SERVICE MANUAL
R–410A Ductless Split System Air Conditioner and Heat Pump
MODELS: DLC4(A/H)6–Outdoor, DLF4(A/H)6–Indoor
SIZES: 9K, 12K, 18K, and 24K

INTRODUCTION

This Service Manual provides the necessary information to service, repair, and maintain the DLF4(A,H), DLC4(A/H)

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⚠ 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.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory–authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions 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.

⚠ 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.

MODEL NOMENCLATURE											
MODEL SERIES	**D**	**L**	**C**	**4**	**A**	**6**	**0**	**9**	**J**	**1**	**A**
Position Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
DLC = Outdoor DLF = Indoor	**Outdoor/Indoor**										
4A6 = AC 4H6 = HP						**Type**					
09 = 9k BTU 12 = 12k BTU 18 = 18k BTU 24 = 24k BTU								**Size**			
J = 115–1–60 K = 208/230–1–60									**Voltage**		
1A											**Factory Designation**

STANDARD FEATURES AND ACCESSORIES

Ease Of Installation	
Mounting Brackets	S
Low Voltage Controls	S
Comfort Features	
Microprocessor Controls	S
Wireless Remote Control	S
Rapid Cooling/Heating	S
Automatic Air Sweep	S
Cold Blow Prevention	S
Continuous Fan *	S
Auto Restart Feature	S
Memory Function	S
Auto Changeover on Heat Pumps	S
Dry Function	S
Energy Saving Features	
Inverter Driven Compressor	S
Sleep Mode	S
24 Hour Stop/Start Timer	S
Safety And Reliability	
Indoor Unit Freeze Protection	S
3 Minute Compressor Time Delay	S
High Compressor Discharge Temperature	S
Low Voltage Protection	S
Compressor Overload Protection	S
Compressor Over current Protection	S
IPM Module Protection	S
Ease Of Service And Maintenance	
Cleanable Filters	S
Diagnostic LED's On Outdoor Board	S
Error Messages Displayed Front Panel	S
Application Flexibility	
Condensate Pump	A
Standard Warranty	
7 Year Compressor Limited Warranty**	S
5 Year Parts Limited Warranty**	S

Legend
S Standard
A Accessory
O Optional
F Field Fabricated
***** Cooling Only

****** For owner occupied residential applications. For Commercial applications, warranty is 1 year parts and 5 years compressor.

INDOOR UNITS

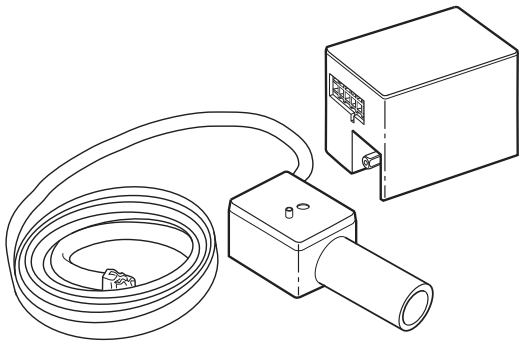

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Figure 1 — Condensate Pump Accessory

On high wall fan coils, the condensate pump accessory is recommended when adequate drain line pitch cannot be provided, or when the condensate must move up to exit.

The pump has a lift capability of 12 ft (3.6 m) on the discharge side if the pump is mounted in the fan coil or 6 ft (1.8 m) on the suction side if the pump is remote mounted.

Table 1—Accessory Condensate Pump Kit Contents

Item	Qty.
16 ft Transparent Suction/Discharge Tubing	1
Condensate Pump Assembly	1
Low voltage Power Cord	1
Transparent Detection Unit Vent Tubing	1
Power Cable	1
Wire Ties	6
Wall Mount Bracket	1
Adhesive	1
Detection Unit Mounting Bracket	1
⅝—in Rubber Elbow	1
Detection Unit	1

⚠ 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 one disconnect switch. Lock out and tag switch with a suitable warning label.

PHYSICAL DATA – DLC4A6

Outdoor Unit DLC4A6	09	12	12	18	24
System Voltage	115–1–60		208/230–1–60		
Control Voltage	Low Voltage Pulse DC				
Rated Cooling Capacity (Btuh)	9,000	11,800	12,000	18,000	22,000
Cooling. Capacity Range Min – Max (Btuh)	3,500–11,000	3,300–12,500	3,300–12,500	4,500–21,000	6,400–24,000
Operating Weight lb. (kg)	75 (34)		63.8 (30)	112.2 (51)	
Refrigerant Type	R–410A				
Metering Device @ Outdoor Unit	Cap. Tube				EXV
Charge lb. (kg)	2.3 (1.05)	2.8 (1.27)	2.2 (1.0)	2.8 (1.27)	3.4 (1.55)
Compressor					
Type	Twin Rotary Inverter Driven				
Model	KNB092FHBMC		QXA–B096ZC190	SNB130FGYMC	C–6RZ146H1A
Outdoor Fan					
CFM	1060		942	1880	1880
RPM	850		880	690	690
Diameter (in)	15.7		14.6	20.5	20.5
Watts	30		21	60	
Outdoor Coil					
Face Area (sq.)	4.4		3.7	5.9	6.1
No. Rows	2				
Fins per inch	16		18		
Refrigerant Lines					
Connection Type	Flare				
Liquid (Mix Phase) in OD	1/4”				
Vapor Line in OD	3/8”			1/2”	
Maximum Length ft.	50	65	50	82	
Max Lift (Fan Coil Above) ft.	33				
Max Drop (Fan Coil Below) ft.	33				
External Finish	White				

PHYSICAL DATA CONTINUED – DLF4A6

Indoor Unit DLF4A6	09	12	12	18	24
System Voltage	115 V		208/230–1–60		
Control Voltage	Low Voltage Pulse DC				
Electrical Connections	Indoor Unit Powered From Outdoor Unit				
Rated Cooling Capacity (Btuh)	9,000	11,800	12,000	18,000	22,000
Operating Weight lb. (kg)	18.7 (8.5)	19.8 (9.0)		26.5 (12.0)	33.1 (15.0)
Refrigerant Type	R–410A				
Metering Device @ Outdoor Unit	Cap. Tube				EXV
Moisture Removal Rate (pints/hr.)	1.7	2.9	2.9	3.8	4.5
Indoor Fan					
RPM/CFM (Turbo) – Cooling	1300/330	1350/341	1350/341	1400/471	1350/588
RPM/CFM (High) – Cooling	1100/277	1150/288	1150/288	1150/400	1150/471
RPM/CFM (Medium) – Cooling	900/224	950/235	950/235	1000/330	1000/412
RPM/CFM (Low) – Cooling	700/188	750/200	750/200	850/271	850/353
Motor Watts	15			20	35
Blower Quantity … Size (DxL) in	1 … 3.62 x 23.4			1 … 3.9 x 25.6	1 … 3.9 x 30.1
Indoor Coil					
Face Area (sq.)	1.93			2.2	2.8
No. Of Rows	2				
Fins Per Inch	18				17
Filters					
Quantity	2		2	2	2
Controls	Integrated Microprocessor				
Wireless Remote	Standard				
Modes	Cool/Heat/Dry/Auto				
Fan Mode	High/Medium/Low/Auto				
Emergency Mode	Yes				
Defrost Method	Demand Defrost				
Diagnostics	Yes				
Air Sweep	Yes				
Soft Start	Yes				
Rapid Cooling/Heating	Yes				
Cold Blow Prevention	Yes				
Sleep Mode	Yes				
24 Hour Timer	Yes				
Auto Restart	Yes				
Freeze Protection On Indoor Unit	Yes				
Refrigerant Lines					
Connection Type	Flare				
Liquid (Mix Phase) in OD	1/4”				
Vapor Line in OD	3/8”			1/2”	
Maximum Length ft.	50	65	50	82	
Max Lift (Fan Coil Above) ft.	33				
Max Drop (Fan Coil Below) ft.	33				
Condensate Drain					
Size in	ID = 1/2” OD = 5/8”				
External Finish	White				

PHYSICAL DATA CONTINUED – DLC4H6

Outdoor Unit DLC4H6	09	12	12	18	24
System Voltage	115–1–60		208/230–1–60		
Control Voltage	Low Voltage Pulse DC				
Rated Cooling Capacity (Btuh)	9,000	11,800	12,000	18,000	22,000
Cooling. Capacity Range Min — Max (Btuh)	3,500 – 11,000	3,300 – 12,500	3,300 – 12,500	4,500 – 21,000	6,400 – 24,000
Rated Heating Capacity (Btuh)	9,800	13,000	12,000	19,200	24,200
Heating. Capacity Range Min — Max (Btuh)	2,500 – 11,000	3,400 – 13,500	3,400 – 13,500	4,000 – 23,000	4,100 – 24,200
Operating Weight lb (kg)	75 (34)		63.8 (30)	112.2 (51)	
Refrigerant Type	R–410A				
Metering Device @ OD Unit	Cap. Tube				EXV
Charge lb (kg)	2.2 (1.0)			2.9 (1.3)	3.4 (1.55)
Compressor					
Type	Twin Rotary Inverter Driven				
Model	KNB092FHBMC		QXA–B096ZC190	SNB130FGYMC	C–6RZ146H1A
Outdoor Fan					
CFM	1060		942	1880	1880
RPM	850		880	690	690
Diameter (in)	15.7		14.6	20.5	20.5
Watts watts	30		21	60	
Outdoor Coil					
Face Area (sq. ft)	4.4		3.7	5.9	6.1
No. Rows	2				
Fins per inch	16		18		
Refrigerant Lines					
Connection Type	Flare				
Liquid (Mix Phase) in OD	1/4”				
Vapor Line in OD	3/8”			1/2”	
Maximum Length ft	65	50		82	
Max Lift (Fan Coil Above) ft	33				
Max Drop (Fan Coil Below) ft	33				
External Finish	White				

PHYSICAL DATA CONTINUED – DLF4H6

Indoor Unit DLF4H6	09	12	12	18	24
System Voltage	115 V		208/230–1–60		
Control Voltage	Low Voltage Pulse DC				
Electrical Connections	Indoor Unit Powered From Outdoor Unit				
Rated Cooling Capacity (Btuh)	9,000	11,800	12,000	18,000	22,000
Rated Heating Capacity (Btuh)	9,800	13,000	12,000	19,200	24,200
Operating Weight lb (kg)	18.7 (8.5)	19.8 (9.0)		26.5 (12.0)	33.1 (15.0)
Refrigerant Type	R–410A				
Metering Device @ Outdoor Unit	Cap. Tube				EXV @ Outdoor Unit
Moisture Removal Rate(pints/hr)	1.7	2.9		3.8	4.2
Indoor Fan					
RPM/CFM (Turbo) – Cooling	1300/330	1350/341	1350/341	1400/471	1350/588
RPM/CFM (High) – Cooling	1100/277	1150/288	1150/288	1150/400	1150/471
RPM/CFM (Medium) – Cooling	900/224	950/235	950/235	1000/330	1000/412
RPM/CFM (Low) – Cooling	700/188	750/200	750/200	850/271	850/353
RPM/CFM (Turbo) – Heating	1300/330	1350/341	1350/341	1450/471	1350/588
RPM/CFM (High) – Heating	1150/277	1200/288	1200/288	1250/400	1150/471
RPM/CFM (Medium) – Heating	980/224	1000/235	1000/235	1100/330	1000/412
RPM/CFM (Low) – Heating	820/188	850/200	850/200	950/271	900/353
Motor Watts	15			20	35
Blower Quantity … Size (DxL) in	1 … 3.62 x 23.4			1 … 3.9 x 25.6	1 … 3.9 x 30.1
Indoor Coil					
Face Area (sq.ft)	1.93			2.2	4.2
No. Of Rows	2				
Fins Per Inch	18				17
Filters					
Quantity	2		2	2	2
Controls	Integrated Microprocessor				
Wireless Remote	Standard				
Modes	Cool/Heat/Dry/Auto				
Fan Mode	High/Medium/Low/Auto				
Emergency Mode	Yes				
Defrost Method	Demand Defrost				
Diagnostics	Yes				
Air Sweep	Yes				
Soft Start	Yes				
Rapid Cooling/Heating	Yes				
Cold Blow Prevention	Yes				
Sleep Mode	Yes				
24 Hour Timer	Yes				
Auto Restart	Yes				
Freeze Protection On Indoor Unit	Yes				
Refrigerant Lines					
Connection Type	Flare				
Liquid (Mix Phase) in OD	1/4”				
Vapor Line in OD	3/8”			1/2”	
Maximum Length ft	65	50		82	
Max Lift (Fan Coil Above) ft	33				
Max Drop (Fan Coil Below) ft	33				
Condensate Drain					
Size in	ID = 1/2” OD = 5/8”				
External Finish	White				

AHRI* CAPACITY RATINGS

Model Numbers		Cooling			High Heating 47°F		Low Heating 17°F
Outdoor Unit	Indoor Unit	Capacity (Btuh)	EER	SEER	Capacity (Btuh)	HSPF	Capacity (Btuh)
DLC4A609J1A	DLF4A609J1A	9,000	12.0	16.0	–	–	–
DLC4A612J1A	DLF4A612J1A	11,800	9.4	16.0	–	–	–
DLC4A612K1A	DLF4A612K1A	12,000	9.8	16.0	–	–	–
DLC4A618K1A	DLF4A618K1A	18,000	11.1	16.0	–	–	–
DLC4A624K1A	DLF4A624K1A	22,000	10.0	16.0	–	–	–
DLC4H609J1A	DLF4H609J1A	9,000	12.0	16.0	9,800	8.6	5,400
DLC4H612J1A	DLF4H612J1A	11,800	9.4	16.0	13,000	8.6	8,500
DLC4H612K1A	DLF4H612K1A	12,000	9.8	16.0	12,000	8.5	6,800
DLC4H618K1A	DLF4H618K1A	18,000	11.1	16.0	19,200	8.0	12,000
DLC4H624K1A	DLF4H624K1A	22,000	10.0	16.0	24,200	8.5	18,600

*Air Conditioning, Heating & Refrigeration Institute

– = N/A

Legend

HSPF – Heating Seasonal Performance Factor

SEER – Seasonal Energy Efficiency Ratio

NOTES:

1. Ratings are net values reflecting the effects of circulating fan heat. Ratings are based on: Cooling Standard: 80°F (26.67°C) db, 67°F (19.44°C) wb air entering indoor unit and 95°F (35°C) db air entering outdoor unit. High Temperature Heating Standard: 70°F (21.11°C) db air entering indoor unit and 47°F (8.33°C) db, 43°F (6.11°C) wb air entering outdoor unit.
2. Ratings are based on 25 ft. (7.62 m) of interconnecting refrigerant lines.
3. All system ratings are based on fan coil units operating at high fan speed. Consult Physical Data tables for air flows at all available fan speeds.

AIR THROW DATA

Unit Size	Approximate Air Throw ft. (m)			
	Low	Medium	High	Turbo
9 K	18 (5.5)	21 (6.4)	23 (7.0)	28 (8.5)
12 K	20 (6.1)	23 (7.0)	25 (7.6)	30 (9.1)
18 K	22 (6.7)	27 (8.2)	33 (10.1)	39 (11.9)
24 K	25 (7.6)	29 (8.8)	34 (10.4)	42 (12.8)

SOUND RATINGS

Outdoor Units

Model Number	Sound Power dBA	Sound Pressure dBA
DLC4A609J1A	63	53
DLC4A612J1A	65	55
DLC4A612K1A	62	52
DLC4A618K1A	66	56
DLC4A624K1A	63	53
DLC4H609J1A	63	53
DLC4H612J1A	65	55
DLC4H612K1A	62	52
DLC4H618K1A	66	56
DLC4H624K1A	66	56

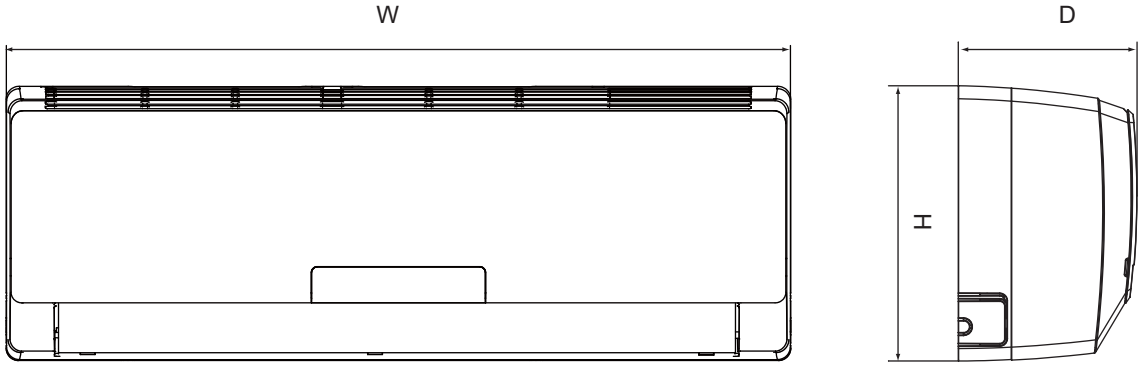
Indoor Units

Model Number	Low		Medium		High		Turbo	
	Sound Power dBA	Sound Pressure dBA	Sound Power dBA	Sound Pressure dBA	Sound Power dBA	Sound Pressure dBA	Sound Power dBA	Sound Pressure dBA
DLF4A609J1A	42	32	45	35	47	37	50	40
DLF4A612J1A	42	32	45	35	47	37	50	40
DLF4A612K1A	38	28	43	33	49	39	54	44
DLF4A618K1A	44	34	48	38	53	43	58	48
DLF4A624K1A	44	34	49	39	53	43	59	49
DLF4H609J1A (cool/heat)	42/42	32/32	45/45	35/35	47/47	37/37	50/50	40/40
DLF4H612J1A (cool/heat)	42/42	32/32	45/45	35/35	47/47	37/37	50/50	40/40
DLF4H612K1A (cool/heat)	38/38	28/28	43/43	33/33	49/49	39/39	54/54	44/44
DLF4H618K1A (cool/heat)	44/44	34/34	48/48	38/38	53/53	43/43	58/58	48/48
DLF4H624K1A (cool/heat)	44/44	34/34	49/49	39/39	53/53	43/43	59/59	49/49

NOTES:

1. Sound power ratings are per AHRI 270 and AHRI 350
2. Sound pressure ratings are estimated sound pressure, 3 feet (.91 m) from the unit, based on sound power data.

DIMENSIONS – INDOOR



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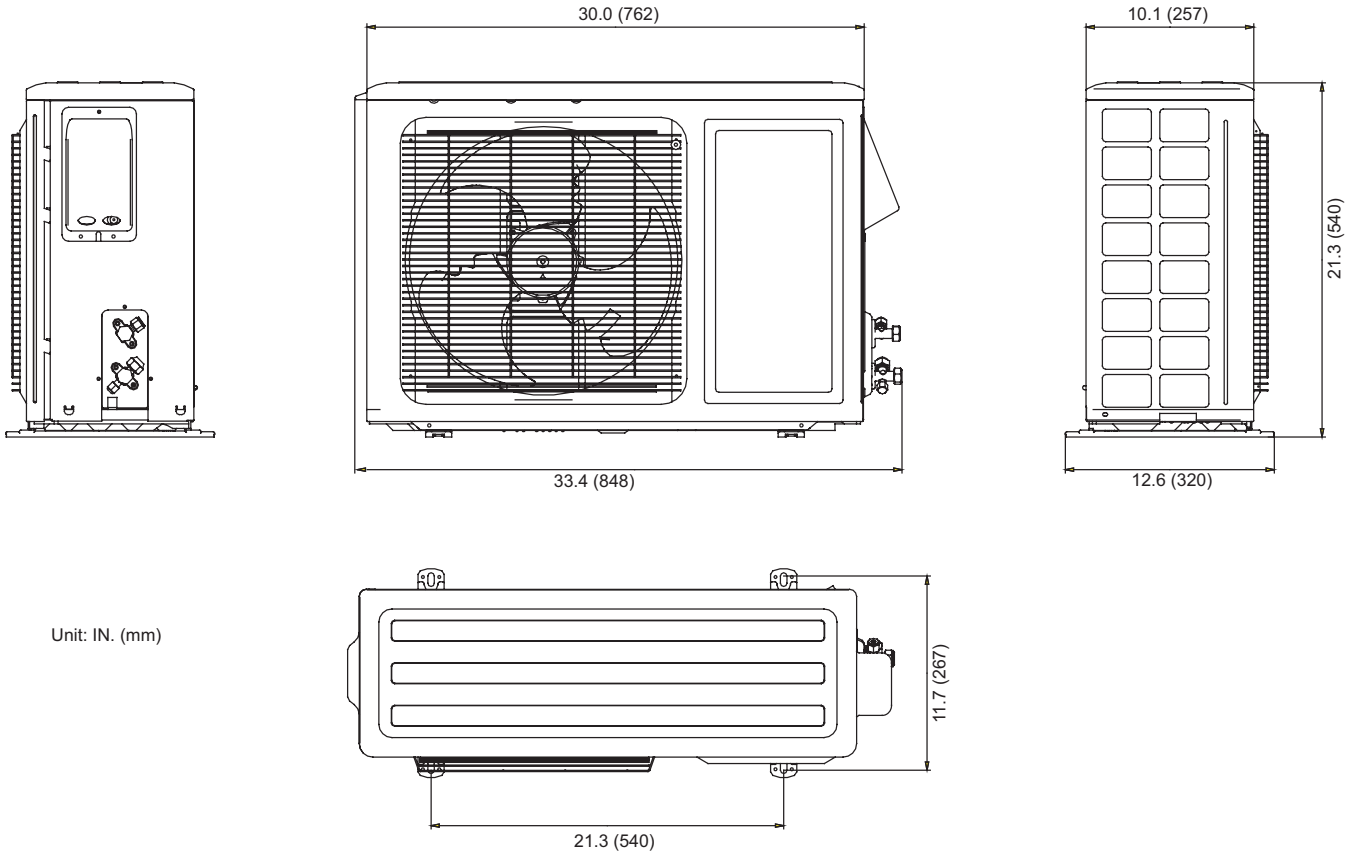
Unit Size	W In. (mm)	H In. (mm)	D In. (mm)	Net Operating Weight Lbs. (Kg)
9 K	30.3 (770)	11.1 (283)	7.9 (201)	18.7 (8.5)
12 K	30.3 (770)	11.1 (283)	7.9 (201)	19.8 (9.0)
18 K	34.0 (865)	12.0 (305)	8.5 (215)	26.4 (12)
24 K	39.7 (1008)	12.6 (319)	8.7 (221)	33.1 (15.0)

Figure 2 — Indoor Unit Dimensions

DIMENSIONS – OUTDOOR



Unit: IN. (mm)

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Figure 3 — 9K and 12K 115V (Net Operating Weight: 75 lbs. / 34 kg)

DIMENSIONS – OUTDOOR

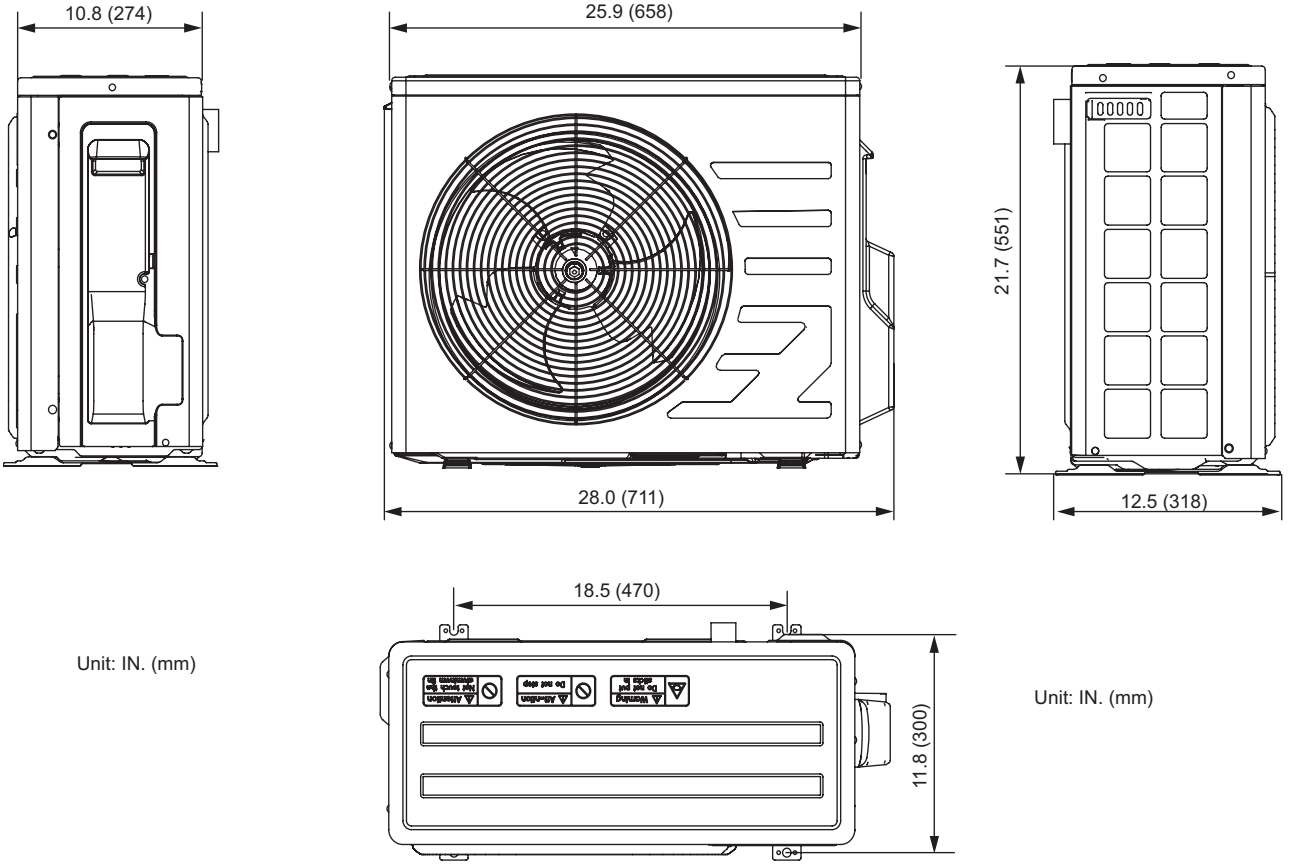


Figure 4 – 12K 230V (Net Operating Weight: 63.8 lbs. / 30 kg)

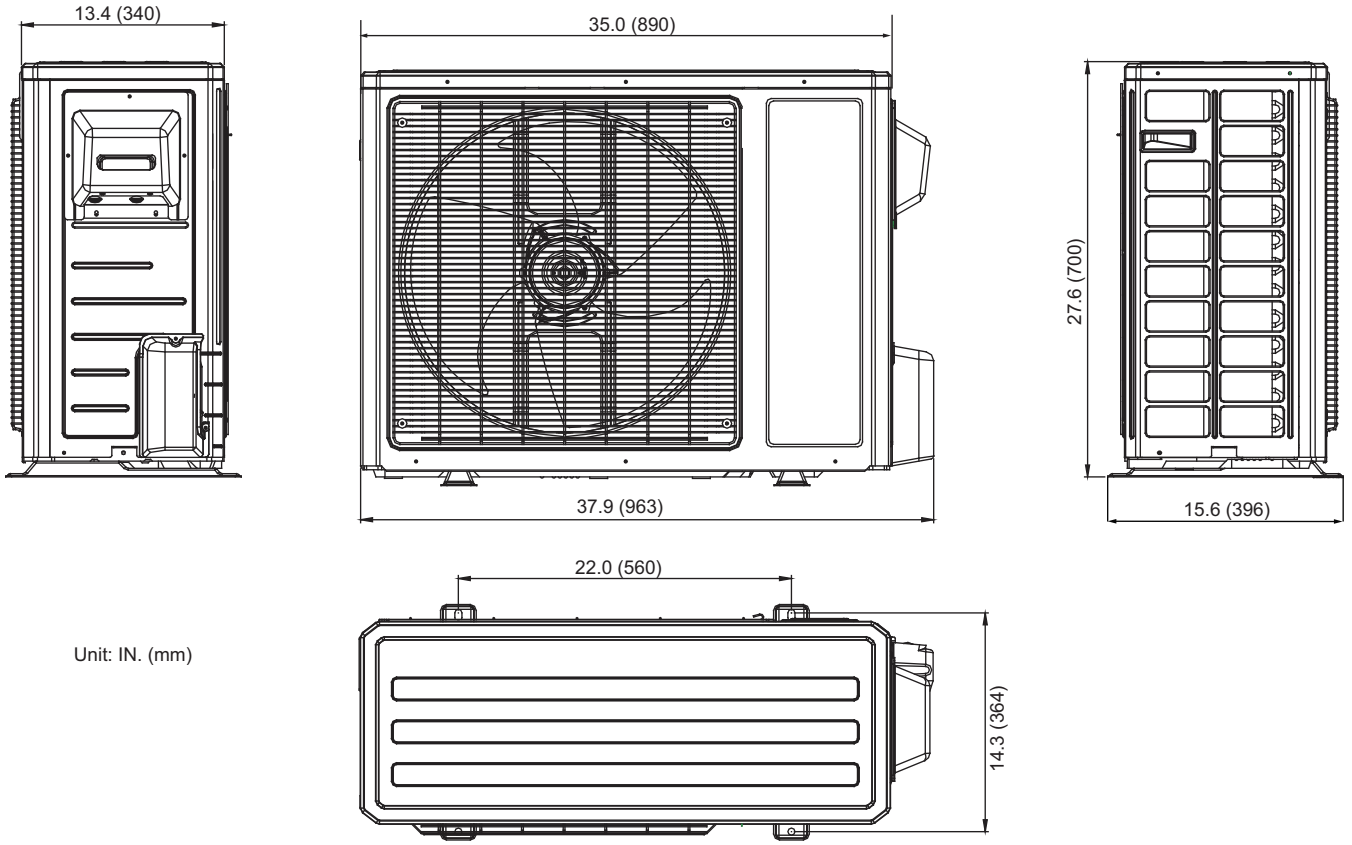
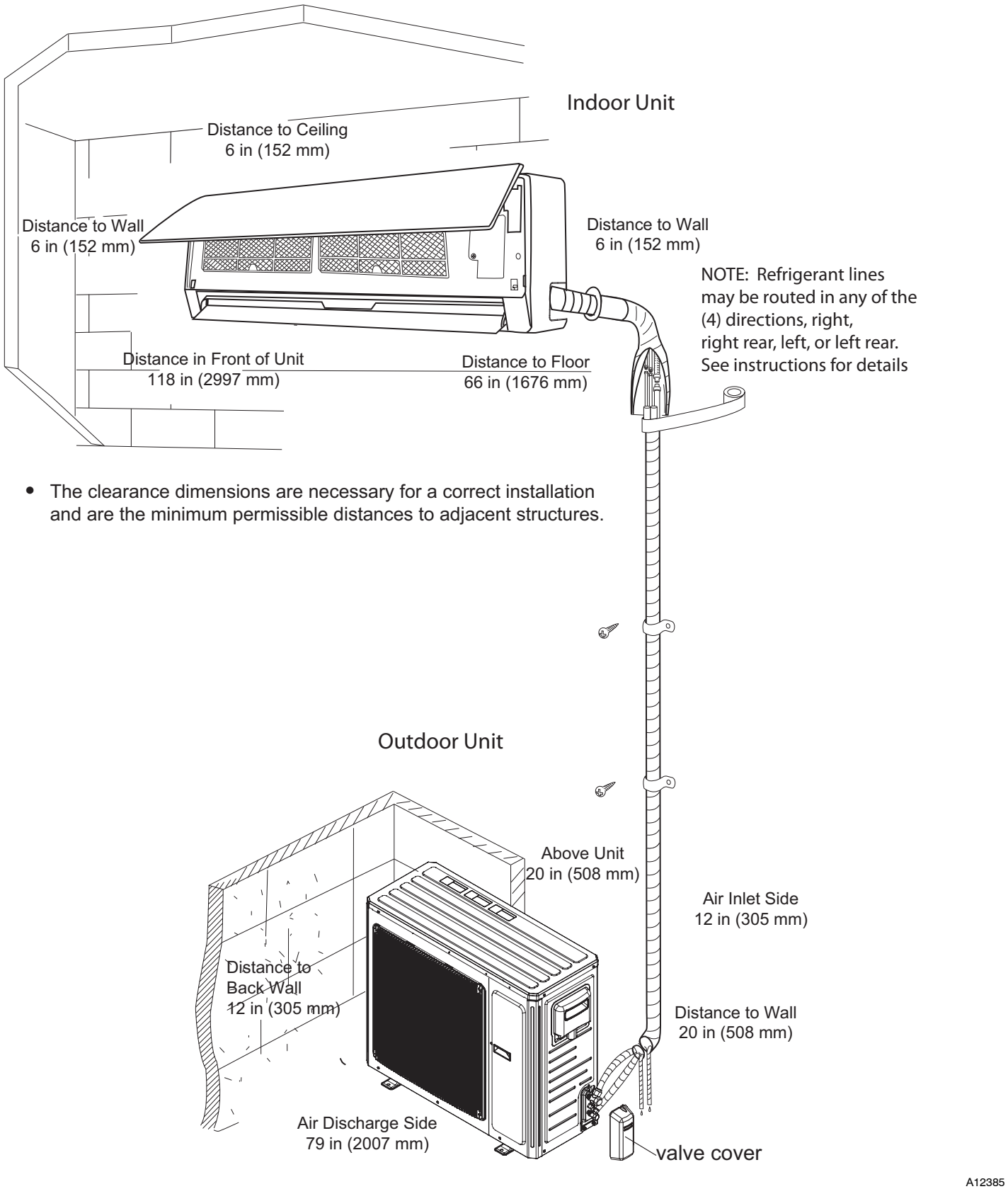


Figure 5 — 18K and 24K (Net Operating Weight: 112.2 lbs. / 51 kg)

CLEARANCES



- The clearance dimensions are necessary for a correct installation and are the minimum permissible distances to adjacent structures.

Figure 6 — Indoor and Outdoor Unit Clearances

SYSTEM OPERATING ENVELOPE

Supply Voltage	115—1—60 AC		208/230—1—60 AC		
Model	**9k**	**12k**	**12k**	**18k**	**24k**
Indoor Operating Range (A/C and HP) °F (°C)	61 – 86 (16 – 30)				
Cooling Ambient Operating Range (A/C) °F (°C)	64 – 113 (18 – 45)	64 – 113 (18 – 45)	5 – 109 (–15 – 43)	5 – 118 (–15 – 48)	5 – 118 (–15 – 48)
Cooling Ambient Operating Range (HP) °F (°C)	64 – 113 (18 – 45)	64 – 113 (18 – 45)	5 – 109 (–15 – 43)	5 – 118 (–15 – 48)	5 – 115 (–15 – 46)
Heating Ambient Operating Range (HP) °F (°C)	5 – 75 (–15 – 24)	5 – 75 (–15 – 24)	5 – 75 (–15 – 24)	19 – 75 (–7 – 24)	19 – 75 (–7 – 24)
See Figure	7		8	9	10 & 11

