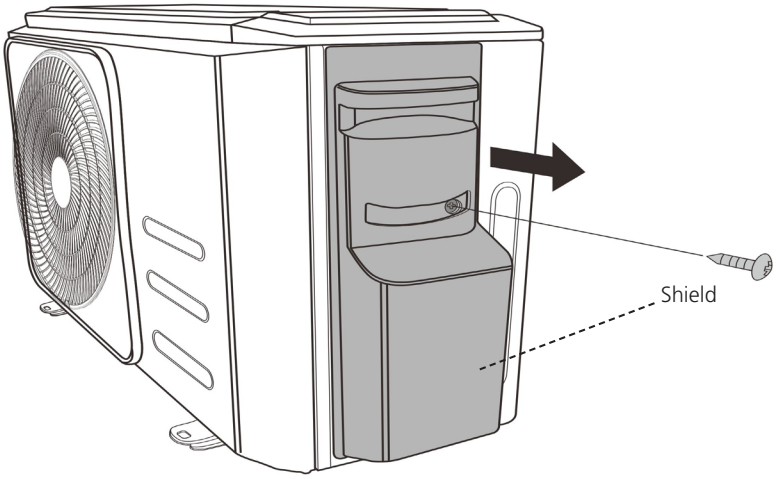
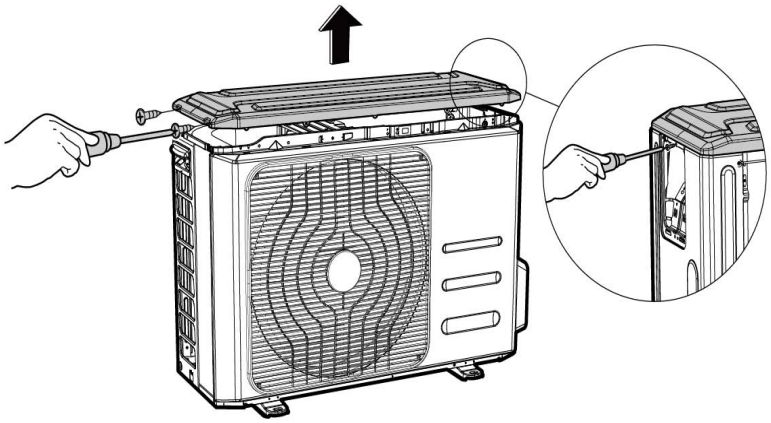
Procedure	Illustration
5) Remove the screws of the front panel and then remove the front panel (9 screws) (see CJ_Multi_D30-004).	 **CJ_Multi_D30-004**
6) Remove the screws of the rear net and then remove the rear net (6 screws) (see CJ_Multi_D30-005). (for some models)	 **CJ_Multi_D30-005**

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

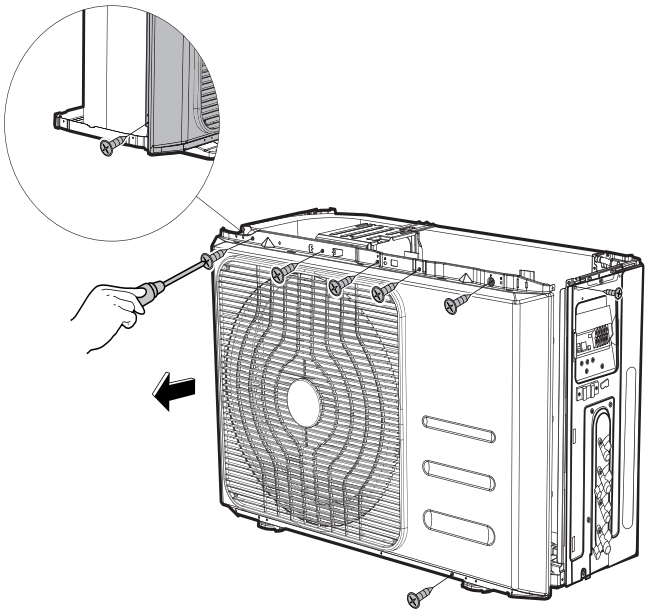
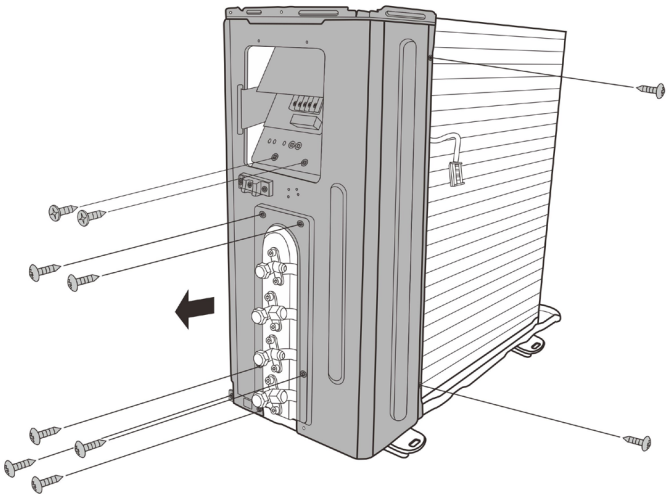
Procedure	Illustration
7) Remove the screws of the right panel and then remove the right panel (12 screws) (see CJ_multi_D30-006 and CJ_Multi_D30-007).	 **CJ_Multi_D30-006**  **CJ_Multi_D30-007**

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

3. B30

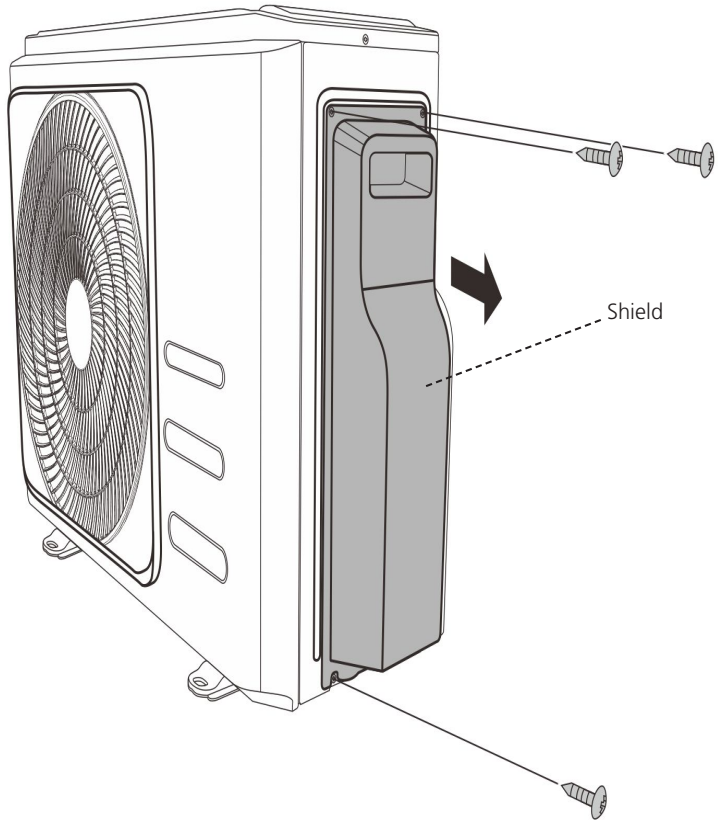
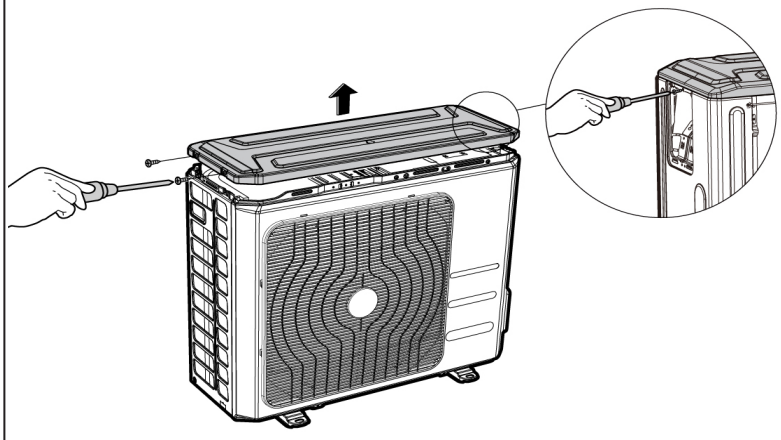
Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screw of the shield and then remove it.(1 screw) (see CJ_ Multi_B30-001). 3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_ B30_002).	 **CJ_Multi_B30-001**  **CJ_Multi_B30-002**

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

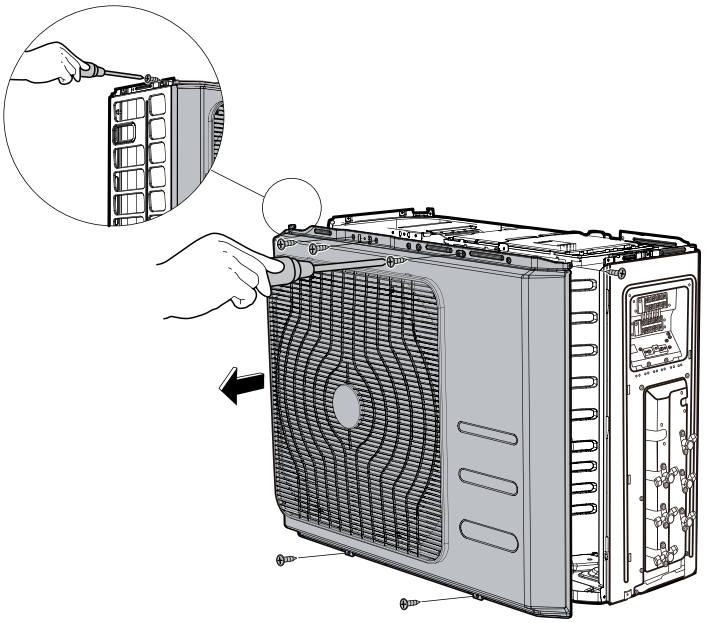
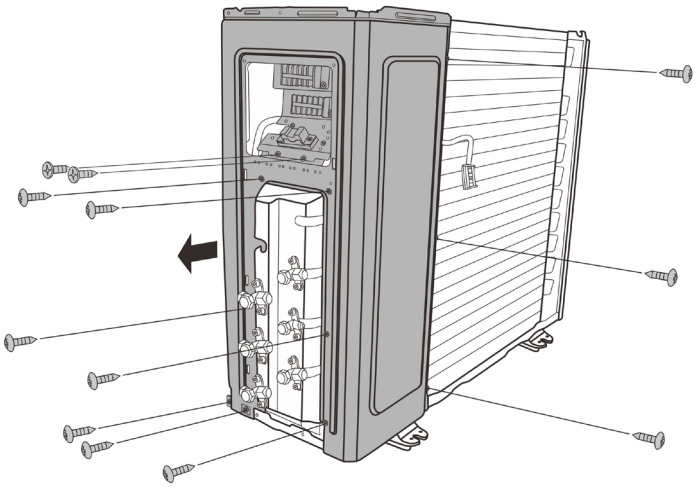
Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (8 screws) (see CJ_Multi_B30-003).	 CJ_Multi_B30-003
5) Remove the screws of the right panel (10 screws) (see CJ_Multi_B30-004).	 CJ_Multi_B30-004

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

4. CA30

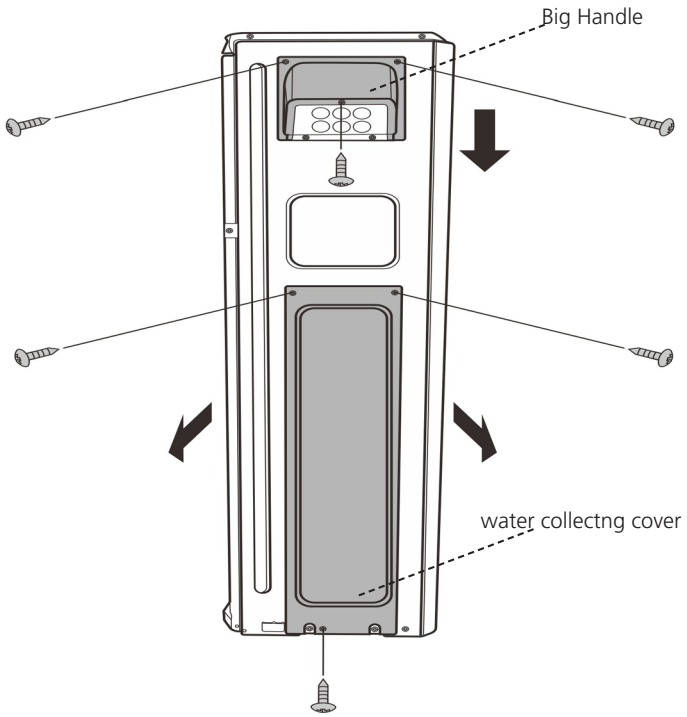
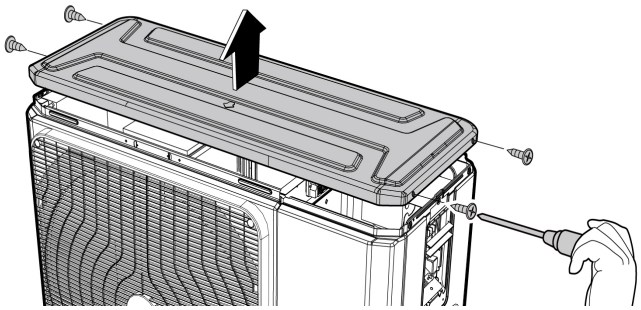
Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the shield and then remove it.(3 screws) (see CJ_ Multi_CA30-001).	 **CJ_Multi_CA30-001**
3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_ Multi_CA30-002).	 **CJ_Multi_CA30-002**

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

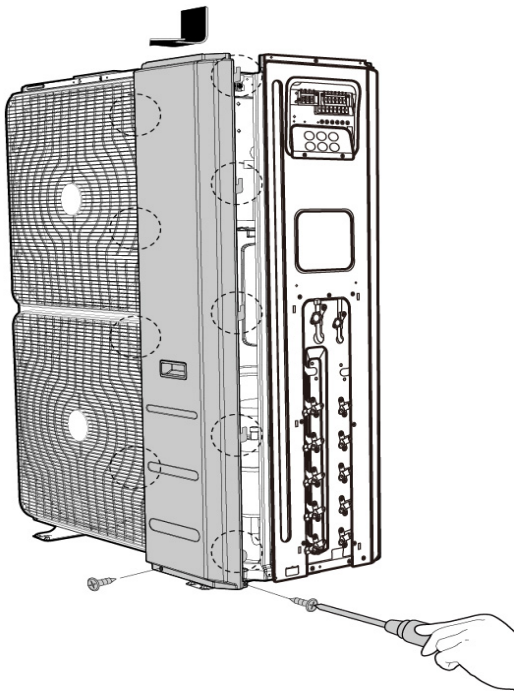
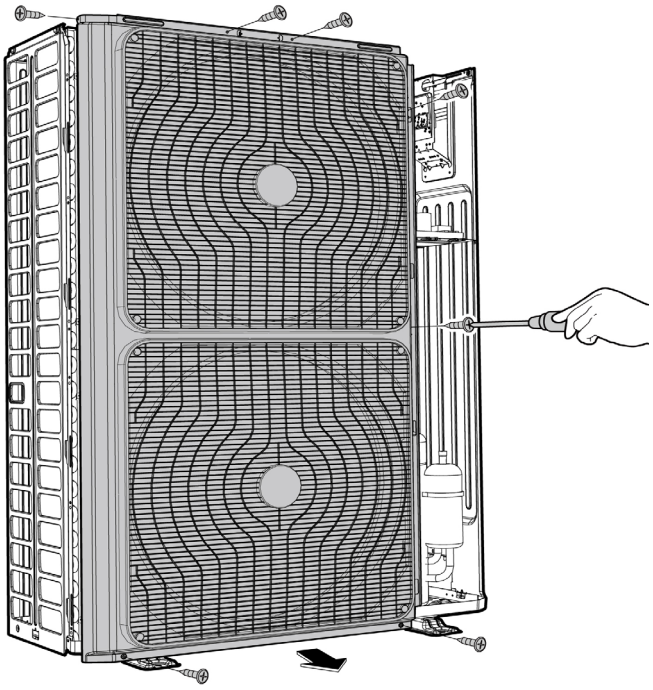
Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (7 screws) (see CJ_Multi_CA30-003).	 CJ_Multi_CA30-003
5) Remove the screws of the right panel and then remove the right panel (12 screws) (see CJ_CA30_004).	 CJ_Multi_CA30-004

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

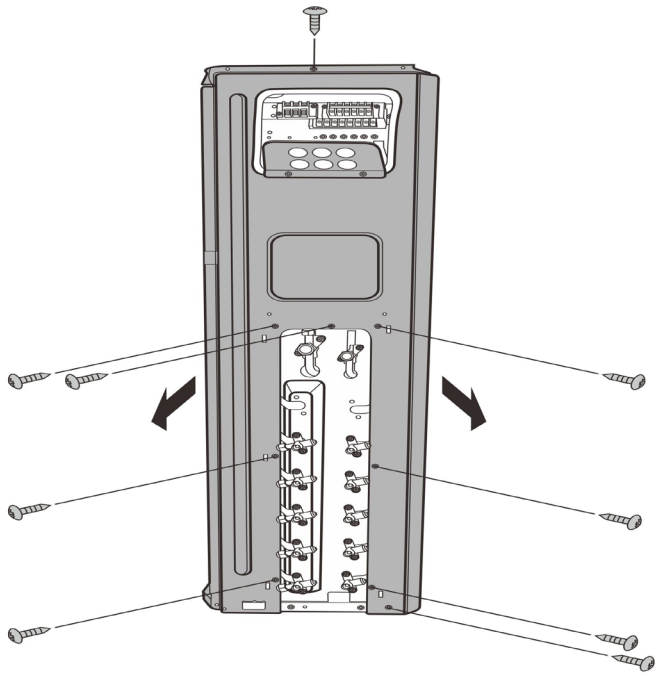
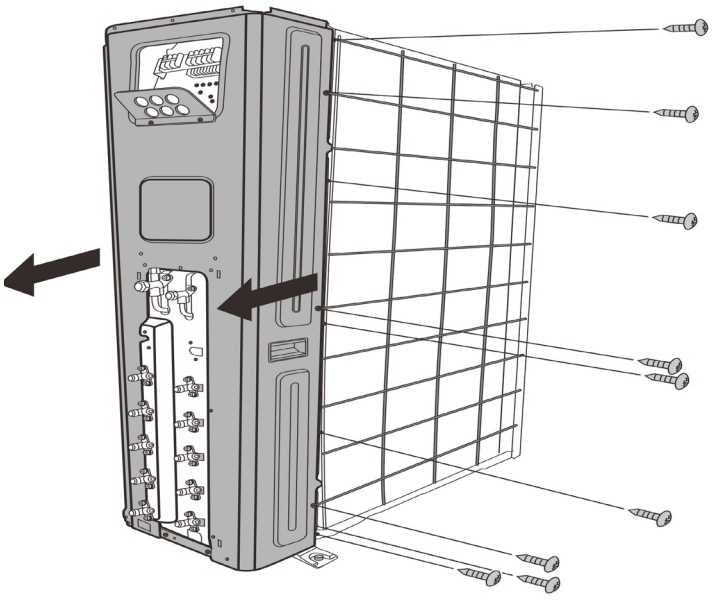
4. E30

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the big handle and then remove it.(3 screws) (see CJ_Multi_E30-001). 3) Remove the screws of the water collecting cover and then remove it.(3 screws) (see CJ_Multi_E30-001). 4) Unfix the four screws of the top cover and then remove it. (see CJ_Multi_ E30-002).	 **CJ_Multi_E30-001**  **CJ_Multi_E30-002**

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

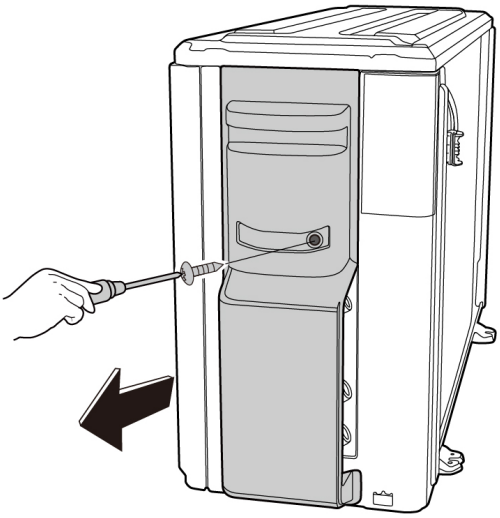
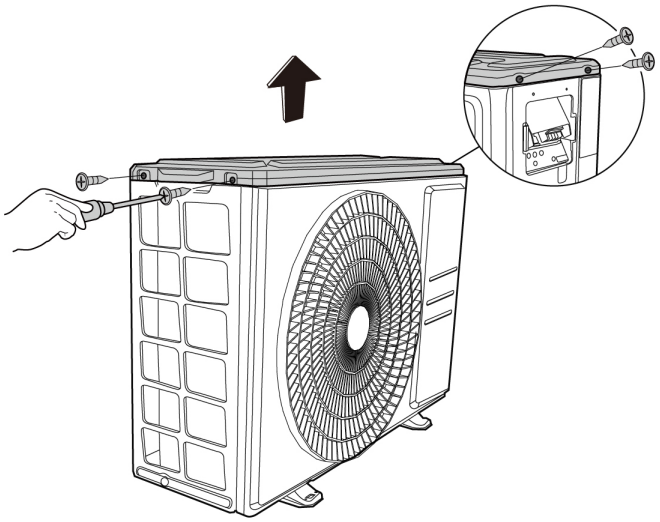
Procedure	Illustration
5) Remove the two screws of the right front panel and then push it down to unhook the right fornt pannel from the nine hooks.(see CJ_Multi_E30-003).	 CJ_Multi_E30-003
6) Remove the seven screws of the front panel and then remove the front panel (see CJ_Multi_E30-004).	 CJ_Multi_E30-004

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

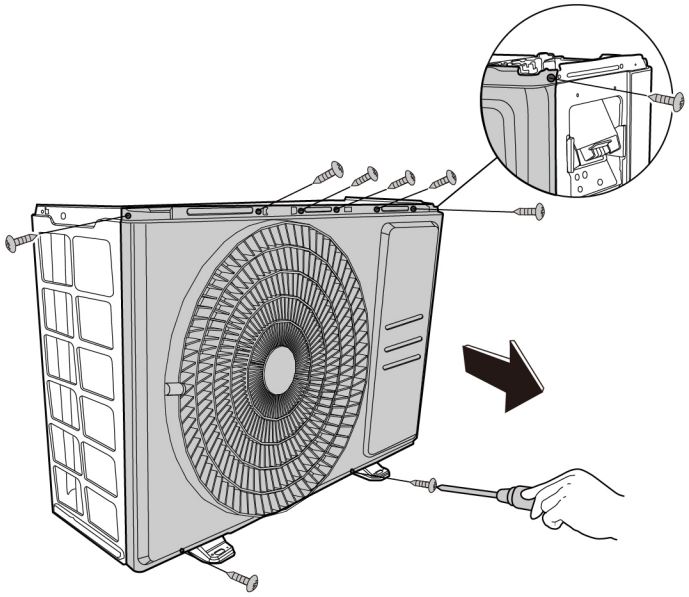
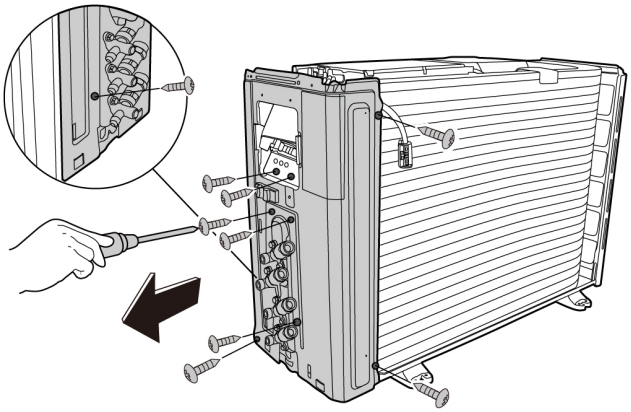
Procedure	Illustration
1) Unfix the screws on the right side of the right panel.(9 screws)(see CJ_ Multi_E30-005).	 CJ_Multi_E30-005
2) Remove the screws on the back of the right panel and then remove the right panel and rear net.(9 screws).(see CJ_Multi_E30-006).	 CJ_Multi_E30-006

