619FB/538FR
High−Wall Ductless Split System
Sizes 009 to 018

Service Manual

TABLE OF CONTENTS

	PAGE
SAFETY CONSIDERATIONS	1
INTRODUCTION	1
MODEL / SERIAL NUMBER NOMENCLATURE	2
STANDARD FEATURES AND ACCESSORIES	3
SPECIFICATIONS	4
DIMENSIONS	5
CLEARANCES	7
ELECTRICAL DATA	7
WIRING	8
CONNECTION DIAGRAM	8
WIRING DIAGRAMS	9
REFRIGERATION SYSTEM DIAGRAM	12
REFRIGERANT LINES	13
CONTROL SYSTEM	14
SYSTEM SAFETIES	14
SEQUENCE OF OPERATION	15
MODES OF OPERATION	15
TROUBLESHOOTING	18

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air−conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start−up, and service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep a quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

Read this manual thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety−alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: DANGER, WARNING, and CAUTION. These words are used with the safety−alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING



EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury, and/or property damage.

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

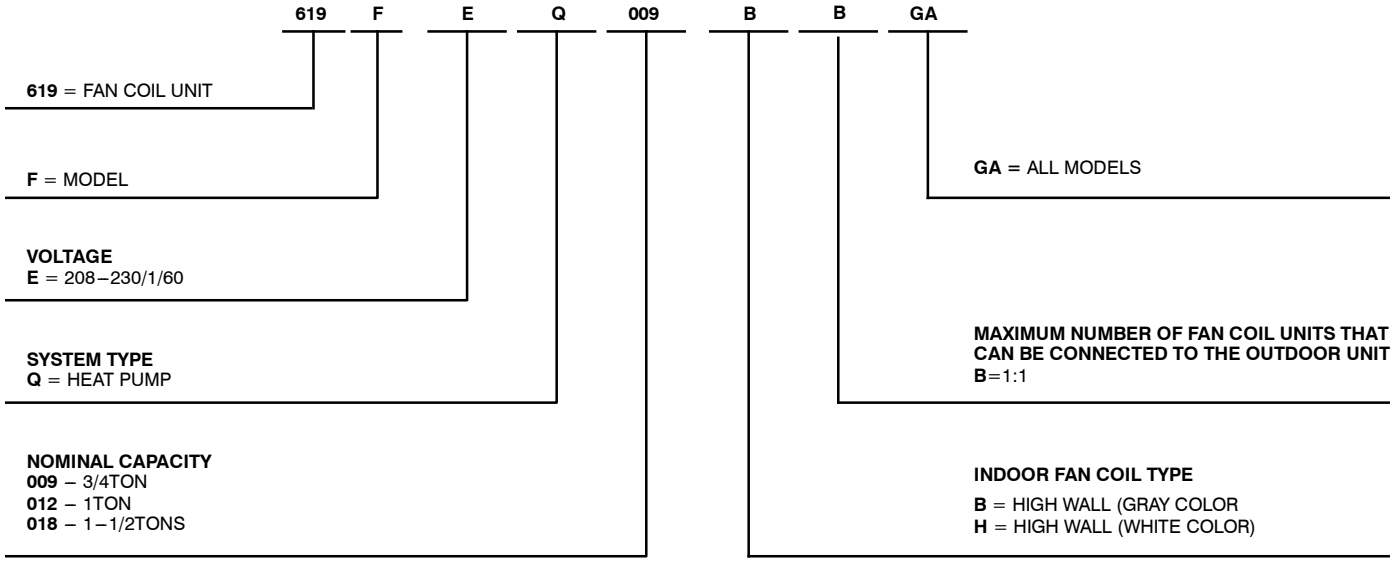
Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start−up.

INTRODUCTION

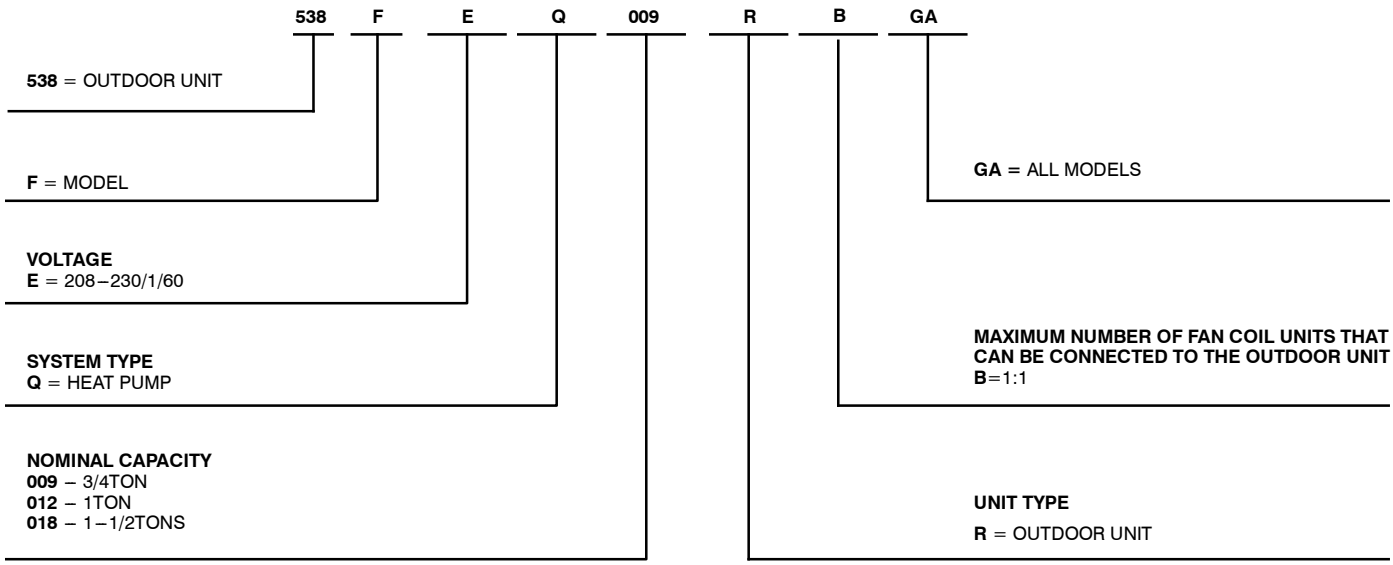
This Service Manual provides the necessary information to service, repair, and maintain the 619FB/538FR family heat pumps. Section 2 of this manual is an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

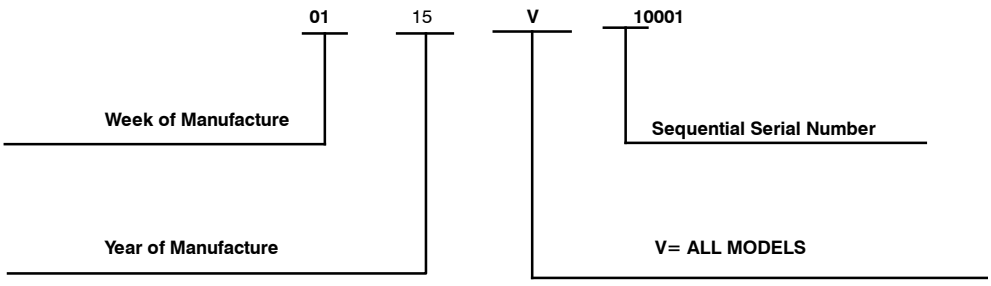
MODEL / SERIAL NUMBER NOMENCLATURES

INDOOR UNIT



OUTDOOR UNIT





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INTERTEK ETL LISTED C US

STANDARD FEATURES AND ACCESSORIES

Ease Of Installation	
Mounting Brackets	S
Low Voltage Controls	S
Comfort Features	
Microprocessor Controls	S
Automatic Horizontal Air Sweep	S
Air Direction Control	S
Auto Restart Function	S
Cold Blow Protection On Heat Pumps	S
Freeze Protection Mode On Heat Pumps	S
Turbo Mode	S
Silence Mode	S
Auto Changeover On Heat Pumps	S
46°F Heating Mode (Heating Setback)	S
I FEEL Function	S
Smart Phone Control	S
80% Heating Capacity at –22°F	S
Energy Saving Features	
Sleep Mode	S
Stop/Start Timer	S
Safety And Reliability	
3 Minute Time Delay For Compressor	S
Over Current Protection For Compressor	S
Indoor Coil Freeze Protection	S
Indoor Coil High Temp Protection in Heating Mode	S
Condenser High Temp Protection in Cooling Mode	S
Ease Of Service And Maintenance	
Cleanable Filters	S
Diagnostics	S
Liquid Line Pressure Taps	S
Application Flexibility	
Condensate Pumps	A
Crankcase Heater	S
Base pan Heater	S

Legend
S Standard
A Accessory

INDOOR UNITS

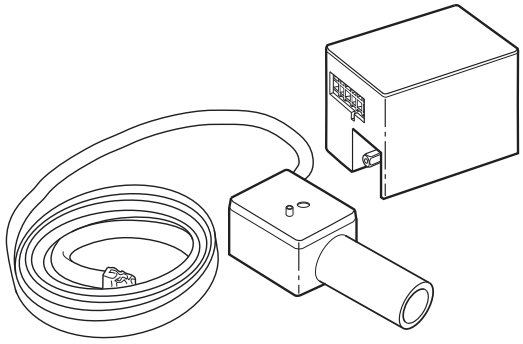


Fig. 1 – Condensate Pump Accessory

On high wall fan coils, the condensate pump has a lift capability of 12 ft (3.6 m) on the discharge side with the pump mounted in the fan coil or 6 ft (1.8 m) on the suction side if the pump is remote mounted. The pump is recommended when adequate drain line pitch cannot be provided, or when the condensate must move up to exit.

OUTDOOR UNITS

Crankcase Heater

Standard on all unit sizes. Heater clamps around compressor oil stump.

SPECIFICATIONS - HEAT PUMP UNITS (FEQ SERIES)

	Size		9	12	18
System	Outdoor Model		538FEQ009RBGA	538FEQ012RBGA	538FEQ018RBGA
	Indoor Model (White)		619FEQ009HBGA	619FEQ012HBGA	619FEQ018HBGA
	Indoor Model (Gray)		619FEQ009BBGA	619FEQ012BBGA	619FEQ018BBGA
Performance	Cooling Rated Capacity	Btu/h	9,000	12,000	18,000
	Cooling Cap. Range Min - Max	Btu/h	1,535~12,966	2,900~15,354	4,435~21,496
	SEER		30.5	23.0	21.0
	EER		15.8	12.8	12.5
	Heating Rated Capacity	Btu/h	9,000	13,000	19,000
	Heating Cap. Range Min - Max	Btu/h	2,388~13,648	3,071~18,766	3,753~24,566
	HSPF		10.3	10.3	10.3
	COP	W/W	4.19	3.12	3.09
	Heating Capacity @ 5F	Btu/h	9,000	12,185	18,521
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard		
	Wired Remote Controller (°F/°C Convertible)		Not available		
Operating Range	Cooling Outdoor DB Min - Max	°F	0-129	0-129	0-129
	Heating Outdoor DB Min - Max	°F	-22-75	-22-75	-22-75
	Cooling Indoor DB Min -Max	°F	64-95	64-95	64-95
	Heating Indoor DB Min -Max	°F	32~86	32~86	32~86
Piping	Total Piping Length	Ft.	82	82	82
	Piping Lift*	Ft.	33	33	33
	Pipe Connection Size - Liquid	In.	1/4"	1/4"	1/4"
	Pipe Connection Size - Suction	In.	1/2"	1/2"	5/8"
Refrigerant	Type		R410A		
	Design Pressure	PSIG	550	550	550
	Metering Device		Electronic Expansion Valve		
	Charge	Lb.	3.1	3.1	4.4
Outdoor Coil	Face Area	Sq. Ft.	4.5	4.5	7.7
	No. Rows		2.5	2.5	2
	Fins per inch		18	18	18
	Circuits		2	2	4
Indoor Coil	Face Area (sq. ft.)	Sq. Ft.	2.3	2.3	2.3
	No. Rows		2	2	2
	Fins per inch		17	17	17
	Circuits		4	4	4
Compressor	Type		Rotary	Rotary	Rotary
	Model		QXAT-B121zE070	QXAT-B096zE070	QXAT-D20zF030
	Oil Type		FV50S	68EP	RB68EP
	Oil Charge	Fl. Oz.	16.2	16.2	29.4
	Rated Current	RLA	8.5	9.5	14.5
	Locked Rotor Amp	LRA	35	40	30
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	208-230/1/60	208-230/1/60	208-230/1/60
	Power Supply		Indoor unit powered from outdoor unit		
	MCA	A.	12	13	19
	MOCP - Fuse Rating	A.	15	20	30
Outdoor	Unit Width	In.	35.4	35.4	38.6
	Unit Height	In.	23.5	23.5	31.1
	Unit Depth	In.	14.9	14.9	16.8
	Net Weight	Lbs.	99.2	97.0	141.1
	Airflow	CFM	1412	1412	2354
	Sound Pressure	dB(A)	53	55	59
Indoor	Unit Width	In.	37.8	37.8	37.8
	Unit Height	In.	12.6	12.6	12.6
	Unit Depth	In.	8.1	8.1	8.1
	Net Weight (lbs.)	Lbs.	30.9	30.9	30.9
	Number of Fan Speeds		7	7	7
	Airflow (lowest to highest)	CFM	206/235/294/324/353/383/412	265/294/353/383/412/441/471	324/353/412/441/471/500/530
	Sound Pressure (lowest to highest)	dB(A)	22/24/26/30/34/38/41	23/25/27/31/35/39/42	26/28/31/35/39/43/48
	Air throw Data	Ft.	29.5	29.5	29.5

DIMENSIONS - INDOOR

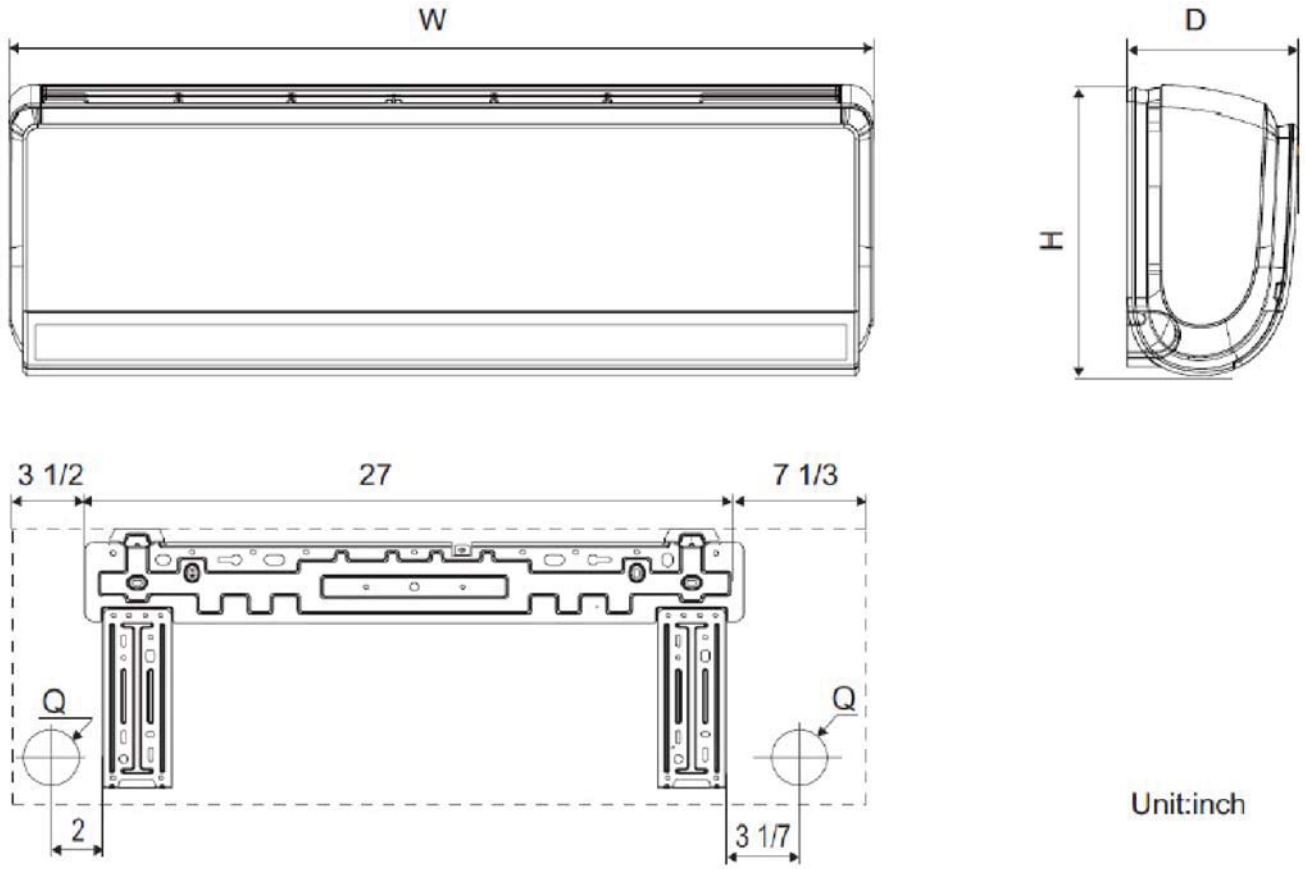


Fig. 2 – Indoor unit

Model	W	H	D	Q
09/12K	37 4/5	12 3/5	8	Φ 2 1/6
18K	37 4/5	12 3/5	8	Φ 2 3/4

DIMENSIONS - OUTDOOR

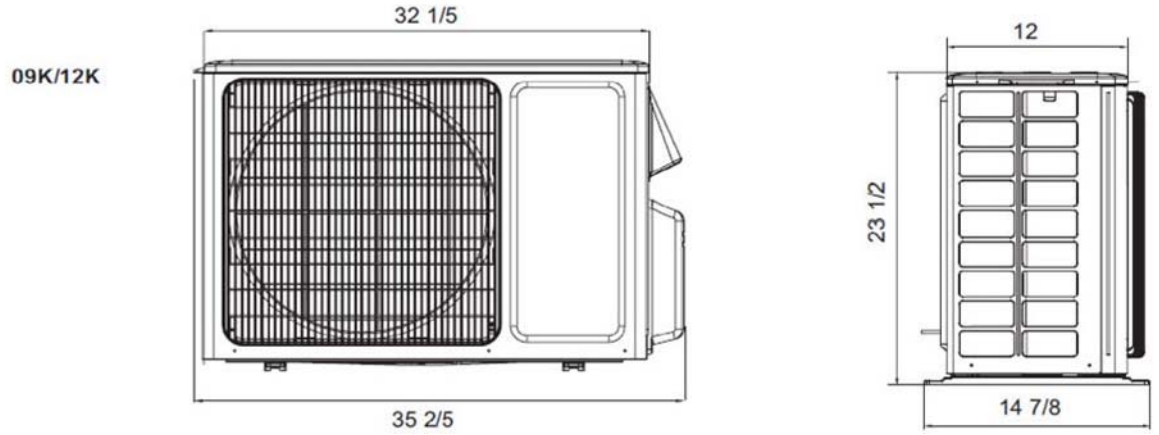


Fig. 3 – Dimensions

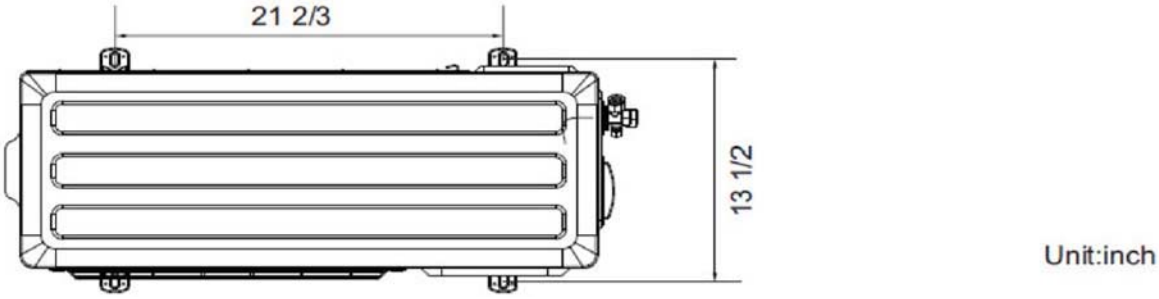


Fig. 4 – Dimensions

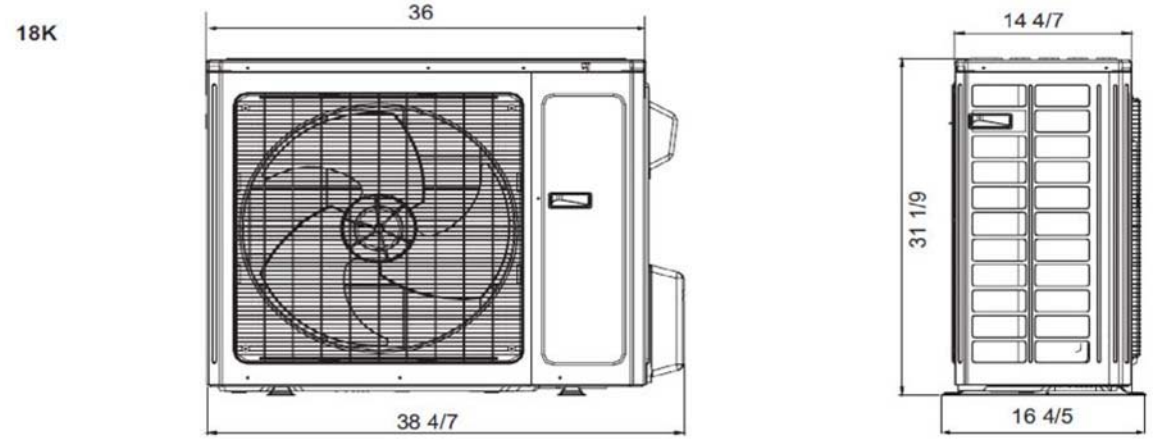


Fig. 5 – Dimensions

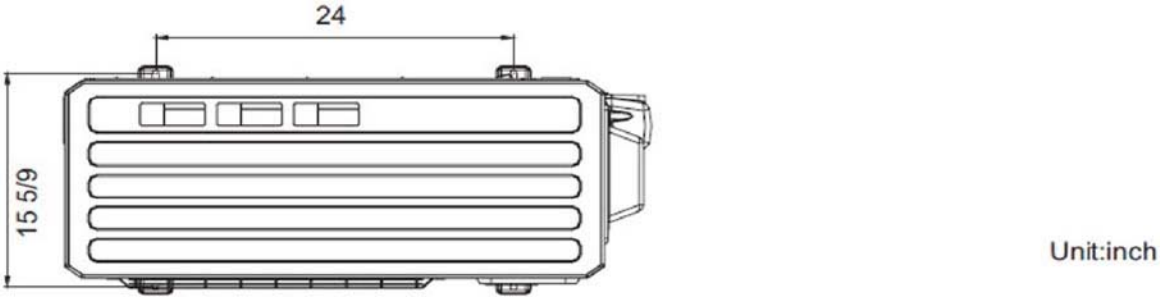


Fig. 6 – Dimensions

CLEARANCES - INDOOR

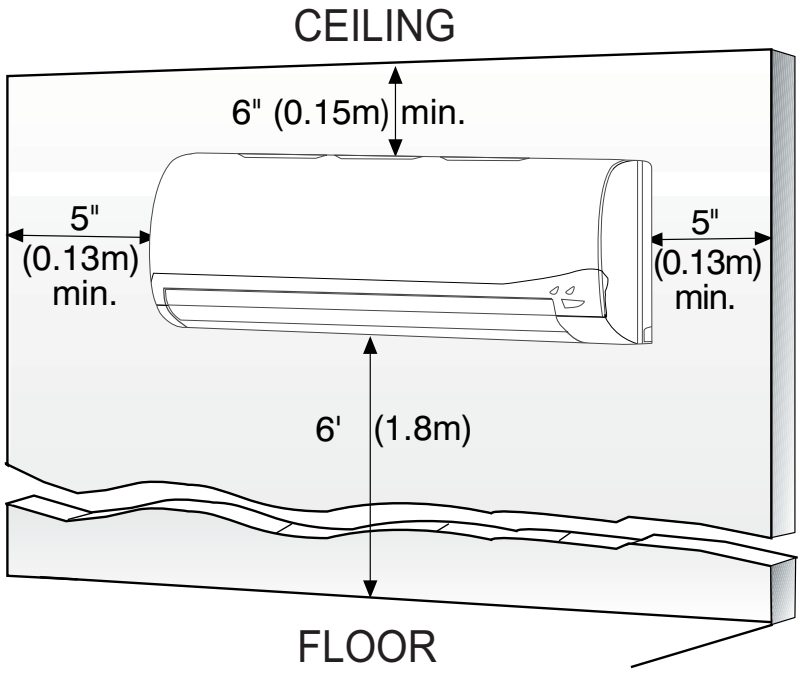


Fig. 7 – Indoor Unit Clearance

CLEARANCES - OUTDOOR

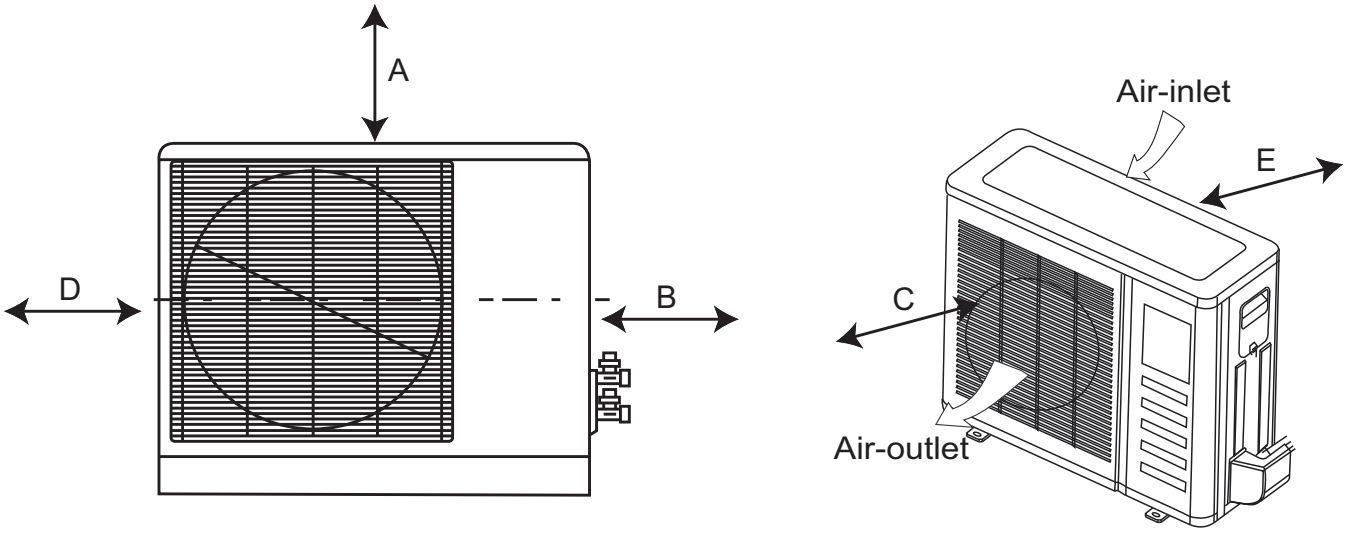


Fig. 8 – Outdoor Unit Clearance

UNIT	Minimum Value in. (mm)
A	24 (609)
B	24 (609)
C	24 (609)
D	4 (101)
E	4 (101)

ELECTRICAL DATA

UNIT SIZE	OPERVOLTAGE- MAX / MIN*	COMPRESSOR			OUTDOOR FAN				INDOOR FAN				MCA	MAX FUSE CB AMP
		V/PH/HZ	RLA	LRA	V/PH/HZ	FLA	HP	W	V/PH/HZ	FLA	HP	W		
9K	253 / 187	208-230/1/60	8.5	35	208-230/1/60	0.37	0.04	30	208-230/1/60	0.1	0.027	20	12	15
12K			9.5	40		0.37	0.04	30		0.1	0.027	20	13	20
18K			14.5	30		0.48	0.12	90		0.1	0.027	20	19	30

*Permissible limits of the voltage range at which the unit will operate satisfactorily

LEGEND

FLA – Full Load Amps
LRA – Locked Rotor Amps
MCA – Minimum Circuit Amps
RLA – Rated Load Amps

WIRING

All wires must be sized per NEC (National Electrical Code) or CEC (Canadian Electrical Code) and local codes. Use Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.

Per caution note, only copper conductors with a minimum 300 volt rating and 2/64-inch thick insulation must be used.

The use of BX cable is not recommended.

Recommended Connection Method for Power and Communication Wiring - Power and Communication Wiring:

The main power is supplied to the outdoor unit. The field supplied 14/3 power/communication wiring from the outdoor unit to indoor unit consists of four (4) wires and provides the power for the indoor unit. Two wires are high voltage AC power, one is communication wiring and the other is a ground wire.

Recommended Connection Method for Power and Communication Wiring (To minimize communication wiring interference)

Power Wiring:

The main power is supplied to the outdoor unit. The field supplied power wiring from the outdoor unit to indoor unit consists of three (3) wires and provides the power for the indoor unit. Two wires are high voltage AC power and one is a ground wire.
To minimize voltage drop, the factory recommended wire size is 14/2 stranded with a ground.

Communication Wiring:

A separate shielded copper conductor only, with a minimum 300 volt rating and 2/64-inch thick insulation, must be used as the communication wire from the outdoor unit to the indoor unit.
Please use a separate shielded 16GA stranded control wire.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

- Wires should be sized based on NEC and local codes.
- Use copper conductors only with a minimum 300 volt rating and 2/64 inch thick insulation.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

- Be sure to comply with local codes while running wire from indoor unit to outdoor unit.
- Every wire must be connected firmly. Loose wiring may cause terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.
- No wire should be allowed to touch refrigerant tubing, compressor or any moving parts.
- Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.
- Connecting cable with conduit shall be routed through hole in the conduit panel.

CONNECTION DIAGRAM

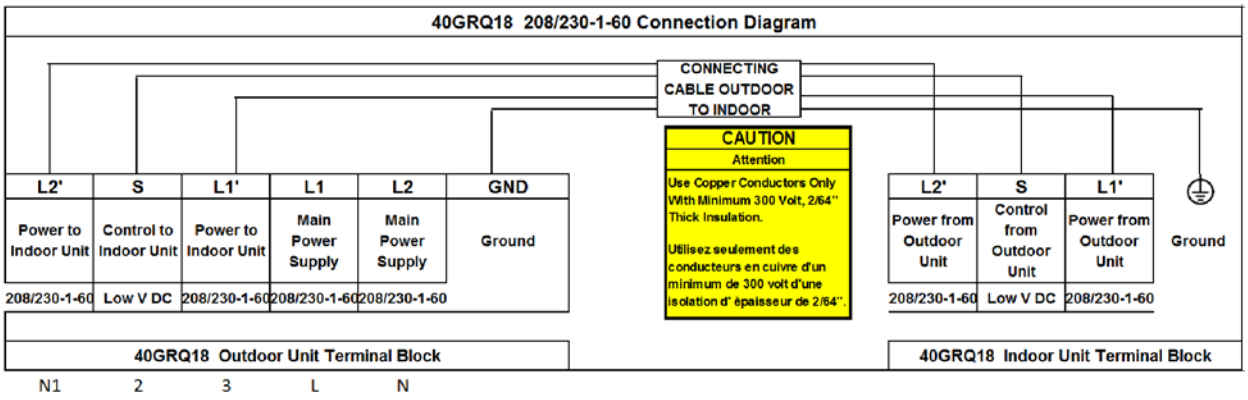


Fig. 9 – Connection Diagram

WIRING DIAGRAMS

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP	Jumper Cap
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue	⏚	Grounding wire
YEGN	Yellow/Green	BK	Black	/	/
VT	Violet	OG	Orange	/	/

NOTE: Jumper cap is used to determine the fan speed and the swing angle of the horizontal louver of this model.

Indoor Unit

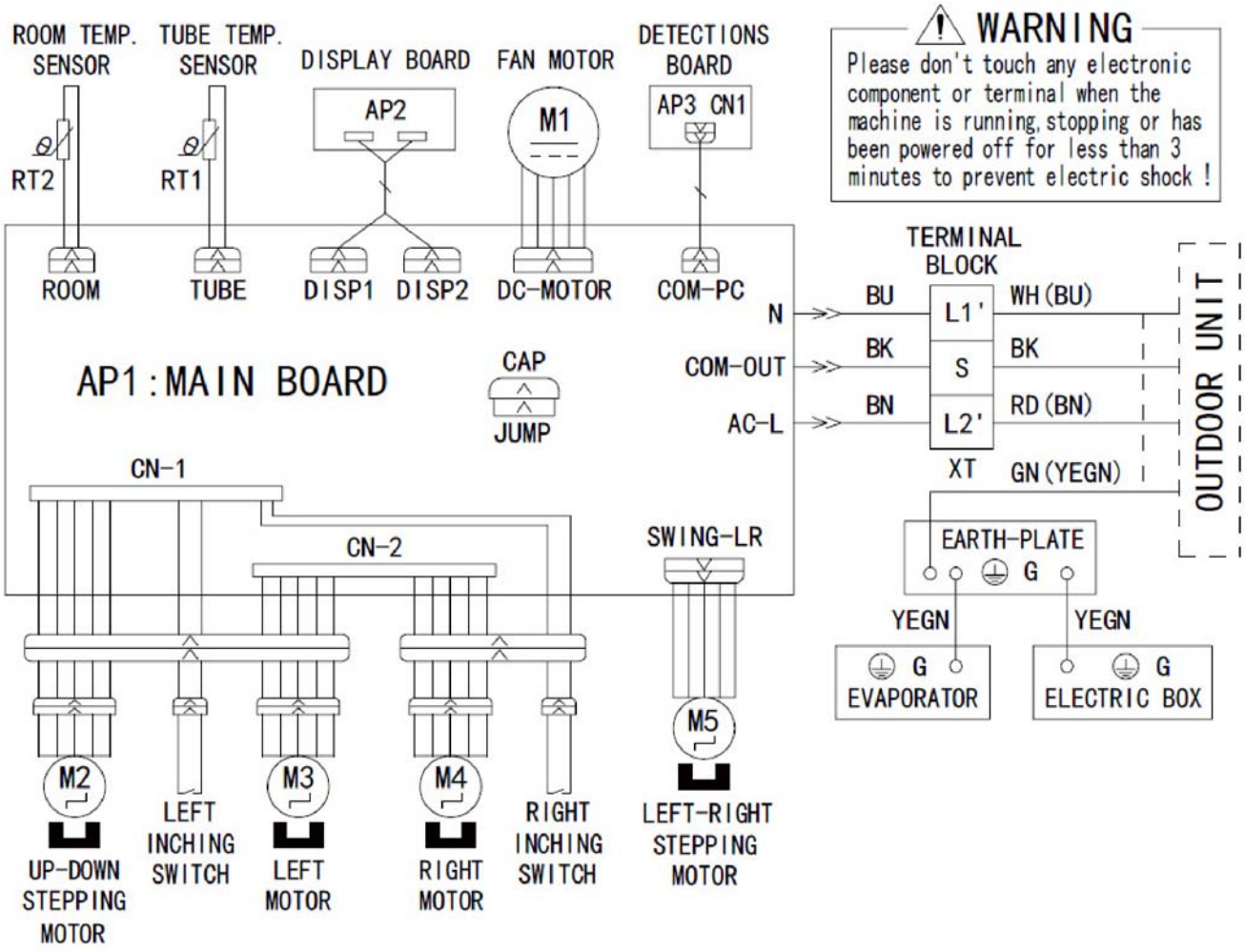


Fig. 10 – Indoor unit

Outdoor Unit

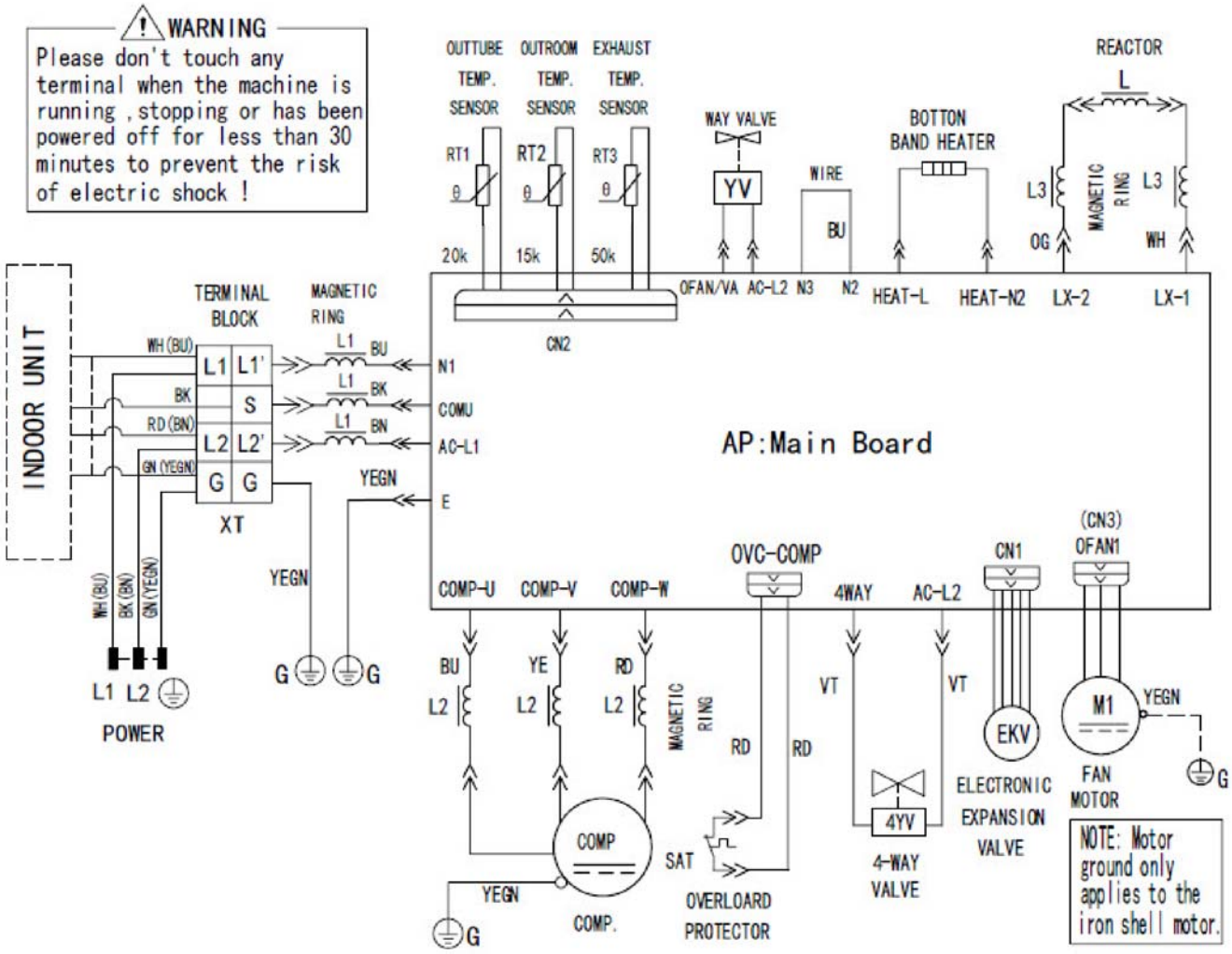


Fig. 11 – Sizes 09 - 12

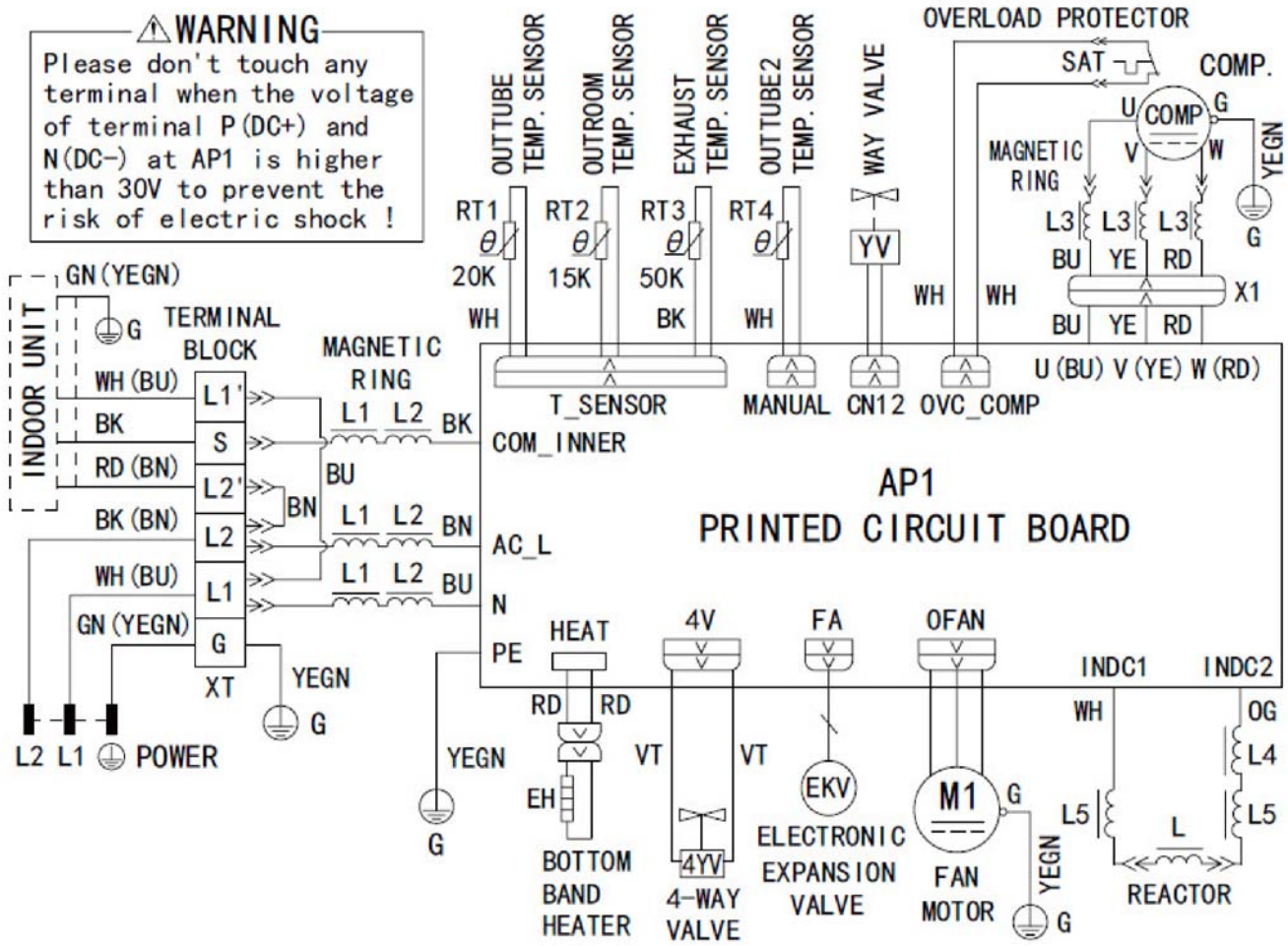


Fig. 12 – Size 18

NOTE: These wiring diagrams are subject to change without notice. Refer to the one supplies with the unit.

