

# Service Manual

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## SAFETY CONSIDERATIONS

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

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

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

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

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

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

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, and **CAUTION**.

These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and

property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.



## WARNING

### ELECTRICAL SHOCK HAZARD

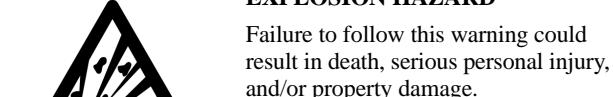
Failure to follow this warning could result in personal injury or death.

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



## WARNING

### EXPLOSION HAZARD



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

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



## CAUTION

### EQUIPMENT DAMAGE HAZARD

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

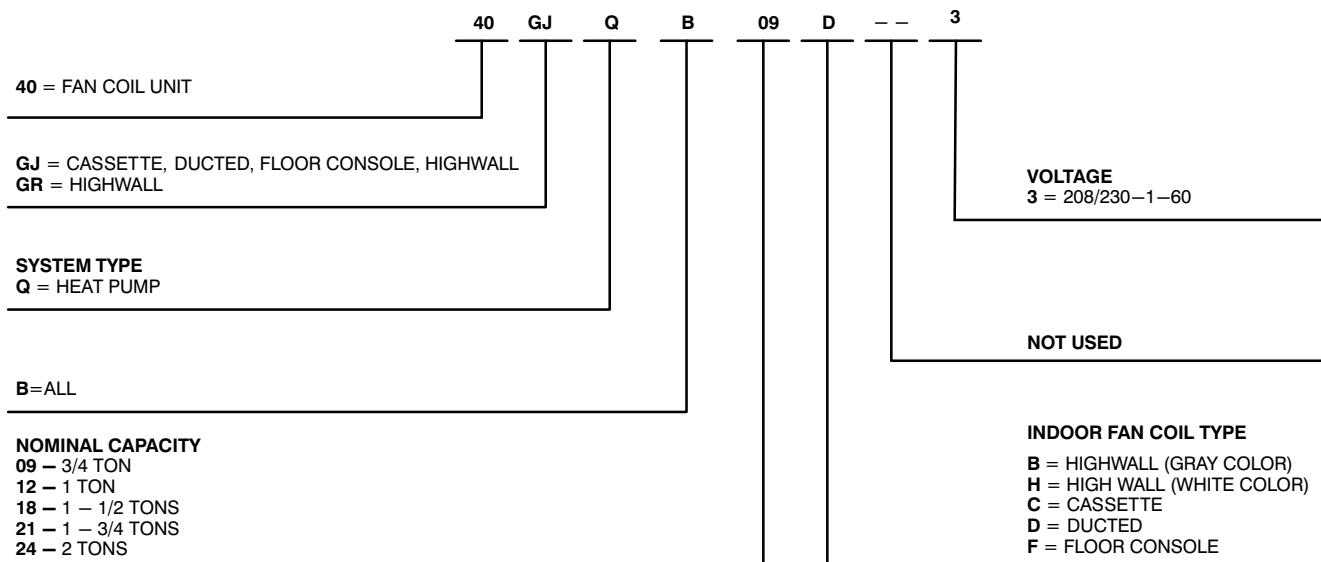
Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during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