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

5. X330

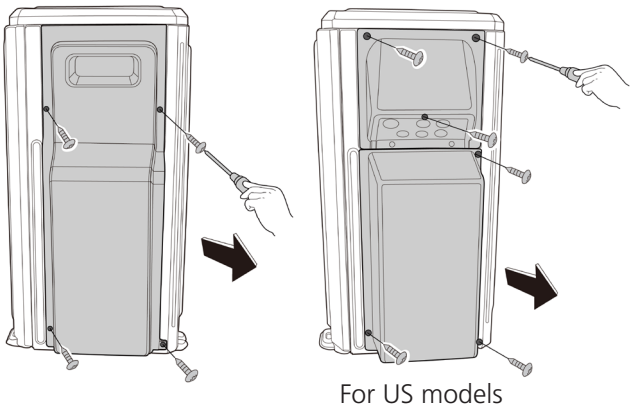
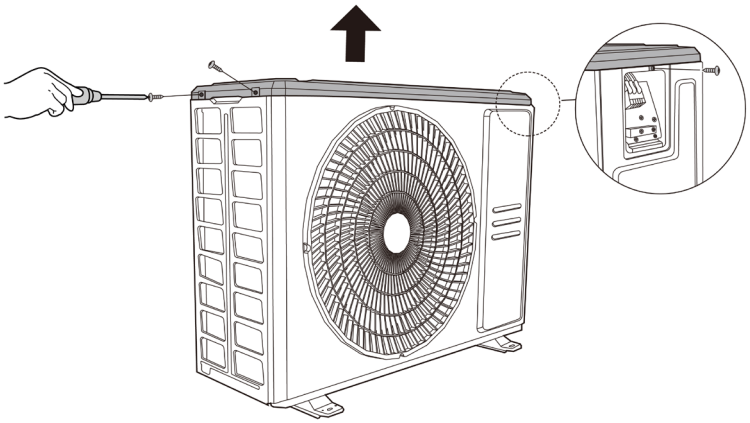
Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screw of the shield and then remove it.(1 screw) (see CJ_Multi_X330_001). 3) Remove the screws of the top cover and then remove the top cover (4 screws). (see CJ_Multi_X330_002).	 **CJ_Multi_X330_001**  **CJ_Multi_X330_002**

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

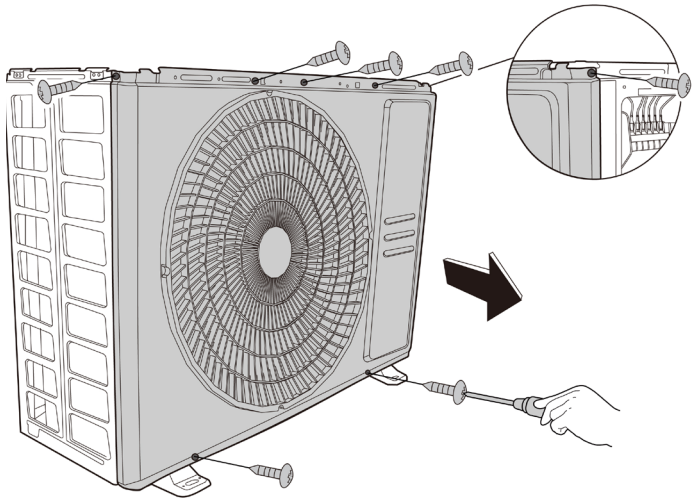
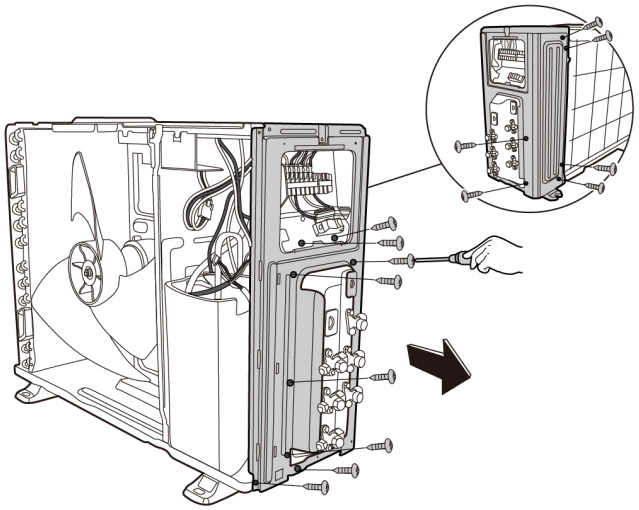
Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (8 screws) (see CJ_Multi_X330_003).	 CJ_Multi_X330_003
5) Remove the screws of the right panel and then remove the right panel (9 screws) (see CJ_Multi_X330_005).	 CJ_Multi_X330_004

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

6. X430

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the shield and then remove it.(4 screws). For US models, remove the screws of big handle assembly and water collector then remove them.(6 screws) (see CJ_Multi_X430_001).	 For US models **CJ_Multi_X430_001**
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_Multi_X430_002).	 **CJ_Multi_X430_002**

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

Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (7 screws) (see CJ_Multi_X430_003).	 CJ_Multi_X430_003
5) Remove the screws of the right panel and then remove the right panel (14 screws, two of them are used to fix the optional rear net) (see CJ_Multi_X430_004).	 CJ_Multi_X430_004

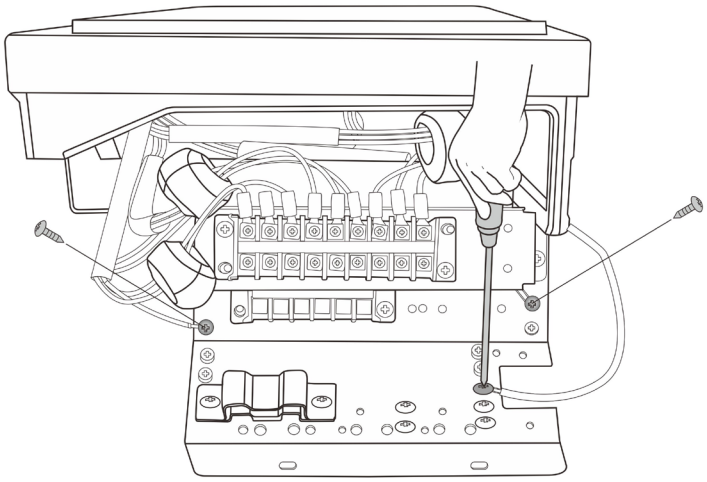
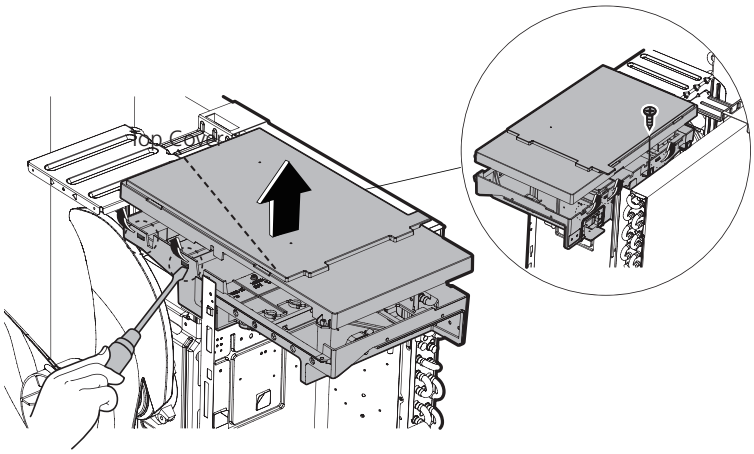
Note: This section is for reference only. Actual unit appearance may vary.

3.2 Electrical parts

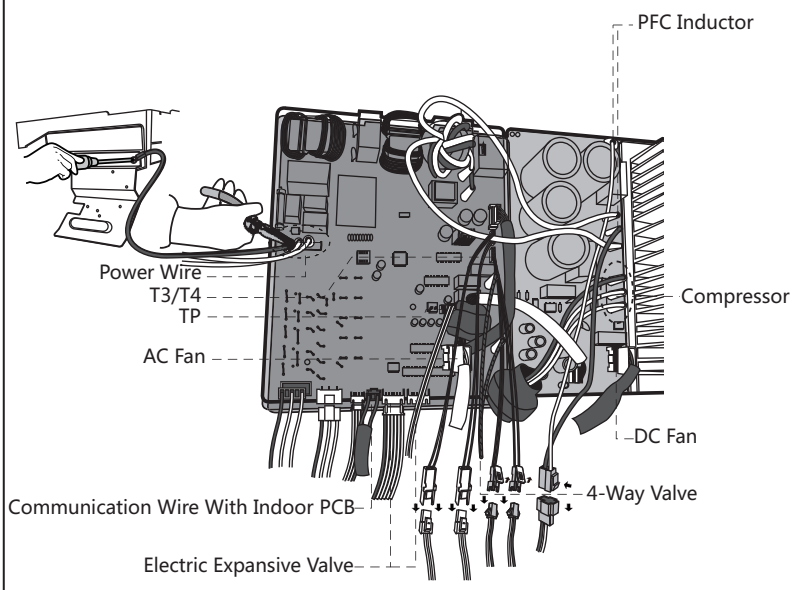
WARNING: Antistatic gloves must be worn when you disassemble the electronic box.

Note: Remove the air outlet grille(refer to 1.1 Panel Plate) before disassembling electrical parts.

PCB Board 1

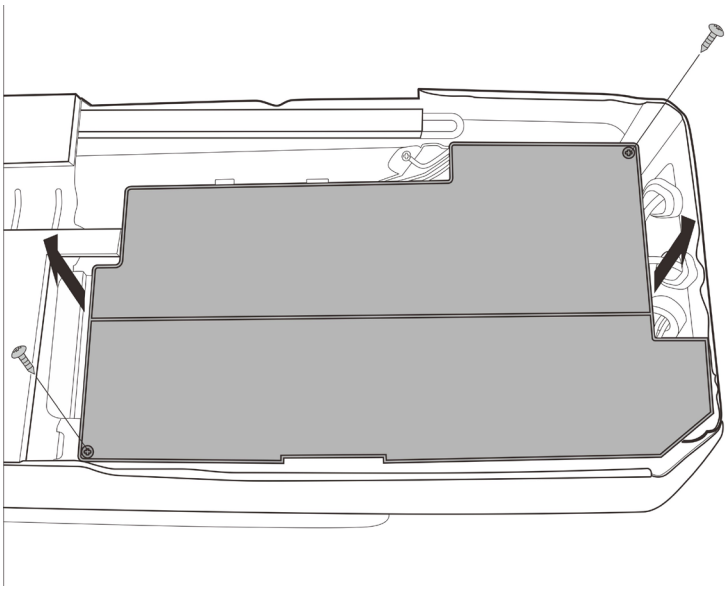
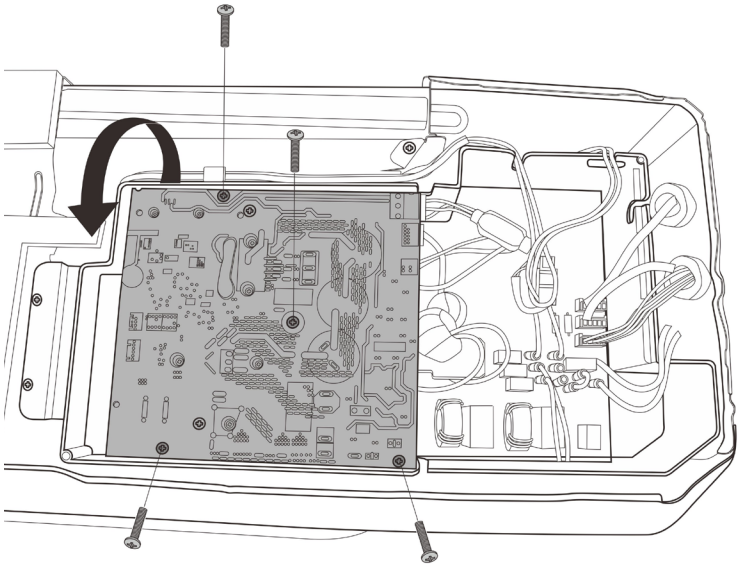
Procedure	Illustration
1) Remove the screws of the ground wirings. (3 screws) (CJ_Multi-PCB_001-1).	 **CJ_Multi-PCB_001-1**
2) Unfix the hooks and screw and then open the electronic control box cover (5 hooks and 1 screw)(see CJ_Multi-PCB_001-2).	 **CJ_Multi-PCB_001-2**

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

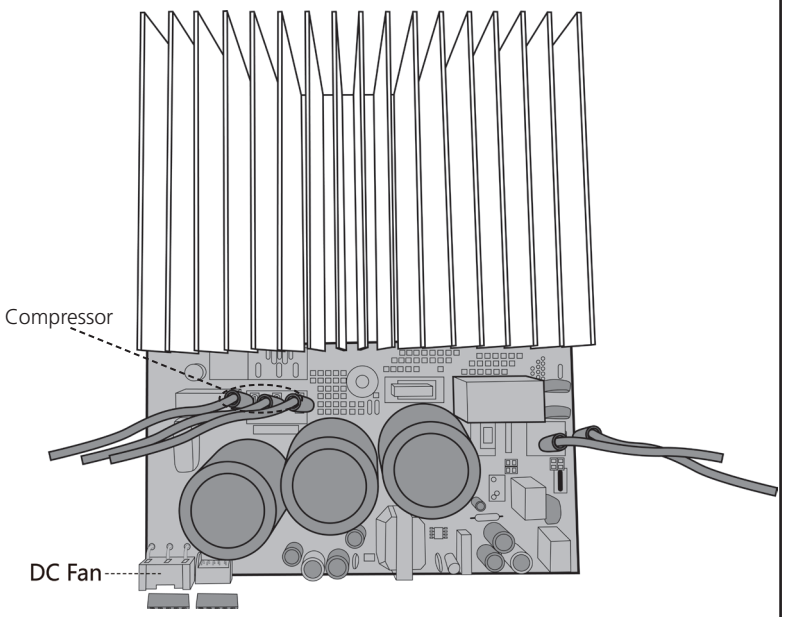
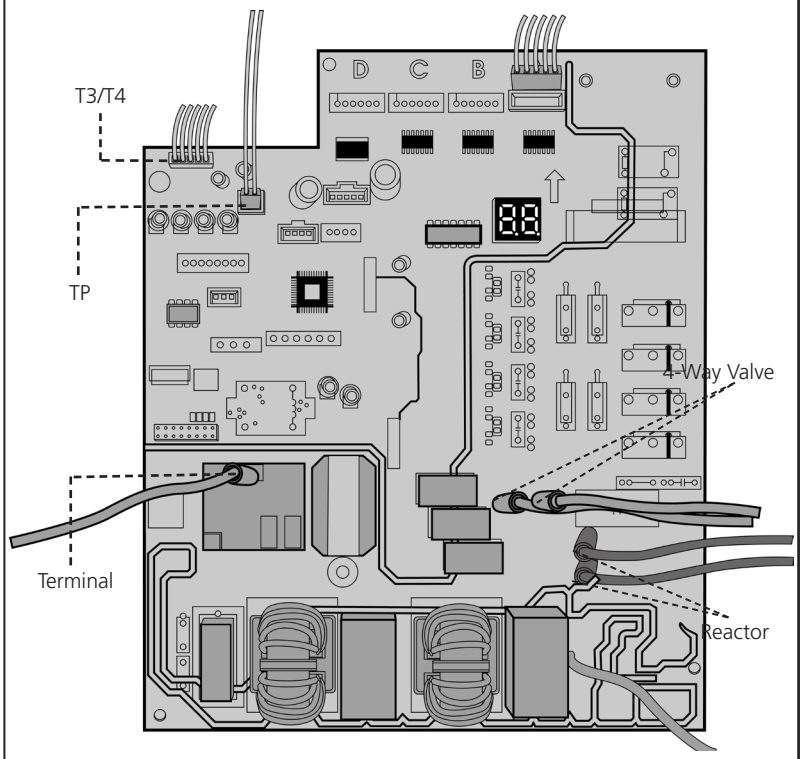
Procedure	Illustration
3) Disconnect the connector for outdoor DC fan from the electronic control board (see CJ_Multi-PCB_001-3). 4) Remove the connector for the compressor (see CJ_Multi-PCB_001-3). 5) Pull out the two blue wires connected with the four way valve (see CJ_Multi-PCB_001-3). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_Multi-PCB_001-3). 7) Disconnect the electronic expansion valve wire (see CJ_Multi-PCB_001-3). 8) Disconnect the communication wire indoor PCB (see CJ_Multi-PCB_001-3). 9) Disconnect the PFC inductor (see CJ_Multi-PCB_001-3). 10)Then remove the electronic control box (see CJ_Multi-PCB_001-3).	 **CJ_Multi-PCB_001-3**

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

PCB Board 2

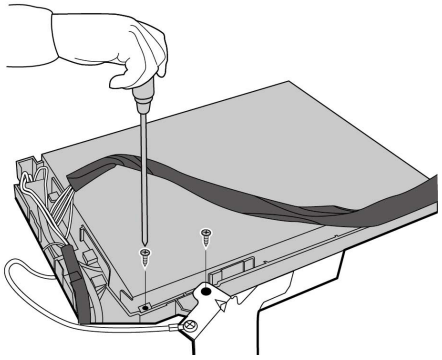
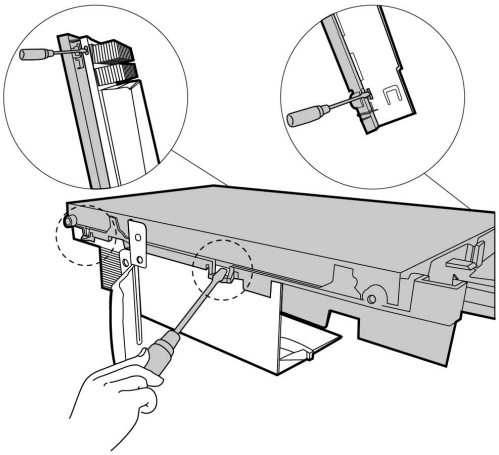
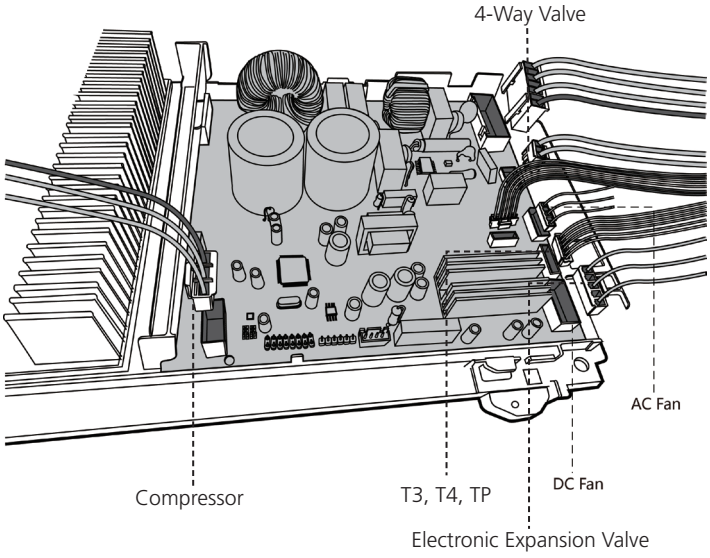
Procedure	Illustration
1) Remove the screws of the top cover. (2 screws) (CJ_Multi-PCB_002-1).	 CJ_Multi-PCB_002-1
2) Unfix the screws and then turn over the IPM board (4 screws) (see CJ_ Multi-PCB_002-2).	 CJ_Multi-PCB_002-2

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

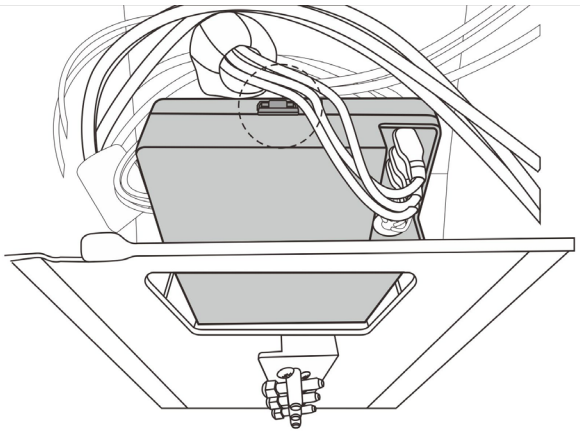
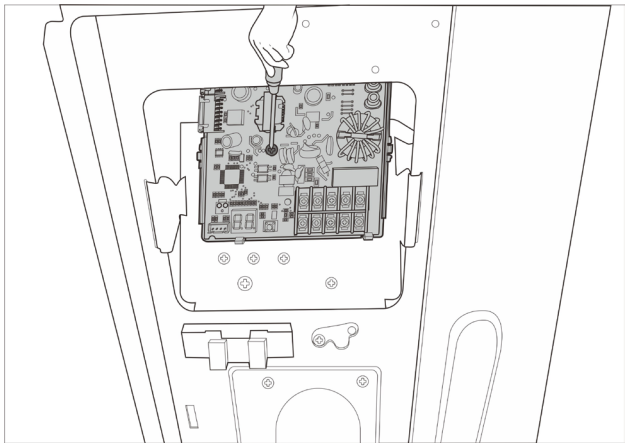
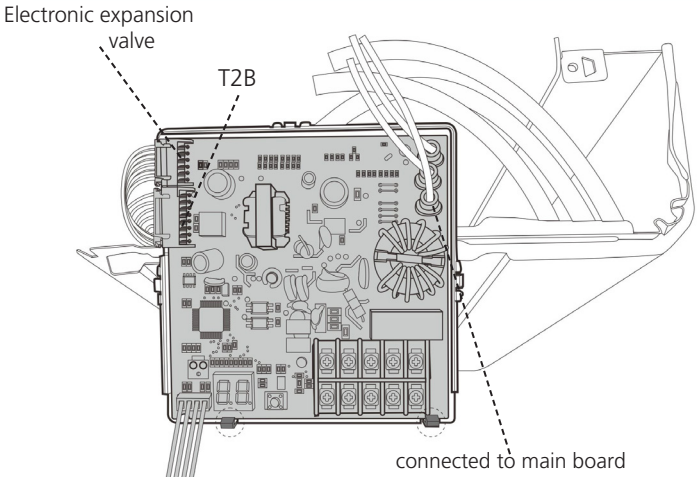
Procedure	Illustration
3) Disconnect the connector for outdoor DC fan from the electronic control board (see CJ_Multi-PCB_002-3). 4) Remove the connector for the compressor (see CJ_Multi-PCB_002-4). 5) Pull out the two blue wires connected with the four way valve (see CJ_Multi-PCB_002-4). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_Multi-PCB_002-4). 7) Disconnect the electronic expansion valve wire (see CJ_Multi-PCB_002-4). 8) Disconnect the communication wire indoor PCB (see CJ_Multi-PCB_002-4). 9) Disconnect the PFC inductor (see CJ_Multi-PCB_002-4). 10)Then remove the electronic control box (see CJ_Multi-PCB_002-4).	 **CJ_Multi-PCB_002-3**  **CJ_Multi-PCB_002-4**

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

PCB board 3

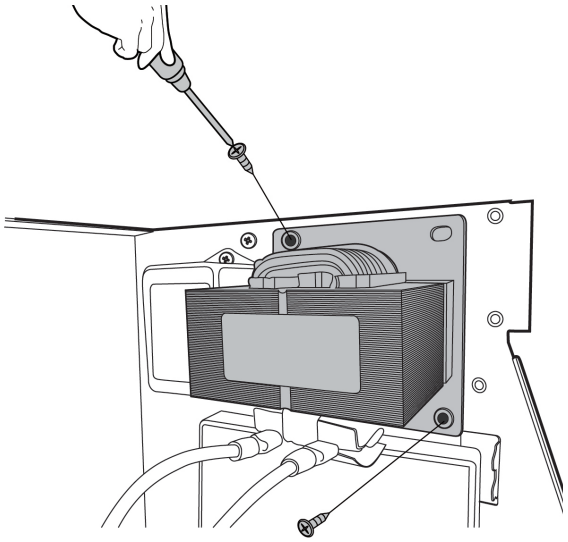
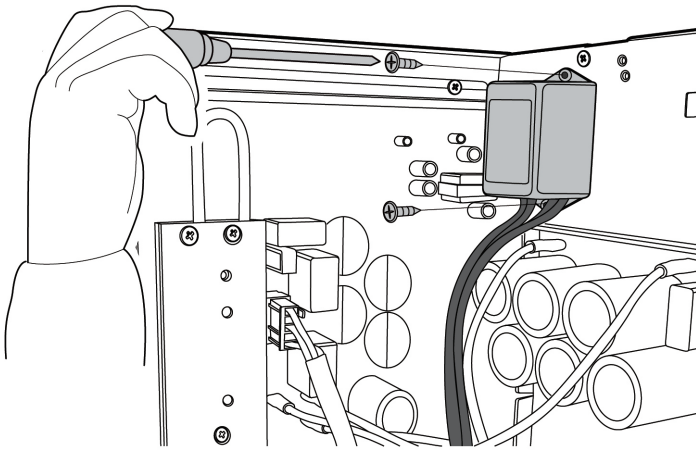
Procedure	Illustration
1) Remove the screws of the top cover. (2 screws) (see CJ_Multi-PCB_003-1).	 **CJ_Multi-PCB_003-1**
2) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_Multi-PCB_003-2).	 **CJ_Multi-PCB_003-2**
3) Disconnect the connector for fan motor from the electronic control board (see CJ_Multi-PCB_003-3). 4) Remove the connector for the compressor (see CJ_Multi-PCB_003-3). 5) Pull out the two blue wires connected with the four way valve (CJ_Multi-PCB_003-3). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (CJ_Multi-PCB_003-3). 7) Disconnect the electronic expansion valve wire (CJ_Multi-PCB_003-3). 8) Then remove the electronic control board.	 **CJ_Multi-PCB_003-3**