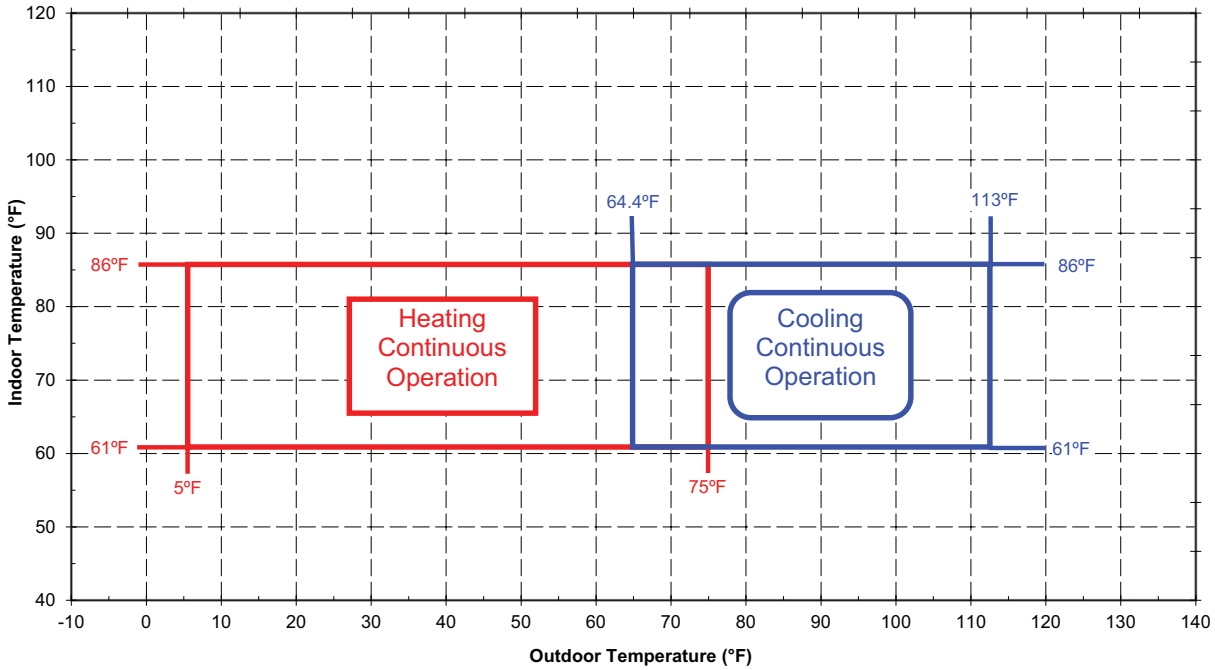


Figure 7 — 9k / 12k 115V System Operating Envelope

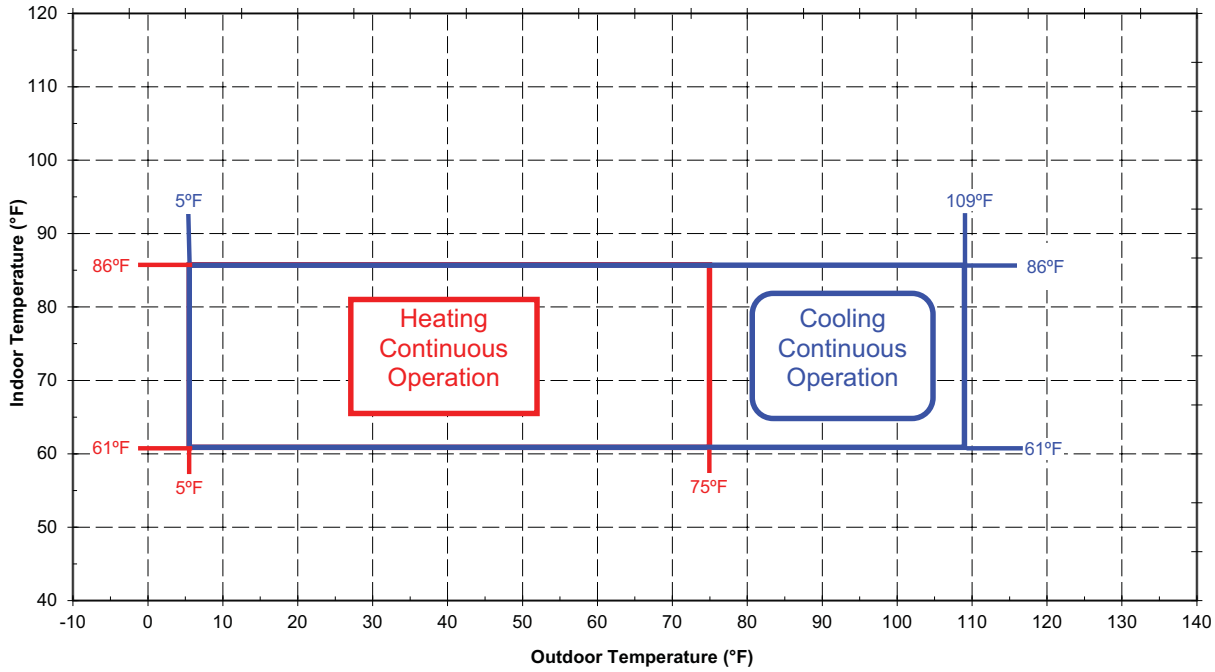


Figure 8 — 12k 230V System Operating Envelope

SYSTEM OPERATING ENVELOPE CONTINUED

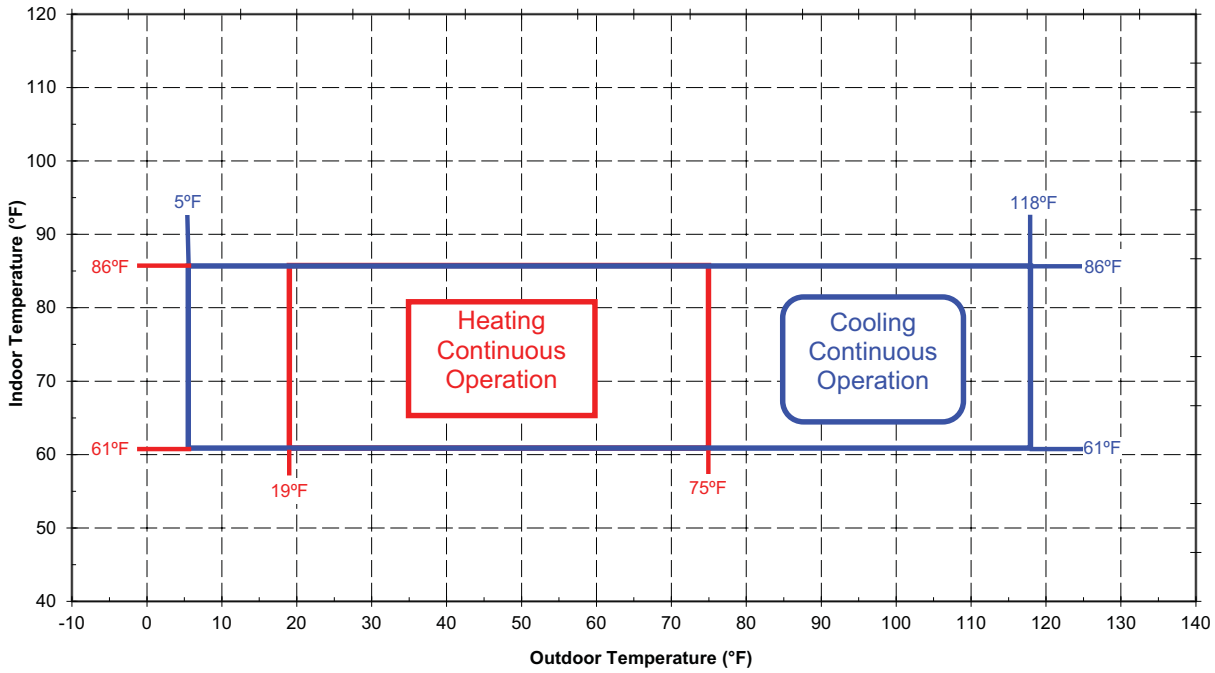


Figure 9 — 18k 230V System Operating Envelope

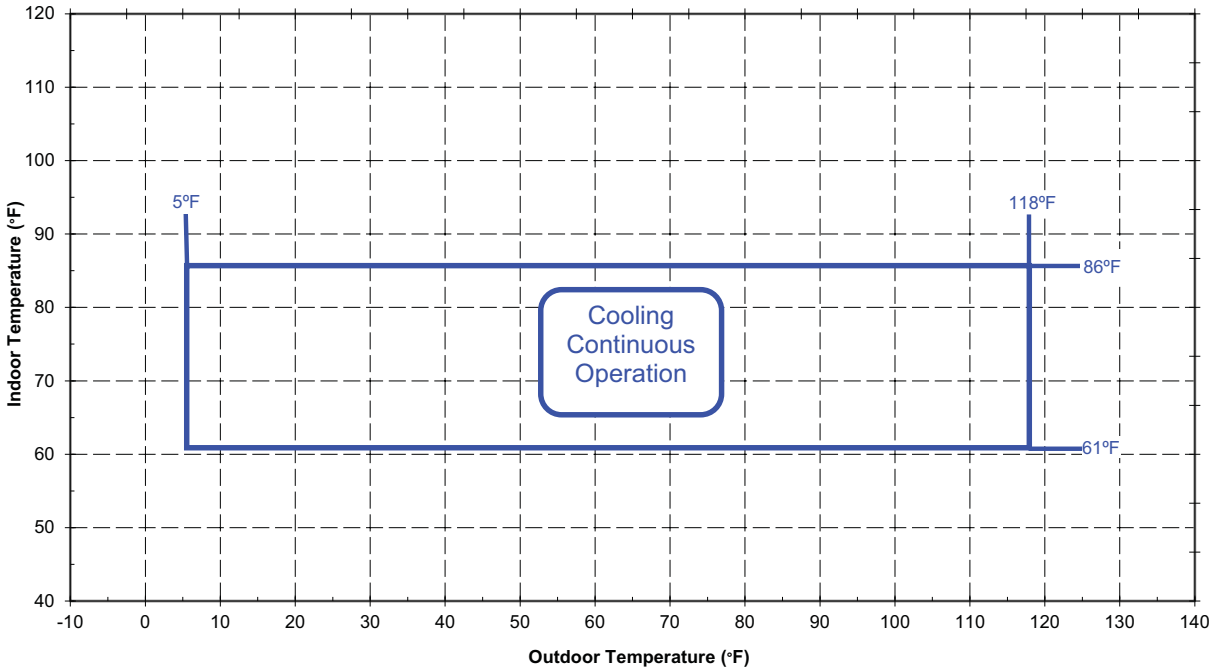


Figure 10 — 24k AC 230V System Operating Envelope

SYSTEM OPERATING ENVELOPE CONTINUED

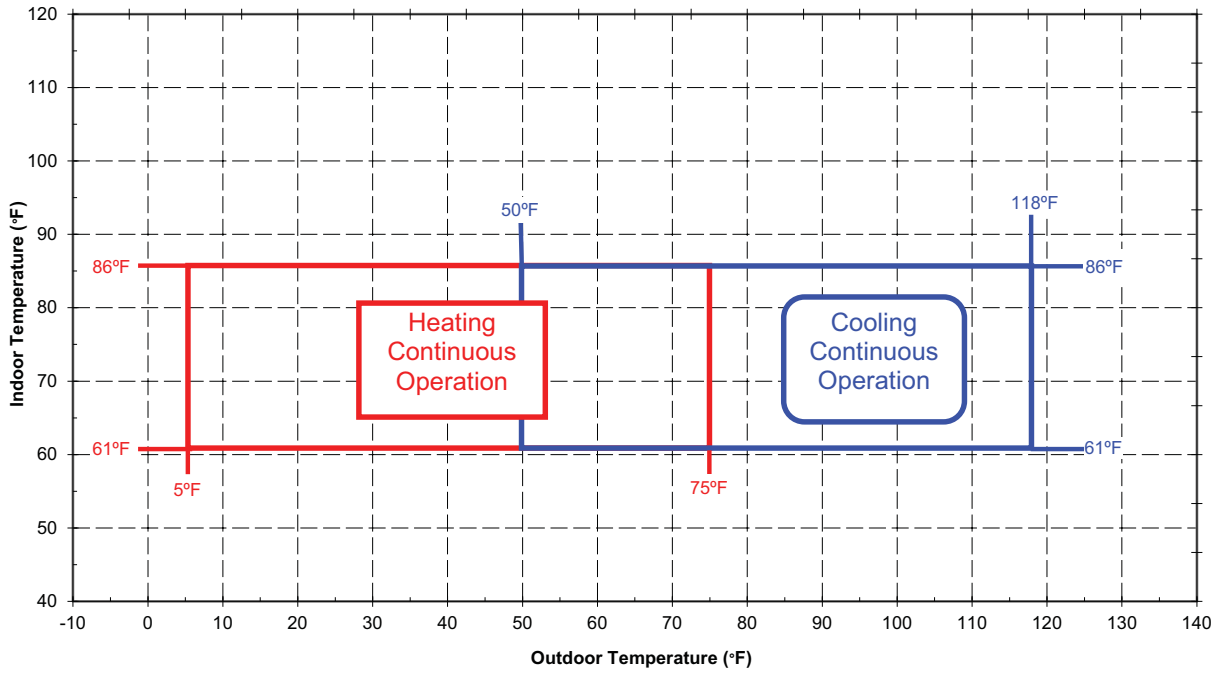


Figure 11 — 24k HP 230V System Operating Envelope

ELECTRICAL DATA

Cooling Only											
	System Voltage	Operating Voltage*	Compressor		Outdoor Fan		Indoor Fan†				MAX FUSE/ CB Amp (MOCP)
Unit Size	VOLT–PH–HZ	MAX / MIN	RLA	LRA	FLA	W	VOLTS	FLA	W	MCA	
9 K	115 –1 – 60	127/103	9.76	25.00	0.17	30	115	0.38	15	13	20
12 K	115 –1 – 60	127/103	11.20	25.00	0.17	30				15	25
12 K	208/230–1–60	253/187	7.30	16.50	0.25	21	208/230	0.19	15	10	15
18 K	208/230–1–60	253/187	10.86	27.00	0.62	60	208/230	0.32	20	15	25
24 K	208/230–1–60	253/187	11.71	41.00	0.62	60	208/230	0.45	35	16	25
Heat Pump											
9 K	115–1–60	127/103	9.76	20.00	0.17	30	115	0.38	15	13	20
12 K	115–1–60	127/103	11.20	20.00	0.17	30				15	25
12 K	208/230–1–60	253/187	7.30	16.50	0.25	21	208/230	0.19	15	10	15
18 K	208/230–1–60	253/187	10.86	27.00	0.62	60	208/230	0.32	20	15	25
24 K	208/230–1–60	253/187	12.50	41.00	0.62	60	208/230	0.45	35	17	25

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

† Indoor fan powered from outdoor unit.

LEGEND

FLA – Full Load Amps
LRA – Locked Rotor Amps
MCA – Minimum Circuit Amps
RLA – Rated Load Amps
MOCP– Maximum Over Current Protection

WIRING

Power Wiring:

The main power is supplied to the outdoor unit. The field supplied connecting cable 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.

Consult your local building codes and the NEC (National Electrical Code) or CEC (Canadian Electrical Code) for special requirements.

All wires must be sized per NEC or CEC 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.

Control 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 from the outdoor unit to the indoor unit.

To minimize voltage drop of the control wire, use the following wire size and maximum lengths shown in the chart below.

Wire Size	Length ft (m)
18 AWG	50 ft. (15 m)
16 AWG	50 ft (15) to 100 ft. (30 m)

⚠ 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.

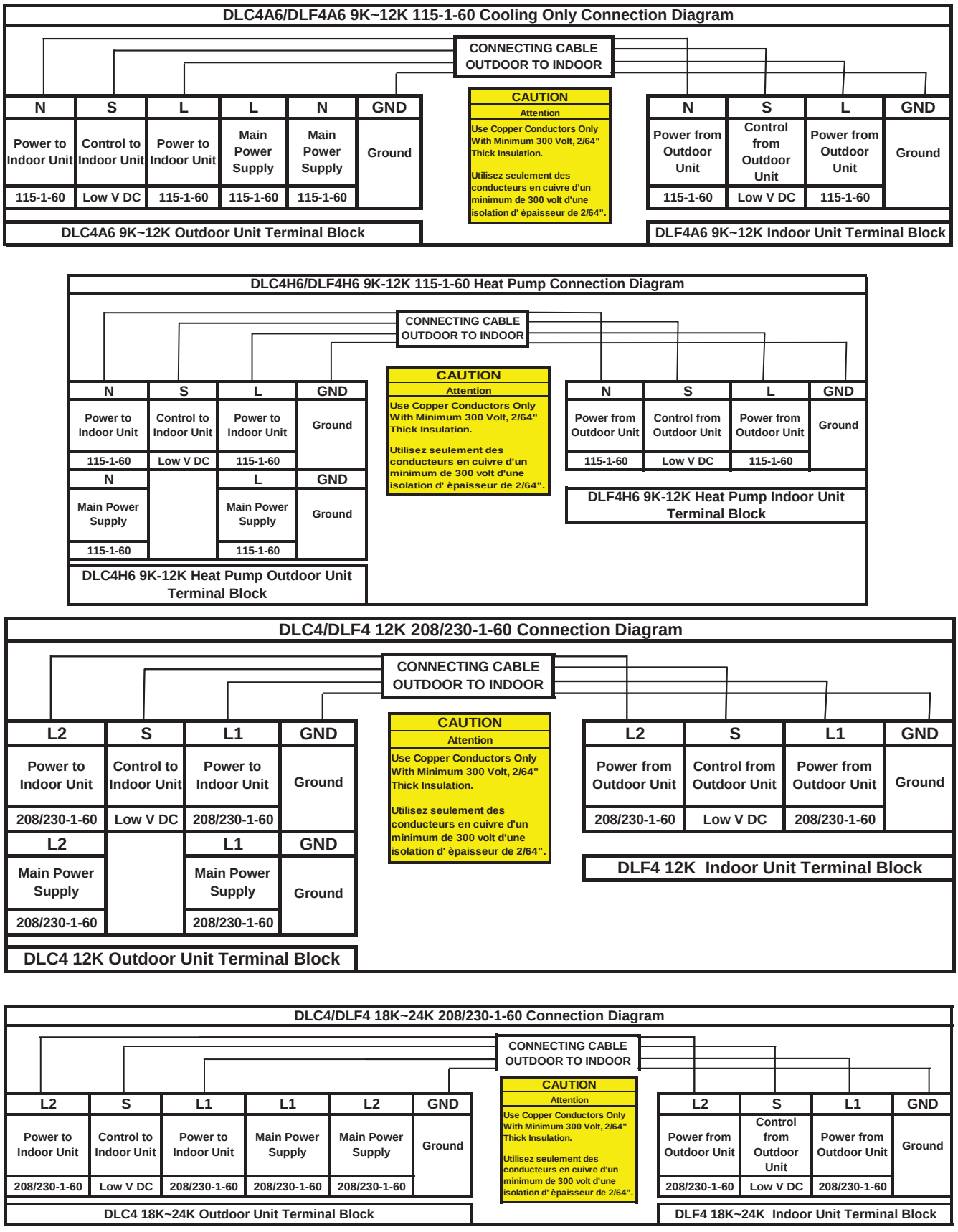
⚠ CAUTION

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 DIAGRAMS



NOTE: Polarity of power wires muct match original connection on outdoor unit.

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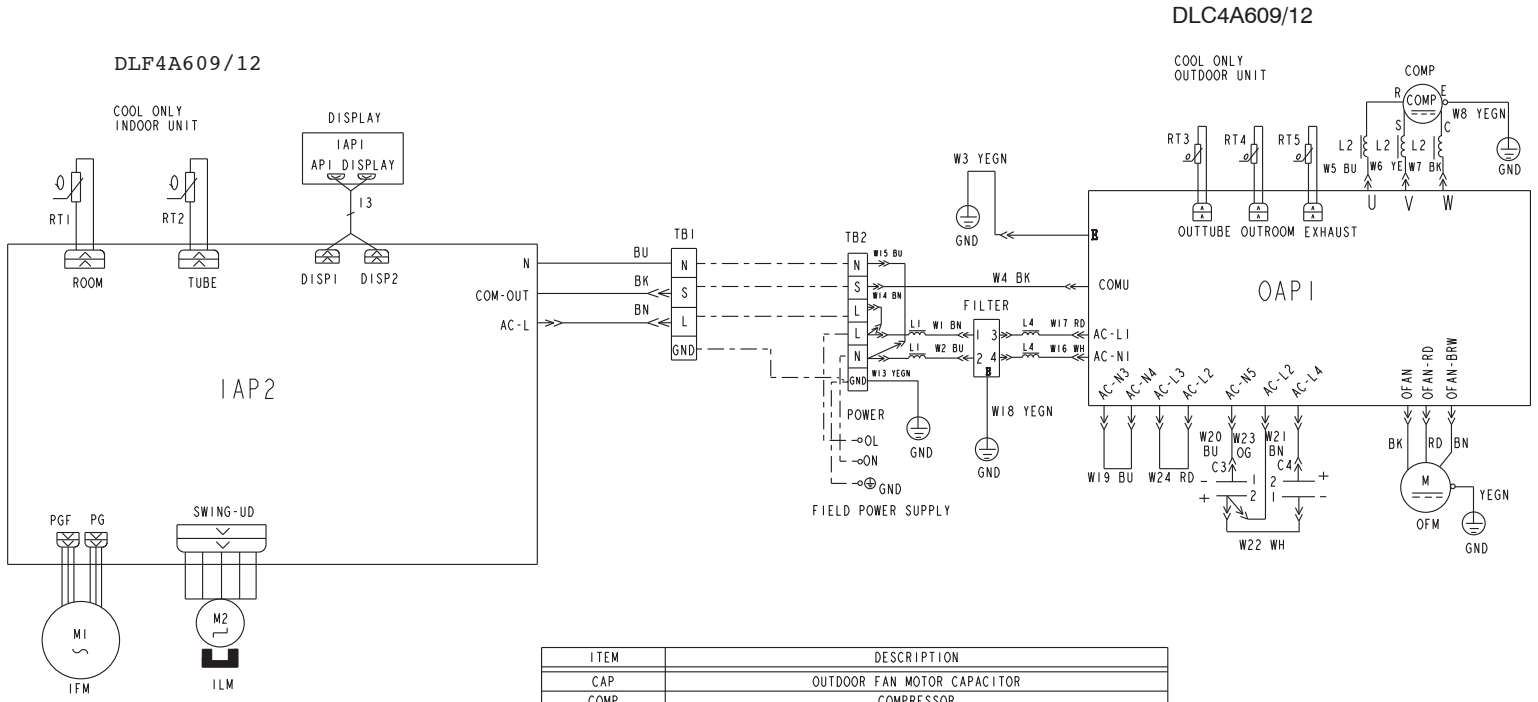
Figure 12 — Connection Diagrams

CONNECTION DIAGRAMS



ITEM	DESCRIPTION
CAP	OUTDOOR FAN MOTOR CAPACITOR
COMP	COMPRESSOR
CT1,2	OVERLOAD
EXV	ELECTRONIC EXPANSION VALVE
GND	GROUND
IAP1	INDOOR BOARD 1: DISPLAY
IAP2	INDOOR BOARD 2: MAIN CONTROL BOARD
IFM	INDOOR FAN MOTOR
ILM	INDOOR LOUVER MOTOR
OAP1	OUTDOOR BOARD 1: MAIN CONTROL BOARD
OFM	OUTDOOR FAN MOTOR
RT1	INDOOR ROOM THERMISTOR
RT2	INDOOR COIL THERMISTOR
RT3	OUTDOOR COIL THERMISTOR
RT4	OUTDOOR AIR THERMISTOR
RT5	COMPRESSOR DISCHARGE THERMISTOR
RVS (Heat Pump)	REVERSING VALVE SOLENOID
TB1	FAN COIL TERMINAL BLOCK
TB2	TERMINAL BLOCK FOR FIELD POWER AND FOR FIELD WIRING OF FAN COIL
TRAN	TRANSFORMER
W	WIRE
———	FACTORY WIRING
- — - — - — -	FIELD WIRING

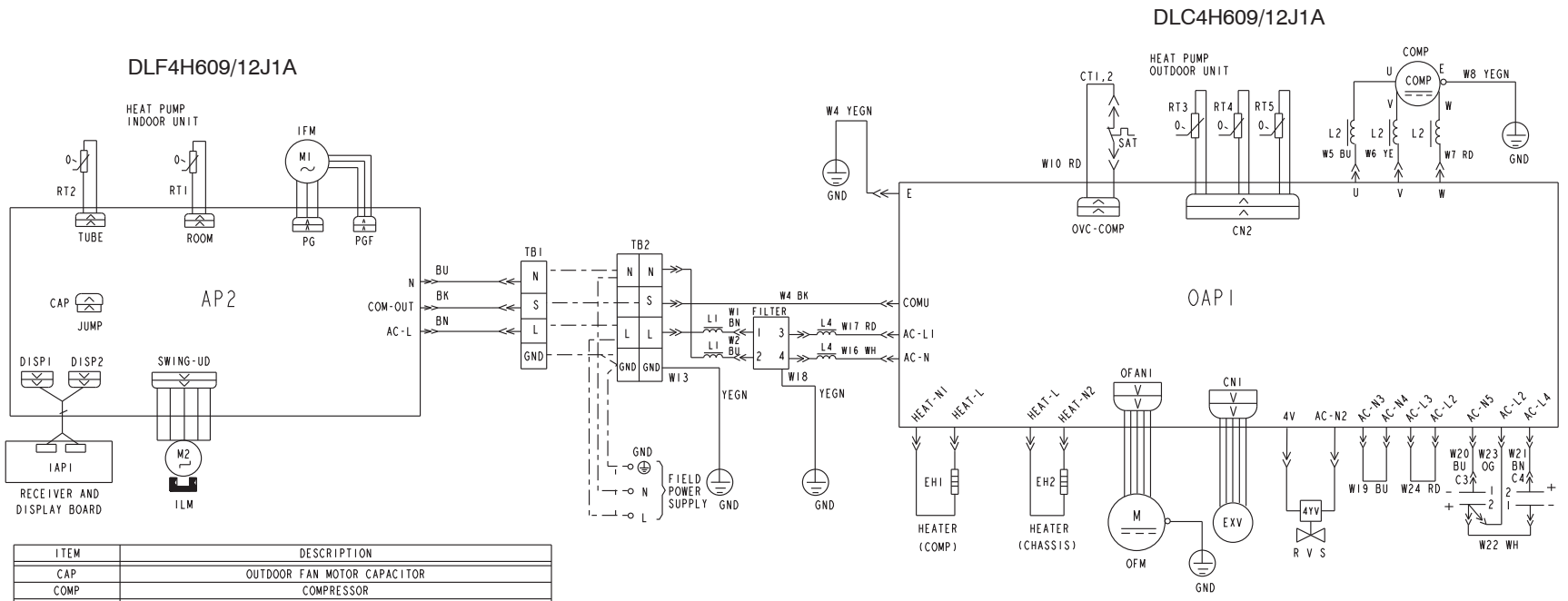
WIRE COLOUR LEGEND	
ITEM	COLOUR
BK	BLACK
BN	BROWN
BU	BLUE
OG	ORANGE
RD	RED
WH	WHITE
YE	YELLOW
YEGN	YELLOW/GREEN

NOTES:
1. WIRE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C) AND LOCAL CODES.
2. IF ANY OF THE ORIGINAL WIRE FURNISHED NEEDS TO BE REPLACED, IT MUST BE REPLACED WITH TYPE 90C WIRE OR ITS EQUIVALENT.
⊗3. FOR ALL FIELD WIRES, USE COPPER CONDUCTORS ONLY, WITH A MINIMUM 300 VOLT, 2/64 INCH THICK INSULATION.

A13081

Figure 13 — 9K / 12K Cooling Only 115–1–60

CONNECTION DIAGRAMS



ITEM	DESCRIPTION
CAP	OUTDOOR FAN MOTOR CAPACITOR
COMP	COMPRESSOR
CT1,2	OVERLOAD
EXV	ELECTRONIC EXPANSION VALVE
GND	GROUND
HP	HIGH PRESSURE SWITCH
IAP1	INDOOR BOARD 1: DISPLAY
IAP2	INDOOR BOARD 2: MAIN CONTROL BOARD
IFM	INDOOR FAN MOTOR
ILM	INDOOR LOUVER MOTOR
OAP1	OUTDOOR BOARD 1: MAIN CONTROL BOARD
OFM	OUTDOOR FAN MOTOR
RT1	INDOOR ROOM THERMISTOR
RT2	INDOOR COIL THERMISTOR
RT3	OUTDOOR COIL THERMISTOR
RT4	OUTDOOR AIR THERMISTOR
RT5	COMPRESSOR DISCHARGE THERMISTOR
RVS (Heat Pump)	REVERSING VALVE SOLENOID
TB1	FAN COIL TERMINAL BLOCK
TB2	TERMINAL BLOCK FOR FIELD POWER AND FOR FIELD WIRING OF FAN COIL
TRAN	TRANSFORMER
W	WIRE
———	FACTORY WIRING
- — - — - — -	FIELD WIRING

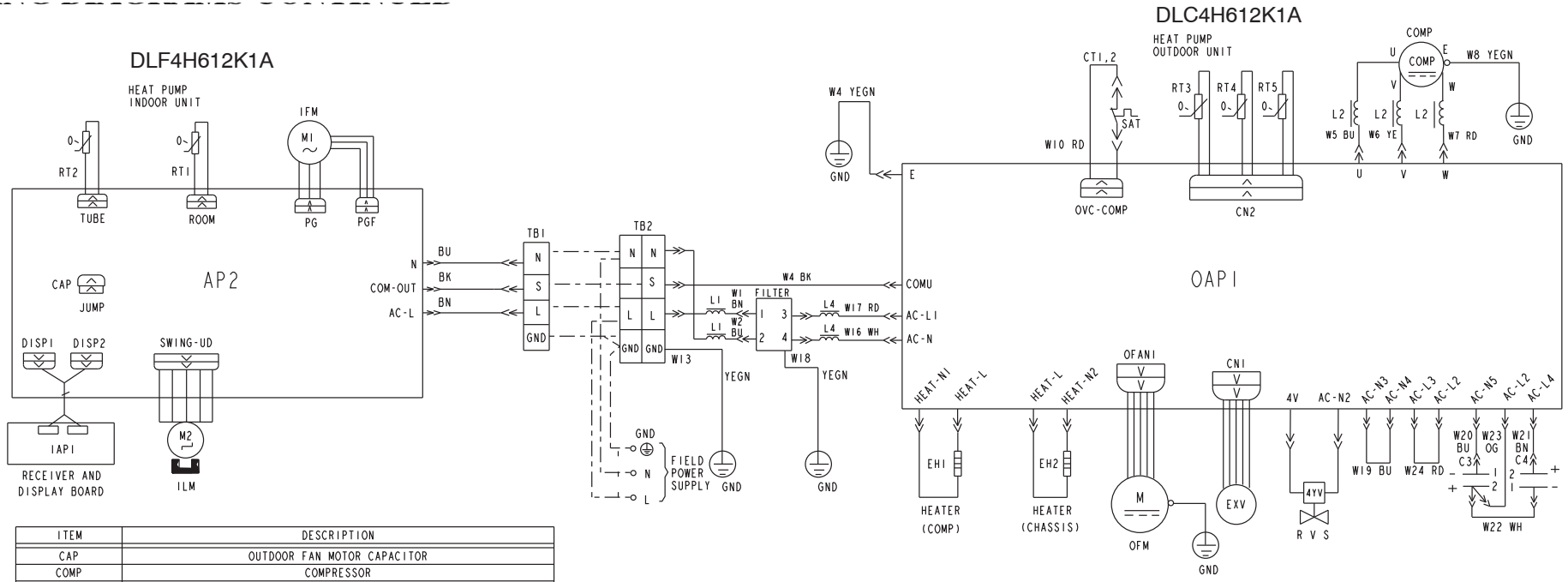
WIRE COLOUR LEGEND	
ITEM	COLOUR
BK	BLACK
BN	BROWN
BU	BLUE
OG	ORANGE
RD	RED
WH	WHITE
YE	YELLOW
YEGN	YELLOW/GREEN

NOTES:
1. WIRE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C) AND LOCAL CODES.
2. IF ANY OF THE ORIGINAL WIRE FURNISHED NEEDS TO BE REPLACED, IT MUST BE REPLACED WITH TYPE 90C WIRE OR ITS EQUIVALENT.
⊗3. FOR ALL FIELD WIRES, USE COPPER CONDUCTORS ONLY, WITH A MINIMUM 300 VOLT, 2/64 INCH THICK INSULATION.

A13082

Figure 14 — 9K / 12K Heat Pump Only 115–1–60

CONNECTION DIAGRAMS



ITEM	DESCRIPTION
CAP	OUTDOOR FAN MOTOR CAPACITOR
COMP	COMPRESSOR
CT1,2	OVERLOAD
EXV	ELECTRONIC EXPANSION VALVE
GND	GROUND
HP	HIGH PRESSURE SWITCH
IAP1	INDOOR BOARD 1: DISPLAY
IAP2	INDOOR BOARD 2: MAIN CONTROL BOARD
IFM	INDOOR FAN MOTOR
ILM	INDOOR LOUVER MOTOR
OAP1	OUTDOOR BOARD 1: MAIN CONTROL BOARD
OFM	OUTDOOR FAN MOTOR
RT1	INDOOR ROOM THERMISTOR
RT2	INDOOR COIL THERMISTOR
RT3	OUTDOOR COIL THERMISTOR
RT4	OUTDOOR AIR THERMISTOR
RT5	COMPRESSOR DISCHARGE THERMISTOR
RVS (Heat Pump)	REVERSING VALVE SOLENOID
TB1	FAN COIL TERMINAL BLOCK
TB2	TERMINAL BLOCK FOR FIELD POWER AND FOR FIELD WIRING OF FAN COIL
TRAN	TRANSFORMER
W	WIRE
———	FACTORY WIRING
- — - — - — -	FIELD WIRING

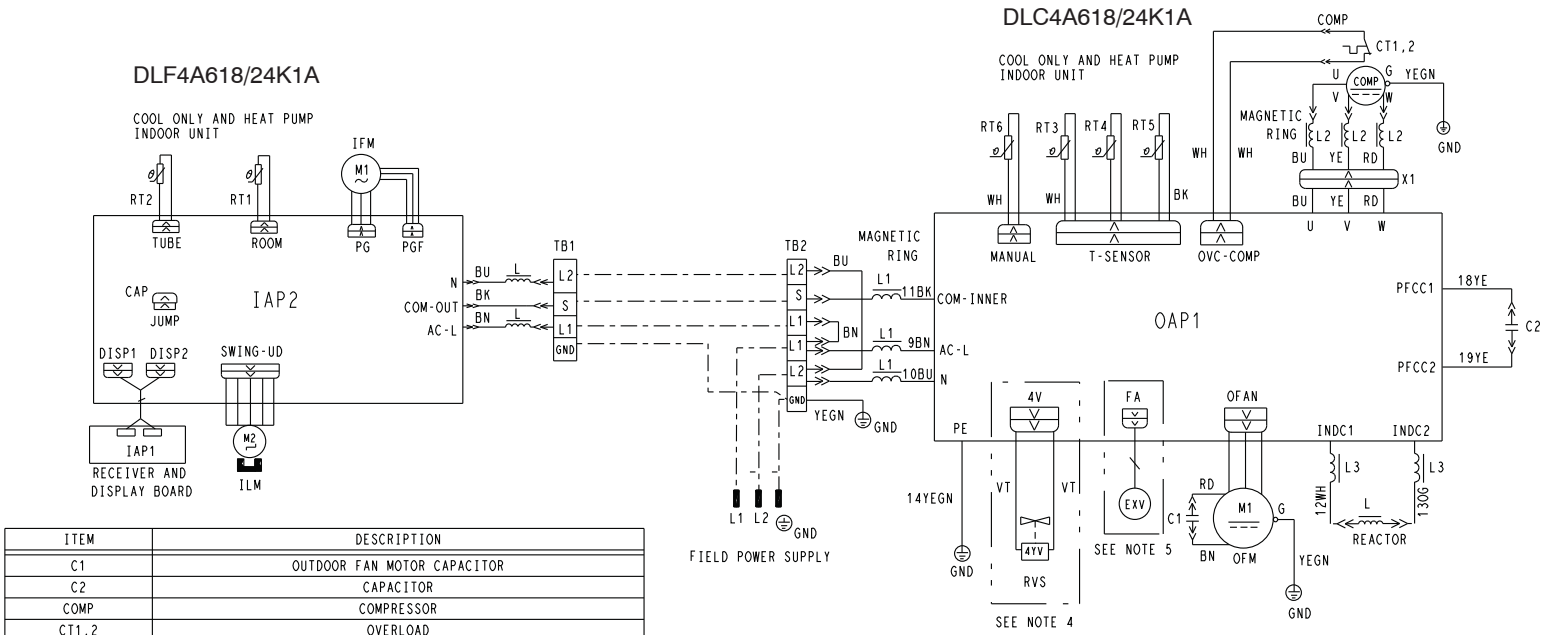
WIRE COLOUR LEGEND	
ITEM	COLOUR
BK	BLACK
BN	BROWN
BU	BLUE
OG	ORANGE
RD	RED
WH	WHITE
YE	YELLOW
YEGN	YELLOW/GREEN

NOTES:
1. WIRE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C) AND LOCAL CODES.
2. IF ANY OF THE ORIGINAL WIRE FURNISHED NEEDS TO BE REPLACED, IT MUST BE REPLACED WITH TYPE 90C WIRE OR ITS EQUIVALENT.
⊗3. FOR ALL FIELD WIRES, USE COPPER CONDUCTORS ONLY, WITH A MINIMUM 300 VOLT, 2/64 INCH THICK INSULATION.

A13083

Figure 15 — 12k Heat Pump Only 230–1–60

CONNECTION DIAGRAMS



ITEM	DESCRIPTION
C1	OUTDOOR FAN MOTOR CAPACITOR
C2	CAPACITOR
COMP	COMPRESSOR
CT1,2	OVERLOAD
EXV	ELECTRONIC EXPANSION VALVE
GND	GROUND
IAP1	INDOOR BOARD 1: DISPLAY
IAP2	INDOOR BOARD 2: MAIN CONTROL BOARD
IFM	INDOOR FAN MOTOR
ILM	INDOOR LOUVER MOTOR
OAP1	OUTDOOR BOARD 1: MAIN CONTROL BOARD
OFM	OUTDOOR FAN MOTOR
RT1	INDOOR ROOM THERMISTOR
RT2	INDOOR COIL THERMISTOR
RT3	OUTDOOR COIL THERMISTOR
RT4	OUTDOOR AIR THERMISTOR
RT5	COMPRESSOR DISCHARGE THERMISTOR
RT6	OUTDOOR COIL THERMISTOR #2
RVS (Heat Pump)	REVERSING VALVE SOLENOID
TB1	FAN COIL TERMINAL BLOCK
TB2	TERMINAL BLOCK FOR FIELD AND FOR FIELD WIRING OF FAN COIL
TRAN	TRANSFORMER
W	WIRE
———	FACTORY WIRING
- — - — - — -	FIELD WIRING

WIRE COLOUR REGION	
ITEM	COLOUR
BK	BLACK
BN	BROWN
BU	BLUE
OG	ORANGE
RD	RED
WH	WHITE
YE	YELLOW
YEGN	YELLOW/GREEN

NOTES:

1. WIRE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C) AND LOCAL CODES.
2. IF ANY OF THE ORIGINAL WIRE FURNISHED NEEDS TO BE REPLACED, IT MUST BE REPLACED WITH TYPE 90C WIRE OR ITS EQUIVALENT.
3. ⊗ FOR ALL FIELD WIRES, USE COPPER CONDUCTORS ONLY, WITH A MINIMUM 300 VOLT, 2/64 INCH THICK INSULATION.
4. USED ON HEAT PUMP SYSTEMS ONLY.
5. USED ON 24K SYSTEMS ONLY

A13084

Figure 16 — 18K / 24K 230–1–60

REFRIGERATION SYSTEM DIAGRAMS

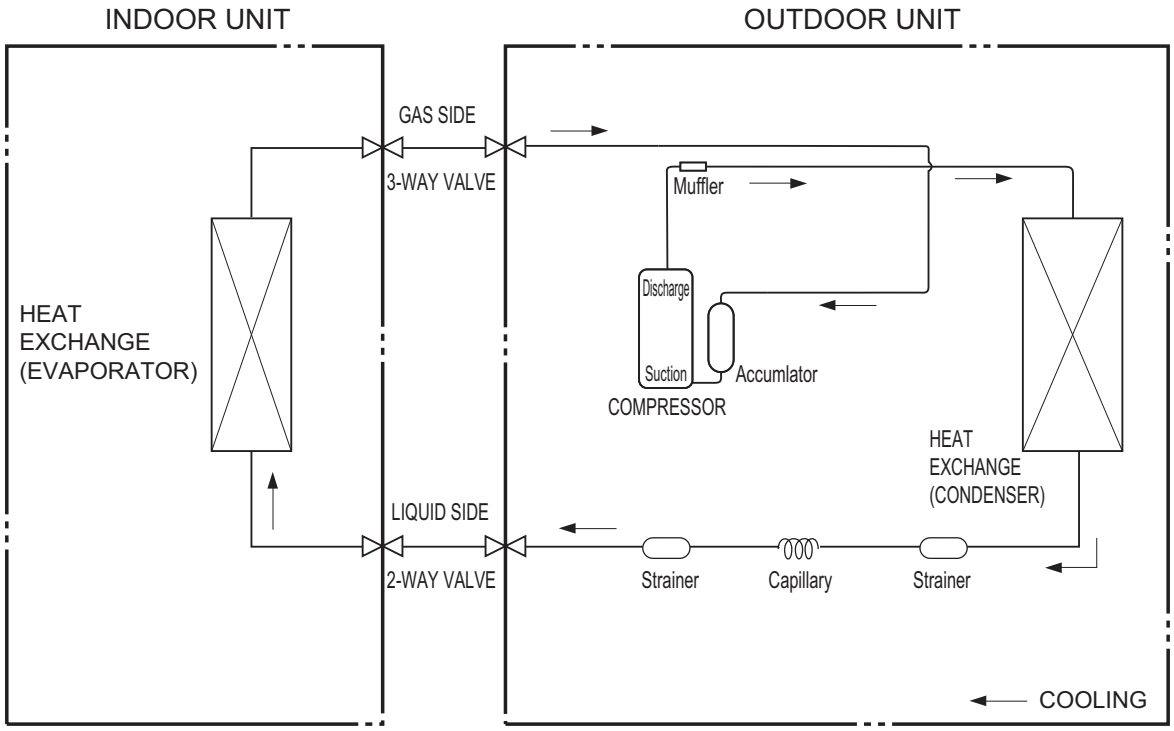


Figure 17 — Refrigeration System Diagram DLC/DLF4A6 Cooling Only
9k / 12k – 115v; 12k / 18k – 230v

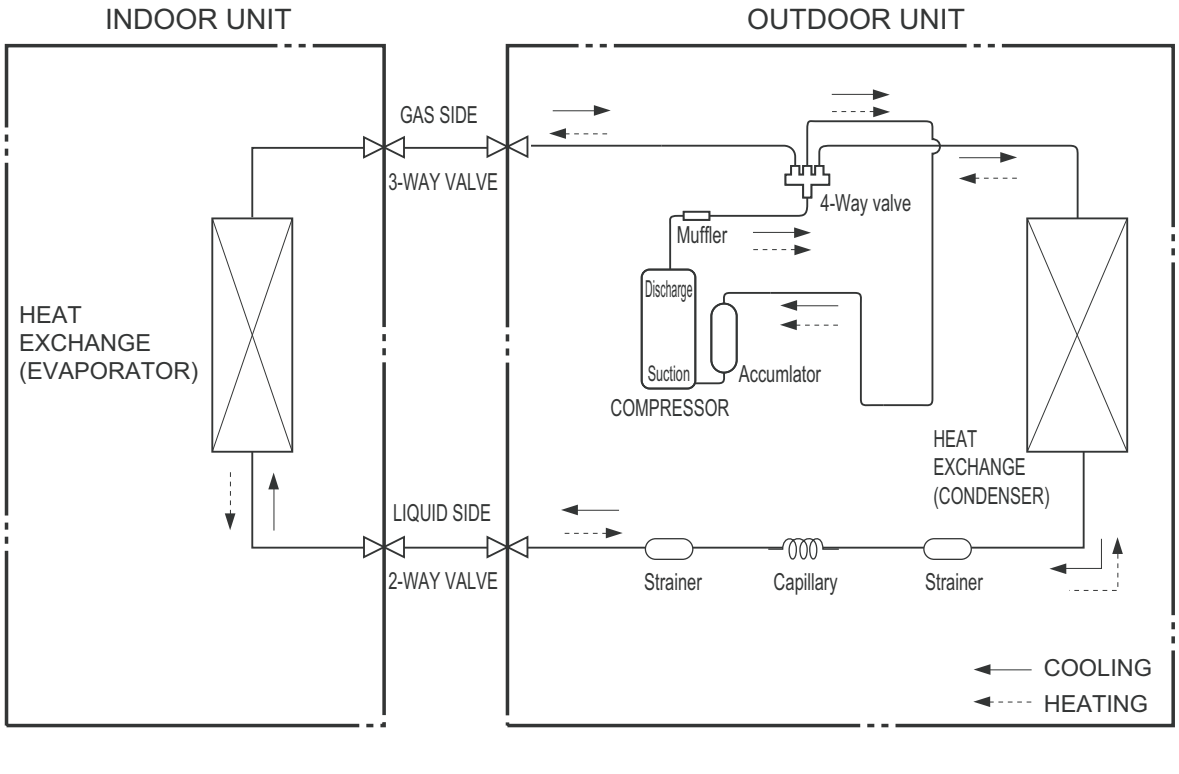


Figure 18 — Refrigeration System Diagram DLC/DLF4H6
12k / 18k – 230v

Refrigerant Pipe Diameter:

9k / 12k – Liquid: 1/4" (6.4 mm) Gas: 3/8" (9.5 mm)
18k – Liquid: 1/4" (6.4 mm) Gas: 1/2" (12.7 mm)

REFRIGERATION SYSTEM DIAGRAMS CONTINUED

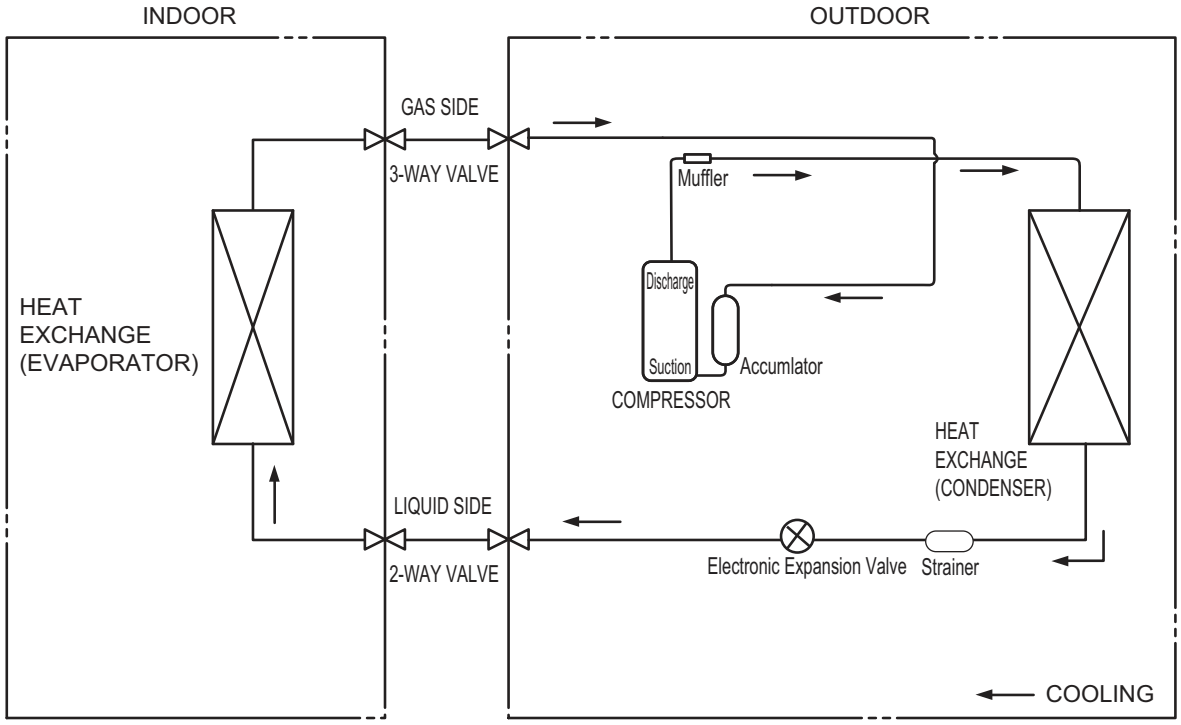


Figure 19 — Refrigeration System Diagram DLC/DLF4A6 Cooling Only
24k – 230v

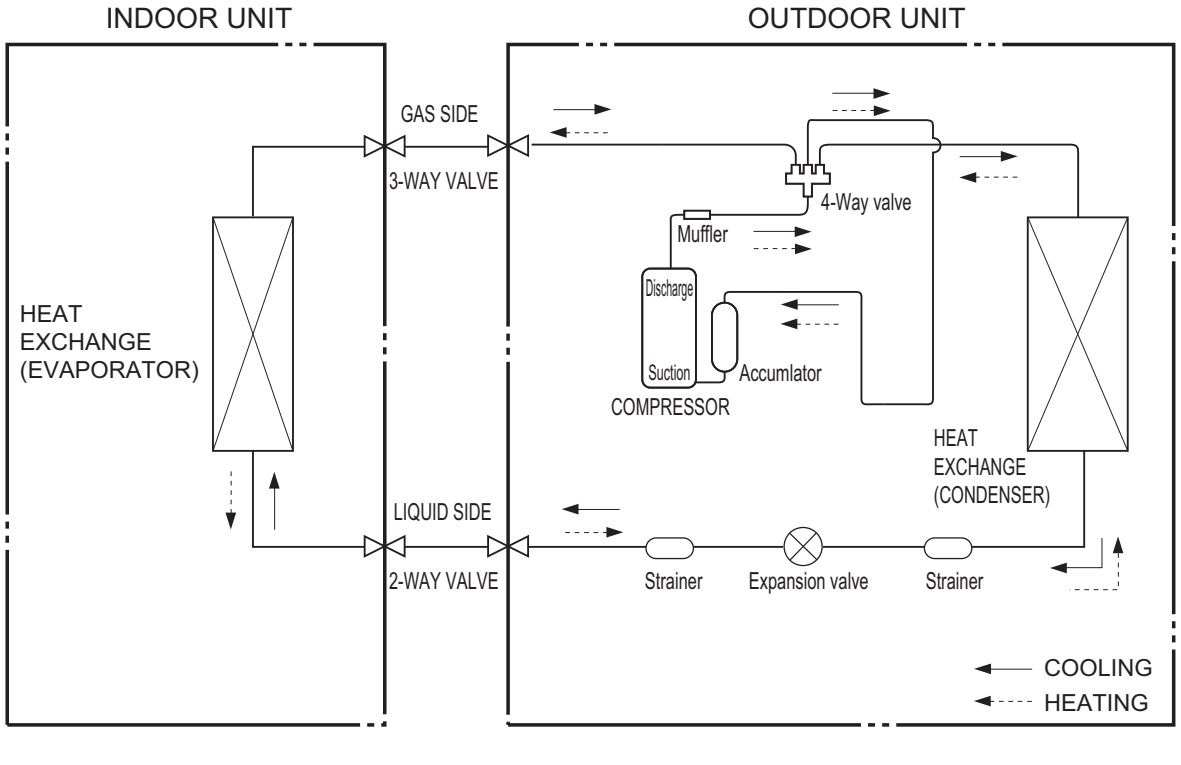


Figure 20 — Refrigeration System Diagram DLC/DLF4H6
9k / 12k – 115v; 24k – 230v

Refrigerant Pipe Diameter:
9k / 12k – Liquid: 1/4" (6.4 mm) Gas: 3/8" (9.5 mm)
24k – Liquid: 1/4" (6.4 mm) Gas: 1/2" (12.7 mm)

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. 21.)