1	Interface of neutral wire	5	Interface of DC motor	9	Interface of WIFI	13	Display interface
2	Interface of live wire	6	Up and Down swing 3	10	Interface of left and right swing	14	Interface of communication wire for neutral wire and live wire
3	Interface of fuse	7	Tube temperature sensor	11	Up and down swing 2	/	/
4	Interface of jumper cap	8	Ambient temperature sensor	12	Up and down swing 1	/	/

1	Input of live wire of power	4	Input of ground wire of power	7	Neutral wire of electric heater of compression	10	Interface of fan	13	U.V.W. Three phases of compressor
2	Input of neutral wire of power	5	Live wire of electric heater	8	Neutral wire of electric heater of chassis	11	Interface 1 of electric reactor	14	Input of overload
3	Communication interface	6	Neutral wire of 4-wire valve	9	Live wire of 4-way valve	12	Interface 2 of electric reactor	15	Temp. sensor

REFRIGERATION SYSTEM DIAGRAM

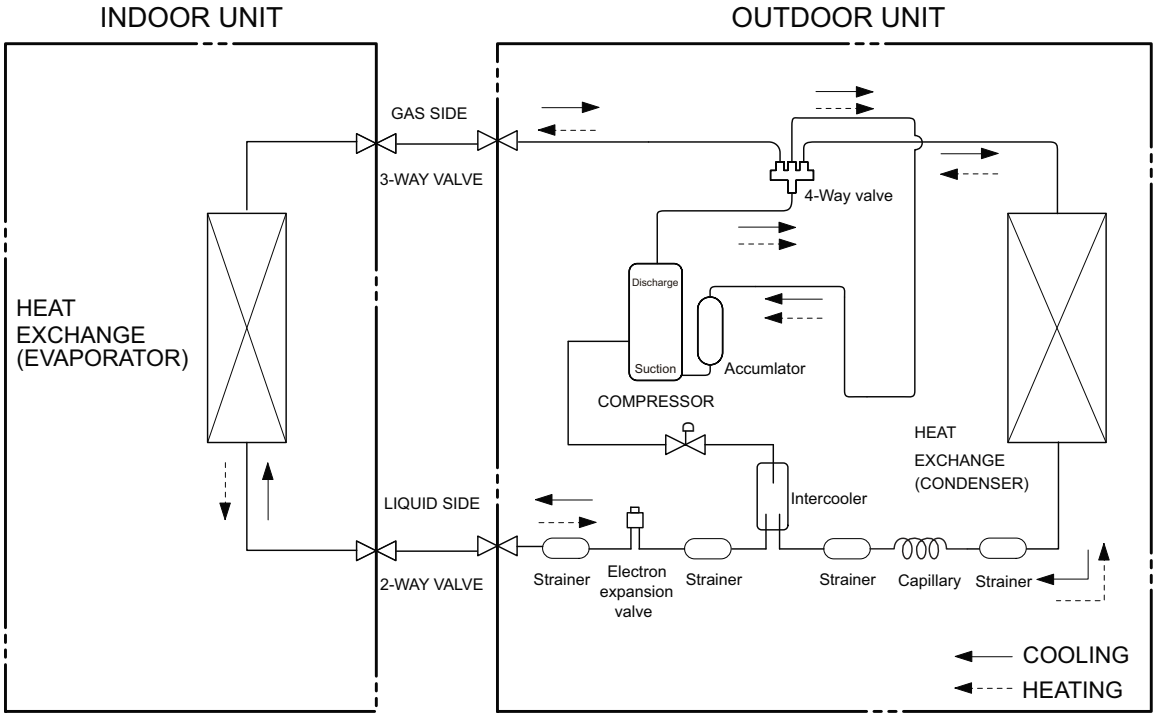


Fig. 13 – Refrigeration System Diagrams

Connection pipe specification:
Liquid: ¼”
Gas: ½” (09K/12K)
Gas: ⅝” (18K)

REFRIGERANT LINES

General refrigerant line sizing:

1 The 619FB/538FR units are shipped with a full charge of R410A refrigerant. All charges, line sizing, and capacities are based on runs of 25 ft (7.6 m). For runs over 25 ft (7.6 m), consult the long-line section on this page for proper charge adjustments.

2 Minimum refrigerant line length between the indoor and outdoor units is 10 ft. (3 m).

3 Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, not more than 36-in (914 mm) should be buried. Provide a minimum 6-in (152 mm) vertical rise to the service valves to prevent refrigerant migration.

4 Both lines must be insulated. Use a minimum of 1/2-in. (12.7 mm) thick insulation. A closed-cell insulation is recommended in all long-line applications.

5 Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so that vibration or noise is not transmitted into the structure.

IMPORTANT: **Both refrigerant lines must be insulated separately.**

- The following maximum lengths are allowed:

System Size			9K (208-230V)	12K (208-230V)	18k (208-230V)
Piping	Min. Piping Length	ft (m)	10 (3)	10 (3)	10 (3)
	Standard Piping Length	ft (m)	25 (7.6)	25 (7.6)	25 (7.6)
	Max. outdoor-indoor height difference	ft (m)	32.8 (9.9)	32.8 (9.9)	32.8 (9.9)
	Max. Piping Length with no additional refrigerant charge	ft (m)	25 (7.6)	25 (7.6)	25 (7.6)
	Max. Piping Length	ft (m)	82 (25)	82 (25)	82 (25)
	Additional refrigerant charge (between Standard – Max piping length)	Oz/ft (g/m)	0.2 (18.6)	0.2 (18.6)	0.2 (18.6)
	Gas Pipe (size - connection type)	in	1/2 Flare connection	1/2 Flare connection	5/8 Flare connection
	Liquid Pipe (size - connection type)	in	1/4 Flare connection	1/4 Flare connection	1/4 Flare connection
Refrigerant	Refrigerant Type		R410A	R410A	R410A
	Charge Amount	Lbs (kg)	3.1 (1.4)	3.1 (1.4)	4.4 (2)

ADDITIONAL REFRIGERANT CHARGE TABLE				
Unit Size	Total Line Length ft.		Additional Charge oz/ft. ft (m)	
	Min	Max	10-25 (3-8)	>25-82 (8-25)
9	10	82	None	0.02
12				
18				

Long Line Applications Units:

1 No change in line sizing is required.

2 Add refrigerant per Additional Charge table.

SYSTEM EVACUATION AND CHARGING

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the procedure outlined below is followed. Always break a vacuum with dry nitrogen.

System Vacuum and Charge

Using Vacuum Pump

1 Completely tighten flare nuts A, B, C, D, connect manifold gage charge hose to a charge port of the low side service valve (see Fig. 14).

2 Connect charge hose to vacuum pump.

3 Fully open the low side of manifold gage (see Fig. 15).

4 Start vacuum pump.

5 Evacuate using either deep vacuum or triple evacuation method.

6 After evacuation is complete, fully close the low side of manifold gage and stop operation of vacuum pump.

7 The factory charge contained in the outdoor unit is good for up to 25 ft. (8 m) of line length. For refrigerant lines longer than 25 ft (8 m), add refrigerant as specified in the ADDITIONAL REFRIGERANT CHARGE TABLE on this page.

8 Disconnect charge hose from charge connection of the low side service valve.

9 Fully open service valves B and A.

10 Securely tighten caps of service valves.

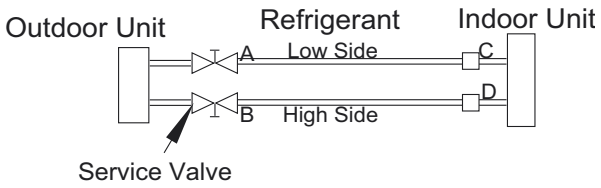


Fig. 14 – Service Valve

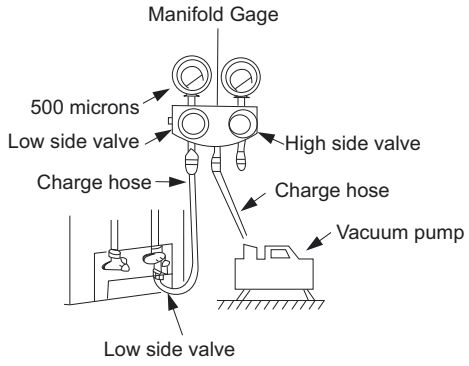


Fig. 15 – Manifold

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water (see Fig. 16).

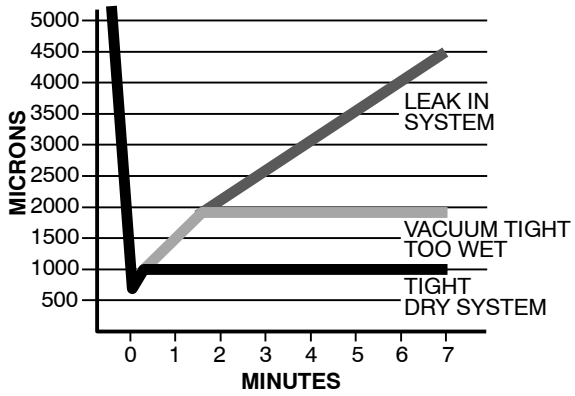


Fig. 16 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation process should be used in accordance with the following figure. Refer to Fig. 17 and proceed as follows:

1 Pump system down to 500 microns and allow pump to continue operating for an additional 15 minutes.

2 Close service valves and shut off vacuum pump.

3 Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.

4 Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.

5 Repeat this procedure as indicated in Fig. 17. The system is freed of any contaminants and water vapor.

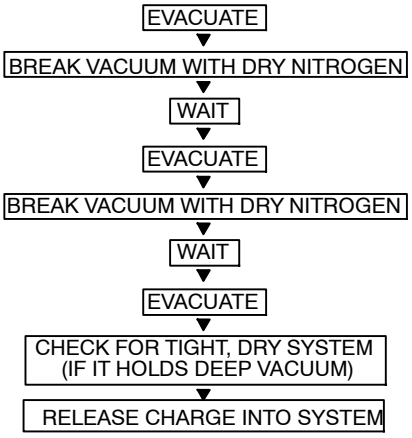


Fig. 17 – Triple Evacuation Method

Final Tubing Check

IMPORTANT: Ensure the factory tubing on both the indoor and outdoor units has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to feeder tubes, making sure wire ties on the feeder tubes are secure and tight.

CONTROL SYSTEM

The 619FB/538FR unit is equipped with a microprocessor control to perform two functions:

1 Provide safety for the system

2 Control the system and provide optimum levels of comfort and efficiency.

The main microprocessor is located on the control board of outdoor unit. Outdoor and indoor units have thermistors used to monitor the system operation to maintain the unit within acceptable parameters and control the operating mode.

SYSTEM SAFETIES

3 Minute Time Delay

To protect the compressor, there is a 3 minute delay on break even if the control is calling for heating or cooling. The compressor has an additional 1 minute delay when powering the unit on for the first time, or after a power failure.

Compressor Top Temperature Protection

The unit stops working when the compressor top temperature protector cuts off, and restarts after the compressor top temperature protector restarts.

Compressor Discharge Temperature Protection

When the compressor discharge temperature reaches a higher one than in normal operation, the running frequency is limited based on the following algorithm:

- When discharge B≥208°F, prohibit increasing frequency
- When discharge B≥217°F, prohibit decreasing frequency
- When discharge B≥230°F, compressor stop operation
- When discharge B≤194°F, protection is released.
  - — If the compressor discharge temperature is lower than 194°F (90°C), there is no limit in the frequency.
  - — If this value is between 194°F and 221°F (90<T5<105°C), the compressor continues running at the current frequency.
  - — If this value is now between 221°F and 239°F (105<T5<115°C), the frequency will decrease to a lower level every 3 minutes.
  - — When the compressor discharge temperature reaches a value higher than 239°F (115°C), and has been running at this condition for 5 seconds, the compressor stops.

Fan Speed Protection

When indoor fan speed is below 300RPM for a specific amount of time the unit stops and the LED displays the failure.

Inverter Module Protection

The Inverter module is protected for abnormalities in current, voltage and temperature. If abnormal values of any of these take place, the corresponding code appears in the indoor unit and the unit stops.

Indoor Fan Delayed Operation

When the unit starts up, the louver will be active immediately and the indoor fan will operate 10s later. If the operating mode is heating, the indoor fan will also be controlled by the anti-cold blow function.

Compressor Preheating Function

The compressor crankcase heater activates if:

- The outdoor ambient temperature, T4, is lower than 37°F (3°C) and power has been recently supplied to the machine.
- If T4 < 37°F (3°C) and the compressor has not been operating for over 3 hours.

During the preheating mode, a weak current flow flows through the compressor coil from the wiring terminal of the compressor. The compressor is heated when this is not operating.

The preheating function deactivates if T4 is greater than 41°F (5°C) or the compressor starts operating.

Condenser temperature protection

The condenser temperature protection function acts as follows:

- If the condenser coil temperature (T3) is between 131°F and 140°F (55C°<T3<60°C), the compressor frequency decreases to a lower level until it reaches the lowest value, F1. It then runs at the F1 frequency. Once T3<129°F (54°C), the compressor continues running at the current frequency.
- When the coil temperature reaches a value lower than 126°F (52°C), the compressor will not limit the frequency and resumes to the required frequency.
- If T3>140°F (60°C) for 5 seconds, the compressor stops and restarts once the coil temperature reaches a value lower than 126°F (52°C).

Evaporator Temperature Protection

The evaporator temperature protection function acts as follows:

- If the evaporator coil temperature (T2) is lower than 32°F (0°C), the compressor stops and restarts once T2 ≥ 41°F (5°C).
- If 32°F ≤ T2 <39°F (0°C ≤T2 <4°C), the compressor frequency will be limited and decreased to a lower level.
- Now, if 39°F ≤T2 <45°F (4°C ≤T2 <7°C), the compressor continue running at the current frequency.
- If T2>45°F (7°C), the compressor frequency will not be limited, and operation is normal.

SEQUENCE OF OPERATION

Interface

A wireless remote control, supplied with the unit, is the interface between the fan coil and the user. The wireless remote control has the following characteristics:

- Capable of displaying °C and °F with °F being the default setting. To change the default setting, refer to the Owner's Manual.
- The remote control setpoint range is from 62°F (17°C) to 86°F (30°C) in increments of 1°F (1°C).
- The wireless remote control has an operating range of 25 ft. (7.62 m).
- The same remote control can be used to control more than one unit.
- If the remote control is lost, damaged, or the batteries are exhausted, the system can be operated by using the manual button (forced Auto) located under the front panel.

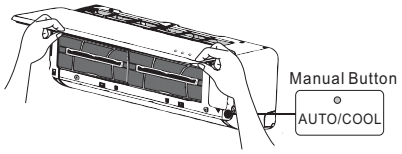


Fig. 18 – Manual Button Location on Unit

MODES OF OPERATION

COOLING MODE

In this mode, the system cools and dries the room air with the fan running continuously, either at a selected fan speed or Auto fan speed. The fan runs even when the compressor cycles off. This feature enhances room comfort and efficiency of the system.

Compressor operation in cooling mode:

In cooling mode, the maximum operation frequency (Fmax) of the compressor, after it starts running, depends on the outdoor ambient temperature (T4).

Once the system starts running, the compressor runs at the Fmax frequency for 7 minutes at a specific T4. During this time, the frequency limitation is active, therefore the compressor continues running even if the set point condition is satisfied. The compressor running frequency will then be controlled based on the difference between the room temperature and the temperature set point (T1-Ts).

Outdoor Fan Operation in Cooling Mode:

When in cooling mode, the outdoor fan motor cycles based on the outdoor ambient temperature as shown below:

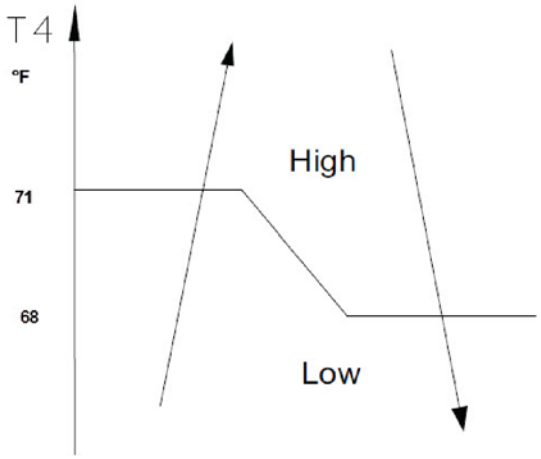


Fig. 19 – Cooling mode

Indoor Fan Operation in Cooling Mode:

When in cooling mode, the indoor fan runs continuously either at the chosen set speed (high, medium, or low), or in Auto mode, where the speed is determined by the microprocessor based on the difference between the room temperature and the temperature set point as shown below:

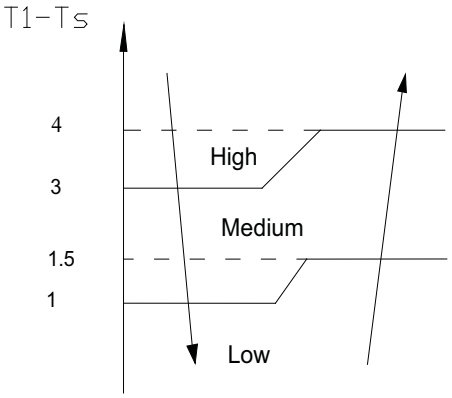


Fig. 20 – Cooling mode

HEATING MODE

In this mode, the system heats the room air with the indoor fan running at either the selected speed or on Auto. As in the cooling mode, the indoor fan will run continuously unless interrupted by the cold blow algorithm. This algorithm will not allow the fan to run if the indoor coil temperature drops below a preset value.

Defrost is controlled by the on-board microprocessor.

Compressor operation in heating mode

In heating mode, the maximum operation frequency (Fmax) of the compressor, after it starts running, depends on the outdoor ambient temperature (T4).

Once the system starts running, the compressor will run at the Fmax frequency for 7 minutes at a specific outdoor ambient temperature (T4). During this time, the frequency limitation is active, therefore the compressor will continue running even if the set point condition is satisfied. The compressor running frequency will then be controlled based on the difference between the room temperature, the temperature set point, and a temperature difference that takes a default value of 32°F (T1-Ts-ΔT).

Outdoor fan Operation in Heating Mode

When in heating mode, the outdoor fan motor cycles based on the outdoor ambient temperature as shown below:

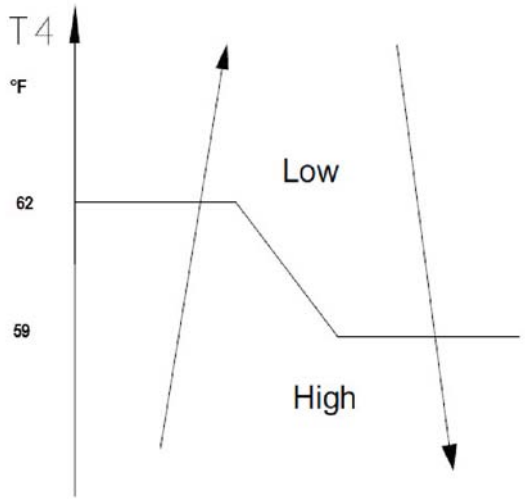


Fig. 21 – Heating mode

Indoor fan Operation in heating mode

In heating mode, the indoor fan runs depending on the evaporator coil temperature (T2).

If the set point conditions are satisfied and the compressor stops, the indoor fan will be forced to run for 127 seconds with breeze. During this period, the anti-cold air is disabled.

If the machine is running at the rated capacity test mode, the indoor fan will run at the rated speed and the anti-cold-wind function is disabled.

Auto Mode in Heating Mode

In heating mode, When the fan speed is set to Auto, the fan will run at a speed determined by the microprocessor based on the difference between the room temperature and the temperature set point as shown below:

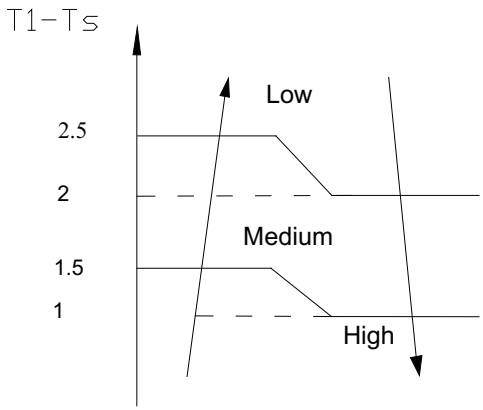


Fig. 22 – Heating mode

Defrost

Defrost on heat pump units is controlled by the microprocessor and is initiated if either of the following conditions occur:

1 If for the outdoor temperature, T4>32°F (0°C):

— The outdoor coil temperature (T3) has been lower than 37°F (3°C) for about 40 minutes and during that period, the coil temperature is lower than TCDI for more than 3 minutes.

— The outdoor coil temperature (T3) has been lower than 37°F (3°C) for about 80 minutes and during that period, the coil temperature is lower than (TCDI+2°C) for more than 3 minutes.

2 If for the outdoor temperature, T4＜32°F (0°C):

— If the conditions described above are satisfied, then the program judges if the evaporator coil temperature (T2) has decreased more than 41°F (5°C). When the evaporator coil temperature has decreased more than 41°F (5°C), the defrost mode starts.

3 At any value of outdoor ambient temperature (T4):

— If the machine runs with a condenser coil temperature lower than 37°F (3°C) for more than 120 minutes and the outdoor coil temperature (T3) has been lower than (TCDI+4°C) for more than 3 minutes, the machine will enter into defrost mode.

TCDI = -7°C = 19.4°F

Defrost cycle termination:

If any one of the following conditions is satisfied, the defrost cycle will end and the system will return to normal operation:

1 The outdoor coil temperature (T3) reaches (TCDE1).

— For 9K-12K: TCDE1 = (64°F) 18°C

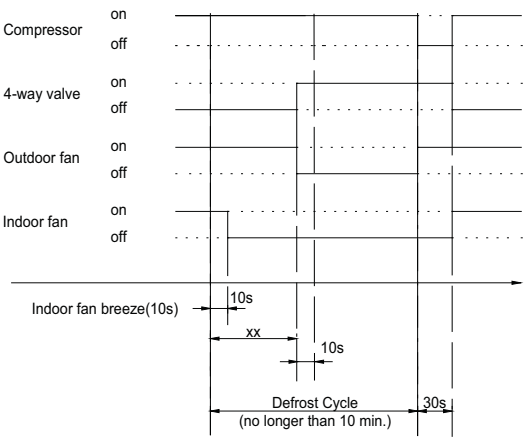
— For 18K-30K: TCDE1 = (59°F) 15°C

2 The outdoor coil temperature (T3) is kept at about 46°F (8°C) for at least 80 seconds.

3 The defrost cycle reaches 10 minutes.

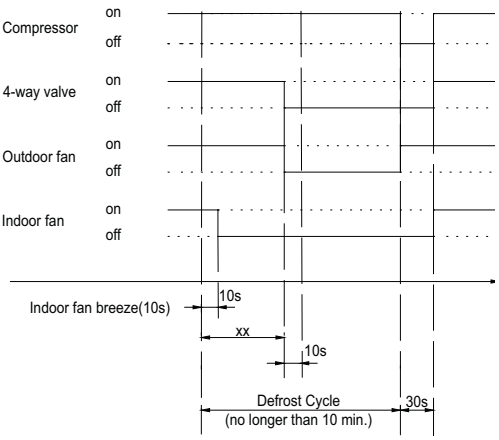
The cycles of defrost algorithm are shown below:

For 9K, 12K models:



xx=60s for 9k & 12k models

For 18K, 26K models:



AUTO MODE

In the Auto mode, the temperature can be set to values between 62~86°F (17~30℃). In this mode, the machine chooses either Cooling, Heating or Fan-only mode according to ΔT.

NOTE: ΔT =T1-Ts, where T1 represents the indoor room temperature and Ts represents the set temperature.

ΔT=T1-Ts	Running mode
ΔT＞33°F	Cooling
-1<ΔT≤33°F	Fan-only
ΔT≤-30°F	Heating

Indoor fan will run at an automatic fan speed for each running mode. The louver will also operate depending in relevant mode taking place.

If the machine switches mode between heating and cooling, the compressor stops for 15 minutes and then chooses a mode according to ΔT.

If a new set temperature is commanded, the system chooses a running mode according to ΔT.

FORCED OPERATION FUNCTION

When the machine is off, pressing the manual button carries the machine to forced auto mode. Press the button once again, within 5 seconds, the machine turns to forced cooling mode. In forced auto, forced cooling or any other operation mode, press the manual button to turn the machine off. When in this mode, all general protections and remote control functions are available.

Forced cooling mode:

The compressor runs at F2 frequency and indoor fan runs as breeze. After running for 30 minutes, the machine turns to auto mode with a 75°F (24°C) set temperature.

Forced auto mode:

The action of forced auto mode is the same as normal auto mode with a 75°F (24°C) set temperature.

TIMER FUNCTION

Timing range is 24 hours.

The timer function will not change the system's current operation mode. The setting time is relative time.

Timer on

The machine turns on automatically when reaching the set time.

Timer off

The machine turns off automatically when reaching the setting time.

Timer on/off

The machine turns on automatically when reaching the set "on" time, and then turn off automatically when reaching the set "off" time.

SLEEP MODE FUNCTION

Operation time in sleep mode is 7 hours. After 7 hours the system turns off. The Operation process in sleep mode is as follows:

When in cooling mode, the set temperature rises 1.8°F (1°C) (up to a maximum 86°F (30°C)) every one hour. Two hours later the set temperature stops rising and indoor fan is fixed at low speed.

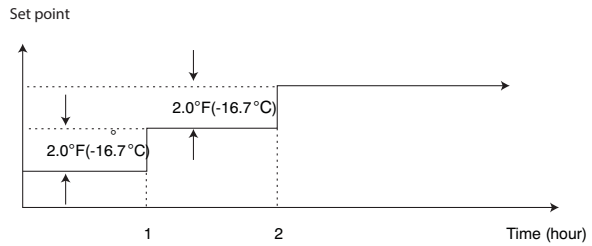


Fig. 23 – Sleep Mode - Cooling

When in heating mode, the set temperature decreases 2.0°F (-16.7°C) (down to a minimum 62°F (17°C)) every one hour. Two hours later the set temperature stops rising and indoor fan is fixed at low speed.

NOTE: Anti-cold wind function has the priority.

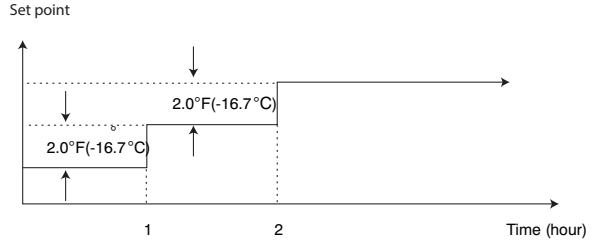


Fig. 24 – Sleep Mode - Heating

When the user uses timer off function in sleep mode (or sleep function in timer off mode), if the timing is less than 7 hours, sleep function will be cancelled when reaching the setting time. If the timing is more than 7 hours, the machine will not stop until it reaches the set time in sleep mode.

AUTO-RESTART FUNCTION

The indoor unit is equipped with auto-restart function, which is carried out through an auto-restart module. In case of a sudden power failure, the module memorizes the setting conditions present previous to the power failure. The unit automatically resume to the previous operation settings (not including swing function) 3 minutes after the power returns.

If the memorization condition is forced cooling mode, the unit runs in cooling mode for 30 minutes and returns to auto mode at a 75°F (24°C) set temp. If the equipment was off before the power went off, and it is required to start up after this power failure, the compressor will have a 1 minute delay when powering on. In other conditions, the compressor will have a 3 minutes delay at re-start.

TROUBLESHOOTING

This section provides the required flow charts to troubleshoot problems that may arise.

NOTE: **Information required in the diagnoses can be found either on the wiring diagrams or in the appendix.**

Required Tools:

The following tools are needed when diagnosing the units:

- Digital multimeter
- Screw drivers (Phillips and straight head)
- Needle-nose pliers

Recommended Steps

1 Refer to the diagnostic hierarchy charts below and determine the problem at hand.

2 Go to the chart listed in the diagnostic hierarchy and follow the steps in the chart for the selected problem.

For the ease of service, the systems are equipped with diagnostic code display LED's on both the indoor and outdoor units. The outdoor diagnostic display is on the outdoor unit board and is limited to very few errors. The indoor diagnostic display is a combination of flashing LED's on the display panel on the front of the unit. If possible always check the diagnostic codes displayed on the indoor unit first.

2.0

Problems may occur that are not covered by a diagnostic code, but are covered by the diagnostic flow charts. These problems will be typical air conditioning mechanical or electrical issues that can be corrected using standard air conditioning repair techniques.

For problems requiring measurements at the control boards note the following:

1 Always disconnect the main power.

2 When possible check the outdoor board first.

3 Start by removing the outdoor unit top cover.

4 Reconnect the main power.

5 Probe the outdoor board inputs and outputs with a digital multi-meter referring to the wiring diagrams.

6 Connect the red probe to hot signal and the black probe to the ground or negative.

7 Note that some of the DC voltage signals are pulse will give continuously variable readings.

8 If it is necessary to check the indoor unit board you must start by disconnecting the main power.

9 Next remove the front cover of the unit and then control box cover.

10 Carefully remove the indoor board from the control box, place it face up on a plastic surface (not metal).

11 Reconnect the main power and repeat steps 5,6, and 7.

12 Disconnect main power before reinstalling board to avoid shock hazard and board damage.

No.	Malfunction Name	Display Method of Indoor Unit				Display Method of Outdoor Unit			A/C Status	Possible Causes
		Dual-8 Code Display	Indicator Display (during blinking, ON 0.5s and OFF 0.5s)			Indicator has 3 kinds of display status and during blinking, ON 0.5s and OFF 0.5s				
			Operation Indicator	Cool Indicator	Heating Indicator	Yellow Indicator	Red Indicator	Green Indicator		
1	High pressure protection of system	E1							During cooling and drying operation, indoor fan operates, all modes stop operation. During heating operation, the unit stops.	Possible reasons: 1. Refrigerant was overcharged ; 2. Poor heat exchange (including blockage of heat exchanger 3. Ambient temperature is too high
2	Anti-freezing protection	E2				OFF 1S and blink3 times			During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates.	1. Poor air-return in indoor unit; 2. Fan speed is abnormal; 3. Evaporator is dirty.
3	Refrigerant leakage protection	F0					OFF 1S and blink 9 times		The Code Display displays F0 and the complete unit stops.	1. Refrigerant leakage; 2. Indoor evaporator temperature sensor not working; 3. The unit has a restriction in the piping.
4	High discharge temperature protection of compressor	E4				OFF 1S and blink 7 times			During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all modes stop.	Refer to the malfunction analysis (discharge protection, overload).
5	Overcurrent protection	E5				OFF 1S and blink 5 times			During cooling and drying operation, compressor and outdoor fan stop while indoor fan operates. During heating operation, all modes stop.	1. Supply voltage is unstable; 2. Supply voltage is too low and load is too high; 3. Evaporator is dirty.
6	Communication Malfunction	E6				Always			During cooling operation, compressor stops while indoor fan motor operates. During heating operation, the complete unit stops.	Refer to the corresponding malfunction analysis.
7	High temperature resistant protection	E8				OFF 1S and blink 6 times			During cooling operation: compressor stops while indoor fan operates. During heating operation, the complete unit stops.	Refer to the malfunction analysis (overload, high temperature resistant).
8	EEPROM malfunction	EE				OFF 1S and blink 11 times			During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops	Replace outdoor control panel AP1
9	Limit / decrease frequency due to high temp. of module	EU							All modes operate normally, while operation frequency for compressor is decreased	Discharging after the complete unit is de-energized for 20mins, ensure the thermal grease on IPM Module of the outdoor control panel AP1 is sufficient. If is no use, replace the control panel AP1.
10	Malfunction protection of jumper cap	C5							Wireless remote receiver and button are effective, but can not dispose the related command	1. No jumper cap insert on mainboard. 2. Incorrect insert of jumper cap. 3. Jumper cap damaged. 4. Abnormal detecting circuit of mainboard.
11	Gathering refrigerant	Fo				OFF 1S and blink17 times			When the outdoor unit receives signal of gathering refrigerant, the system is forced to run under cooling mode for gathering refrigerant	Nominal cooling mode
12	Indoor ambient temperature sensor is open/short circuited	F1							During cooling and drying operation, indoor unit operates while other modes stop; during heating operation, the complete unit stops operation.	1. Loosening or bad contact of indoor ambient temp. sensor and mainboard terminal. 2. Indoor ambient temp. sensor damaged.(check with sensor resistance value chart) 3. Mainboard damaged.
13	Indoor evaporator temperature sensor is open/short circuited	F2							AC stops operation once reaching the setting temperature. Cooling, drying: internal fan motor stops operation while other modes stop operation; heating: AC stop operation	1. Loosening or bad contact of Indoor evaporator temp. sensor and mainboard terminal. 2. Components on the mainboard fail and lead to a short circuit.. 3. Indoor evaporator temp. sensor damaged.(check temp. sensor value chart for testing) 4. Mainboard damaged.
14	Outdoor ambient temperature sensor is open/short circuited	F3					OFF 1S and blink 6 times		During cooling and drying operating, compressor stops while indoor fan operates; During heating operation,the complete unit stops operation	Outdoor temperature sensor has not been connected well or is damaged. Check it by referring to the resistance table for temperature sensor)
15	Outdoor condenser temperature sensor is open/short circuited	F4					OFF 1S and blink 5 times		During cooling and drying operation, compressor stops while indoor fan operates; During heating operation, the unit stops operation.	Outdoor temperature sensor has not been connected well or is damaged. check it by referring to the resistance table for temperature sensor)

No.	Malfunction Name	Dual-8 Code Display	Operation Indicator	Cool Indicator	Heating Indicator	Yellow Indicator	Red Indicator	Green Indicator	AC Status	Possible Causes
16	Outdoor discharge temperature sensor is open/short circuited	F5					OFF 1S and blink 7 times		During cooling and drying operation, compressor stops after operating for about 3 mins, while indoor fan operates. During heating operation, the complete unit stops after 3 mins.	1.Outdoor temperature sensor has not been connected well or is damaged. Check it by referring to the resistance table for temperature sensor) 2.The head of temperature sensor has not been inserted into the copper tube
17	Limit/ decrease frequency due to overload	F6					OFF 1S and blink 3 times		All loads operate normally, while operation frequency for compressor is decreased	Refer to the malfunction analysis (overload, high temperature resistant)
18	Decrease frequency due to over-current	F8					OFF 1S and blink once		All loads operate normally, while operation frequency for compressor is decreased	The input supply voltage is too low. System pressure is too high.
19	Decrease frequency due to high air discharge	F9					OFF 1S and blink twice		All modes operate normally, while operation frequency for compressor is decreased	Temperature is too high; Malfunction of electric expansion valve (EKV)
20	Limit/ decrease frequency due to anti freezing	FH					OFF 1S and blink 4 times		All modes operate normally, while operation frequency for compressor is decreased	Poor air-return in indoor unit or fan speed is too low
21	Voltage for DC is too high	PH							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the unit stops operation.	1. Measure the voltage on terminals L2 and S on terminal block, if the voltage is higher than 265VAC, turn on the unit 2. If the AC input is normal, measure the voltage of electrolytic capacitor C on control panel (AP1) if its normal, there is a malfunction in the circuit, replace the control panel (AP1)
22	Voltage of DC is too low	PL							During cooling and drying operation, compressor will stop while indoor fan will operate; During heating operation, the complete unit will stop	1. Measure the voltage of position L2 and S on terminal block, if the voltage is higher than 150VAC, turn on the unit. 2. If the AC input is normal, measure the voltage of electrolytic capacitor C on control panel (AP1), if normal, there is a malfunction on the circuit, replace the control panel (AP1)
23	Compressor Min frequence in test state	P0								Showing during min. cooling or min. heating test
24	Compressor rated frequence in test state	P1								Showing during nominal cooling or nominal heating test
25	Compressor maximum frequence in test state	P2								Showing during middle cooling or middle heating test
26	Compressor intermediate frequence in test state	P3								Showing during middle cooling or middle heating test
27	Overcurrent protection of phase current for compressor	P5							During cooling and drying operation, compressor stops while indoor fan operates; During heating operation, the unit stops operation.	Refer to the malfunction analysis (IPM protection, loss of synchronism protection and over current protection of phase current for compressor.
28	Charging malfunction of capacitor	PU							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops.	Refer to the part three—charging malfunction analysis of capacitor
29	Malfunction of module temperature sensor circuit	P7							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops.	Replace outdoor control panel AP1
30	Module high temperature protection	P8							During cooling operation, compressor will stop while indoor fan will operate; During heating operation, the complete unit will stop	After the complete unit is de-energized for 20mins, ensure the thermal grease on IPM Module of AP1 is sufficient. If not, replace control panel AP1.
31	Decrease frequency due to high temperature resistant during heating operation	H0							All modes operate normally, while operation frequency for compressor is decreased	Refer to the malfunction analysis (overload, high temperature resistant)
32	Static de-dusting protection	H2								
33	Overload protection for compressor	H3				OFF 1S and blink 8 times			During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops operation.	1. Wiring terminal OVC-COMP is loosened. In normal state, the resistance for this terminal should be less than 1ohm. 2.Refer to the malfunction analysis (discharge protection, overload)
34	System is abnormal	H4				OFF 1S and blink 6 times			During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops operation.	Refer to the malfunction analysis (overload, high temperature resistant)