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

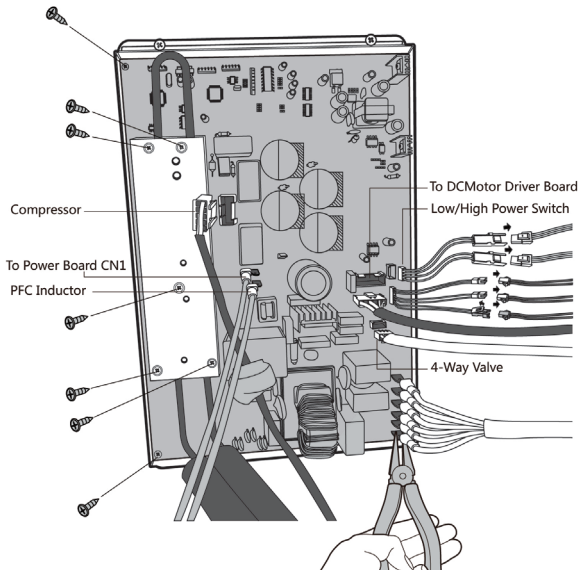
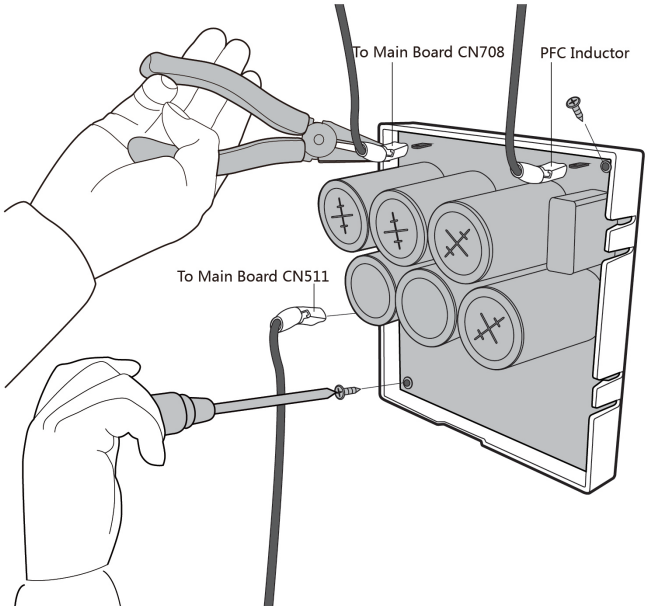
Procedure	Illustration
9) Unfix the hooks and then remove the electronic installing box . (2 screws) (see CJ_Multi_PCB_003-4) .	 CJ_Multi-PCB_003-4
10)Remove one screw of module board. (see CJ_Multi_PCB_003-5).	 CJ_Multi-PCB_003-5
11)Disconnect the connectors of the module board. (see CJ_Multi_ PCB_003-6).	 CJ_Multi-PCB_003-6

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

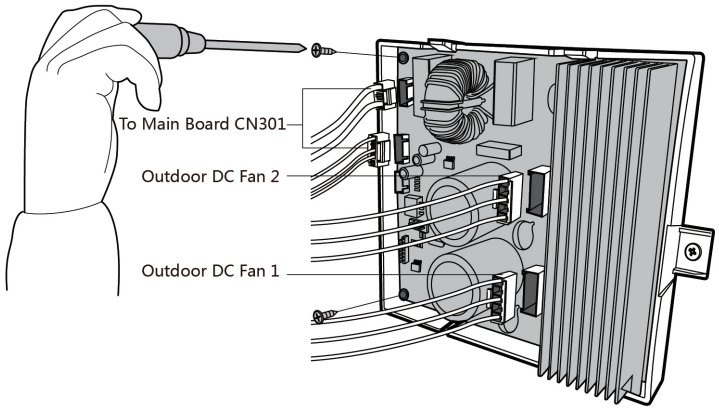
PCB board 4

Procedure	Illustration
1) Remove the screws and then remove the reactor 1. (2 screws) (see CJ_Multi_PCB_004-1).	 CJ_Multi-PCB_004-1
2) Remove the screws and then remove the reactor 2 (see CJ_Multi_PCB_004-2).	 CJ_Multi-PCB_004-2

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

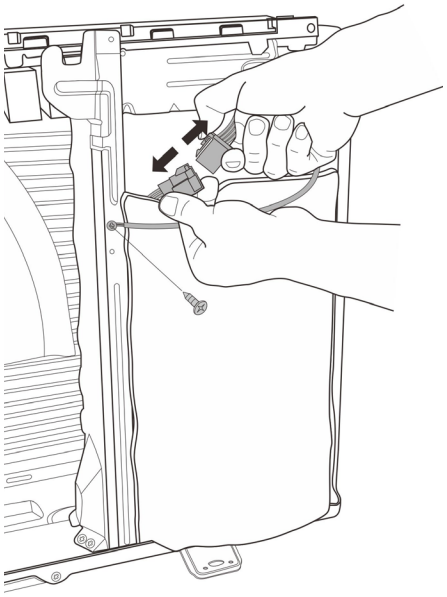
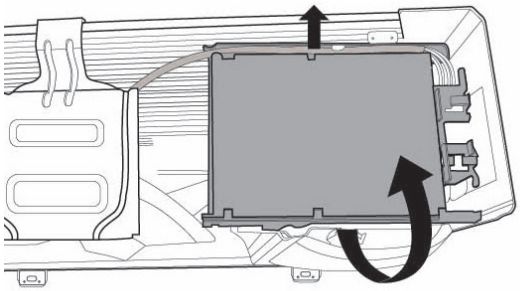
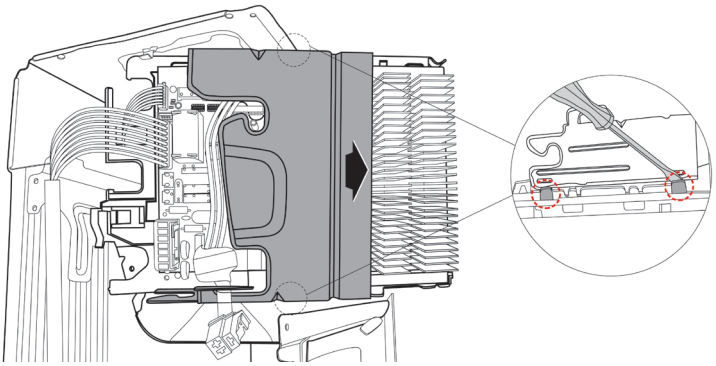
Procedure	Illustration
3) Unfix five screws and then remove the radiating pipe. (see CJ_Multi_PCB_004-3). 4) Unfix two screws on the main board (see CJ_Multi_PCB_004-3). 5) Disconnect the connectors on the main board.(see CJ_Multi_PCB_004-3).	 **CJ_Multi-PCB_004-3**
6) Unfix two screws on the upper board (see CJ_Multi_PCB_004-4). 7) Remove the connectors on the upper board (see CJ_Multi_PCB_004-4).	 **CJ_Multi-PCB_004-4**

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

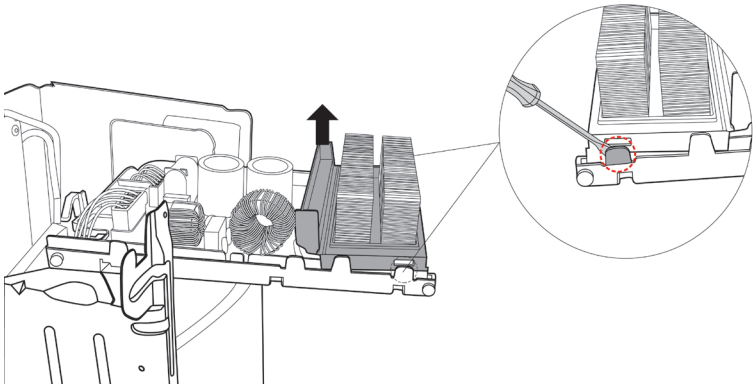
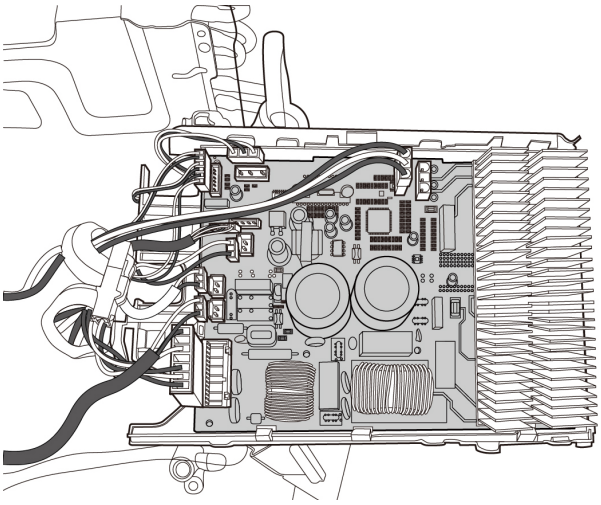
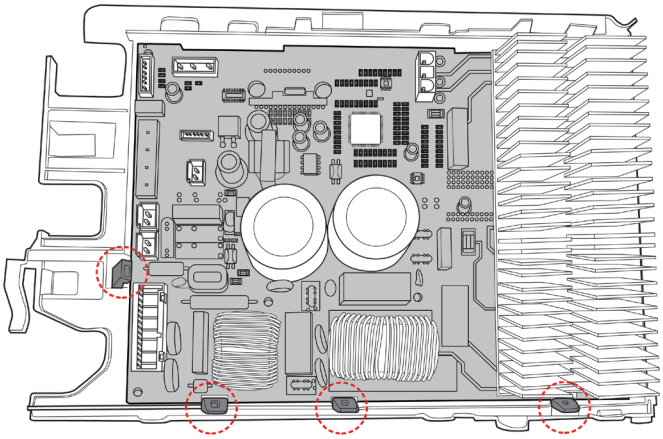
Procedure	Illustration
8) Unfix two screws on the bottom board. (see CJ_Multi_PCB_004-5). 9) Disconnect the connectors on the bottom board (see CJ_Multi_PCB_004-5).	 **CJ_Multi-PCB_004-5**

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

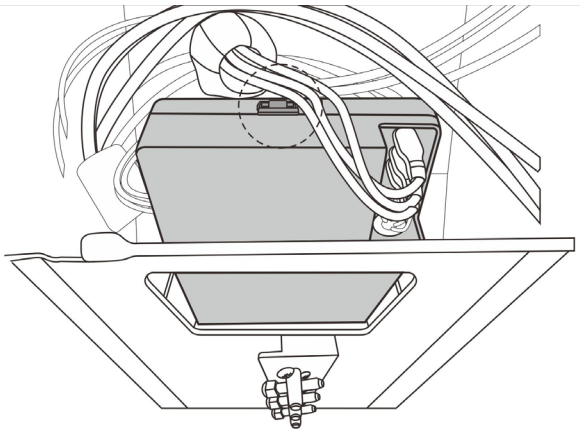
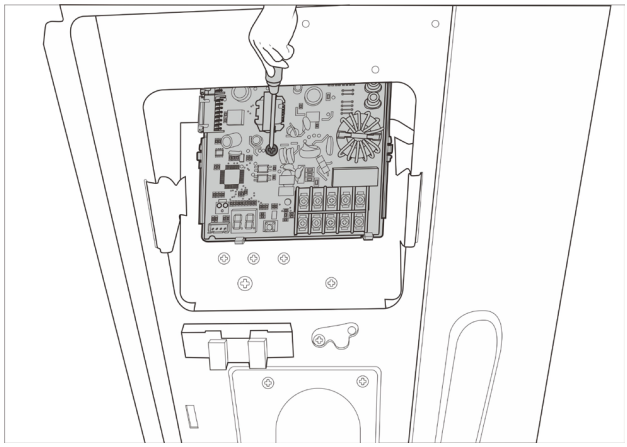
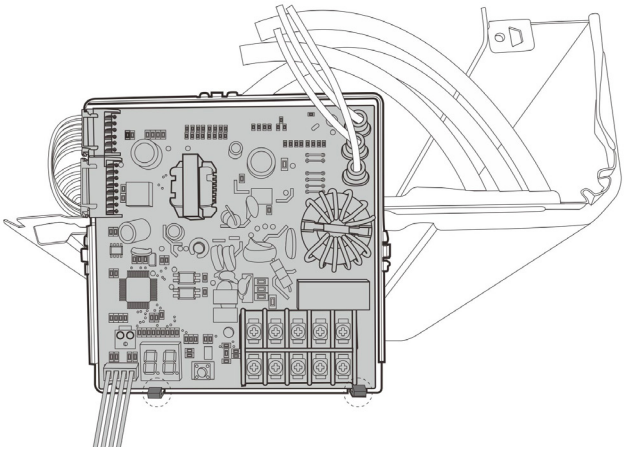
PCB board 5

Procedure	Illustration
1) Disconnect the connector for compressor and release the ground wire(1 screw). (see CJ_ODU_Multi_PCB_005-1).	 CJ_ODU_Multi_PCB_005-1
2) Pull out the wires from electrical supporting plate and turn over the electronic control assembly. (see CJ_ODU_Multi_PCB_005-2).	 CJ_ODU_Multi_PCB_005-2
3) Remove the electronic installing box subassembly (4 hooks) (see CJ_ODU_Multi_PCB_005-3).	 CJ_ODU_Multi_PCB_005-3

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

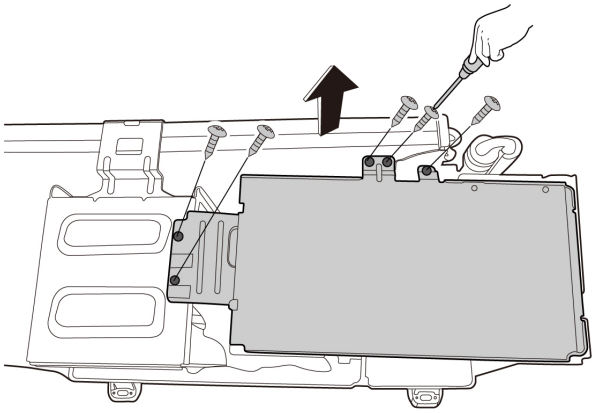
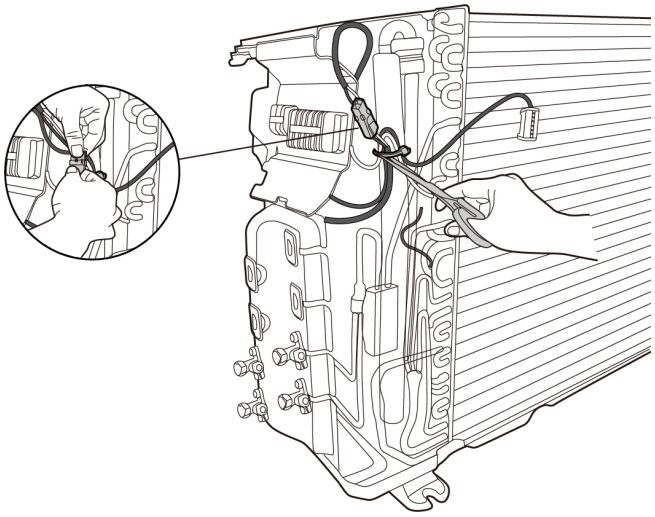
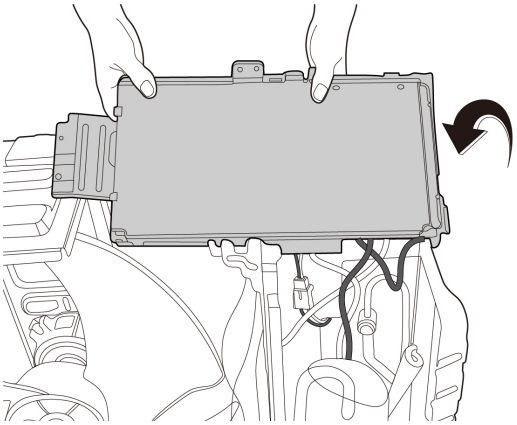
Procedure	Illustration
4) Remove the fixing board (2 hooks) (see CJ_ODU_Multi_PCB_005-4).	 CJ_ODU_Multi_PCB_005-4
5) Disconnect the connectors from the electronic control board (see CJ_ODU_Multi_PCB_005-5).	 CJ_ODU_Multi_PCB_005-5
6) Then remove the electronic control board (4 hooks).(see CJ_ODU_Multi_PCB_005-6).	 CJ_ODU_Multi_PCB_005-6

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

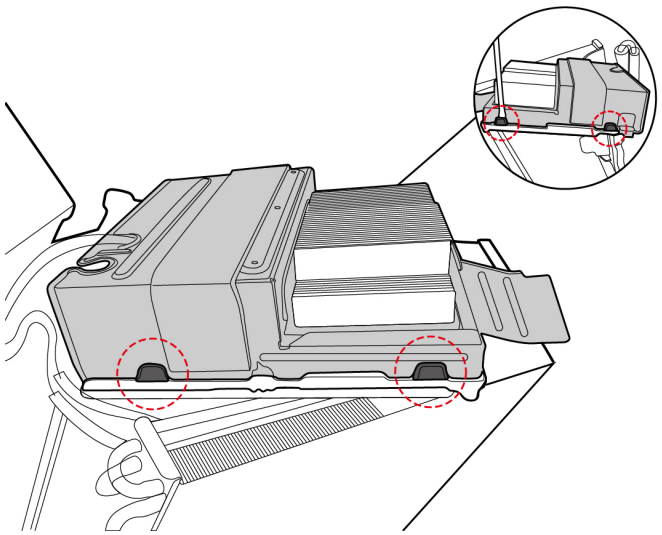
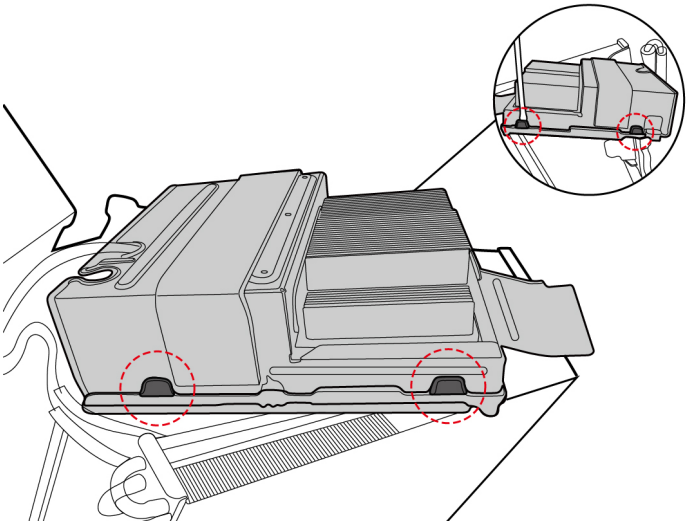
Procedure	Illustration
7) Unfix the hooks and then remove the electronic installing box . (2 screws) (see CJ_Multi_PCB_005-7) .	 CJ_Multi-PCB_005-7
8) Remove one screw of module board. (see CJ_Multi_PCB_005-8).	 CJ_Multi-PCB_005-8
9) Disconnect the connectors of the module board. (see CJ_Multi_ PCB_005-9).	 CJ_Multi-PCB_005-9

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

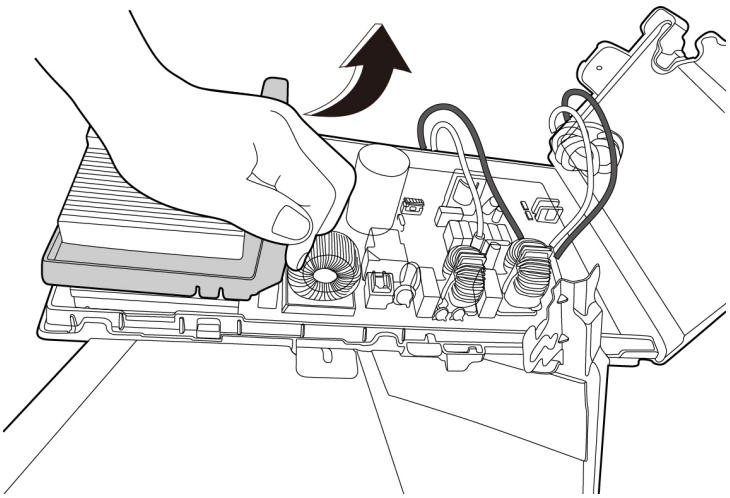
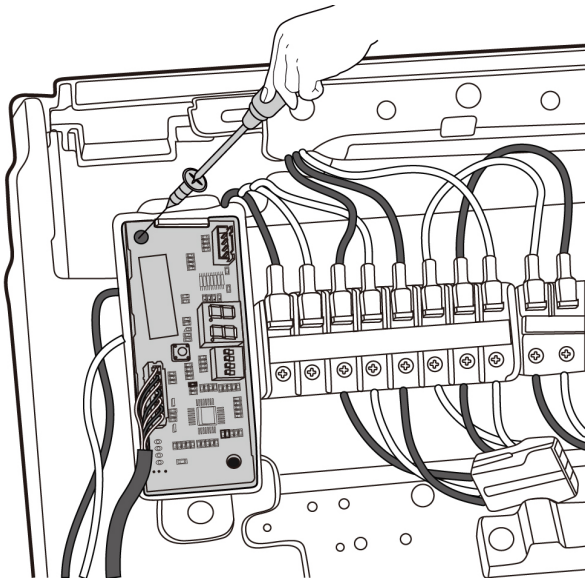
PCB board 6

Procedure	Illustration
1) Remove 5 screws of the cover of electrical control box cover and remove it. (see CJ_ODU_Multi_PCB_006-1).	 CJ_ODU_Multi_PCB_006-1
2) Cut the ribbon by a shear and disconnect the 4-way valve connector. (see CJ_ODU_Multi_PCB_006-2).	 CJ_ODU_Multi_PCB_006-2
3) Ture over the electronic control box subassembly. (see CJ_ODU_Multi_PCB_006-3).	 CJ_ODU_Multi_PCB_006-3

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

Procedure	Illustration
4) Remove the electronic installing box subassembly (4 hooks) (see CJ_ODU_Multi_PCB_006-4).	 CJ_ODU_Multi_PCB_006-4
5) Remove the support of electronic control box.(see CJ_ODU_Multi_PCB_006-5).	 CJ_ODU_Multi_PCB_006-5

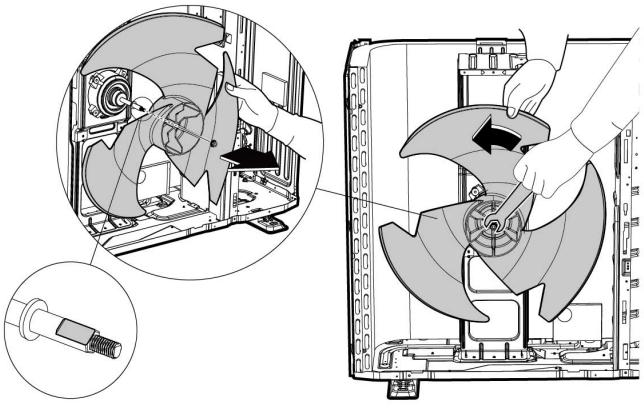
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
6) Disconnect the connectors from the electronic control board (see CJ_ODU_Multi_PCB_006-6). 7) Remove 2 screws and then remove the electronic control board.(see CJ_ODU_Multi_PCB_006-6).	 **CJ_ODU_Multi_PCB_006-6**
8) Pull out the connector, remove one screw and then remove the key board subassembly on terminal board. (see CJ_Multi_PCB_006-7).	 **CJ_Multi-PCB_006-7**

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

3.3 Fan Assembly

Note: Remove the panel plate (refer to 1.1 Panel Plate) before disassembling fan.