(2.) Connect charge hose to vacuum pump.

(3.) Fully open the low side of manifold gage. (See Fig. 22)

(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 0.1 oz. per foot of extra piping up to allowable maximum length listed in physical data.

(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.

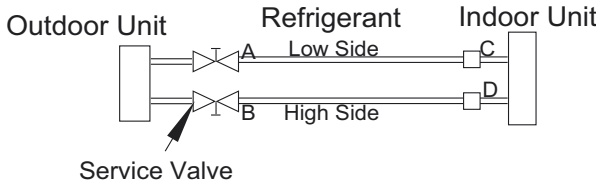


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Figure 21 — Service Valve

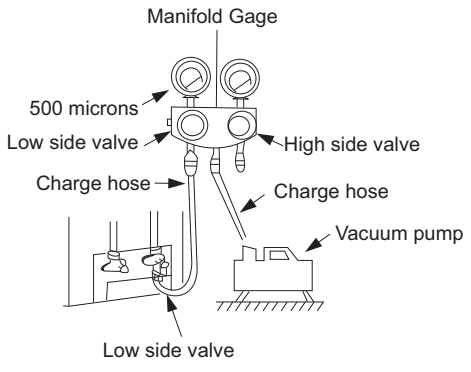

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Figure 22 — Manifold

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. 23)

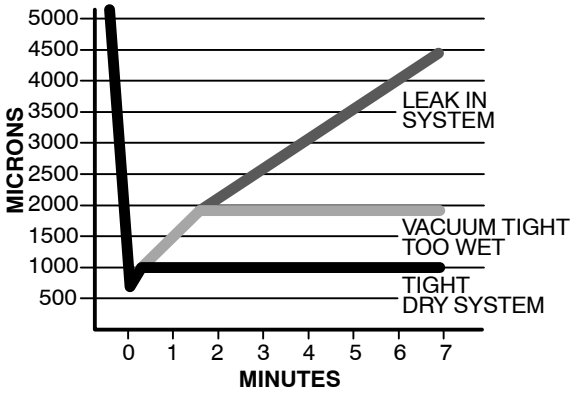

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Figure 23 — Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is only capable of pumping down to 28 in. of mercury vacuum and system does not contain any liquid water.

Refer to Fig. 24 and proceed as follows:

(1.) Pump system down to 28 in. of mercury 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. 24. System will then be free of any contaminants and water vapor.

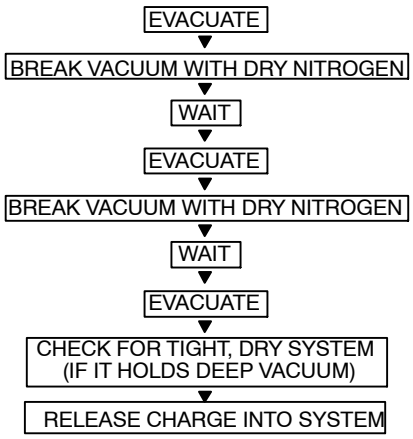

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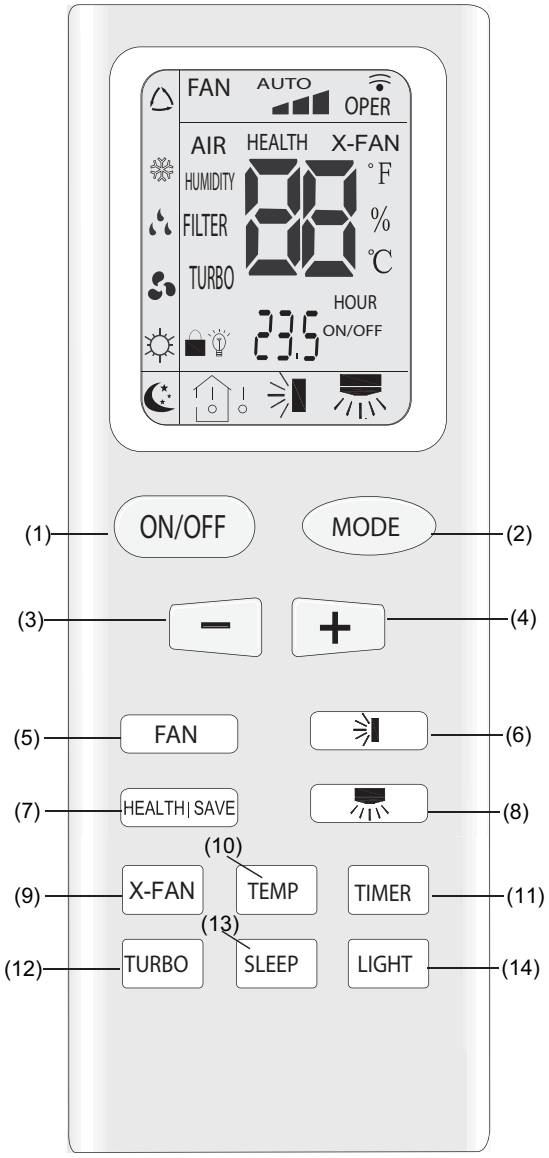
Figure 24 — Triple Evacuation Method

Final Tubing Check

IMPORTANT: Check to be certain factory tubing on both indoor and outdoor unit 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 feeder tubes are secure and tight.

REMOTE CONTROL AND FUNCTIONS



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Remote Control

(1) **ON/OFF**
Press to start or stop operation

(2) **MODE**
Press to select operation mode (AUTO/COOL/DRY/FAN/HEAT)

(3) **-** : Press to decrease temperature setting

(4) **+**: Press to increase temperature setting

(5) **FAN**
Press to set fan speed

(6) **Horizontal Swing**
Press to activate horizontal swing or set louver positions

(7) **HEALTH|SAVE (Not Available)**

(8) **Vertical Swing** (Not Available)

(9) **X-FAN**
Press to activate or deactivate DRY function

(10) **TEMP**
Press to alternate between set point and room temperature display

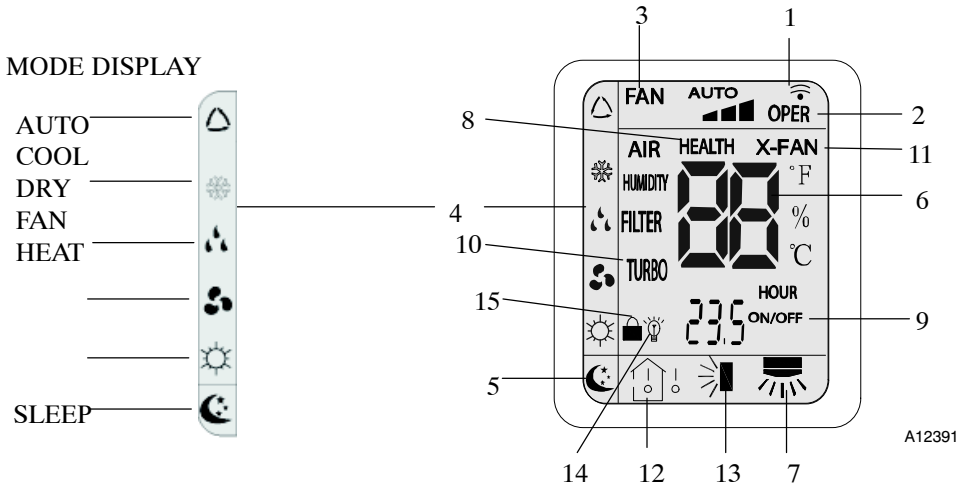
(11) **TIMER**
Press to set TIMER ON/ TIMER OFF

(12) **TURBO**
Press to activate or deactivate TURBO mode

(13) **SLEEP**
Press to activate or deactivate SLEEP mode

(14) **LIGHT**
Press to activate or deactivate display panel light

Remote Control Display



NOTE: Symbols shown in this manual are for the purpose of demonstration. During actual operation, only the relevant symbols are displayed.

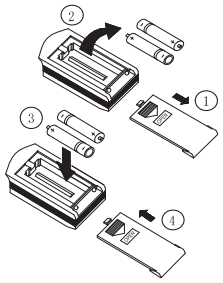
1. **TRANSMISSION INDICATOR**: Illuminates when remote control transmits signals to the indoor unit.
2. This symbol appears when the unit is turned on by the remote control, and disappears when the unit is turned off.
3. **FAN SPEED DISPLAY**: Indicates the set fan speed. AUTO is displayed when unit is running in AUTO mode.
4. **MODE DISPLAY**: Indicates the current operation mode “AUTO”, “COOL”, “DRY”, “FAN ONLY”, or “HEAT”
5. **SLEEP DISPLAY**: Indicates unit is running in SLEEP mode.
6. **TEMPERATURE DISPLAY**: Temperature setting from 61°F (16°C) to 86°F (30°C) will be displayed. If FAN mode is selected, there will be no temperature displayed. During DEFROST operation, H1 will be displayed. During SAVE mode, SE will be displayed.
7. **Left/Right Louver Swing:** Not available on these models.
8. **HEALTH/SAVE**: HEALTH is not available. SAVE is available on sizes 18k and 24k. SAVE mode can be applied to cooling mode and when set point is less than 80°F (27°C).
9. **SETTING ON / OFF TIMES:** 0.5 to 24 hours.
10. **TURBO DISPLAY:** Displayed when unit is running in TURBO mode.
11. **DRY COIL DISPLAY:** Indicates unit is running in DRY COIL mode where the fan continues to run after the unit is shut off to dry the coil.
12. **TEMPERATURE DISPLAY:** Displays set point or room temperature.
13. **SWING DISPLAY:** Sets louver position or set louvers to continuously move for better air distribution.
14. **LIGHT DISPLAY:** Indicates if LED display on the front panel is illuminated or not.
15. **LOCK DISPLAY:** Indicates if remote control is locked.

Battery Installation

Two AAA 1.5 v alkaline batteries (included) are required for operation of the remote control.

To install or replace batteries :

1. Slide the back cover off the control to open the battery compartment.
2. Remove old batteries if you are replacing the batteries.
3. Insert batteries. Follow the polarity markings inside the battery compartment.
4. Replace battery compartment cover.



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NOTE:

1. When replacing batteries, do not use old batteries or a different type battery. This may cause the remote control to malfunction. 2.If the remote is not going to be used for several weeks, remove the batteries. Otherwise battery leakage may damage the remote control.
3. The average battery life under normal use is about 6 months.
4. Replace the batteries when there is no audible beep from the indoor unit or if the Transmission Indicator fails to light.

FUNCTION AND CONTROLS

Description of Each Control Operation

Temperature Parameters

◆Indoor preset temperature (T_{preset})
◆Indoor ambient temperature ($T_{amb.}$)

Basic Functions

Once energized, in no case should the compressor be restarted within less than 3 minutes. In the situation that memory function is available, for the first energization, if the compressor is at stop before de−energization, the compressor will be started without a 3−minute lag; if the compressor is in operation before de−energization, the compressor will be started with a 3−minute lag; and once started, the compressor will not be stopped within 6 minutes regardless of changes in room temperature;

Cooling Mode

Working Conditions and Cooling Process.

When T_{amb} . T_{preset}, the unit will enter cooling operation, in which case the indoor fan, the outdoor fan and the compressor will work and the indoor fan will run at preset speed.

When T_{amb} v T_{preset} −3.6°F , the compressor will stop, the outdoor fan will stop with a time lag of 30 seconds (60 seconds for 30k and 36k units), and the indoor fan will run at preset speed.

When T_{preset} −3.6°F < $T_{amb.}$ < T_{preset} +1.8°F, the unit will remain at its previous state.

Under this mode, the four−way valve will be de−energized and temperature can be set within a range from 61°F to 86°F.

If the compressor is shut down for some reason, the indoor fan and the swing device will operate at original state.

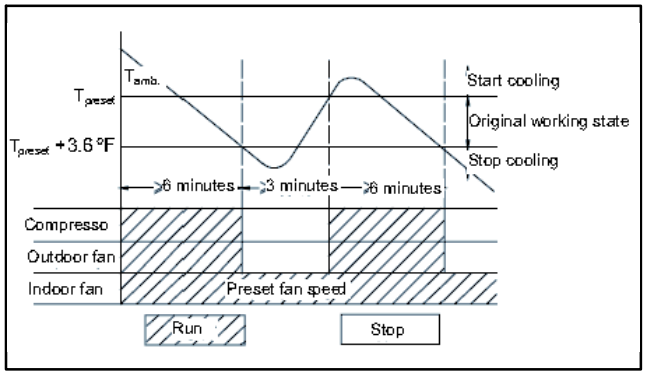


Figure 25 — Cooling Mode

PROTECTION

Antifreeze Protection

Under cooling and dehumidifying mode, 6 minutes after the compressor is started:

If T_{evap} ≤35.6°F, the compressor will operate at reduced frequency.

If T_{evap} ≤30.2°F is detected for duration of 3 minutes, the compressor will stop, and after 60 seconds, the outdoor fan will stop; and under cooling mode, the indoor fan and the swing motor will remain at the original state.

If $T_{evap.}$ 42.8°F and the compressor has remained at OFF for at least 3 minutes, the compressor will resume its original operation state.

Total current up and frequency down protection

If I_{total} ≤A, frequency rise will be allowed; if I_{total} ≥ B, frequency rise will not be allowed; if I_{total} ≥ C, the compressor will run at reduced frequency; and if I_{total} ≥ D, the compressor will stop and the outdoor fan will stop with a time lag of 30s. Lag will be 60s for size 30 and 36 units.

Total Current Table				
Unit Size – V	Variables			
	A	B	C	D
9k--115V	10A	12A	14A	16A
12K-115V	14A	16A	18A	20A
12K-230V	6A	7A	8A	9A
18k-230V	8A	9A	10A	11A
24K-230V	10A	11A	12A	13A

Heating Mode

Working Conditions and Heating Process

If $T_{amb.}$ ≤ T_{preset} +3.6°F , the unit enters heating mode, in which case the four−way valve, the compressor and the outdoor fan will operate simultaneously, and the indoor fan will run at preset speed in the condition of preset cold air prevention.

If $T_{amb.}$ ≥ T_{preset} +9°F , the compressor will stop, the outdoor fan will stop with a time lag of 60s, and the indoor fan will stop after 60−second blow at low speed

If T_{preset} +3.6°F < $T_{amb.}$ < T_{preset} +9°F , the unit will maintain its original operating status.

Under this mode, the four−way valve is energized and temperature can be set within a range of 61°F − 86°F. The operating symbol, the heating symbol and preset temperature are revealed on the display.

Defrost Mode

Condition and Defrost Process

When Toutdoor amb. ≥41°F and the compressor has run for 3 hour, if Toutdoor tube < 0°F is continuously detected for 1 minute, the unit will enter defrost. [Note: the accumulated time is cleared if one of the below condition is met. $T_{outdoor\ ambient}$ > 41°F, the compressor starts up after switching to cooling or dry mode, when defrosting is finished; for other situations besides above conditions, the accumulated time will not be cleared (including the unit stops when reaching the temperature point, the unit stops for protection, switching to fan mode, et.)]

When duration of successive heating operations is more than 45 minutes, or accumulated heating time IS more than 90 minutes,

and one of the following conditions is reached, the unit will enter the defrost mode after 3 minutes.

a. $T_{outdoor\ amb.}$ >41°F, $T_{outdoor\ tube}$ ≤ 28.4°F
b. 28.4°F ≤ $T_{outdoor\ amb.}$ <41°F, $T_{outdoor\ tube}$ ≤ 21.2°F
c. 23°F ≤ $T_{outdoor\ amb.}$ <28.4°F, $T_{outdoor\ tube}$ ≤ 17.6°F
d. 14°F ≤ $T_{outer\ amb.}$ <23°F, $T_{outer\ tube}$ − $T_{compensatorys}$ ≤ ($T_{outdoor\ amb.}$ −5.4°F)
e. $T_{outdoor\ amb.}$>14°F $T_{outer\ tube}$ − $T_{compensatorys}$ ≤ ($T_{outdoor\ amb.}$ −5.4°F)

After energization, for the first defrost, $T_{compensation}$ = 0°F. If it is not the first defrost, $T_{compensation}$ will be determined by $T_{outdoor}$ pipe when defrost ends.

a. $T_{outdoor\ pipe}$ >35.6°F; $T_{compensation}$ = 0°F
b. $T_{outdoor\ pipe}$ ≤ 35.6°F; $T_{compensation}$ = 5.4°F

During defrost, if operation time for compressor doesn't reach 3 minutes, the condenser will not defrost in the next 2 hours. At the time of defrost the compressor stops operation, and 30 seconds later, the outdoor fan stops operation. In an additional 30 seconds, the 4−way valve will stop operation. 30 seconds later, compressor will increase it's frequency to 85 Hz for defrosting. Defrost will last for 450 seconds, or until the outdoor pipe ≥ 50°F. When defrost is complete the compressor will decrease its frequency. 30 seconds later the compressor will stop operation. In 30 seconds the 4−way valve will be started up. 60 seconds later the compressor and outdoor fan will operate.

PROTECTION

Cold air prevention

The unit is started under heating mode (the compressor is ON):

1 In the case of $T_{indoor\ amb.}$ <75.2°F : if $T_{tube} \leq$ 107.6°F and the indoor fan is stopped, the indoor fan will begin to run at low speed with a time lag of 2 minutes. Within 2 minutes, if T_{tube} >104°F, the indoor fan also will run at low speed; and after 1−minute operation at low speed, the indoor fan will be ramped to operation at a preset speed. Within 1−minute of low speed operation or 2−minutes of non−operation, if T_{tube}>108°F, the fan will run at preset speed.

2 In the case of $T_{indoor\ amb.} \geq$ 75°F: if $T_{tube} \leq$108°F, the indoor fan will run at low speed, and after one minute, the indoor fan will be ramped to preset speed. Within one−minute low speed operation, if T tube>107.6°F, the indoor fan will be ramped to preset speed.

Note: $T_{indoor\ amb.}$ indicated in 1 and 2 refers to, the indoor ambient temperature before the command to start the compressor is performed, or after the unit is withdrawn from defrost and the defrost symbol is cleared.

Total current up and frequency down protection

If the total current $I_{total} \leq$W, frequency rise will be allowed; if $I_{total} \geq$X frequency rise will not be allowed; if $I_{total} \geq$Y, the compressor will run at reduced frequency; and if $I_{total} \geq$Z, the compressor will stop and the outdoor fan will stop with a time lag of 30s.

Fan Mode

Under the mode, the indoor fan will run at preset speed and the compressor, the outdoor fan, the four−way valve and the electric heater will stop.

Under the mode, temperature can be set within a range of 61°F − 86°F.

AUTO Mode

Working conditions and Auto mode process:

Under AUTO mode, standard cooling temperature T_{preset} is 77°F and standard heating temperature T_{preset} is 64.4°F.

Once energized, if $T_{amb} \leq$68°F, the unit will be started under heating mode; if 68°F < $T_{amb.}$< 77°F, the unit will run under fan mode and the run indicator will be bright; and if $T_{amb} \geq$77°F, the unit will be started under cooling mode.

Under AUTO mode, if $T_{amb.} \geq T_{preset}$ is detected, the unit will select to run under cooling mode, in which case the preset temperature is 77°F; if $T_{amb.} \leq T_{preset}$ −3.6°F, the compressor will stop, the outdoor fan will stop with a time lag of 1 minute, and the indoor fan will run at preset speed. If T_{preset} −(−3.6°F)< $T_{amb.}$< T_{preset} , the unit will remain in its original state.

Under AUTO mode, if $T_{amb.} \leq T_{preset}$ +3.6°F is detected, the unit will select to run under heating mode, in which case the preset temperature is 64.4°F; if $T_{amb.} \geq T_{preset}$ +9°F, the compressor will stop, the outdoor fan will stop with a time lag of 1 minute, and the indoor fan will blow residual heat; and if T_{preset} +3.6°F < $T_{amb.}$ < T_{preset} +9°F, the unit will remain in its original state. The cooling−only unit will run under fan mode.

Under AUTO mode, if 68°F < $T_{amb.}$ < 77°F, the unit will remain in its original state.

Protection

In cooling operation, protection is the same as that under the cooling mode.

In heating operation, protection is the same as that under the heating mode.

When ambient temperature changes, operation mode will be converted preferentially. Once started, the compressor will remain unchanged for at least 6 minutes.

Common Protection Functions and Fault Display under

COOL, HEAT, DRY and AUTO Modes

Overload protection

T tube : measured temperature of outdoor heat exchanger under cooling mode; and measured temperature of indoor heat

exchanger under heating mode.

1) Cooling overload

a. If $T_{tube} \leq$ 125.6°F, the unit will return to its original operation state.

b. If $T_{tube} \geq$131°F, frequency rise is not allowed.

c. If $T_{tube} \geq$136.4°F, the compressor will run at reduced frequency.

d. If $T_{tube} \geq$143.6°F, the compressor will stop and the indoor fan will run at preset speed.

2) Heating overload

a. If $T_{tube} \leq$125.6°F, the unit will return to its original operation state.

b. If $T_{tube} \geq$131°F, frequency rise is not allowed.

c. If T_{tube} w136.4°F, the compressor will run at reduced frequency.

d. If $T_{tube} \geq$143.6°F, the compressor will stop and the indoor fan will blow residual heat and then stop.

Exhaust temperature protection of compressor

If exhaust temperature ≥208.4°F, frequency is not allowed to rise.

If exhaust temperature ≥217.4°F, the compressor will run at reduced frequency.

If exhaust temperature ≥230°F, the compressor will stop.

If exhaust temperature ≥194°F and the compressor has stayed at stop for at least 3 minutes, the compressor will resume its operation.

Communication fault

If the unit fails to receive correct signals for 3 minutes, a communication fault will be registered and the whole system will stop.

Module protection

Under module protection mode, the compressor will stop. When the compressor remains at a stop for at least 3 minutes, the compressor will resume its operation. If module protection occurs six times in succession, the compressor will not be started again.

Overload protection

If temperature sensed by the overload sensor is over 239°F, the compressor will stop and the outdoor fan will stop with a time lag of 30 seconds. If the temperature drops below 203°F, the overload protection will be reset.

If voltage on the DC bus is below 150V or over 420V, the compressor will stop and the outdoor fan will stop with a time lag of 30 seconds. When voltage on the DC bus returns to its normal value and the compressor has stayed at a stop for at least 3 minutes, the compressor will resume its operation.

Faults of temperature sensors

Description of Sensors	Faults
Indoor Ambient Temperature	The sensor is open or short−circuited for 30 consecutive seconds
Indoor Tube Temperature	The sensor is open or short−circuited for 30 consecutive seconds
Outdoor Ambient Temperature	The sensor is open or short−circuited for 30 consecutive seconds
Outdoor Tube Temperature	The sensor is open or short−circuited for 30 consecutive seconds, and no detection is performed within 10 minutes after defrost begins
Exhaust	After the compressor has run for 3 minutes, the sensor is open or short−circuited for 30 consecutive seconds
Overload	After the compressor has run for 3 minutes, the sensor is open or short−circuited for 30 consecutive seconds

NOTE: Refer to Appendix Tables on pages 60−62 for sensor information.

Other Controls

(1) ON/OFF

Press the remote button ON/OFF: the on−off state will be changed once each time you press the button.

(2) Mode Selection:

Press the remote button MODE, then select: AUTO, COOL, DRY, FAN, HEAT, or AUTO.

(3) Temperature Setting Option Button

Each time you press the remote button TEMP+ or TEMP−, the setting temperature will be up or down by 1°F. Regulating Range: 61−86°F , the button is useless under the AUTO mode.

(4) Time Switch

You can start and stop the machine according to the setting time with the remote controller.

(5) SLEEP State Control

a. When the indoor unit is in the COOL or DRY mode, and the SLEEP mode has been set, after about 1 hour, the pre−setting T will raise 1.8°F. It will raise another 1.8°F again after 2 hours. It will raise 3.6°F in 2 hours, then it will run on at the setting temperature and fan speed.

b. When the indoor unit is in the HEAT mode, and the Timer has been set, after about 1 hour, the pre−setting T will reduce 1.8°F, and it will reduce another 1.8°F again after 2 hours. It will reduce 3.6°F in 2 hours, then it will run on at the setting temperature and blower speed.

c. The set point stays the same under the FAN mode and AUTO mode.

(6) Indoor Fan Control

The Indoor Fan can be set to HIGH, MED, LOW by remote control, and the Indoor Fan will be respectively run at high, medium, low speed. It can also be set as AUTO.

In moisture removal mode, the Indoor Fan will be set to low speed.

(7) Buzzer Control

The buzzer will send a “Beep” sound when the indoor unit is powered up or receives the information sent by the remote control or there is a button pushed.

(8) Auto button

If the controller is on, it will stop when the button is pressed. If the controller is off, it will start when the button is pressed. The swing light will be on, and the main unit will run based on the remote controls current settings.

(9) Up−and−Down Swinging Control

When the power is turned on, the up−and−down motor will first move the air deflector to 0 counter−clockwise. The air outlet will be closed.

After starting the machine, if you don’t set the swinging function, heating mode and auto−heating mode, the up−and−down air deflector will move to D clockwise; under other modes, the up−and−down air deflector will move to L1. If you set the swing function when you start the machine, then the deflector will swing between L and D. The air deflector has 7 swing states: Location L, Location A, Location B, Location C, Location D, Location L to Location D, stop at any location between L−D (the included angle between L~D is the same). The air deflector will be closed at 0 location, and the swing is function only works if the indoor fan is running.

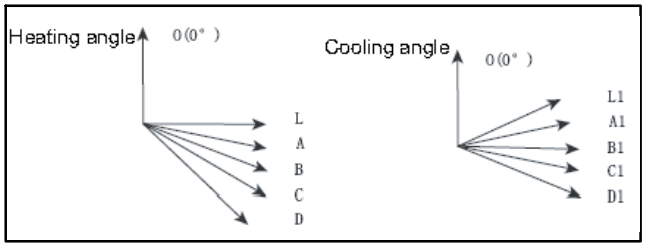


Figure 26 − Swing Angles for Heating and Cooling

(10) Display

a. Operation pattern and mode pattern display

All the display patterns will display for a time when the unit is powered on, the operation indication icon will display in red under standby status. When the machine is started by remote controller, the indication icon will light and display the current operation mode (the mode light includes: Cooling, Heating and Dry). If you press the light button, all the display icons will go dark.

b. Double−8 display

According to the settings of the remote control, the display may show the current temperature (the temperature scope is from 61°F to 86°F) on the indoor ambient temperature. The heating and air supply temperature will display 77°F under auto−mode, the temperature will display 64°F under the heating mode, and the temperature will display H1 under the defrosting mode.(If you set the Celsius temperature display, the display will show according to Celsius temperature)

(11) Protection function and failure display

E2: Freeze−proofing E4: Exhaust protection E5: Over−current protection

E6: Communication failure E8: Overload protection

F1: Indoor ambient sensor start and short circuit (continuously measured failure for 30S)

F2: Indoor evaporator sensor start and short circuit (continuously measured failure for 30S)

F3: Outdoor ambient sensor start and short circuit (continuously measured failure for 30S)

F2: Outdoor condenser sensor start and short circuit (continuously measured failure for 30S, and not measured within 10 minutes after defrosted)

F5: Outdoor exhaust sensor start and short circuit (continuously measured failure for 30S after the compressor has operated 3 minutes)

H3: Overload protection of compressor H5: Module protection

PH: High−voltage protection PL: Low−voltage protection

P1: Nominal cooling and heating P2: Maximum cooling and heating

P3: Medium cooling and heating P0: Minimum cooling and heating

(12) Drying Function

You may start or stop the dry function under the cooling and dry modes. Automatic heating and air modes do not support the dry function).

(13) Memory function when interrupting the power supply Memory content: mode, swing function, light, set temperature and blower speed.

After power is interrupted, the machine will start according to the content of the memory automatically. If the last remote control command has not set a timed function, the system will remember the last remote control command and operate accordingly. If the last remote control command has set a timed function and the power supply is interrupted before the time expires, the system will remember the timed function of the last remote control command, the timed time will be recounted from power on. If the last remote control command has set a timed function, the time is up and the system is started or stopped according to the set time when the power supply is interrupted, the system will remember the operation status before the power supply was interrupted, and not carry out the timed action; The time clock will not be remembered.

Detection of Temperature Sensor Malfunction

Indoor Temperature Sensor

Malfunctions of the temperature sensor can be detected at any time.

Indoor Pipe Temperature Sensor

During defrost, a temperature sensor malfunction will not be detected. Five minutes after finishing defrost, the system will again begin to detect temperature sensor malfunctions. At all other times, a temperature sensor malfunction will be detected when:

1. A short−circuit occurs to the temperature sensor for 30 seconds: The temperature sensor overheats. In this case to protect the system, the entire unit will stop. At the same time, the temperature protection and temperature sensor malfunction will be shown.
2. An open circuit of the temperature sensor occurs for 30s: The unit will stop and the temperature sensor malfunction will be displayed

Frequency Control

When starting the compressor, or when conditions have varied due to the changes in the room, the frequency must be initialized according to the ΔD value of the indoor unit and the Q value of the indoor unit. Q value: Indoor unit output determined from indoor unit volume, air flow rate and other factors.

Compressor Protection Function

When turning the compressor from OFF to ON, the system will ramp the frequency up from a lower starting limit to protect the compressor.

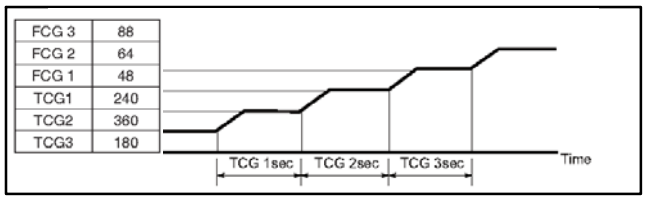


Figure 27 — Compressor Frequency (When the compressor is turned off, it cannot be turned back on for 3 minutes, except after defrost.

Discharge Pipe Control

The discharge pipe temperature is used as the compressor's internal temperature. If the discharge pipe temperature rises above a certain level, the operating frequency upper limit is set to keep this temperature from going up further.

Input Current Control

Detects an input current with the current transformer as the compressor is running, and sets the upper frequency limit from the input current.

In the case of a heat pump, this control is the upper limit control function of the frequency, which takes priority over the lower limit of four way valves activation compensation.

Freeze−up Protection Control

During cooling operation, the signals being sent from the indoor unit allow operating frequency limitation and then prevent freezing of the indoor heat exchanger.

Heating Peak−cut Control: Heat−Pump Only

During heating operation, the signals being sent from the indoor unit allow operating frequency limitation and prevent abnormally high pressure.

Defrost Control: Heat Pump Only

Defrosting is carried out by the cooling cycle (reverse cycle). The defrost time must be complete or the outdoor heat exchanger temperature must be more than its preset value when finishing.

Conditions for Starting Defrost

The starting conditions must be determined by the outdoor air temperature and heat exchanger temperature. When the system is in heating operation, 6 minutes after the compressor is started, and more than 44 minutes of accumulated time has passed since the start of the operation or end of defrost.

Conditions for Canceling Defrost

The heat exchanger temperature must be between (39°F−72°F)

Fan Control

Fan control is carried out according to the following priority.

1. Fan ON control for electric component cooling fan
2. Fan control when defrosting
3. Fan OFF delay when stopped
4. ON/OFF control in cooling operation
5. Speed control when frequency adjustment function is working
6. Fan control in forced operation
7. Fan control in indoor/outdoor unit silent operation
8. Fan control in powerful mode
9. Fan control in normal operation

Fan OFF Control when Stopped

Fan OFF delay for 60 seconds must be made when the compressor is stopped.

Speed Control in indoor/outdoor unit silent operation

1. When in Cooling Operation

When the outdoor air temperature is lower than 99°F, the speed tap must be set to Low.

2. When in Heating Operation

When the outdoor air temperature is higher than 39°F, the speed tap must be set to Low (only for heat pump model).

TROUBLESHOOTING

Precautions for Performing Inspections and Repairs

Be cautious during installation and maintenance. Follow all rules and regulations to avoid electric shock and to prevent injury or damage.

⚠ 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 one disconnect switch. Lock out and tag switch with a suitable warning label.

Static Maintenance

Static Maintenance is maintenance during de−energization of the indoor unit.

For static maintenance, make sure that the unit is de−energized and the plug is disconnected.

Dynamic Maintenance

Dynamic maintenance is the maintenance during energization of the unit.

Before dynamic maintenance, check the electricity and ensure that there is a good ground. Check if there is electricity on the case and copper pipe of the indoor unit with a voltage tester.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

A large−capacity electrolytic capacitor is used in the outdoor unit controller (inverter). When the power supply is turned off, charge (charging voltage DC280V to 380V) remains and takes a long time to discharge.

Do Not open the outdoor unit for 20 minutes after power has been turned OFF.

Take sufficient care to avoid directly touching any of the circuit parts without first turning off the power.

At times, such as when the circuit board is to be replaced, place the circuit board assembly in a vertical position.

Diagnose troubles according to the trouble diagnosis procedure as described below.

Also refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.

No.	Trouble Shooting Procedure
1	Confirmation
2	Code displays interpretation of error codes.
3	Basic System Check

Confirmation:

1. Confirmation of Power Supply: Confirm that the power breaker operates normally and provides power
2. Confirmation Voltage: Confirm that voltage is AC 220−240 ±10%. If voltage is not in this range, the unit may not operate normally.

TROUBLESHOOTING (CONTINUED)

Display and Interpretation of Error Codes:

This unit has on−board diagnostics. Error codes will appear on the LED display on the front panel of the indoor unit in place of the temperature display. Error codes are also displayed on the outdoor unit microprocessor board with colored LED lights. The table below explains the error codes for both units.

Diagnostic Codes
DLC/DLF4(A,H)6 9k / 12k, 115v

Malfunction	Error Code on indoor unit	Repair Method/Cause
Indoor PCB Malfunction	EE	Replace indoor main board
Anti−freeze Protection	E2	Outdoor ambient temperature is too low
System overload protection	H4	Check for dirty or blocked heat exchangers
Indoor motor malfunction	H6	Check motor mounting and wiring
Indoor pipe temperature sensor malfunction	F2	Measure the resistance value in the sensor
Return air temperature sensor malfunction	F1	Measure the resistance value in the sensor
Indoor board malfunction	UF	Replace indoor main board
Compressor overload protection	H3	Check overload wiring
Compressor start−up failure	Lc	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Outdoor fan motor failure	UH	Check outdoor motor
Low voltage protection	E5	Check incoming power
4−way valve malfunction	U7	Replace 4−way valve
Compressor phase detection error	U1	Replace outdoor main board
Compressor speed reduction	H7	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Current detection malfunction	U5	Replace outdoor main board
Outdoor ambient temperature sensor malfunction	F3	Measure the resistance value in the sensor
Discharge temperature sensor malfunction (out of range)	E4	Measure the resistance value in the sensor
Discharge temperature sensor malfunction (open or shorted)	F5	Measure the resistance value in the sensor
Condenser temperature sensor malfunction (open or shorted)	F4	Measure the resistance value in the sensor
Heat sink over−temperature	P8	Is outdoor ambient temperature out of system operating range? Is heat sink blocked or damaged?
DC over−current	UU	−−
Heat sink temperature sensor malfunction	P7	Replace outdoor main board
Low charge	F0	Check for leaks
DC input voltage is too high	PH	Check incoming power supply
DC input voltage is too low	PL	Check incoming power supply
Communication malfunction	E6	Check wiring connection
Indoor and outdoor unit mismatched	UA	Check system combination
Remarks:	4 minutes after the compressor has stopped due to a protection error, an error code will be displayed. To display other errors, press the LIGHT button six (6) times within four (4) seconds. **NOTE**: Refer to Appendix Tables on pages 60−62 for sensor information.	