## INTRODUCTION

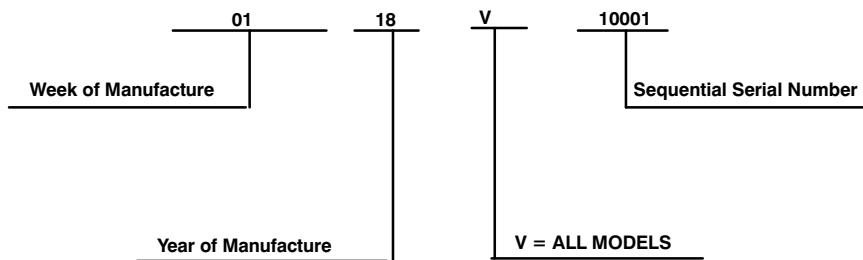
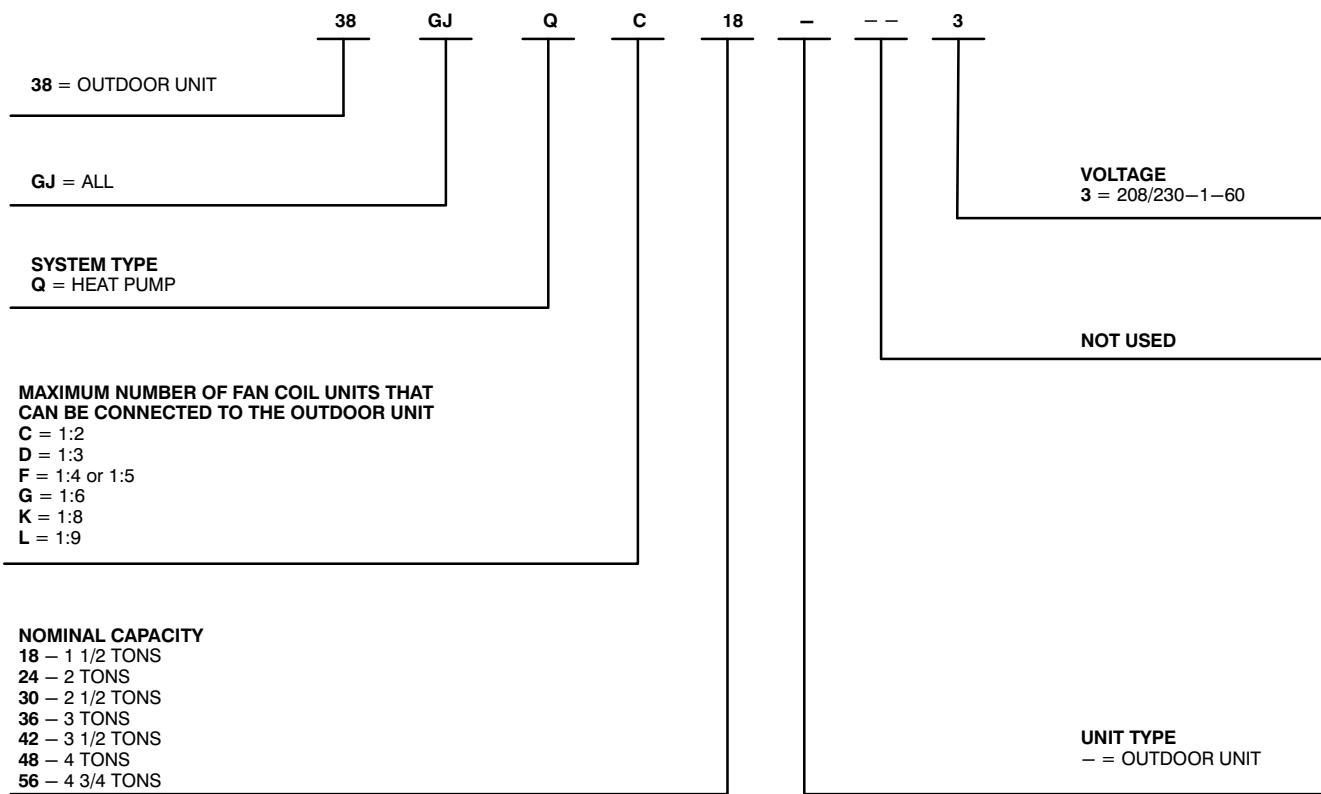
This Service Manual provides the necessary information to service, repair, and maintain the multi-zone family of heat pumps. Section 2 of this manual has an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