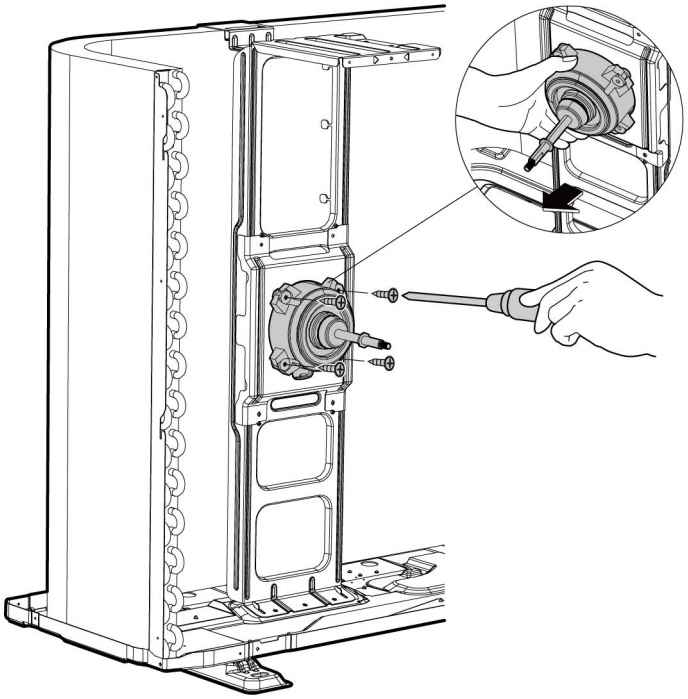
Procedure	Illustration
1) Remove the nut securing the fan with a spanner (see CJ_ODU_FAN_001). 2) Remove the fan.	

CJ_ODU_FAN_001

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 1.1 Panel Plate and 1.2 Electrical parts) before disassembling fan motor.

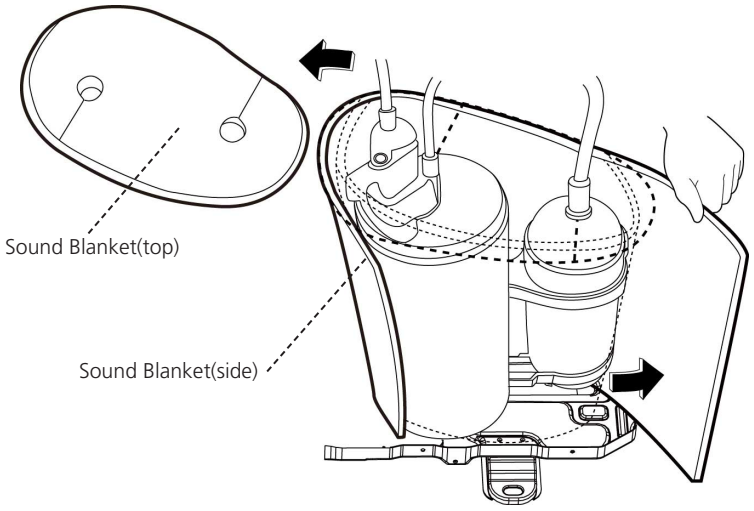
Procedure	Illustration
3) Remove the fixing screws of the fan motor (4 screws) (see CJ_ODU_MOTOR_001). 4) Remove the fan motor.	

CJ_ODU_MOTOR_001

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

3.5 Sound blanket

Note: Remove the panel plate (refer to 1.1 Panel plate) before disassembling sound blanket.

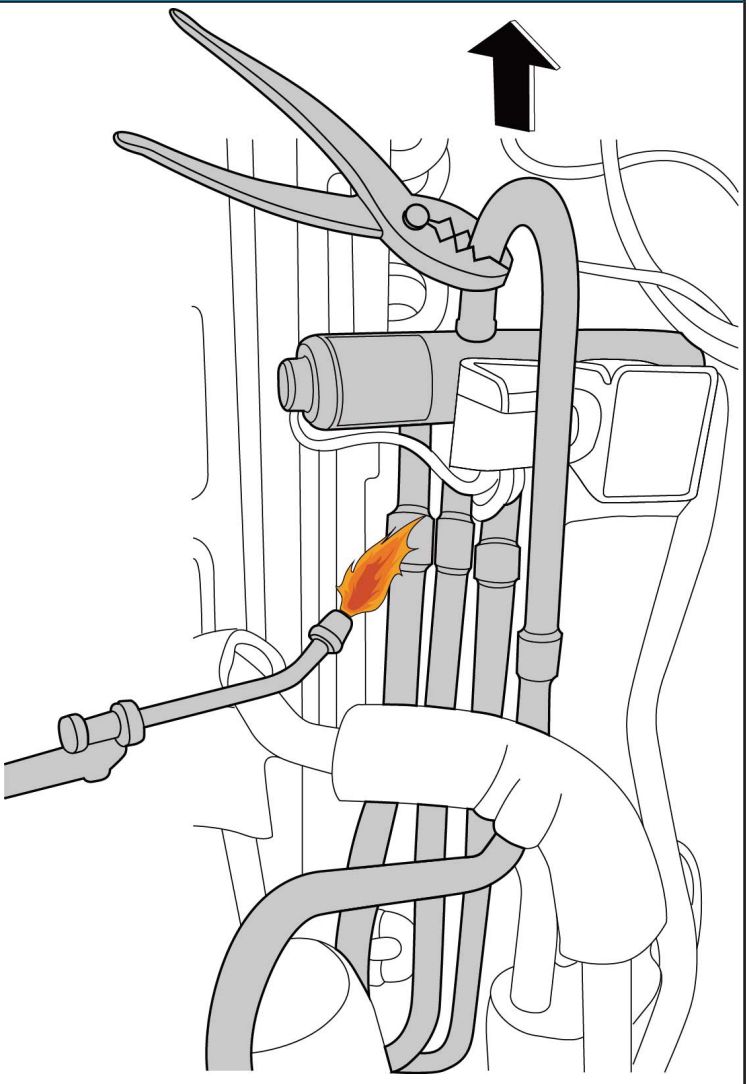
Procedure	Illustration
1) Remove the sound blanket (side and top) (see CJ_ODU_BLANKET_001).	 **CJ_ODU_BLANKET_001**

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 1.1 Panel plate and 1.2 Electrical parts) before disassembling sound blanket.

Procedure	Illustration
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.	

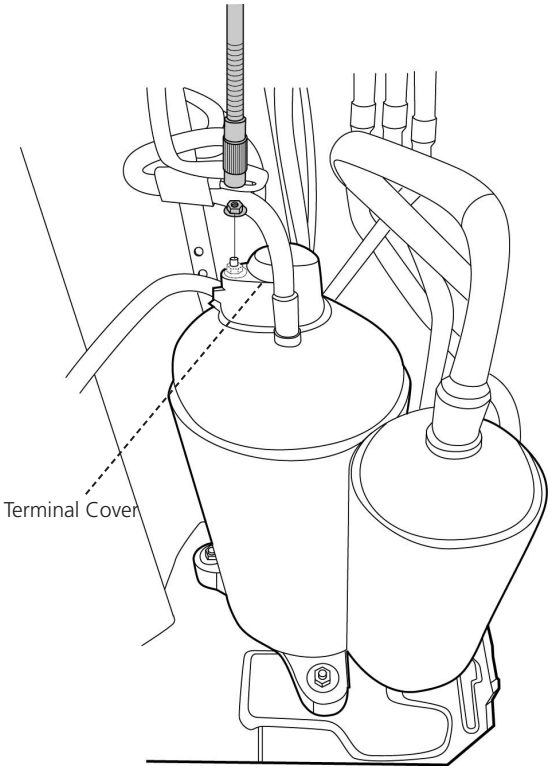
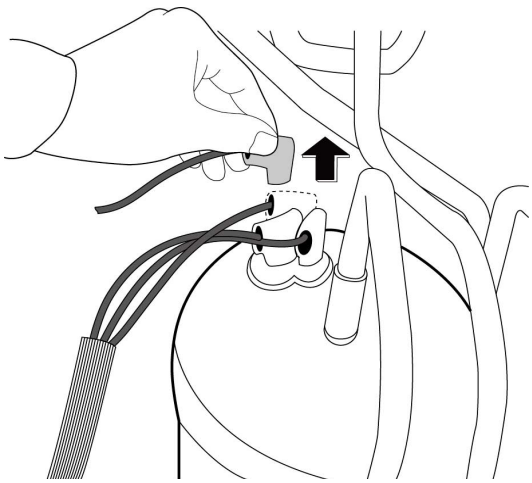
CJ_ODU_VALVE_001

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

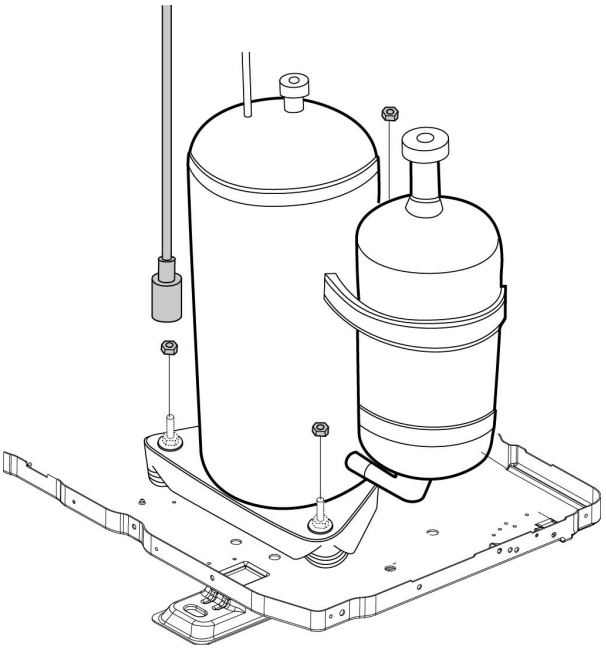
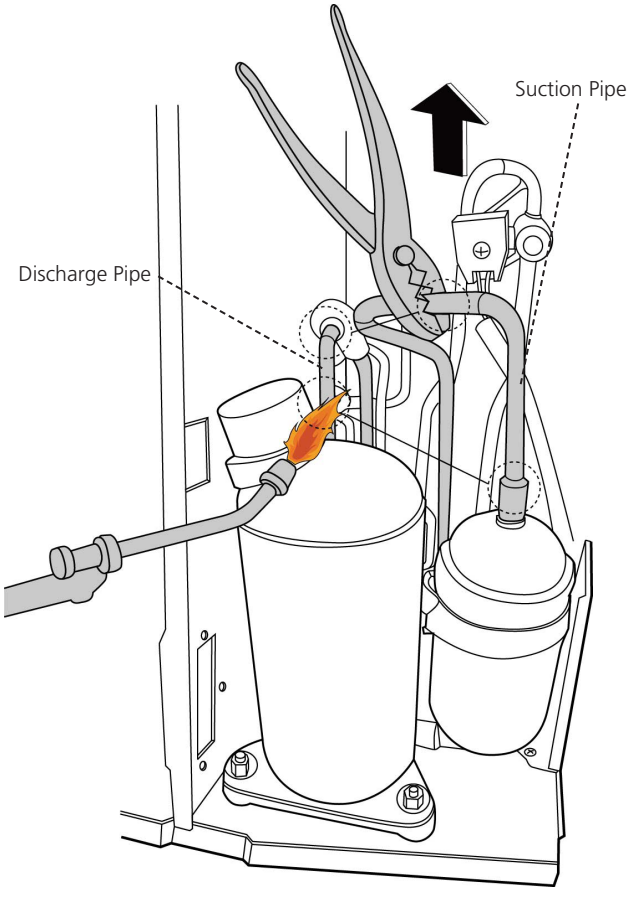
3.7 Compressor

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 1.1 Panel plate and 1.2 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).	 CJ_ODU_COMP_001
2) Disconnect the connectors (see CJ_ODU_COMP_002).	 CJ_ODU_COMP_002

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

Procedure	Illustration
3) Remove the hex nuts and washers securing the compressor, located on the bottom plate (see CJ_ODU_COMP_003).	 CJ_ODU_COMP_003
4) Heat up the brazed parts and then remove the the discharge pipe and the suction pipe (see CJ_ODU_COMP_004). 5) Lift the compressor from the base pan assembly with pliers.	 CJ_ODU_COMP_004

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

Troubleshooting

Contents

Troubleshooting

Contents

1. Safety Caution

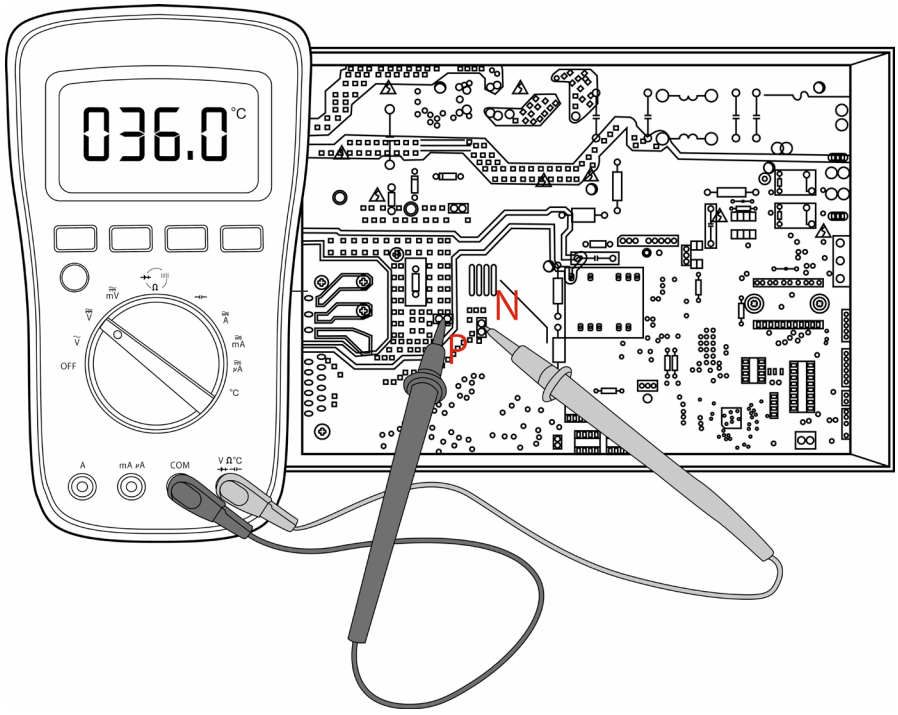
WARNING

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 on different models ,
1. the running LED with flash in a corresponding series, the timer LED may turn on or begin flashing;
2. an error code will be displayed;
3. both 1 and 2.

These error codes are described in the following tables:

Running Lamp	Timer Lamp	Display	Information	Solution
--	--	dF	Defrost	Normal Display, not error code
--	--	CL	Filter cleaning reminder(power on display for 15 seconds)	
--	--	CL	Active clean	
--	--	nF	Filter replacement reminder(power on display for 15 seconds)	
--	--	FP	Heating in room temperature under 8°C	
--	--	FC	Forced cooling	
--	--	AP	AP mode of WIFI connection	
--	--	CP	Remote switched off	
1 time	OFF	EH00	Indoor unit EEPROM parameter error	TS27
2 times	OFF	EL01	Indoor/outdoor units communication error	TS28
3 times	OFF	EH02	Zero-crossing signal detection error(for some models)	TS45
4 times	OFF	EH03	The indoor fan speed is operating outside of the normal range	TS31
5 times	OFF	EC51	Outdoor unit EEPROM parameter error	TS27
5 times	OFF	EC52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	TS33
5 times	OFF	EC53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	TS33
5 times	OFF	EC54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	TS33
5 times	OFF	EC56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited(for free-match indoor units)	TS33
6 times	OFF	EH60	Indoor room temperature sensor T1 is in open circuit or has short circuited	TS33
6 times	OFF	EH61	Evaporator coil middle temperature sensor T2 is in open circuit or has short circuited	TS33
12 times	OFF	EC07	The outdoor fan speed is operating outside of the normal range	TS31
7 times	FLASH	PC00	IPM malfunction or IGBT over-strong current protection	TS36
2 times	FLASH	PC01	Over voltage or over low voltage protection	TS38
3 times	FLASH	PC02	Top temperature protection of compressor or High temperature protection of IPM module or High pressure protection	TS46
5 times	FLASH	PC04	Inverter compressor drive error	TS36
1 time	FLASH	PC08	Current overload protection	TS34
7 times	FLASH	PC03	High pressure protection or low pressure protection	TS47/TS49
1 times	ON	--	Indoor units mode conflict(match with multi outdoor unit)	--

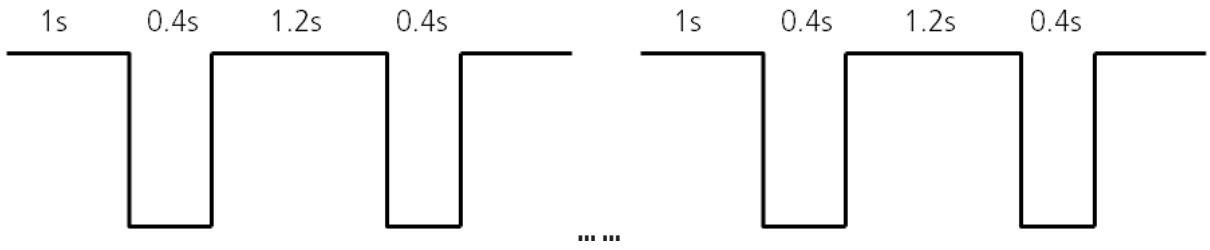
For other errors:

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.

88 flash frequency:



2.2 Error Display (Outdoor unit)

Display	Malfunction or Protection	Solution
dF	Defrosting	Normal Display, not error code
FC	Forced cooling	
EC 51	Outdoor EEPROM malfunction	TS27
Eb 01	Indoor / outdoor units communication error	TS28
PC 40	Communication malfunction between IPM board and outdoor main board	TS40
PC 08	Outdoor overcurrent protection	TS34
PC 10	Outdoor unit low AC voltage protection	TS38
PC 11	Outdoor unit main control board DC bus high voltage protection	TS38
PC 12	Outdoor unit main control board DC bus high voltage protection /341 MCE error	TS38
PC 00	IPM module protection	TS36
PC 0F	PFC module protection	TS41
EC 71	Over current failure of outdoor DC fan motor	TS31
EC 72	Lack phase failure of outdoor DC fan motor	TS51
EC 07	Outdoor fan speed has been out of control	TS31
PC 43	Outdoor compressor lack phase protection	TS52
PC 44	Outdoor unit zero speed protection	TS34
PC 45	Outdoor unit IR chip drive failure	TS53
PC 46	Compressor speed has been out of control	TS34
PC 49	Compressor overcurrent failure	TS34
PC 30	High pressure protection	TS47
PC 31	Low pressure protection	TS49
PC 0R	High temperature protection of condenser	TS43
PC 06	Temperature protection of compressor discharge	TS42
PC 02	Top temperature protection of compressor	TS46
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	TS33
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	TS33
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	TS33
EC 56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited	TS33
EC 50	Open or short circuit of outdoor unit temperature sensor(T3,T4.TP)	TS33
LC 06	IPM module frequency limit shutdown/IPM high temperature protection	--
PC 0L	Low ambient temperature protection	--

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	☐Cooling ☐Heating ☐Fan only ☐Dry		
Setting temperature	_____°C / °F	Fan speed	☐Turbo ☐High ☐Medium ☐Low ☐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	Sunction 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	
☐Approved	
☐More Proof needed	
☐Rejected	

4. Information Inquiry

- To enter information inquiry status, complete the following procedure within 10 seconds:
  - Press LED 3 times.
  - Press SWING 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) displays the next code in the sequence. Pressing SWING(or AIR DIRECTION) will show the previous.
- The following table shows information codes. The screen displays this code for 1.2 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	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
A0	Reserved	0-FF 2-28 5-20 5-25	-	-
A1				
b0				
b1				
b2				
b3				
b4				
b5				
b6				
dL				
Rc				
Uo				
Td				
dA				
dS				
dT				

5. Outdoor Unit Point Check Function

- A check switch is included on the outdoor PCB.
- Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed.

For some models,

Number of Presses	Display	Remark
0	Normal display	Displays running frequency, running state, or malfunction code
1	Quantity of indoor units with working connection	Display Number of indoor unit 1 1 2 2 3 3 4 4
2	Outdoor unit running mode code	Stanby: 0,Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4, Forced defrostling: A
3	Indoor unit A capacity	The capacity unit is horse power. If the indoor unit is not connected, the digital display shows the following: "--" (9K:1HP,12K:1.2HP,18K:1.5HP)
4	Indoor unit B capacity	
5	Indoor unit C capacity	
6	Indoor unit D capacity	
7	Indoor unit E capacity	
8	Indoor unit A capacity demand code	Norm code*HP (9K: 1HP,12K: 1.2HP,18K: 1.5HP)
9	Indoor unit B capacity demand code	
10	Indoor unit C capacity demand code	
11	Indoor unit D capacity demand code	
12	Indoor unit E capacity demand code	
13	Outdoor unit amendatory capacity demand code	
14	The frequency corresponding to the total indoor units' amendatory capacity demand	
15	The frequency after the frequency limit	
16	The frequency sending to compressor control chip	

17	Indoor unit A evaporator outlet temperature (T2BA)	If the temperature is lower than -9°C, the digital display shows "-9." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
18	Indoor unit B evaporator outlet temperature (T2BB)	
19	Indoor unit C evaporator outlet temperature (T2BC)	
20	Indoor unit D evaporator outlet temperature (T2BD)	
21	Indoor unit E evaporator outlet temperature (T2BE)	
22	Indoor unit A room temperature (T1A)	If the temperature is lower than 0°C, the digital display shows "0." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
23	Indoor unit B room temperature (T1B)	
24	Indoor unit C room temperature (T1C)	
25	Indoor unit D room temperature (T1D)	
26	Indoor unit E room temperature (T1E)	
27	Indoor unit A evaporator temperature (T2A)	If the temperature is lower than -9°C, the digital display shows "-9." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
28	Indoor unit B evaporator temperature (T2B)	
29	Indoor unit C evaporator temperature (T2C)	
30	Indoor unit D evaporator temperature (T2D)	
31	Indoor unit E evaporator temperature (T2E)	
32	Condenser pipe temperature (T3)	
33	Outdoor ambient temperature (T4)	
34	Compressor discharge temperature (TP)	The display value is between 30–129°C. If the temperature is lower than 30°C, the digital display shows "30." If the temperature is higher than 99°C, the digital display shows single and double digits. For example, if the digital display shows "0.5", the compressor discharge temperature is 105°C.
35	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
36	AD value of voltage	

<table>
<tr><td>37</td><td>EXV open angle for A indoor unit</td><td colspan="3" rowspan="5">Actual data/4.
If the value is higher than 99, the digital display shows single and double digits.
For example, if the digital display shows “2.0”, the EXV open angle is 120×4=480p.</td></tr>
<tr><td>38</td><td>EXV open angle for B indoor unit</td></tr>
<tr><td>39</td><td>EXV open angle for C indoor unit</td></tr>
<tr><td>40</td><td>EXV open angle for D indoor unit</td></tr>
<tr><td>41</td><td>EXV open angle for E indoor unit</td></tr>
<tr><td>42</td><td>Frequency limit symbol</td><td>Bit7</td><td>Frequency limit caused by IGBT radiator</td><td rowspan="8">The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1.
This means that a frequency limit may be caused by T4, T3, or the current.</td></tr>
<tr><td></td><td>Bit6</td><td>Frequency limit caused by PFC</td></tr>
<tr><td></td><td>Bit5</td><td>Frequency limit caused by T4.</td></tr>
<tr><td></td><td>Bit4</td><td>Frequency limit caused by T2.</td></tr>
<tr><td></td><td>Bit3</td><td>Frequency limit caused by T3.</td></tr>
<tr><td></td><td>Bit2</td><td>Frequency limit caused by T5.</td></tr>
<tr><td></td><td>Bit1</td><td>Frequency limit caused by current</td></tr>
<tr><td></td><td>Bit0</td><td>Frequency limit caused by voltage</td></tr>
<tr><td>43</td><td>Average value of T2</td><td colspan="3">(Sum T2 value of all indoor units)/(number of indoor units in good connection)</td></tr>
<tr><td>44</td><td>Outdoor unit fan motor state</td><td colspan="3">Off: 0, Turbo:1 High speed:2, Med speed: 3, Low speed: 4, Breeze:5, Super breeze: 6</td></tr>
<tr><td>45</td><td>The last error or protection code</td><td colspan="3">00 means no malfunction and protection</td></tr>
<tr><td>46</td><td>F indoor unit capacity</td><td colspan="3" rowspan="6">Reserved</td></tr>
<tr><td>47</td><td>F indoor unit capacity demand code</td></tr>
<tr><td>48</td><td>F indoor unit evaporator outlet temperature (T2BF)</td></tr>
<tr><td>49</td><td>F indoor unit room temperature (T1F)</td></tr>
<tr><td>50</td><td>F indoor unit evaporator temperature (T2F)</td></tr>
<tr><td>51</td><td>EXV open angle for F indoor unit</td></tr>
<tr><td>52</td><td>Reason of stop</td><td colspan="3"></td></tr>
</table>