Diagnostic Codes
DLC/DLF4(A,H)6 12K, 230v

Malfunction	Error Code on indoor unit	Repair Method/Cause
Indoor PCB Malfunction	EE	Replace indoor main board
Anti−freeze Protection	E2	Outdoor ambient temperature is too low
System overload protection	H4	Check for dirty or blocked heat exchangers
Indoor motor malfunction	H6	Check motor mounting and wiring
Indoor pipe temperature sensor malfunction	F2	Measure the resistance value in the sensor
Return air temperature sensor malfunction	F1	Measure the resistance value in the sensor
Indoor board malfunction	UF	Replace indoor main board
Compressor overload protection	H3	Check overload wiring
Compressor start−up failure	Lc	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Outdoor fan motor failure	UH	Check outdoor motor
Low voltage protection	E5	Check incoming power
4−way valve malfunction	U7	Replace 4−way valve
Compressor phase detection error	U1	Replace outdoor main board
Compressor speed reduction	H7	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Current detection malfunction	U5	Replace outdoor main board
Outdoor ambient temperature sensor malfunction	F3	Measure the resistance value in the sensor
Discharge temperature sensor malfunction (out of range)	E4	Measure the resistance value in the sensor
Discharge temperature sensor malfunction (open or shorted)	F5	Measure the resistance value in the sensor
Condenser temperature sensor malfunction (open or shorted)	F4	Measure the resistance value in the sensor
Heat sink over temperature	P8	Is outdoor ambient temperature out of system operating range? Is heat sink blocked or damaged?
DC over−current	H5	−−
Heat sink temperature sensor malfunction	P7	Replace outdoor main board
Low charge	F0	Check for leaks
DC input voltage is too high	PH	Check incoming power supply
DC input voltage is too low	PL	Check incoming power supply
Communication malfunction	E6	Check wiring connection
Indoor and outdoor unit mismatched	UA	Check system combination

NOTE: Refer to Appendix Tables on pages 60−62 for sensor information.

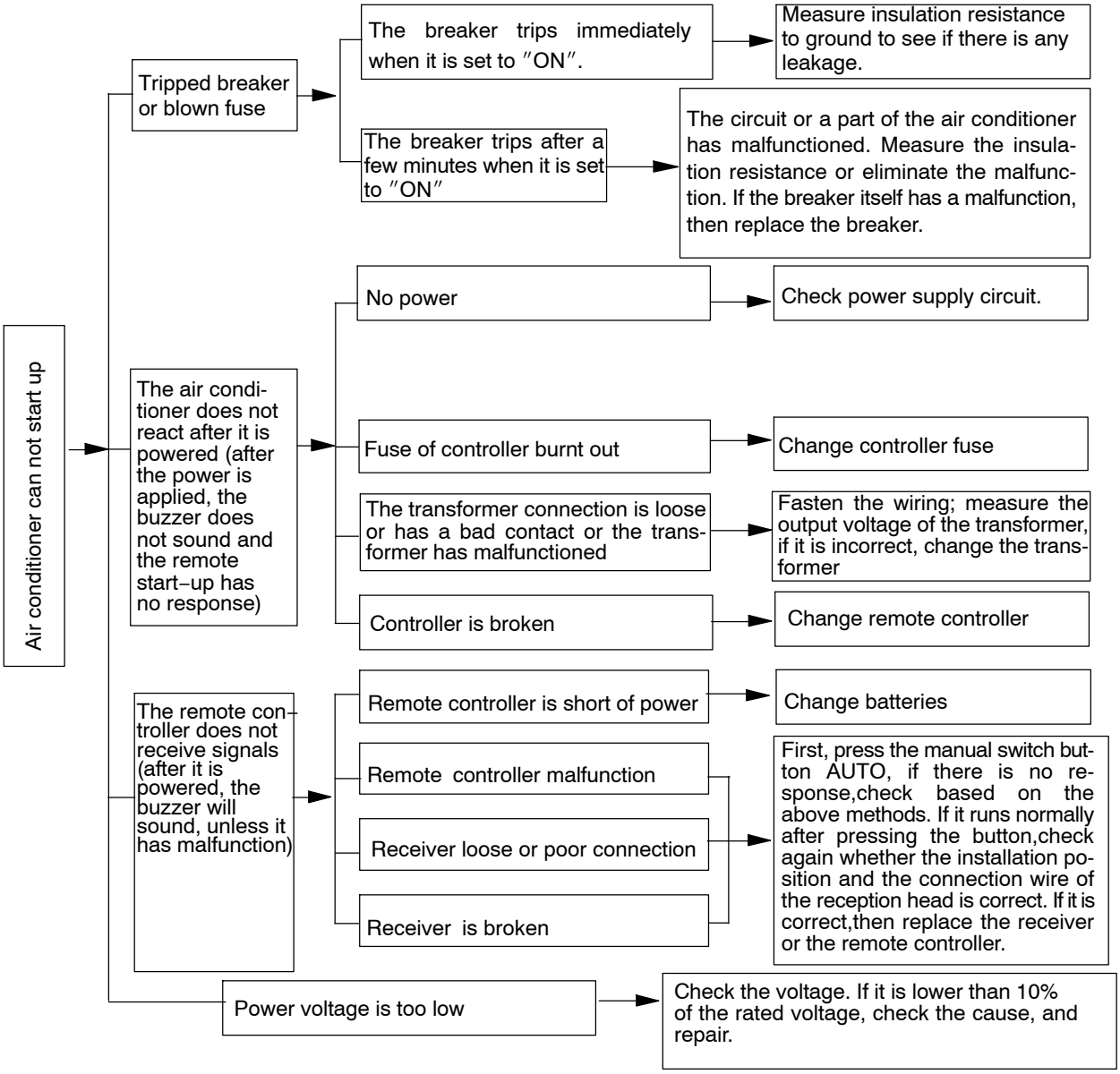
Diagnostic Codes
DLC/DLF4(A,H)6 18k–24k, 230v

Malfunction	Error Code on indoor unit	Repair Method/Cause
System high pressure protection	E1	Poor heat exchange. Are the coils clogged or blocked? Is the ambient temperature out of system range?
Anti−freeze Protection	E2	Outdoor ambient temperature is too low
Discharge temperature sensor malfunction (out of range)	E4	Measure the resistance value in the sensor
Low voltage protection	E5	Check incoming power
Communication malfunction	E6	Check wiring connection
System overload protection	E8	Refer to Service Manual
Indoor board malfunction	U8	Replace indoor main board
Indoor motor malfunction	H6	Check motor mounting and wiring
Missing jumper from indoor board	C5	No jumper on controller or installed improperly or damaged. Corresponding circuit on main board has malfunction.
Return air temperature sensor malfunction	F1	Measure the resistance value in the sensor
Indoor pipe temperature sensor malfunction	F2	Measure the resistance value in the sensor
Outdoor ambient temperature sensor malfunction	F3	Measure the resistance value in the sensor
Condenser temperature sensor malfunction (open or shorted)	F4	Measure the resistance value in the sensor
Discharge temperature sensor malfunction (open or shorted)	F5	Measure the resistance value in the sensor
Overload limit, compressor speed reduction	F6	Refer to Service Manual
Over current compressor speed reduction	F8	System voltage is too low or system voltage is high
Compressor discharge temperature high, compressor speed reduction	F9	Load is too great Ambient temperature too high Refrigerant is low Electric expansion valve malfunction
Over voltage protection	PH	Check incoming power supply
Current detection malfunction	U5	Replace outdoor main board
Compressor current protection	P5	Refer to Service Manual. Check inverter board.
Defrosting	H1	H1 signal normal operation
Compressor overload protection	H3	Check overload wiring
System overload protection	H4	Checked for dirty or blocked heat exchangers
IPM protection	H5	IPM module over temperature, low voltage, silica grease problem
PFC (power factor correction) board protection	HC	Refer to Service Manual
Compressor speed reduction	H7	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Ambient temperature cut off range	H0	Refer to Service Manual (overload, high temperature, cutout)
Compressor start−up failure	LC	Check if the resistance of the compressor and the resistance to ground is normal. If the resistance is normal, the outdoor main board may be defective.
Compressor phase detection error	U1	Replace outdoor main board

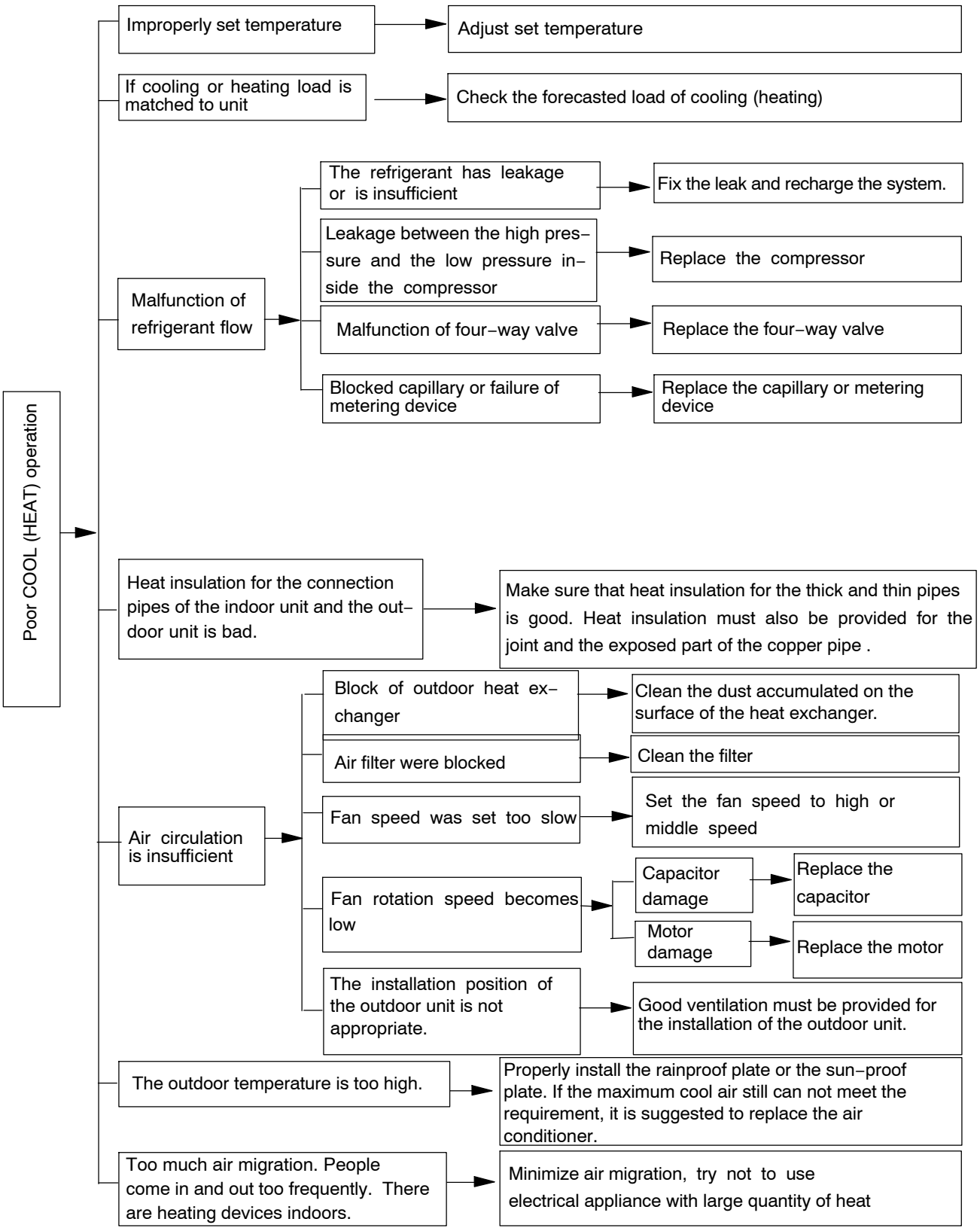
NOTE: Refer to Appendix Tables on pages 60−62 for sensor information.

Malfunction Analysis

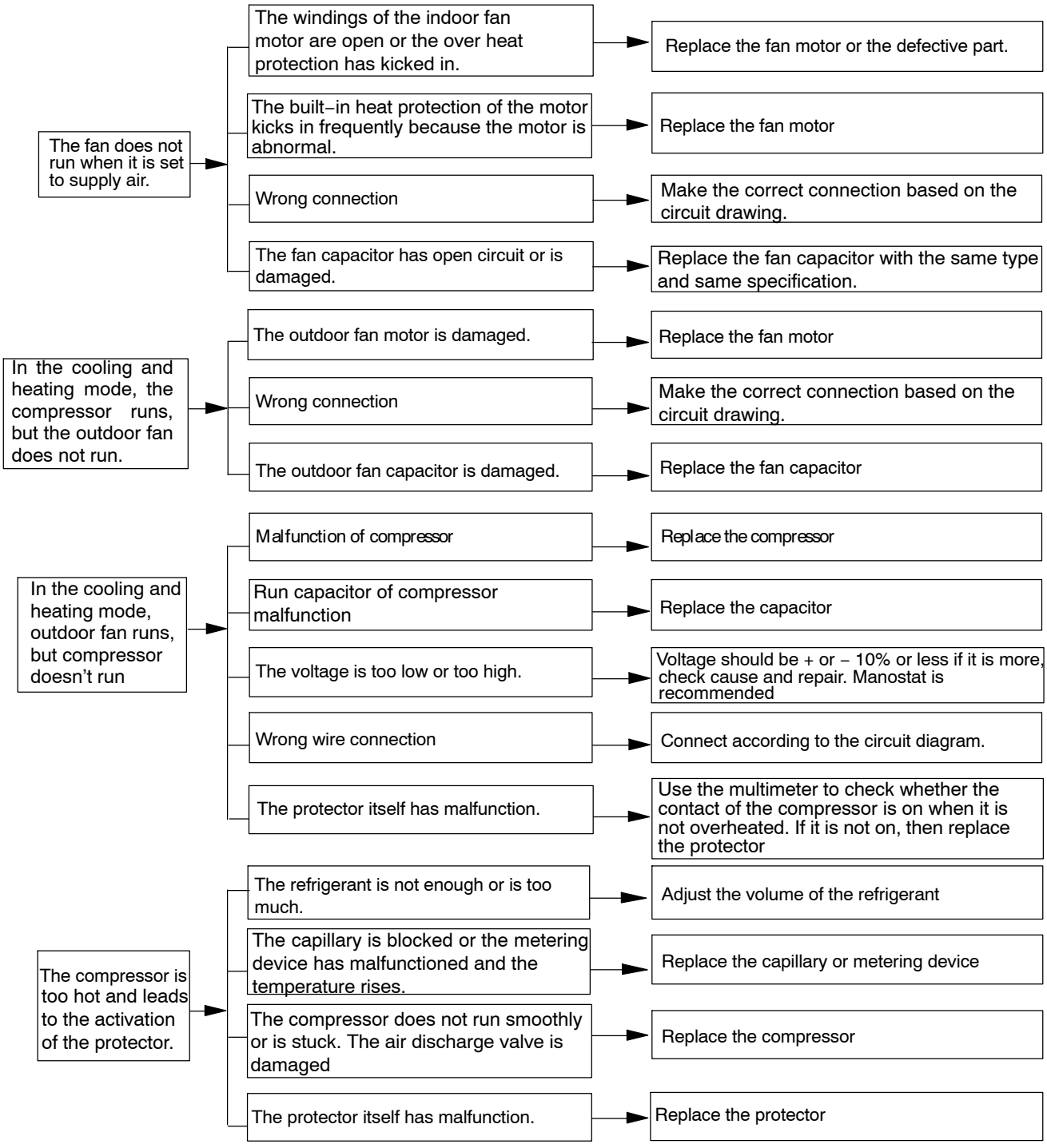
Note: When replacing the controller, make sure to insert the jumper into the new controller, otherwise the unit will display C5



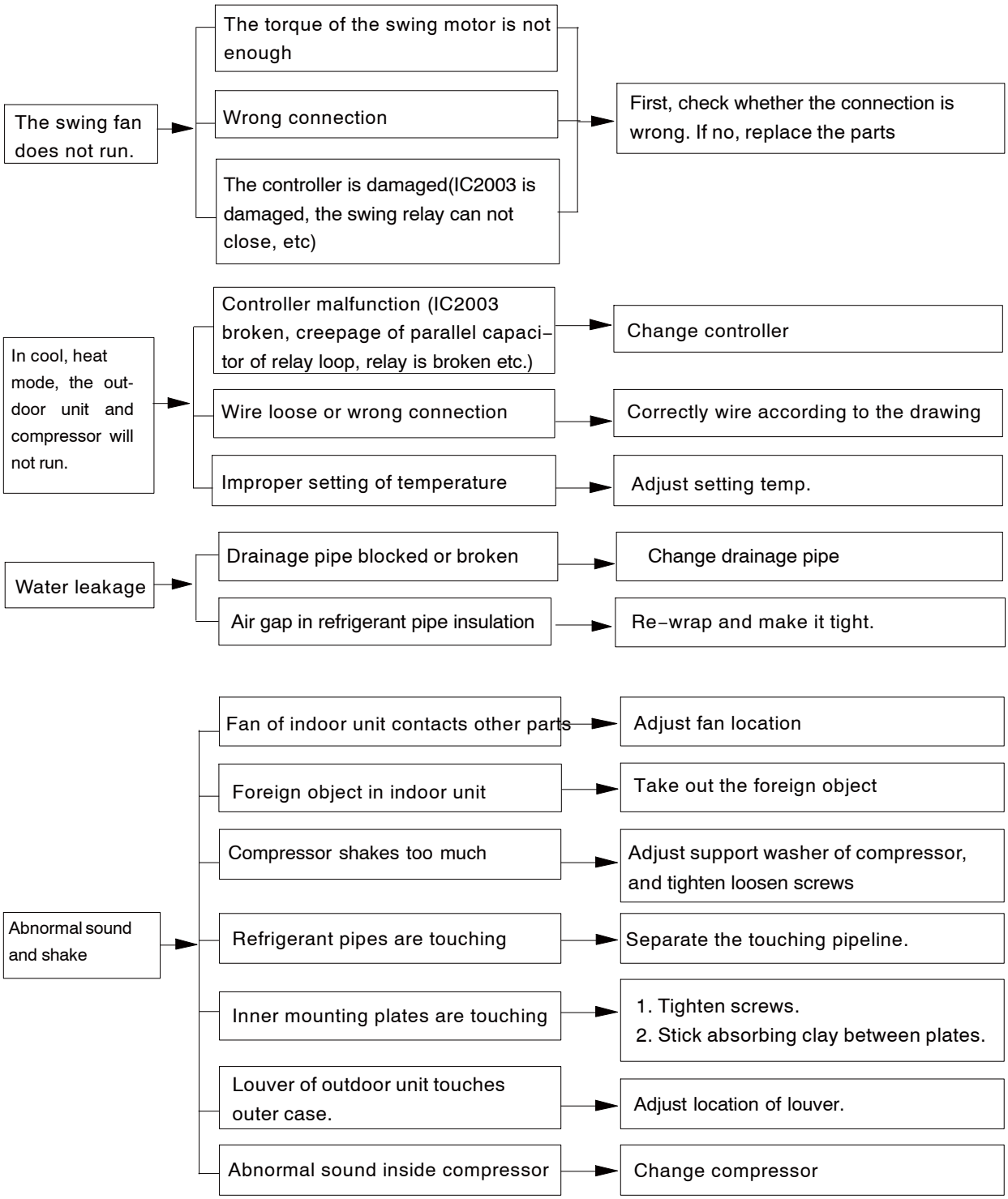
TROUBLESHOOTING (CONTINUED)



TROUBLESHOOTING (CONTINUED)



TROUBLESHOOTING (CONTINUED)



TROUBLESHOOTING (CONTINUED)

Analysis or processing of some of the malfunction display:

1 Compressor discharge protection

Possible causes: shortage of refrigerant; blockage of air filter; poor ventilation or air flow short circuit of condenser; the system has non−condensing gas (such as air, water etc.); blockage of capillary assembly (including filter); malfunction of metering device; leakage inside four−way valve causes incorrect operation; malfunction of compressor; malfunction of protection relay; malfunction of discharge sensor; outdoor temperature too high.

Processing method: refer to the malfunction analysis in the above section.

2 Low voltage over−current protection

Possible cause: Sudden drop of supply voltage.

3 Communication malfunction

Processing method: Check if communicating signal cable is connected reliably.

4 Sensor open or short circuit

Processing method: check whether sensor is normal, connected with the corresponding position on the controller and if damage of lead wire is found.

5 Compressor over load protection

Possible causes: insufficient or too much refrigerant; blockage of capillary or metering device and increase of suction temp.; improper running of compressor, stuck bearing, damage of discharge valve; malfunction of protector.

Processing method: adjust refrigerant amount; replace the capillary or metering device; replace the compressor; use universal meter to check if the contactor of compressor is fine when it is not overheated, if not replace the protector.

6 System malfunction

i.e. overload protection. When tube temperature (check the temperature of outdoor heat exchanger when cooling and check the temperature of indoor heat exchanger when heating) is too high, protection will be activated.

Possible causes: Outdoor temperature is too high when cooling; insufficient outdoor air circulation; refrigerant flow malfunction. Please refer to the malfunction analysis in the previous section for handling method.

7 IPM Module protection

Precessing method: Once the module malfunction happens, if it persists for a long time and cannot be self cancelled, cut off the power and turn off the unit, and then re−energize the unit again after about 10 min. After repeating the procedure for several times, if the malfunction still exists, replace the module.

TROUBLESHOOTING (CONTINUED)

Basic System Check

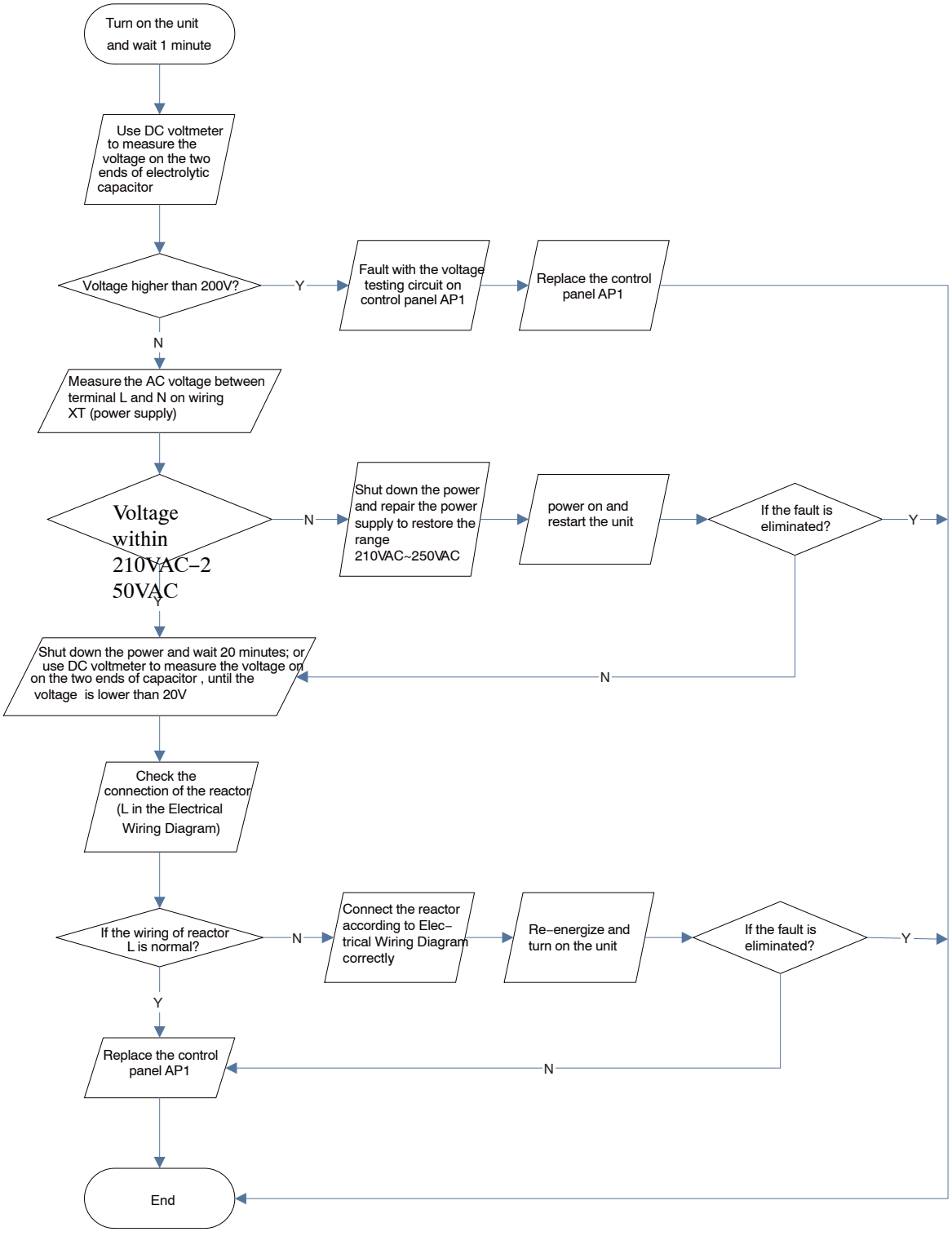
Applicable for 09 & 12K model

(1) Capacitor charge fault (Fault with outdoor unit)(AP1 below refers to the outdoor control panel)

Main Check Points:

- Use AC voltmeter to check if the voltage between terminal L and N on the wiring board is within 210 AC ~240 VAC.
- Is the reactor (L) correctly connected? Is the connection loose or disconnected? Is the reactor (L) damaged?

Fault diagnosis process:



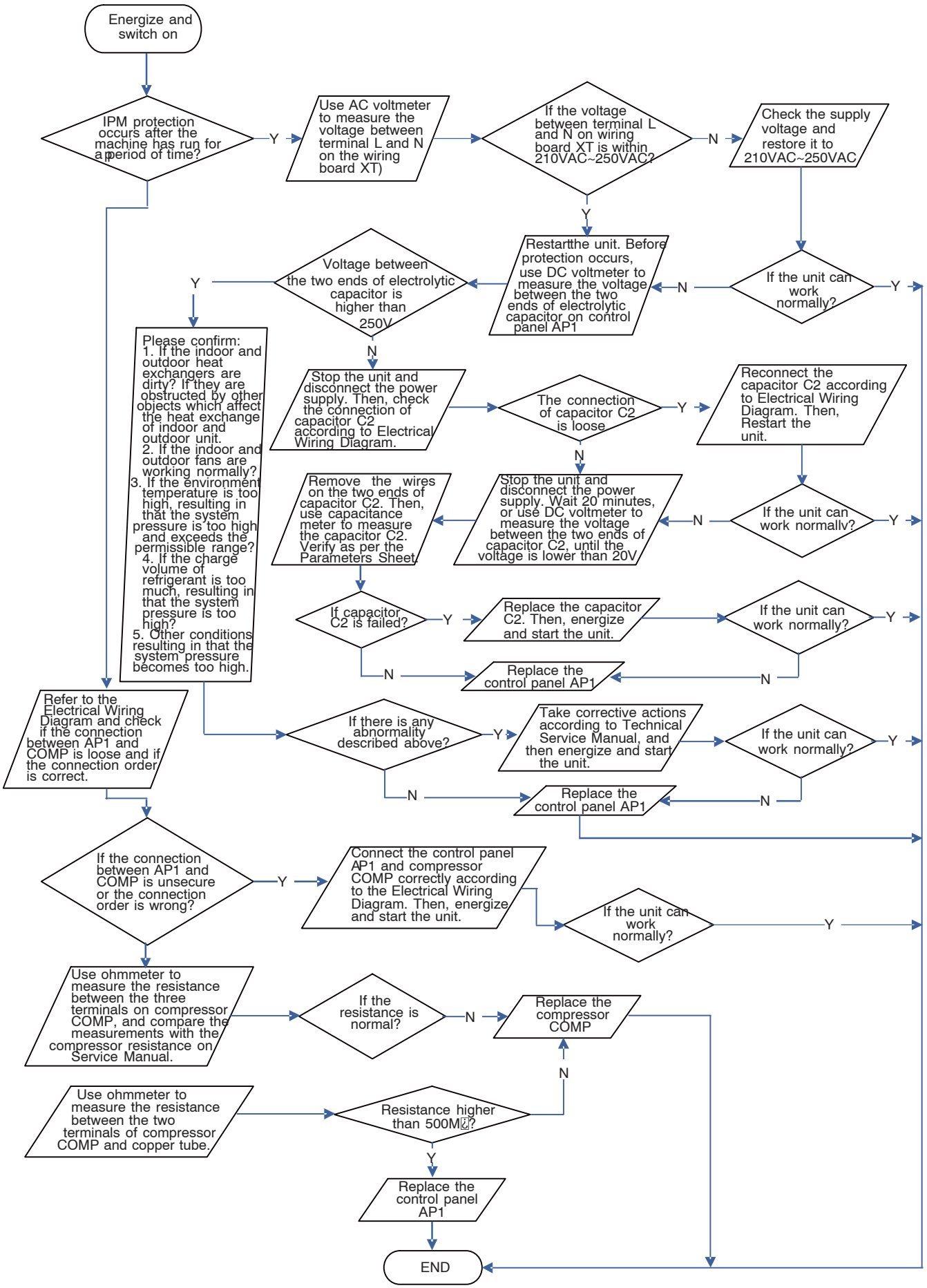
TROUBLESHOOTING (CONTINUED)

IPM Protection, Out−of−step Fault, Compressor Phase Over current (AP1 below refers to the outdoor control panel)

Main check points:

- Is the connection between control panel AP1 and compressor COMP secure? Loose? Is the connection in correct order?
- Is the voltage input of the machine within normal range? (Use AC voltmeter to measure the voltage between terminal L and N on the wiring board XT)
- Is the compressor coil resistance normal? Is the insulation of compressor coil against the copper tube in good condition?
- Is the working load of the machine too high?
- Is the charge volume of refrigerant correct?

Fault diagnosis process:


Energize and switch on
IPM protection occurs after the machine has run for a period of time?
Y
Use AC voltmeter to measure the voltage between terminal L and N on the wiring board XT)
If the voltage between terminal L and N on wiring board XT is within 210VAC~250VAC?
N
Check the supply voltage and restore it to 210VAC~250VAC
Y
Restartthe unit. Before protection occurs, use DC voltmeter to measure the voltage between the two ends of electrolytic capacitor on control panel AP1
N
If the unit can work normally?
Y
Voltage between the two ends of electrolytic capacitor is higher than 250V
Y
N
Please confirm:
1. If the indoor and outdoor heat exchangers are dirty? If they are obstructed by other objects which affect the heat exchange of indoor and outdoor unit.
2. If the indoor and outdoor fans are working normally?
3. If the environment temperature is too high, resulting in that the system pressure is too high and exceeds the permissible range?
4. If the charge volume of refrigerant is too much, resulting in that the system pressure is too high?
5. Other conditions resulting in that the system pressure becomes too high.
Stop the unit and disconnect the power supply. Then, check the connection of capacitor C2 according to Electrical Wiring Diagram.
The connection of capacitor C2 is loose
Y
Reconnect the capacitor C2 according to Electrical Wiring Diagram. Then, Restart the unit.
N
Stop the unit and disconnect the power supply. Wait 20 minutes, or use DC voltmeter to measure the voltage between the two ends of capacitor C2, until the voltage is lower than 20V
N
If the unit can work normallv?
Y
Remove the wires on the two ends of capacitor C2. Then, use capacitance meter to measure the capacitor C2. Verify as per the Parameters Sheet
If capacitor C2 is failed?
Y
Replace the capacitor C2. Then, energize and start the unit.
If the unit can work normally?
Y
N
Replace the control panel AP1
N
Refer to the Electrical Wiring Diagram and check if the connection between AP1 and COMP is loose and if the connection order is correct.
If there is any abnormality described above?
Y
Take corrective actions according to Technical Service Manual, and then energize and start the unit.
If the unit can work normally?
Y
N
Replace the control panel AP1
N
If the connection between AP1 and COMP is unsecure or the connection order is wrong?
Y
Connect the control panel AP1 and compressor COMP correctly according to the Electrical Wiring Diagram. Then, energize and start the unit.
If the unit can work normally?
Y
Use ohmmeter to measure the resistance between the three terminals on compressor COMP, and compare the measurements with the compressor resistance on Service Manual.
If the resistance is normal?
N
Replace the compressor COMP
N
Use ohmmeter to measure the resistance between the two terminals of compressor COMP and copper tube.
Resistance higher than 500M?
Y
Replace the control panel AP1
END

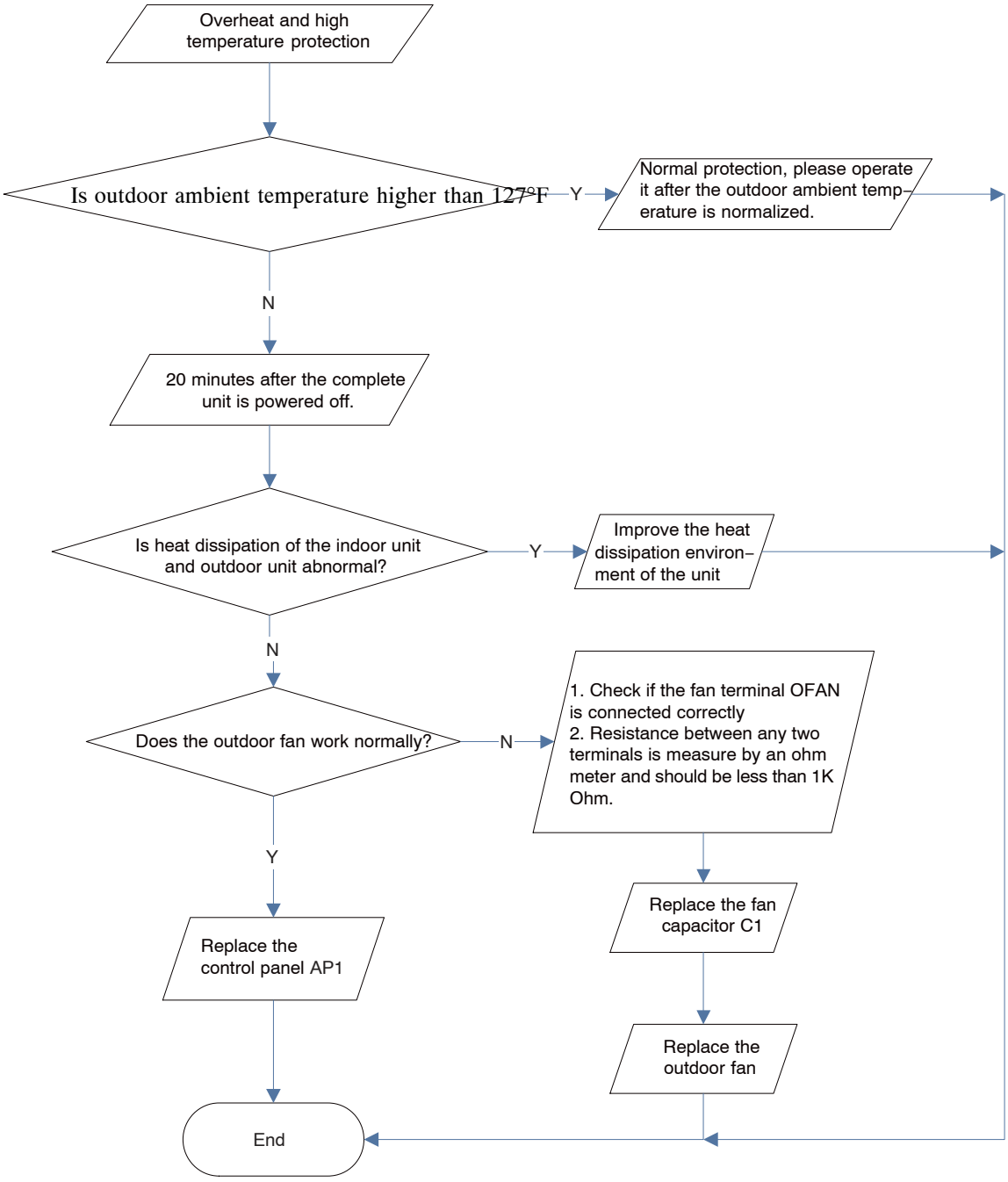
TROUBLESHOOTING (CONTINUED)

High temperature and overload protection diagnosis (AP1 hereinafter refers to the control board of the outdoor unit)

Detection:

- Is outdoor ambient temperature in normal range°?
- Are the outdoor and indoor fans operating normally?
- Is the heat dissipation environment inside and outside the unit good?