No.	Malfunction Name	Dual-8 Code Display	Operation Indicator	Cool Indicator	Heating Indicator	Yellow Indicator	Red Indicator	Green Indicator	AC Status	Possible Causes
35	IPM protection	H5				OFF 1S and blink 4 times			During cooling and drying operation, compressor stops while indoor fan operate. During heating operation, the unit stops operation.	Refer to the malfunction analysis (IPM protection, loss of synchronism protection and over-current protection of phase current for compressor
36	Module temperature is too high	H5				OFF 1S and blink 10 times				
37	Internal motor (fan motor) do not operate	H6							Internal fan motor, external fan motor, compressor and electric heater stop operation, guide louver stops at present location.	1. Bad contact of DC motor feedback terminal. 2. Bad contact of DC motor control end. 3. Fan motor is stalling. 4. Motor malfunction. 5. Malfunction of mainboard rev detecting circuit.
38	Desynchronizing of compressor	H7							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the complete unit stops operation.	Refer to the malfunction analysis (IPM protection, loss of synchronism protection and over-current protection of phase current for compressor.
39	PFC protection	HC				OFF 1S and blink 14 times			During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the unit stops operation.	Refer to the malfunction analysis
40	Outdoor DC fan motor malfunction	L3					OFF 1S and blink 14 times		Outdoor DC fan motor malfunction lead to compressor stop operation.	DC fan motor malfunction or system blocked or the connector loosened.
41	power protection	L9				OFF 1S and blink 9 times			Compressor stops operation and Outdoor fan motor stops 30s later, 3 minutes later fan motor and compressor restarts	To protect the electronic components when detect high power
42	Indoor unit and outdoor unit does not match	LP				OFF 1S and blink 16 times			Compressor and Outdoor fan motor can not work	Indoor unit and outdoor unit does not match
43	Failure start- up	LC							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the unit stops operation.	Refer to the malfunction analysis
44	Malfunction of voltage dropping for DC bus-bar	U1							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the unit stops.	Replace outdoor control panel AP1
45	Malfunction of voltage dropping for DC bus-bar	U3							During cooling and drying operation, compressor stops while indoor fan operates. During heating operation, the unit stops.	Supply voltage is unstable
46	Malfunction of complete units current detection	U5							During cooling and drying operation, compressor stops while indoor fan operates; during heating operating, the unit stops operation.	There is a circuit malfunction on outdoor units control panel AP1, replace the outdoor units control panel AP1.
47	The four-way valve is abnormal	U7							If this malfunction occurs during heating operation, the unit will stop operation.	1.Supply voltage is lower than AC175V; 2.Wiring terminal to the four way valve is loose or broken; 3.four way valve is damaged, replace four way valve.
48	Zero-crossing malfunction of outdoor unit	U9							During cooling operation, compressor stops while indoor fan operates; during heating, the complete unit stops operation.	Replace outdoor control panel AP1
49	Frequency limiting (power)						OFF 1S and blink 13 times			
50	Compressor running					OFF 1S and blink once				
51	The temperature for turning on the unit is reached						OFF 1S and blink 8 times			
52	Frequency limiting (module temperature)						OFF 1S and blink 11 times			
53	Normal communication							OFF 0.5S and blink once		
54	Defrosting		OFF 3S and blink once (during blinking, ON 10s and OFF 0.5s)						Defrosting occurs in heating mode. Compressor operates while indoor fan stops operation.	It is the normal state

TROUBLESHOOTING FOR MAIN MALFUNCTION

Indoor Unit

1. Malfunction of Temperature Sensor F1, F2

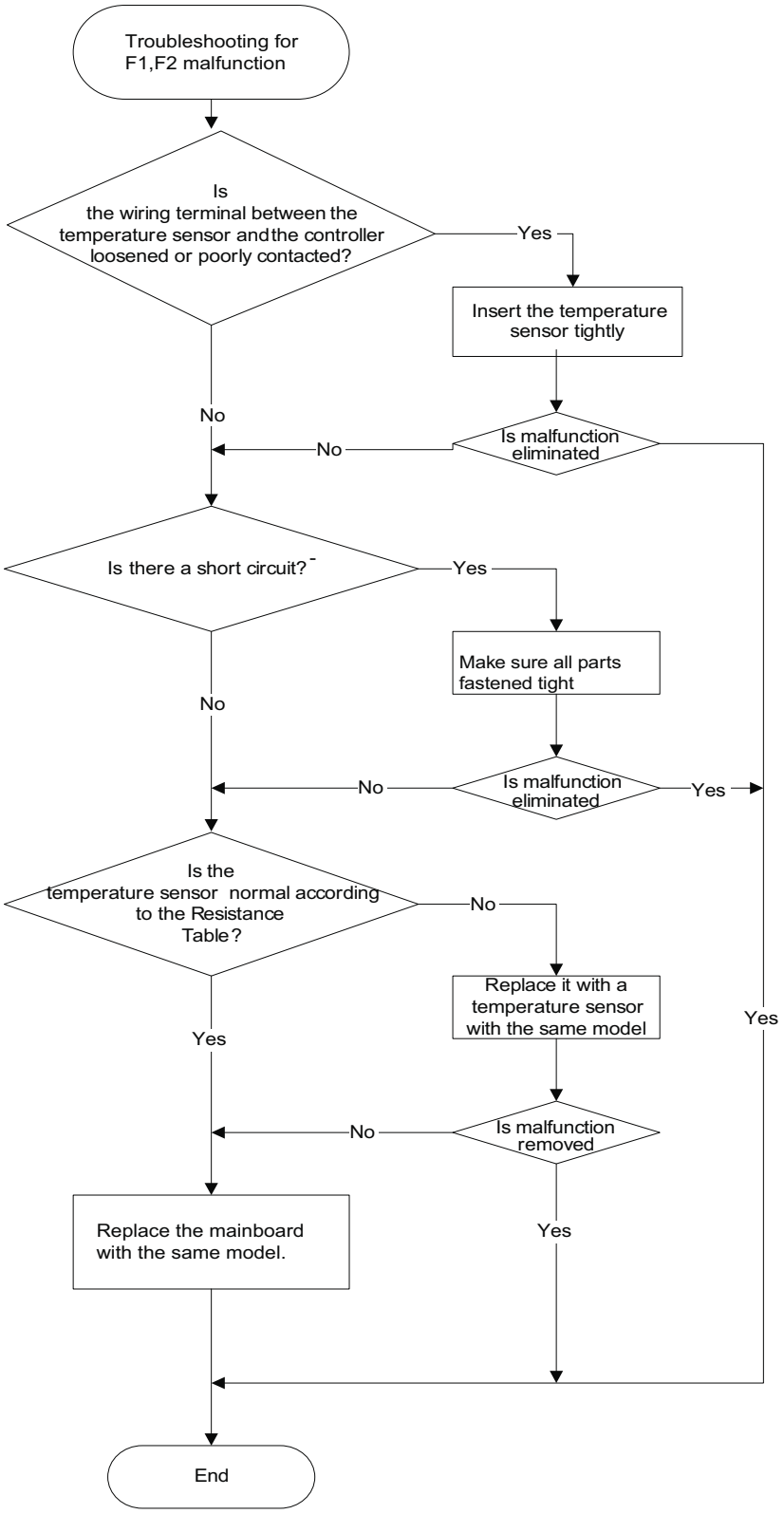


Fig. 25 – Troubleshooting

2. Malfunction of Blocked Protection of IDU Fan Motor H6

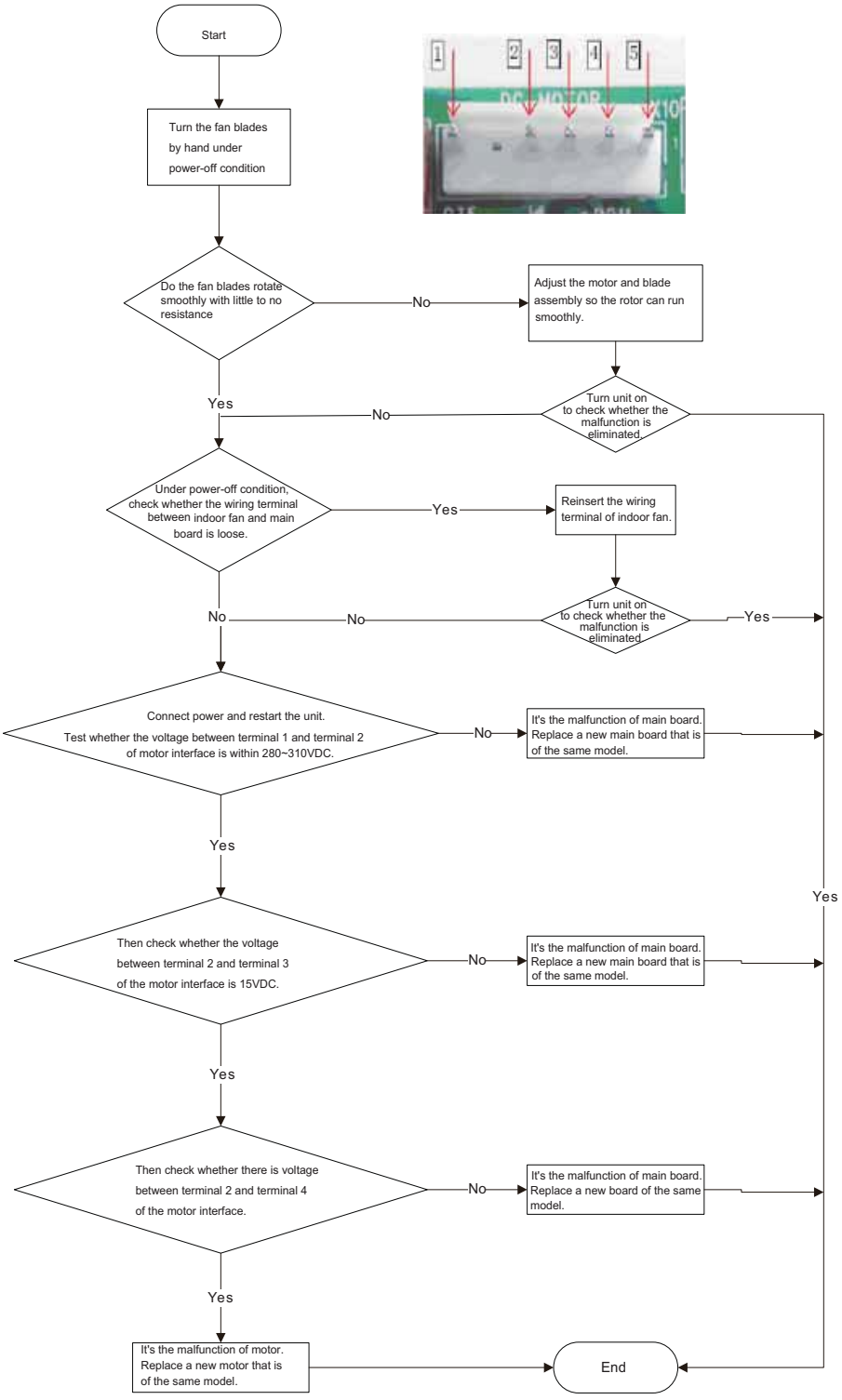


Fig. 26 – Troubleshooting

3. Malfunction of Protection of Jumper Cap C5

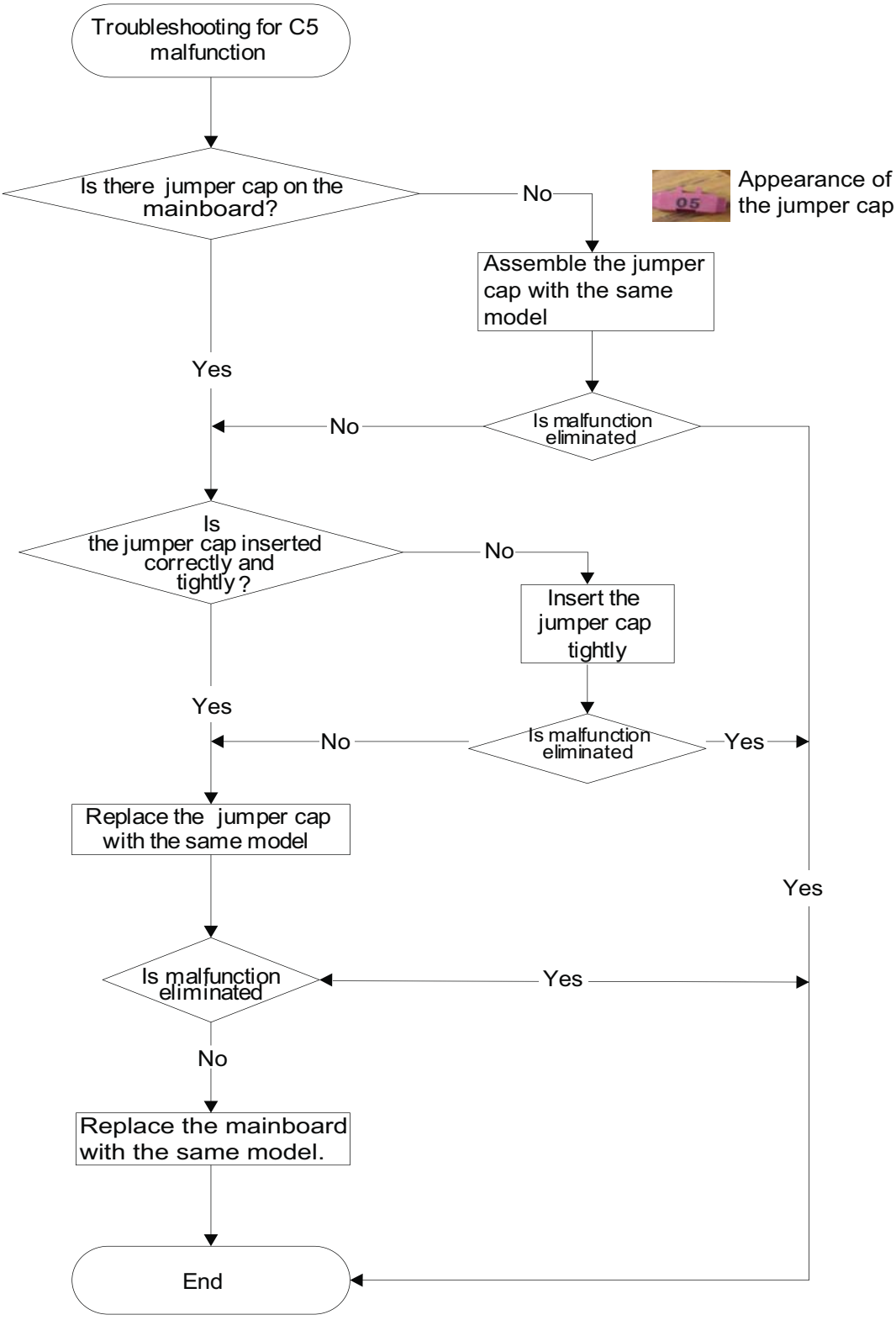


Fig. 27 – Troubleshooting

4. Malfunction of Over current Protection E5



Fig. 28 – Troubleshooting

5. Communication Malfunction E6

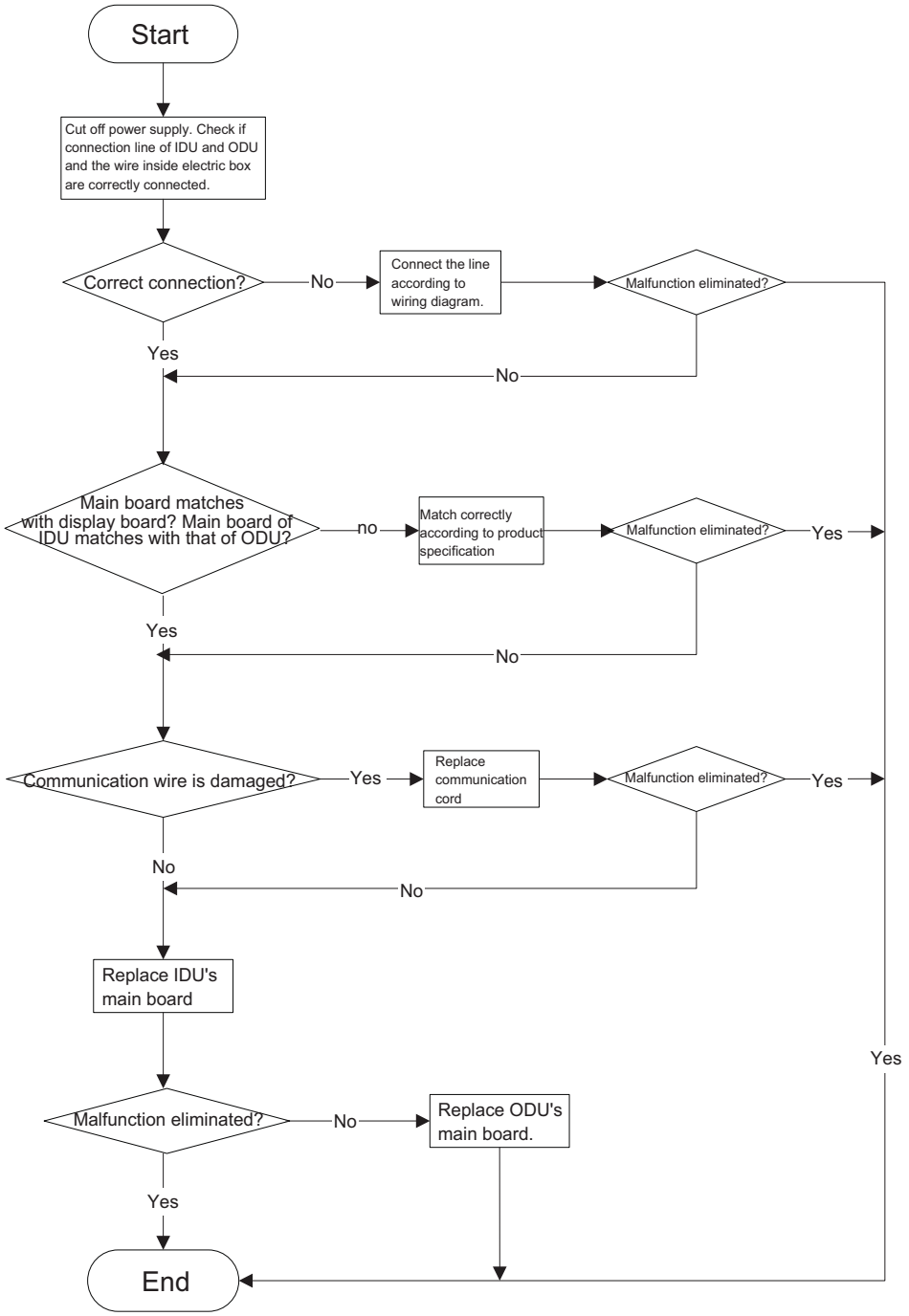


Fig. 29 – Troubleshooting

Outdoor Unit

09K/12K

1. Capacity charging malfunction (outdoor unit malfunction) (AP1 below means control board of the outdoor unit)

Main detection points:

- Detect of the voltage of L1 and L2 terminals of XT wiring board is between 210VAC-240VAC by alternating voltage meter.
- Is reactor (L) well connected? Is connection wire loosened or pulled out?

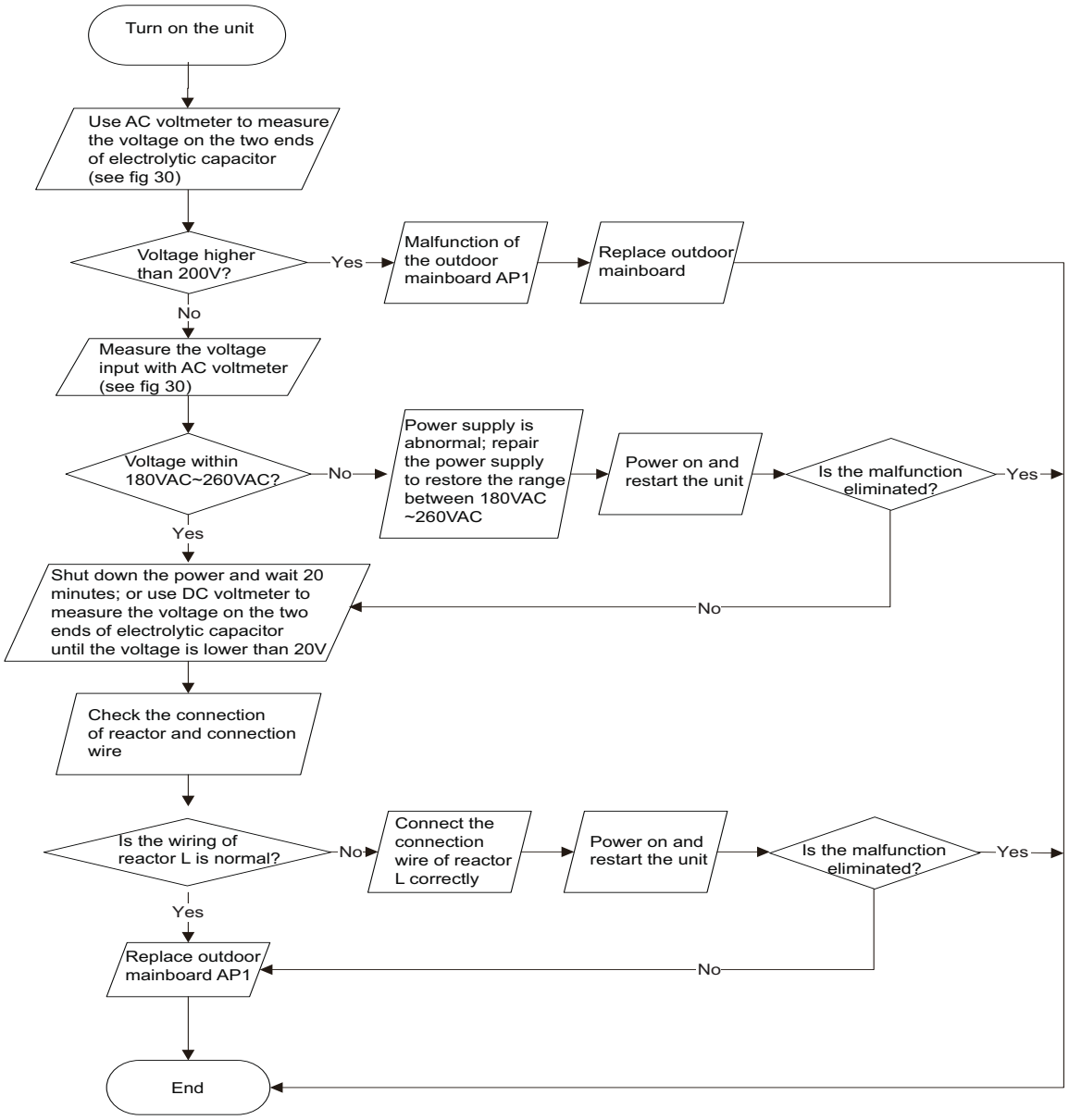


Fig. 30 – Troubleshooting

2. IPM protection (H5), de-synchronizing malfunction (H7), over-current of compressor phase current (P5) (AP1 below means control board of the outdoor unit).

Main detection points:

- Is voltage input within the normal range?
- Is the control board AP1 connected with the compressor comp?
- Are the connections tight?
- Is the connection sequence correct?
- Heat exchange of unit is blocked (heat exchanger is dirty).
- Is the system pressure too high?
- Is the refrigerant charging amount correct?
- Is the coil resistance of compressor normal?

Malfunction diagnosis process:

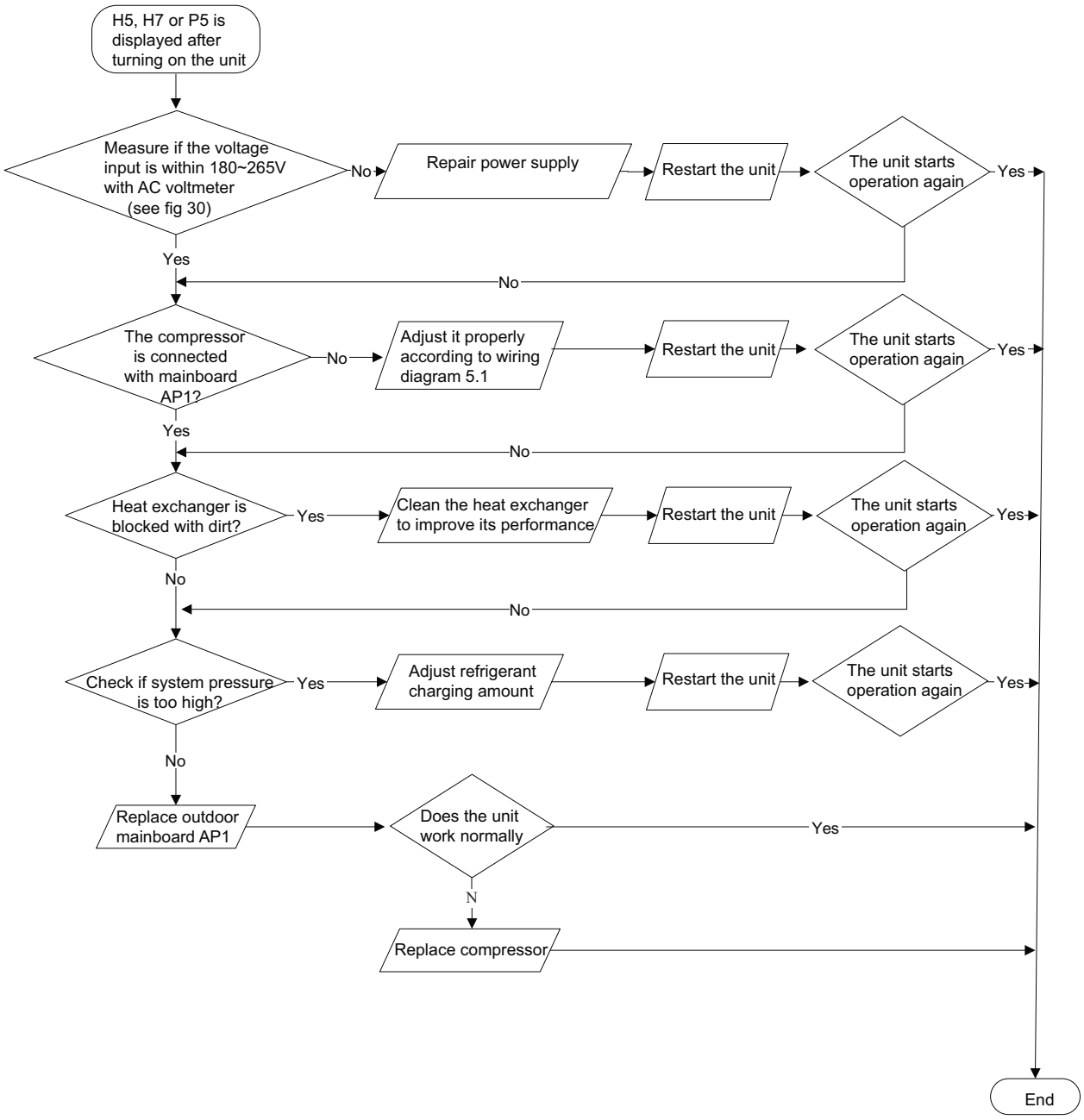


Fig. 31 – Troubleshooting

3. High temperature and overload protection (E8) (AP1 below means control board of outdoor unit)

Main detection points:

- Is the outdoor ambient temperature in normal range?
- Is the indoor and outdoor fan running normally?
- Is the condensing unit blocked with dirt and debris?

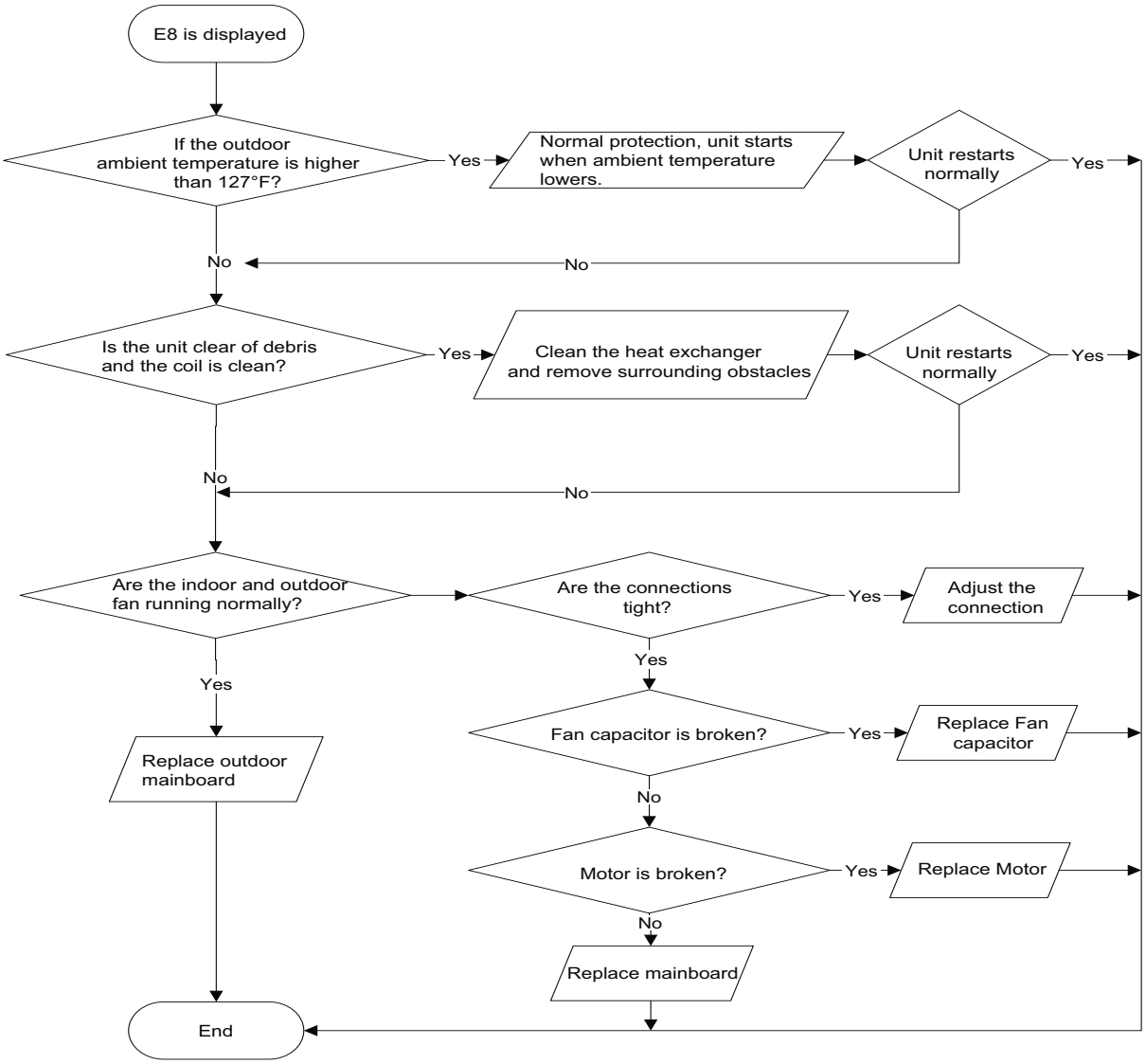


Fig. 32 – Troubleshooting

4. Start-up failure (LC) (AP1 below means control board of the outdoor unit.

Main detection points:

- Is the compressor wiring correct?
- Is the compressor stop time sufficient?
- Is the compressor damaged?
- Is the unit overcharged?

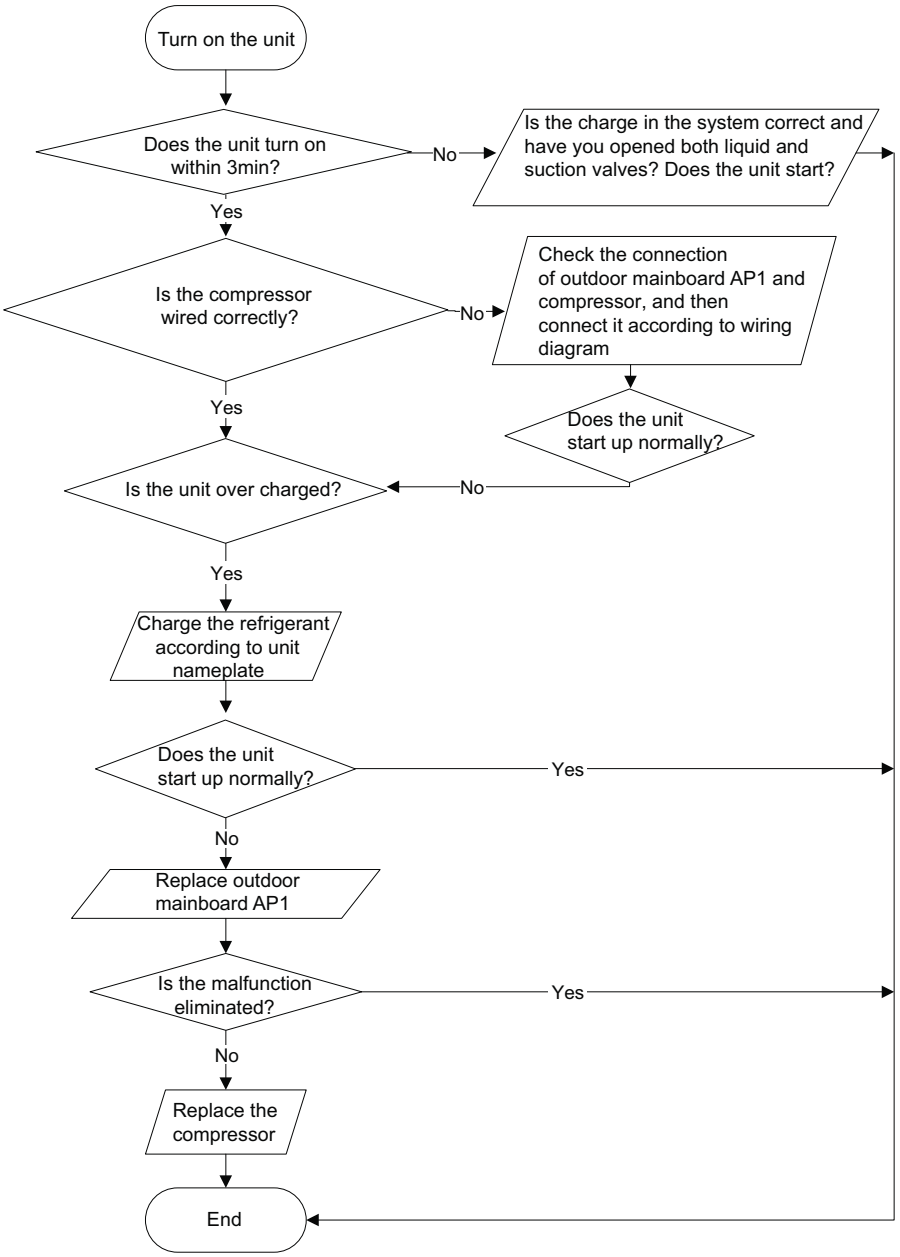


Fig. 33 – Troubleshooting

5. Overload and high discharge temperature malfunction

Main detection points:

- Is the electronic expansion valve connected to the board?
- Is the electronic expansion valve damaged?
- Do you have a refrigerant leak?
- Is the compressor overload protection terminal connected to the mainboard?
- Is the overload protector damaged?
- Is the heat exchange plugged or cracked?
- Is the heat exchanger dirty?
- Is the ambient temperature too high?
- Is there a malfunction in the discharge temperature sensor?

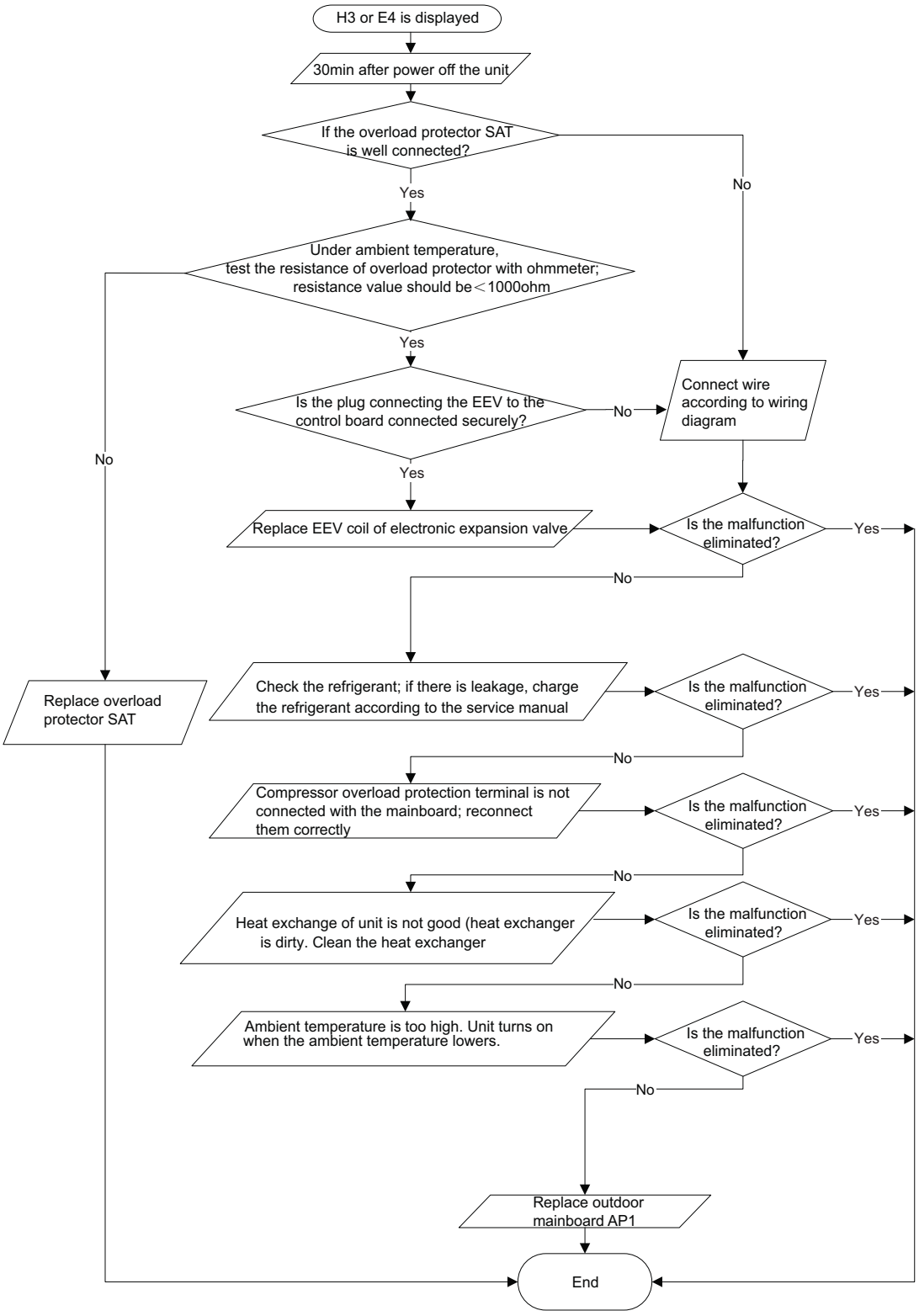


Fig. 34 – Troubleshooting

6. PFC (correction for power factor) malfunction (outdoor unit malfunction)

Main detection points:

- Check if wire is connected properly and if there are any breaks.
- Check of the reactor of the outdoor unit is damaged?