For key board models,

Number of Presses	Display	Remark
0	Normal display	Displays running frequency, running state, or malfunction code
1	Quantity of indoor units with working connection	Display Number of indoor unit 1 1 2 2 3 3 4 4
2	Outdoor unit running mode code	Stanby: 0,Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4, Forced defrostling: A
3	Indoor unit A capacity	The capacity unit is horse power. If the indoor unit is not connected, the digital display shows the following: "--" (9K:1HP,12K:1.2HP,18K:1.5HP)
4	Indoor unit B capacity	
5	Indoor unit C capacity	
6	Indoor unit D capacity	
7	Indoor unit E capacity	
8	Indoor unit A capacity demand code	Norm code*HP (9K: 1HP,12K: 1.2HP,18K: 1.5HP)
9	Indoor unit B capacity demand code	
10	Indoor unit C capacity demand code	
11	Indoor unit D capacity demand code	
12	Indoor unit E capacity demand code	
13	Outdoor unit amendatory capacity demand code	
14	The frequency corresponding to the total indoor units' amendatory capacity demand	
15	The frequency after the frequency limit	
16	The frequency sending to compressor control chip	
17	Indoor unit A evaporator outlet temperature (T2BA)	If the temperature is lower than -9°C, the digital display shows "-9." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
18	Indoor unit B evaporator outlet temperature (T2BB)	
19	Indoor unit C evaporator outlet temperature (T2BC)	
20	Indoor unit D evaporator outlet temperature (T2BD)	
21	Indoor unit E evaporator outlet temperature (T2BE)	

22	Indoor unit A room temperature (T1A)	If the temperature is lower than 0°C, the digital display shows "0." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
23	Indoor unit B room temperature (T1B)	
24	Indoor unit C room temperature (T1C)	
25	Indoor unit D room temperature (T1D)	
26	Indoor unit E room temperature (T1E)	
27	Indoor unit A evaporator temperature (T2A)	If the temperature is lower than -9°C, the digital display shows "-9." If the temperature is higher than 70°C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "--"
28	Indoor unit B evaporator temperature (T2B)	
29	Indoor unit C evaporator temperature (T2C)	
30	Indoor unit D evaporator temperature (T2D)	
31	Indoor unit E evaporator temperature (T2E)	
32	Condenser pipe temperature (T3)	
33	Outdoor ambient temperature (T4)	
34	Compressor discharge temperature (TP)	The display value is between 30–129°C. If the temperature is lower than 30°C, the digital display shows "30." If the temperature is higher than 99°C, the digital display shows single and double digits. For example, if the digital display shows "0.5", the compressor discharge temperature is 105°C.
35	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
36	AD value of AC voltage	
37	AD value of DC voltage	
38	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display shows single and double digits. For example, if the digital display shows "2.0", the EXV open angle is 120×4=480p.
39	EXV open angle for B indoor unit	
40	EXV open angle for C indoor unit	
41	EXV open angle for D indoor unit	
42	EXV open angle for E indoor unit	
43	MVI valve open angle	
44	EVI valve open angle	

45	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by current, IPM or T3.
		Bit6	Frequency limit caused by PFC	
		Bit5	Frequency limit caused by T4.	
		Bit4	Frequency limit caused by T2.	
		Bit3	Frequency limit caused by T3.	
		Bit2	Frequency limit caused by T5.	
		Bit1	Frequency limit caused by current	
		Bit0	Frequency limit caused by voltage	
46	T2B fault	00:No fault,01:T2B-A fault, ,02:T2B-B fault ,03:T2B-C fault,04:T2B-D fault, 05:T2B-E fault, 06:T2B-F fault(The display priority is A-B-C-D-E-F)		
47	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units in good connection)(The heating is the average value of T2, and the cooling is the average value of T2B)		
48	Outdoor unit fan motor state	Off: 0, Super ultra high speed:1, Super high speed:2, High speed:3, Med speed: 4, Low speed: 5, Breeze:6, Super breeze: 7		
49	Reason of stop			

6. Error Diagnosis and Troubleshooting Without Error Code

WARNING

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

6.1 Remote maintenance

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

No.	Problem	Solution
1	Unit will not start	Page 20~21
2	The power switch is on but fans will not start	Page 20~21
3	The temperature on the display board cannot be set	Page 20~21
4	Unit is on but the wind is not cold(hot)	Page 20~21
5	Unit runs, but shortly stops	Page 20~21
6	The unit starts up and stops frequently	Page 20~21
7	Unit runs continuously but insufficient cooling(heating)	Page 20~21
8	Cool can not change to heat	Page 20~21
9	Unit is noisy	Page 20~21

6.2 Field maintenance

	Problem	Solution
1	Unit will not start	Page 22~23
2	Compressor will not start but fans run	Page 22~23
3	Compressor and condenser (outdoor) fan will not start	Page 22~23
4	Evaporator (indoor) fan will not start	Page 22~23
5	Condenser (Outdoor) fan will not start	Page 22~23
6	Unit runs, but shortly stops	Page 22~23
7	Compressor short-cycles due to overload	Page 22~23
8	High discharge pressure	Page 22~23
9	Low discharge pressure	Page 22~23
10	High suction pressure	Page 22~23
11	Low suction pressure	Page 22~23
12	Unit runs continuously but insufficient cooling	Page 22~23
13	Too cool	Page 22~23
14	Compressor is noisy	Page 22~23
15	Horizontal louver can not revolve	Page 22~23

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	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		

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

7. 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 the error code. You can find the parts to replace by error code in the following table.

Part requiring replacement	Error Code										
	EH 00	EL 01	EH 03	EH 60	EH 61	(O)EC 50	EH 02	PC 02	EC 53	EC 52	EC 54
Indoor PCB	✓	✓	✓	✓	✓	x	✓	x	x	x	x
Outdoor PCB	x	✓	x	x	x	✓	x	✓	✓	✓	✓
Indoor fan motor	x	x	✓	x	x	x	x	x	x	x	x
T1 sensor	x	x	x	✓	x	x	x	x	x	x	x
T2 Sensor	x	x	x	x	✓	x	x	x	x	x	x
T3 Sensor	x	x	x	x	x	✓	x	x	x	✓	x
T4 Sensor	x	x	x	x	x	✓	x	x	✓	x	x
TP Sensor	x	x	x	x	x	✓	x	x	x	x	✓
Reactor	x	✓	x	x	x	x	x	x	x	x	x
IPM module board	x	✓	x	x	x	x	x	x	x	x	x
Over load protector	x	x	x	x	x	x	x	✓	x	x	x

Part requiring replacement	Error Code						
	EC 51	EC 56	EC 07/ (O)EC 71	PC 08/(O)PC 44/ PC 46/ PC 49	PC 00/PC 04	PC 01/(O)PC 10/PC 11/PC 12	(O)PC 0F
Outdoor PCB	✓	✓	✓	✓	✓	✓	✓
Outdoor fan motor	x	x	✓	✓	✓	x	x
T3 Sensor	x	x	x	x	x	x	x
T4 Sensor	x	x	x	x	x	x	x
TP Sensor	x	x	x	x	x	x	x
T2B Sensor	x	✓	x	x	x	x	x
Reactor or inductance	x	x	x	✓	✓	✓	✓
Compressor	x	x	x	x	✓	x	x
IPM module board	x	x	x	✓	✓	✓	x
Bridge rectifier	x	x	x	✓	✓	✓	x
PFC module	x	x	x	x	x	x	✓
Additional refrigerant	x	x	x	x	x	x	x
Electric control box	x	x	x	x	x	x	x
High pressure switch	x	x	x	x	x	x	x
Low pressure switch	x	x	x	x	x	x	x

Part requiring replacement	Error Code							
	PC 40	EC 72	PC 43	PC 45	(O)PC 06	(O)PC 08	(O)PC 30	PC 03/ (O)PC 31
Outdoor PCB	✓	✓	✓	x	✓	✓	✓	✓
Outdoor fan motor	x	✓	x	x	x	✓	✓	✓
T3 Sensor	x	x	x	x	x	✓	x	x
T4 Sensor	x	x	x	x	x	x	x	x
TP Sensor	x	x	x	x	✓	x	x	x
T2B Sensor	x	x	x	x	x	x	x	x
Reactor or inductance	x	x	x	x	x	x	x	x
Compressor	x	x	✓	x	x	x	x	x
IPM module board	x	x	x	✓	x	x	x	x
Bridge rectifier	x	x	x	x	x	x	x	x
PFC module	x	x	x	x	x	x	x	x
Additional refrigerant	x	x	x	x	✓	✓	x	✓
Electric control box	✓	x	x	x	x	x	x	x
High pressure switch	x	x	x	x	x	x	✓	x
Low pressure switch	x	x	x	x	x	x	x	✓

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.

8. Troubleshooting by Error Code

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

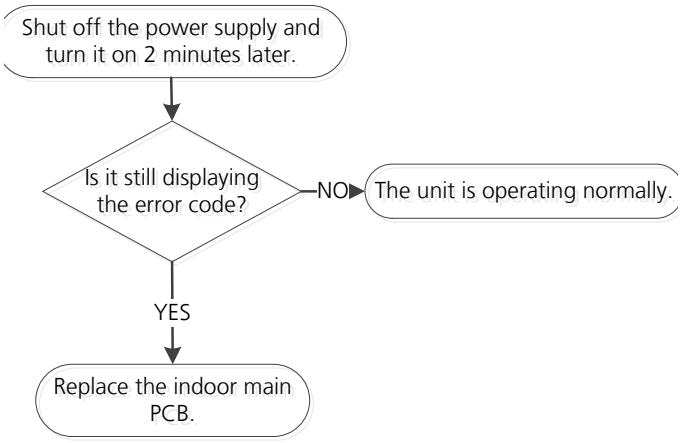
Description: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare:

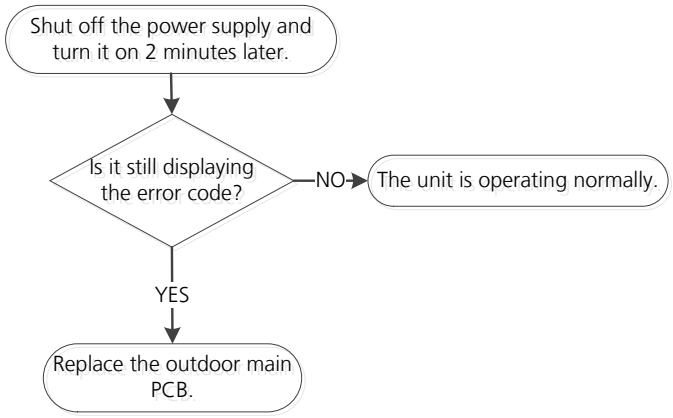
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:

EH 00

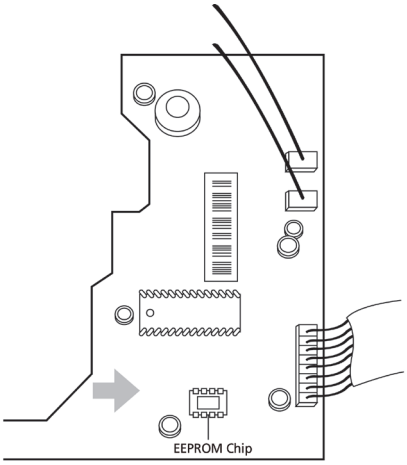


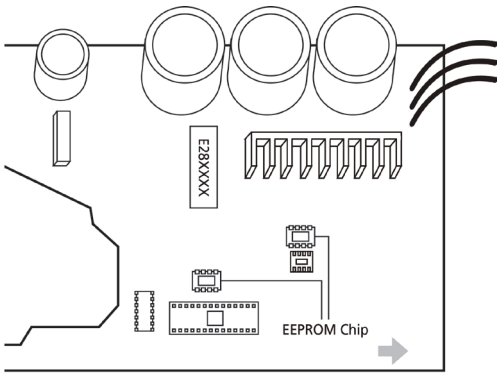
EC 51



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.

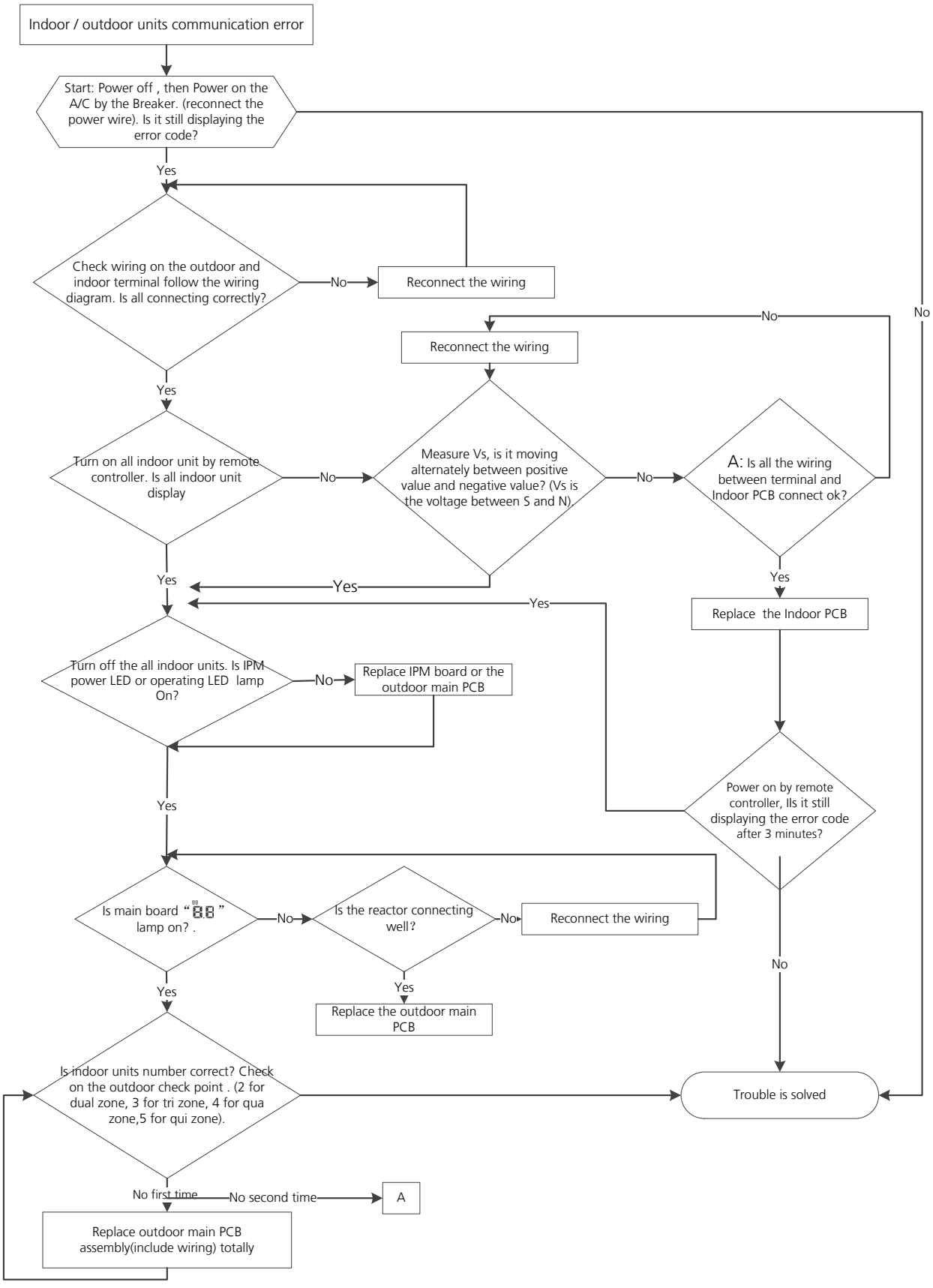
8.2 EL 01(Indoor and outdoor unit communication error diagnosis and solution)

Description: Indoor unit does not receive the feedback from outdoor unit during 110 seconds and this condition happens 4 times continuously.

Recommended parts to prepare:

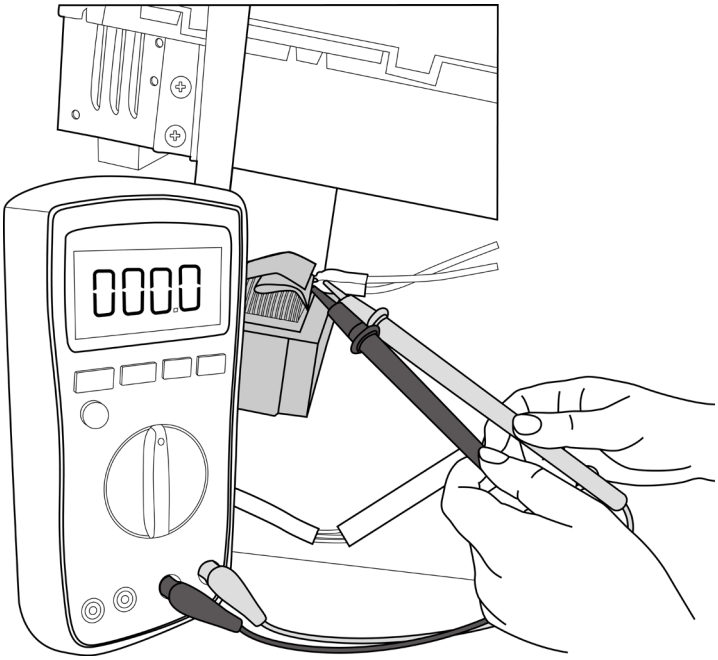
- Indoor PCB
- Outdoor PCB
- IPM module board
- Reactor

Troubleshooting and repair:


Indoor / outdoor units communication error
Start: Power off , then Power on the A/C by the Breaker. (reconnect the power wire). Is it still displaying the error code?
Yes
No
Check wiring on the outdoor and indoor terminal follow the wiring diagram. Is all connecting correctly?
No
Reconnect the wiring
Yes
Reconnect the wiring
No
Turn on all indoor unit by remote controller. Is all indoor unit display
No
Measure Vs, is it moving alternately between positive value and negative value? (Vs is the voltage between S and N)
No
A: Is all the wiring between terminal and Indoor PCB connect ok?
Yes
Yes
Yes
Yes
Replace the Indoor PCB
Turn off the all indoor units. Is IPM power LED or operating LED lamp On?
No
Replace IPM board or the outdoor main PCB
Yes
Power on by remote controller, Ils it still displaying the error code after 3 minutes?
Is main board "88" lamp on? .
No
Is the reactor connecting well?
No
Reconnect the wiring
Yes
Replace the outdoor main PCB
No
Yes
Is indoor units number correct? Check on the outdoor check point . (2 for dual zone, 3 for tri zone, 4 for qua zone,5 for qui zone).
Trouble is solved
No first time
No second time
A
Replace outdoor main PCB assembly(include wiring) totally

Remarks:

- 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.

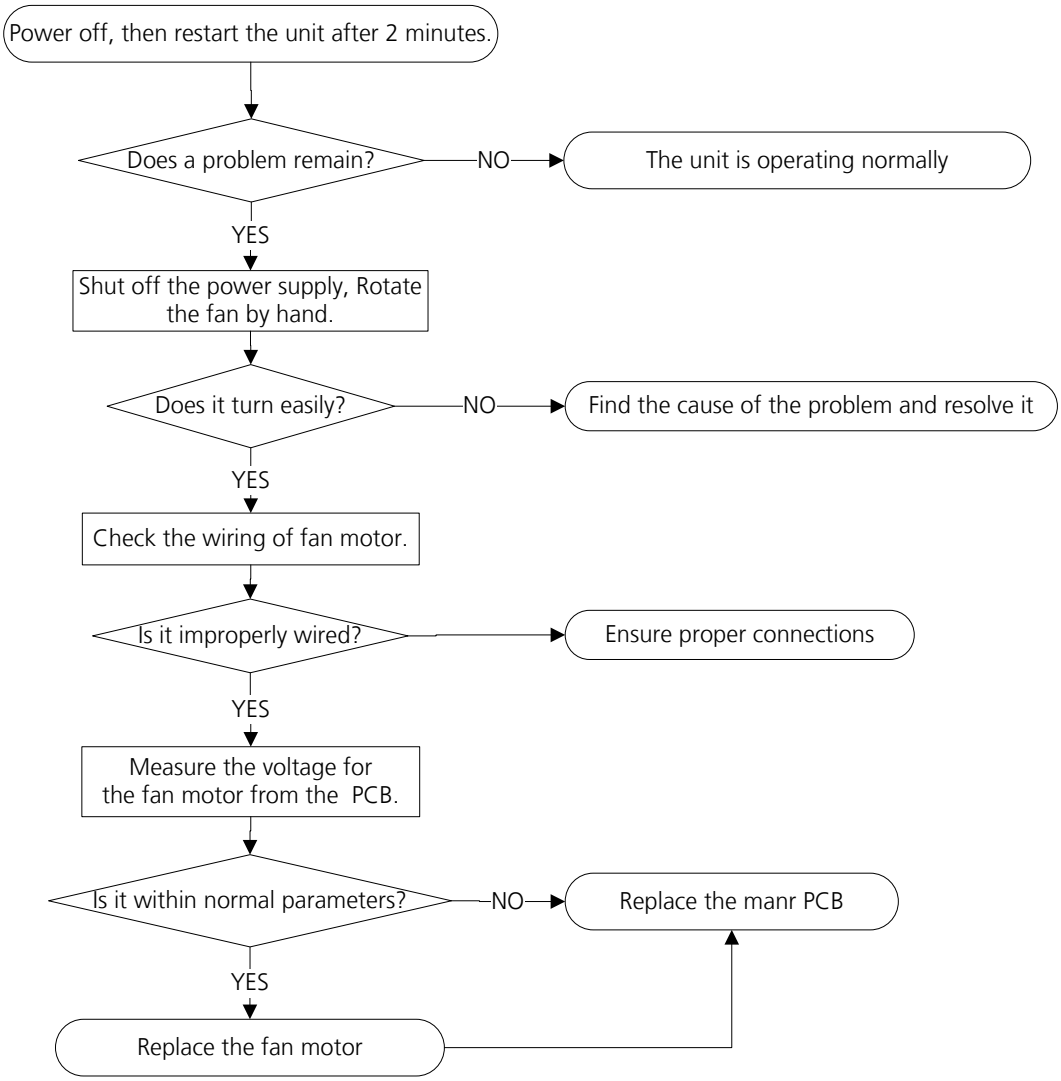
8.3 EH 03 / EC 07 (Fan Speed Is Operating Outside of Normal Range)/EC 71(Over Current Failure of Outdoor DC Fan Motor) Diagnosis and Solution

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.

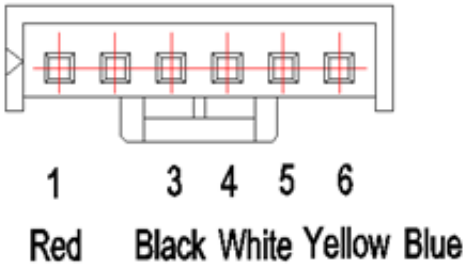
Index:

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.

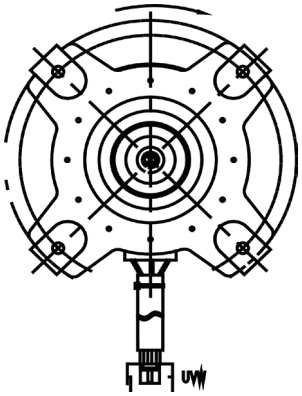
- DC motor voltage input and output (voltage: 220-240V~):

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



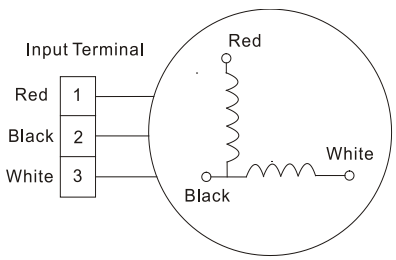
2. Outdoor DC Fan Motor (control chip is in outdoor PCB)

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.