Fault diagnosis process:

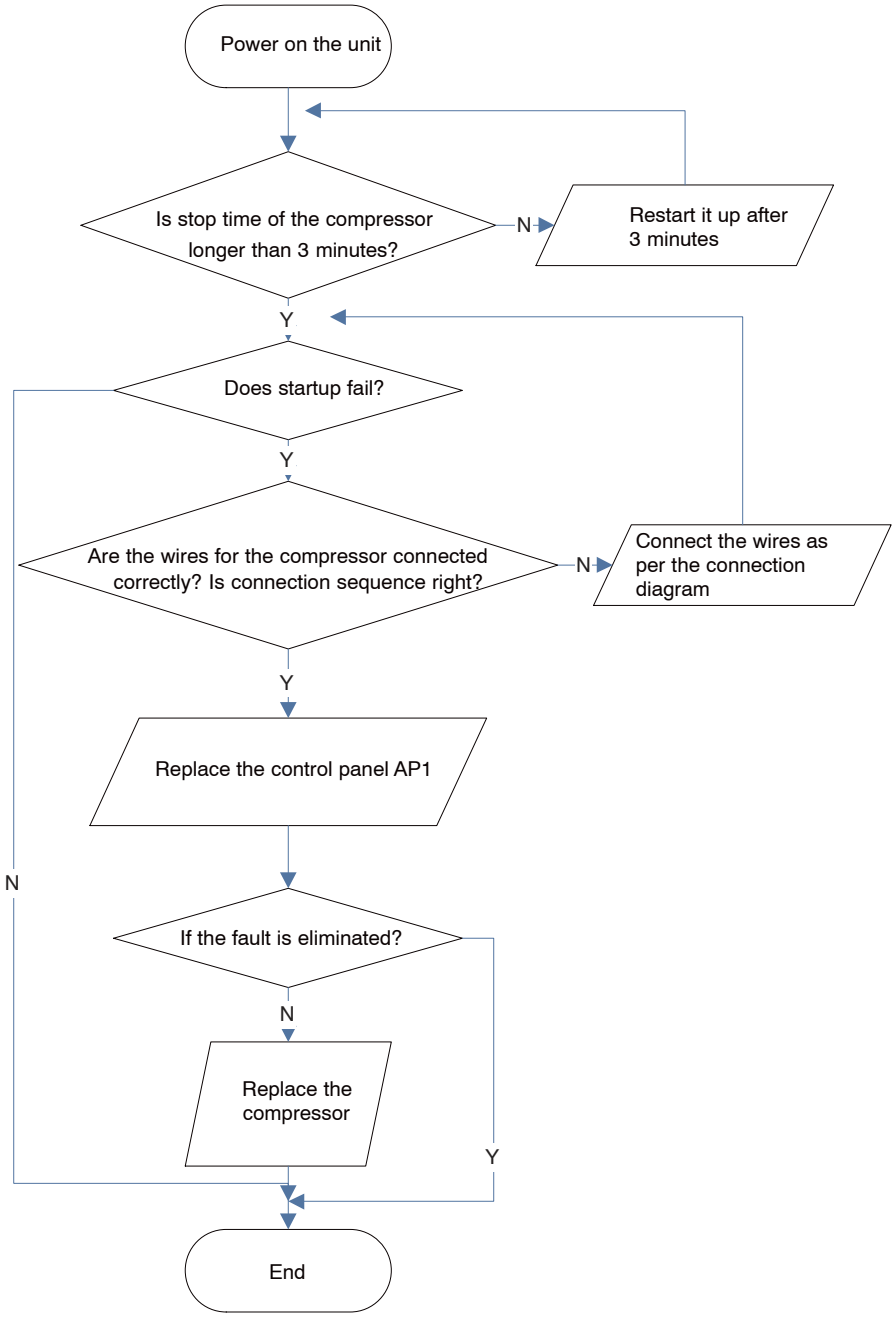


Start−up failure (following AP1 for outdoor unit control board)

Detection

- Whether the compressor wiring is connected correctly?
- Is the compressor broken?
- Has the compressor stopped long enough before re−start

Fault diagnosis process:



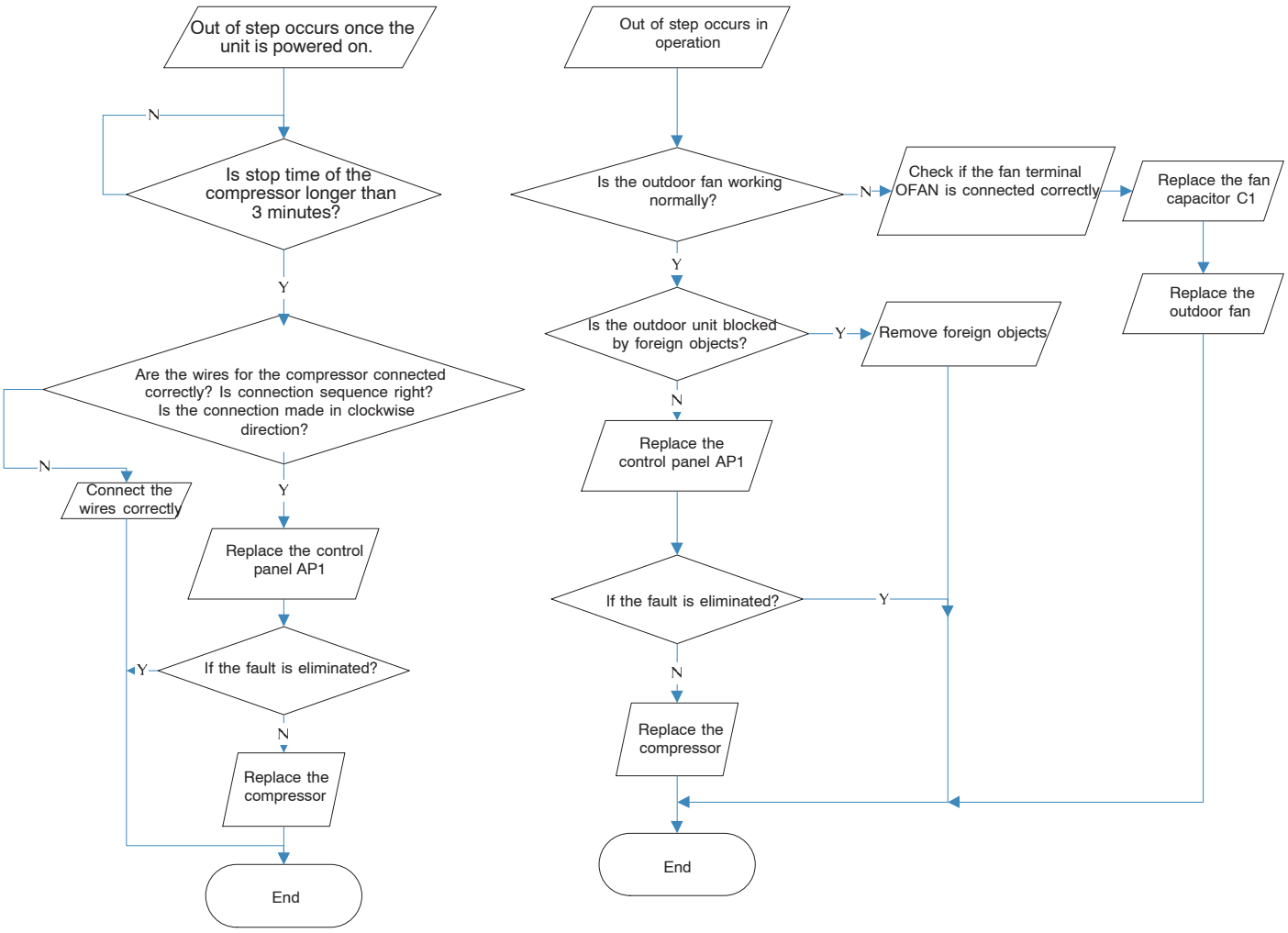
TROUBLESHOOTING (CONTINUED)

Out of step diagnosis for the compressor (AP1 hereinafter refers to the control board of the outdoor unit)

Detection:

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

Fault diagnosis process:

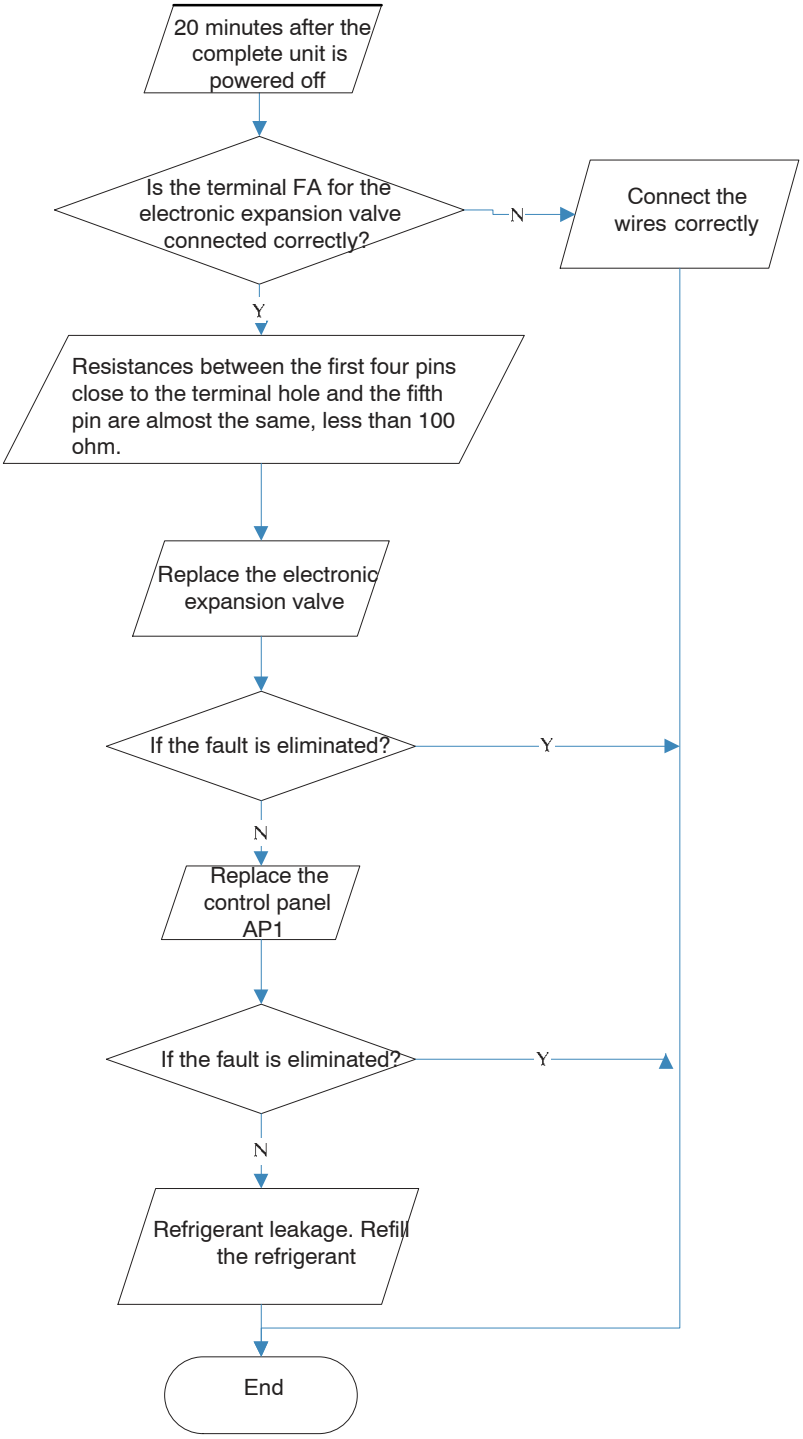


Overload and air exhaust malfunction diagnosis (following AP1 for outdoor unit control board)

Detection:

- Is the PMV connected well or not? Is the PMV damaged?
- Has refrigerant leaked?

Fault diagnosis process:

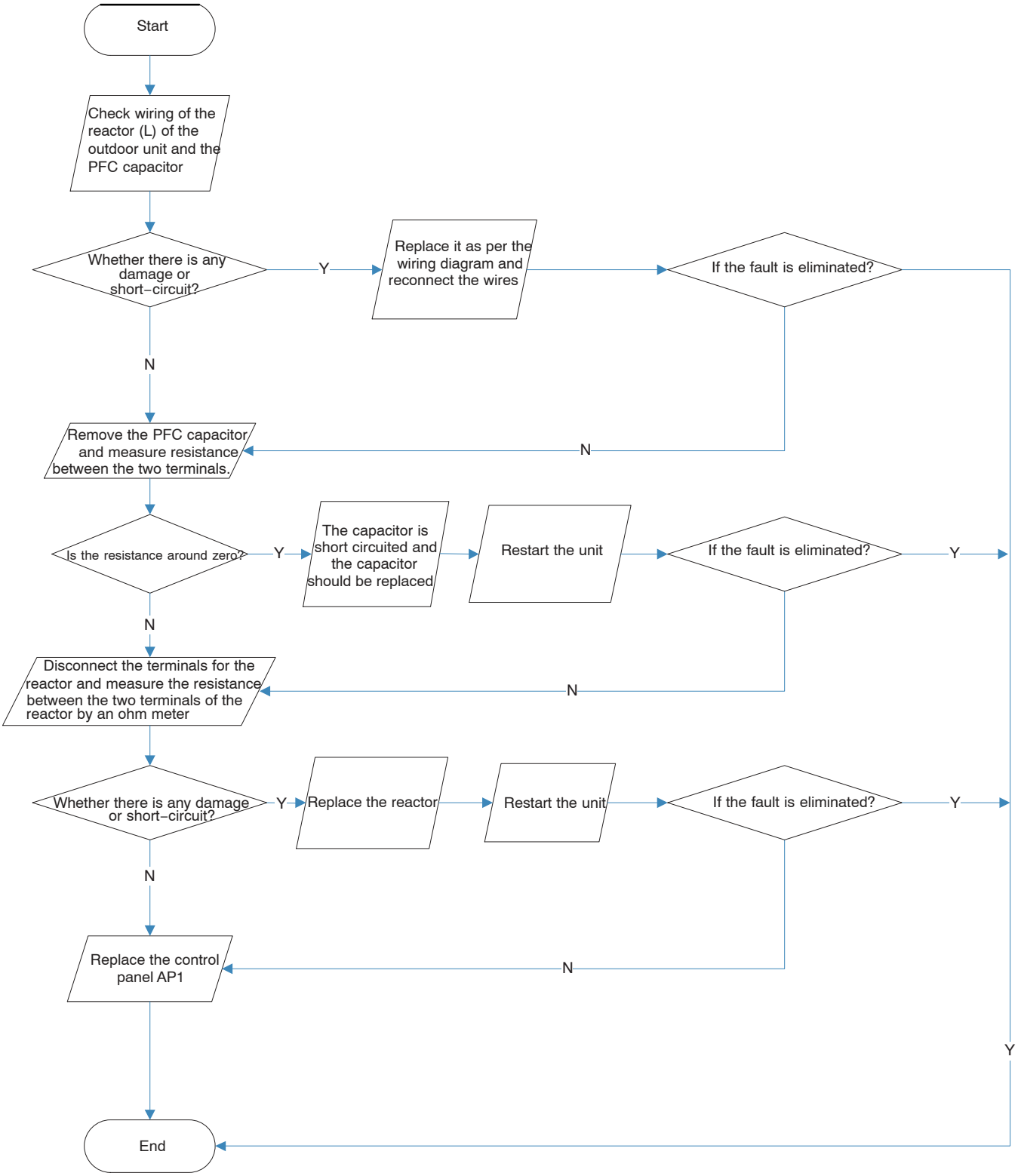


Power factor correct or (PFC) fault (a fault of outdoor unit) (AP1 hereinafter refers to the control board of the outdoor unit)

Detection:

- Check if the reactor (L) of the outdoor unit and the PFC capacitor are broken

Fault diagnosis process:



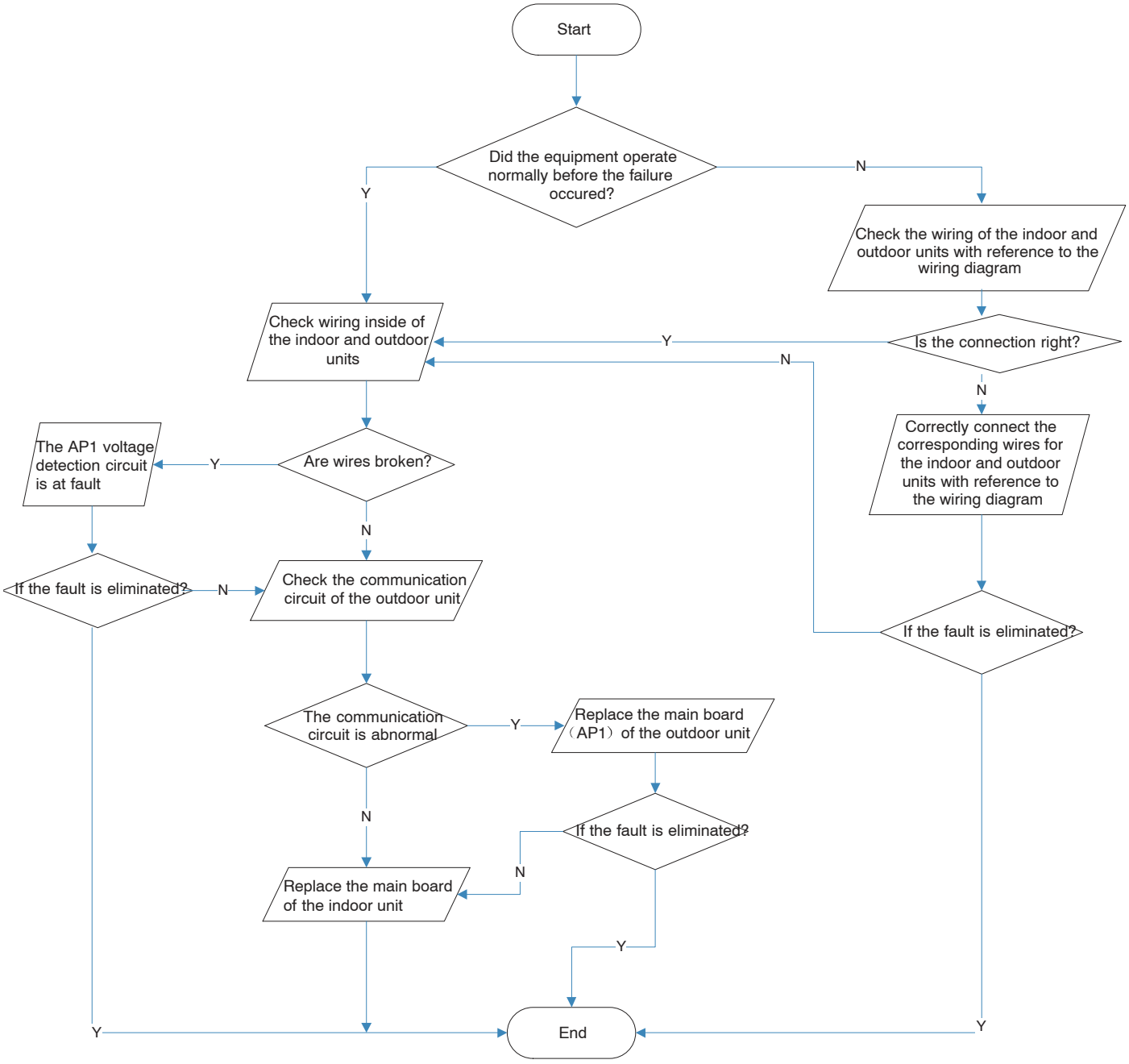
TROUBLESHOOTING (CONTINUED)

Communication malfunction: (following AP1 for outdoor unit control board)

Detection:

- Is there any damage to the indoor unit main board communication circuit? Is communication circuit damaged?
- Are the indoor and outdoor units connection wire, and indoor and outdoor units inside wiring correct or not, is there any damage?

Fault diagnosis process:



TROUBLESHOOTING (CONTINUED)

Application for 18 & 24K model

Confirm the malfunction type according to the malfunction indicator of indoor/outdoor unit and malfunction sheet (usually the sheet will be stuck on the electric box cover or top cover of the unit).

As long as there is a malfunction, the indicator of the outdoor controller board will display the corresponding malfunction directly; Some malfunctions will be displayed on the indoor unit directly and some malfunctions will be seen on the remote controller by pressing light button for 4 times in 3 seconds.

In the below malfunction diagnosis process, “Y” means “Yes”, “N” means “No”;

In the below malfunction diagnosis process, controller board AP1 is for outdoor controller board;

Before proceeding to the malfunction check, discharge the electrolytic capacitor according to the method mentioned before and make sure the voltage is below 20V. Otherwise, it may cause electric shock or brake the controller board!

TROUBLESHOOTING (CONTINUED)

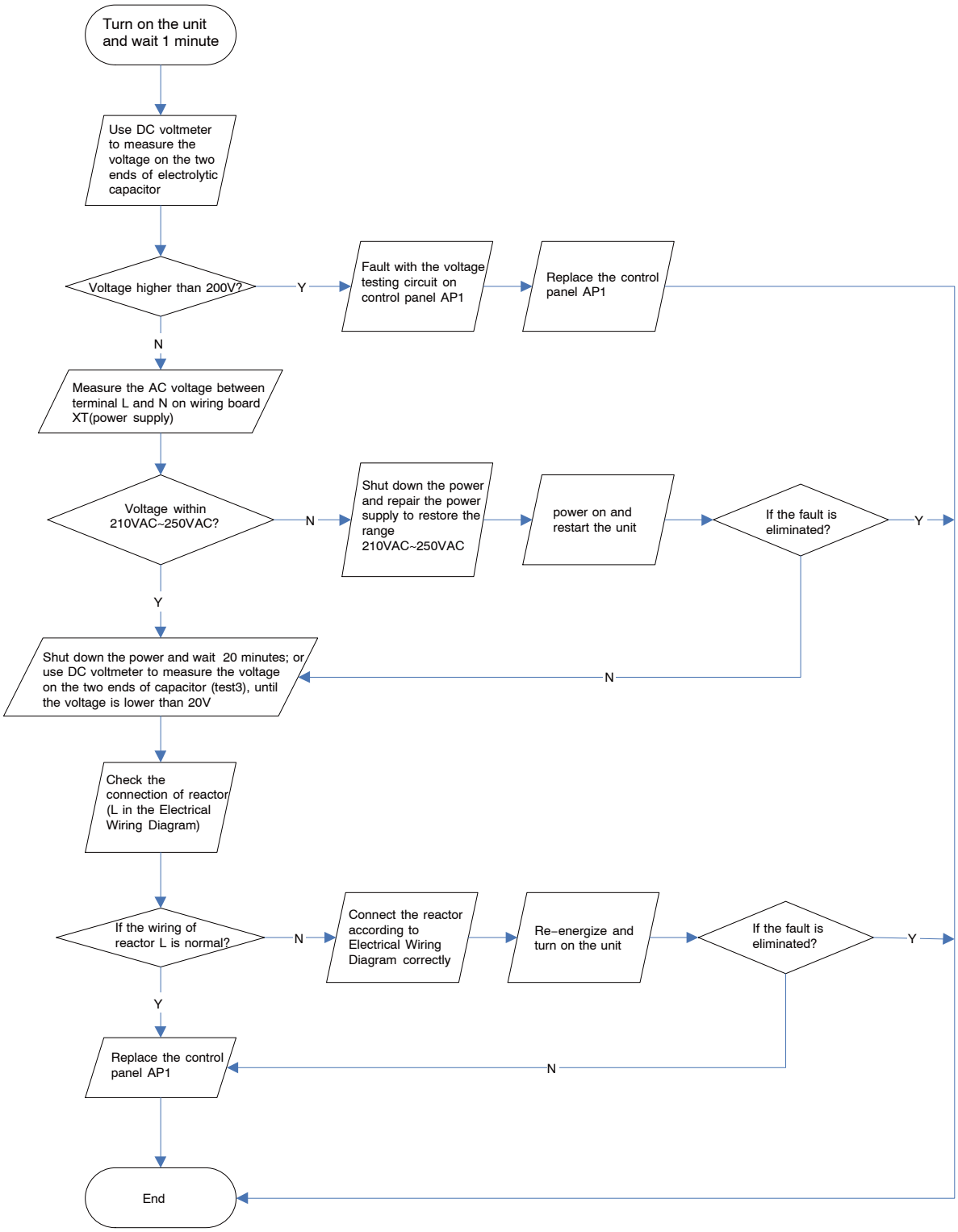
Capacitor charging malfunction (outdoor unit malfunction)

D5	D6	D16	D30
□	■	□	■

Detection:

- Detect if the voltage of L and N terminal of wiring board is between 210AC ~ 240AC by AC volt meter;
- Is reactor (L) well connected? Is connection wire loose or disconnected? Is reactor (L) damaged?

Malfunction diagnosis process:



IPM protection, de−synchronizing malfunction, phase current of compressor is over−current (outdoor unit malfunction)

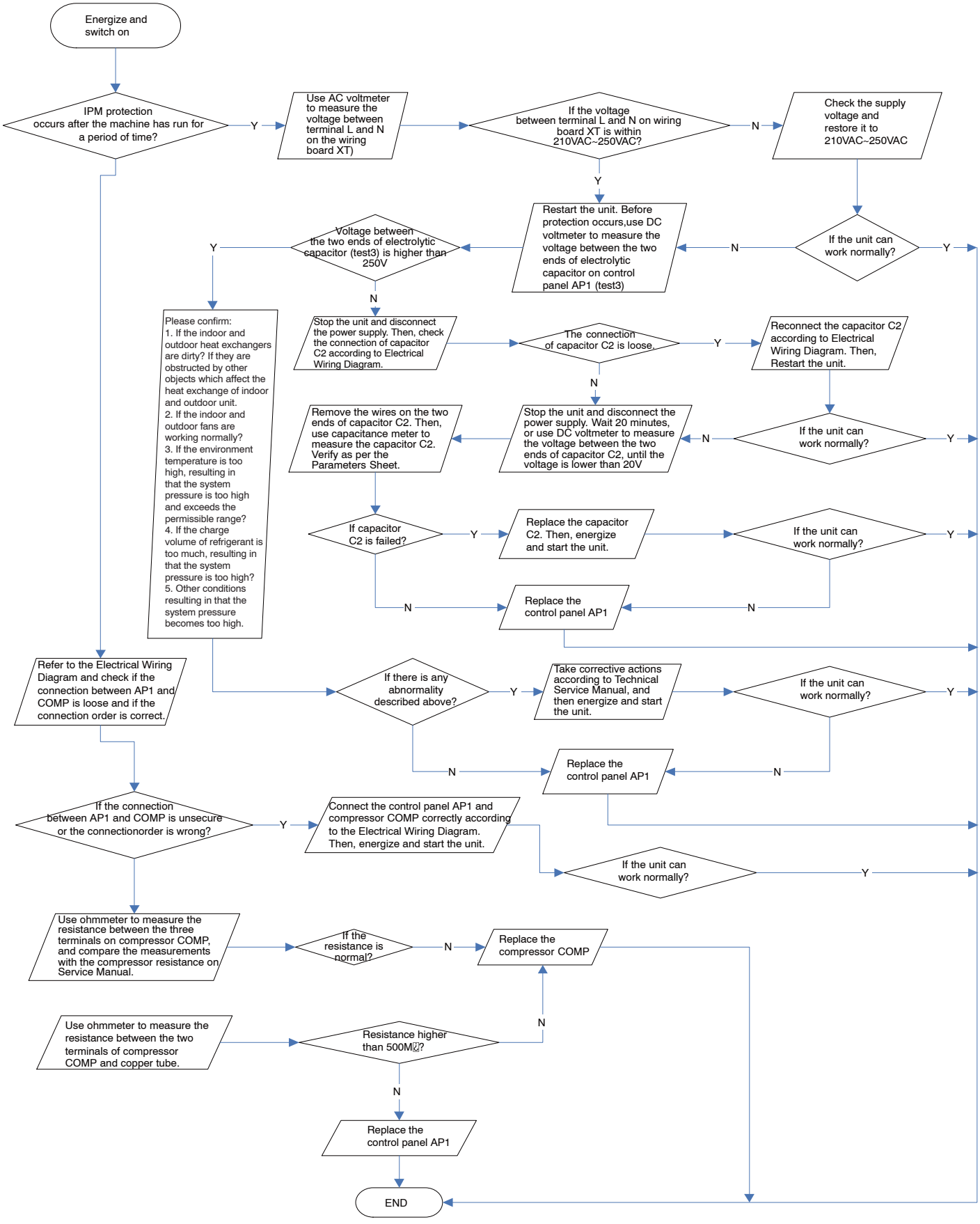
Outdoor unit malfunction indicator status

Malfunction	D5	D6	D16	D30
IPM protection	☐	☆	☐	■
De−synchronizing malfunction	☐	☆	■	☆
Compressor over−current	☐	☆	☐	☐

Detection:

- If control board AP1 and compressor COMP are well connected? If they are loose? If the connection sequence is correct?
- Is voltage input in the normal range (Test the voltage between L, N of wiring board XT by DC voltage meter)?
- If coil resistance of compressor is normal?
- If the work load of unit is heavy? If the refrigerant charging is appropriate?

Malfunction diagnosis process:


Energize and switch on
IPM protection occurs after the machine has run for a period of time?
Y
Use AC voltmeter to measure the voltage between terminal L and N on the wiring board XT)
If the voltage between terminal L and N on wiring board XT is within 210VAC~250VAC?
N
Check the supply voltage and restore it to 210VAC~250VAC
Y
Restart the unit. Before protection occurs,use DC voltmeter to measure the voltage between the two ends of electrolytic capacitor on control panel AP1 (test3)
N
If the unit can work normally?
Y
Voltage between the two ends of electrolytic capacitor (test3) is higher than 250V
Y
N
Please confirm:
1. If the indoor and outdoor heat exchangers are dirty? If they are obstructed by other objects which affect the heat exchange of indoor and outdoor unit.
2. If the indoor and outdoor fans are working normally?
3. If the environment temperature is too high, resulting in that the system pressure is too high and exceeds the permissible range?
4. If the charge volume of refrigerant is too much, resulting in that the system pressure is too high?
5. Other conditions resulting in that the system pressure becomes too high.
Stop the unit and disconnect the power supply. Then, check the connection of capacitor C2 according to Electrical Wiring Diagram.
The connection of capacitor C2 is loose.
Y
Reconnect the capacitor C2 according to Electrical Wiring Diagram. Then, Restart the unit.
N
Stop the unit and disconnect the power supply. Wait 20 minutes, or use DC voltmeter to measure the voltage between the two ends of capacitor C2, until the voltage is lower than 20V
N
If the unit can work normally?
Y
Remove the wires on the two ends of capacitor C2. Then, use capacitance meter to measure the capacitor C2. Verify as per the Parameters Sheet.
If capacitor C2 is failed?
Y
Replace the capacitor C2. Then, energize and start the unit.
If the unit can work normally?
Y
N
Replace the control panel AP1
N
Refer to the Electrical Wiring Diagram and check if the connection between AP1 and COMP is loose and if the connection order is correct.
If there is any abnormality described above?
Y
Take corrective actions according to Technical Service Manual, and then energize and start the unit.
If the unit can work normally?
Y
N
Replace the control panel AP1
N
If the connection between AP1 and COMP is unsecure or the connectionorder is wrong?
Y
Connect the control panel AP1 and compressor COMP correctly according to the Electrical Wiring Diagram. Then, energize and start the unit.
If the unit can work normally?
Y
Use ohmmeter to measure the resistance between the three terminals on compressor COMP, and compare the measurements with the compressor resistance on Service Manual.
If the resistance is normal?
N
Replace the compressor COMP
Use ohmmeter to measure the resistance between the two terminals of compressor COMP and copper tube.
Resistance higher than 500M?
N
N
Replace the control panel AP1
END

Diagnosis for high temperature, overload protection (check outdoor unit in cooling mode and check indoor unit in heating mode)

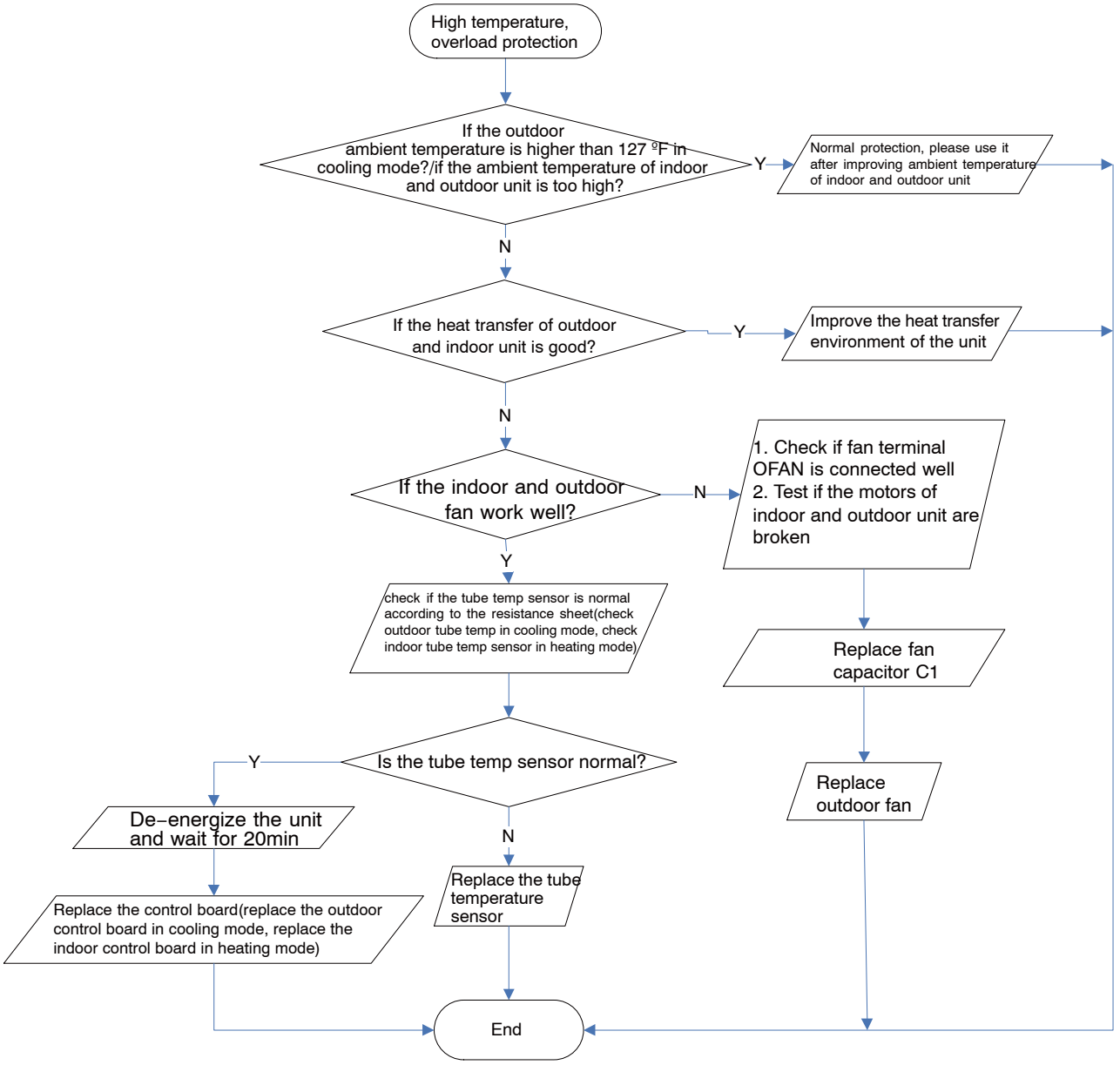
Outdoor unit malfunction indicator status

D5	D6	D16	D30
■	□	■	■

Detection:

- If the outdoor ambient temperature is in normal range;
- If the indoor and outdoor fan are running normally;
- If the heat transfer environment inside and outside the unit is good (including if the fan speed is too low)?
- If the tube temperature sensor of indoor and outdoor unit is normal?

Malfunction diagnosis process:



Diagnosis for failure start up malfunction (outdoor unit malfunction)

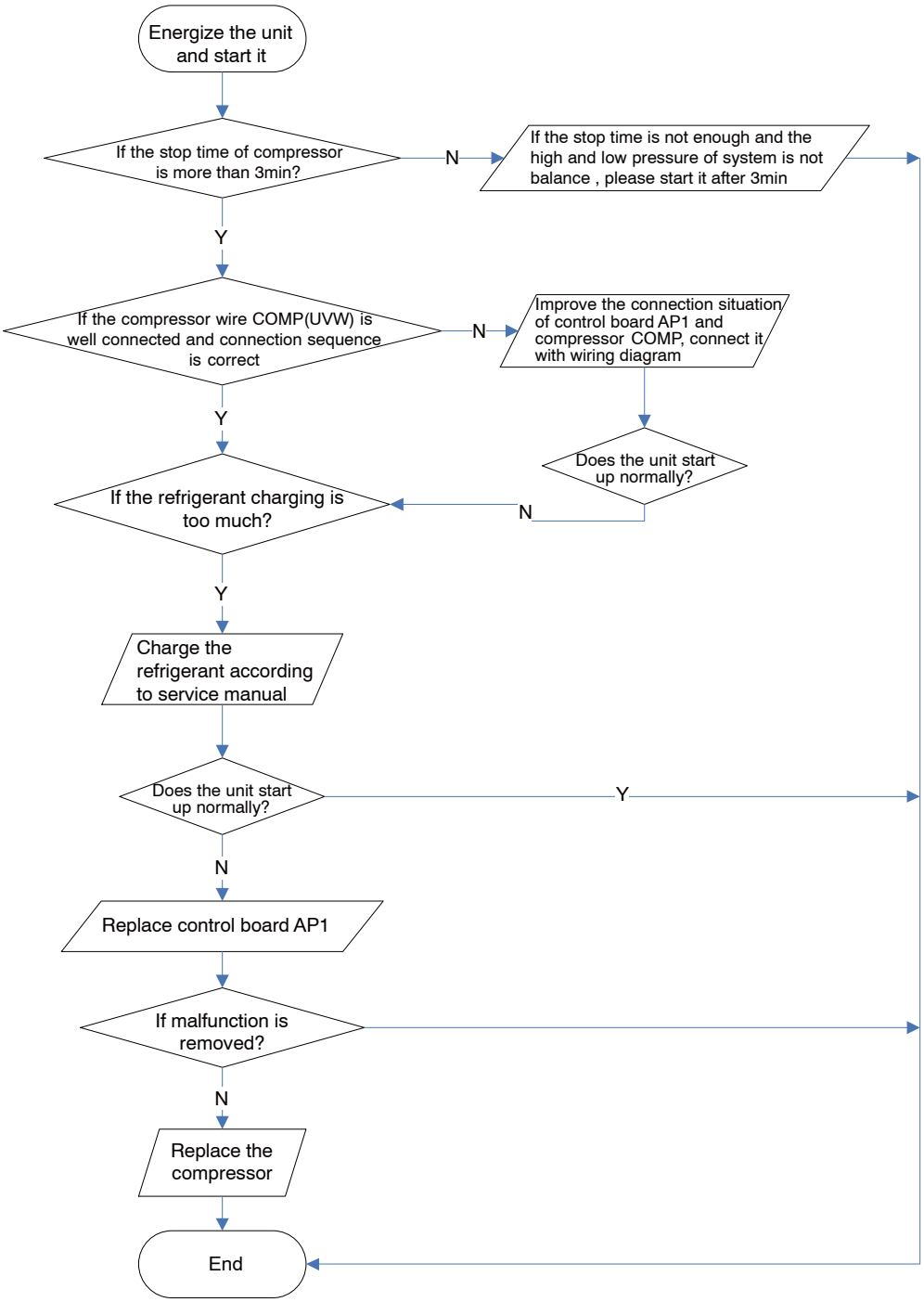
Outdoor unit malfunction indicator status

D5	D6	D16	D30
☐	☆	☐	☆

Detection:

- If the compressor wiring is correct?
- If the compressor has been off long enough?
- If the compressor is damaged?
- If the refrigerant charging is too much?

Malfunction diagnosis process:



Diagnosis for compressor synchronization (outdoor unit malfunction)

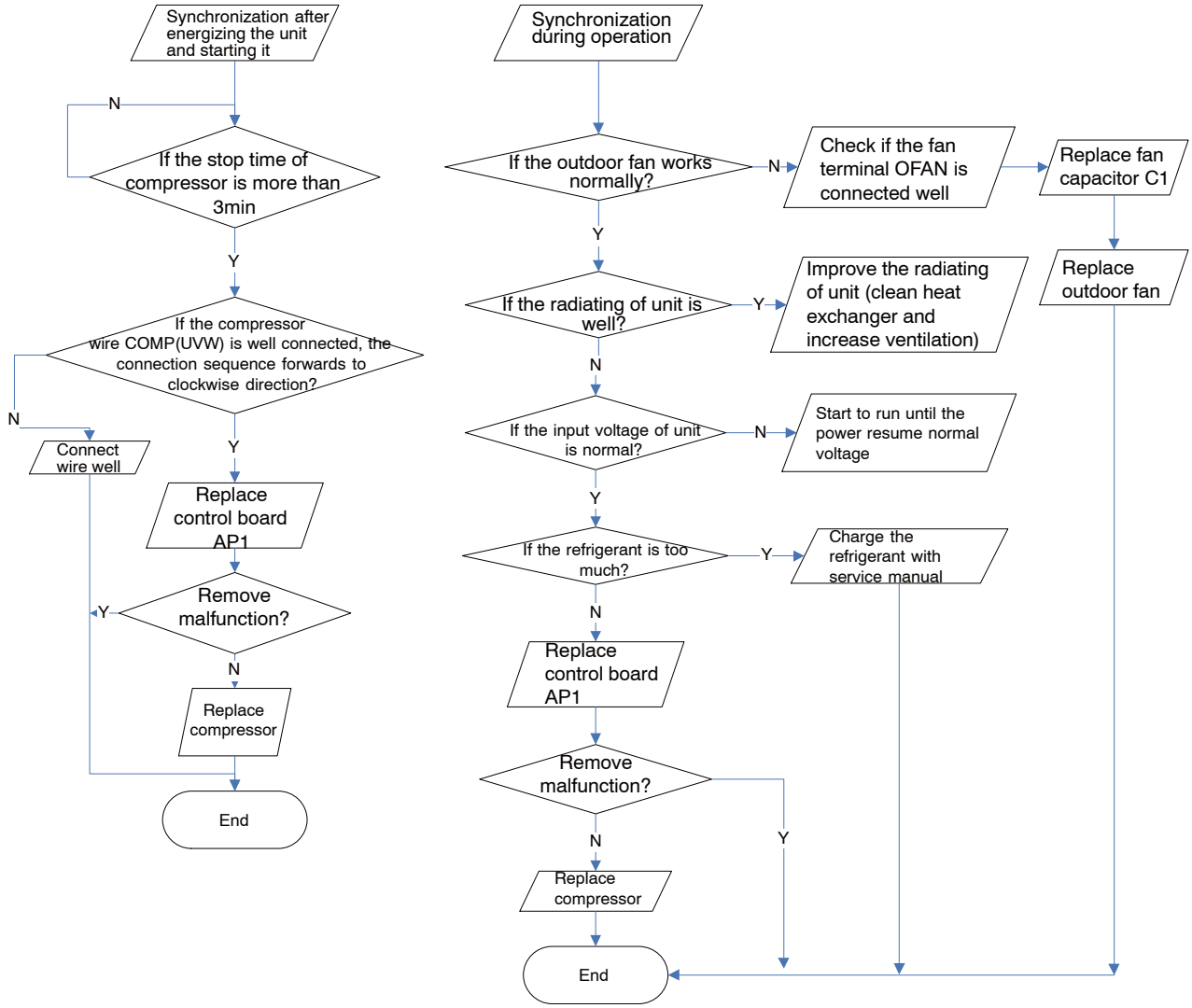
Outdoor unit malfunction indicator status

D5	D6	D16	D30
☐	☆	■	☆

Detection:

- If the system pressure is too high?
- If the working voltage is too low?