Malfunction diagnosis process:

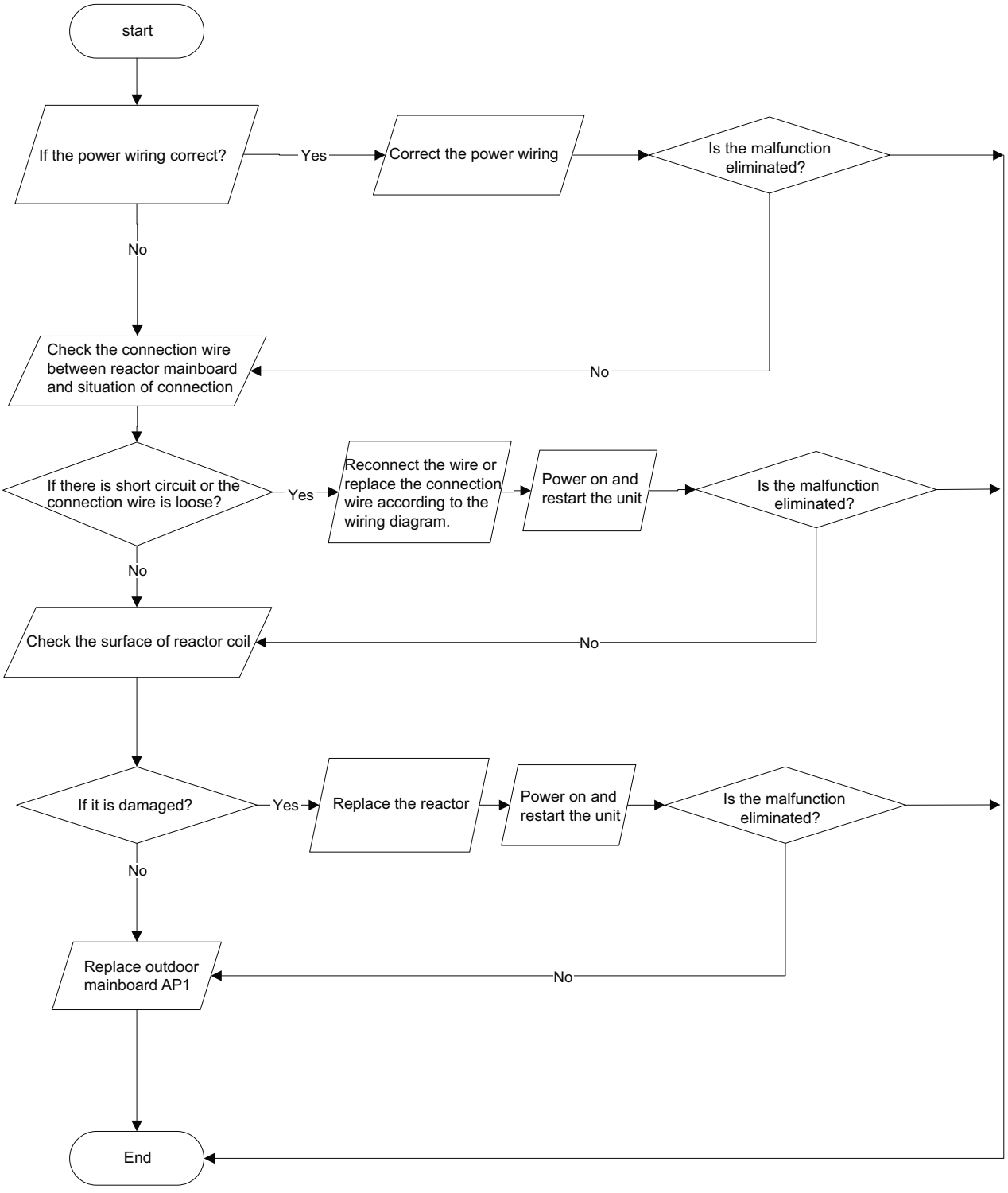


Fig. 35 – Troubleshooting

7. Communication malfunction (E6)

Main detection points:

- Check if the wire is damaged or the polarity is mixed between terminals.
- Is the communication circuit of the indoor mainboard damaged?
- Is the communication circuit of the outdoor mainboard (AP1) damaged?

Malfunction diagnosis process:

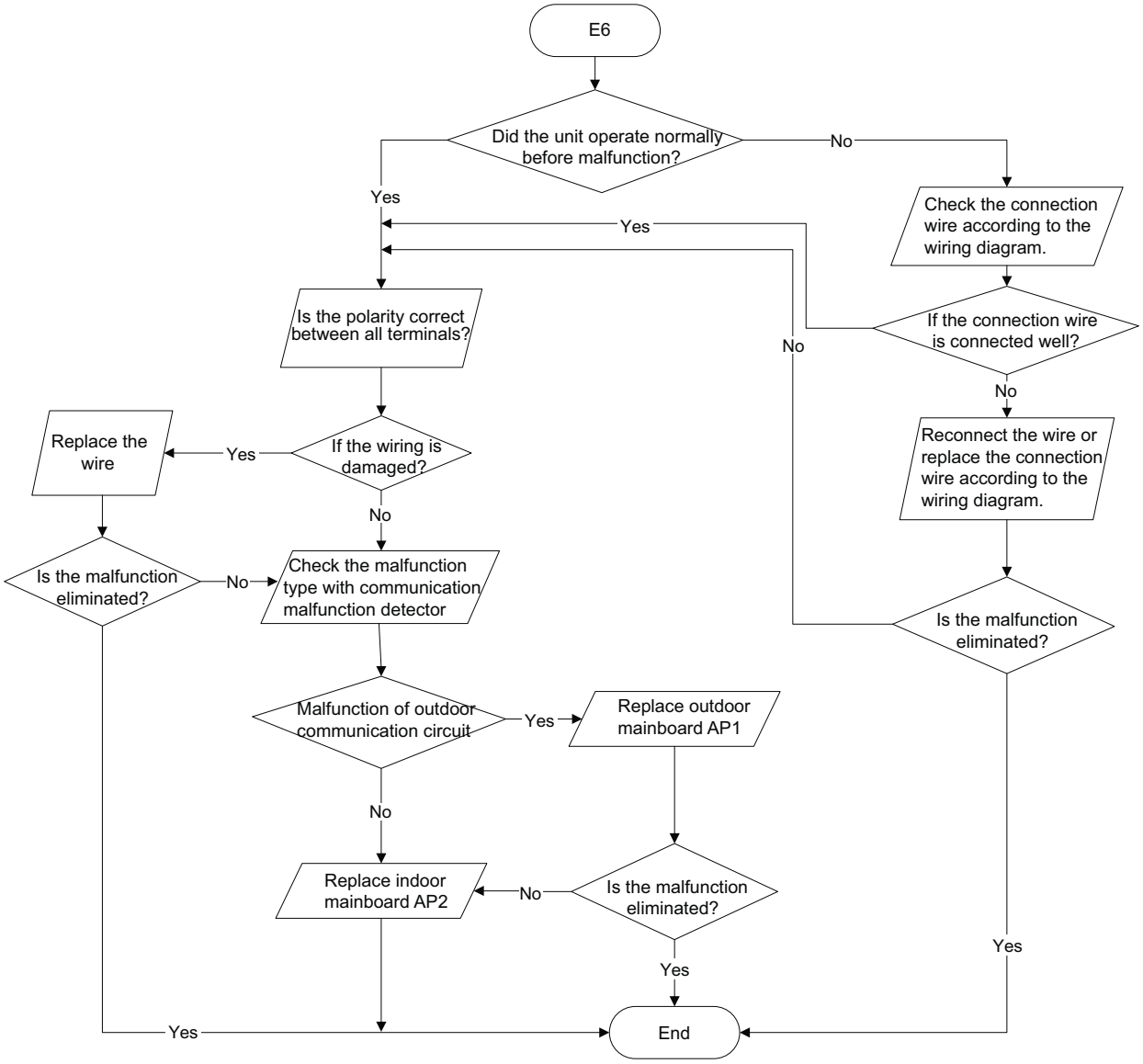


Fig. 36 – Troubleshooting

18K

1. Key detection point

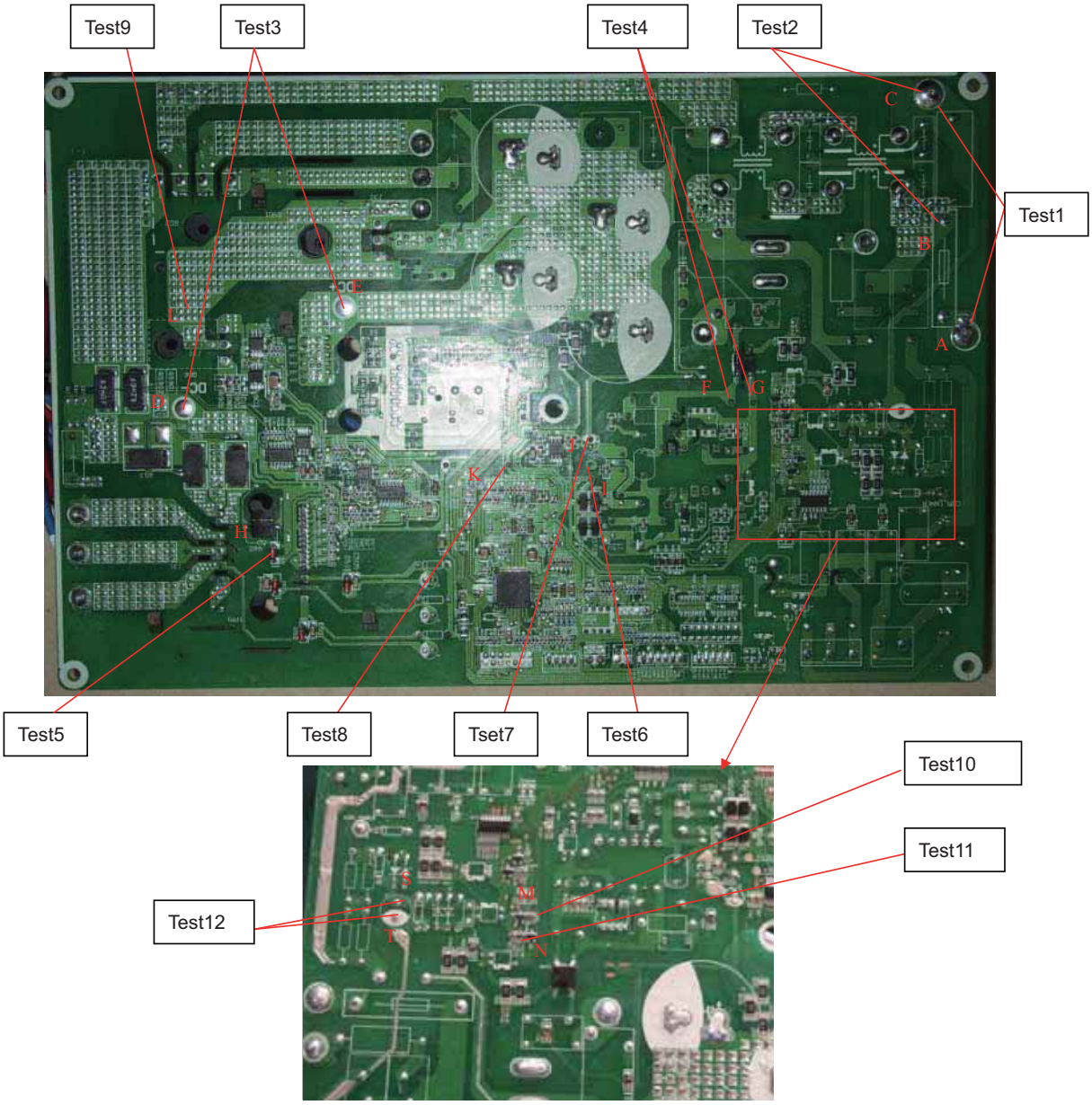


Fig. 37 – Key detection point

Test No.	Test Point	Corresponding component	Test value under normal condition
Test 1	Between A and C	Neutral and live wires	160V-265V
Test 2	Between B and C	Neutral and live wires	160V-265V
Test 3	Between D and E	DC busbar electrolytic capacitor	DC 180V-380V
Test 4	Between F and G	Electrolytic capacitor of power	DC 180V-380V
Test 5	Two ends of diode D15	D15(IPM modular +15V power supply)	DC 14.5V-15.6V
Test 6	Two ends of electrolytic capacitor C715	C715 (+12V power supply)	DC 12V-13V
Test 7	Two ends of electrolytic capacitor C710	C710 (+5V power supply)	DC 5V
Test 8	Two ends of electrolytic capacitor C226	C226 (+3.3V power supply)	DC 3.3V
Test 9	Two ends of chip capacitor C912	C912 (+17V power supply)	DC 15V-18V
Test 10	Between M to GND	Point M of R75 to ground (signal sending port of ODU)	Fluctuate between 0-3.3V
Test 11	Between N to GND	Point N of R123 to ground (signal receiving port of ODU)	Fluctuate between 0-3.3V
Test 12	Between S and T	Power supply of communication ring	DC 56V

2. Capacity charging malfunction (outdoor unit malfunction) (AP1 below is control board of the outdoor unit).

Main detection points:

- Detect of the voltage of L1 and L2 terminals of the wiring board is between 210AC-240AC by alternating voltage meter.
- Is reactor (L) well connected? Is connection wire loosened or pull-out? Is reactor (L) damaged?

Malfunction diagnosis process:

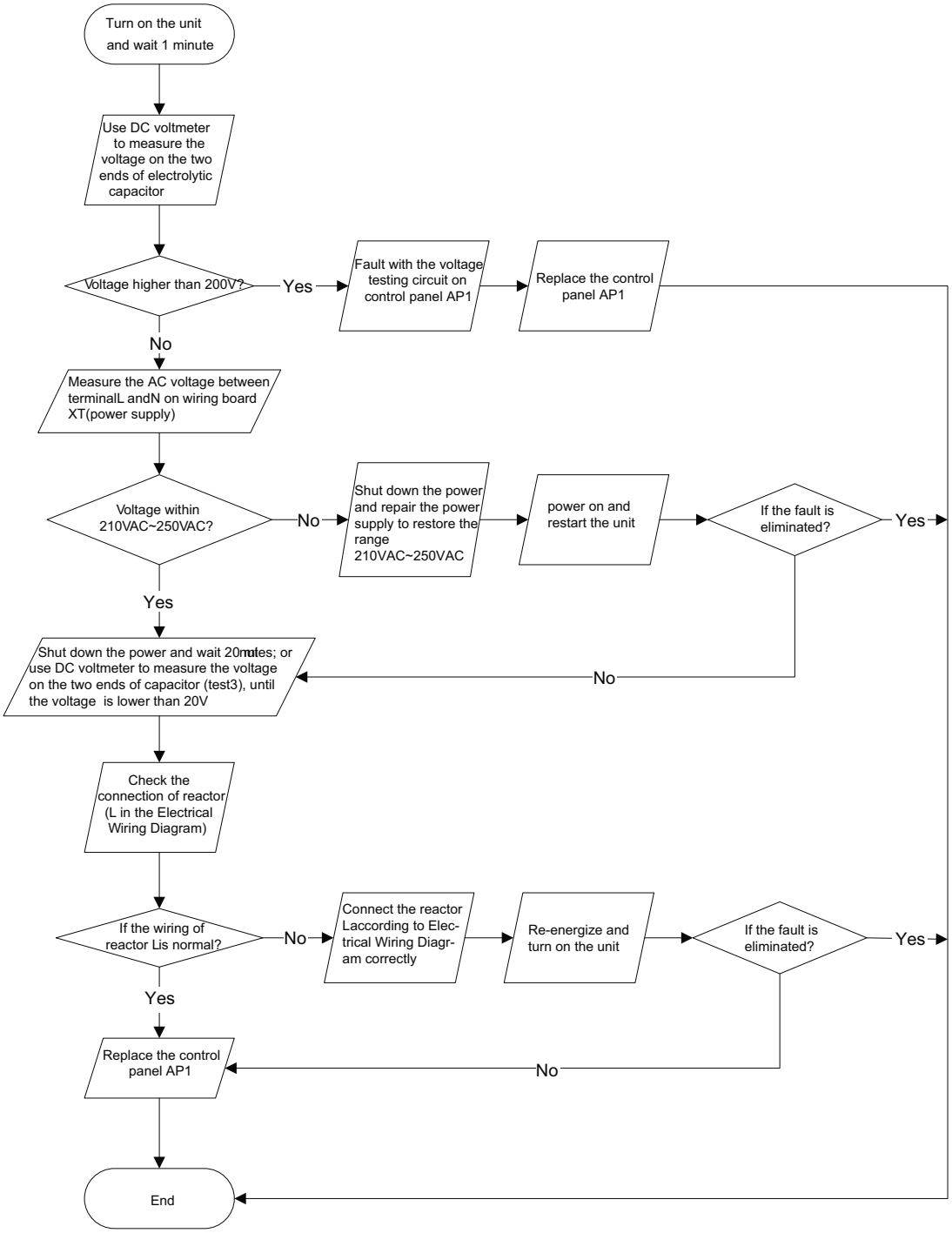


Fig. 38 – Troubleshooting

3. IPM protection, de-synchronizing malfunction, phase current of compressor is over current (AP1 below is control board of outdoor unit)

Main detection points:

- Is the control board AP1 and compressor COMP well connected or are they loose? Is the connection sequence correct?
- Is the voltage input in the normal range (test the voltage between L1, L2 of the wiring board XT with a DC voltage meter)?
- Is the compressor coil resistance normal? Is the compressor coil insulated to the copper pipe well?
- Is the coil blocked with dirt and debris?
- Is the charge correct?

Malfunction diagnosis process:

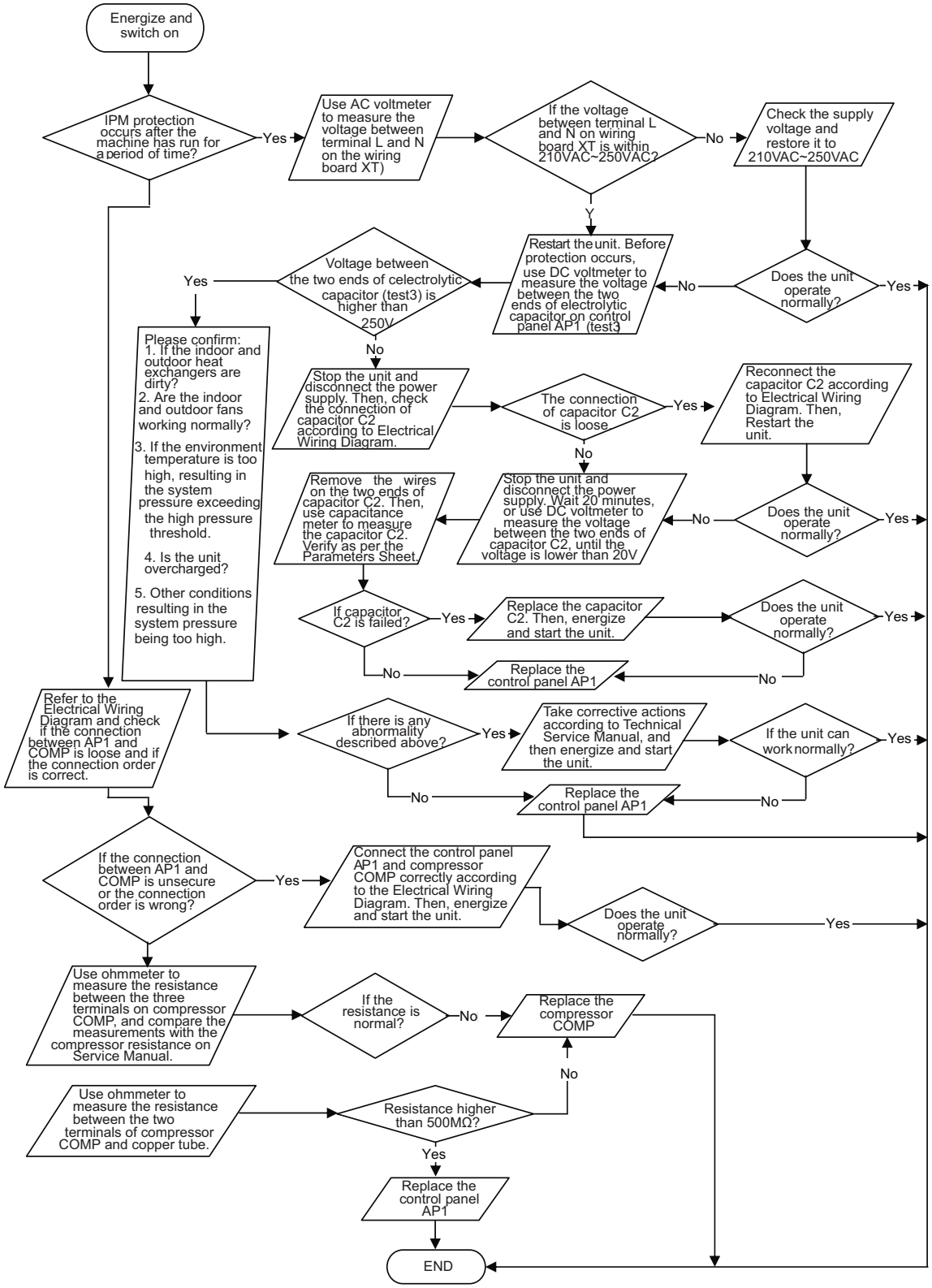


Fig. 39 – Troubleshooting

4. Diagnosis for anti-high temperature, overload protection (AP1 below is control board of the outdoor unit).

Main detection points:

- If the outdoor ambient temperature is in the normal range
- If the indoor and outdoor fan is running normal
- Are the units clear of dirt and debris?

Malfunction diagnosis process:

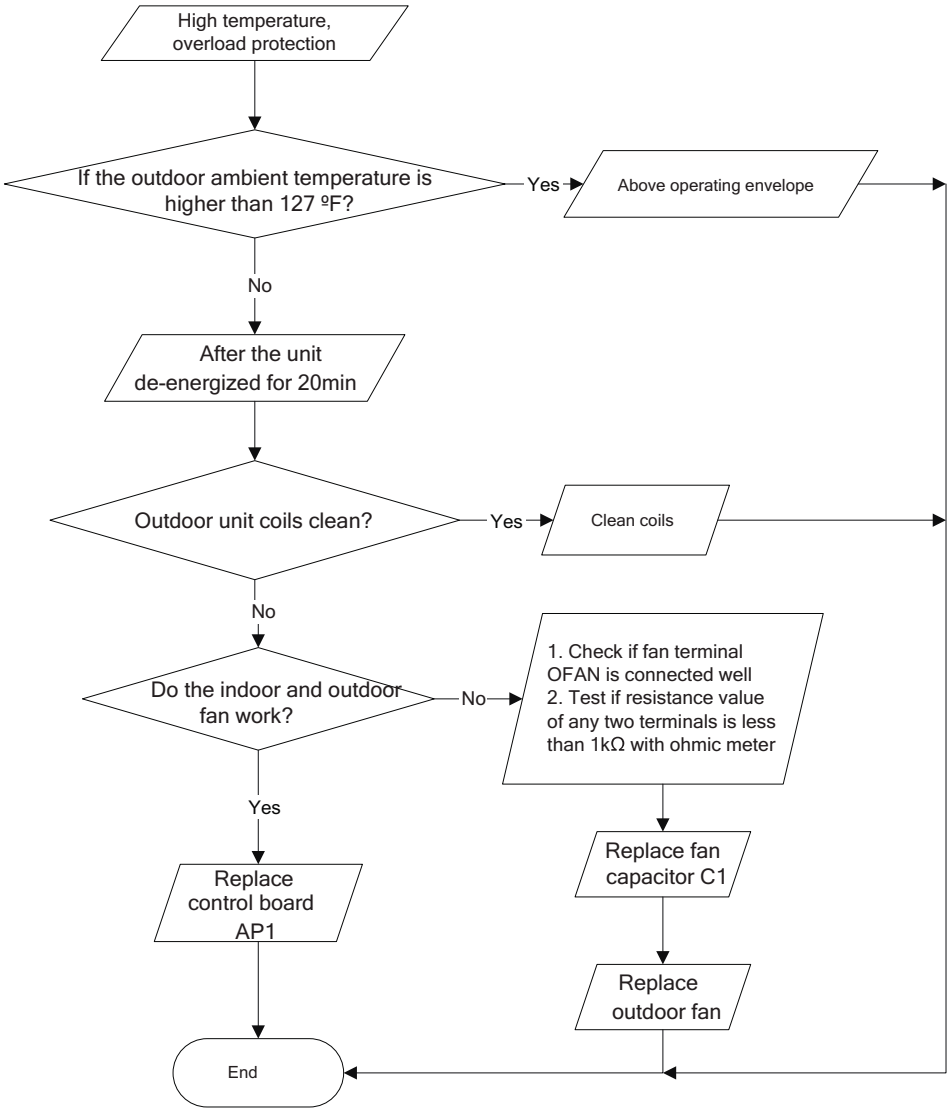


Fig. 40 – Troubleshooting

5. Diagnosis for failure start up malfunction (AP1 below is control board of outdoor unit)

Main detection points:

- Is the compressor wiring correct?
- Is the compressor stop time long enough?
- Is the compressor damaged?
- Is the refrigerant charged correctly?

Malfunction diagnosis process:

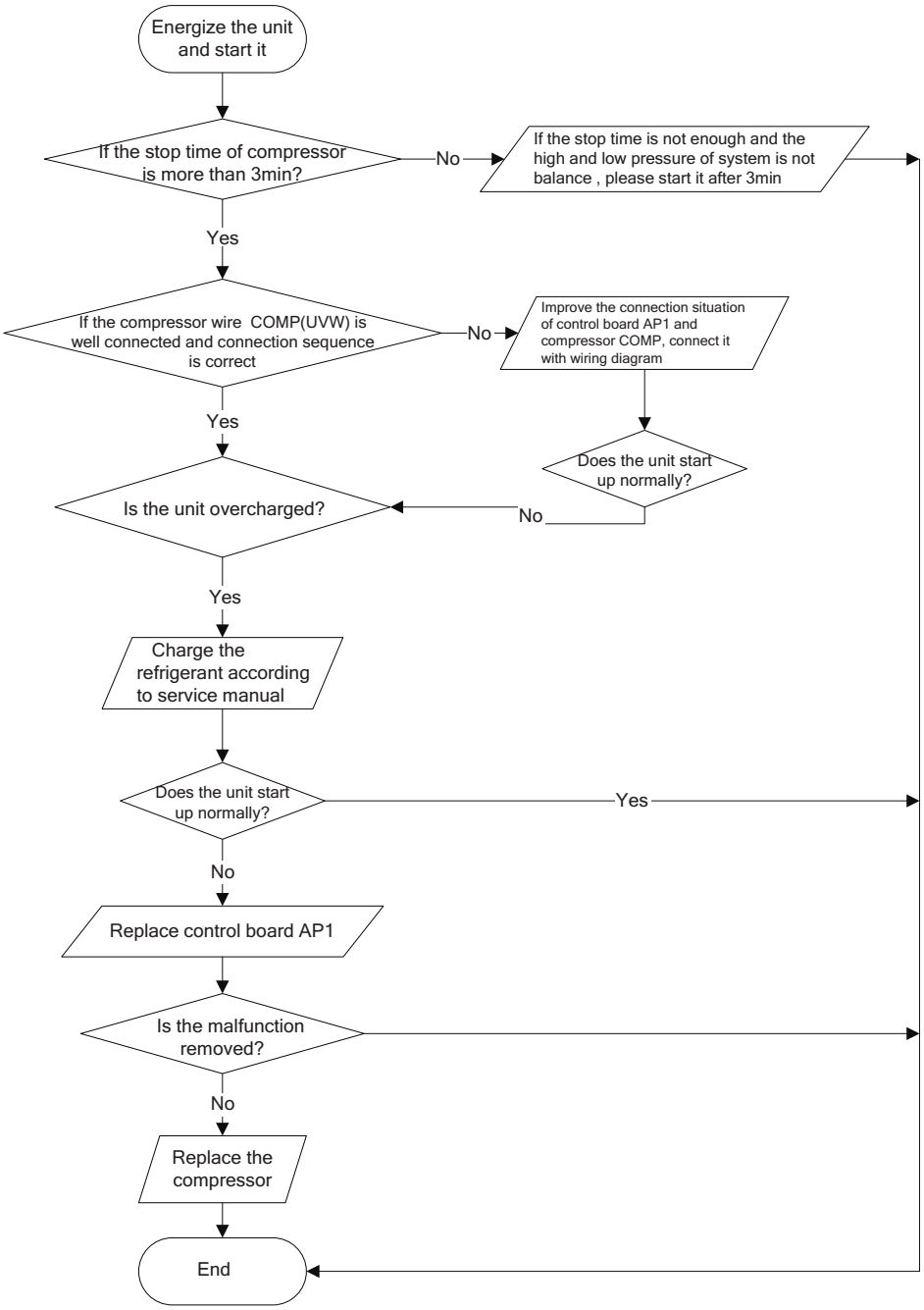


Fig. 41 – Troubleshooting

6. Diagnosis for compressor synchronism (AP1 below is control board of the outdoor unit)

Main detection points:

- Is the system pressure high?
- Is the voltage too low?

Malfunction diagnosis process:

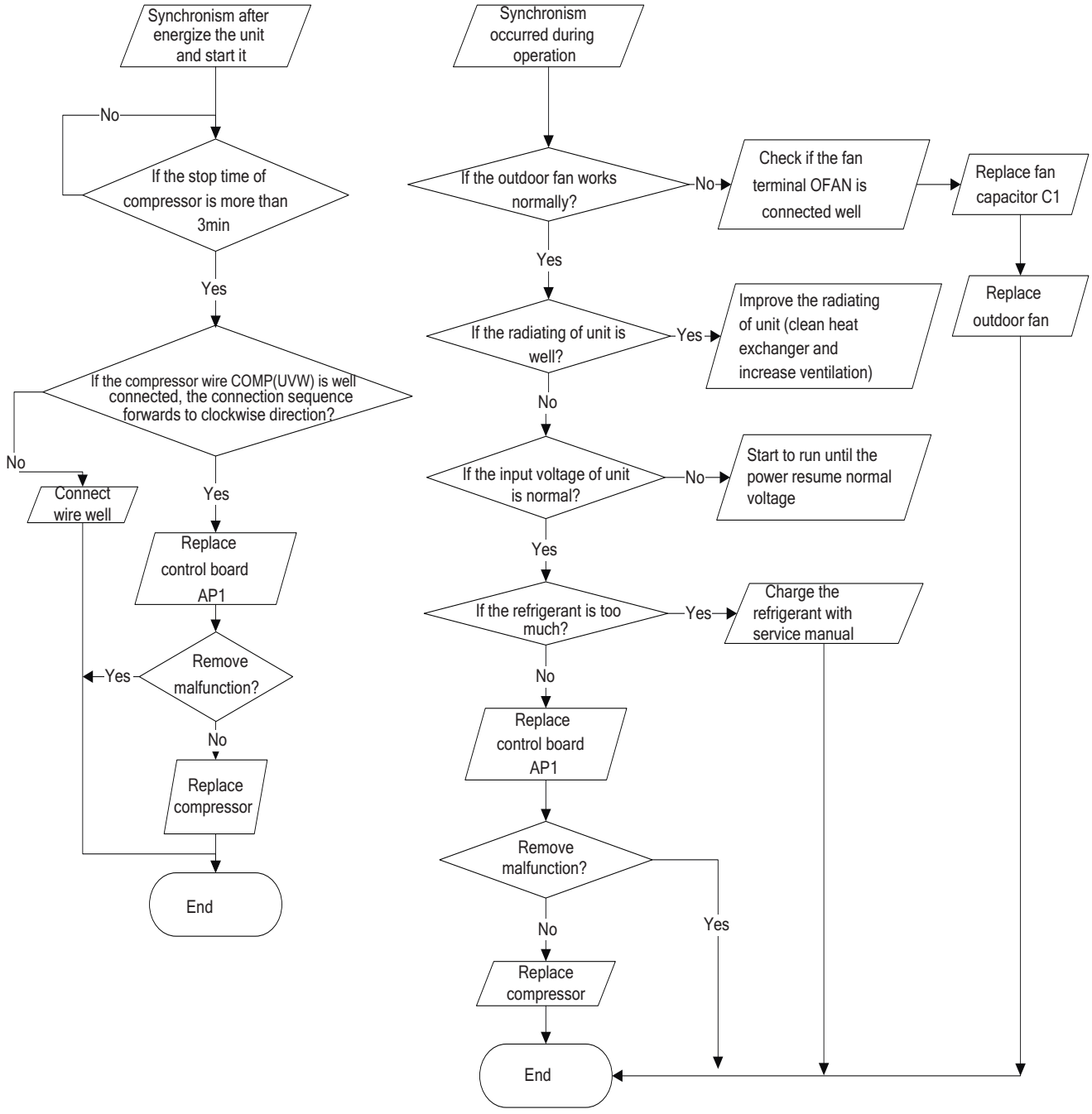


Fig. 42 – Troubleshooting

7. Diagnosis for overboard and discharge malfunction (AP1 below is control board of outdoor unit)

Main detection points:

- Is the electron expansion valve well connected? Is the expansion valve damaged?
- Is there a refrigerant leak?
- Is the overload protection damaged?

Malfunction diagnosis process:

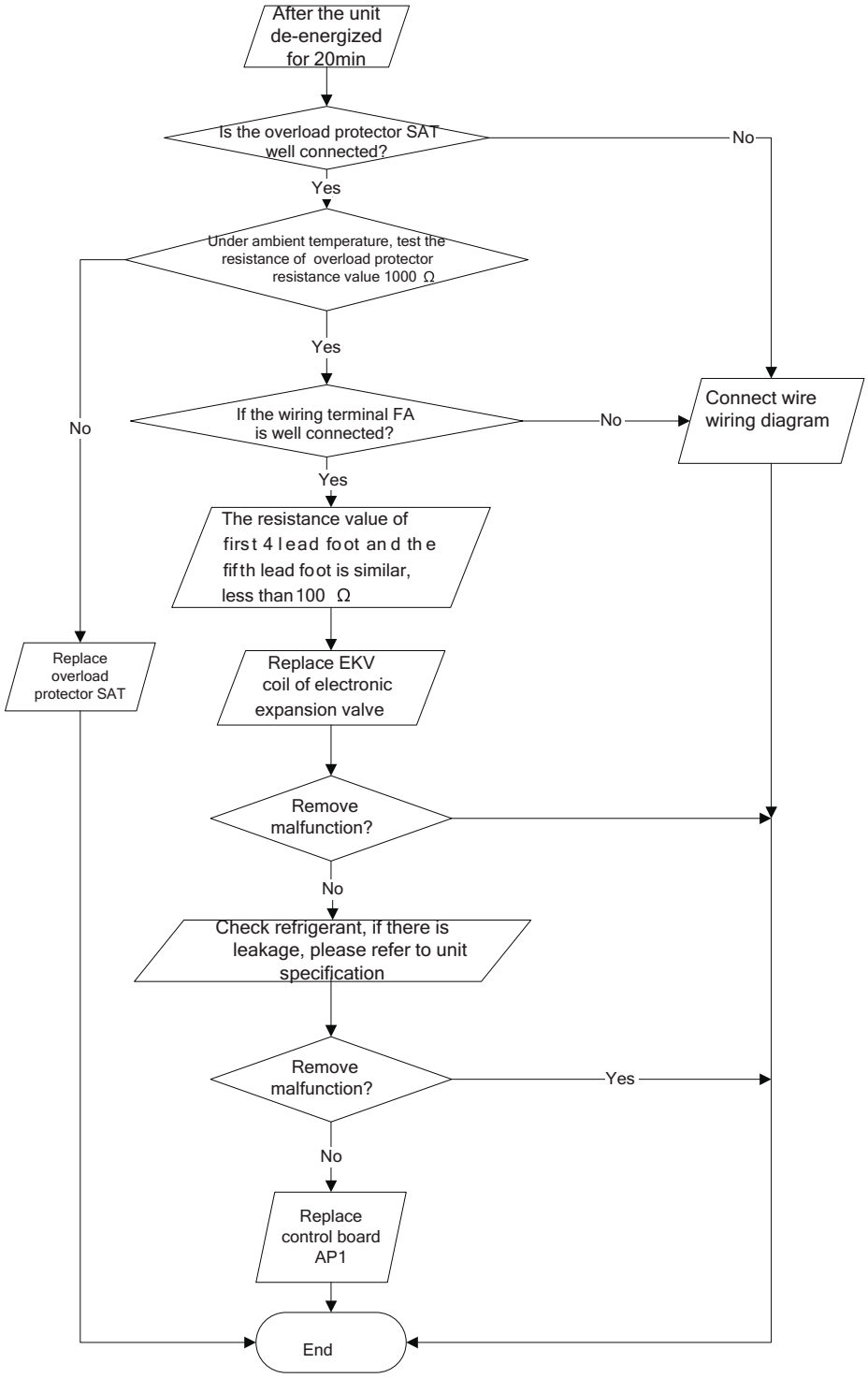


Fig. 43 – Troubleshooting

8. PFC (correction for power factor) malfunction (outdoor unit malfunction) (AP1 below is control board of the outdoor unit).

Main detection point:

- Check if reactor (L) of outdoor unit and PFC capacity are damaged.

Malfunction diagnosis process:

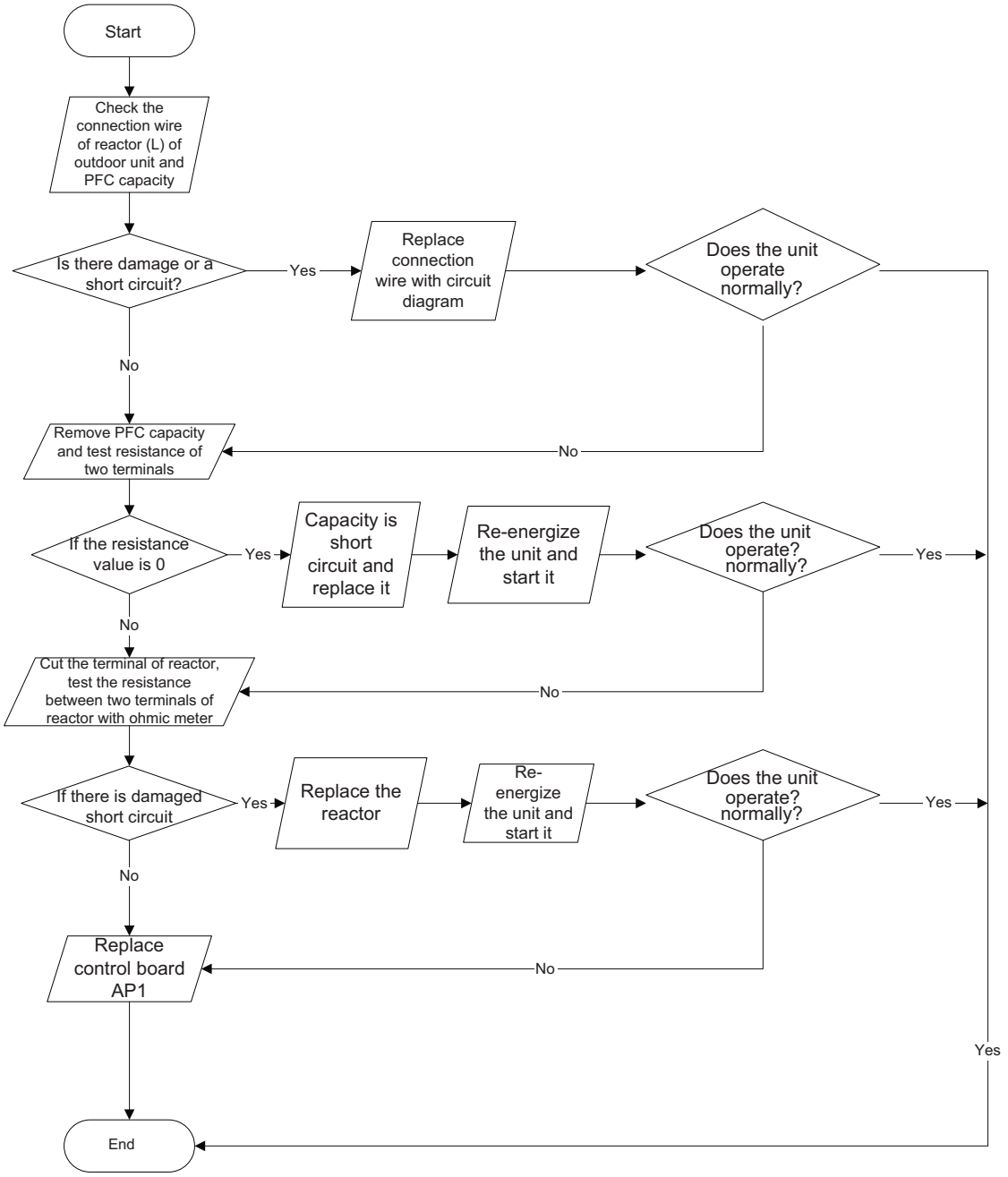


Fig. 44 – Troubleshooting

9. Communication malfunction (AP1 below is control board of the outdoor unit).

Main detection points:

- Check if the connection wire and the built-in wiring of the indoor and the outdoor unit is connected well and not damaged.
- Is the communication circuit of the indoor mainboard damaged? Is the communication circuit of the outdoor mainboard (AP1) damaged?