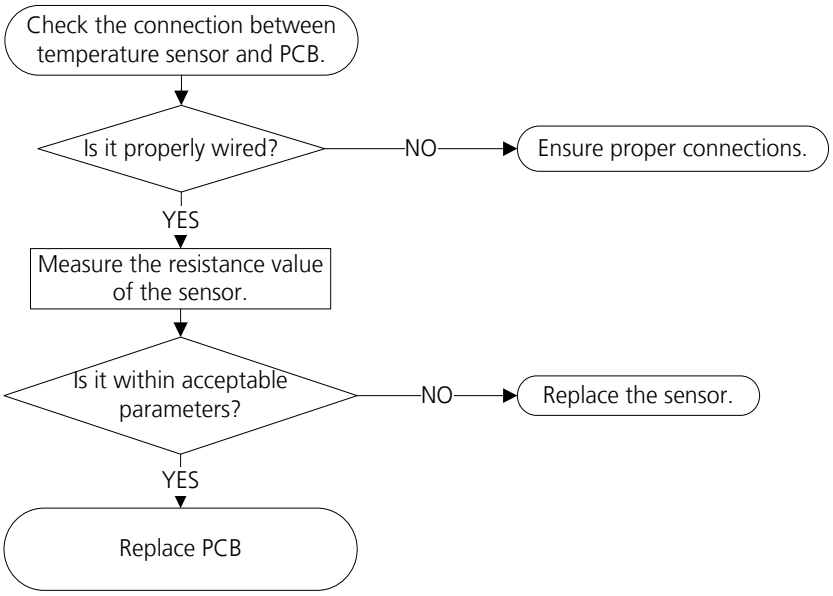
8.4 EH 60/EH 61/EC 53/EC 52/EC 54/EC 56 /(ODU)EC 50 (Open circuit or short circuit of temperature sensor diagnosis and solution)

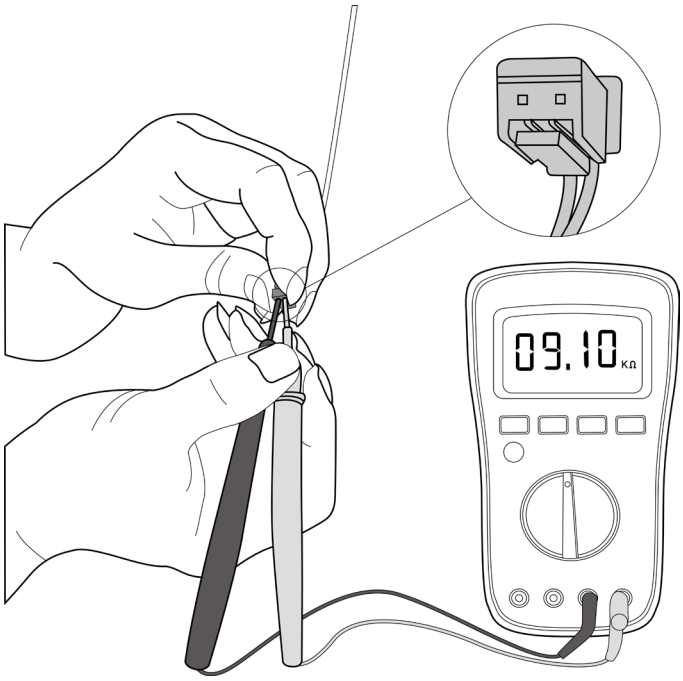
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure code.

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

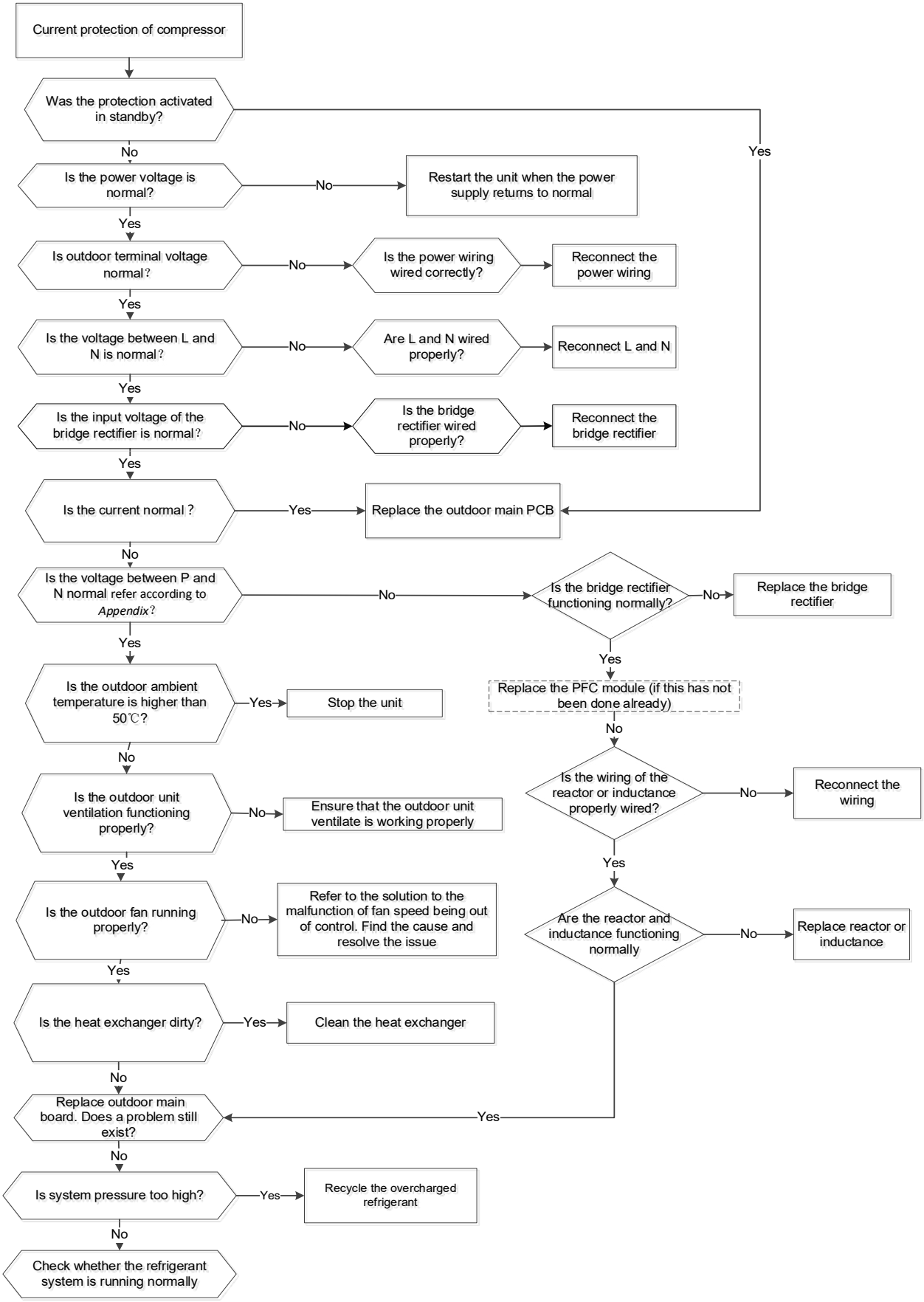
8.5 PC 08(Current overload protection)/PC 44(Outdoor unit zero speed protection) /PC 46(Compressor speed has been out of control)/PC 49(Compressor overcurrent failure)

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

Recommended parts to prepare:

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

Troubleshooting and repair:


Current protection of compressor
Was the protection activated in standby?
Yes
No
Is the power voltage is normal?
No
Restart the unit when the power supply returns to normal
Yes
Is outdoor terminal voltage normal?
No
Is the power wiring wired correctly?
Reconnect the power wiring
Yes
Is the voltage between L and N is normal?
No
Are L and N wired properly?
Reconnect L and N
Yes
Is the input voltage of the bridge rectifier is normal?
No
Is the bridge rectifier wired properly?
Reconnect the bridge rectifier
Yes
Is the current normal ?
Yes
Replace the outdoor main PCB
No
Is the voltage between P and N normal refer according to Appendix?
No
Is the bridge rectifier functioning normally?
No
Replace the bridge rectifier
Yes
Replace the PFC module (if this has not been done already)
Yes
Is the outdoor ambient temperature is higher than 50℃?
Yes
Stop the unit
No
Is the outdoor unit ventilation functioning properly?
No
Ensure that the outdoor unit ventilate is working properly
Yes
Is the outdoor fan running properly?
No
Refer to the solution to the malfunction of fan speed being out of control. Find the cause and resolve the issue
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger
No
Replace outdoor main board. Does a problem still exist?
No
Is system pressure too high?
Yes
Recycle the overcharged refrigerant
No
Check whether the refrigerant system is running normally
No
Is the wiring of the reactor or inductance properly wired?
No
Reconnect the wiring
Yes
Are the reactor and inductance functioning normally
No
Replace reactor or inductance
Yes

8.6 PC 00(IPM malfunction diagnosis and solution)&(IDU)PC 04(Inverter compressor drive error diagnosis and solution)

Description: PC 00/(ODU)P6: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.

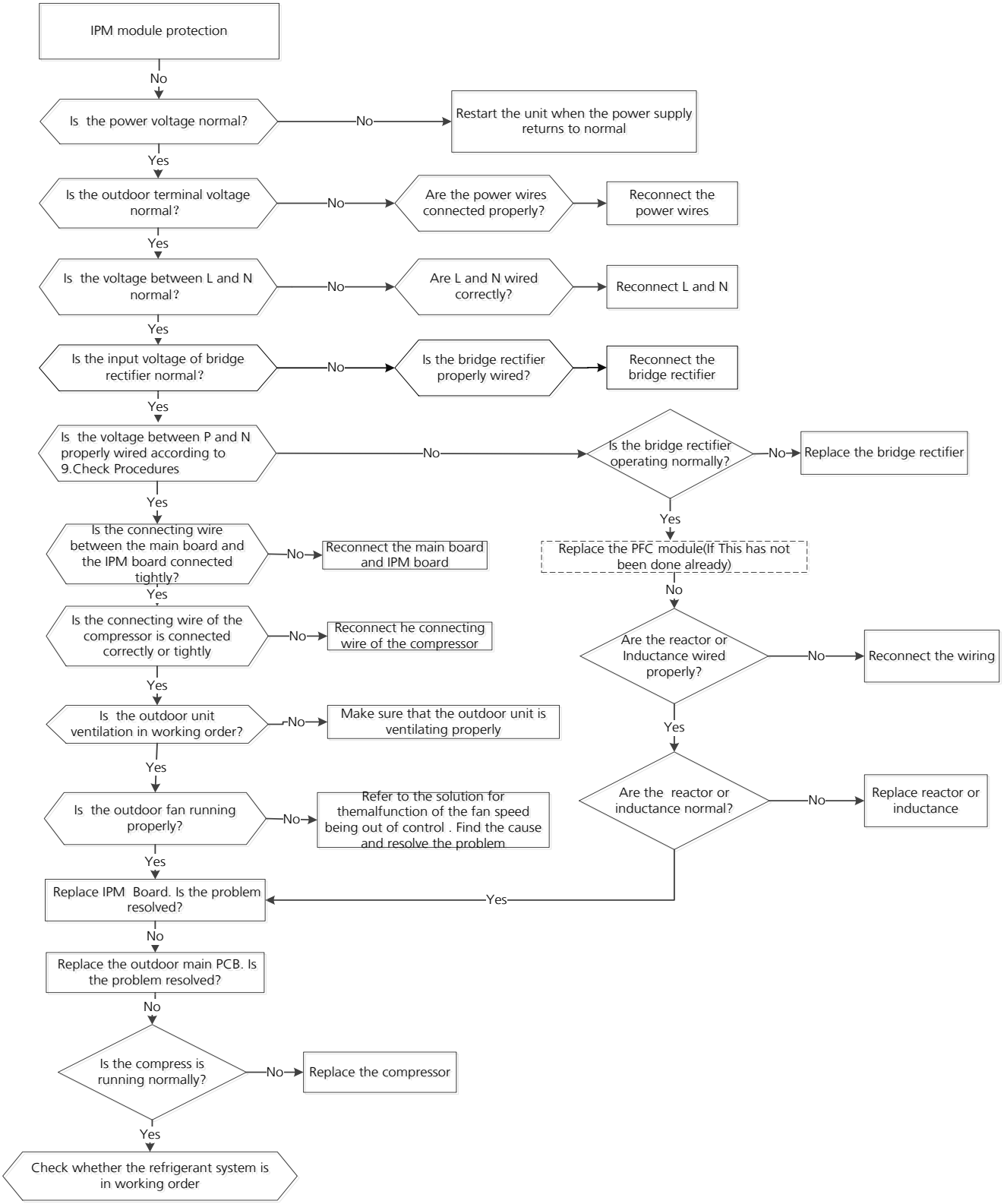
(IDU)PC 04:The driven chip cannot detect the right rotor position of compressor

Recommended parts to prepare:

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

Troubleshooting and repair:

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



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.

8.7 PC 01/E5(Over voltage or too low voltage protection)/PC 10(Outdoor unit low AC voltage protection)/PC 11(Outdoor unit main control board DC bus high voltage protection)/PC 12(Outdoor unit main control board DC bus high voltage protection /341 MCE error) 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
- Outdoor PCB
- Bridge rectifier
- PFC circuit or 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.

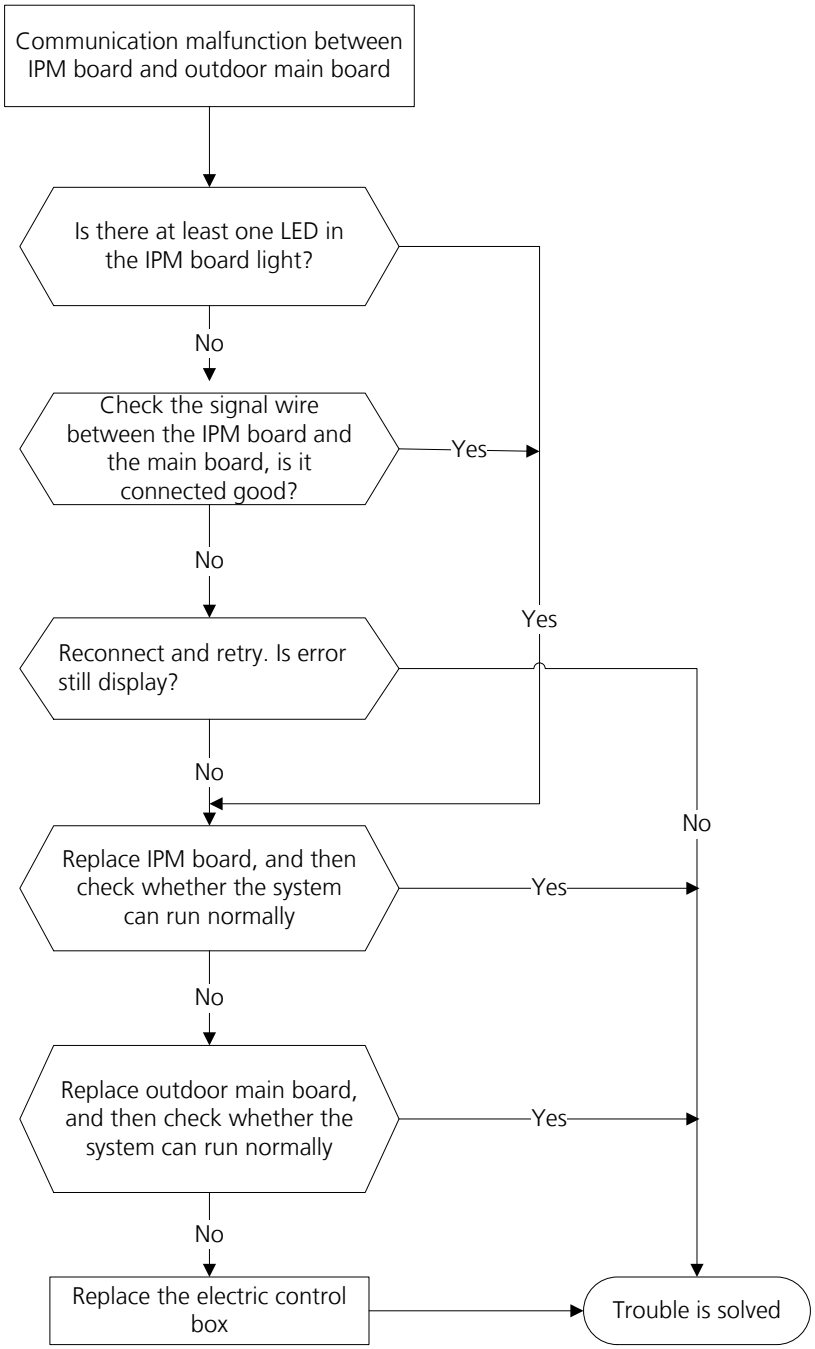
8.8 PC 40(Communication malfunction between IPM board and outdoor main board diagnosis and solution)

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

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

Troubleshooting and repair:



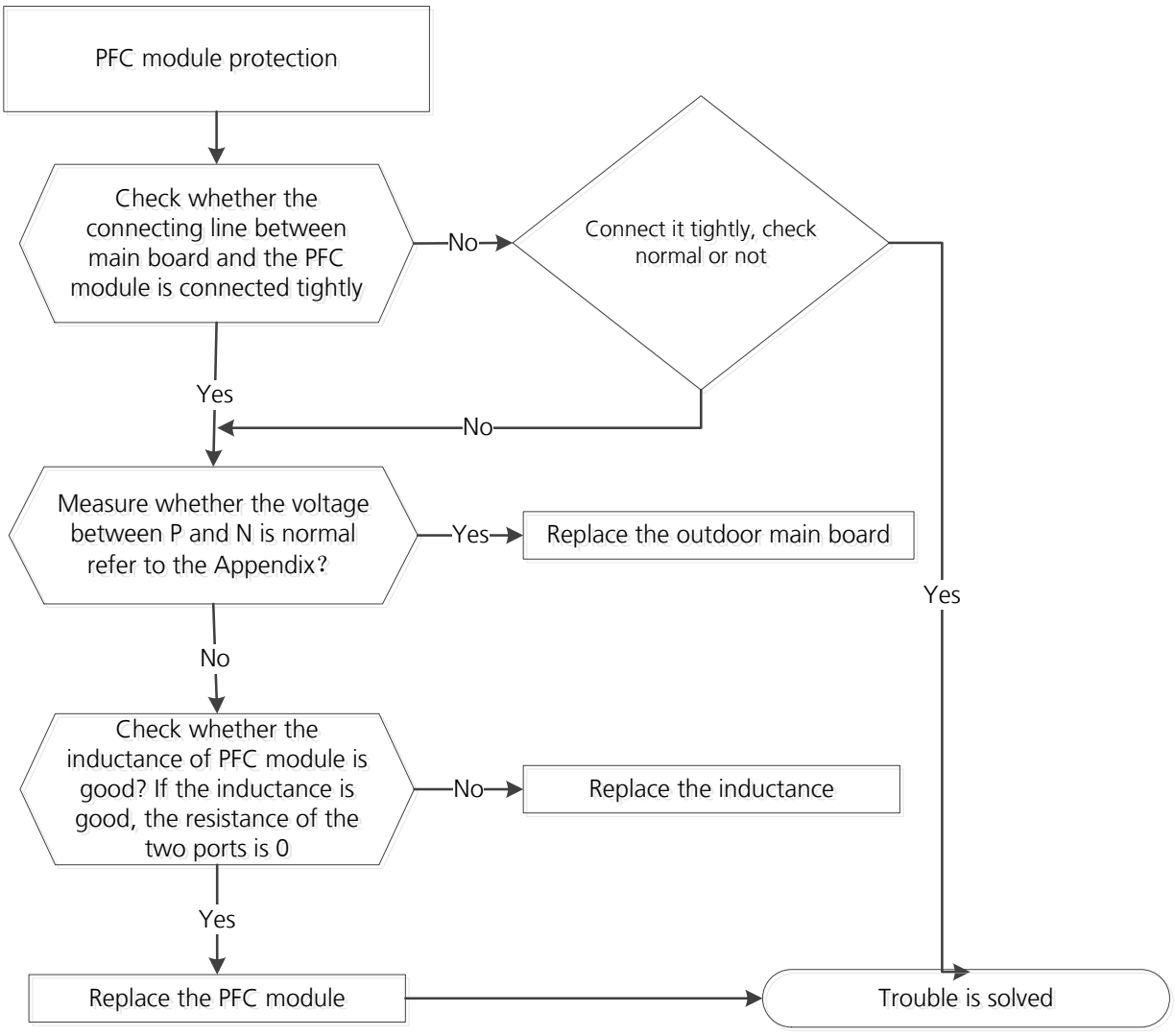
8.9 (ODU)PC 0F(PFC module protection diagnosis and solution)

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

Recommended parts to prepare:

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

Troubleshooting and repair:



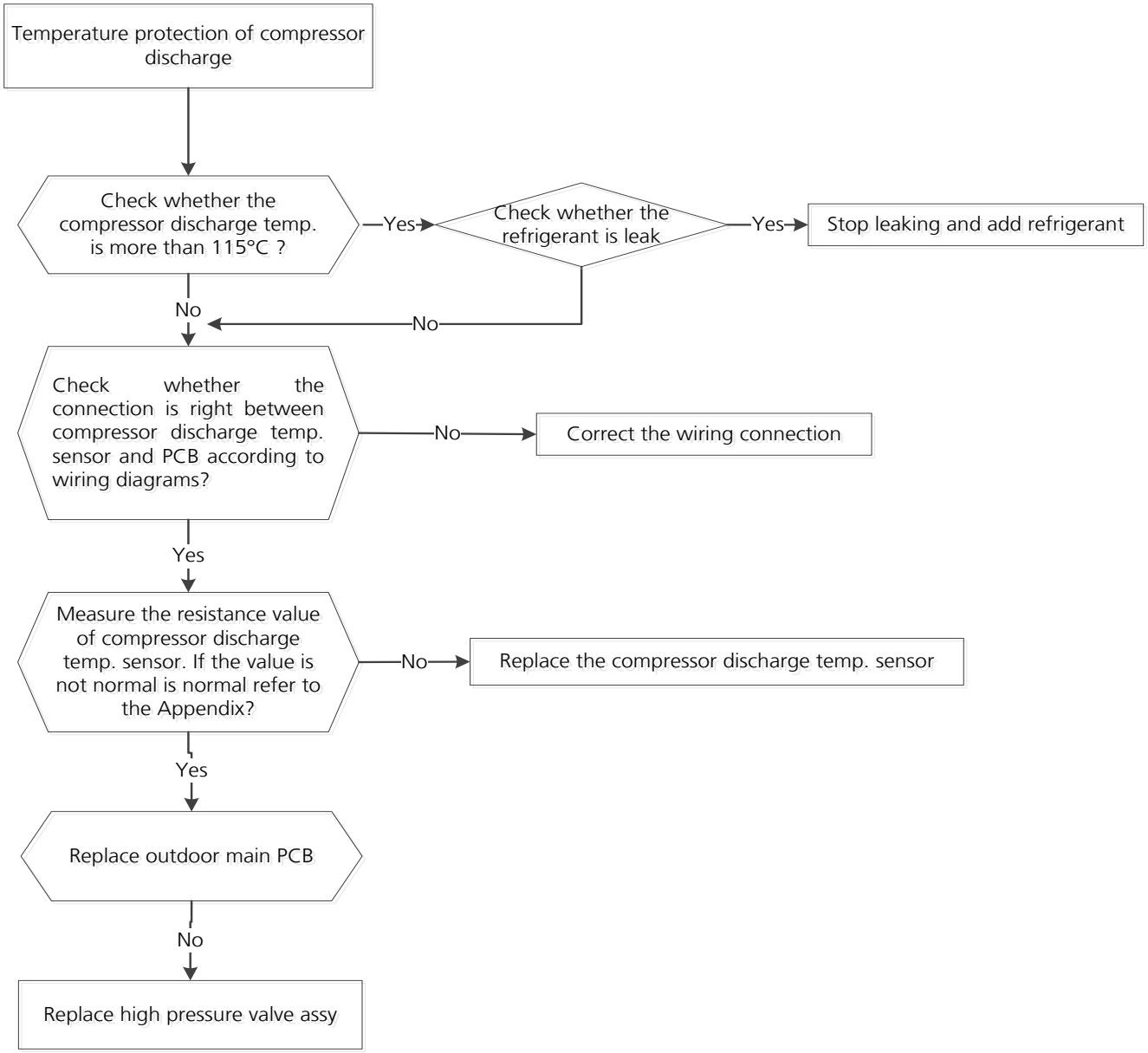
8.10 (ODU)PC 06(Temperature protection of compressor discharge diagnosis and solution)

Description: When the compressor discharge temperature (T5) is more than 115°C for 10 seconds, the compressor ceases operation and does not restart until T5 is less than 90°C

Recommended parts to prepare:

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

Troubleshooting and repair:



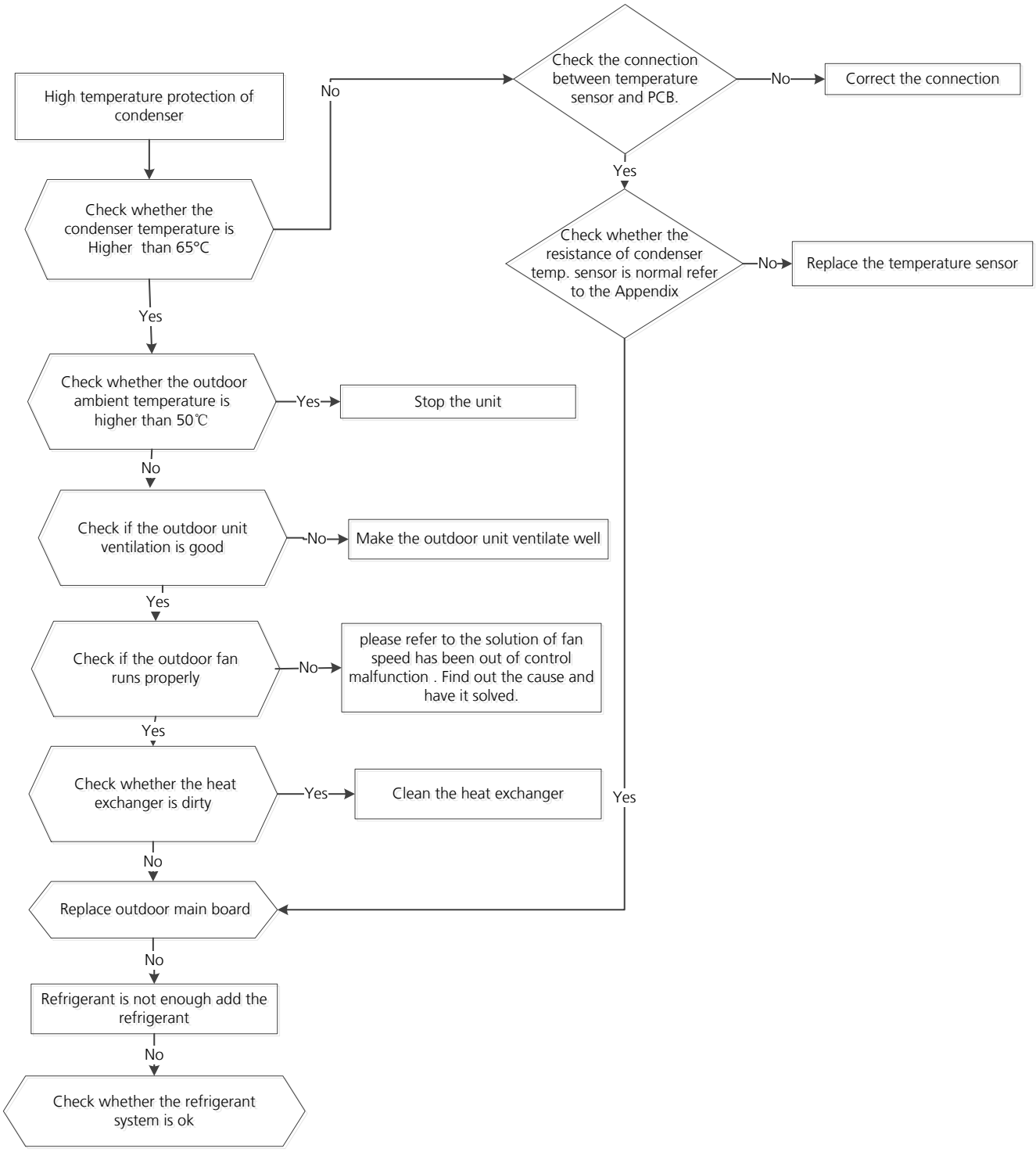
8.11 (ODU)PC 0A(High temperature protection of condenser diagnosis and solution)

Description: The unit will stop when condenser temperature is higher than 65°C, and runs again when it is less than 52°C

Recommended parts to prepare:

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

Troubleshooting and repair:


High temperature protection of condenser
Check whether the condenser temperature is Higher than 65°C
No
Check the connection between temperature sensor and PCB.
No
Correct the connection
Yes
Check whether the resistance of condenser temp. sensor is normal refer to the Appendix
No
Replace the temperature sensor
Yes
Check whether the outdoor ambient temperature is higher than 50℃
Yes
Stop the unit
No
Check if the outdoor unit ventilation is good
No
Make the outdoor unit ventilate well
Yes
Check if the outdoor fan runs properly
No
please refer to the solution of fan speed has been out of control malfunction . Find out the cause and have it solved.
Yes
Check whether the heat exchanger is dirty
Yes
Clean the heat exchanger
Yes
No
Replace outdoor main board
No
Refrigerant is not enough add the refrigerant
No
Check whether the refrigerant system is ok

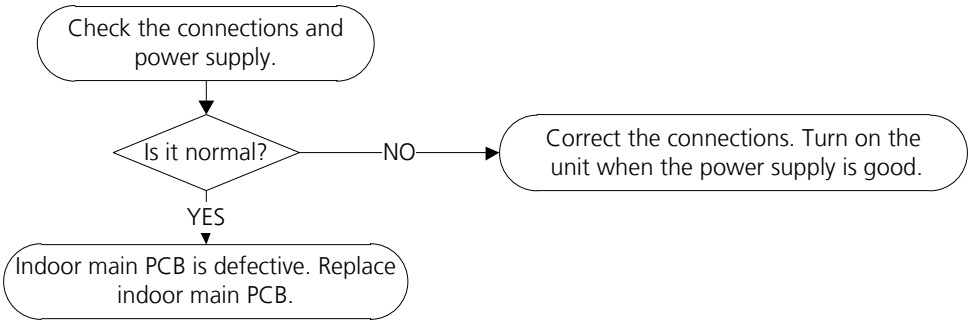
8.12 EH 02 (Zero crossing detection error diagnosis and solution)

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
- Indoor main PCB

Troubleshooting and repair:



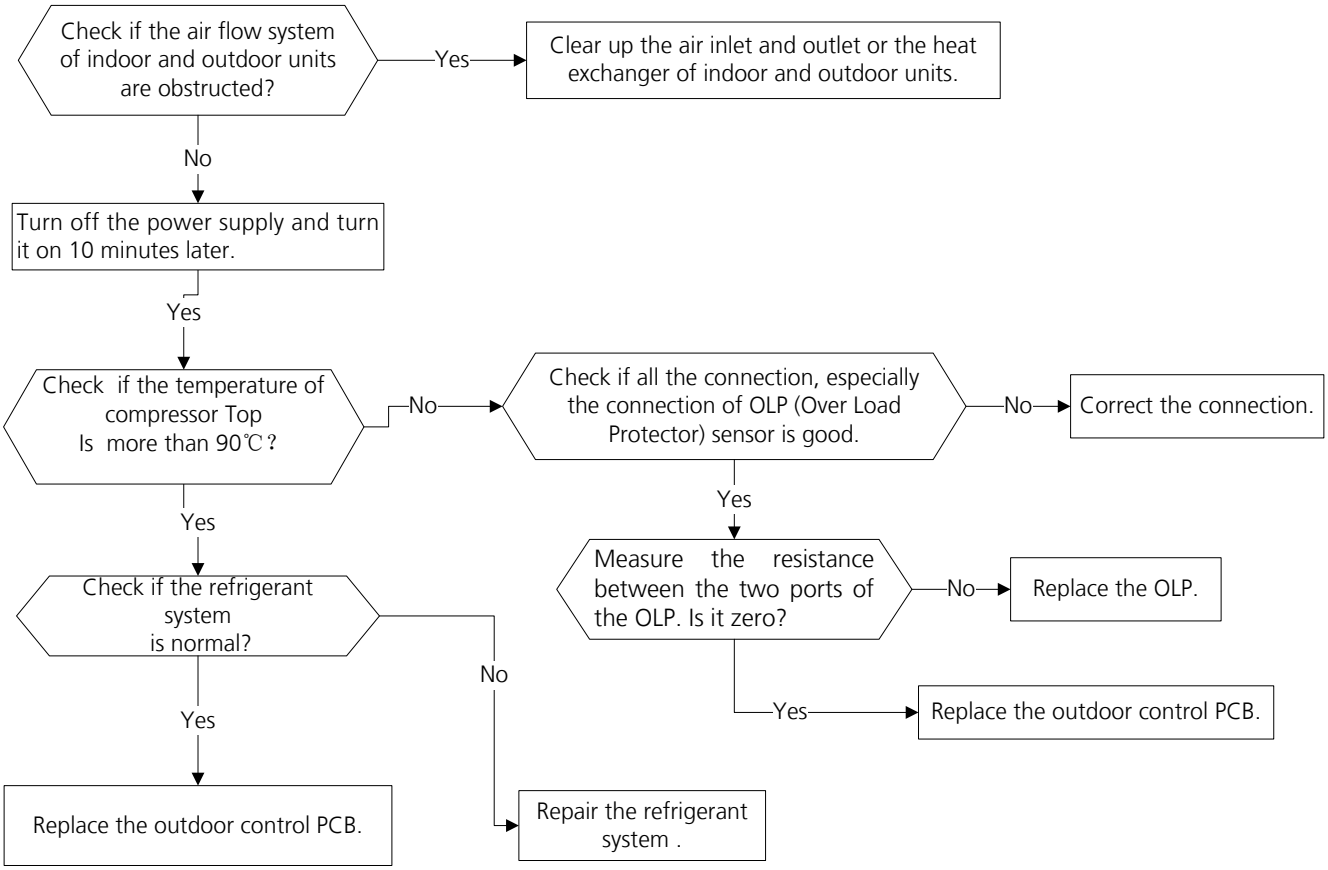
8.13 PC 02 (Top temperature protection of compressor diagnosis and solution)

Description: If the sampling voltage is not 5V, the LED will display the failure.

Recommended parts to prepare:

- Connection wires
- Overload protector
- Outdoor PCB

Troubleshooting and repair:



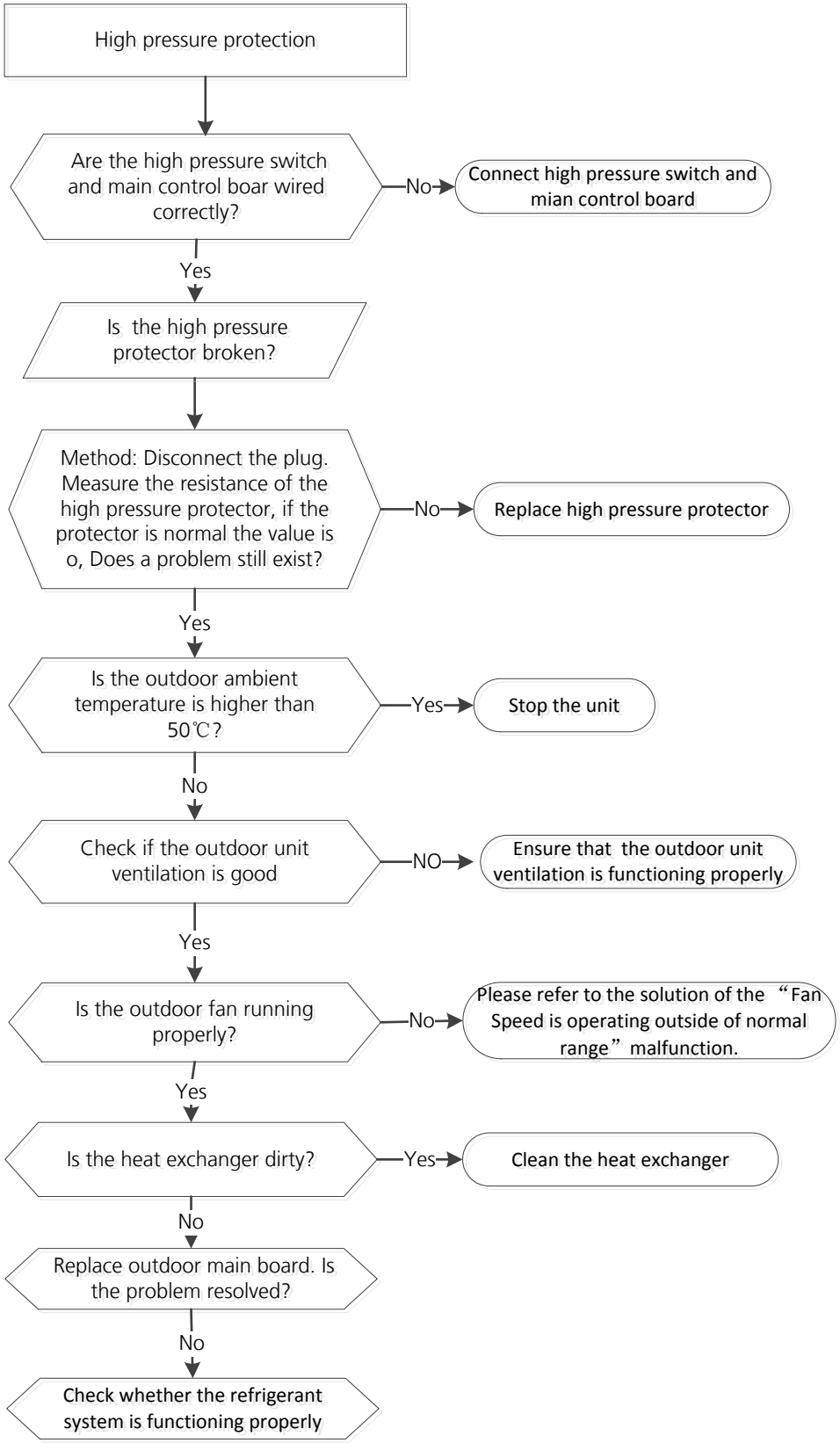
8.14 (IDU)PC 03/(ODU)PC 30 (High pressure protection diagnosis and solution)

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

Recommended parts to prepare:

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

Troubleshooting and repair:


High pressure protection
Are the high pressure switch and main control boar wired correctly?
No
Connect high pressure switch and mian control board
Yes
Is the high pressure protector broken?
Method: Disconnect the plug. Measure the resistance of the high pressure protector, if the protector is normal the value is o, Does a problem still exist?
No
Replace high pressure protector
Yes
Is the outdoor ambient temperature is higher than 50℃?
Yes
Stop the unit
No
Check if the outdoor unit ventilation is good
NO
Ensure that the outdoor unit ventilation is functioning properly
Yes
Is the outdoor fan running properly?
No
Please refer to the solution of the "Fan Speed is operating outside of normal range" malfunction.
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger
No
Replace outdoor main board. Is the problem resolved?
No
Check whether the refrigerant system is functioning properly

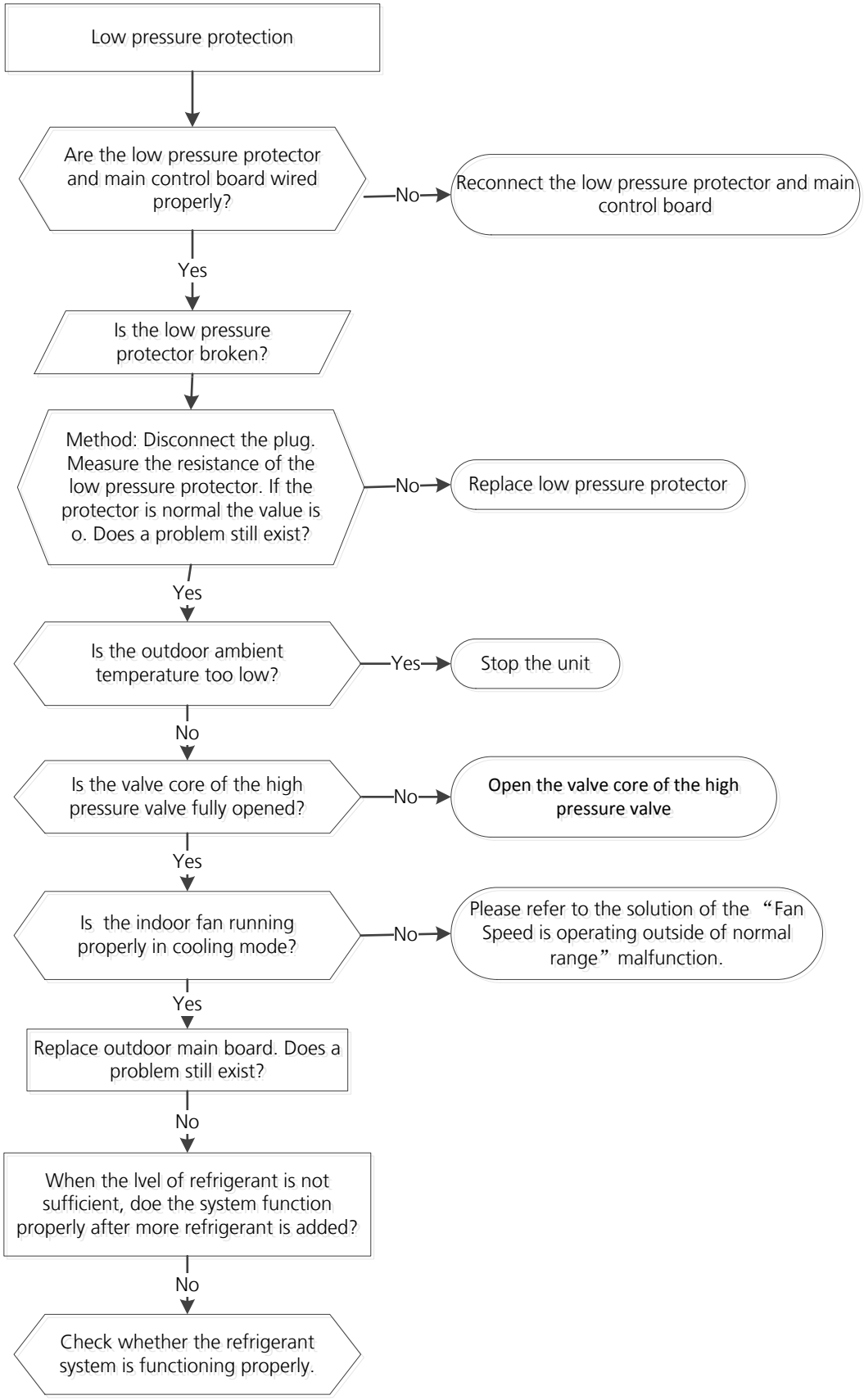
8.15 (IDU)PC 03/(ODU)PC 31 (Low pressure protection diagnosis and solution)

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:



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.

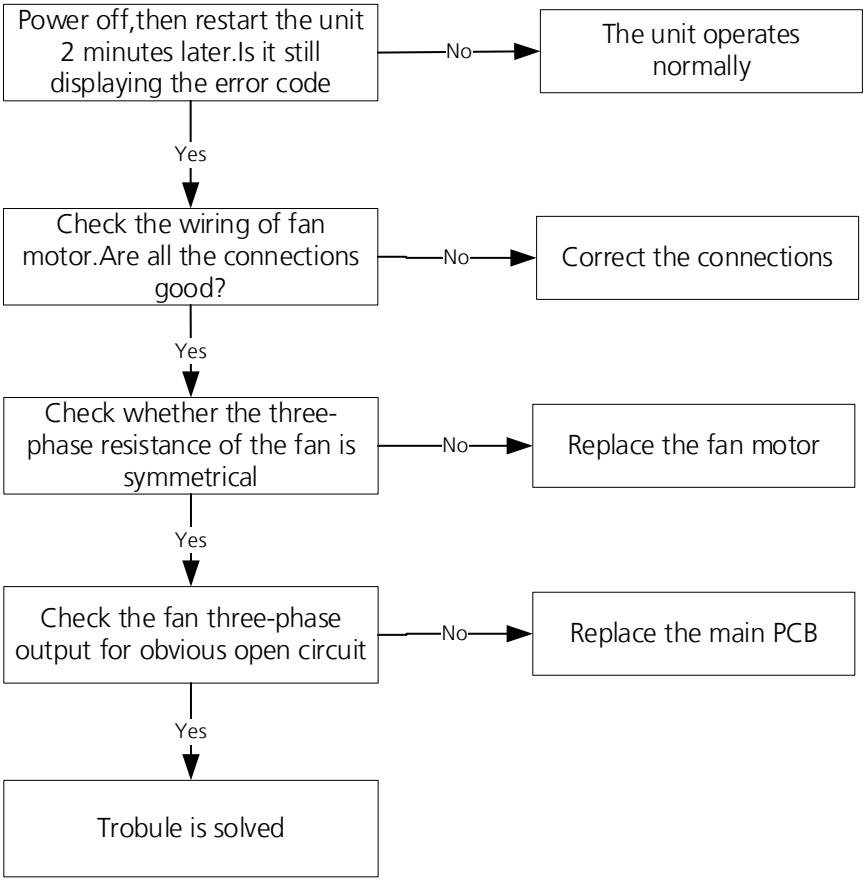
8.16 EC 72 (Lack phase failure of outdoor DC fan motor diagnosis and solution)

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

Recommended parts to prepare:

- Connection wire
- Fan motor
- Outdoor PCB

Troubleshooting and repair:



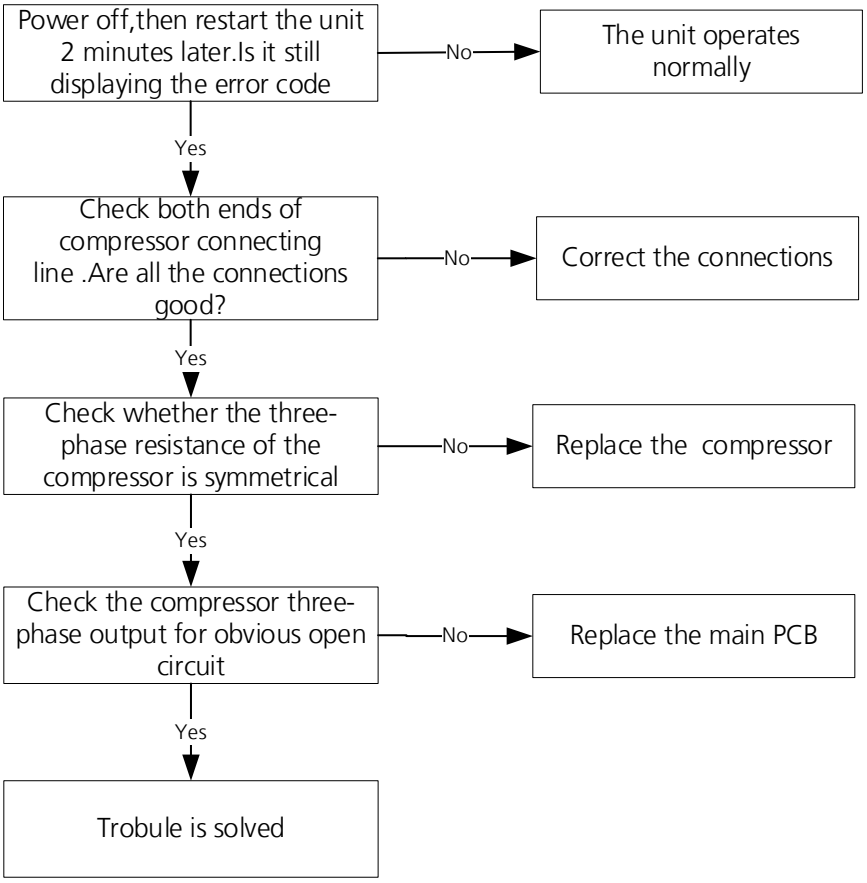
8.17 PC 43 (Outdoor compressor lack phase protection diagnosis and solution)

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

Recommended parts to prepare:

- Connection wire
- Compressor
- Outdoor PCB

Troubleshooting and repair:



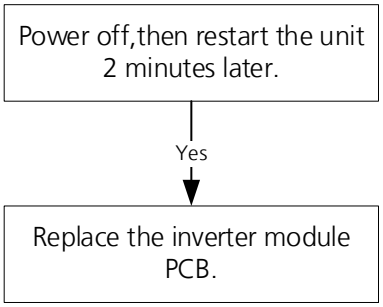
8.18 PC 45 (Outdoor unit IR chip drive failure diagnosis and solution)

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

Recommended parts to prepare:

- Inverter module PCB.

Troubleshooting and repair:



8.19 (ODU)CE (Automatic correction of wiring/piping error)

Press the "check switch" on the outdoor unit PCB board 5 seconds until LED display "CE", which mean this function is working, Approximately 5-10 minutes after the switch is pressed, the "CE" disappear the wiring/piping error will be corrected, and wiring/piping is properly connected.

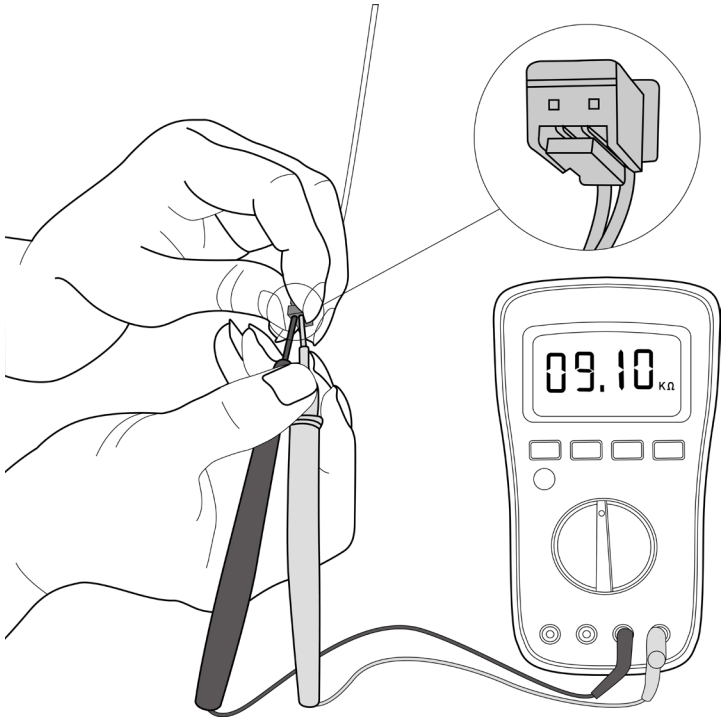
8. Check Procedures

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.