Malfunction diagnosis process:



TROUBLESHOOTING (CONTINUED)

Diagnosis for overload and discharge malfunction (outdoor unit malfunction)

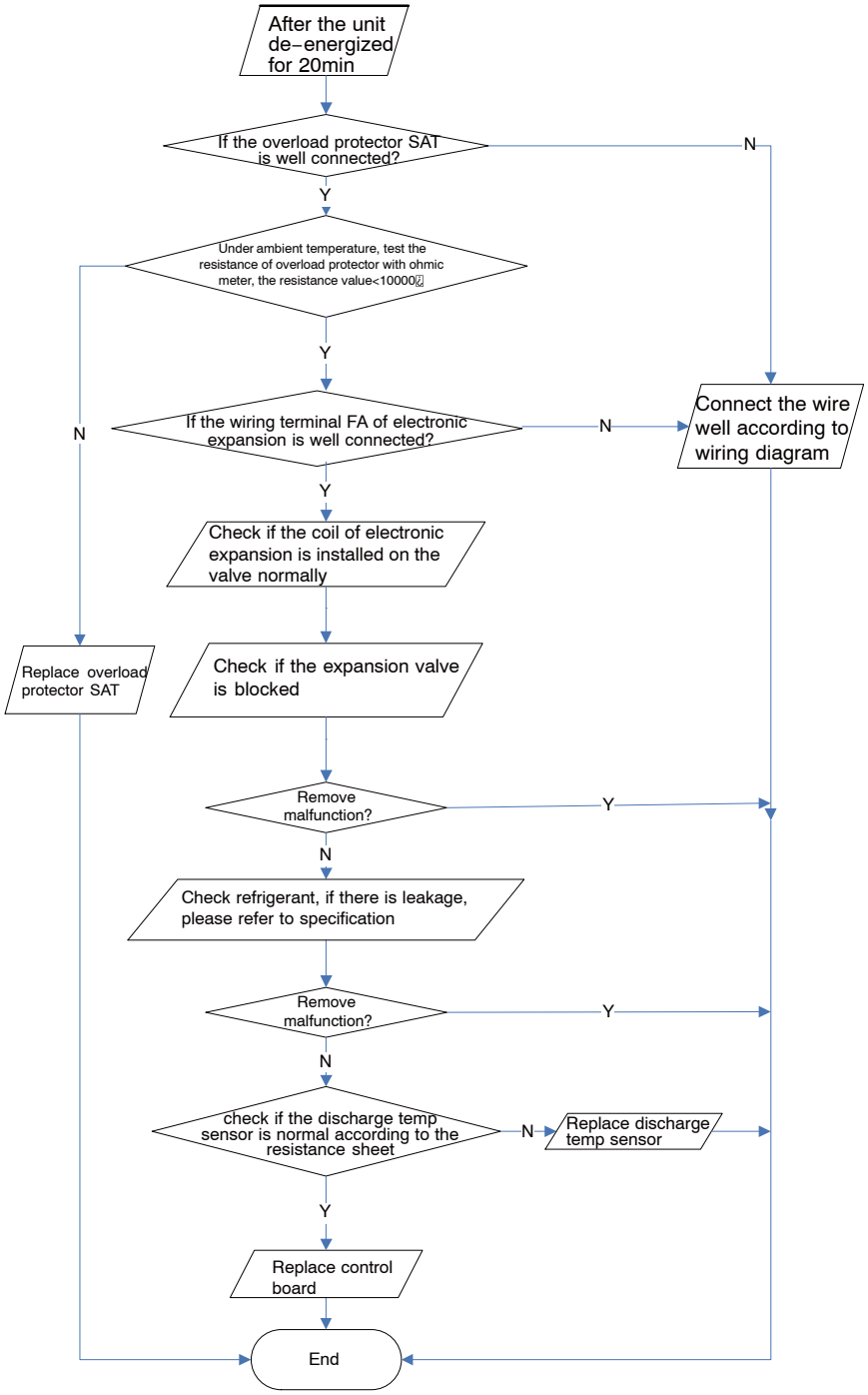
Outdoor unit malfunction indicator status

Malfunction	D5	D6	D16	D30
Overload	☐	☆	☆	☐
Discharge	■	☐	■	☆

Detection:

- If the electronic expansion valve is connected correctly? Is the expansion valve damage?
- If the refrigerant leaked?
- If the overload protector is damage?
- If the discharge temp sensor is damage?

Malfunction diagnosis process:



TROUBLESHOOTING (CONTINUED)

Communication malfunction

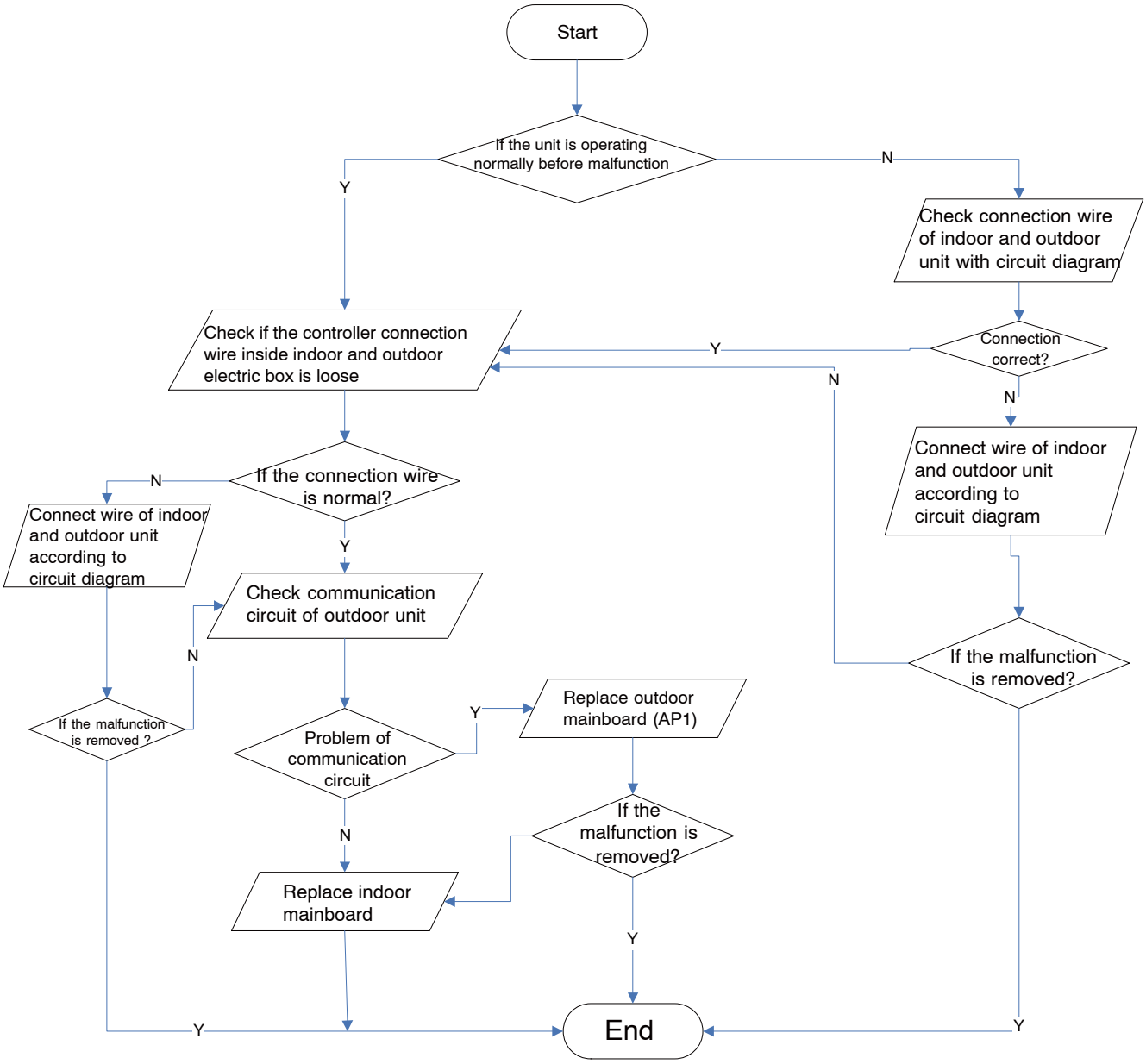
Outdoor unit malfunction indicator status

D5	D6	D16	D30
☐	☐	☐	☆

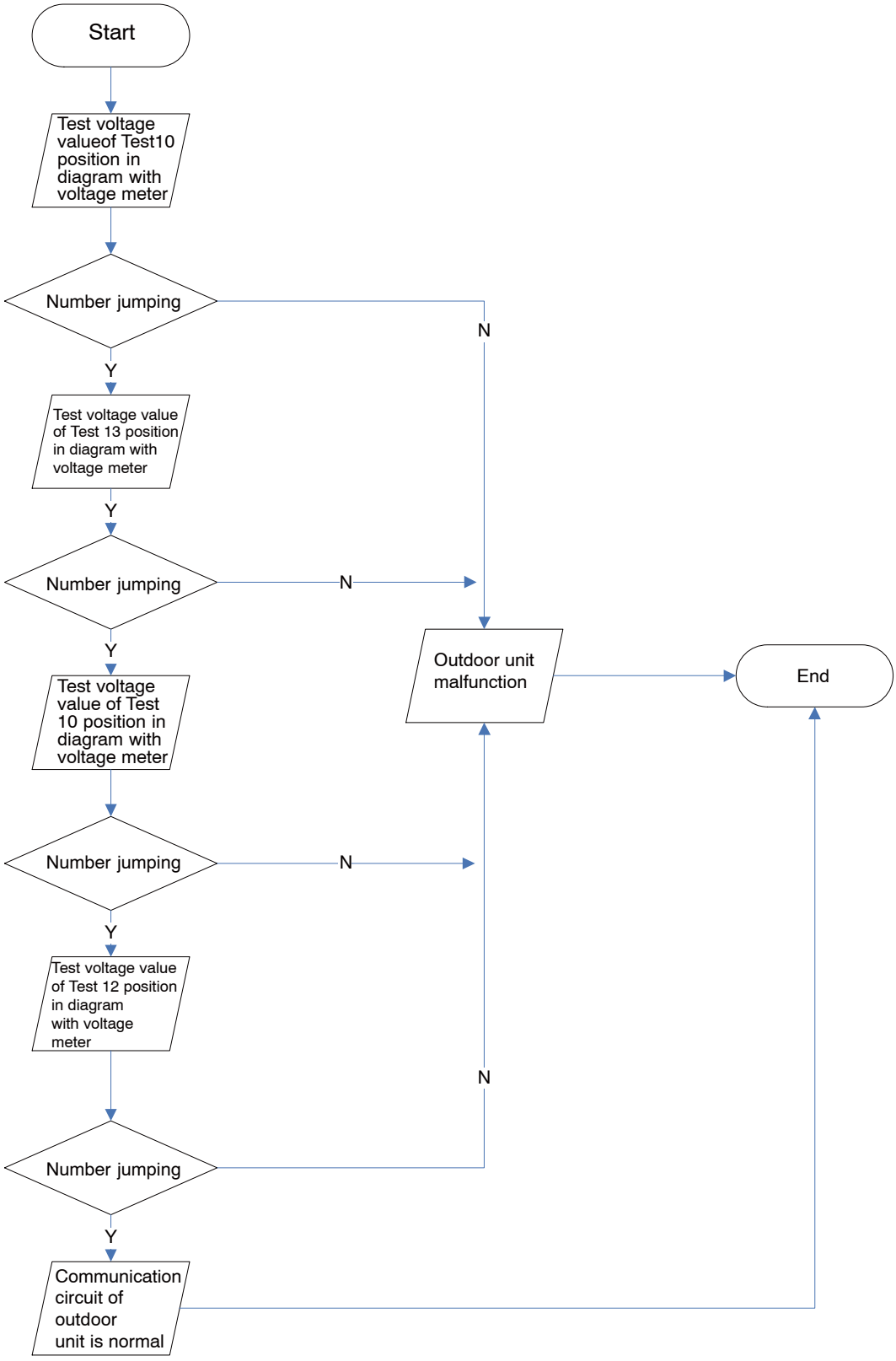
Detection:

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

Malfunction diagnosis process:



Diagnosis process for outdoor communication circuit (refer to the key detection points of outdoor unit)



APPENDIX 1

Appendix 1: Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units							
Temp.(°F)	Resistance(kΩ)	Temp.(°F)	Resistance(kΩ)	Temp.(°F)	Resistance(kΩ)	Temp.(°F)	Resistance(kΩ)
-2.2	138.1	68	18.75	138.2	3.848	208.4	1.071
-0.4	128.6	69.8	17.93	140	3.711	210.2	1.039
1.4	121.6	71.6	17.14	141.8	3.579	212	1.009
3.2	115	73.4	16.39	143.6	3.454	213.8	0.98
5	108.7	75.2	15.68	145.4	3.333	215.6	0.952
6.8	102.9	77	15	147.2	3.217	217.4	0.925
8.6	97.4	78.8	14.36	149	3.105	219.2	0.898
10.4	92.22	80.6	13.74	150.8	2.998	221	0.873
12.2	87.35	82.4	13.16	152.6	2.896	222.8	0.848
14	82.75	84.2	12.6	154.4	2.797	224.6	0.825
15.8	78.43	86	12.07	156.2	2.702	226.4	0.802
17.6	74.35	87.8	11.57	158	2.611	228.2	0.779
19.4	70.5	89.6	11.09	159.8	2.523	230	0.758
21.2	66.88	91.4	10.63	161.6	2.439	231.8	0.737
23	63.46	93.2	10.2	163.4	2.358	233.6	0.717
24.8	60.23	95	9.779	165.2	2.28	235.4	0.697
26.6	57.18	96.8	9.382	167	2.206	237.2	0.678
28.4	54.31	98.6	9.003	168.8	2.133	239	0.66
30.2	51.59	100.4	8.642	170.6	2.064	240.8	0.642
32	49.02	102.2	8.297	172.4	1.997	242.6	0.625
33.8	46.6	104	7.967	174.2	1.933	244.4	0.608
35.6	44.31	105.8	7.653	176	1.871	246.2	0.592
37.4	42.14	107.6	7.352	177.8	1.811	248	0.577
39.2	40.09	109.4	7.065	179.6	1.754	249.8	0.561
41	38.15	111.2	6.791	181.4	1.699	251.6	0.547
42.8	36.32	113	6.529	183.2	1.645	253.4	0.532
44.6	34.58	114.8	6.278	185	1.594	255.2	0.519
46.4	32.94	116.6	6.038	186.8	1.544	257	0.505
48.2	31.38	118.4	5.809	188.6	1.497	258.8	0.492
50	29.9	120.2	5.589	190.4	1.451	260.6	0.48
51.8	28.51	122	5.379	192.2	1.408	262.4	0.467
53.6	27.18	123.8	5.197	194	1.363	264.2	0.456
55.4	25.92	125.6	4.986	195.8	1.322	266	0.444
57.2	24.73	127.4	4.802	197.6	1.282	267.8	0.433
59	23.6	129.2	4.625	199.4	1.244	269.6	0.422
60.8	22.53	131	4.456	201.2	1.207	271.4	0.412
62.6	21.51	132.8	4.294	203	1.171	273.2	0.401
64.4	20.54	134.6	4.139	204.8	1.136	275	0.391
66.2	19.63	136.4	3.99	206.6	1.103	276.8	0.382

APPENDIX 2

Appendix 2: Resistance Table of Outdoor and Indoor Tube Temperature Sensors									
Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)
-2.2	181.4		68	25.01		138.2	5.13		208.4	1.427
-0.4	171.4		69.8	23.9		140	4.948		210.2	1.386
1.4	162.1		71.6	22.85		141.8	4.773		212	1.346
3.2	153.3		73.4	21.85		143.6	4.605		213.8	1.307
5	145		75.2	20.9		145.4	4.443		215.6	1.269
6.8	137.2		77	20		147.2	4.289		217.4	1.233
8.6	129.9		78.8	19.14		149	4.14		219.2	1.198
10.4	123		80.6	18.13		150.8	3.998		221	1.164
12.2	116.5		82.4	17.55		152.6	3.861		222.8	1.131
14	110.3		84.2	16.8		154.4	3.729		224.6	1.099
15.8	104.6		86	16.1		156.2	3.603		226.4	1.069
17.6	99.13		87.8	15.43		158	3.481		228.2	1.039
19.4	94		89.6	14.79		159.8	3.364		230	1.01
21.2	89.17		91.4	14.18		161.6	3.252		231.8	0.983
23	84.61		93.2	13.59		163.4	3.144		233.6	0.956
24.8	80.31		95	13.04		165.2	3.04		235.4	0.93
26.6	76.24		96.8	12.51		167	2.94		237.2	0.904
28.4	72.41		98.6	12		168.8	2.844		239	0.88
30.2	68.79		100.4	11.52		170.6	2.752		240.8	0.856
32	65.37		102.2	11.06		172.4	2.663		242.6	0.833
33.8	62.13		104	10.62		174.2	2.577		244.4	0.811
35.6	59.08		105.8	10.2		176	2.495		246.2	0.77
37.4	56.19		107.6	9.803		177.8	2.415		248	0.769
39.2	53.46		109.4	9.42		179.6	2.339		249.8	0.746
41	50.87		111.2	9.054		181.4	2.265		251.6	0.729
42.8	48.42		113	8.705		183.2	2.194		253.4	0.71
44.6	46.11		114.8	8.37		185	2.125		255.2	0.692
46.4	43.92		116.6	8.051		186.8	2.059		257	0.674
48.2	41.84		118.4	7.745		188.6	1.996		258.8	0.658
50	39.87		120.2	7.453		190.4	1.934		260.6	0.64
51.8	38.01		122	7.173		192.2	1.875		262.4	0.623
53.6	36.24		123.8	6.905		194	1.818		264.2	0.607
55.4	34.57		125.6	6.648		195.8	1.736		266	0.592
57.2	32.98		127.4	6.403		197.6	1.71		267.8	0.577
59	31.47		129.2	6.167		199.4	1.658		269.6	0.563
60.8	30.04		131	5.942		201.2	1.609		271.4	0.549
62.6	28.68		132.8	5.726		203	1.561		273.2	0.535
64.4	27.39		134.6	5.519		204.8	1.515		275	0.521
66.2	26.17		136.4	5.32		206.6	1.47		276.8	0.509

APPENDIX 3

Appendix 3: Resistance Table of Outdoor Discharge Temperature Sensor									
Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)
-20.2	853.5		50	98		120.2	18.34		190.4	4.754
-18.4	799.8		51.8	93.42		122	17.65		192.2	4.609
-16.6	750		53.6	89.07		123.8	16.99		194	4.469
-14.8	703.8		55.4	84.95		125.6	16.36		195.8	4.334
-13	660.8		57.2	81.05		127.4	15.75		197.6	4.204
-11.2	620.8		59	77.35		129.2	15.17		199.4	4.079
-9.4	580.6		60.8	73.83		131	14.62		201.2	3.958
-7.6	548.9		62.6	70.5		132.8	14.09		203	3.841
-5.8	516.6		64.4	67.34		134.6	13.58		204.8	3.728
-4	486.5		66.2	64.33		136.4	13.09		206.6	3.619
-2.2	458.3		68	61.48		138.2	12.62		208.4	3.514
-0.4	432		69.8	58.77		140	12.17		210.2	3.413
1.4	407.4		71.6	56.19		141.8	11.74		212	3.315
3.2	384.5		73.4	53.74		143.6	11.32		213.8	3.22
5	362.9		75.2	51.41		145.4	10.93		215.6	3.129
6.8	342.8		77	49.19		147.2	10.54		217.4	3.04
8.6	323.9		78.8	47.08		149	10.18		219.2	2.955
10.4	306.2		80.6	45.07		150.8	9.827		221	2.872
12.2	289.6		82.4	43.16		152.6	9.489		222.8	2.792
14	274		84.2	41.34		154.4	9.165		224.6	2.715
15.8	259.3		86	39.61		156.2	8.854		226.4	2.64
17.6	245.6		87.8	37.96		158	8.555		228.2	2.568
19.4	232.6		89.6	36.38		159.8	8.268		230	2.498
21.2	220.5		91.4	34.88		161.6	7.991		231.8	2.431
23	209		93.2	33.45		163.4	7.726		233.6	2.365
24.8	198.3		95	32.09		165.2	7.47		235.4	2.302
26.6	199.1		96.8	30.79		167	7.224		237.2	2.241
28.4	178.5		98.6	29.54		168.8	6.998		239	2.182
30.2	169.5		100.4	28.36		170.6	6.761		240.8	2.124
32	161		102.2	27.23		172.4	6.542		242.6	2.069
33.8	153		104	26.15		174.2	6.331		244.4	2.015
35.6	145.4		105.8	25.11		176	6.129		246.2	1.963
37.4	138.3		107.6	24.13		177.8	5.933		248	1.912
39.2	131.5		109.4	23.19		179.6	5.746		249.8	1.863
41	125.1		111.2	22.29		181.4	5.565		251.6	1.816
42.8	119.1		113	21.43		183.2	5.39		253.4	1.77
44.6	113.4		114.8	20.6		185	5.222		255.2	1.725
46.4	108		116.6	19.81		186.8	5.06		257	1.682
48.2	102.8		118.4	19.06		188.6	4.904		258.8	1.64

⚠ 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 one disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

A large−capacity electrolytic capacitor is used in the outdoor unit controller (inverter). When the power supply is turned off, charge (charging voltage DC280V to 380V) remains and takes a long time to discharge.
Do Not open the outdoor unit for 20 minutes after power has been turned OFF.

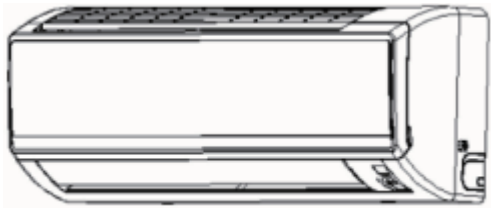
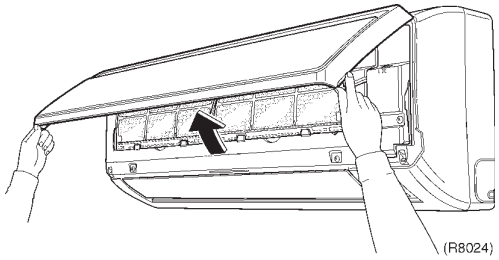
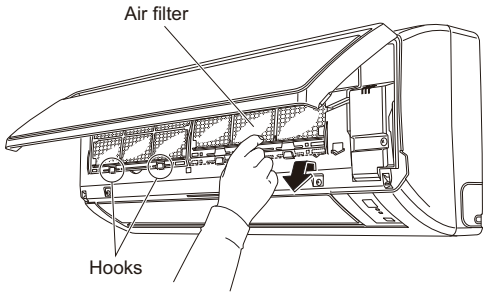
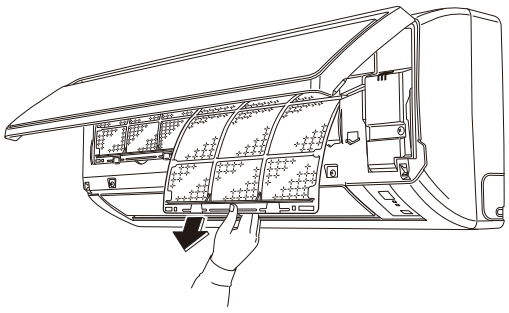
⚠ WARNING

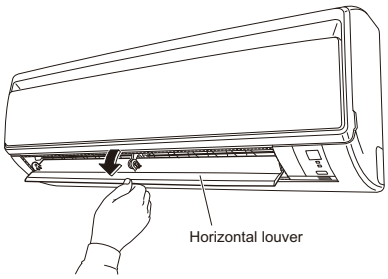
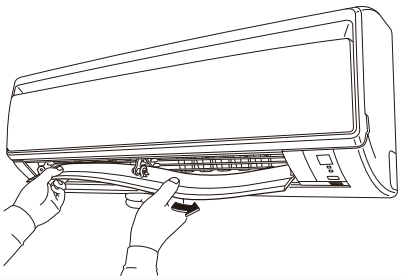
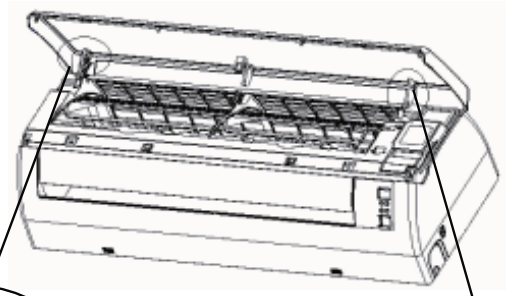
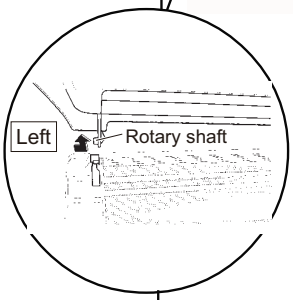
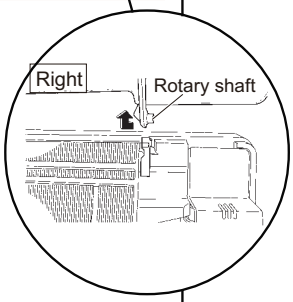
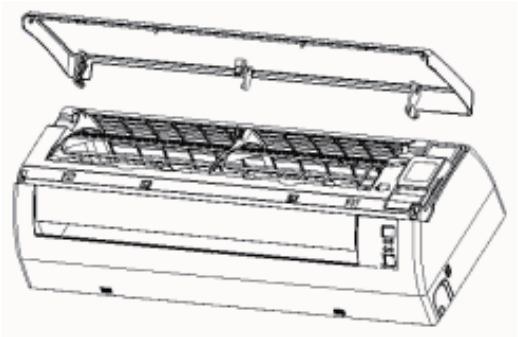
EXPLOSION HAZARD

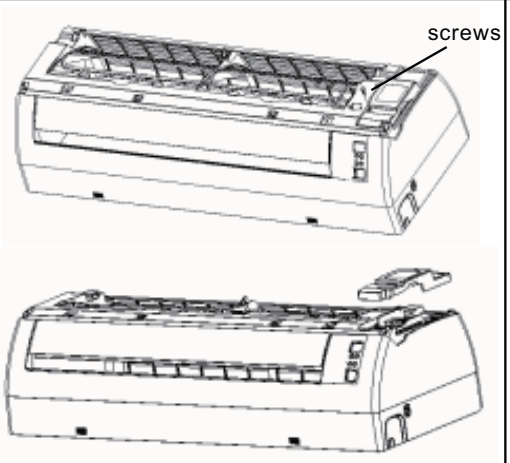
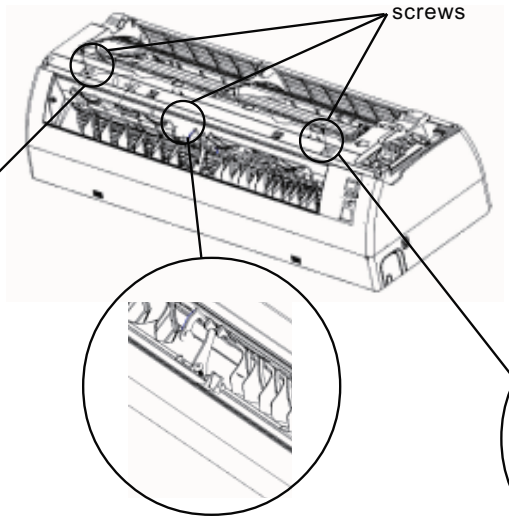
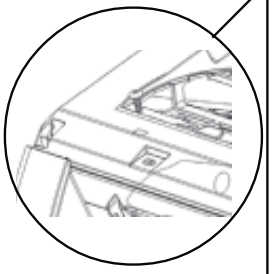
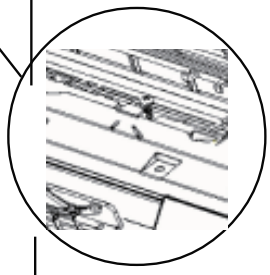
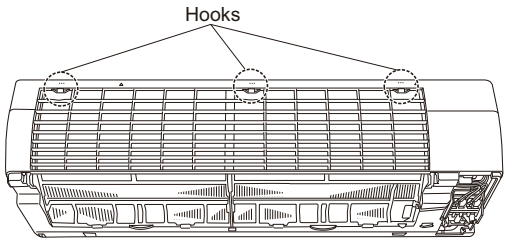
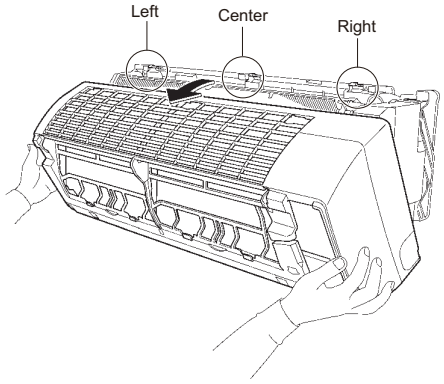
Failure to follow this warning could result in death, serious personal injury, and/or property damage.

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.

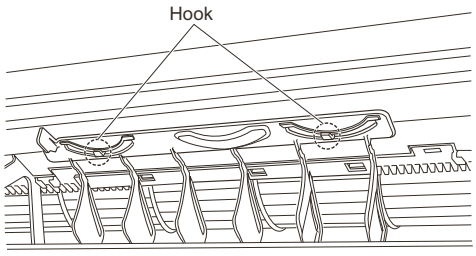
REMOVAL PROCEDURE OF INDOOR UNIT – 9K – 12K 115V

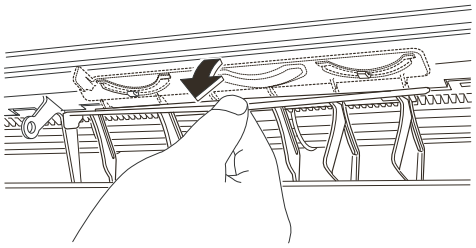
Steps	Procedure	Points
1. External features		■ If the ON/OFF button is pressed for 5 seconds, a forced cooling operation will be carried out for approx. 15 minutes
2. Removing air filters		
1 Pull protrusions on left and right sides of panel with fingers and open front panel all the way.		
2 Lift center section of air filter and disengage hooks.		■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide.
3 Remove air filter by pulling forward.		

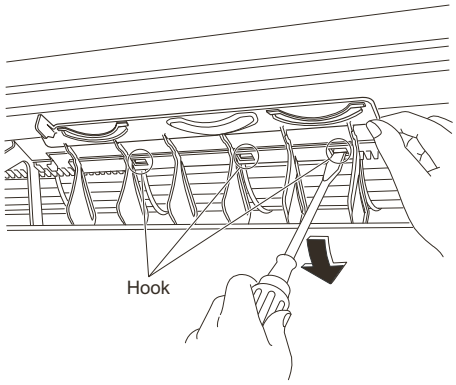
Steps	Procedure	Points
3. Remove front panel		Support the front panel with one hand, while removing the rotation axis at the upper center with the other hand.
1 Pull down horizontal louver by pulling it forwards.		■ And pull the front panel forward to remove.
2 Remove horizontal louver by pulling it forwards.		
3 Hook a finger onto the projection part provided on both sides of the unit's panel and open the panel past the stop.	  	■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide.
4 Remove the front panel from the unit.		

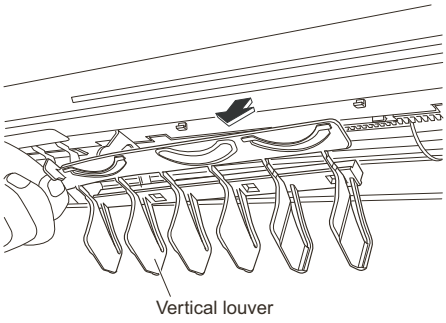
Steps	Procedure	Points
4. Remove electric box cover		
1 Remove the electric box cover mounting screw. Open electric box cover upwards.		
5. Remove front case assembly		
1 Remove the 3 screws, in the right and the left sides, which fix the main body with the front case.	 	■ Screw stoppers inside the flap which were equipped in the existing models are not provided.
2 Disengage the 3 hooks on the upper part. In case that the hooks are not pressed from above, remove the front panel and then remove the grille while pushing the hook through a clearance between the front case and the heat exchanger.		■ At the upper part there are 2 hooks in the left and the right.
3 The front case can be removed by pulling the upper part forward and lifting up the lower part.		■ Disengage the hooks by pressing knobs with a screwdriver.

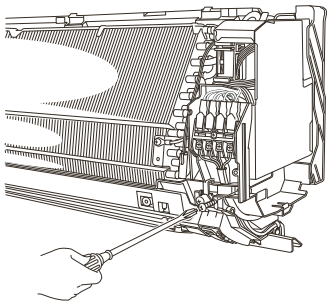
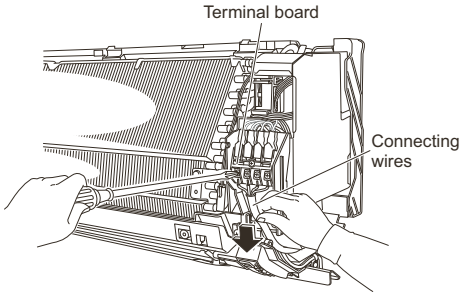
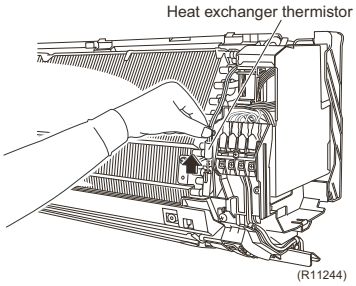
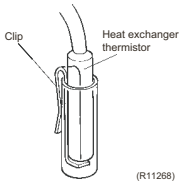
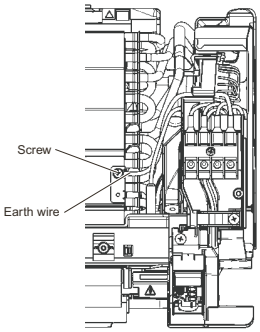
Steps	Procedure	Points
6. Remove the Vertical blade		
1	Unfasten the hooks at the upper 2 positions.	■ A set of vertical blade has 6 fins on the assembly. (It is impossible to replace only one fin.) ■ The set of vertical blades is not marked for difference between right and left.
2	Unfasten the 3 hooks at the shaft mounting part by pressing them with a flat screwdriver.	■ Repeat the same procedure to remove the vertical blade on the other side.
3	Remove the vertical louver.	

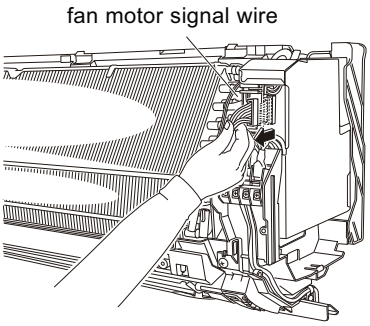
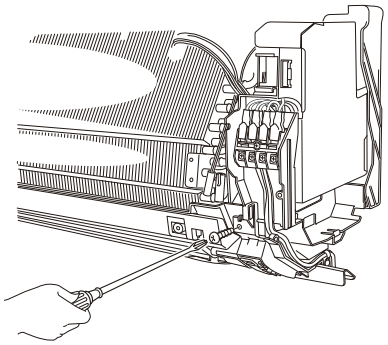
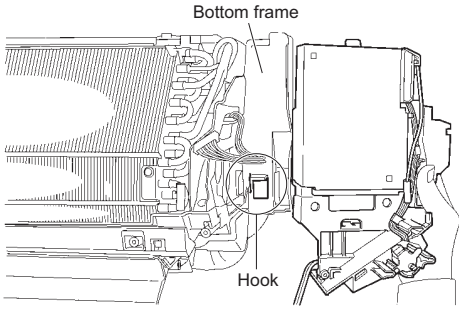


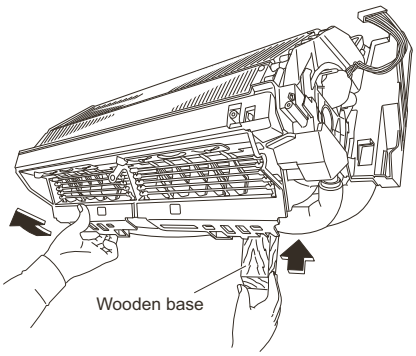
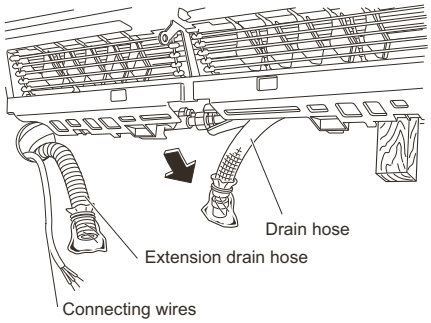
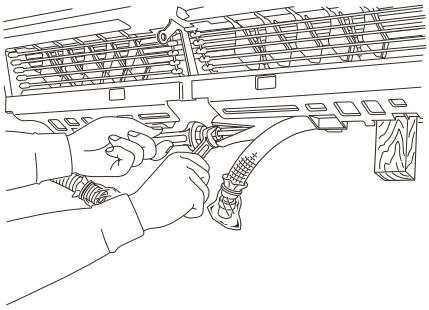
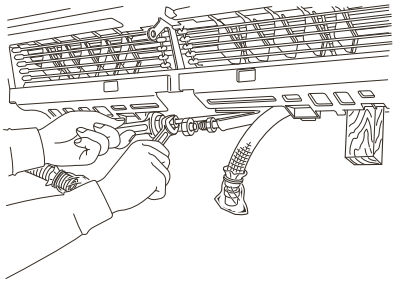


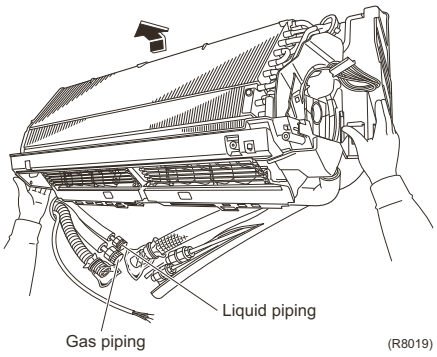
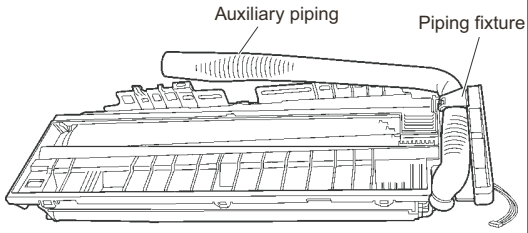
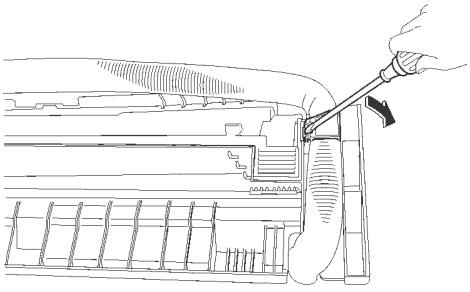
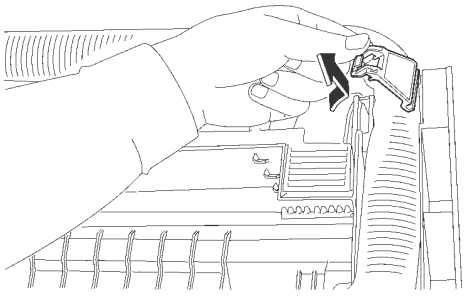


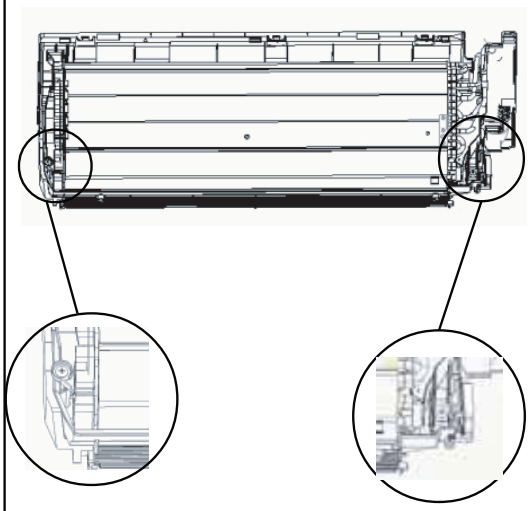
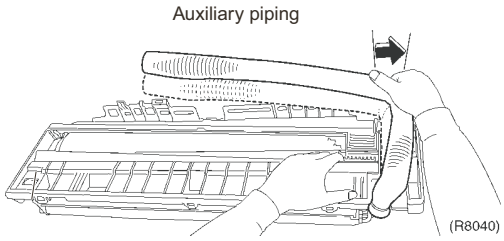
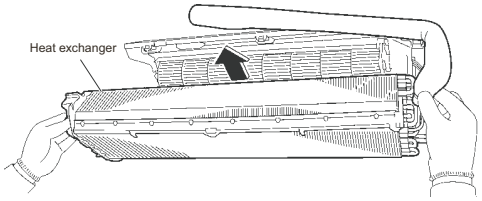


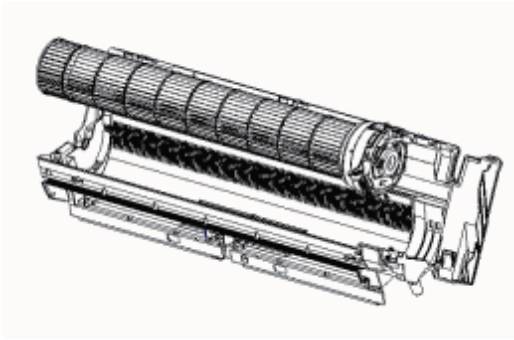
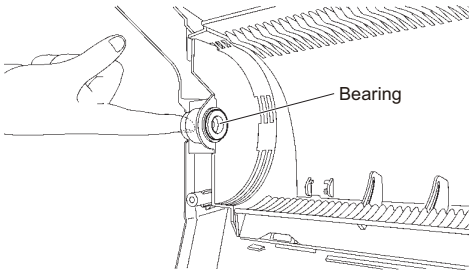
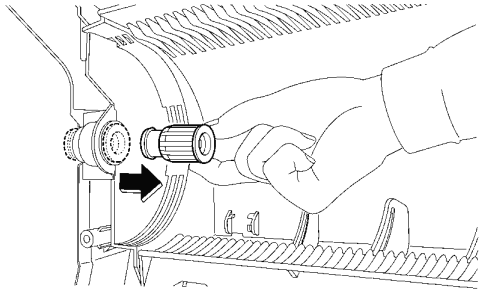
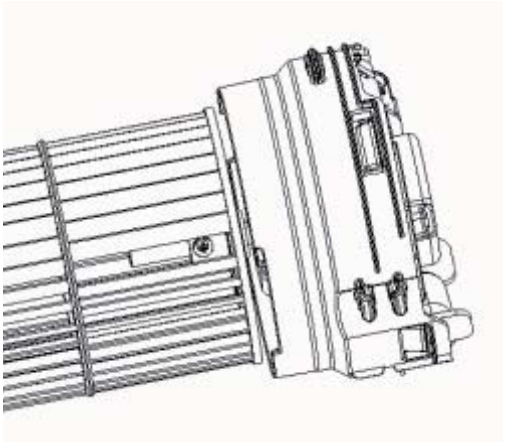
Steps	Procedure	Points
7. Remove electric box		
1 Disconnect the cable clamp		■ Pay attention to the direction of the retainer of the thermistor so that the retainer will not touch the harness (same as the existing models.)
2 Disconnect the connection wires.		
3 Remove the temperature sensor		■ Take care not to loose the clip for the thermistor. 
4 Remove a screw on the terminal board.		■ The electrical box can be removed instead of disengaging the terminal board.