Malfunction diagnosis process:

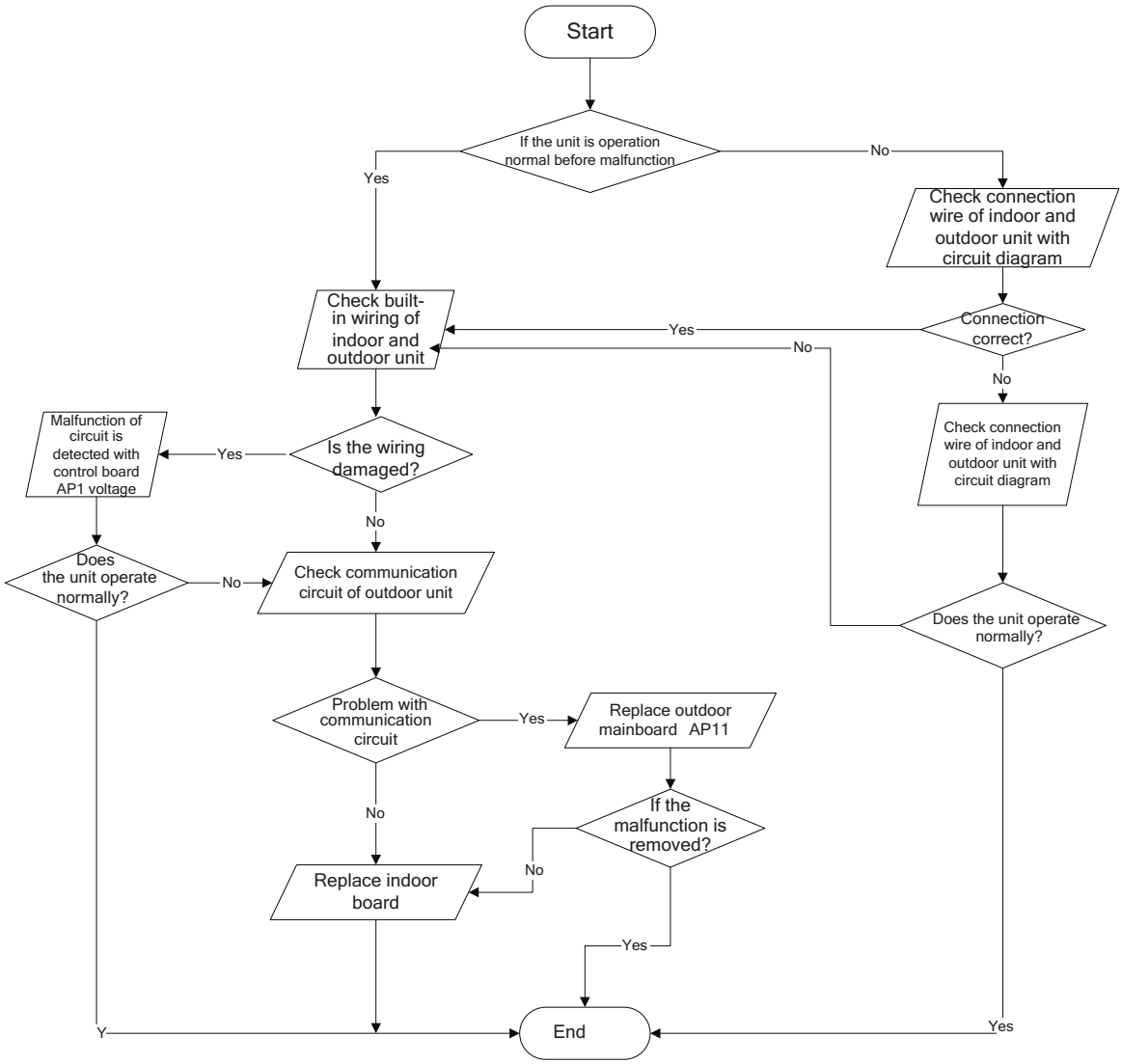


Fig. 45 – Troubleshooting

10. Diagnosis process for outdoor communication circuit.

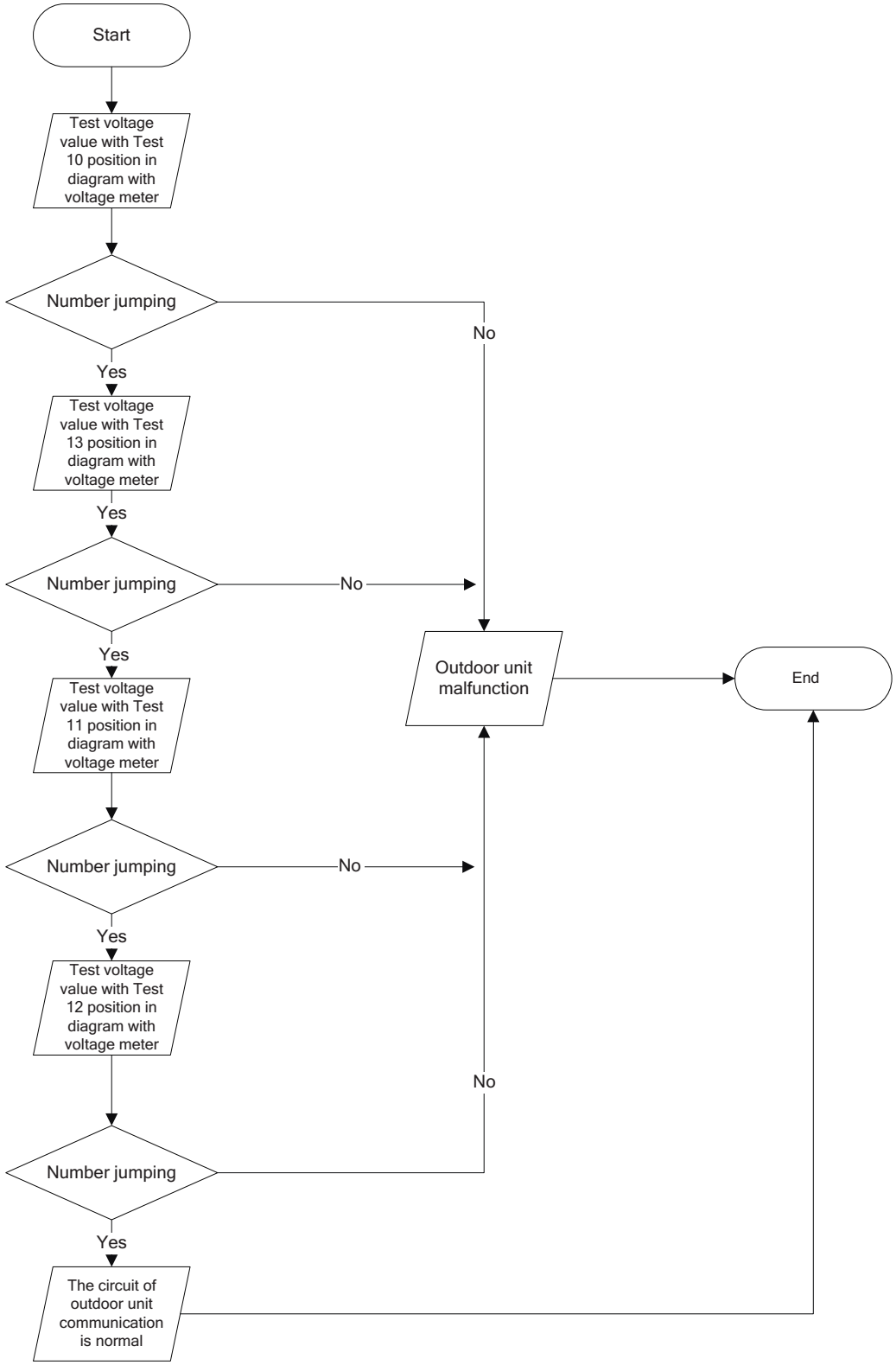


Fig. 46 – Troubleshooting

TROUBLESHOOTING FOR NORMAL MALFUNCTION

1. Air conditioner can not start up

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
No power supply or poor connection for power plug	After energizer, operation indicator is not bright and the buzzer can not give out sound.	Confirm whether it's due to power failure. If yes, wait for power recovery. If not, check power supply circuit and ensure the power plug is connected well.
Wrong wire connection between indoor unit and the outdoor unit, or poor connection for wiring terminals.	Under normal power supply circumstances, operation indicator is not bright after energization	Check the circuit according to the circuit diagram and connect wires correctly. Ensure all wiring terminals are connected firmly.
Electric leakage from air conditioner	After energization, room circuit breaker trips off at once.	Ensure the air conditioner is ground reliably. Ensure wires of the air conditioner are connected correctly. Check the wiring inside the air conditioners. Check whether the insulation layer of power cord is damaged; if yes replace the power cord.
Model selection for air switch is improper	After energization air switch trips off	Select proper air switch
Malfunction of remote controller	After energization, operation indicator is bright while no display on remote controller or buttons have no action.	Replace batters for remote controller Repair or replace remote controller

2. Poor cooling (heating) for air conditioner

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
Set temperature is improper	Observe the set temperature on remote controller	Adjust the set temperature
Rotation speed of the IDU fan motor is set too low	Small wind blow	Set the fan speed at high or medium
Filter of indoor unit is blocked	Check the filter to see if its blocked	Clean the filter
Installation position for the indoor and outdoor units is improper	Check whether the installation position is correct according to installation requirements for air conditioner.	Adjust the installation position and install the rainproof and sun proof for the outdoor unit
Refrigerant is leaking	Discharged air temperature during cooling is higher than normal discharged wind temperature. Discharged air temperature during heating is lower than normal discharged wind temperature. Unit's pressure is much lower than regulated range.	Find the leakage causes and repair them. Add refrigerant.
Malfunction of 4-way valve	Blow cold wind during heating	Replace the 4-way valve
Malfunction of capillary	Discharged air temperature during cooling is higher than normal discharged wind temperature. Discharged air temperature during heating is lower than normal discharged wind temperature. Unit's pressure is much lower than regulated range. If refrigerant is not leaking, part of capillary is blocked.	Replace the capillary
Flow volume is insufficient	The pressure of valves is much lower than that stated in the specification	Open the valve completely
Malfunction of horizontal louver	Horizontal louver can not swing	Refer to point 3 of maintenance method for details
Malfunction of the IDU fan motor	The IDU fan motor can not operate	Refer to troubleshooting for H6 for maintenance method in details
Malfunction of the ODU fan motor	The ODU fan motor can not operate	Refer to point 4 of maintenance method for details
Malfunction of compressor	Compressor can not operate	Refer to point 5 of maintenance method for details

3. Horizontal louver can not swing

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
Wrong wire connection, or poor connection	Check the wiring status according to the circuit diagram	Connect wires according to the wiring diagram to ensure all wiring terminals are connected firmly
Stepping motor is damaged	Stepping motor cannot operate	Repair or replace stepping motor
Main board is damaged	Others are all normal while horizontal lover can not operate	Replace the main board with the same model

4. ODU fan motor can not operate

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
Wrong wire connection or poor connection	Check the wiring status according to circuit diagram	Connect wires according to the wiring diagram to ensure all wiring terminals are connected firmly.
Capacity of the ODU fan motor is damage. Wrong wire connection or poor connection	Measure the capacity of the fan capacitor with a universal meter and find that the capacity is out of the deviation range indicated on the nameplate of the fan capacitor.	Replace the capacity of fan
Power voltage is too or high	Use a universal meter to measure the power supply voltage. The voltage is a little high or low	Suggest to equip with voltage regulator
Outdoor unit motor is damaged	When the unit is on, cooling/heating performance is bad and the ODU compressor generates a lot of noise and heat.	Change the compressor oil and refrigerant If no better, replace the compressor with a new one.

5. Compressor can not operate

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
Wrong wire connection or poor connection	Check the wiring status according to the circuit diagram	Connect wires according to the wiring diagram to ensure all wiring terminals are connected firmly
Capacity of compressor is damaged	Measure the capacity of the fan capacitor with a universal meter and find that the capacity is out of the deviation range indicated on the nameplate of the fan capacitor.	Replace the compressor capacitor
Power voltage is too low or high	Use a universal meter to measure the power supply voltage. The voltage is a little high or low	Suggest to equip with a voltage regulator
Compressor coil is burnt out	Use a universal meter to measure the resistance between the compressor terminals and its 0	Repair or replace the compressor
Cylinder of compressor is blocked	Compressor can not operate	Repair or replace the compressor

6. Air conditioner is leaking

Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
Drain pipe is blocked	Water leaking from indoor unit	Eliminate the foreign objects inside the drain pipe
Drain pipe is broken	Water leaking from drain pipe	Replace drain pipe
Wrapping is not tight	Water leaking from the pipe connection place of indoor unit	Wrap it again and bundle it tight

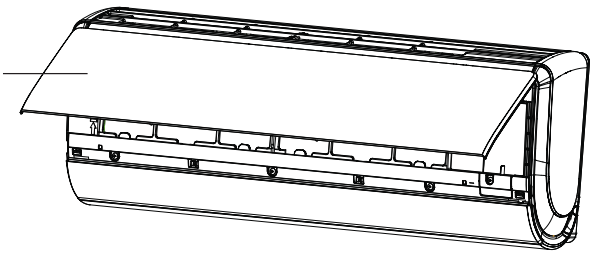
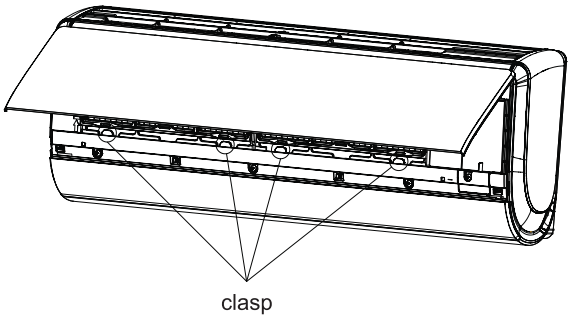
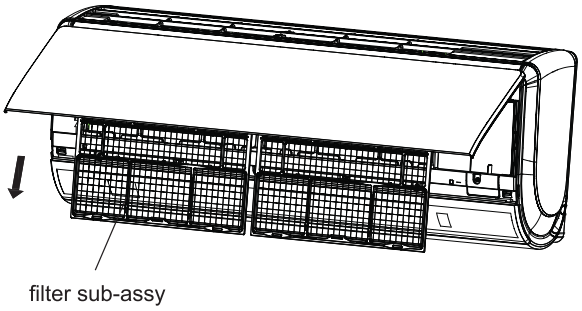
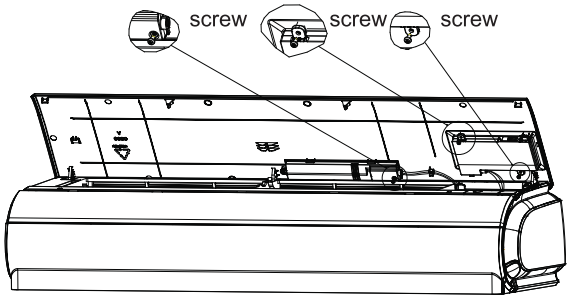
7. Abnormal sound and vibration

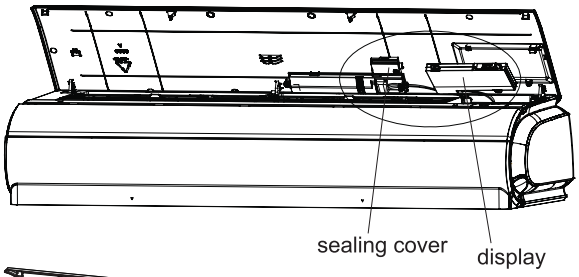
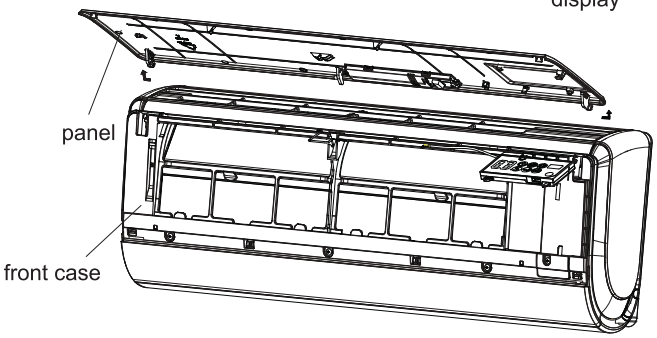
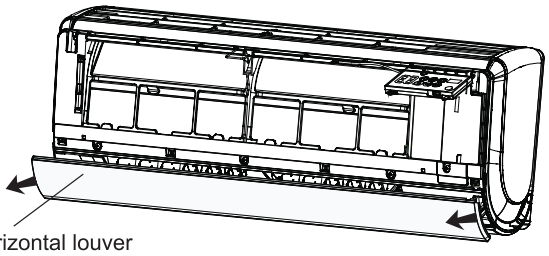
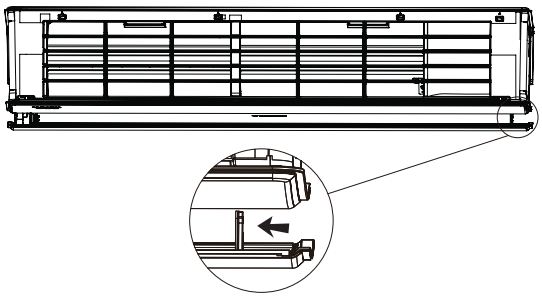
Possible Causes	Discriminating Method (Air Conditioner Status)	Troubleshooting
When turning on or off the unit, the panel and other parts expand and there is an abnormal sound	The unit may make a crackling or popping noise.	Normal phenomenon. Abnormal sound will disappear after a few minutes
When turning on or off the unit, there is an abnormal sound due to the flow of refrigerant inside the air conditioner	Water-running sound can be heard	Normal phenomenon. Abnormal sound will disappear after a few minutes
Foreign objects inside the indoor unit or there are parts touching together inside the indoor unit	There is an abnormal sound coming from the indoor unit	Remove the foreign objects. Adjust all parts positions of indoor units, tighten screws and stick damping plaster between connected parts.
Foreign objects inside the outdoor unit or there are parts touching together inside the outdoor unit	There is an abnormal sound coming from the outdoor unit	Remove the foreign objects. Adjust all parts positions of outdoor units, tighten screws and stick damping plaster between connected parts.
Abnormal shake of compressor	Outdoor unit gives out abnormal sound	Adjust the support foot mat of compressor. Tighten the bolts
Abnormal sound inside the compressor	Abnormal sound inside the compressor	If add too much refrigerant during maintenance, reduce refrigerant properly, Replace compressor for other circumstances.

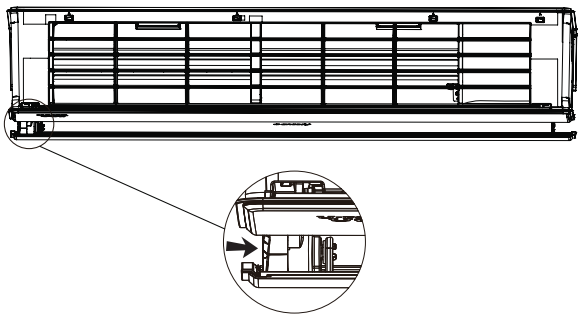
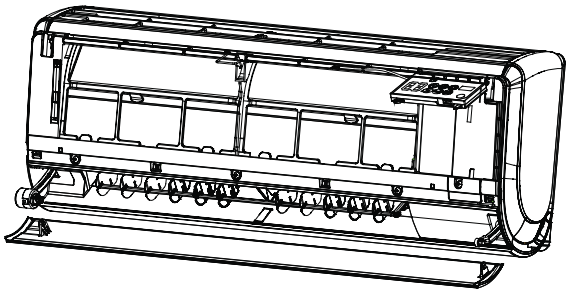
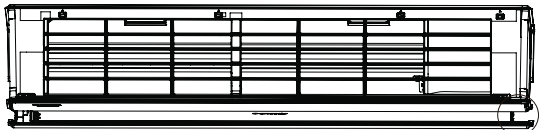
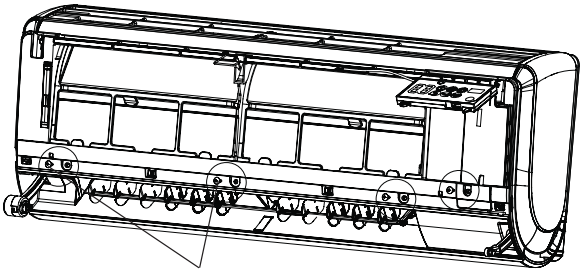
REMOVAL PROCEDURE

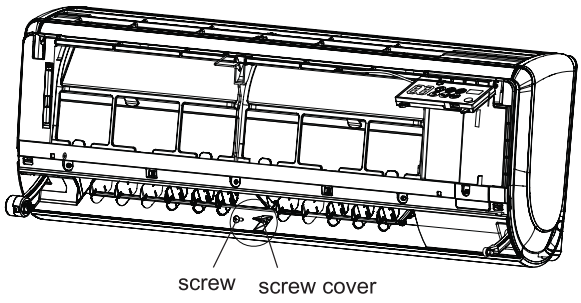
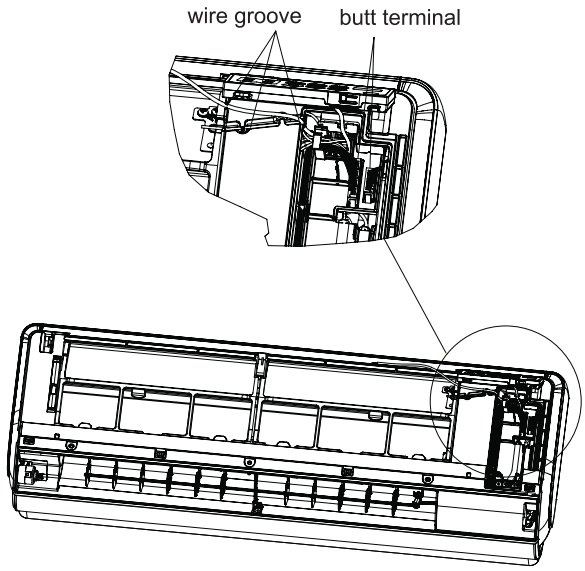
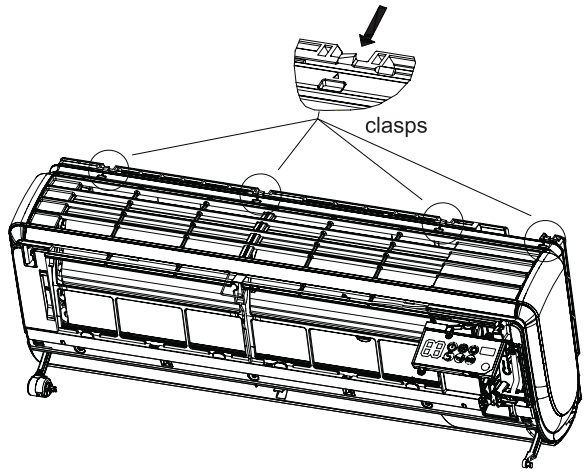
IMPORTANT: Discharge the refrigerant completely before removal.

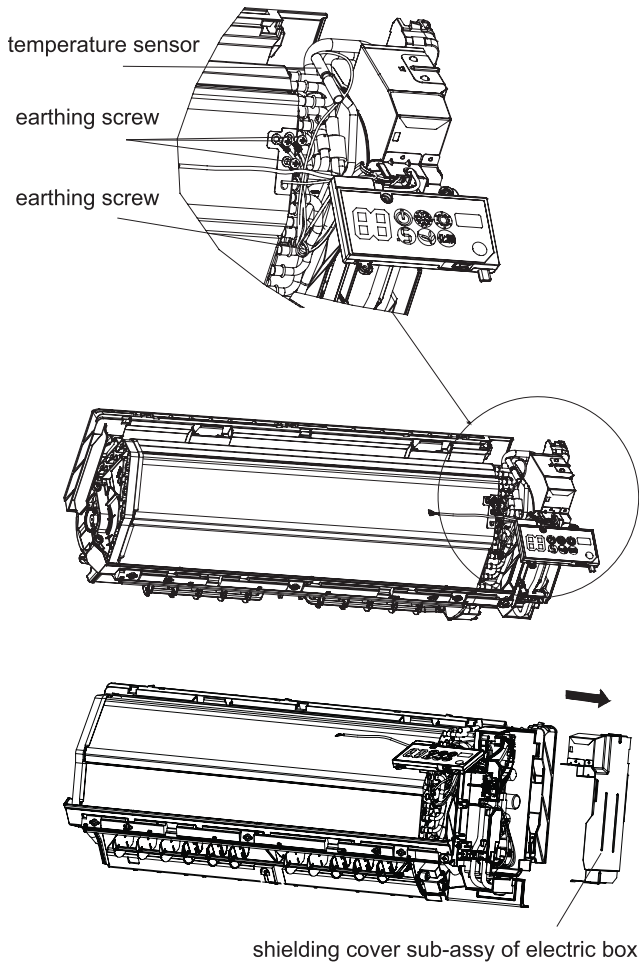
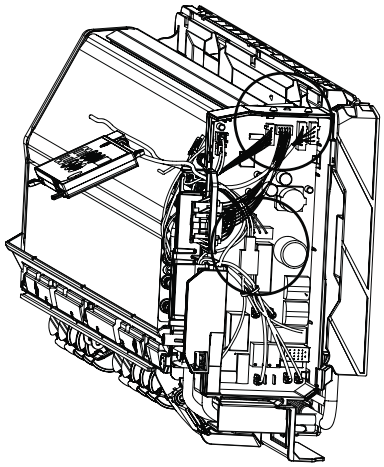
Indoor Unit Removal Procedure

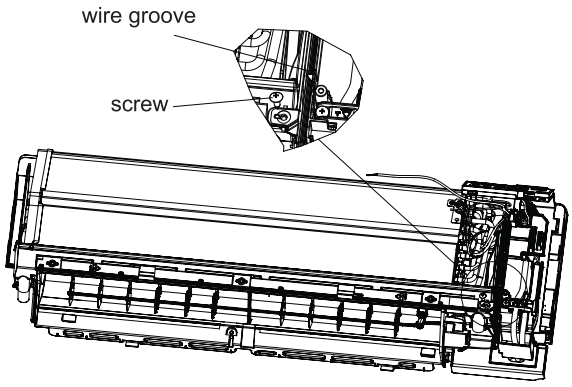
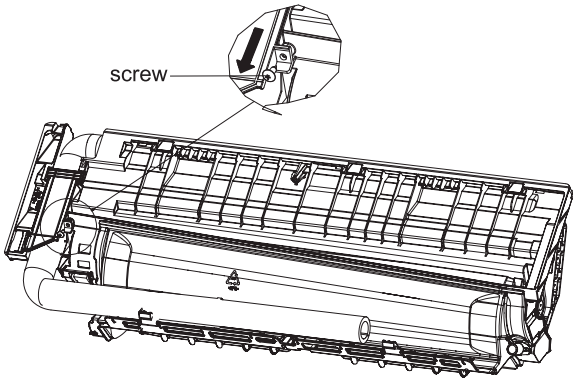
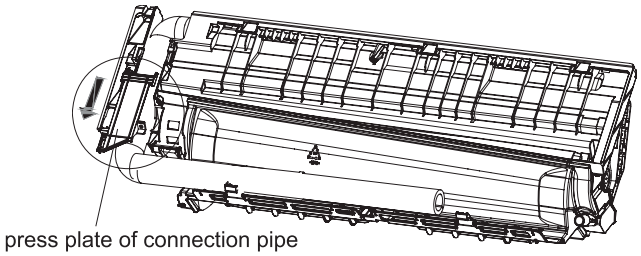
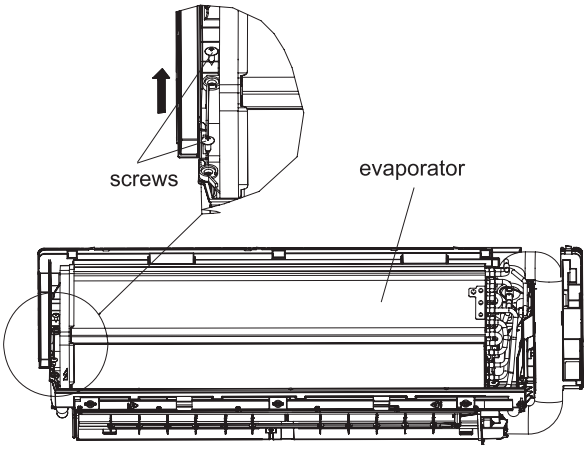
Steps	Procedure	
1. Remove filter sub-assy		
a	Open the panel.	
b	Remove clasps on filter.	
c	Remove filter sub-assy with hand.	
2. Remove panel		
a	Remove 3 screws on sealing cover of panel and display with screwdriver.	

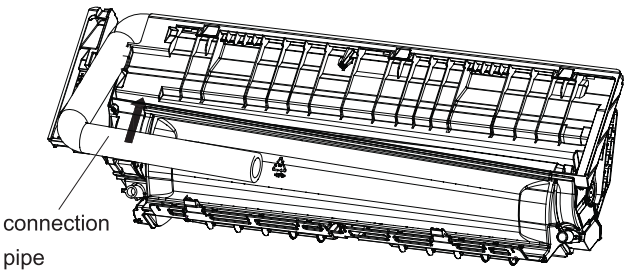
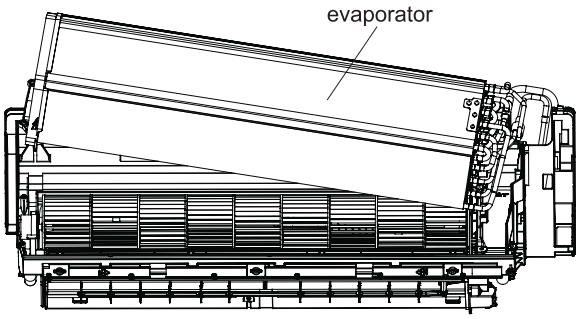
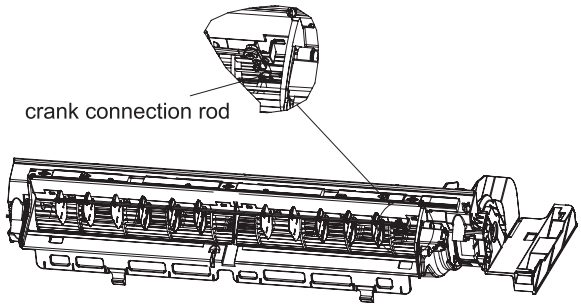
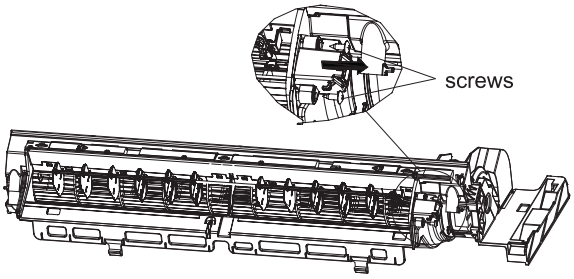
Steps	Procedure	
b	Remove sealing cover and display.	
c	Remove hinges at both sides of panel to separate panel and front case and then remove the panel.	
3. Remove horizontal louver and front case		
a	Shut off power, hold both ends of horizontal louver with hand, and then draw it out horizontally.	
b	Remove right end at first. Hold the right end of horizontal louver, push the connection rod with thumb to sperate the connection rod and horizontal louver.	

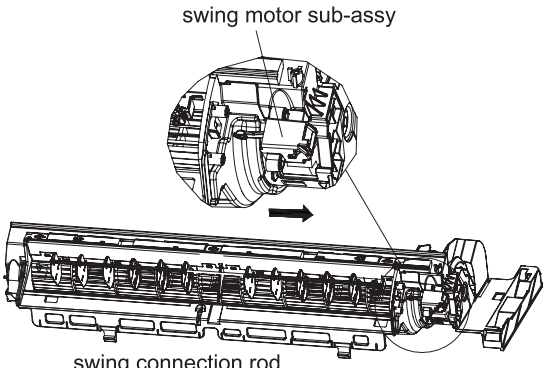
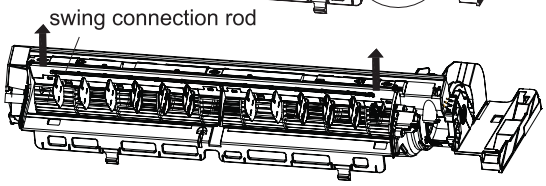
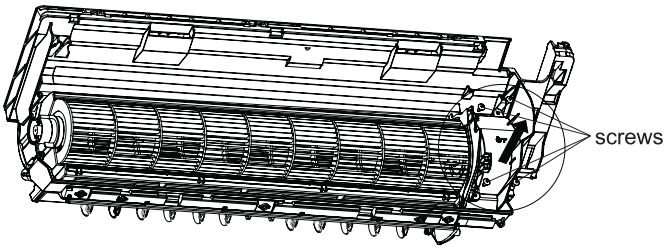
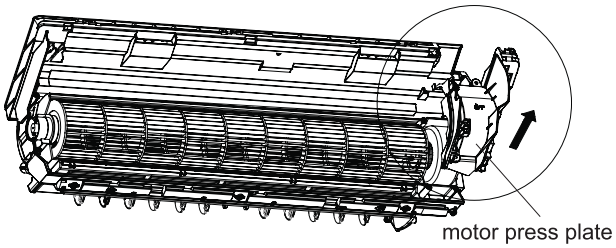
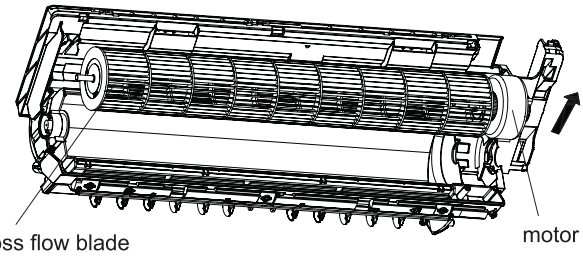
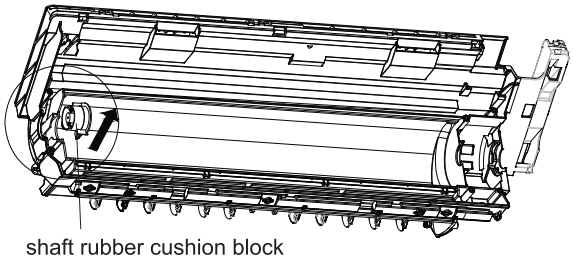
c	Remove the left end. Hold the end of connection rod with left hand, hold the horizontal louver with right hand to separate connection rod and horizontal louver.	
d	Remove the horizontal louver along the axile center direction.	
e	Note: (during operation, install the left end and then install the right end. After installation, re-energize the unit until the horizontal louver is reset. After that, you can operate the unit).	
f	Remove 4 screws on front case and electric box cover with screwdriver.	 screws
g	Remove electric box cover.	electric box cover

Steps	Procedure	
h	Turn over the screw cover on front case with hand, and then remove one screw inside the screw cover with screwdriver.	
i	Pull out two butt terminals on electric box, and then take out connection wire of butt terminal, connection wire of inspection board and wire of temperature sensor from the wire groove.	
j	Open 4 clasps at left, middle and right side of front case with hand.	

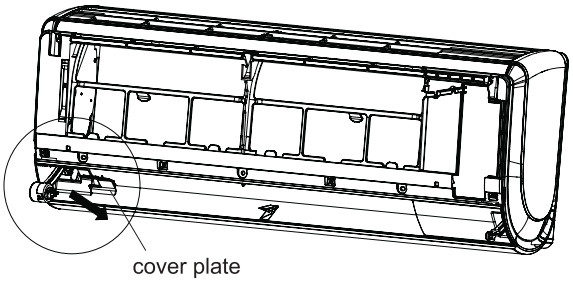
Steps	Procedure
4. Remove electric box	
a Remove three earthing screws, pull out the indoor tube temperature sensor with hand and then cut off the ziptie with side cutters.	
b Take out the electric box shielding cover sub-assy.	
5. Remove evaporator	
a Pull out the power plug from motor and stepping motor.	

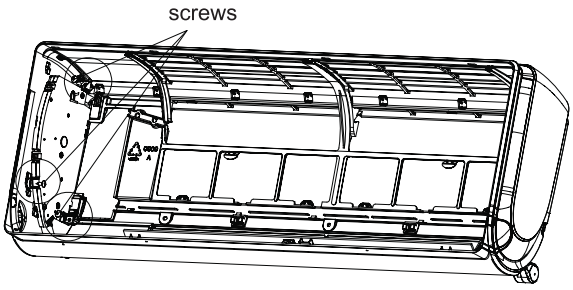
b	Remove screws fixing electric box with screwdriver, and then take out the wires from the wire groove of electric box with hand.	
c	Remove screw from press plate of connection pipe with screwdriver.	
d	Remove press plate of connection pipe with hand to separate it from the bottom case.	
e	Remove 2 screws at the connection position of evaporator and bottom case with screwdriver.	

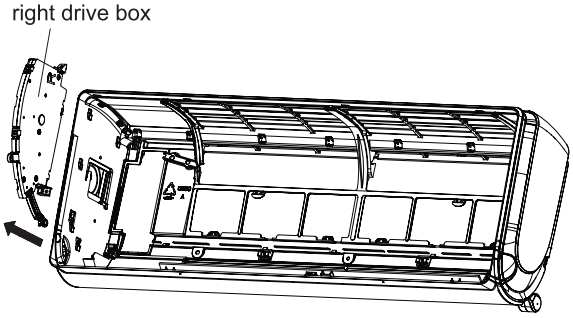
Steps	Procedure	
f	Open the connection pipe of evaporator with hand.	
g	Lift up the left end of evaporator with hand, and then take out the evaporator.	
6. Remove swing blade		
a	Remove crank connection rod.	
b	Remove 2 screws fixing swing motor cover with screwdriver.	