# MODEL/SERIAL NUMBER NOMENCLATURES

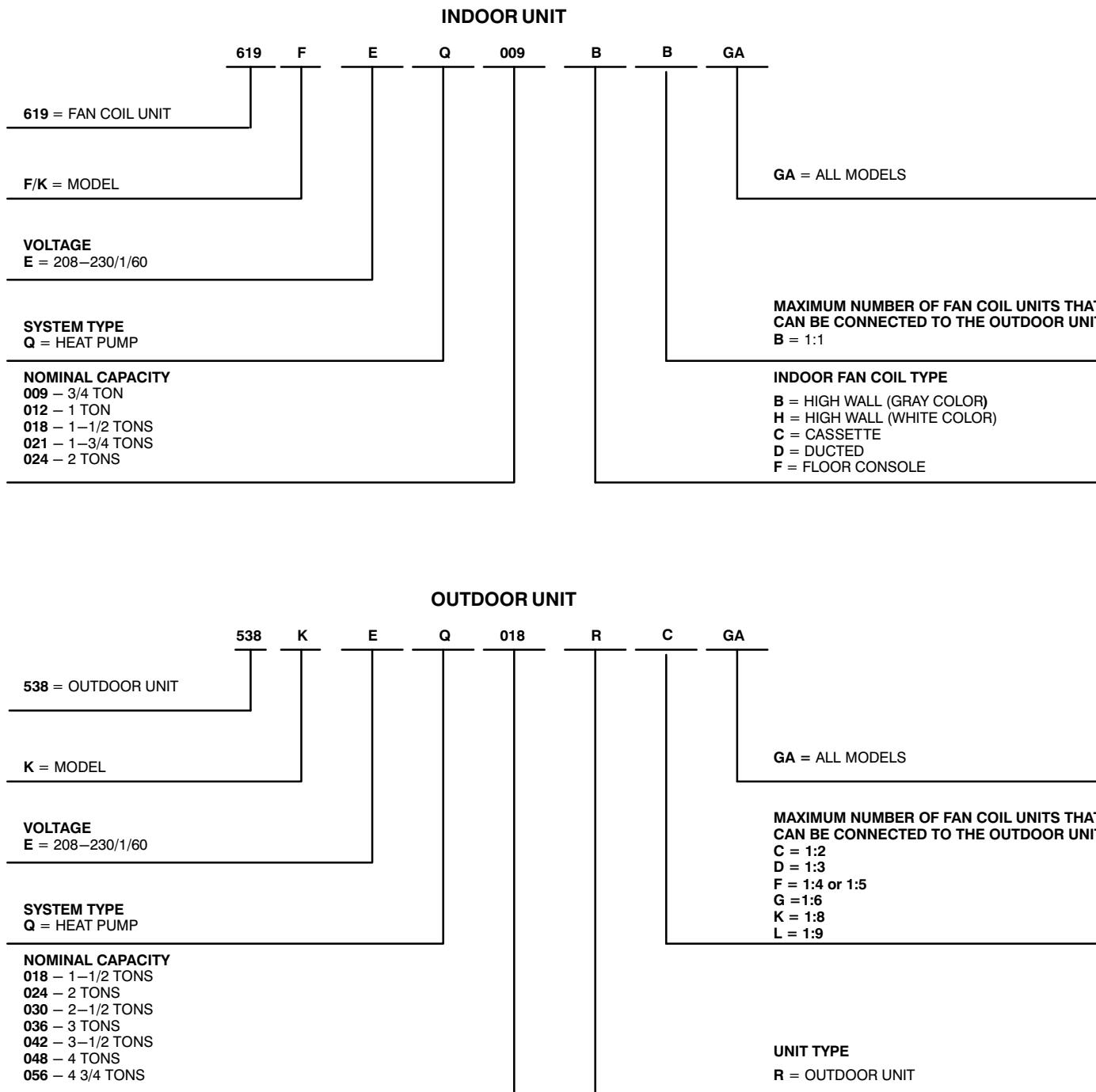
## INDOOR UNIT



## OUTDOOR UNIT



# MODEL/SERIAL NUMBER NOMENCLATURES (CONT)



Use of the AHRI Certified™ Mark indicates a manufacturer's participation in the program. For verification of certification for individual products, go to [www.ahridirectory.org](http://www.ahridirectory.org).