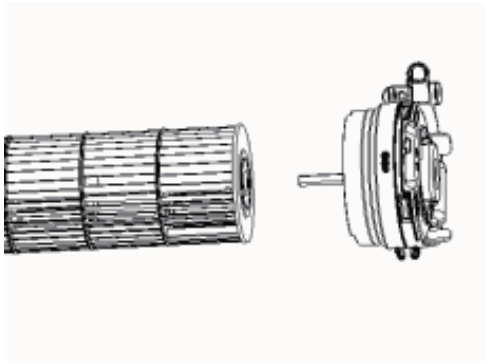
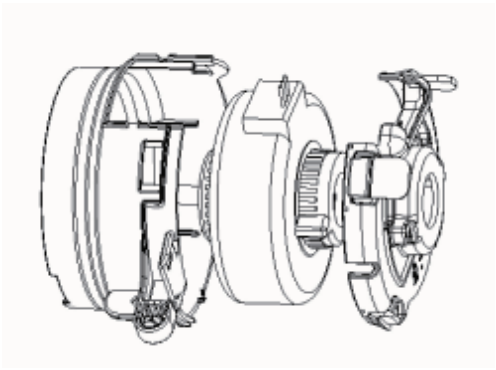
Steps	Procedure		Points
5	Remove fan motor signal wire		
6	Remove a screw on the electrical box.		
7	Pull up the electrical box forward to remove.		

Steps	Procedure	Points
8. Remove the refrigerant piping.		
1 Lift the indoor unit by a wooden base.		⚠ CAUTION If gas leaks, collect all refrigerant from the unit, then repair the leak. After conducting vacuum drying, recharge the proper amount of refrigerant. ⚠ CAUTION Do not contaminate the refrigerant. (Contaminating with air or other gas causes abnormal high pressure in the refrigerating cycle, and this could result in pipe rupture or personal injury.)
2 Place a plastic sheet under the drain pan as remaining moisture may leak.		
3 Disconnect the flare nut for gas piping with 2 wrenches.		■ In case a drain hose is buried inside a wall, disconnect it after the drain hose has been removed from the wall.
4 Disconnect the flare nut for liquid piping with 2 wrenches.		■ Use two wrenches to disconnect pipes. ■ When disconnecting pipes, cover with caps to prevent contamination.

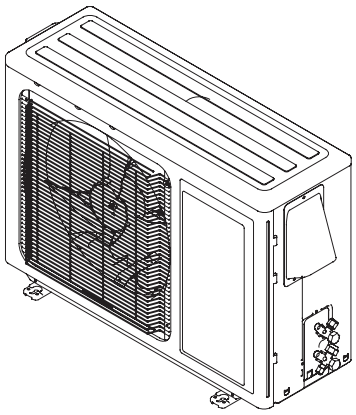
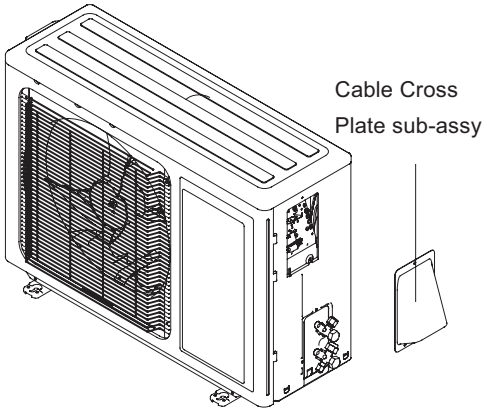
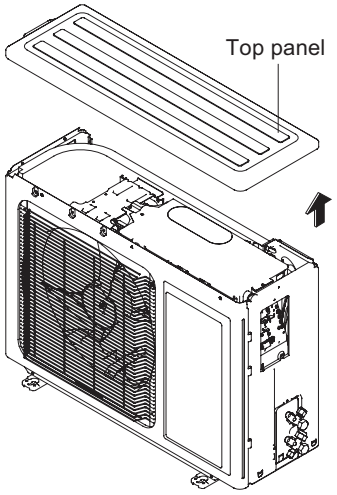
Steps		Procedure	Points
9. Remove the heat exchanger.			
1	Remove the indoor unit from the mounting plate.		■ When disconnecting pipes, cover with caps to prevent contamination.
2	Release the hook of the piping fixture on the back of the unit.	  	

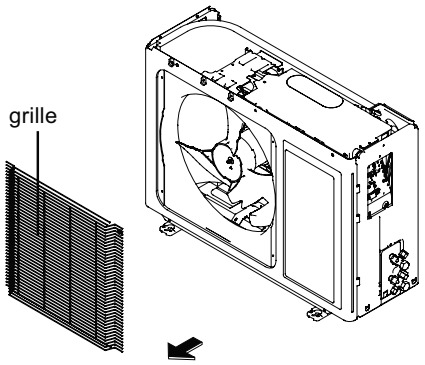
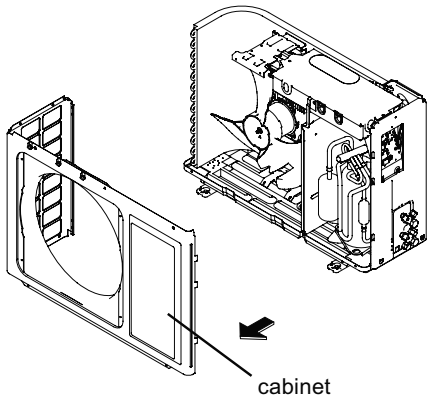
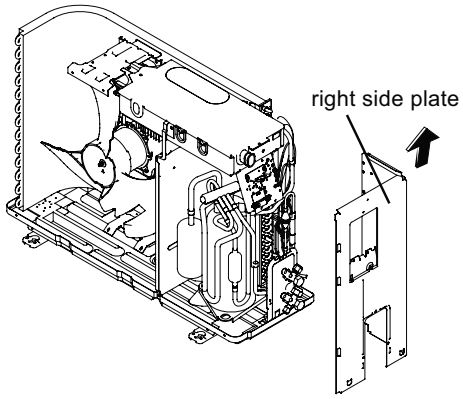
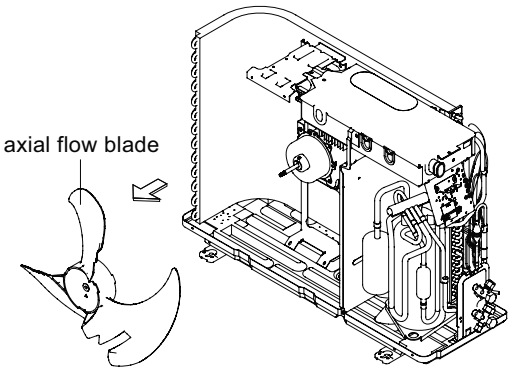
Steps	Procedure		Points
3	Loosen the 2 screws at the right and the left, which fix the Evaporator Assy.		
4	Widen the auxiliary piping to the extent of 10°~20°.		
5	Pull the heat exchanger to the front side to undo the hooks completely, and then lift it.		

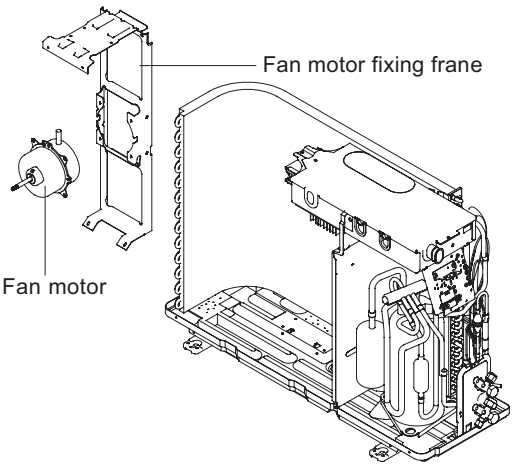
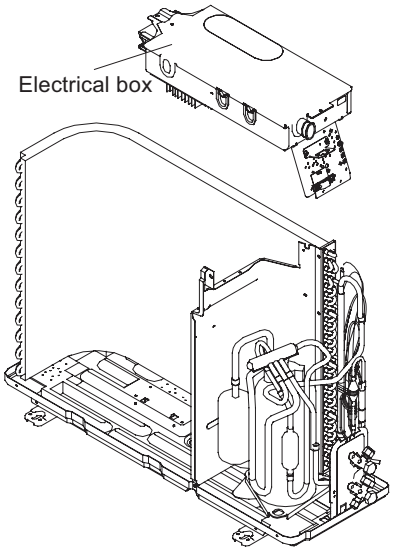
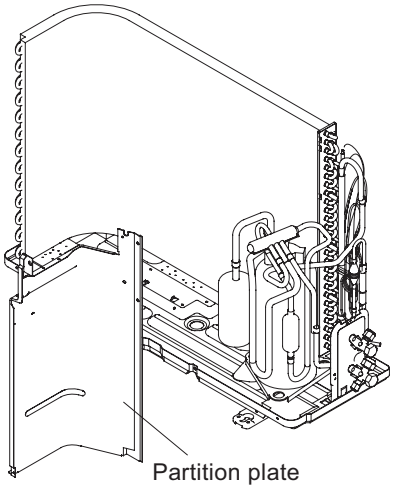
Steps	Procedure	Points
10. Remove cross flow blade and fan motor Remove cross flow blade and fan motor		
11. Remove retention ring of bearing.	 	
12. Remove cross flow blade and motor sub-assy		

Steps	Procedure	Points
13. Remove motor sub-assy		
Remove motor sub-assy		
14. Remove fan motor		

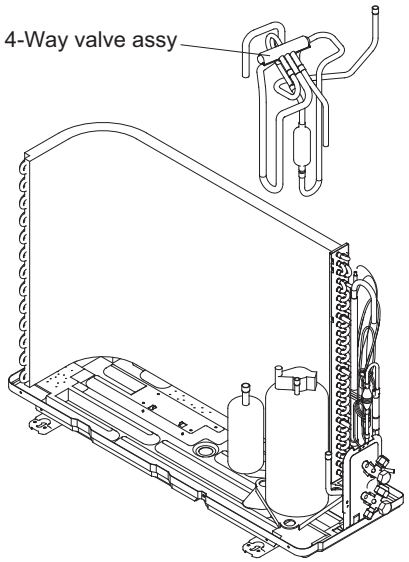
REMOVAL PROCEDURE OF OUTDOOR UNIT – 9K – 12K 115V

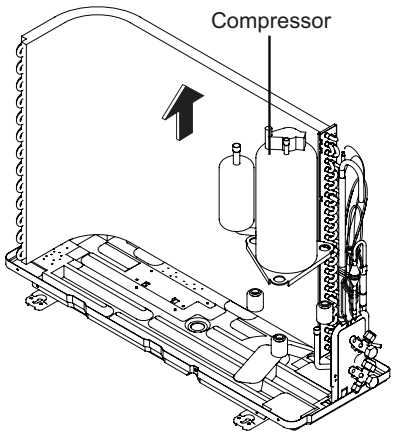
Steps	Procedure	Points
1. Features		
1 Loosen the screw of the Cable Cross Plate sub-assy and remove it. Pull down the stop valve cover and remove it.		
2. Remove top panel		
1 Loosen the 3 screws (right, left) and lift the top panel.		

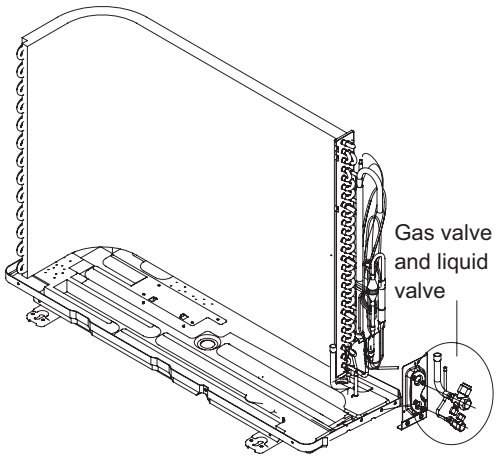
Steps	Procedure		Points
2	Remove the screws connecting the grille and the panel with a screwdriver and then remove the grille.		
3	Remove the screws connecting the panel and the motor support, chassis and grille with a screwdriver and then remove the outer case.		■ Lift the front panel and remove it while pushing the right side panel inwards.
4	Remove the screws connecting right side plate and end plate of condenser, grille, valve support and electric box, and then remove the right side plate.		
3.Remove the fan motor			
1	Remove the nut on blade with a wrench and then remove the axial flow blade.		■ The screw has a reverse thread. ■ Remove the propeller fan.

Steps	Procedure		Points
2	Remove the 4 tapping screws fixing the motor, pull out the pin of leading wire of motor and then remove the motor. Remove the 2 tapping screws on motor support and 1 screws on electric box, pull it upward and then remove the motor support.		
4.Remove the electric box.			
	Remove the 2 screws fixing the electric box cover with a screwdriver, pull it upward and then remove the electric box cover. Remove the screws fixing the electric box with a screwdriver, loosen the terminal block, pull out the wiring terminal, pull it upward and then remove the electric box.		
5.Remove the partition plate.			■ The partition plate is fixed to the bottom frame with a hook.
1	Loosen the 2 screws.		
2	The partition plate has a hook on the lower side. Lift and pull the partition plate to remove.		

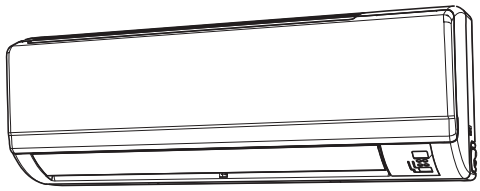
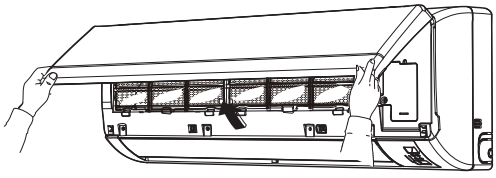
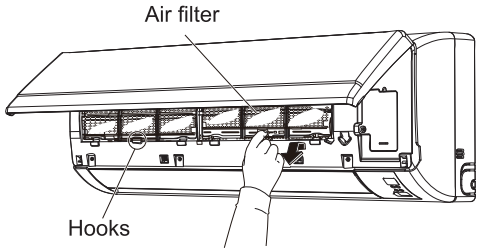
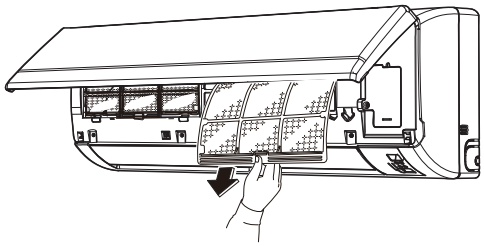
Steps	Procedure	Points
6. Remove compressor		
1	Unsolder the pipeline connected to the compressor. (Reclaim all refrigerant before disassembling the pipeline)	
2	Remove the 3 foot nuts on compressor and then remove the compressor.	
3	Remove the 2 bolts fixing the gas valve, unsolder the joint between the gas valve and suction return pipe then remove the gas valve. (note: When unsoldering the joint, wrap the gas valve with a wet cloth completely to avoid damage to the valve.) Remove the 2 bolts fixing the liquid valve, unsolder the joint between liquid valve and Y-type tube and then remove the liquid valve.	



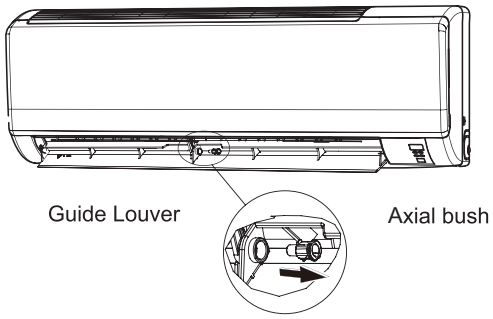


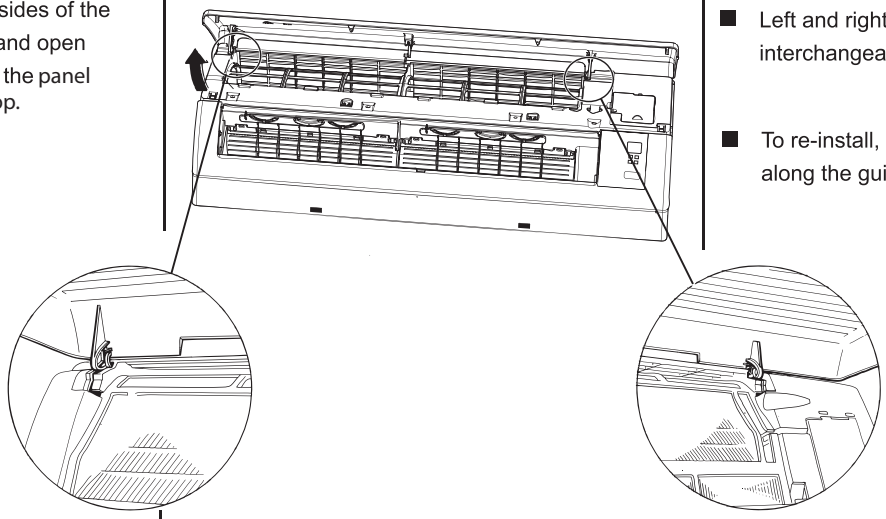


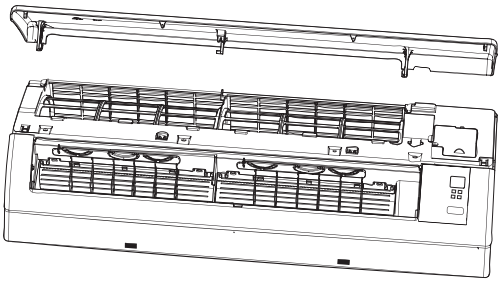
REMOVAL PROCEDURE OF INDOOR UNIT – 12K – 18K 230V

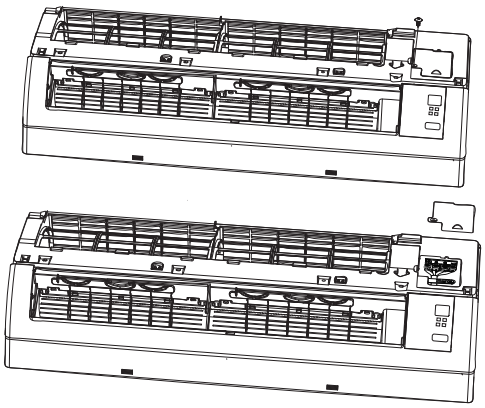
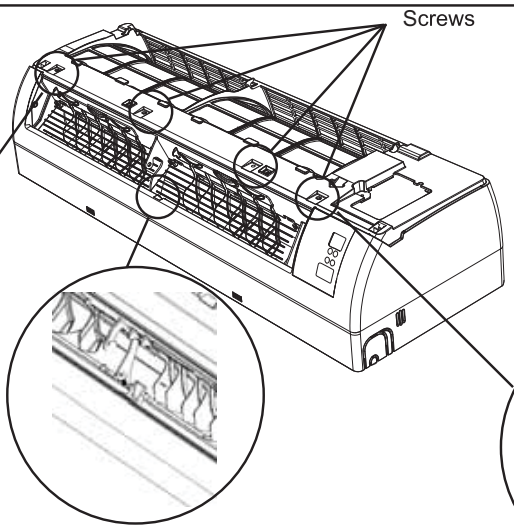
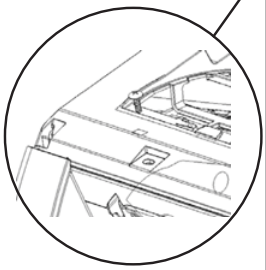
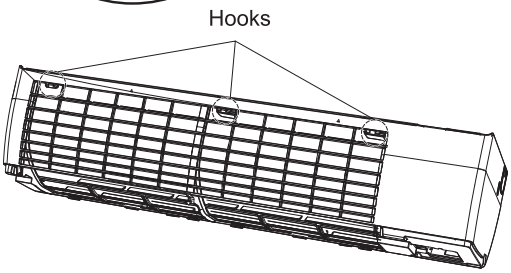
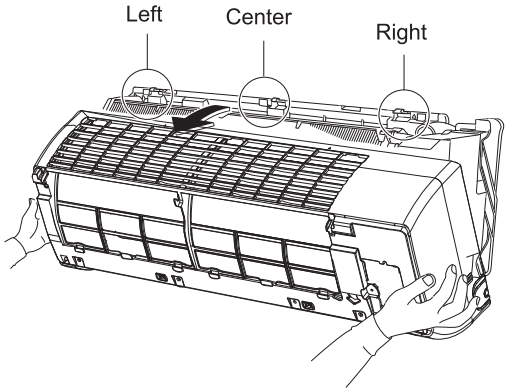
Steps	Procedure	Points
1. External features		■ If ON/OFF button is kept pressed for 5 seconds, a forced cooling operation will be carried out for approx. 15 minutes.
2. Removing air filters		
1 Pull protrusions on left and right sides of panel with fingers and open front panel all the way.		
2 Lift center section of air filter and disengage hooks.		■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide.
3 Remove air filter by pulling forward.		

Steps	Procedure	Points
3. Opening and shutting front panel		
1	Draw out the axial bush. Bend the horizontal louver slightly and then remove it.	■ Support the front panel with one hand, while removing the rotation axis at the upper center with the other hand.
2	Hook a finger onto the projection part provided on the both sides of the units panel and open the panel to the panel panst the stop.	■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide.
3	Remove the front panel from the unit.	

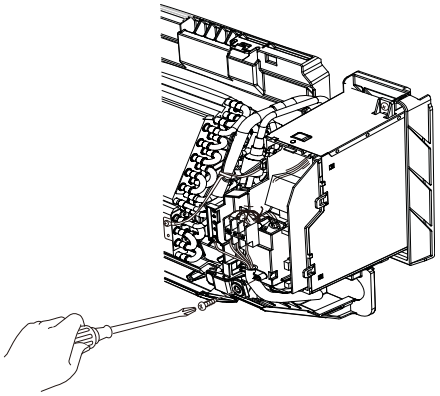


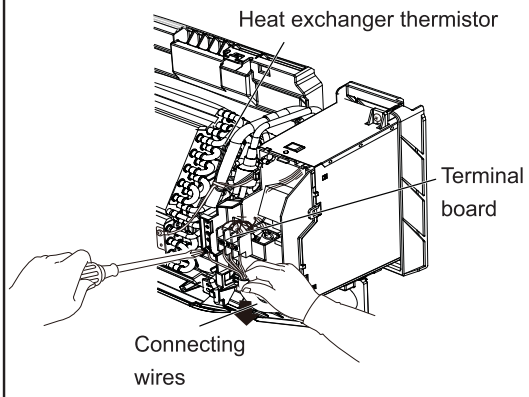


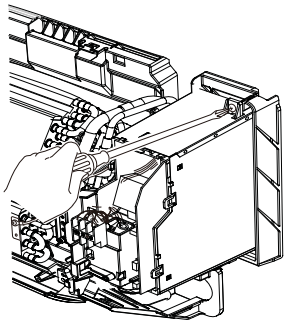


Steps	Procedure	Points
4. Opening and closing of service cover		
1 Remove the service cover mounting screw. Lift the service cover upward.		
5. Removal of front grille assembly		
1 Remove the 5 screws, in the right and the left sides which fix the main body with the front grille.		■ Screw stoppers inside the flap which were equipped in the existing models are not provided.
2 Disengage the 3 hooks on the upper part. In case the hooks are not pressed from above, remove the front panel and then remove the grille while pushing the hook through a clearance between the front grille and the heat exchanger.		■ At the upper part there are 2 hooks in the left and the right.
3 The front grille can be removed by pulling the upper part forward and lifting up the lower part.		■ Disengage the hooks by pressing knobs with a screwdriver.

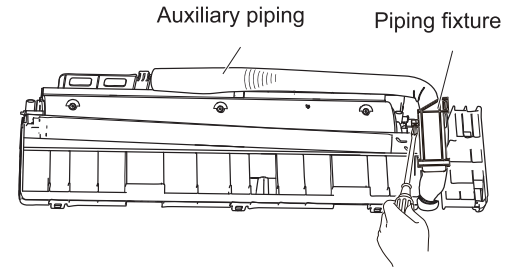
Steps	Procedure	Points
6. Remove electrical box		
1	Disconnect the Cable clamp	■ Pay attention to the direction of the retainer of the thermistor so that the retainer will not touch the harness (same as the existing models.)
2	Remove the temperature sensor; disconnect the connection wires. Remove the ground screw fixing the evaporator; disconnect all the wires from the terminal.	Take care not to lose the clip for the thermistor.
3	Remove a screw on the electrical box.	

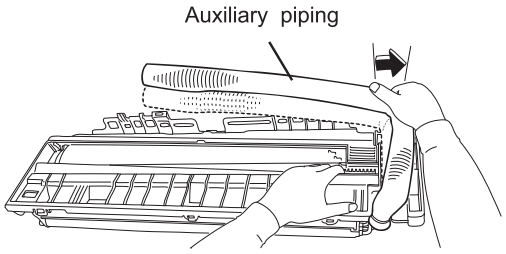


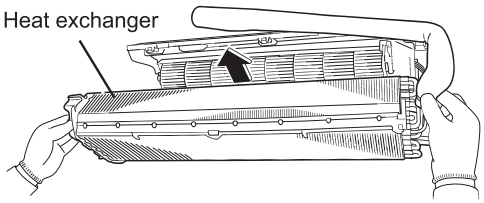


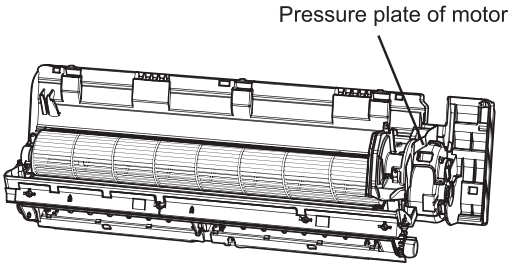
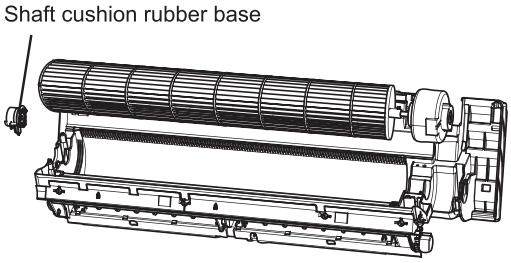
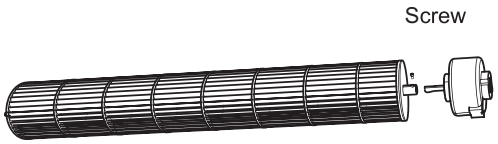


Steps	Procedure	Points
7. Remove piping fixture.		
1	Remove the pipe clamp	
2	Adjust the pipe slightly	
3	Loosen the screws, in the right and the left sides which fix the evaporator assy. Remove the evaporator assy.	







Steps	Procedure	Points
8. Remove the pressure plate of motor		
Remove the screws from the motor pressure plate and then remove the motor pressure plate.		
9. Remove shaft cushion rubber base		
Remove the motor, blade, and shaft cushion rubber base.		
Remove screws on the cross flow blade and then remove the motor.		

REMOVAL PROCEDURE OF OUTDOOR UNIT – 12K 230V

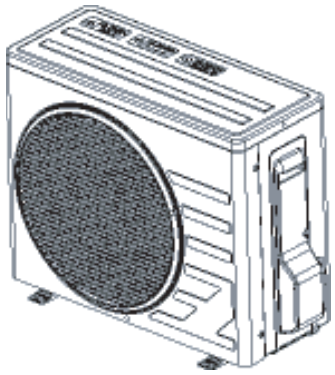
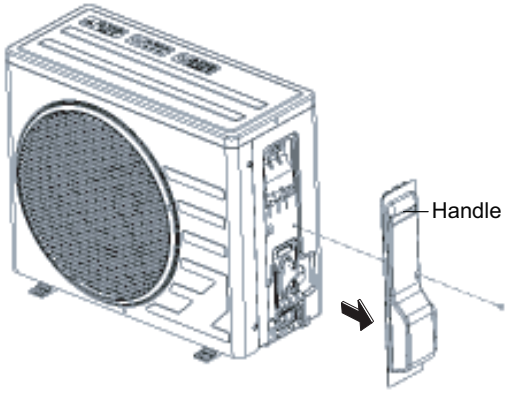
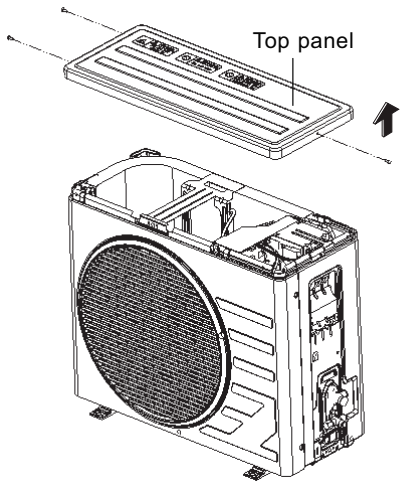
12K

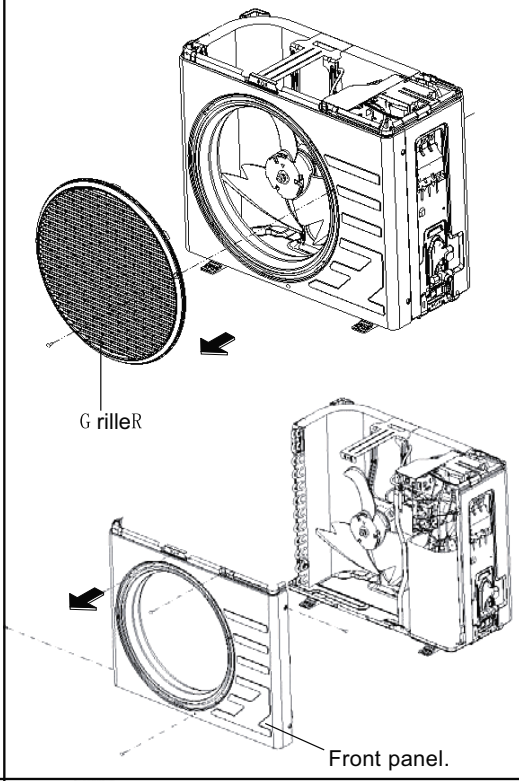
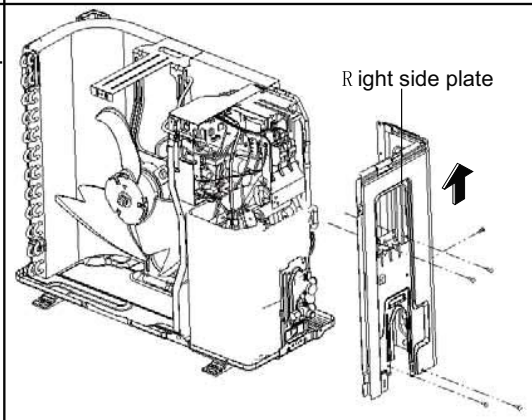
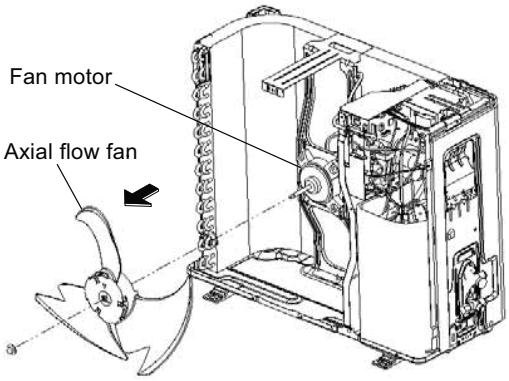
Note:

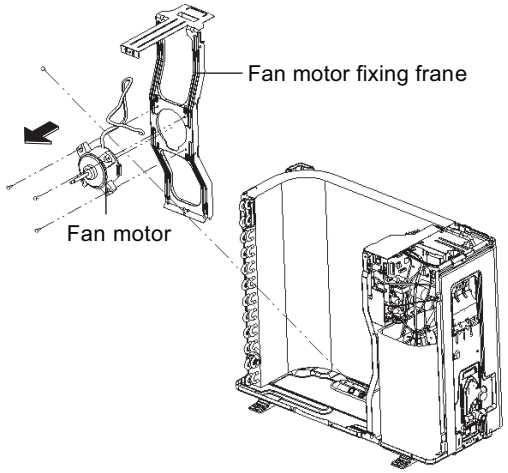
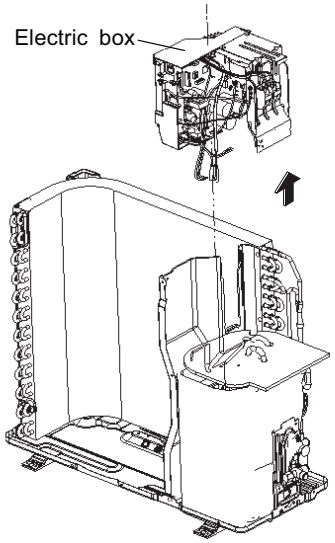
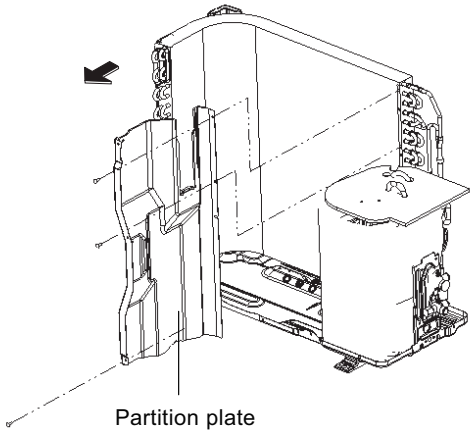
1.Take heat pump type for example.

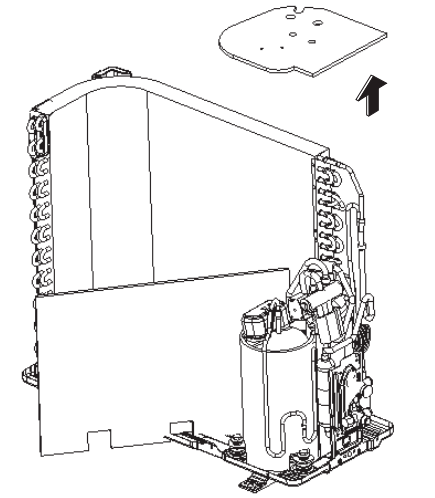
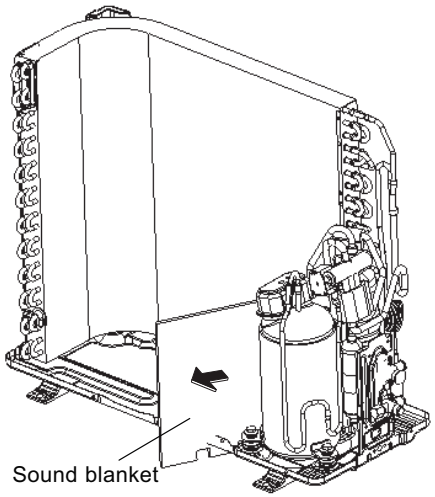
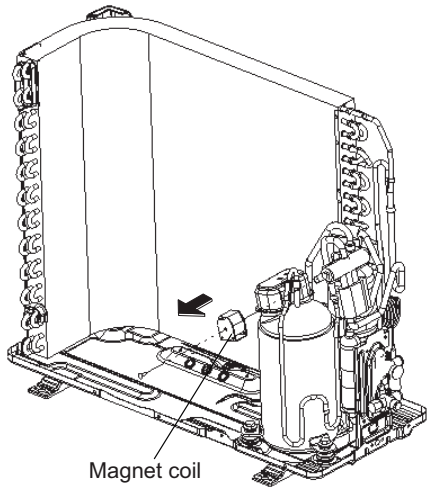
2.Electric heater band is not shown.

3.Grille in the picture is for reference only.

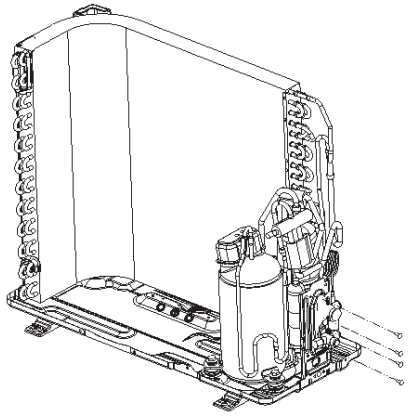
Steps	Procedure		Points
1. Remove the valve cover			■ The valve cover has 6 hooks.
1	Loosen the screw of the Handle. Pull down the handle and remove it.		
2. Remove the top panel			
1	Loosen the 3 screws (front, right, left) and lift the top panel.		

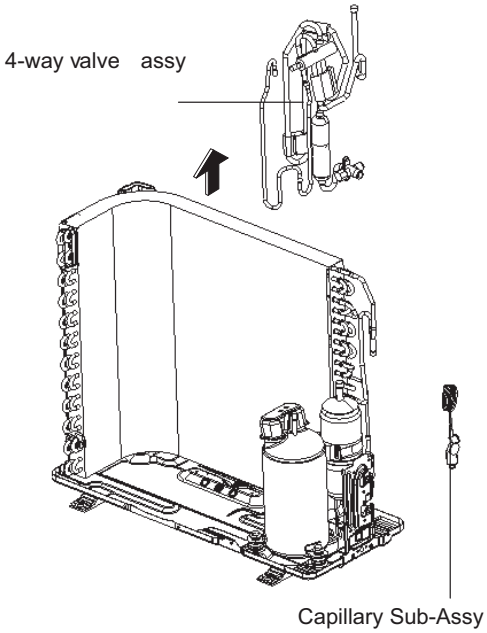
Steps	Procedure	Points
3.Remove grille and front panel		
1 Loosen one screw and remove the discharge grille.		
2 Loosen the 5 screws of the front panel.		■ Lift the front panel and remove it while pushing the right side panel inwards.
4.Remove right side plate		
1 Remove the 5 screws from the edge between right-side board and condenser and from the valve. Lift to remove the right side plate.		
5.Remove the fan motor and Axial fan		
1 Remove the screws of the fan with a wrench and then remove the axial flow fan and fan motor.		■ The screw has reverse threads. ■ Remove the propeller fan.

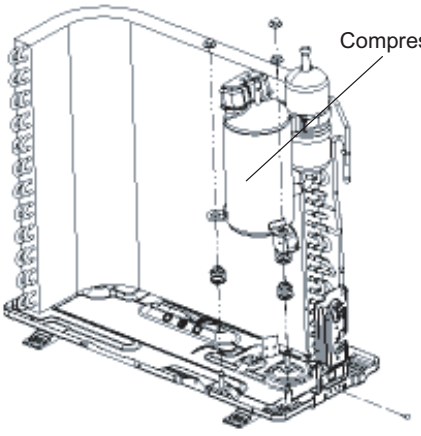
Steps	Procedure		Points
2	Remove the 4 tapping screws fixing the motor. Pull out the lead-out wire and remove the motor. Remove the 2 tapping screws fixing the motor support. Lift to remove the motor support.		■ M4×16 ■ DC fan motor
6.Remove the electric box			
1	Re move the 2 screws fixing the cover of electric box. Lift to remove the cover. Remove the screws fixing the electric box subassembly Loosen the wire and disconnect the termina Lift to remove the electric box subassembly.		
7.Remove the partition plate			
1	Loosen the 2 screws.		■ The partition plate is fixed to the bottom frame with a hook.
2	The partition plate has a hook on the lower side. Lift and pull the partition plate to remove.		

Steps	Procedure	Points
8.Remove the sound blanket	 	■ Since the piping ports on the sound blanket are torn easily, remove the blanket carefully.
1 Lift and remove the sound blanket (top). 2 Untie the strings and open the sound blanket. 3 Lift and remove the sound blanket (body) as it is opened. 4 Pull the sound blanket (inner) out.		
9.Remove four way valve coil		■ Provide a protective sheet or a steel plate so that the brazing flame cannot influence peripheries. ■ Be careful so as not to break the pipes by pressing it excessively with pliers when withdrawing it. ⚠ Caution Piping may be hot. Take precautions to avoid burns.
1 Loosen the screw of the four way valve coil.		

Steps	Procedure	Points
10.Remove compressor		
1	Unbraze the capillary, valve, and outlet pipe of condenser	
2	Remove the 2 screws fixing the gas valve. Unbraze the gas valve and suction pipe and remove the gas valve. (Note: it is necessary to wrap the gas valve when unbrazing. Remove the 2 screws fixing liquid valve. unbraze the connecting liquid valve and remove the liquid valve.	
3	Unbraze the pipe connected to the compressor.	
4	Remove the 3 footing screws of the compressor and remove the compressor.	