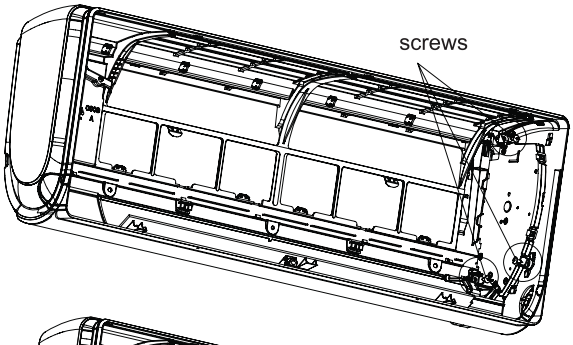
Steps	Procedure	
c	Remove swing motor sub-assy.	
d	Take out swing connection rod to separate it from the swing blade.	
7. Remove cross flow blade and motor		
a	Remove 4 screws fixing the motor press plate with screwdriver.	
b	Take out the motor press plate.	
c	Take out cross flow blade and motor.	
d	Pull out the shaft rubber cushion block with hand.	

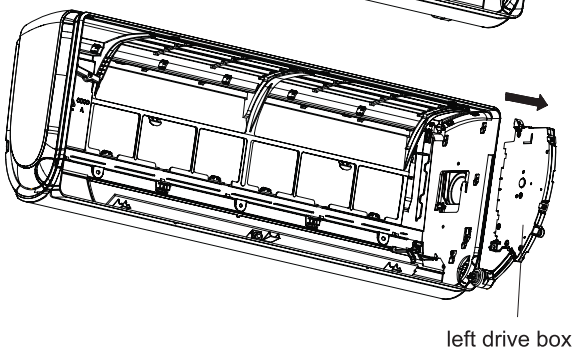
Steps	Procedure
8. Remove drive box	
a	Remove the left side cover plate of front case.
b	Remove 3 screws fixing the left drive box with screwdriver.
c	Take out right drive box.
d	Remove 3 screws fixing left drive box with screwdriver.
e	Take out the left drive box.











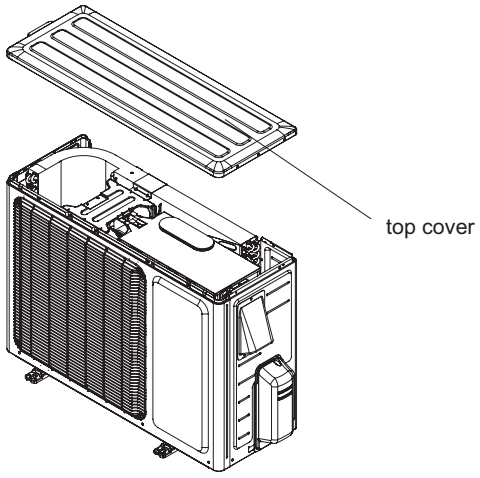
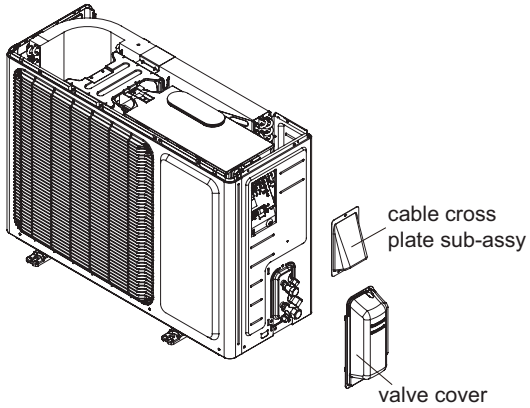
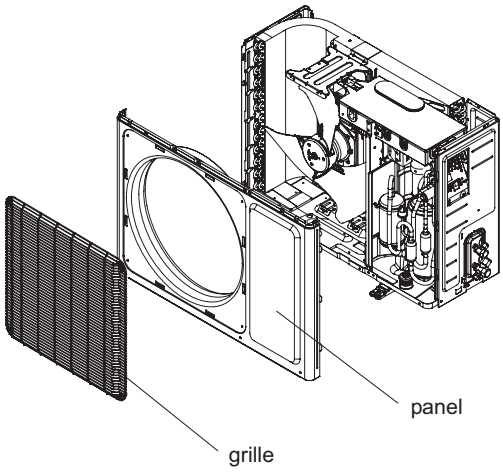
OUTDOOR UNIT REMOVAL PROCEDURE

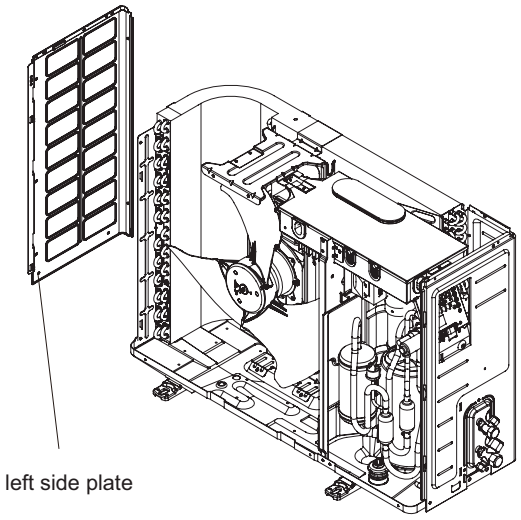
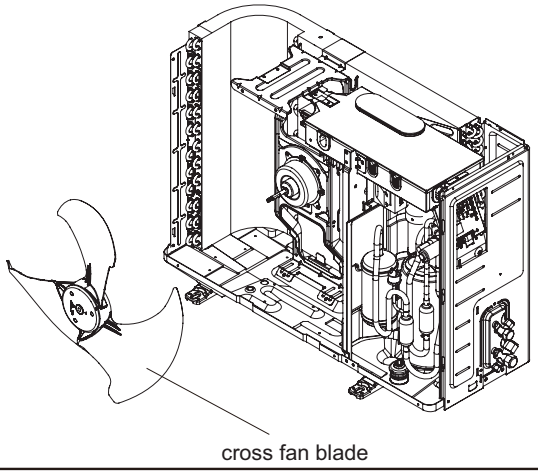
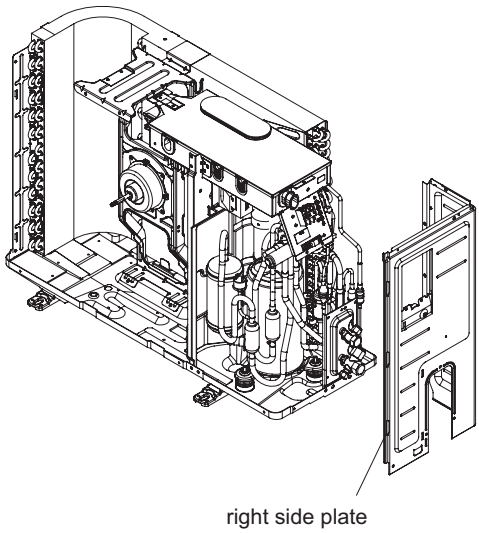
⚠ WARNING

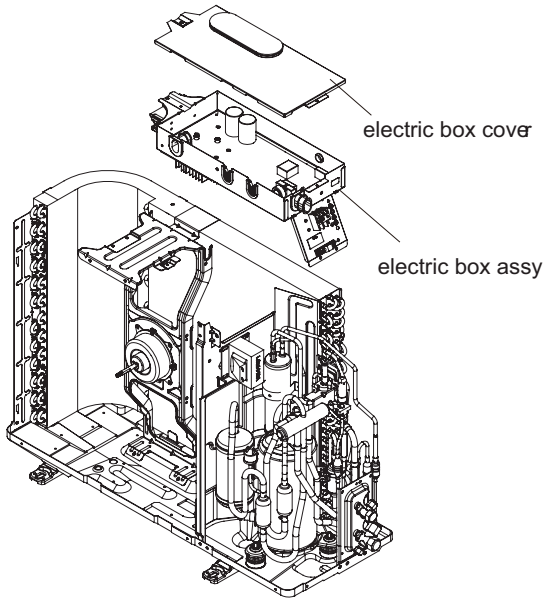
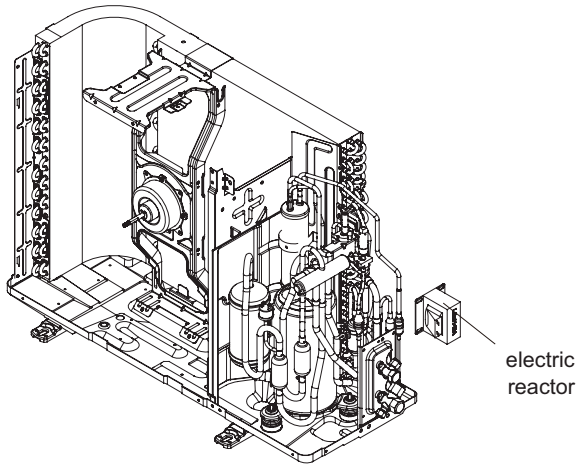
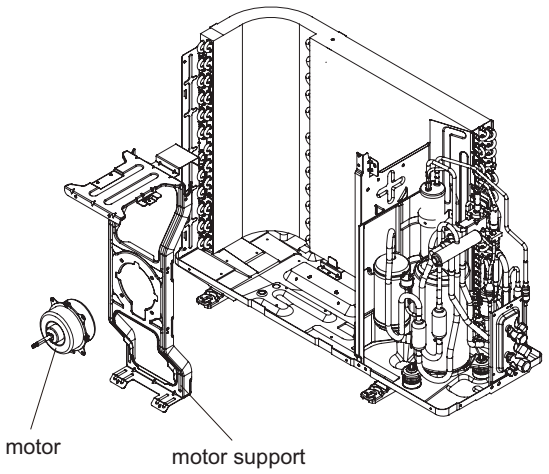
UNIT DAMAGE HAZARD

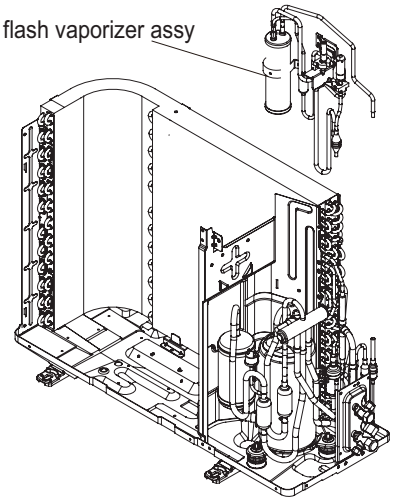
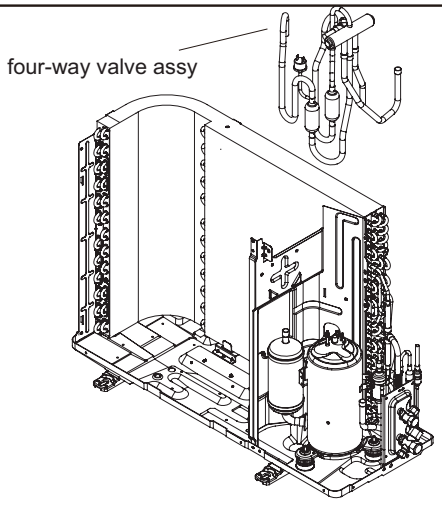
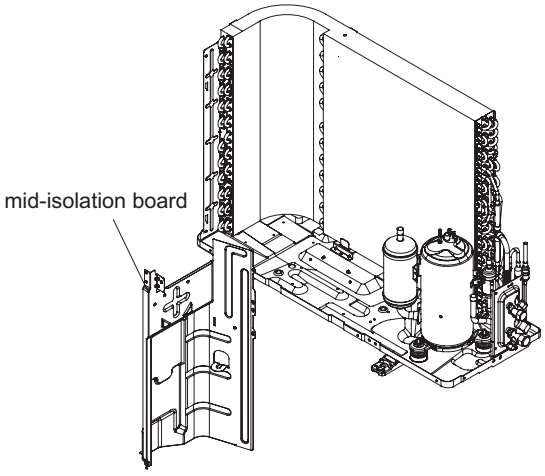
Be sure to wait for a minimum of 20 minutes after turning off all power supplies and discharge the refrigerant completely before removal.

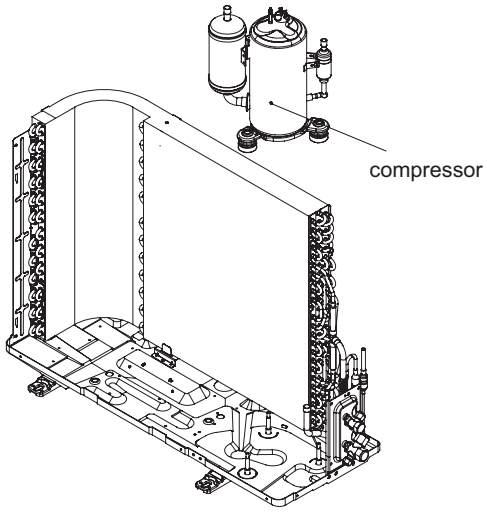
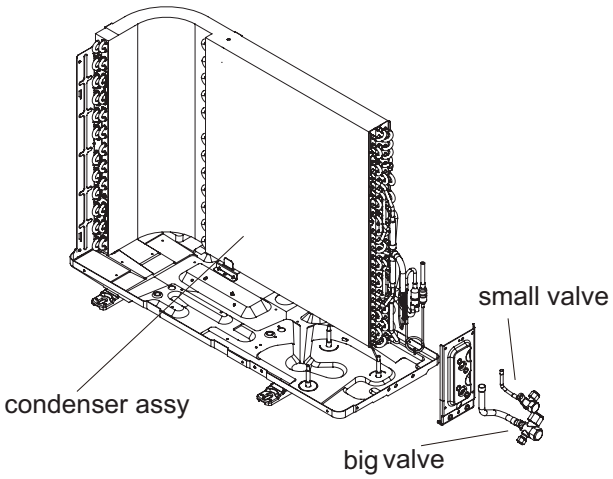
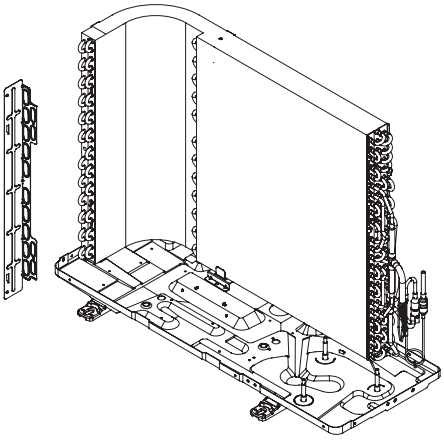
09K/12K

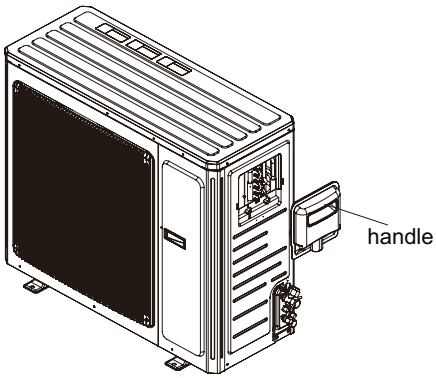
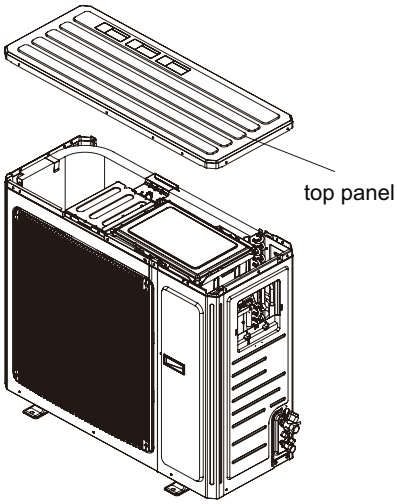
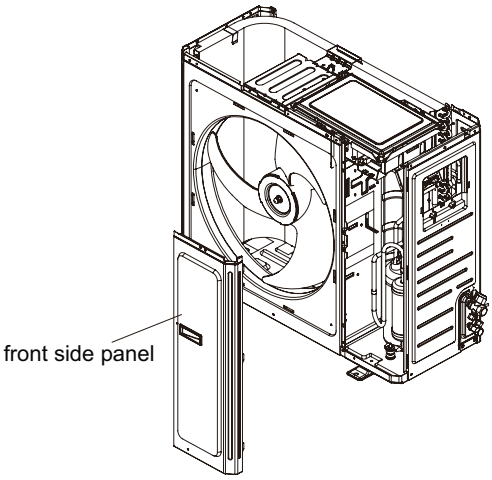
Steps	Procedure	
1. Remove top cover		
	Remove the screws connecting top cover, left and right side plate, as well as panel, to remove the top cover.	
2. Remove cable cross plate sub-assy and valve cover		
	Remove the screws connecting cable cross plate sub-assy and right side plate, to remove the cable cross plate sub-assy. Remove the screw fixing valve cover, to remove the cover.	
3. Remove panel and grille		
	Remove the screws fixing panel, to remove the panel. Remove the screws connecting panel grille and panel, loosen the clamp, to remove the panel grille.	

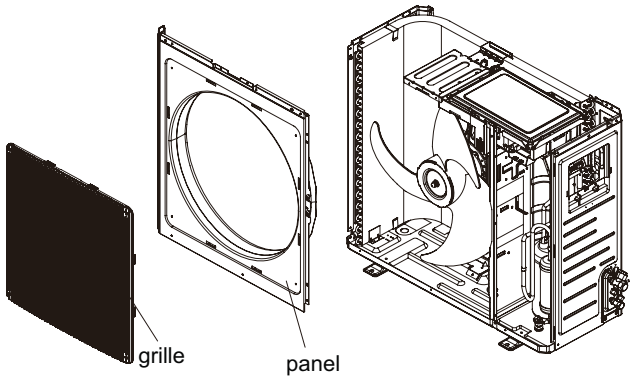
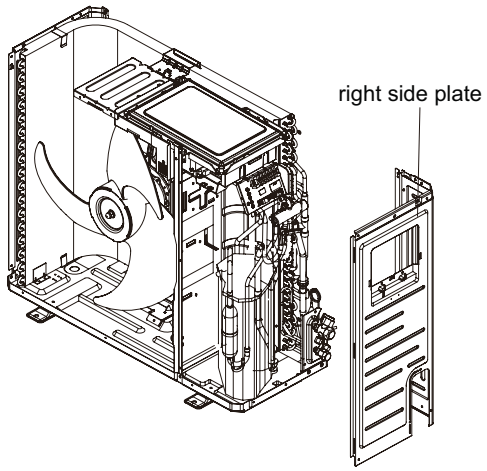
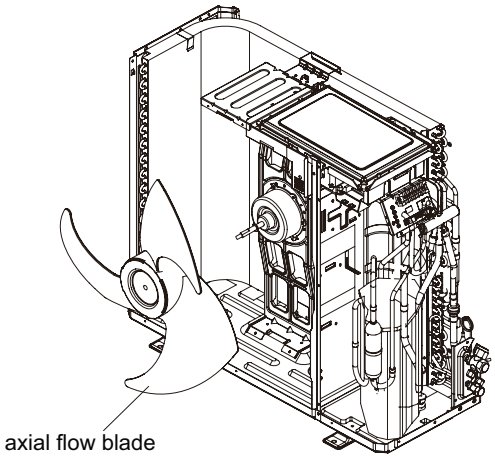
Steps	Procedure
4. Remove left side plate	
Remove the screws fixing left side plate and condenser support boa rd, to remove the left side plate.	
5. Remove cross fan blade	
Remove the screw nut fixing cross fan blade, remove the gasket and spring cushion, to remove the cross fan blade.	
6. Remove right side plate	
Remove the screws fixing right side plate and valve support, to remove the right side plate.	

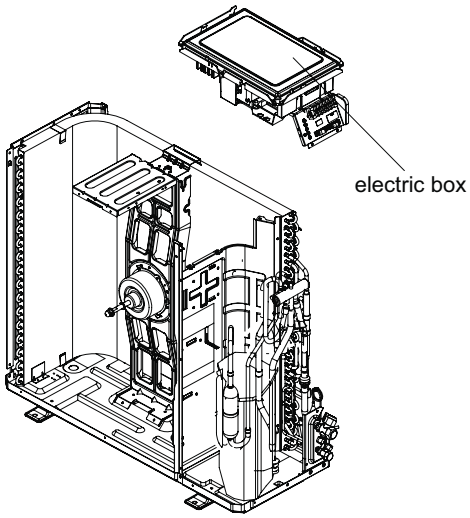
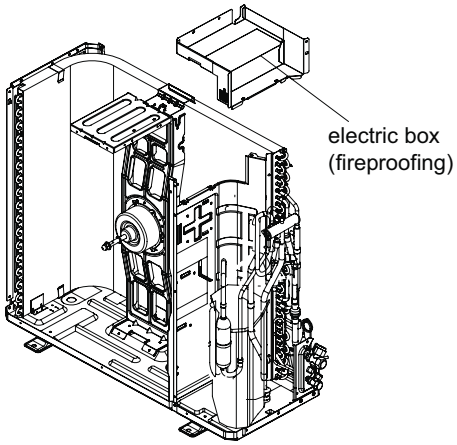
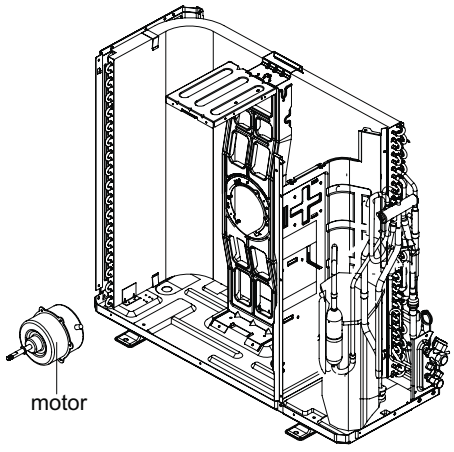
Steps	Procedure
7. Remove electric box assy	
Remove screws fixing electric box assy and mid-isolation board, loosen the bonding tie, pull off the wiring terminal, lift to remove the electric box assy.	
8. Remove electric reactor	
Remove the screws fixing electric reactor, to remove the electric reactor.	
9. Remove motor and motor support	
Remove the four tapping screws fixing motor, pull out the contact tag of motor wiring, to remove the motor. Remove the two tapping screws fixing motor support and chassis, lift to remove the motor support.	

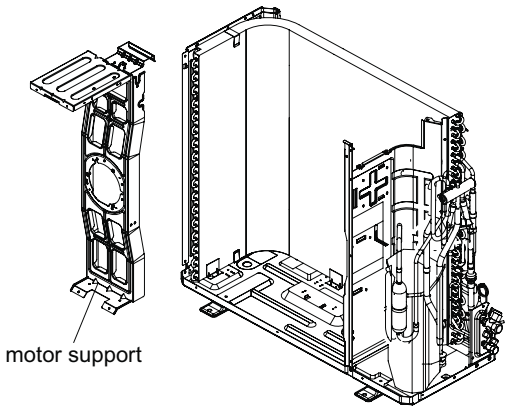
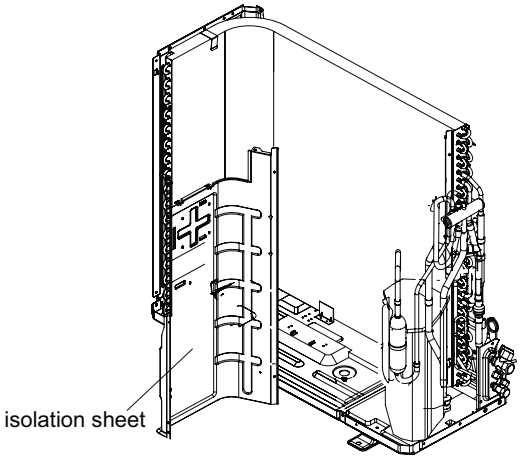
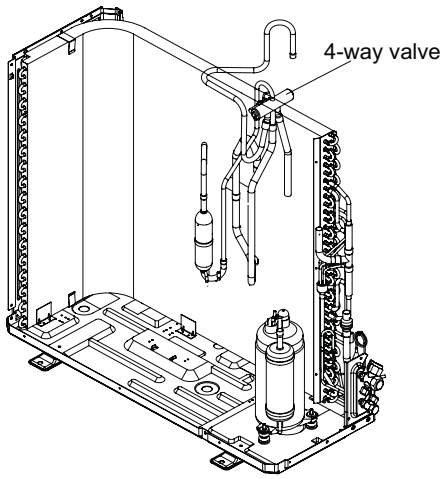
Steps	Procedure
10. Remove flash vaporizer assy	
Remove the screws connecting mid-isolation board, lift to remove the flash vaporizer assy.	
11. Remove four-way valve assy	
Cut the spot weld of four-way valve assy, compressor air suction/discharging valve and condenser pipe outlet, lift to remove the four-way valve assy. (Note: release the refrigerant before cutting.)	
12. Remove mid-isolation board	
Remove the screws connecting mid-isolation board, chassis and condenser assy, to remove the mid-isolation.	

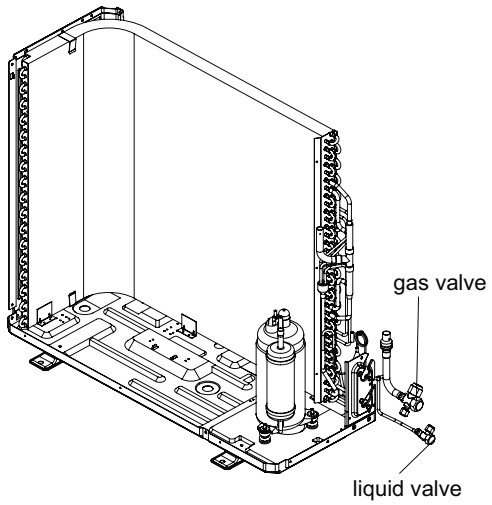
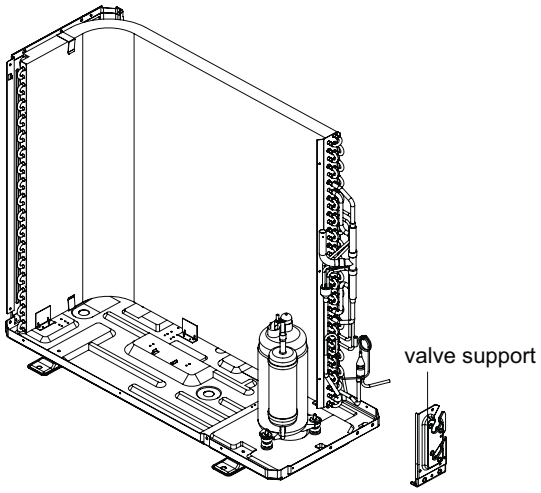
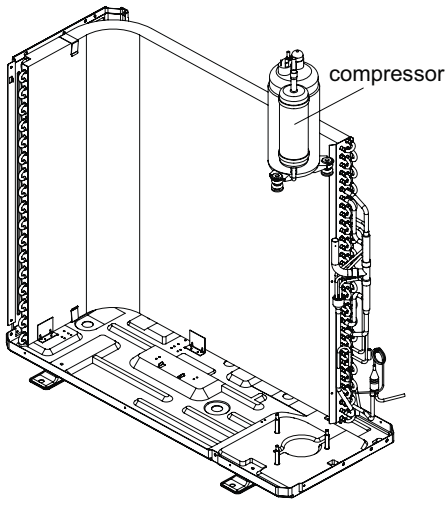
Steps	Procedure
13. Remove compressor	
	Remove the three feet screwnuts fixing compressor, to remove the compressor.
	
14. Remove big and small valve assy	
	Remove screws connecting condenser assy and chassis, to remove the condenser assy. Remove the screws fixing big and small valve, to remove the valves.
	
15. Remove chassis sub-assy	
	Remove screws connecting condenser assy and chassis, to remove the chassis sub-assy.
	

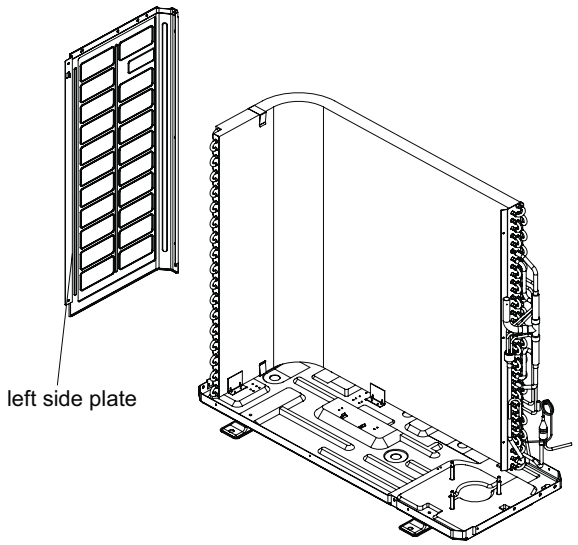
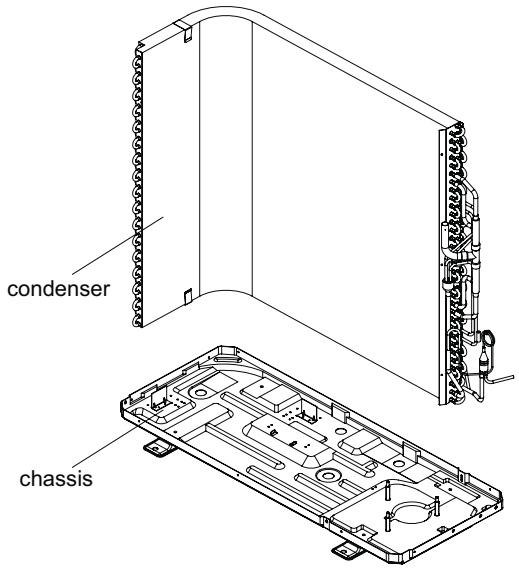
Steps	Procedure
1.Remove handle	
Twist off the screws used for fixing the handle，pull the handle up ward to remove it.	
2.Remove top panel	
Remove the screws connecting the top panel with the front panel and left&right side plate, and then remove the top panel.	
3.Remove front side panel	
Loosen the screws connecting the front side panel and chassis. Remove the front side panel.	

Steps	Procedure
4.Remove grille and panel	
Twist off the screws connecting the grille and panel, and then remove the grille. Twist off the screws connecting the panel, chassis and motor support with screwd-river, and then remove the panel.	
5.Remove right side plate	
Twist off the screws connecting the right side plate and chassis, valve support and condenser, and then remove the right side plate.	
6.Remove axial flow blade	
Twist off the nuts on blade with wrench and then remove the axial flow blade.	

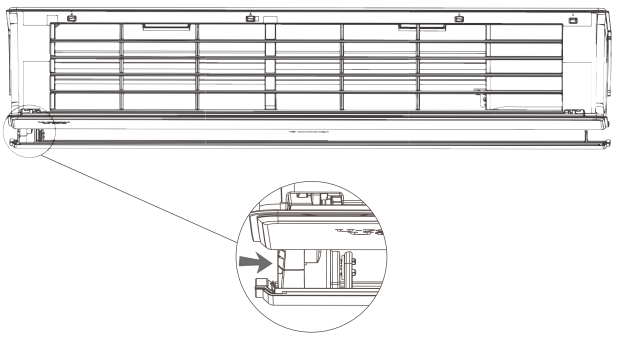
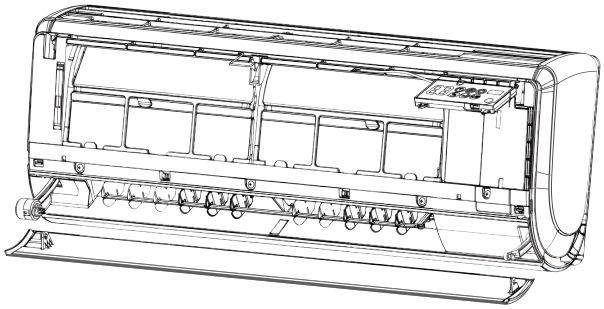
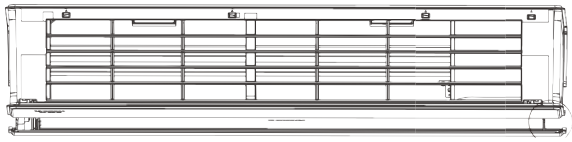
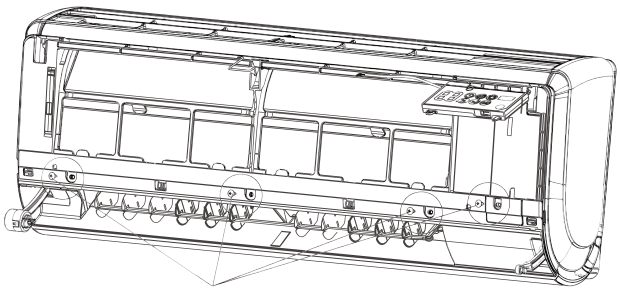
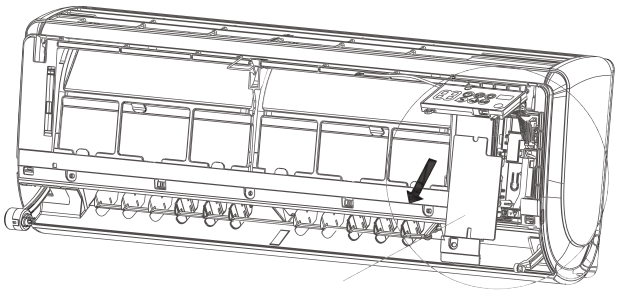
Steps	Procedure
7.Remove electric box	
Twist off the screws on electric box, cut off the tieline with scissors or pliers, pull out the wiring terminal, pull it upwards to remove the electric box.	
Twist off the screws on electric box (fireproofing) with screwdriver, and then remove the electric box (fireproofing).	
8.Remove motor	
Twist off the tapping screws fixing the motor, pull out the pin of leading wire for motor and then remove the motor.	

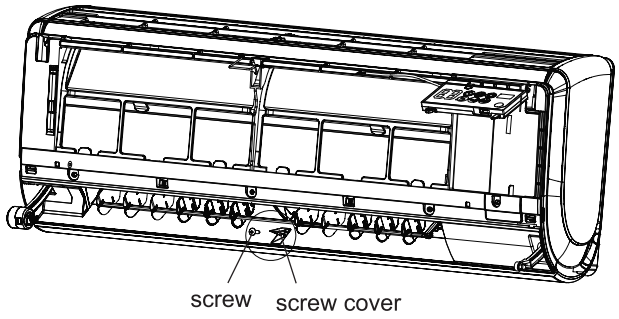
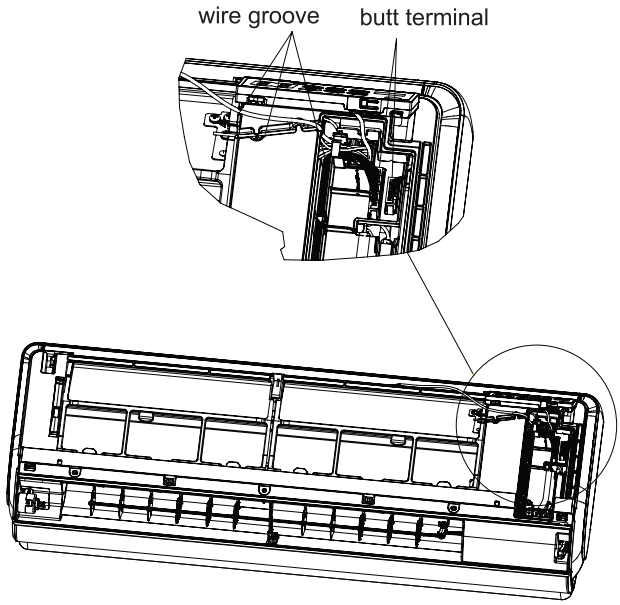
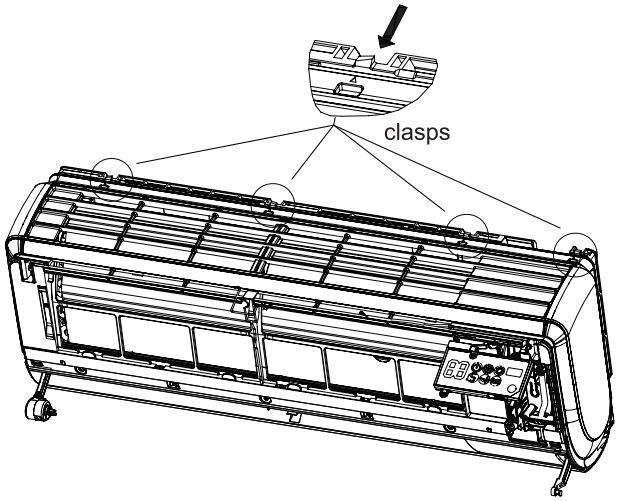
Steps	Procedure
9.Remove motor support	
Twist off the tapping screws fixingthe motor support, pull it upwardsand then remove the motor support.	
10.Remove isolation sheet	
Twist off the screws connecting isolation sheet and end plate of condenser and chassis, and then remove the isolation sheet.	
11.Remove 4-way valve	
Unsolder the pipeline between compressor, condenser, gas and liquid valve, and then remove the 4-way valve. (note: release all refrigerant before unsoldering).	

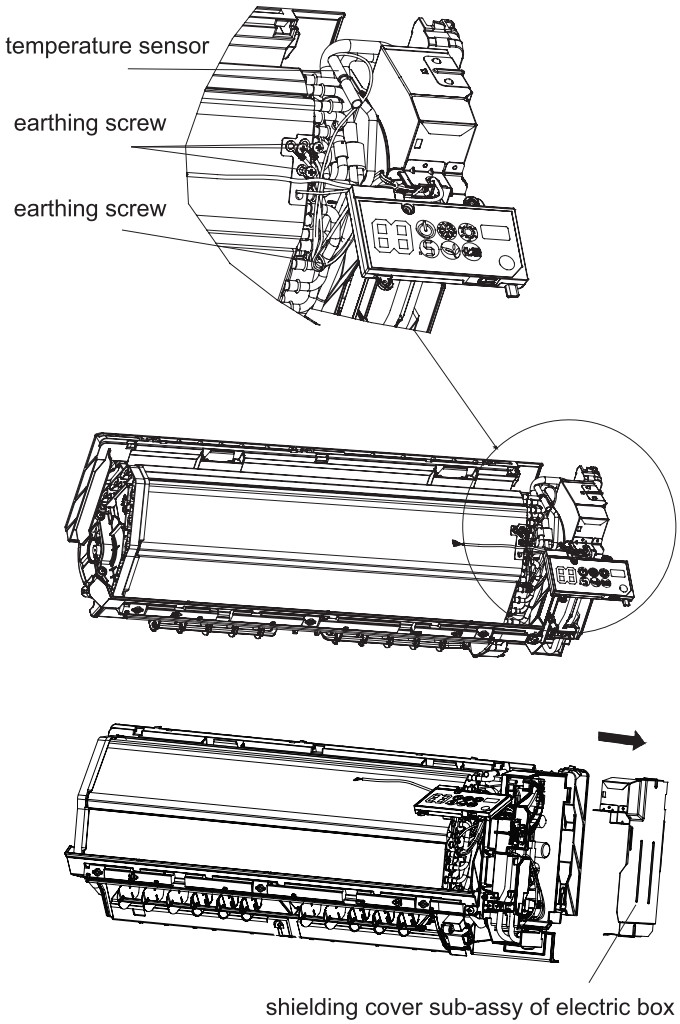
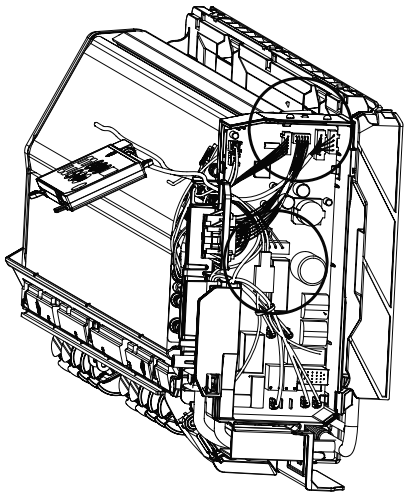
Steps	Procedure
12.Remove gas valve and liquid valve	
Twist off the 2 bolts fixing the valve sub-assy. Unsolder the soldering joint between gas valve and air-return pipe and then remove the gas valve.(note: when unsoldering the soldering joint, wrap the gas valve with wet cloth completely to avoid the damage to valve, and recover all refrigerant completely at first). Unsolder the soldering joint between liquid valve and connection pipe of liquid valve, and then remove the liquid valve.	
13.Remove valve support	
Twist off the screws connecting valve support and chassis, and then remove the valve support.	
14.Remove compressor	
Twist off the 3 foot nuts on compressor and then remove the compressor.	