# SPECIFICATIONS – HEAT PUMP

Table 1—Multi-Zone

		Heat Pump						
System	Size	18	24	30	36	42	48	56
	Outdoor Model	38GJQC18---3 538KEQ018RCGA	38GJQD24---3 538KEQ024RCGA	38GJQF30---3 538KEQ030RCGA	38GJQG36---3 538KEQ036RCGA	38GJQG42---3 538KEQ042RCGA	38GJQK48---3 538KEQ048RCGA	38GJQL56---3 538KEQ056RCGA
	Max No. of Zones	2	3	4	5	5	8	9
Performance Non-Ducted	Energy Star®	YES	NO	NO	NO	NO	NO	NO
	Cooling System Tons	1.5	2.2	2.4	2.8	3.3	4.0	4.4
	Cooling Rated Capacity	Btu/h	18,000	26,000	29,000	34,000	39,000	48,000
	Cooling Cap. Range Min – Max	Btu/h	7000~21000	7500~33000	8189~33438	8871~35826	8871~40944	3412~54592
	SEER		22	20.5	21	21	16	16
	EER		12.5	9.5	12	12.4	9.56	9.45
	Heating Rated Capacity (47° F)	Btu/h	19,000	29,000	31,600	42,500	45,000	61,500
	Heating Cap. Range Min – Max	Btu/h	8530~22600	7500~35000	8189~32414	8871~44356	8871~46062	4094~59368
	HSPF		9	10.2	10.2	10.2	8.2	8.2
	COP @ 47F	W/W	3.85	3.86	3.76	3.63	3.50	3.34
	COP @17F	W/W	2.96	2.69	2.71	2.56	2.68	2.11
Performance Combination Ducted and Non-Ducted	Energy Star®		NO	NO	NO	NO	NO	NO
	Cooling Rated Capacity	Btu/h	18,000	26,000	29,200	34,000	39,500	48,500
	Cooling Cap. Range Min – Max	Btu/h	7000~21000	7500~33000	7195~32118	16511.5~36395.5	11335.5~41872	7706~53296
	SEER		18	17.25	17.75	17.9	17.85	15.75
	EER		11	8.75	10.55	11.25	10.1	9.2
	Heating Rated Capacity (47° F)	Btu/h	19,000	29,000	31,800	43,000	46,000	54500
	Heating Cap. Range Min – Max	Btu/h	8530~22600	7500~35000	7344.5~32457	8051~44550.5	8185.5~46531	10047~56934
	HSPF		9	9.6	10	9.9	8.2	8.2
	COP @ 47F	W/W	3.53	3.52	3.52	3.30	3.31	3.18
	COP @17F	W/W	2.68	2.51	2.60	2.43	2.50	2.16
Performance Ducted	Energy Star®		NO	NO	NO	NO	NO	NO
	Cooling Rated Capacity	Btu/h	18,000	26,000	29,200	34,000	39,500	48,500
	Cooling Cap. Range Min – Max	Btu/h	7000~21000	7500~33000	6200~30800	12706~36965	13800~42800	12000~52000
	SEER		14	14	14.5	14.8	14.7	15.5
	EER		9.5	8	9.1	10.1	9.8	8.8
	Heating Rated Capacity (47° F)	Btu/h	19,000	29,000	32,000	43,500	46,500	54,500
	Heating Cap. Range Min – Max	Btu/h	8530~22600	7500~35000	6500~32500	7231~44745	7500~47000	16000~54500
	HSPF		9	9	9.8	9.6	8.2	8.2
	COP @ 47F	W/W	3.22	3.18	3.29	2.97	3.12	3.01
	COP @17F	W/W	2.39	2.32	2.49	2.29	2.32	2.17
Operating Range	Cooling Outdoor DB Min – Max	° F (° C)	0~119 (-18~48)	0~119 (-18~48)	0~119 (-18~48)	0~119 (-18~48)	0~119 (-18~48)	0~119 (-18~48)
	Heating Outdoor DB Min – Max	° F (° C)	-4~75 (-20~25)	-4~75 (-20~25)	-4~75 (-20~25)	-4~75 (-20~25)	-4~75 (-20~25)	-4~75 (-20~25)
Piping	Total Piping Length	ft (m)	65 (19.8)	196 (59.7)	229.7 (70)	246 (75)	246 (75)	442.91 (135)
	Piping to furthest FCU	ft (m)	33 (10.1)	65 (19.8)	82 (25)	82 (25)	82 (25)	229 (69.8)
	Drop (OD above ID)	ft (m)	32 (9.8)	32 (9.8)	49.2 (15)	49.2 (15)	49.2 (15)	98.42 (30)
	Lift (OD below ID)	ft (m)	33 (10.1)	33 (10.1)	49.2 (15)	49.2 (15)	49.2 (15)	98.42 (30)
	Pipe Connection Size – Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)
	Pipe Connection Size – Suction	in (mm)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)	5/8 (16)
Refrigerant	Type		R410A	R410A	R410A	R410A	R410A	R410A
	Charge	lbs (kg)	3.53 (1.6)	4.85 (2.2)	6.17 (2.8)	8.05 (3.65)	8.05 (3.65)	10.91 (4.9)
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	208/230~1~60	208/230~1~60	208/230~1~60	208/230~1~60	208/230~1~60	208/230~1~60
	Power Supply		Indoor unit powered from outdoor unit				Powered from Branch Box	
Compressor	MCA	A.	15	21	19	21	24	30
	MOCP – Fuse Rating	A.	25	35	30	35	40	50
Outdoor	Type		Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter
	Unit Width	in (mm)	37.6 (955)	38.6 (980)	38.6 (980)	42.8 (1087)	42.8 (1087)	35.4 (899)
	Unit Height	in (mm)	27.6 (701)	31.1 (790)	31.1 (790)	43.4 (1102)	43.4 (1102)	53 (1346)
	Unit Depth	in (mm)	15.6 (396)	16.8 (427)	17.3 (439)	17.3 (439)	17.3 (439)	13.4 (340)
	Net Weight	lbs (kg)	114.7 (52)	153.2 (69.5)	145.5 (66)	198.4 (90)	198.4 (90)	255.7 (116)
	Airflow	CFM	1883	2354	2330	4531	4531	3766
	Sound Pressure	dB(A)	56	59	59	61	61	57