REMOVAL PROCEDURE OF OUTDOOR UNIT – 18K 230V

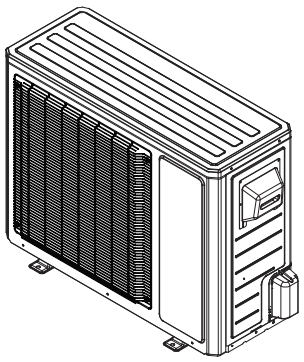
18K

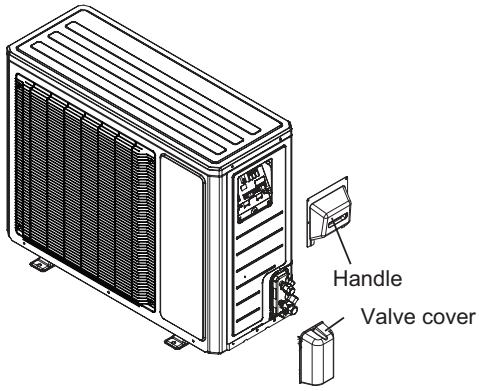
Note:

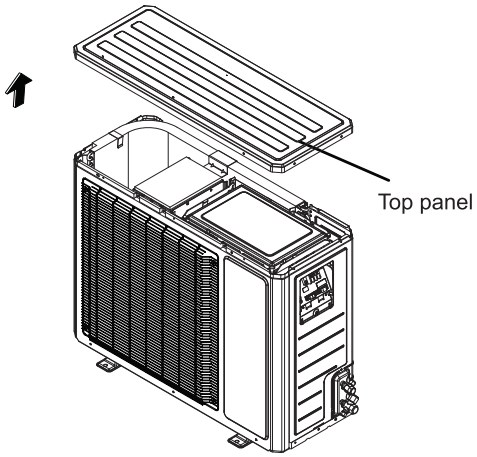
1.Take heat pump type for example.

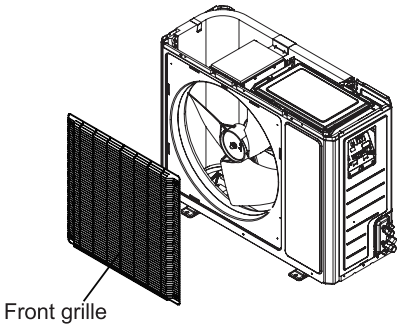
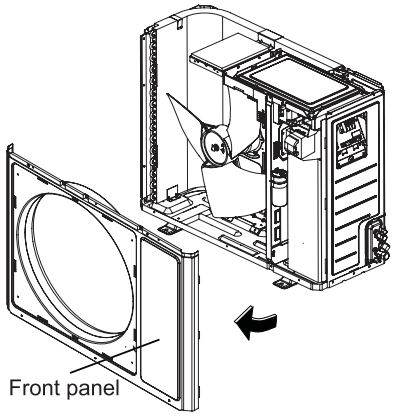
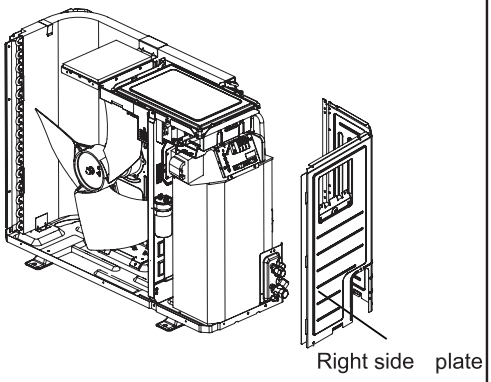
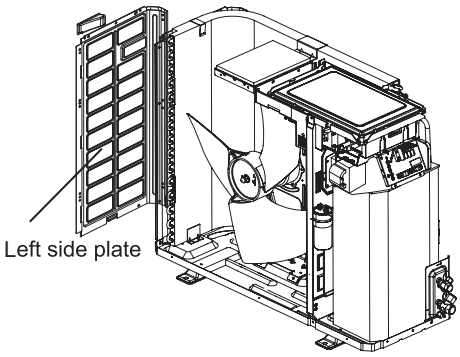
2. Electric heater band is not shown.

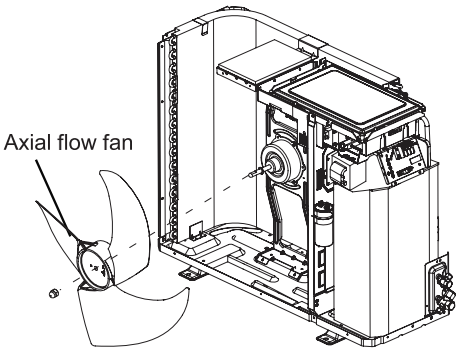
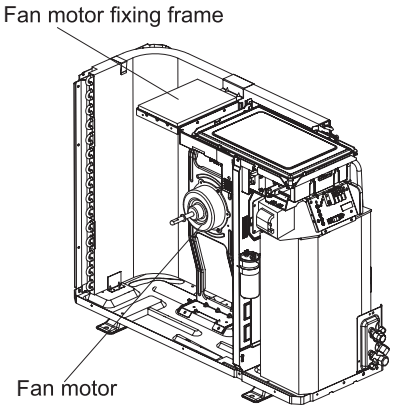
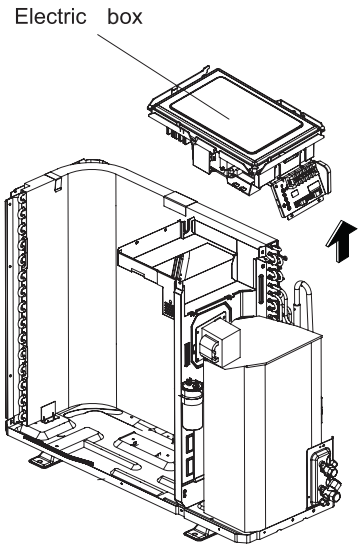
Steps	Procedure	Points
1. Remove top cover,valve cover and handle		
1	Before disassembly.	
2	Remove the screws used for fixing the handle and valve cover, pull the handle and valve cover upward to remove them.	
3	Remove the screws used for fixing the top cover, pull the top cover upward to remove it.	

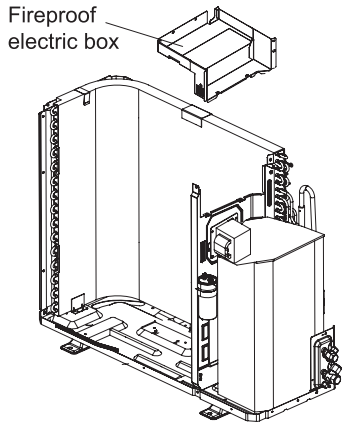
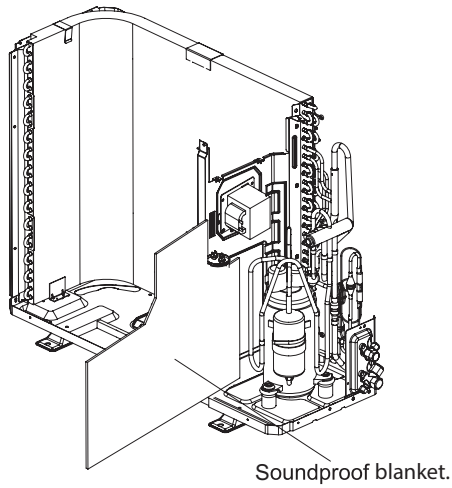
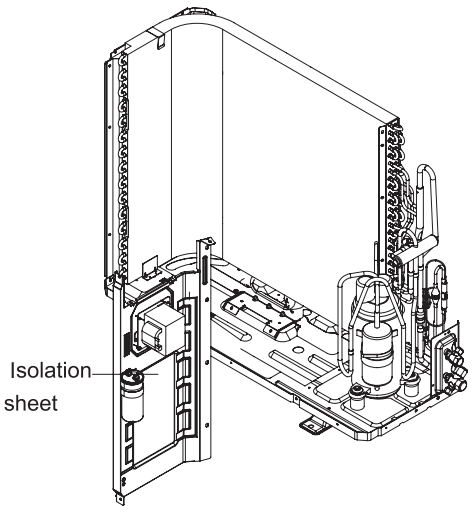


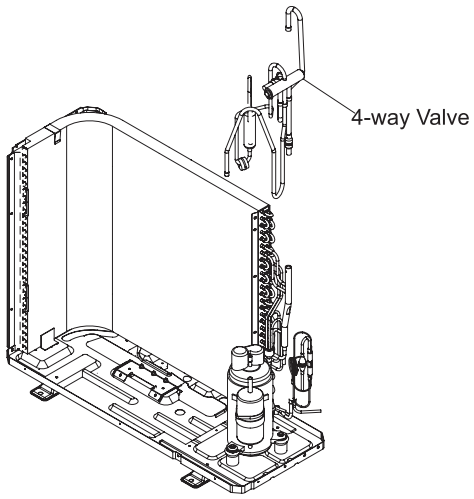
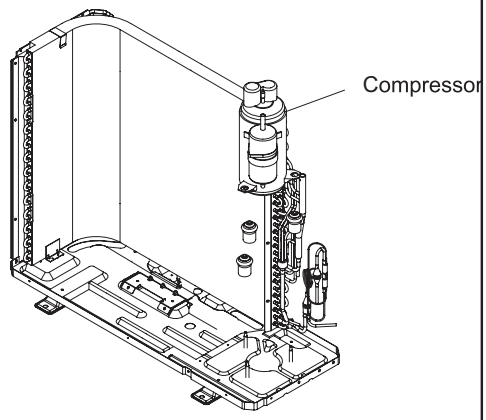
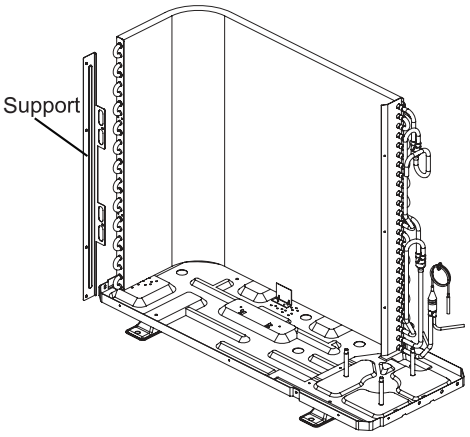


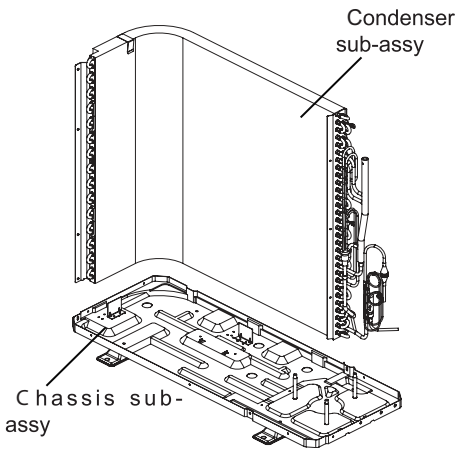


Steps		Procedure	Points
2.Remove front grille and front panel			
1	Remove the screws connecting the front grille and the front panel. Remove the front grille.		
2	Remove the screws fixing the panel, pull it upward, loosen the clasp on the right side, rotate it to the left and then remove the front panel.		■ Lift the front panel and remove it while pushing the right side panel inwards.
3.Remove left side plate and right side plate			
1	Remove the screws connecting the right side plate with the chassis, the valve support and the electric box, and then remove the right side plate assy.		
2	Remove the screws connecting the left side plate and the chassis, and then remove the left side plate assy.		

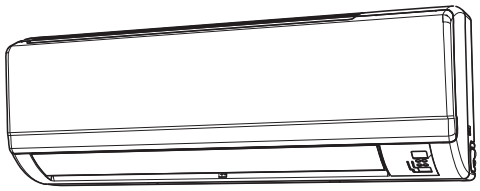
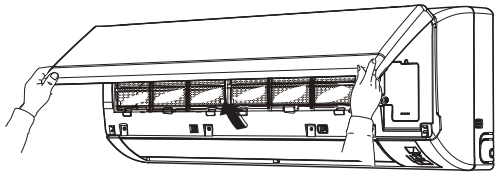
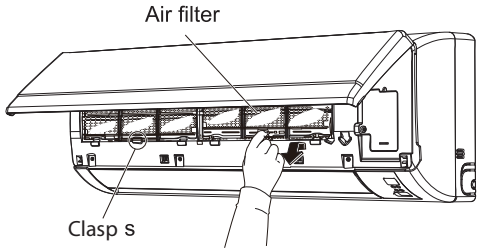
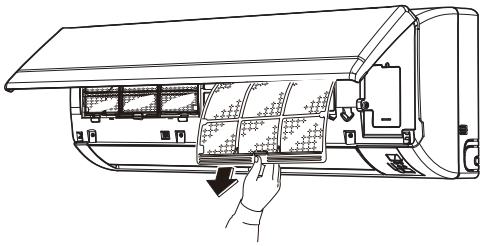
Steps	Procedure	Points
4.Remove the axial flow fan		■ The screw has reverse threads
1.Remove the nuts fixing the blade and then remove the axial flow blade.		
2.Remove the 4 tapping screws fixing the motor; disconnect the lead wire of the motor and then remove the motor. Remove the 2 tapping screws fixing the motor support and then pull the motor support upwards to remove it.		
5.Remove Electric Box		
1 Remove the screws fixing the electric box sub-assy; loosen the wire bundle; remove all wires from the terminals and then pull the electric box upwards to remove it.		

Steps	Procedure	Points
6. Remove fireproof electric box and soundproof blanket. Remove the screws on fireproof electric box and then remove the fireproof electric box.	 	■ Since the piping ports on the sound blanket are torn easily, remove the blanket carefully.
7. Remove isolation sheet Remove screws fixing isolation sheet and then remove the isolation sheet.		

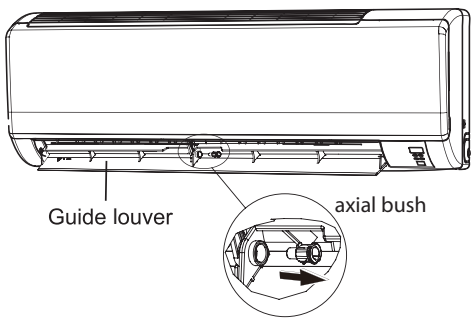
Steps	Procedure	Points
8.Remove 4-way valve assy		**Caution** Piping may be hot. Take precautions to avoid burns.
1 Reclaim the refrigerant completely; unbraze the pipelines connecting the compressor and the condenser assy,and then remove the 4-way valve assy.		
9. Remove compressor		■ Be careful not to burn the compressor terminals or the name plate.
1 Remove the three foot nuts on compressor and then remove the compressor.		
10.Remove condenser sub-assy		
1 Remove the screws connecting the support (condenser) and condenser assy,and then remove the support(condenser).		

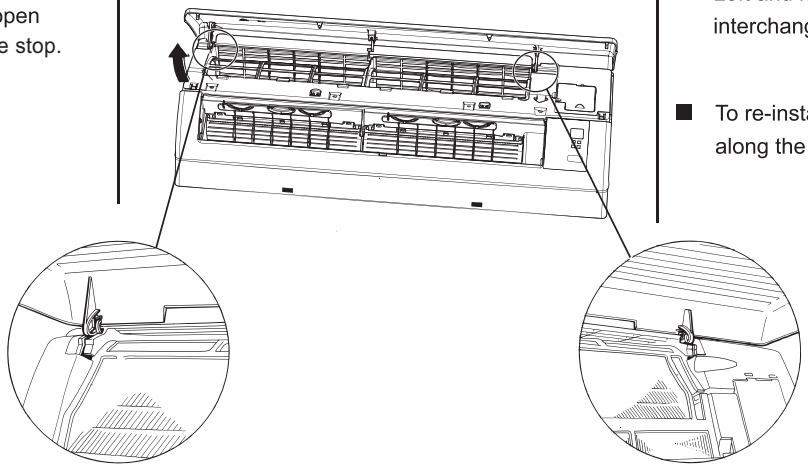
Steps	Procedure		Points
2	Remove the chassis sub-assy and condenser sub-assy.		

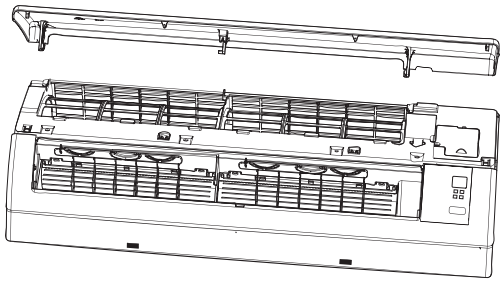
REMOVAL PROCEDURE OF INDOOR UNIT – 24K 230V

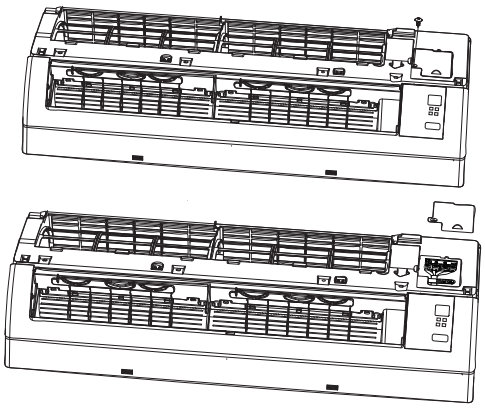
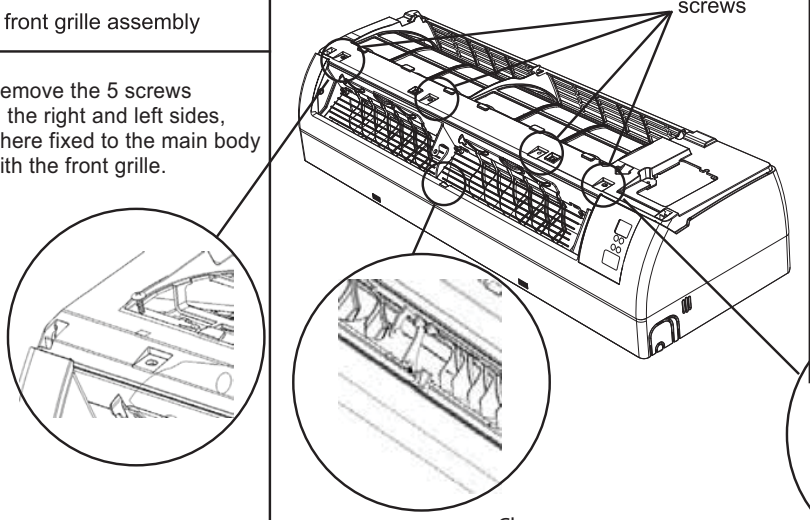
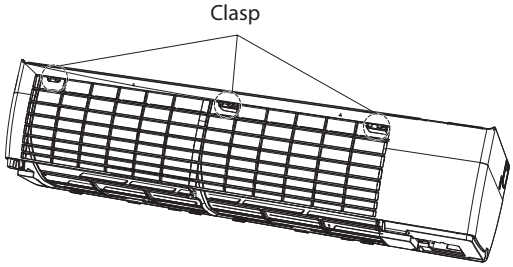
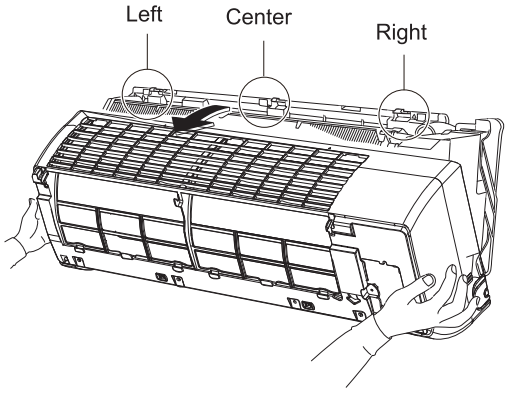
Step	Procedure		Points
1. Outside view drawing			■ If the ON/OFF button is kept pressed for 5 seconds, a forced cooling operation will be carried out for approx. 15 minutes.
2. Remove air filters			
1	Pull protrusions on left and right sides of panel with fingers and open front panel all the way.		
2	Lift center section of air filter and disengage the clasp s.		■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide louver.
3	Remove air filter by pulling it forward.		

Step	Procedure	Points
3. Remove front panel		
1	Draw out the axial bush. Bend the guide louver slightly and then remove it.	■ Support the front panel with one hand, while removing the rotation axis at the upper center with the other hand.
2	Hook a finger onto the projection part provided on the both sides of the units panel and open the panel past the stop.	■ Left and right filters are interchangeable. ■ To re-install, insert air filter along the guide louver.
3	Remove the front panel from the unit.	

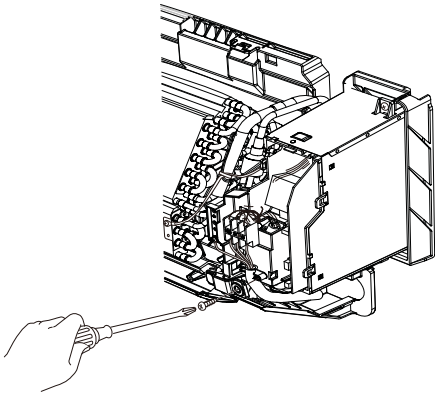


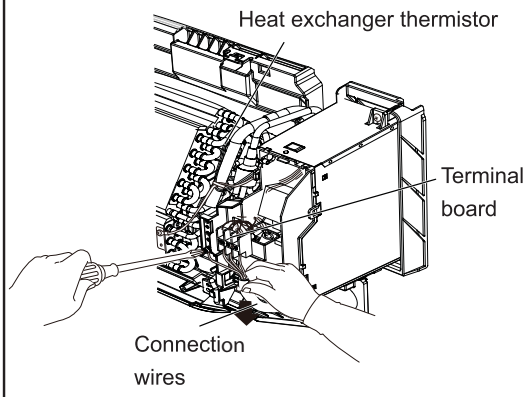


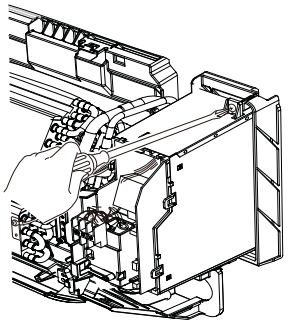


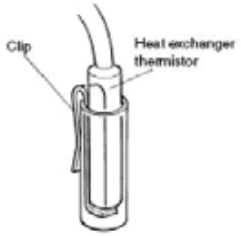
Step	Procedure	Points
4. Remove service cover		
1 Remove the service cover mounting screw. Lift the service cover upward.		
5. Remove front grille assembly		
1 Remove the 5 screws in the right and left sides, where fixed to the main body with the front grille.		■ Screw stoppers inside the flap which were equipped in the existing models are not provided.
2 Disengage the 3 clasps on the upper part. In case the clasps are not pressed from above, remove the front panel and then remove the grille while pushing the clasps through a clearance between the front grille and the heat exchanger.		■ At the upper part, there are 2 clasps at the left and right side.
3 The front grille can be removed by pulling the upper part forward and lifting up the lower part.		■ Disengage the clasps by pressing knobs with a screwdriver.

Step	Procedure	Points
7. Remove electrical box		
1	Disconnect the cable clamp	■ Pay attention to the direction of the retainer of the thermistor so that the retainer will not touch the harness (same as the existing models.)
2	Remove the temperature sensor. Disconnect the connection wires. Remove the ground screw fixing the evaporator. Disconnect all the wires from the terminal.	Take care not to lose the clip for the thermistor.
3	Remove the screw on the electric box.	

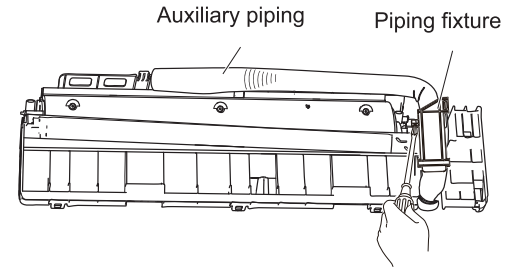


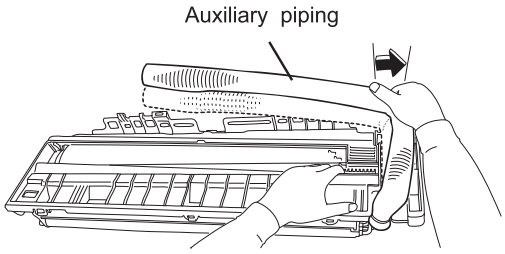


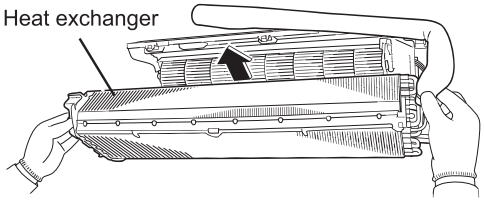




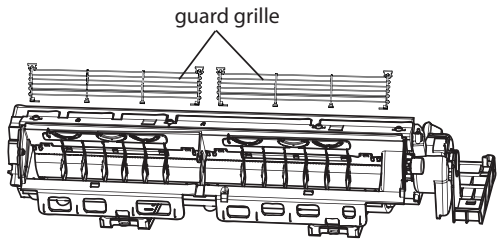
Step	Procedure	Points
9. Remove piping fixture		
1	Remove the pipe clamp	
2	Adjust the pipeline slightly	
3	Loosen the screws at the right and left sides fixing the evaporator assy, and then remove evaporator.	

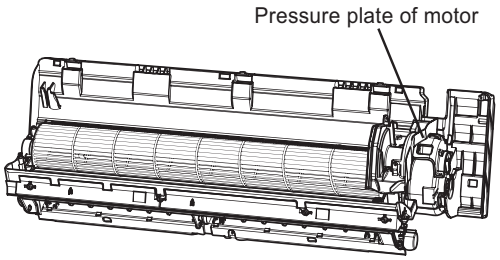


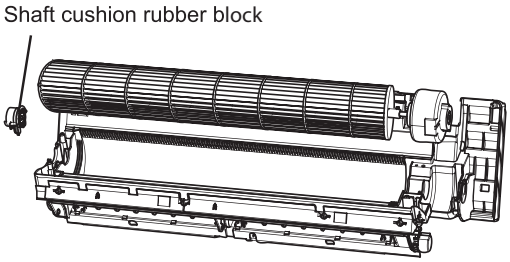


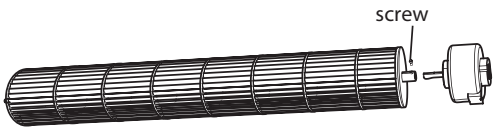


Step	Procedure	Points
10. Remove guard grille		
	Loosen the clasps and then remove the guard grille.	
10. Remove pressure plate of motor		
	Remove the screws fixing the motor pressure plate and then remove the motor pressure plate.	
11. Remove shaft cushion rubber block		
	Remove the motor, blade and shaft cushion rubber block.	
	Remove the screws on the cross flow blade and then pull out the motor.	



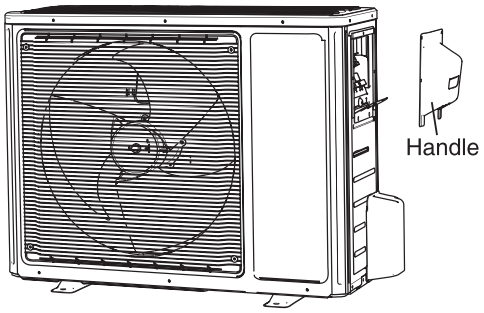


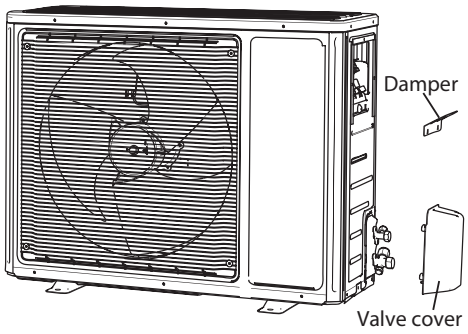


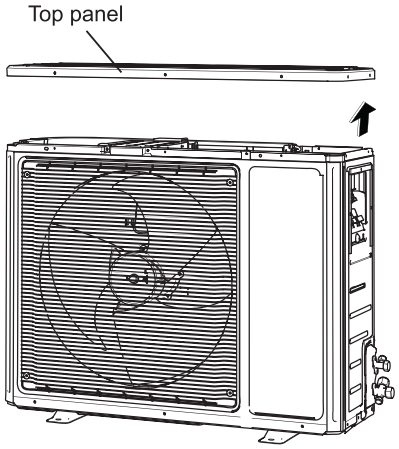


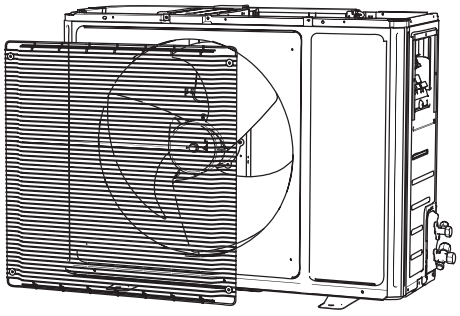
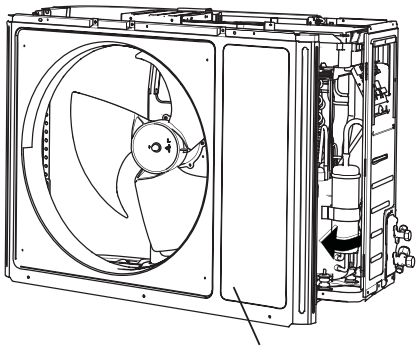
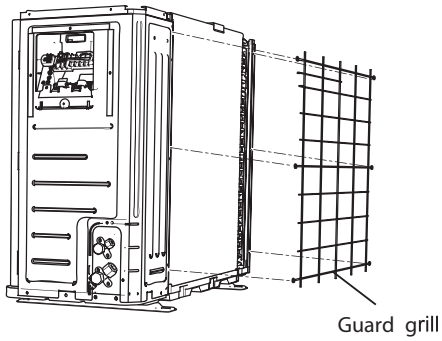
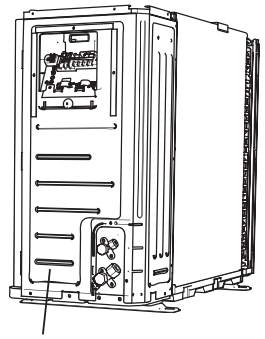
REMOVAL PROCEDURE OF OUTDOOR UNIT – 24K 230V

Step	Procedure	Points
1. Remove top cover and handle		
1	Remove the screws used for fixing the handle, and pull the handle upward to remove it.	
2	Remove the 2 screws fixing the damper, and then remove the damper. Remove the 2 screws fixing the valve cover, push it downward and then remove the valve cover.	
3	Remove the screws used for fixing the top cover,and pull the top cover upward to remove it.	

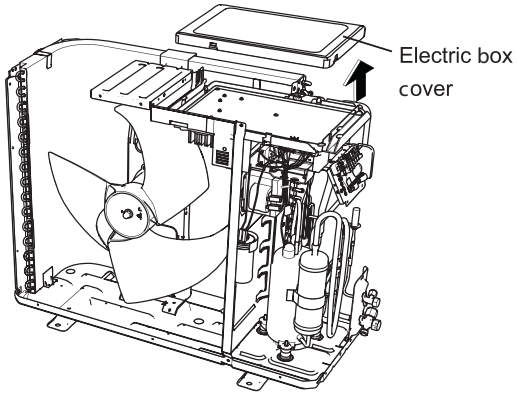


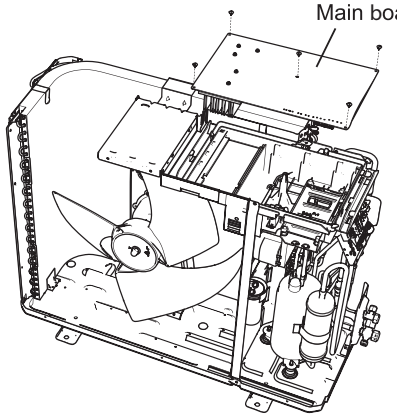


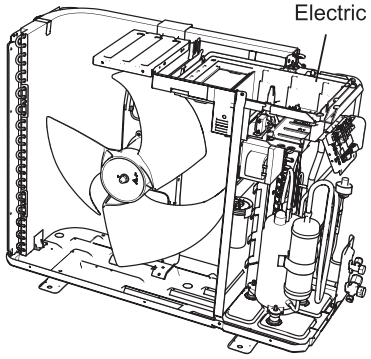


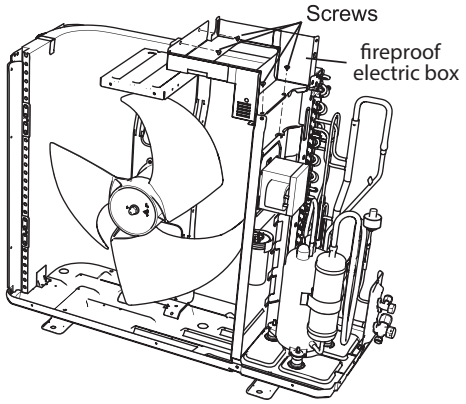
Step	Procedure	Points
2.Remove panel		
1 Remove the screws fixing the panel and then remove the panel.		
2 Remove the screws fixing the panel, pull it upward, loosen the clasp on the right side, rotate it to the left and then remove the panel.	 Front panel	■ Lift the front panel and remove it while pushing the right side panel inwards. Step procedure points
3.Remove right side plate		
1 Remove the screws fixing the guard grille and then remove the guard grille.	 Guard grill	
2 Remove the screws fixing the right side plate and end plate of condenser and valve support, pull it upward and then remove the right side plate sub-assy.	 Right side plate	

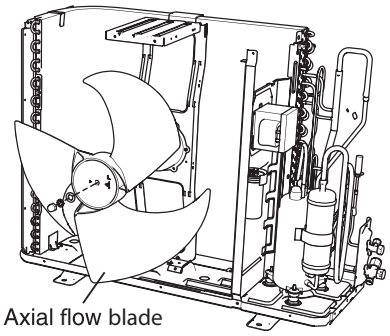
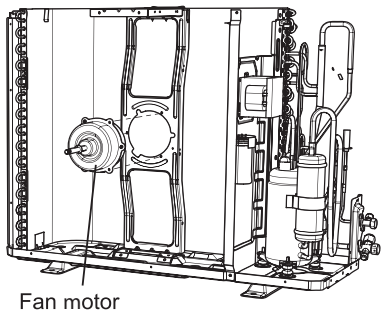
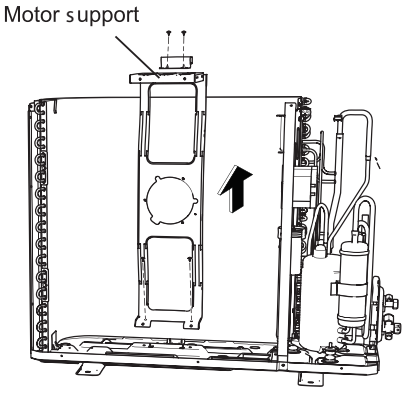
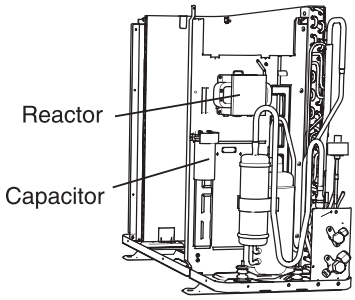
Step	Procedure	Points
4.Remove electric box assy		
1	Remove the clasps at the electric box cover and then remove the electric box cover.	
2	Pull out the motor, compressor, temperature sensor, reactor and wiring terminal of capacitor; remove the ground screws on the side wiring terminal , and the 5 screws fixing the main board, and then remove the main board.	
	Remove the screws fixing the electric box cover and then pull the electric box upward to remove it.	
	Remove the screws on fireproof electric box and then remove the fireproof electric box .	



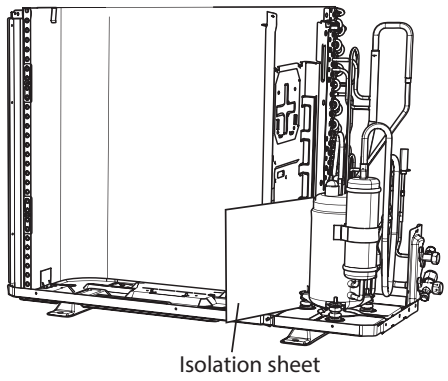




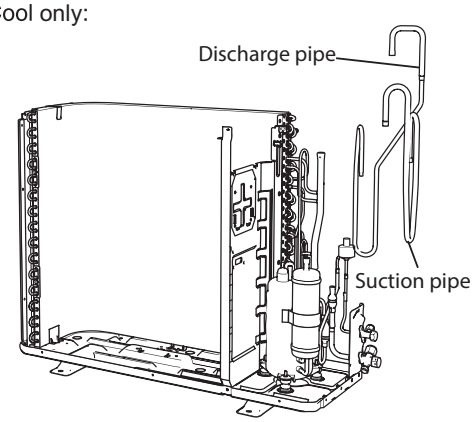


Step	Procedure	Points
5.Remove the axial flow blade		■ The screw has reverse winding.
Remove the nut fixing the blade with wrench and the draw out the axial flow blade.		
6. Remove the fan motor and the motor support.		
1 Remove the 4 screws fixing the motor and then remove the motor.		
2 Remove the 4 screws fixing the motor support and then remove the motor support.		
7. Remove the reactor and capacitor		
Remove the screws fixing the reactor and then remove the reactor; remove the screws fixing the capacitor clamp and then remove the capacitor.		

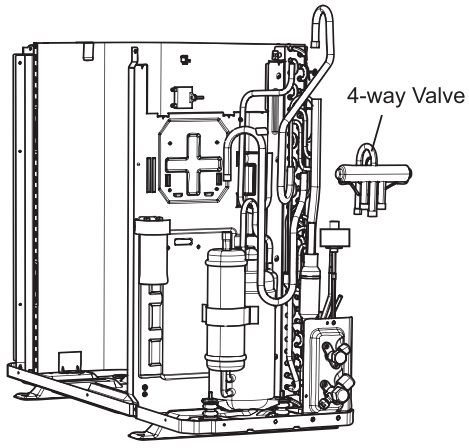
Step	Procedure	Points
8. Remove suction pipe and discharge pipe of compressor		
1	Remove the soundproof blanket	■ Since the piping ports on the soundproof blanket are torn easily, remove the soundproof blanket carefully.
2	Cooling only unit: unbraze the suction pipe and discharge pipe, and then move them away.	■ Be careful so as not to burn the compressor terminals or the name plate. ■ Before working, make sure that there's no refrigerant in the circuit.
	Heat pump: Loosen the screws on the 4-way valve coil; Heat up the brazed part and withdraw the piping with pliers.	■ Provide a protective sheet or a steel plate so that the brazing flame cannot affect peripheries. **Caution** Piping may be hot. Take precautions to avoid burns.

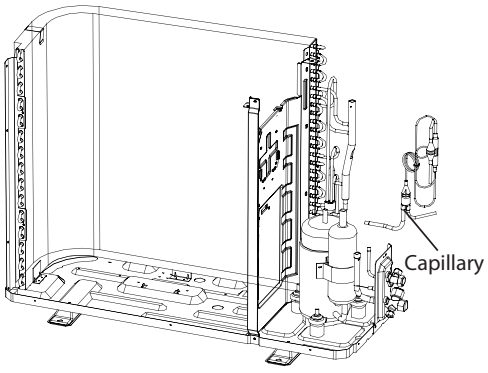
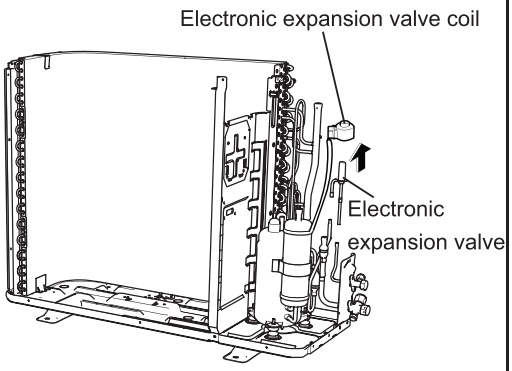
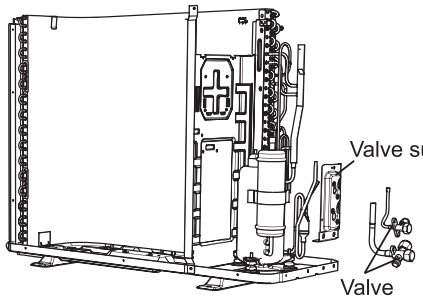


Cool only:



Heat pump:



Step	Procedure	Points
9. Remove capillary or electric expansion valve		
	18: Unbraze the weld spots of the main capillary and auxiliary capillary to take off the capillary.	
	24: Remove the electronic expansion valve coil. Heat up the two brazed parts of the electronic expansion valve and disconnect.	
10. Remove compressor		
1	Remove the screws fixing the valve and valve support and then remove the valve support.	
2	Remove the three foot nuts on compressor and then remove the compressor.