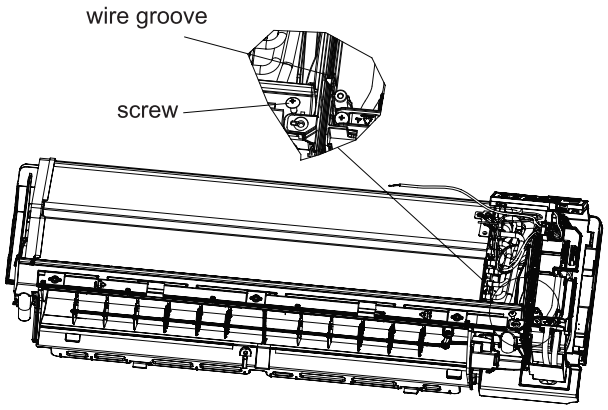
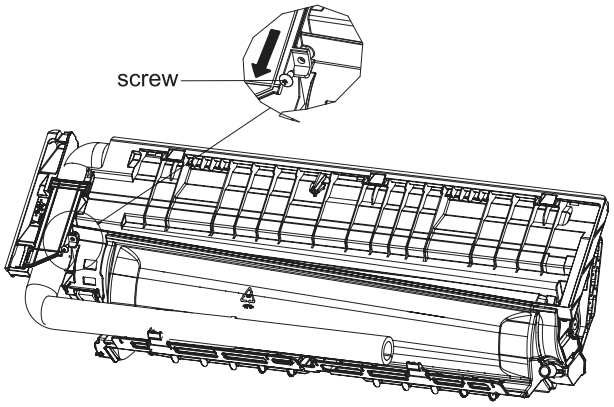
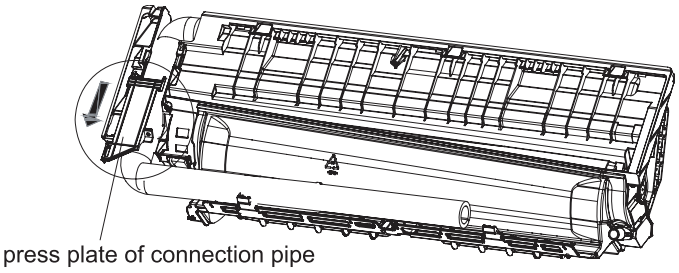
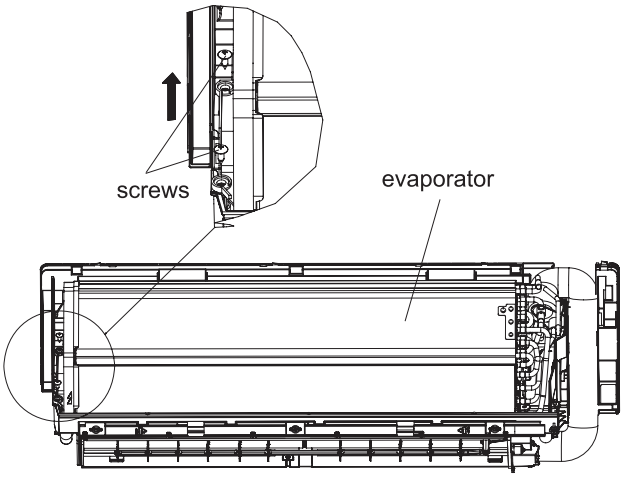
Steps	Procedure
15.Remove left side plate	
Twist off the screws connecting the left side plate and chassis with screwdriver, and then remove the left side plate.	
16.Remove chassis and condenser	
Pull it upwards to separate the chassis and condenser.	

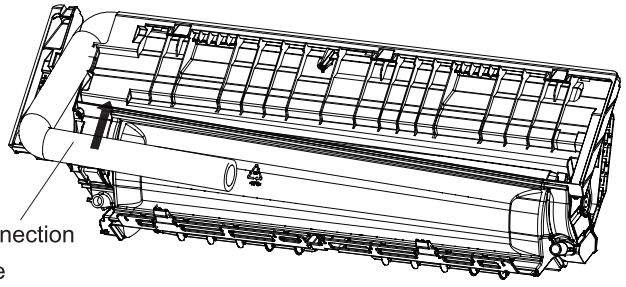
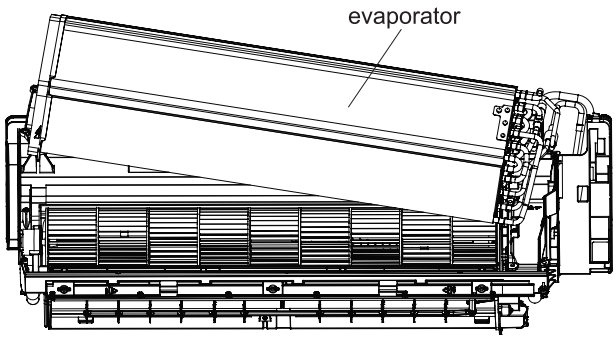
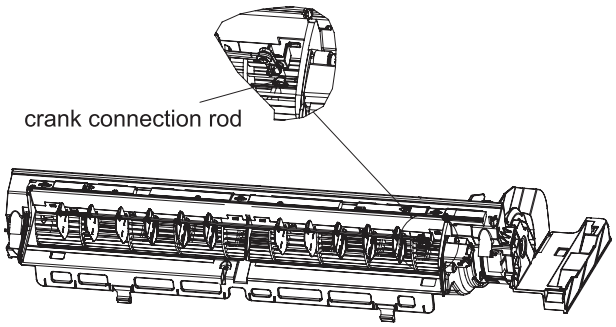
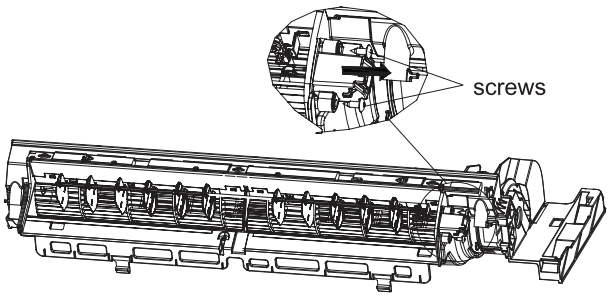
DISASSEMBLY

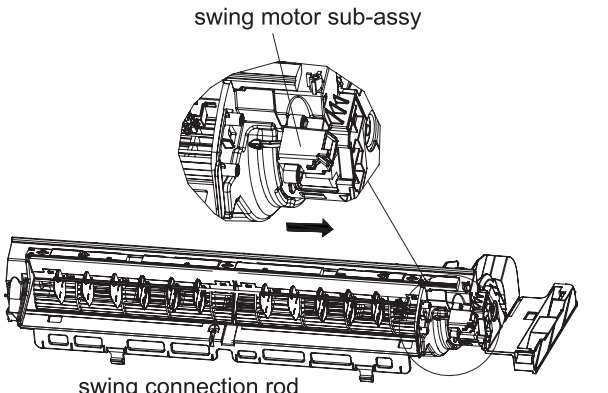
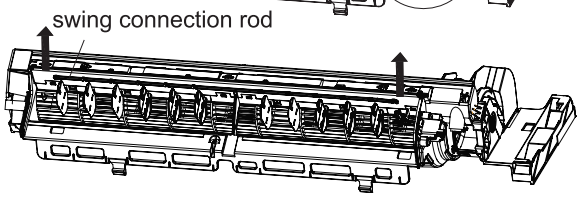
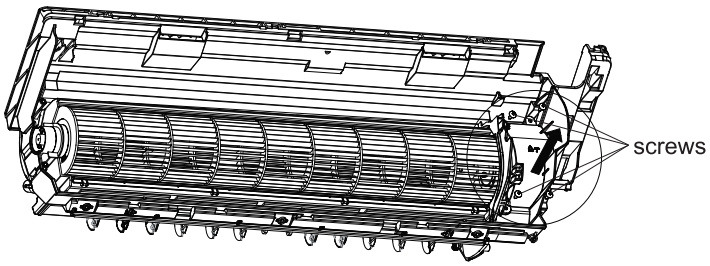
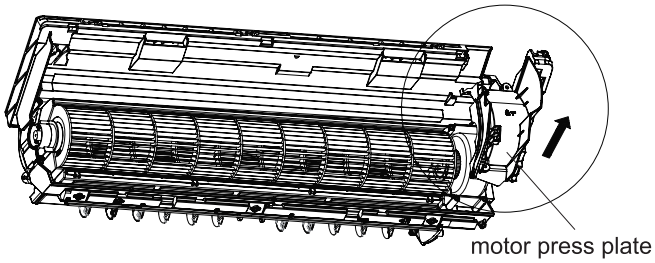
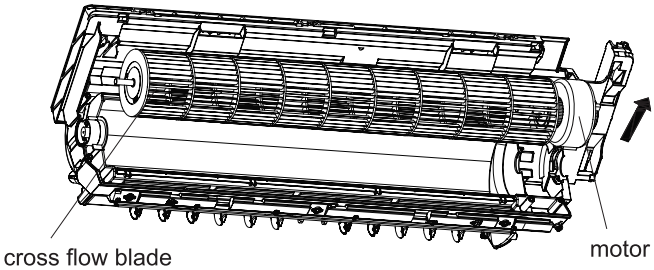
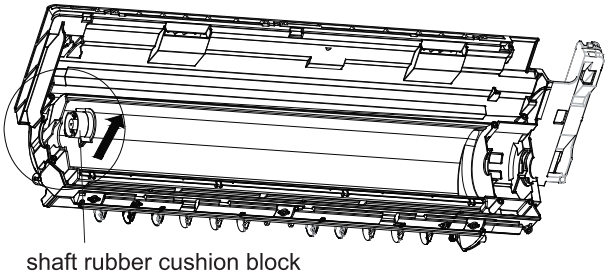
Steps	Procedure	
1	Remove the left end connection. Hold the end of connection rod with left hand. Hold the horizontal louver with right hand to separate connection rod and horizontal louver.	
2	Remove the horizontal louver along the center axle.	
3	**NOTE**: During operation, install the left end of the horizontal louver first then install the right end. Once installed, restart the unit until the louver is reset. Once louver is reset, you can operate the unit.	
4	Remove 4 screws on front case and electric box cover with screwdriver.	
5	Remove electric box cover.	

Steps	Procedure	
6	Turn over the screw cover on front case with hand, and then remove one screw inside the screw cover with screwdriver.	
7	Pull out two butt terminals on electric box, and then take out connection wire of butt terminal, connection wire of inspection board and wire of temperature sensor from the wire groove.	
8	Open 4 clasps at left, middle and right side of front case with hand.	

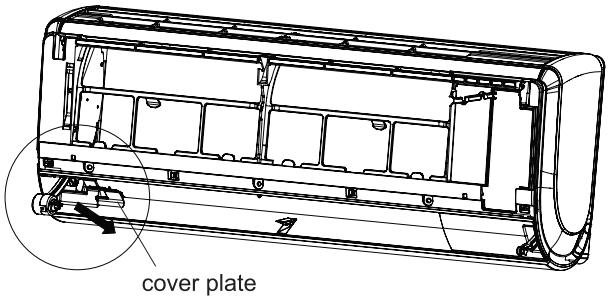
Steps	Procedure
9. Remove electric box	
a Remove three earthing screws with screws, pull out the indoor tube temperature sensor with hand and then cut off the tileline with scissors.	
b Take out the electric box shielding cover sub-assy.	
10. Remove evaporator	
a Pull out the power plug from motor and stepping motor.	

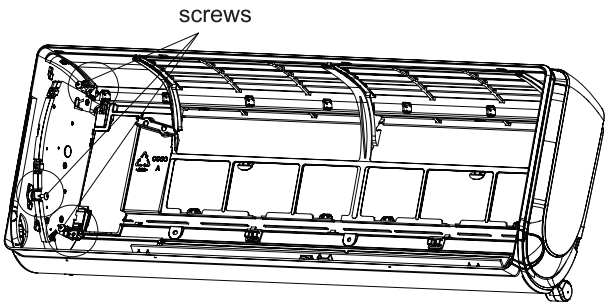
b	Remove screws fixing electric box with screwdriver, and then take out the wires from the wire groove of electric box with hand.	
c	Remove screw from press plate of connection pipe with screwdriver.	
d	Remove press plate of connection pipe with hand to separate it from the bottom case.	
e	Remove 2 screws at the connection position of evaporator and bottom case with screwdriver.	

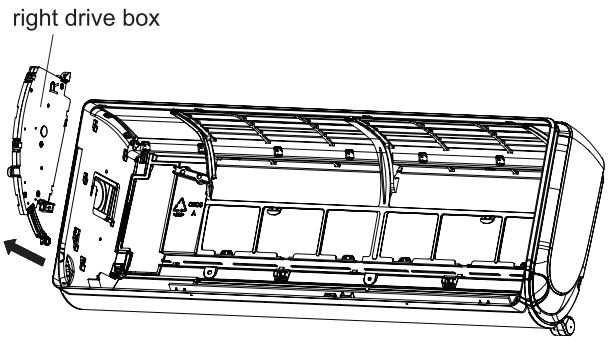
Steps	Procedure	
f	Open the connection pipe of evaporator with hand.	
g	Lift up the left end of evaporator with hand, and then take out the evaporator.	
11. Remove swing blade		
a	Remove crank connection rod.	
b	Remove 2 screws fixing swing motor cover with screwdriver.	

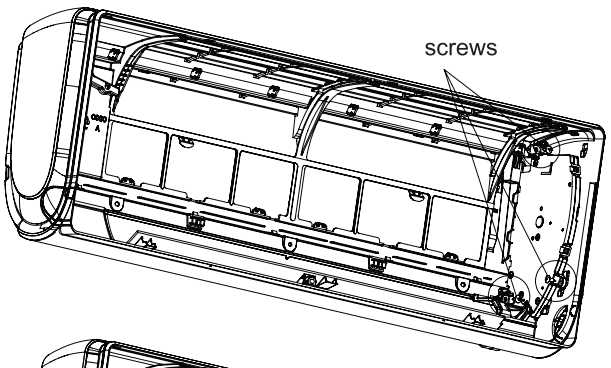
Steps	Procedure	
c	Remove swing motor sub-assy.	
d	Take out swing connection rod to separate it from the swing blade.	
12. Remove cross flow blade and motor		
a	Remove 4 screws fixing the motor press plate with screwdriver.	
b	Take out the motor press plate.	
c	Take out cross flow blade and motor.	
d	Pull out the shaft rubber cushion block with hand.	

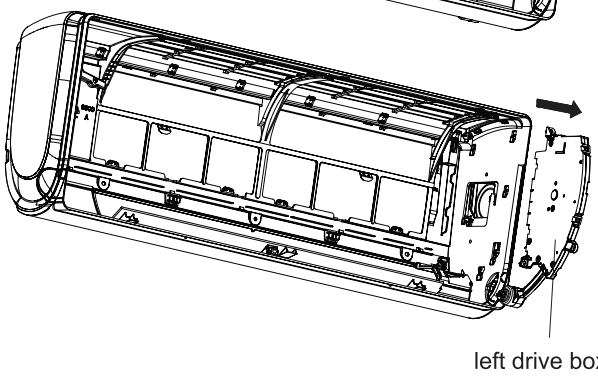
Steps	Procedure
13. Remove drive box	
a	Remove the left side cover plate of front case.
b	Remove 3 screws fixing the left drive box with screwdriver.
c	Take out right drive box.
d	Remove 3 screws fixing left drive box with screwdriver.
e	Take out the left drive box.







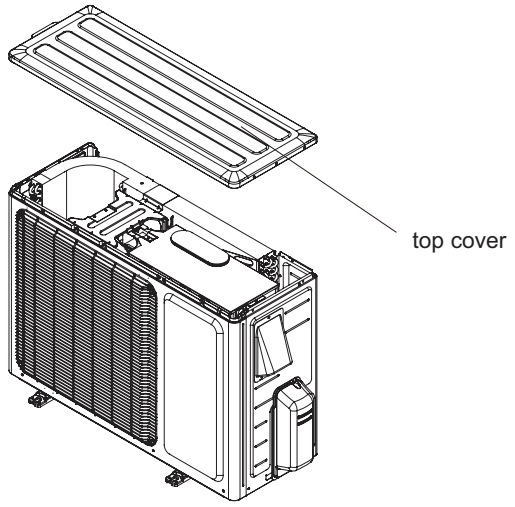
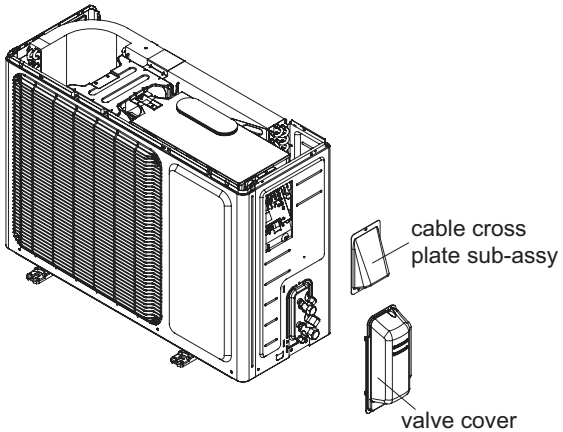
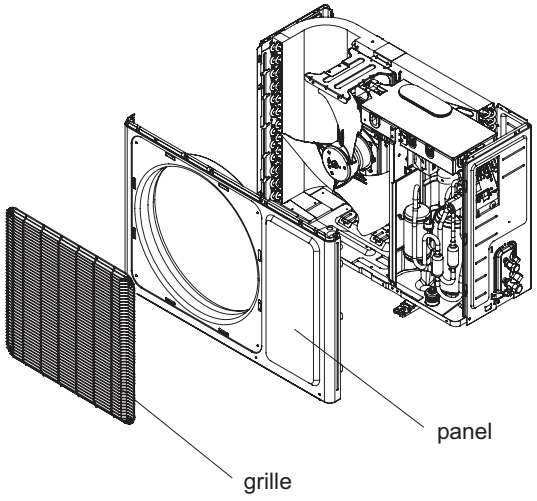


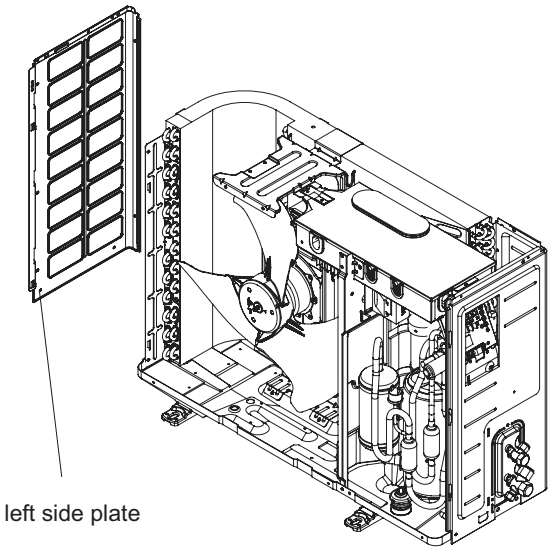
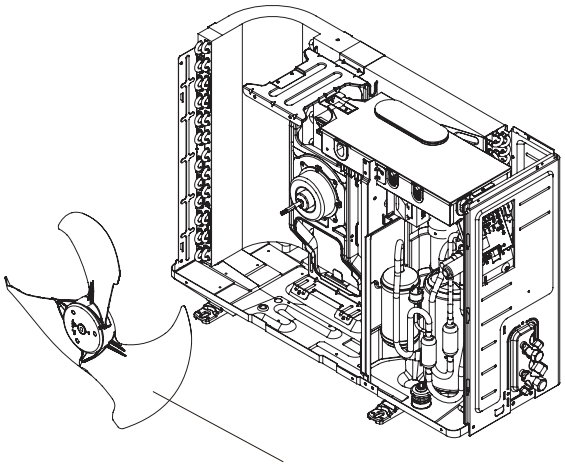
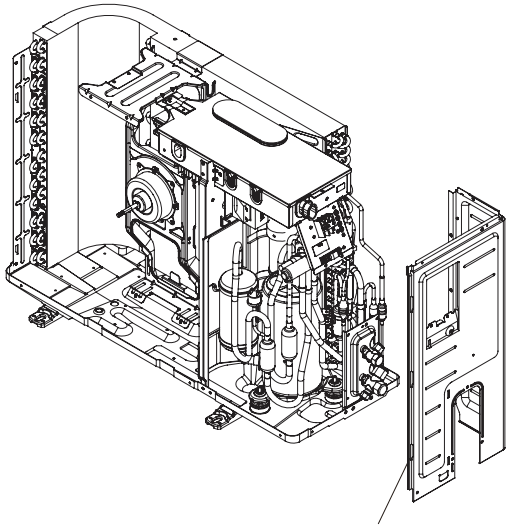


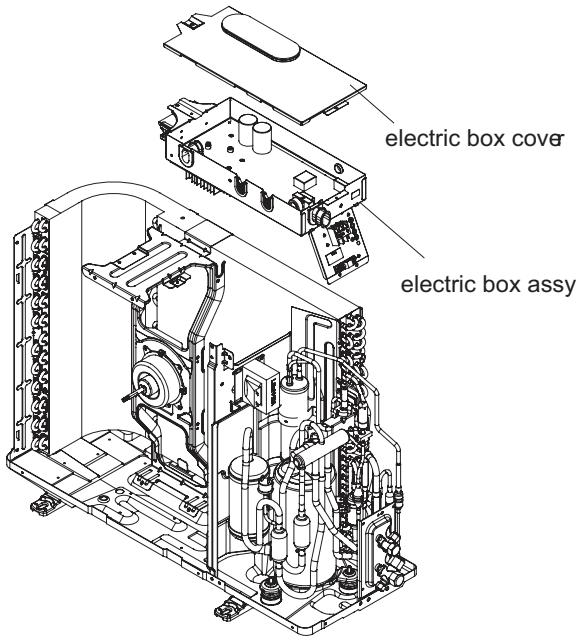
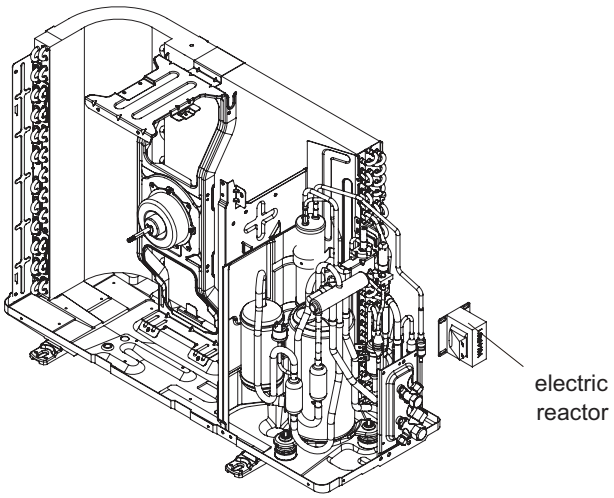
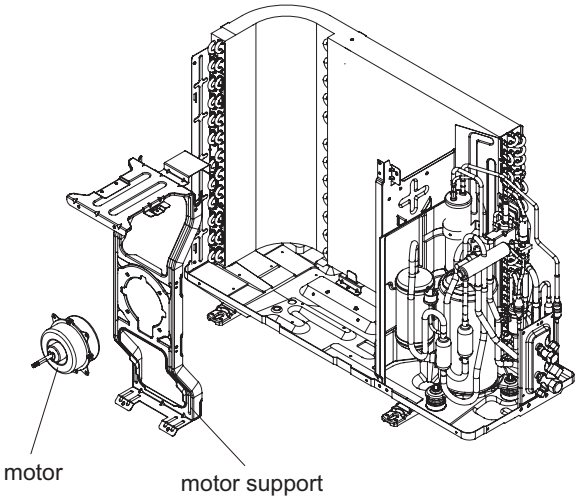
14. Removal Procedure of Outdoor Unit

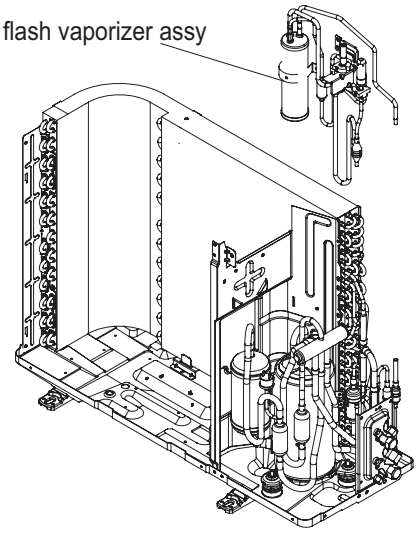
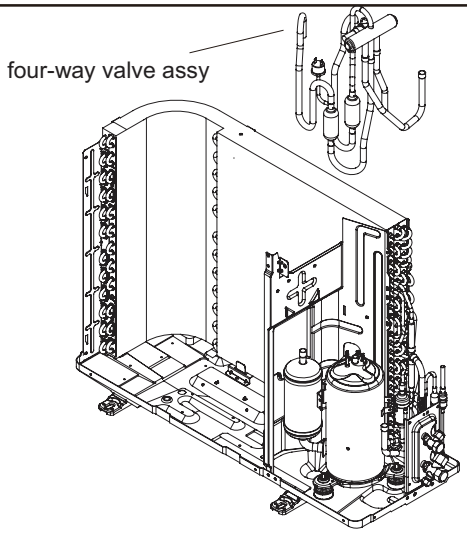
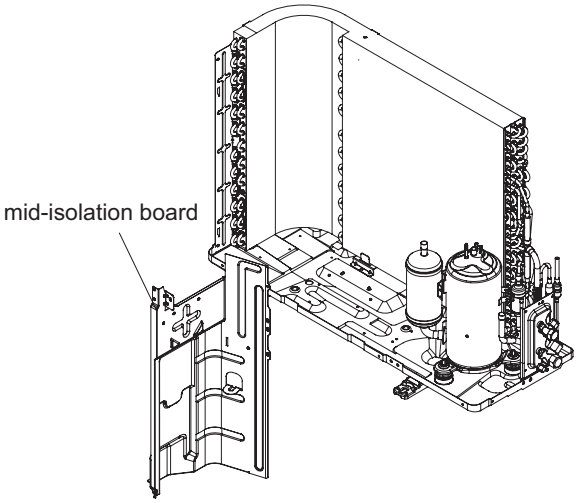
Warning: Be sure to wait for a minimum of 20 minutes after turning off all power supplies and discharge the refrigerant completely before removal.

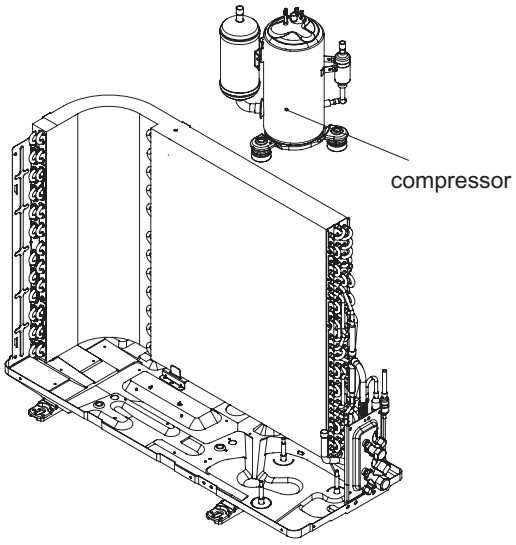
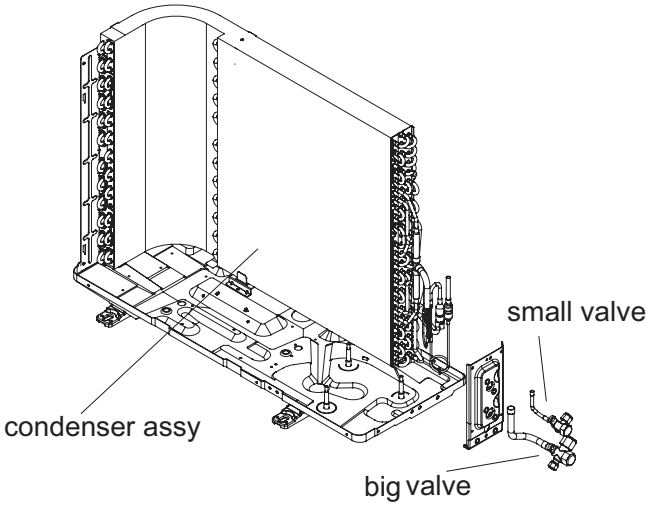
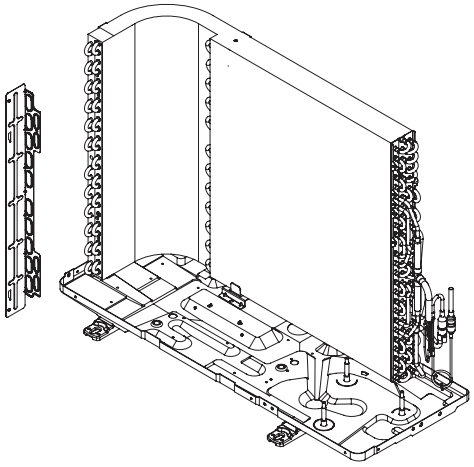
09K/12K

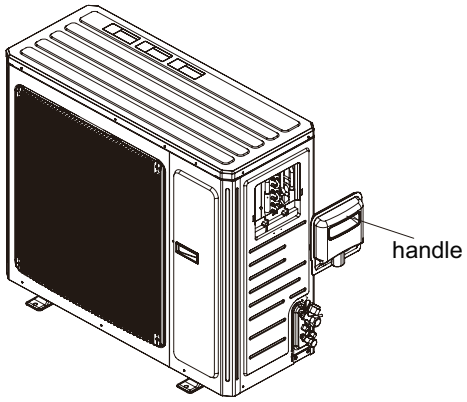
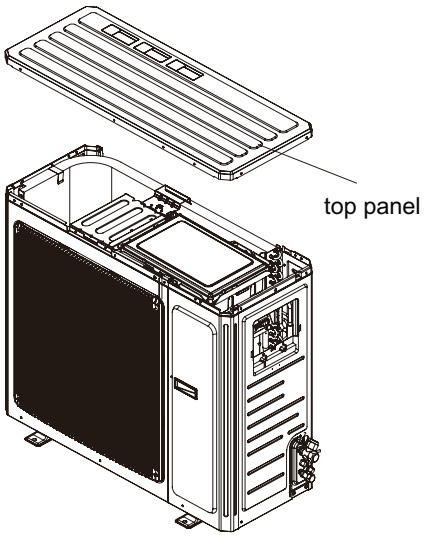
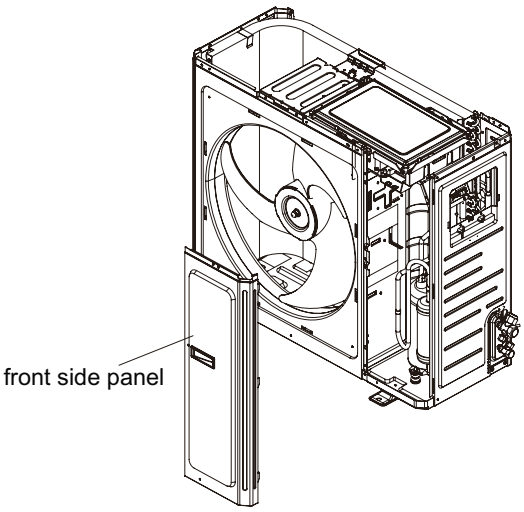
Steps	Procedure	
1. Remove top cover		
	Remove the screws connecting top cover, left and right side plate, as well as panel, to remove the top cover.	
2. Remove cable cross plate sub-assy and valve cover		
	Remove the screws connecting cable cross plate sub-assy and right side plate, to remove the cable cross plate sub-assy. Remove the screw fixing valve cover, to remove the cover.	
3. Remove panel and grille		
	Remove the screws fixing panel, to remove the panel. Remove the screws connecting panel grille and panel, loosen the clamp, to remove the panel grille.	

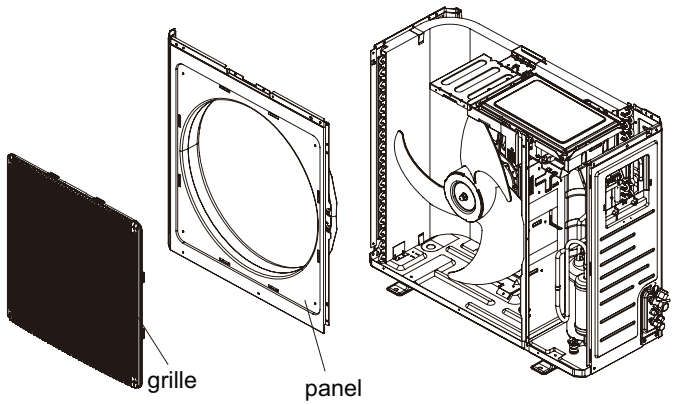
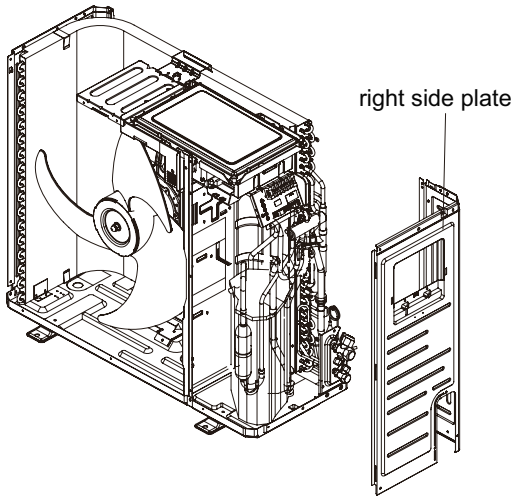
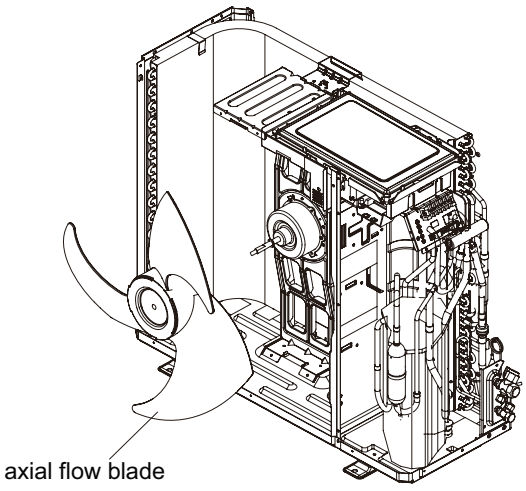
Steps	Procedure
4. Remove left side plate	
Remove the screws fixing left side plate and condenser support boa rd, to remove the left side plate.	left side plate
5. Remove cross fan blade	
Remove the screw nut fixing cross fan blade, remove the gasket and spring cushion, to remove the cross fan blade.	cross fan blade
6. Remove right side plate	
Remove the screws fixing right side plate and valve support, to remove the right side plate.	right side plate

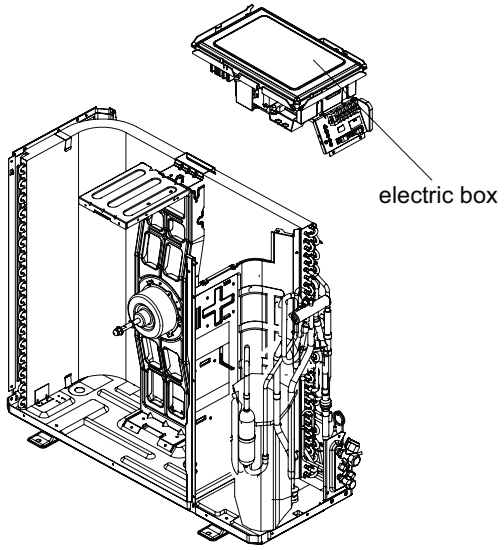
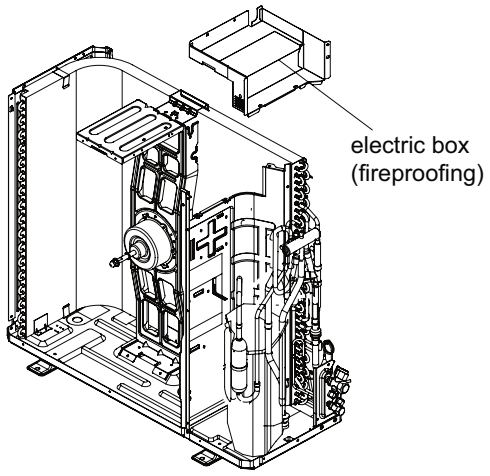
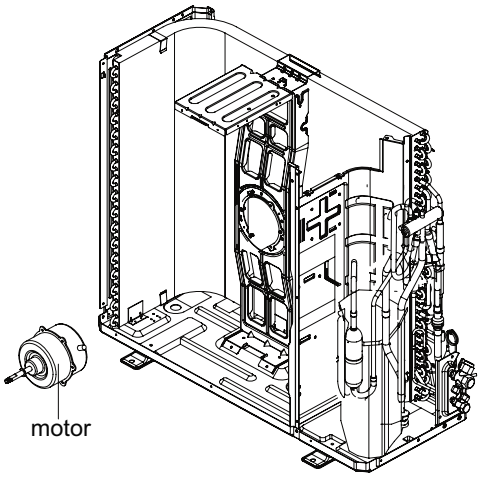
Steps	Procedure
7. Remove electric box assy	
Remove screws fixing electric box assy and mid-isolation board, loosen the bonding tie, pull off the wiring terminal, lift to remove the electric box assy.	
8. Remove electric reactor	
Remove the screws fixing electric reactor, to remove the electric reactor.	
9. Remove motor and motor support	
Remove the four tapping screws fixing motor, pull out the contact tag of motor wiring, to remove the motor. Remove the two tapping screws fixing motor support and chassis, lift to remove the motor support.	

Steps	Procedure
10. Remove flash vaporizer assy	
Remove the screws connecting mid-isolation board, lift to remove the flash vaporizer assy.	
11. Remove four-way valve assy	
Welding cut the spot weld of four-way valve assy, compressor air suction/discharging valve and condenser pipe outlet, lift to remove the four-way valve assy. (Note: release the refrigerant before welding cutting.)	
12. Remove mid-isolation board	
Remove the screws connecting mid-isolation board, chassis and condenser assy, to remove the mid-isolation.	

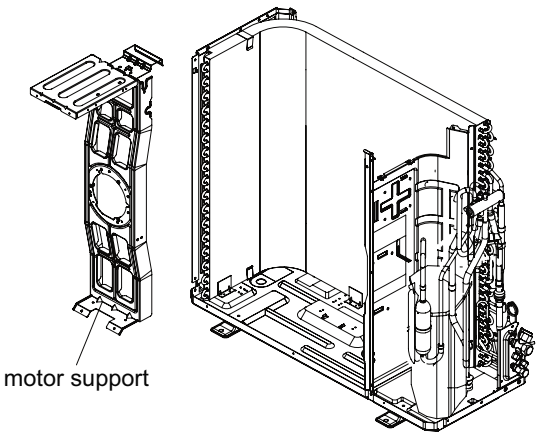
Steps	Procedure
13. Remove compressor	
Remove the three feet screwnuts fixing compressor, to remove the compressor.	
14. Remove big and small valve assy	
Remove screws connecting condenser assy and chassis, to remove the condenser assy. Remove the screws fixing big and small valve, to remove the valves.	
15. Remove chassis sub-assy	
Remove screws connecting condenser assy and chassis, to remove the chassis sub-assy.	