NOTE: Sizes 48 and 56 require a Branch Box.

# COMBINATION TABLES

Table 2—Combination

Indoor Unit	Nominal Unit Btuh	Indoor Model Number	Indoor Model Number	Outdoor Model Number	Outdoor Model Number
High Wall	9,000	40GRQB09B—3	619FEQ009BBGA	38GJQC18---3 38GJQD24---3	538KEQ018RCGA 538KEQ024RDGA
	12,000	40GRQB12B—3	619FEQ012BBGA		
	18,000	40GRQB18B—3	619FEQ018BBGA		
	9,000	40GRQB09H—3	619FEQ009HBGA		
	12,000	40GRQB12H—3	619FEQ012HBGA		
	18,000	40GRQB18H—3	619FEQ018HBGA		
High Wall	9,000	40GJQB09B—3	619KEQ009BBGA	38GJQC18---3 38GJQD24---3	538KEQ018RCGA 538KEQ024RDGA
	12,000	40GJQB12B—3	619KEQ012BBGA		
	18,000	40GJQB18B—3	619KEQ018BBGA		
Cassette	12,000	40GJQB12C—3	619KEQ012CBGA		
	18,000	40GJQB18C—3	619KEQ018CBGA		
Ducted	9,000	40GJQB09D—3	619KEQ009DBGA		
	12,000	40GJQB12D—3	619KEQ012DBGA		
	18,000	40GJQB18D—3	619KEQ018DBGA		
Floor Console	9,000	40GJQB09F—3	619KEQ009FBGA	38GJQC18---3 38GJQD24---3	538KEQ018RCGA 538KEQ024RDGA
	12,000	40GJQB12F—3	619KEQ012FBGA		
	18,000	40GJQB18F—3	619KEQ018FBGA		