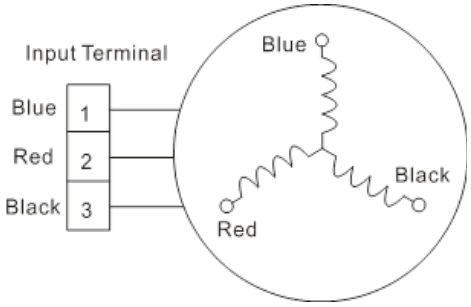
1. Disconnect the temperature sensor from PCB (Refer to Chapter 5&6. Indoor&Outdoor Unit Disassembly).
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table (Refer to Chapter 8. Appendix).



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

1.1 Compressor Check

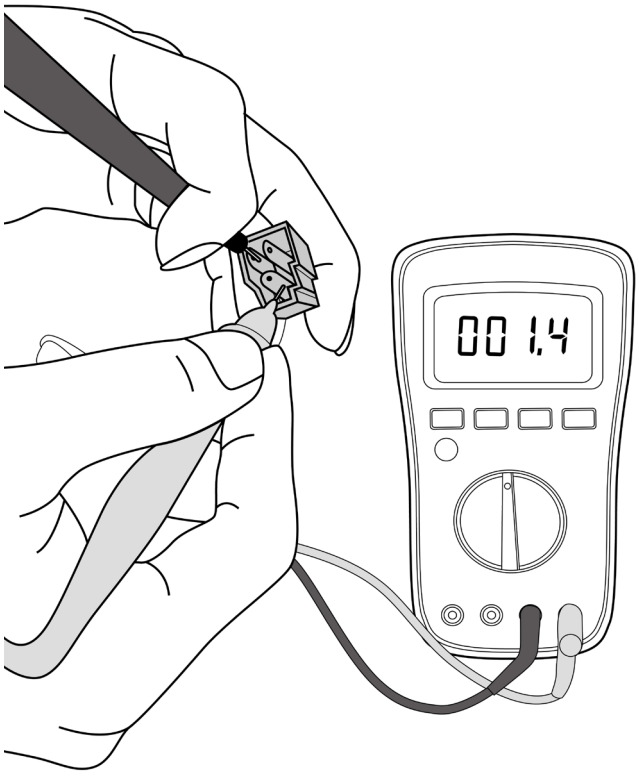
1. Disconnect the compressor power cord from outdoor PCB (Refer to Chapter 6. Outdoor Unit Disassembly)).
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



Resistance Value	KSN133D42UFZ	ATN150D30UFZA	ATF235D22UMT	GKT176MBH	KTM240D57UMT
Blue-Red	1.82Ω	1.03Ω	0.75 Ω	1.75 Ω	0.62 Ω
Blue-Black					
Red-Black					

Resistance Value	ATM150D23UFZ	ATF235D22UMT	ATF310D43UMT	ATQ360D1UMU	EAPQ420D1UMUA	KTM180D68UMT
Blue-Red	1.72Ω	0.75Ω	0.65 Ω	0.37 Ω	0.37 Ω	1.91 Ω
Blue-Black						
Red-Black						

Resistance Value	ASM135D23UFZ	KTF310D43UMT	KSN140D21UFZ	KSN140D58UFZ	KTN150D30UFZA	KTM240D57UMT
Blue-Red	1.75Ω	0.65Ω	1.28 Ω	1.86 Ω	1.28 Ω	0.62Ω
Blue-Black						
Red-Black						



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

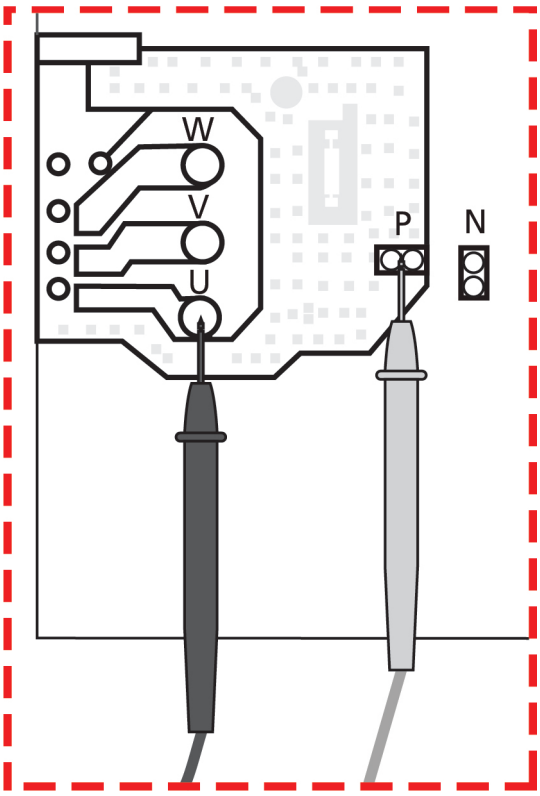
1.2 IPM Continuity Check

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		(+)Red	(-)Black	
P	N	∞ (Several MΩ)	U	N	∞ (Several MΩ)
	U		V		
	V		W		
	W		-		



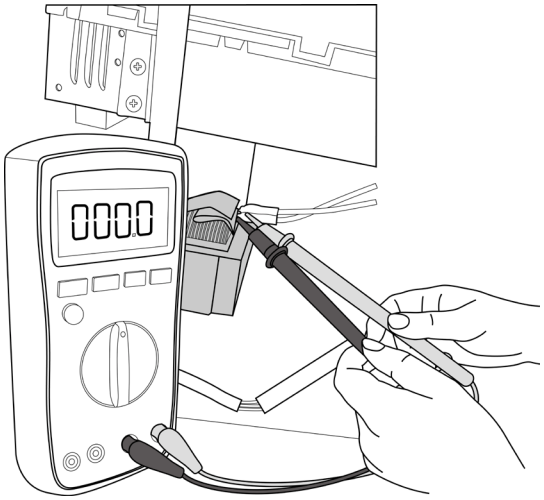
Note: The picture and the value are only for reference, actual condition and specific value may vary.

Normal voltage of P and N

208-240V(1-phase,3-phase)			380-415V(3-phase)
In standby			
around 310VDC			around 530VDC
In operation			
With passive PFC module	With partial active PFC module	With fully active PFC module	/
>200VDC	>310VDC	>370VDC	>450VDC

1.3 Reactor Check

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



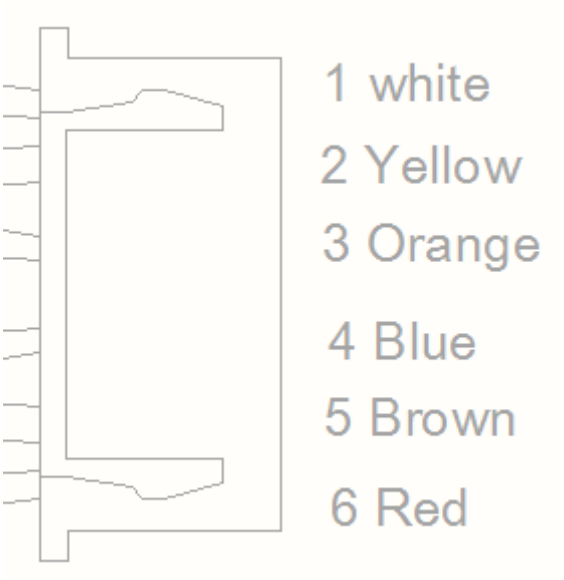
1.4 4-way valve Check

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

If the value of the voltage is not in the range, the PCB must have problems and need to be replaced.

2 Turn off the power, use a digital tester to measure the resistance. The value should be 1.8~2.5 KΩ.

1.5 EXV Check



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

Resistance to EXV coil

Color of lead wire	Normal Value
Red- Blue	About 50Ω
Red - Yellow	
Brown-Orange	
Brown-White	

Appendix

Contents

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

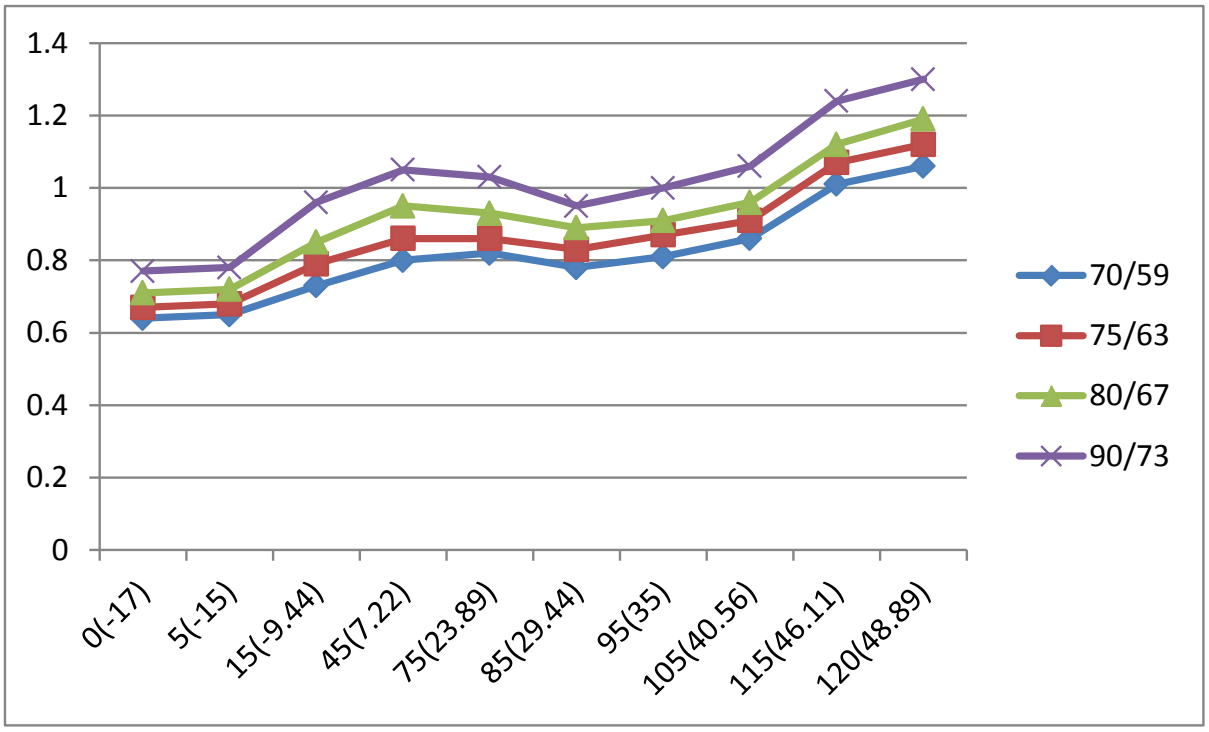
ii) Temperature Sensor Resistance Value Table for TP(for some units) (°C --K)

°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

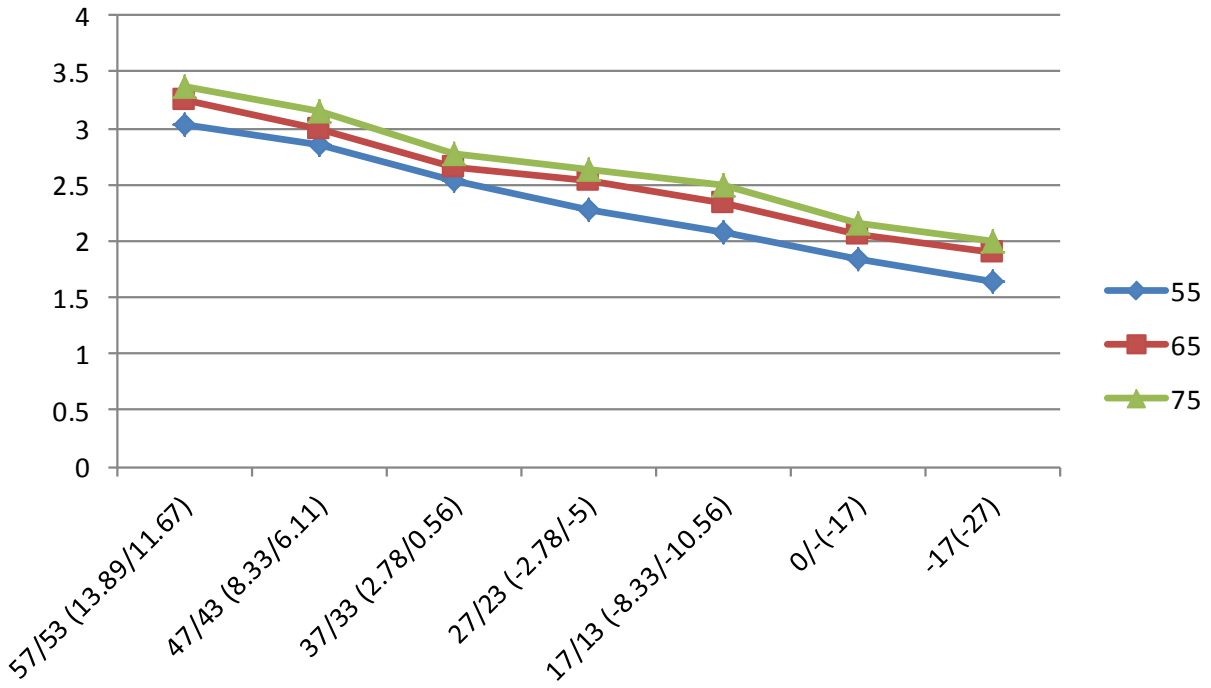
Cooling chart(R410A):

°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



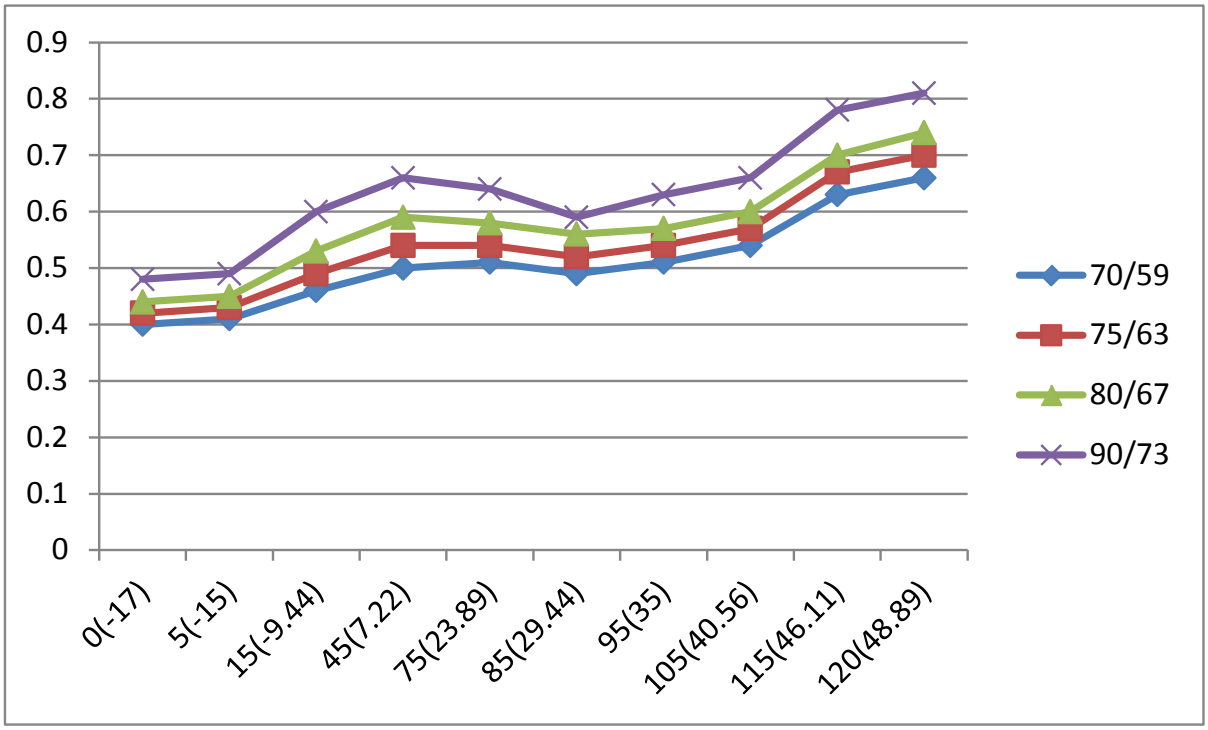
Heating chart(R410A):

°F(°C)	QDU(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



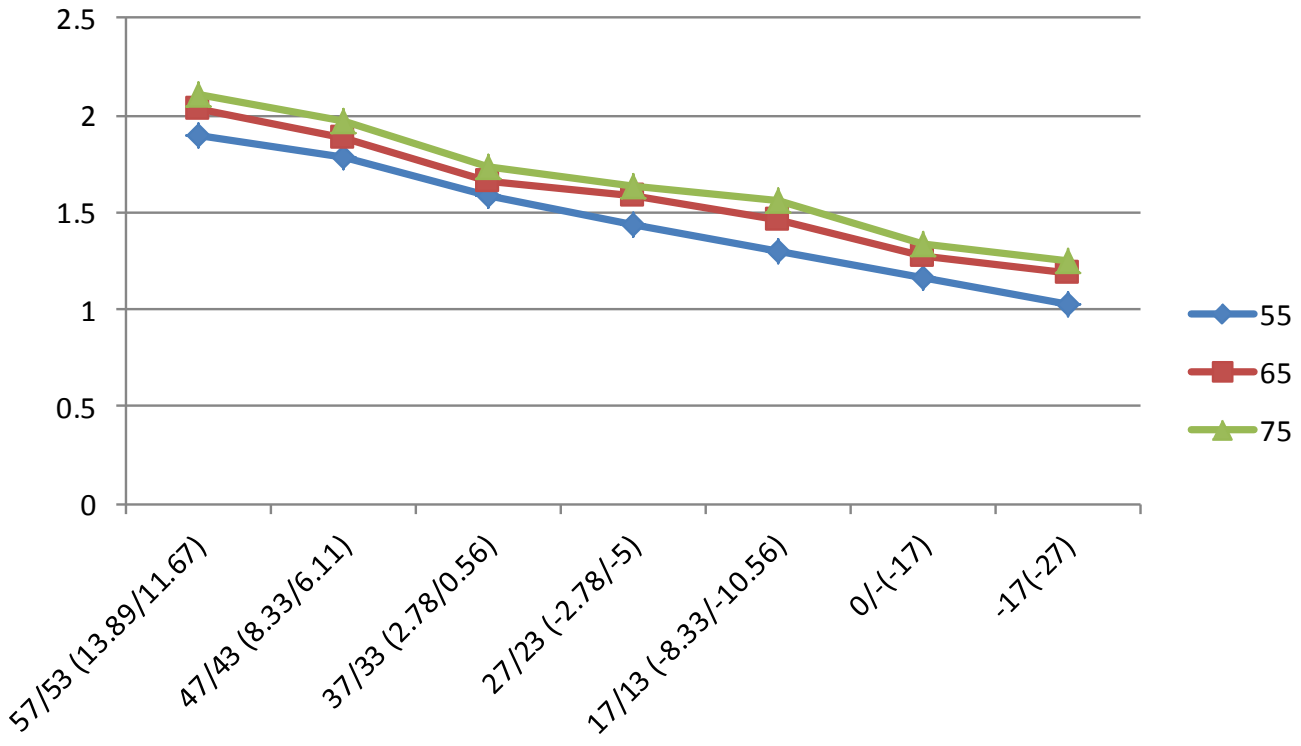
Cooling chart(R22):

°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



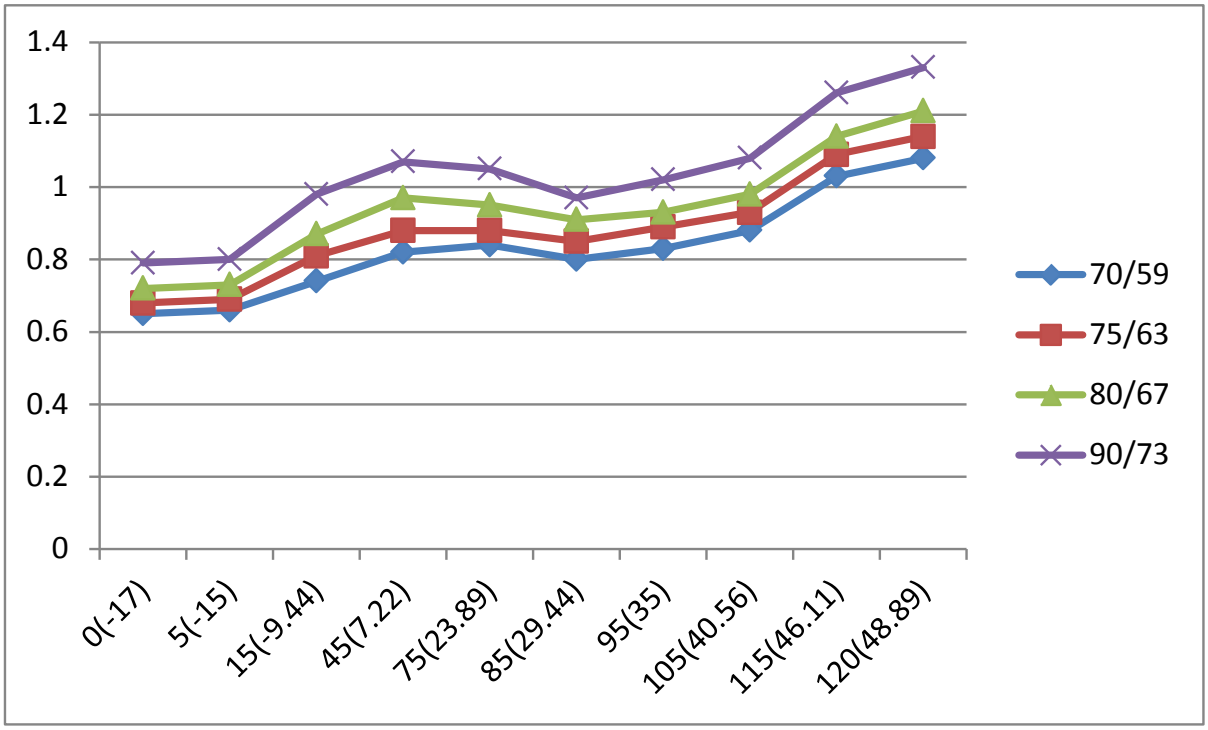
Heating chart(R22):

°F(°C)	QDU(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



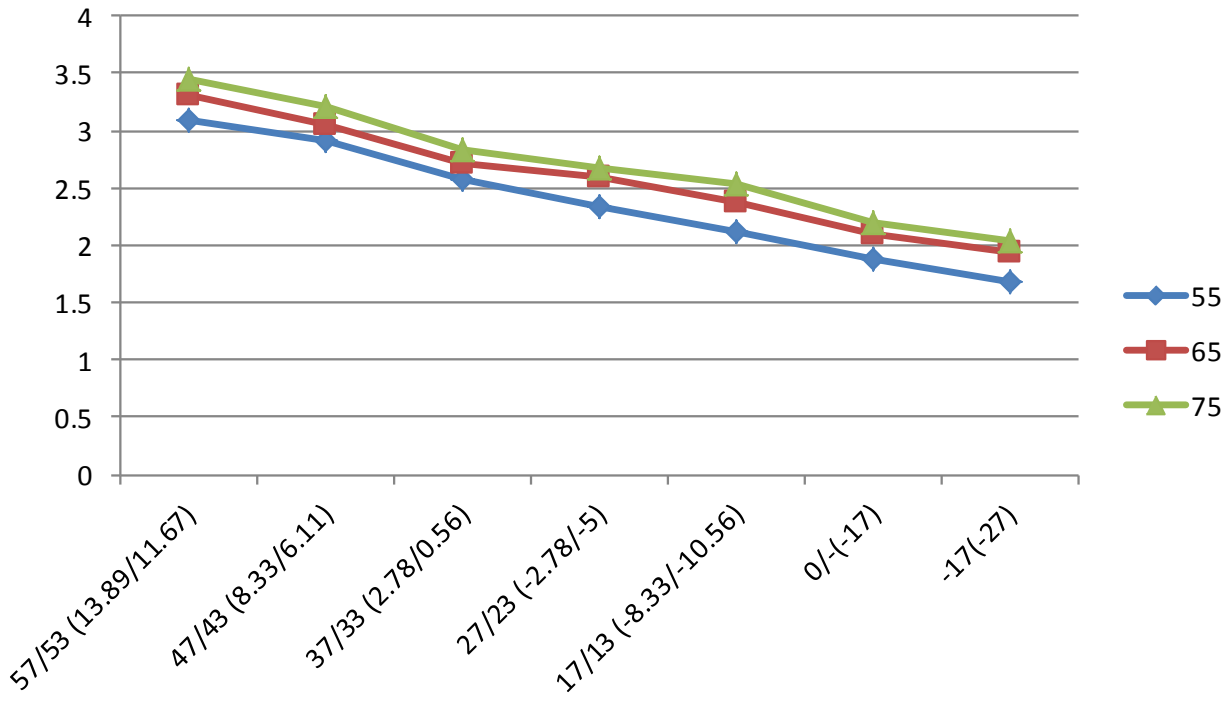
Cooling chart(R32):

°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)	QDU(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					