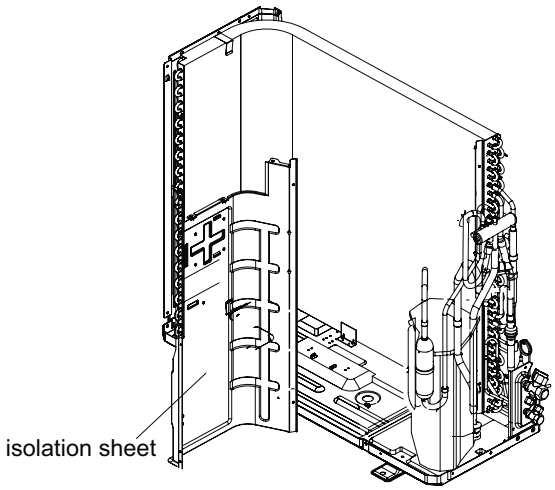
Steps	Procedure
1.Remove handle	
Twist off the screws used for fixing the handle，pull the handle up ward to remove it.	
2.Remove top panel	
Remove the screws connecting the top panel with the front panel and left&right side plate, and then remove the top panel.	
3.Remove front side panel	
Loosen the screws connecting the front side panel and chassis. Remove the front side panel.	

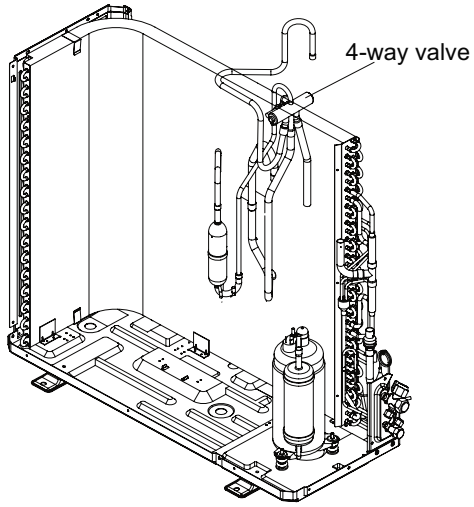
Steps	Procedure
4.Remove grille and panel	
Twist off the screws connecting the grille and panel, and then remove the grille. Twist off the screws connecting the panel, chassis and motor support with screwd-river, and then remove the panel.	
5.Remove right side plate	
Twist off the screws connecting the right side plate and chassis, valve support and condenser, and then remove the right side plate.	
6.Remove axial flow blade	
Twist off the nuts on blade with wrench and then remove the axial flow blade.	

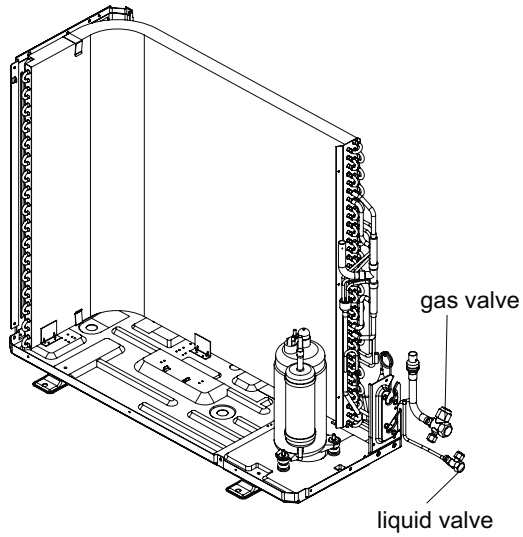
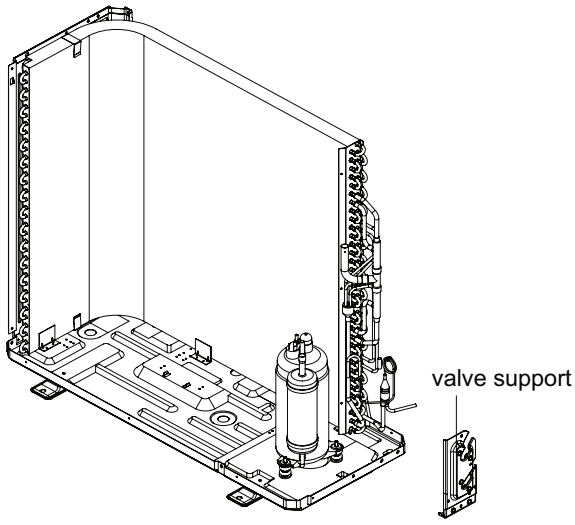
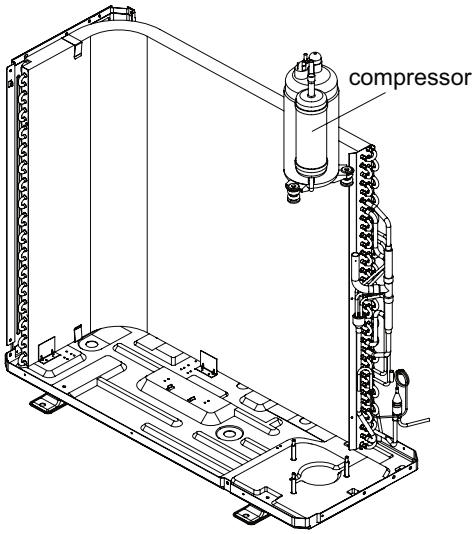
Steps	Procedure
7.Remove electric box	
Twist off the screws on electric box, cut off the tieline with scissors or pliers, pull out the wiring terminal, pull it upwards to remove the electric box.	
Twist off the screws on electric box (fireproofing) with screwdriver, and then remove the electric box (fireproofing).	
8.Remove motor	
Twist off the tapping screws fixing the motor, pull out the pin of leading wire for motor and then remove the motor.	

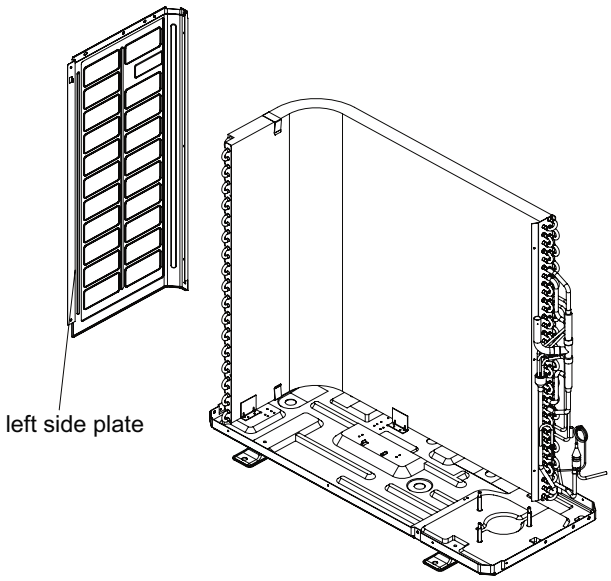
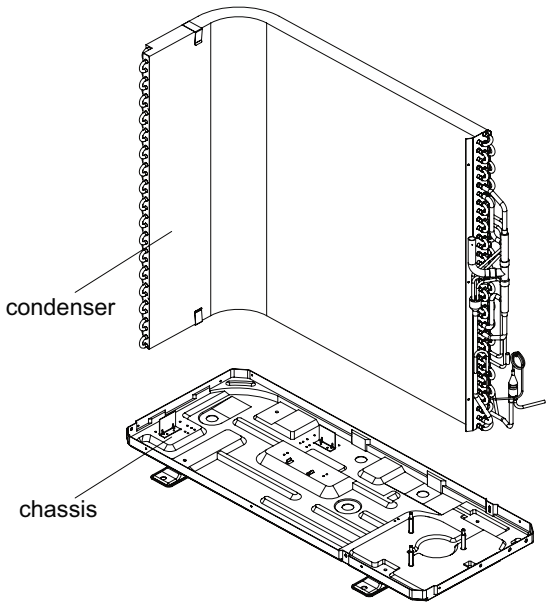
Steps	Procedure
9.Remove motor support	
	Twist off the tapping screws fixingthe motor support, pull it upwardsand then remove the motor support.
10.Remove isolation sheet	
	Twist off the screws connecting isolation sheet and end plate of condenser and chassis, and then remove the isolation sheet.
11.Remove 4-way valve	
	Unsolder the pipeline between compressor, condenser, gas and liquid valve, and then remove the 4-way valve. (note: release all refrigerant before unsoldering).







Steps	Procedure
12.Remove gas valve and liquid valve Twist off the 2 bolts fixing the valve sub-assy. Unsolder the soldering joint between gas valve and air-return pipe and then remove the gas valve.(note: when unsoldering the soldering joint, wrap the gas valve with wet cloth completely to avoid the damage to valve, and release all refrigerant completely at first). Unsolder the soldering joint between liquid valve and connection pipe of liquid valve, and then remove the liquid valve.	
13.Remove valve support Twist off the screws connecting valve support and chassis, and then remove the valve support.	
14.Remove compressor Twist off the 3 foot nuts on compressor and then remove the compressor.	

Steps	Procedure
15.Remove left side plate	
Twist off the screws connecting the left side plate and chassis with screwdriver, and then remove the left side plate.	
16.Remove chassis and condenser	
Pull it upwards to separate the chassis and condenser.	

APPENDIX:

Appendix 1: Reference Sheet of Celsius and Fahrenheit

Conversion formula for Fahrenheit degree and Celsius degree: Tf=Tcx1.8+32

Set temperature

Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)
61	60.8	16		69/70	69.8	21		78/79	78.8	26
62/63	62.6	17		71/72	71.6	22		80/81	80.6	27
64/65	64.4	18		73/74	73.4	23		82/83	82.4	28
66/67	66.2	19		75/76	75.2	24		84/85	84.2	29
68	68	20		77	77	25		86	86	30

Ambient temperature

Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)		Fahrenheit display temperature (℉)	Fahrenheit (℉)	Celsius (℃)
32/33	32	0		55/56	55.4	13		79/80	78.8	26
34/35	33.8	1		57/58	57.2	14		81	80.6	27
36	35.6	2		59/60	59	15		82/83	82.4	28
37/38	37.4	3		61/62	60.8	16		84/85	84.2	29
39/40	39.2	4		63	62.6	17		86/87	86	30
41/42	41	5		64/65	64.4	18		88/89	87.8	31
43/44	42.8	6		66/67	66.2	19		90	89.6	32
45	44.6	7		68/69	68	20		91/92	91.4	33
46/47	46.4	8		70/71	69.8	21		93/94	93.2	34
48/49	48.2	9		72	71.6	22		95/96	95	35
50/51	50	10		73/74	73.4	23		97/98	96.8	36
52/53	51.8	11		75/76	75.2	24		99	98.6	37
54	53.6	12		77/78	77	25				

Appendix 2: Configuration of Connection Pipe

1.Standard length of connection pipe

● 5m, 7.5m, 8m.

2.Min. length of connection pipe is 3m.

3.Max. length of connection pipe and max. high difference.

4.The additional refrigerant oil and refrigerant charging required after prolonging connection pipe

● After the length of connection pipe is prolonged for 10m at the basis of standard length, you should add 5ml of refrigerant oil for each additional 5m of connection pipe.

● The calculation method of additional refrigerant charging amount (on the basis of liquid pipe):

Cooling capacity	Max length of connection pipe	Max height difference
5000 Btu/h(1465 W)	15 m	5 m
7000 Btu/h(2051 W)	15 m	5 m
9000 Btu/h(2637 W)	15 m	10 m
12000 Btu/h(3516 W)	20 m	10 m
18000 Btu/h(5274 W)	25 m	10 m
24000 Btu/h(7032 W)	25 m	10 m
28000 Btu/h(8204 W)	30 m	10 m
36000 Btu/h(10548 W)	30 m	20 m
42000 Btu/h(12306 W)	30 m	20 m
48000 Btu/h(14064 W)	30 m	20 m

● When the length of connection pipe is above 5m, add refrigerant according to the prolonged length of liquid pipe. The additional refrigerant charging amount per meter is different according to the diameter of liquid pipe. See the following sheet.

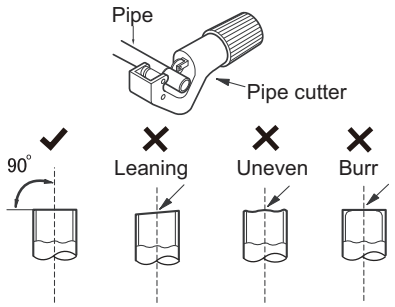
● Additional refrigerant charging amount = prolonged length of liquid pipe X additional refrigerant charging amount per meter

Additional refrigerant charging amount for R22, R407C, R410A and R134a			
Diameter of connection pipe		Outdoor unit throttle	
Liquid pipe(mm)	Gas pipe(mm)	Cooling only(g/m)	Cooling and heating(g/m)
Φ6	Φ9.5 or Φ12	15	20
Φ6 or Φ9.5	Φ16 or Φ19	15	20
Φ12	Φ19 or Φ22.2	30	120
Φ16	Φ25.4 or Φ31.8	60	120
Φ19	/	250	250
Φ22.2	/	350	350

Appendix 3: Pipe Expanding Method

⚠ **Note:**

Improper pipe expanding is the main cause of refrigerant leakage.Please expand the pipe according to the following steps:

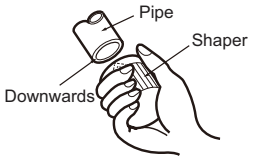


A:Cut the pip

- Confirm the pipe length according to the distance of indoor unit and outdoor unit.
- Cut the required pipe with pipe cutter.

B:Remove the burrs

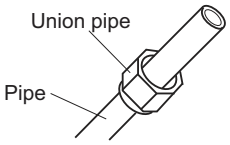
- Remove the burrs with shaper and prevent the burrs from getting into the pipe.



C:Put on suitable insulating pipe

D:Put on the union nut

- Remove the union nut on the indoor connection pipe and outdoor valve; install the union nut on the pipe.



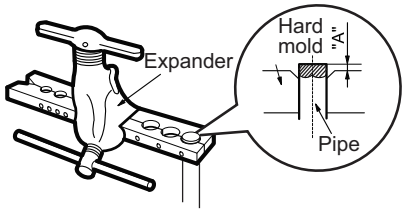
E:Expand the port

- Expand the port with expander.

⚠ **Note:**

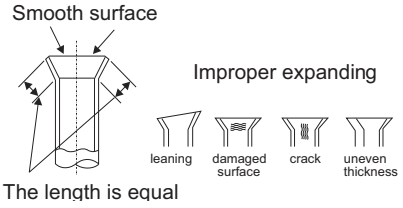
- "A" is different according to the diameter, please refer to the sheet below:

Outer diameter(mm)	A(mm)	
	Max	Min
Φ6 - 6.35 (1/4")	1.3	0.7
Φ9.52 (3/8")	1.6	1.0
Φ12 - 12.70 (1/2")	1.8	1.0
Φ16 - 15.88 (5/8")	2.4	2.2



F:Inspection

- Check the quality of expanding port. If there is any blemish, expand the port again according to the steps above.



Appendix 4: List of Resistance for Temperature Sensor

Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units(15K)

Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)
-19	138.1		20	18.75		59	3.848		98	1.071
-18	128.6		21	17.93		60	3.711		99	1.039
-17	121.6		22	17.14		61	3.579		100	1.009
-16	115		23	16.39		62	3.454		101	0.98
-15	108.7		24	15.68		63	3.333		102	0.952
-14	102.9		25	15		64	3.217		103	0.925
-13	97.4		26	14.36		65	3.105		104	0.898
-12	92.22		27	13.74		66	2.998		105	0.873
-11	87.35		28	13.16		67	2.896		106	0.848
-10	82.75		29	12.6		68	2.797		107	0.825
-9	78.43		30	12.07		69	2.702		108	0.802
-8	74.35		31	11.57		70	2.611		109	0.779
-7	70.5		32	11.09		71	2.523		110	0.758
-6	66.88		33	10.63		72	2.439		111	0.737
-5	63.46		34	10.2		73	2.358		112	0.717
-4	60.23		35	9.779		74	2.28		113	0.697
-3	57.18		36	9.382		75	2.206		114	0.678
-2	54.31		37	9.003		76	2.133		115	0.66
-1	51.59		38	8.642		77	2.064		116	0.642
0	49.02		39	8.297		78	1.997		117	0.625
1	46.6		40	7.967		79	1.933		118	0.608
2	44.31		41	7.653		80	1.871		119	0.592
3	42.14		42	7.352		81	1.811		120	0.577
4	40.09		43	7.065		82	1.754		121	0.561
5	38.15		44	6.791		83	1.699		122	0.547
6	36.32		45	6.529		84	1.645		123	0.532
7	34.58		46	6.278		85	1.594		124	0.519
8	32.94		47	6.038		86	1.544		125	0.505
9	31.38		48	5.809		87	1.497		126	0.492
10	29.9		49	5.589		88	1.451		127	0.48
11	28.51		50	5.379		89	1.408		128	0.467
12	27.18		51	5.197		90	1.363		129	0.456
13	25.92		52	4.986		91	1.322		130	0.444
14	24.73		53	4.802		92	1.282		131	0.433
15	23.6		54	4.625		93	1.244		132	0.422
16	22.53		55	4.456		94	1.207		133	0.412
17	21.51		56	4.294		95	1.171		134	0.401
18	20.54		57	4.139		96	1.136		135	0.391
19	19.63		58	3.99		97	1.103		136	0.382

Resistance Table of Tube Temperature Sensors for Indoor and Outdoor (20k)

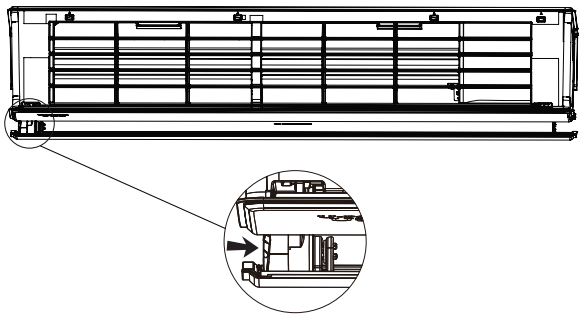
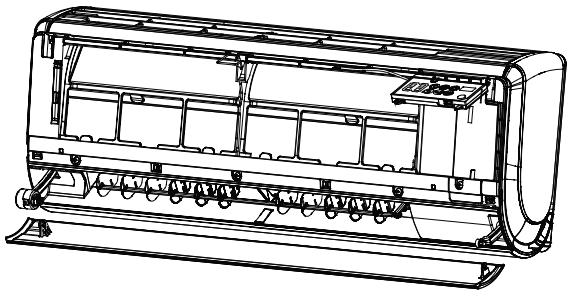
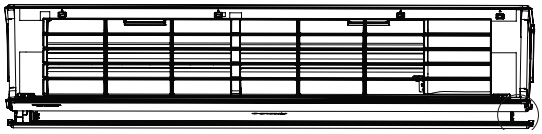
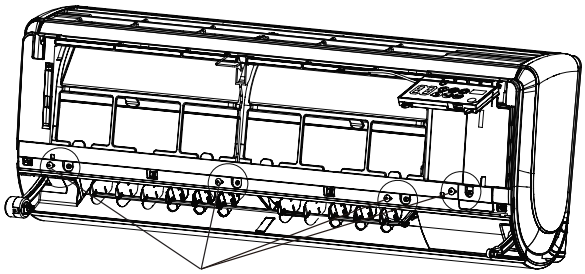
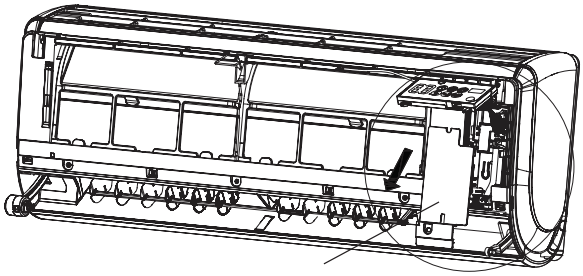
Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)
-19	181.4		20	25.01		59	5.13		98	1.427
-18	171.4		21	23.9		60	4.948		99	1.386
-17	162.1		22	22.85		61	4.773		100	1.346
-16	153.3		23	21.85		62	4.605		101	1.307
-15	145		24	20.9		63	4.443		102	1.269
-14	137.2		25	20		64	4.289		103	1.233
-13	129.9		26	19.14		65	4.14		104	1.198
-12	123		27	18.13		66	3.998		105	1.164
-11	116.5		28	17.55		67	3.861		106	1.131
-10	110.3		29	16.8		68	3.729		107	1.099
-9	104.6		30	16.1		69	3.603		108	1.069
-8	99.13		31	15.43		70	3.481		109	1.039
-7	94		32	14.79		71	3.364		110	1.01
-6	89.17		33	14.18		72	3.252		111	0.983
-5	84.61		34	13.59		73	3.144		112	0.956
-4	80.31		35	13.04		74	3.04		113	0.93
-3	76.24		36	12.51		75	2.94		114	0.904
-2	72.41		37	12		76	2.844		115	0.88
-1	68.79		38	11.52		77	2.752		116	0.856
0	65.37		39	11.06		78	2.663		117	0.833
1	62.13		40	10.62		79	2.577		118	0.811
2	59.08		41	10.2		80	2.495		119	0.77
3	56.19		42	9.803		81	2.415		120	0.769
4	53.46		43	9.42		82	2.339		121	0.746
5	50.87		44	9.054		83	2.265		122	0.729
6	48.42		45	8.705		84	2.194		123	0.71
7	46.11		46	8.37		85	2.125		124	0.692
8	43.92		47	8.051		86	2.059		125	0.674
9	41.84		48	7.745		87	1.996		126	0.658
10	39.87		49	7.453		88	1.934		127	0.64
11	38.01		50	7.173		89	1.875		128	0.623
12	36.24		51	6.905		90	1.818		129	0.607
13	34.57		52	6.648		91	1.736		130	0.592
14	32.98		53	6.403		92	1.71		131	0.577
15	31.47		54	6.167		93	1.658		132	0.563
16	30.04		55	5.942		94	1.609		133	0.549
17	28.68		56	5.726		95	1.561		134	0.535
18	27.39		57	5.519		96	1.515		135	0.521
19	26.17		58	5.32		97	1.47		136	0.509

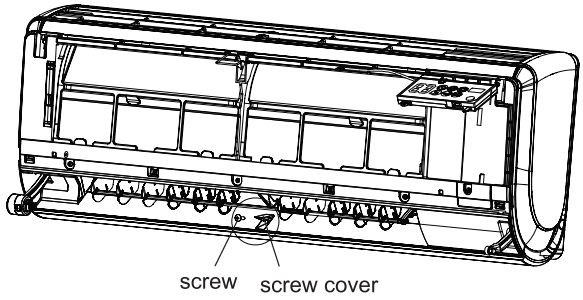
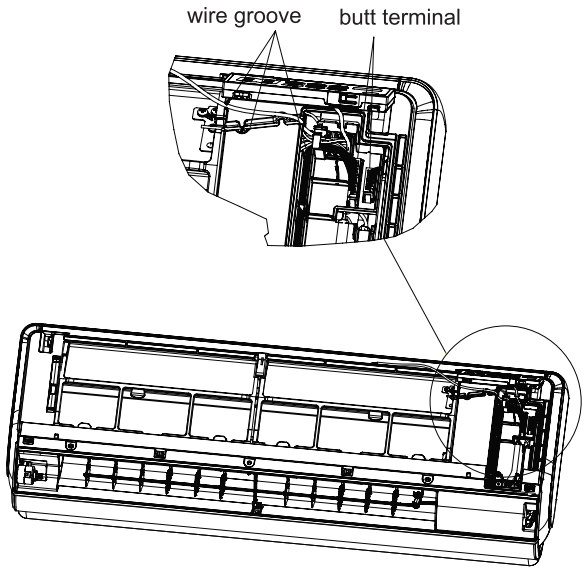
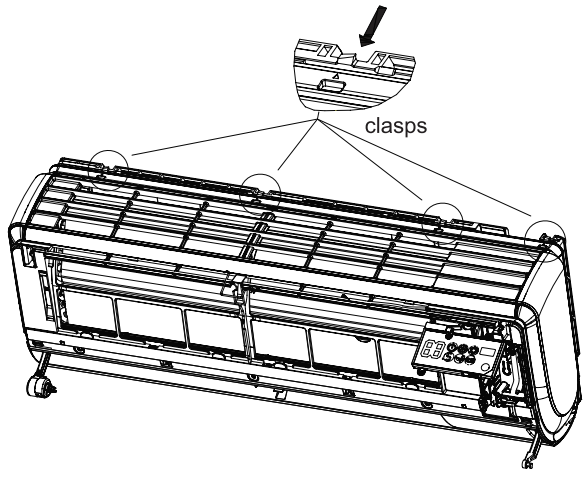
Resistance Table of Discharge Temperature Sensor for Outdoor(50K)

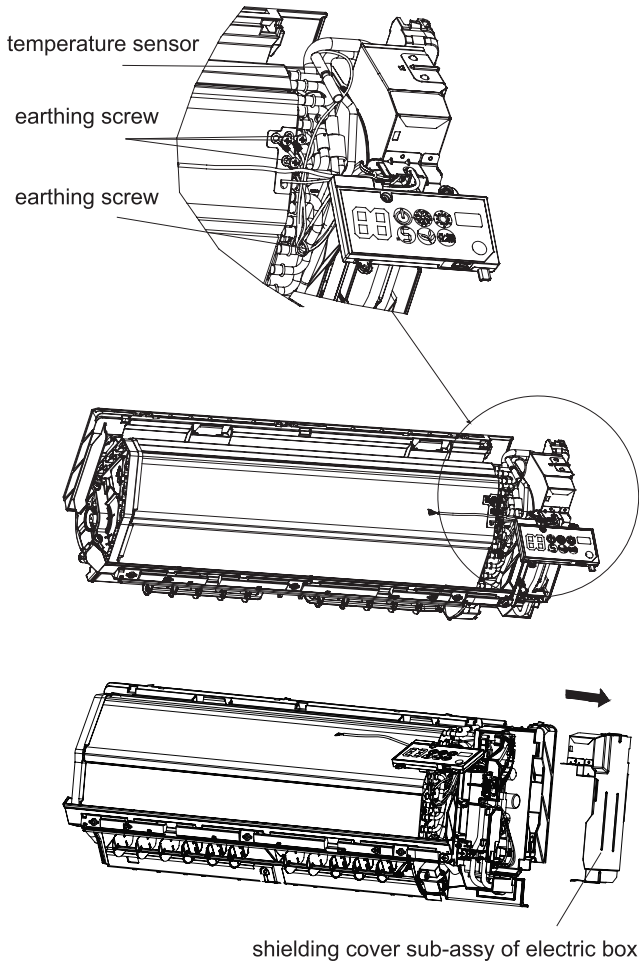
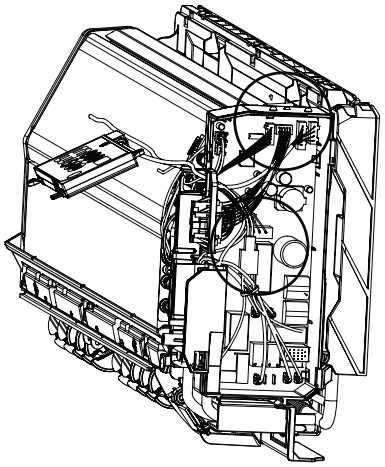
Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)		Temp(℃)	Resistance(kΩ)
-29	853.5		10	98		49	18.34		88	4.754
-28	799.8		11	93.42		50	17.65		89	4.609
-27	750		12	89.07		51	16.99		90	4.469
-26	703.8		13	84.95		52	16.36		91	4.334
-25	660.8		14	81.05		53	15.75		92	4.204
-24	620.8		15	77.35		54	15.17		93	4.079
-23	580.6		16	73.83		55	14.62		94	3.958
-22	548.9		17	70.5		56	14.09		95	3.841
-21	516.6		18	67.34		57	13.58		96	3.728
-20	486.5		19	64.33		58	13.09		97	3.619
-19	458.3		20	61.48		59	12.62		98	3.514
-18	432		21	58.77		60	12.17		99	3.413
-17	407.4		22	56.19		61	11.74		100	3.315
-16	384.5		23	53.74		62	11.32		101	3.22
-15	362.9		24	51.41		63	10.93		102	3.129
-14	342.8		25	49.19		64	10.54		103	3.04
-13	323.9		26	47.08		65	10.18		104	2.955
-12	306.2		27	45.07		66	9.827		105	2.872
-11	289.6		28	43.16		67	9.489		106	2.792
-10	274		29	41.34		68	9.165		107	2.715
-9	259.3		30	39.61		69	8.854		108	2.64
-8	245.6		31	37.96		70	8.555		109	2.568
-7	232.6		32	36.38		71	8.268		110	2.498
-6	220.5		33	34.88		72	7.991		111	2.431
-5	209		34	33.45		73	7.726		112	2.365
-4	198.3		35	32.09		74	7.47		113	2.302
-3	199.1		36	30.79		75	7.224		114	2.241
-2	178.5		37	29.54		76	6.998		115	2.182
-1	169.5		38	28.36		77	6.761		116	2.124
0	161		39	27.23		78	6.542		117	2.069
1	153		40	26.15		79	6.331		118	2.015
2	145.4		41	25.11		80	6.129		119	1.963
3	138.3		42	24.13		81	5.933		120	1.912
4	131.5		43	23.19		82	5.746		121	1.863
5	125.1		44	22.29		83	5.565		122	1.816
6	119.1		45	21.43		84	5.39		123	1.77
7	113.4		46	20.6		85	5.222		124	1.725
8	108		47	19.81		86	5.06		125	1.682
9	102.8		48	19.06		87	4.904		126	1.64

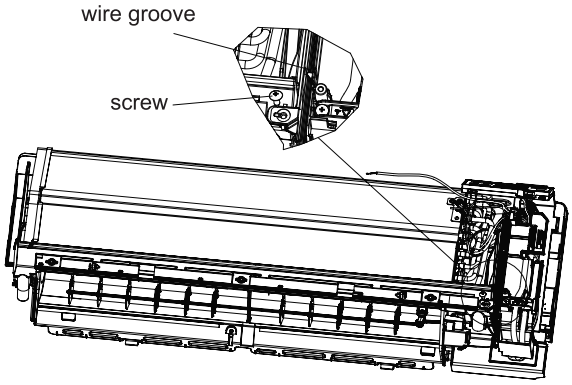
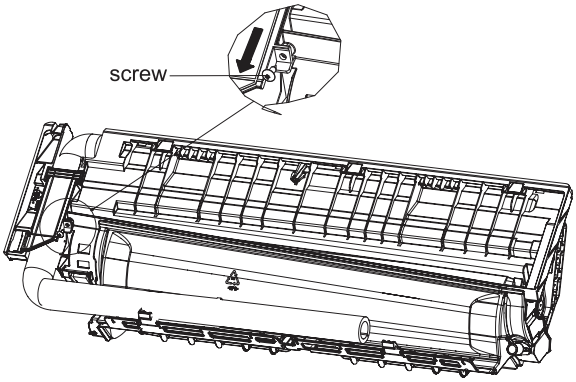
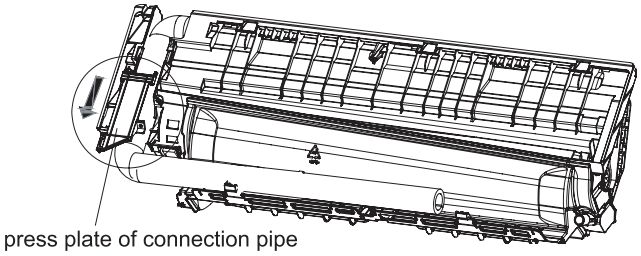
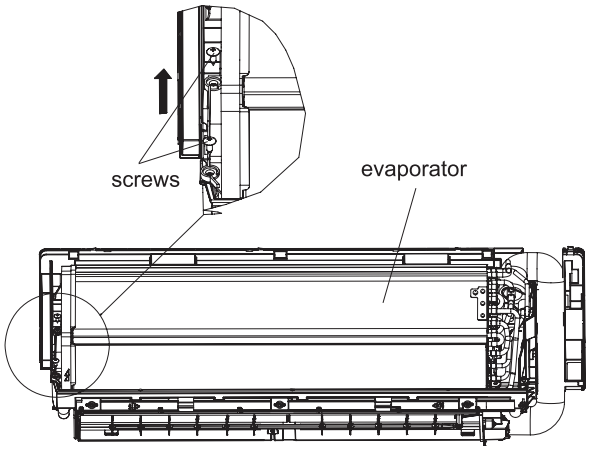
Note: The information above is for reference only.

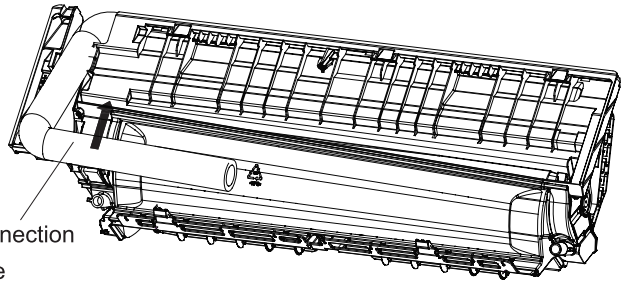
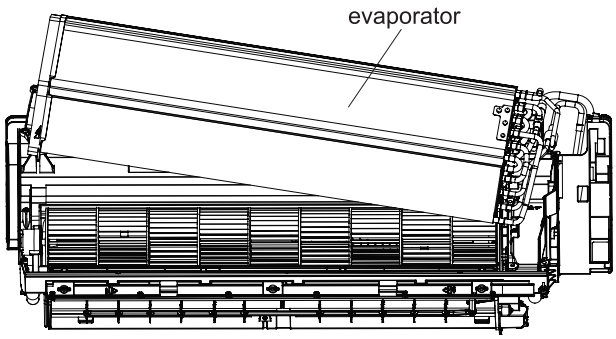
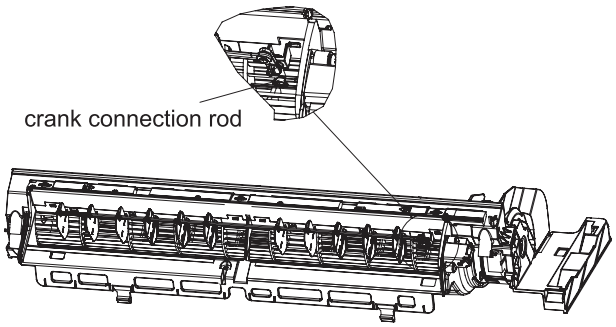
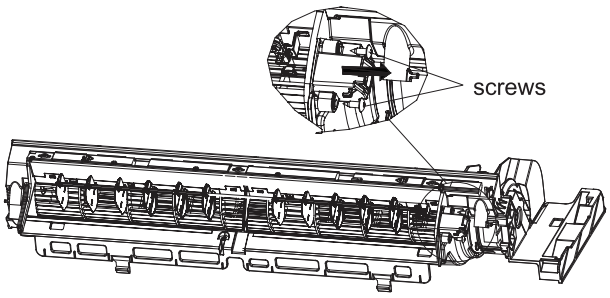
UNIT BREAKDOWNS

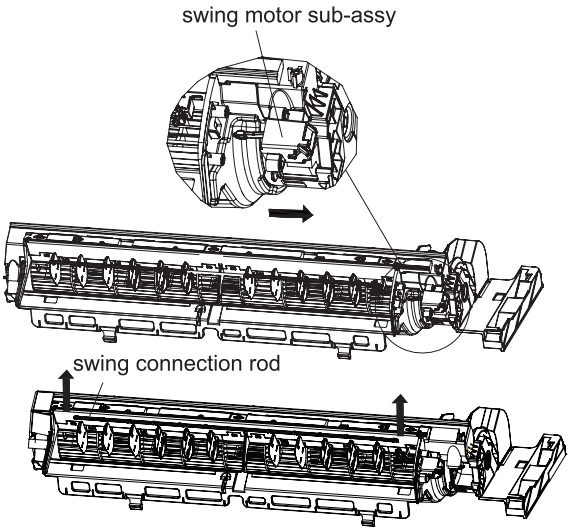
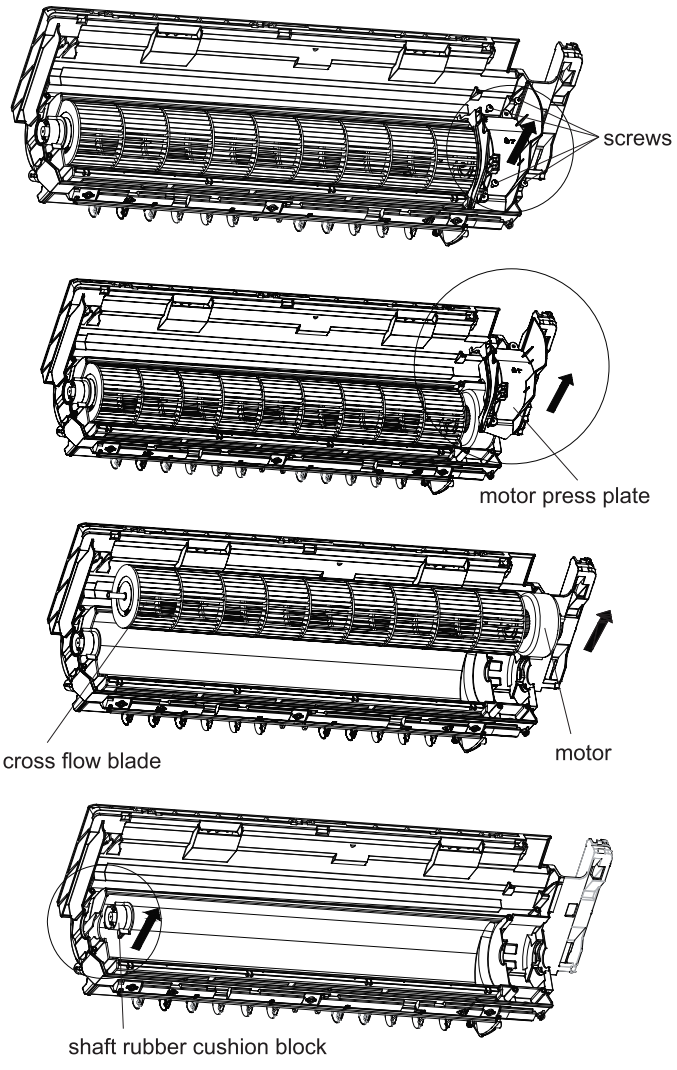
Steps	Procedure	
a	Remove the left end. Hold the end of connection rod with left hand, hold the horizontal louver with right hand to separate connection rod and horizontal louver.	
b	Remove the horizontal louver along the axile center direction.	
c	Note: (during operation, install the left end and then install the right end. After installation, re-energize the unit until the horizontal louver is reset. After that, you can operate the unit).	
d	Remove 4 screws on front case and electric box cover with screwdriver.	 screws
e	Remove electric box cover.	 electric box cover

Steps	Procedure	
f	Turn over the screw cover on front case with hand, and then remove one screw inside the screw cover with screwdriver.	
g	Pull out two butt terminals on electric box, and then take out connection wire of butt terminal, connection wire of inspection board and wire of temperature sensor from the wire groove.	
h	Open 4 clasps at left, middle and right side of front case with hand.	

Steps	Procedure
Remove electric box	
a Remove three earthing screws with screws, pull out the indoor tube temperature sensor with hand and then cut off the tileline with scissors.	
b Take out the electric box shielding cover sub-assy.	
5. Remove evaporator	
a Pull out the power plug from motor and stepping motor.	

b	Remove screws fixing electric box with screwdriver, and then take out the wires from the wire groove of electric box with hand.	
c	Remove screw from press plate of connection pipe with screwdriver.	
d	Remove press plate of connection pipe with hand to separate it from the bottom case.	
e	Remove 2 screws at the connection position of evaporator and bottom case with screwdriver.	

Steps	Procedure	
f	Open the connection pipe of evaporator with hand.	
g	Lift up the left end of evaporator with hand, and then take out the evaporator.	
6. Remove swing blade		
a	Remove crank connection rod.	
b	Remove 2 screws fixing swing motor cover with screwdriver.	

Steps	Procedure	
c	Remove swing motor sub-assy.	
d	Take out swing connection rod to separate it from the swing blade.	
7. Remove cross flow blade and motor		
a	Remove 4 screws fixing the motor press plate with screwdriver.	
b	Take out the motor press plate.	
c	Take out cross flow blade and motor.	
d	Pull out the shaft rubber cushion block with hand.	

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Replaces: New