Table 3—Combination

Indoor Unit	Nominal Unit Btuh	Indoor Model Number	Indoor Model Number	Outdoor Model Number	Outdoor Model Number
High Wall	9,000	40GRQB09B—3	619FEQ009BBGA	38GJQC30---3 38GJQG36---3 38GJQG42---3	538KEQ030RFGA 538KEQ036RGGA 538KEQ042RGGA
	12,000	40GRQB12B—3	619FEQ012BBGA		
	18,000	40GRQB18B—3	619FEQ018BBGA		
	9,000	40GRQB09H—3	619FEQ009HBGA		
	12,000	40GRQB12H—3	619FEQ012HBGA		
	18,000	40GRQB18H—3	619FEQ018HBGA		
High Wall	9,000	40GJQB09B—3	619KEQ009BBGA	38GJQC30---3 38GJQG36---3 38GJQG42---3	538KEQ030RFGA 538KEQ036RGGA 538KEQ042RGGA
	12,000	40GJQB12B—3	619KEQ012BBGA		
	18,000	40GJQB18B—3	619KEQ018BBGA		
	24,000	40GJQB24B—3	619KEQ024BBGA		
Cassette	12,000	40GJQB12C—3	619KEQ012CBGA		
	18,000	40GJQB18C—3	619KEQ018CBGA		
	24,000	40GJQB24C—3	619KEQ024CBGA		
Ducted	9,000	40GJQB09D—3	619KEQ009DBGA	38GJQC30---3 38GJQG36---3 38GJQG42---3	538KEQ030RFGA 538KEQ036RGGA 538KEQ042RGGA
	12,000	40GJQB12D—3	619KEQ012DBGA		
	18,000	40GJQB18D—3	619KEQ018DBGA		
	21,000	40GJQB21D—3	619KEQ021DBGA		
	24,000	40GJQB24D—3	619KEQ024DBGA		
Floor Console	9,000	40GJQB09F—3	619KEQ009FBGA		
	12,000	40GJQB12F—3	619KEQ012FBGA		
	18,000	40GJQB18F—3	619KEQ018FBGA		

Table 4—Combination

Indoor Unit	Nominal Unit Btuh	Indoor Model Number	Indoor Model Number	Outdoor Model Number	Outdoor Model Number
High Wall	9,000	40GRQB09B—3	619FEQ009BBGA	38GJQK48---3 38GJQL56---3	538KEQ048RKGA 538KEQ056RLGA
	12,000	40GRQB12B—3	619FEQ012BBGA		
	18,000	40GRQB18B—3	619FEQ018BBGA		
	9,000	40GRQB09H—3	619FEQ009HBGA		
	12,000	40GRQB12H—3	619FEQ012HBGA		
	18,000	40GRQB18H—3	619FEQ018HBGA		
High Wall	9,000	40GJQB09B—3	619KEQ009BBGA	38GJQK48---3 38GJQL56---3	538KEQ048RKGA 538KEQ056RLGA
	12,000	40GJQB12B—3	619KEQ012BBGA		
	18,000	40GJQB18B—3	619KEQ018BBGA		
	24,000	40GJQB24B—3	619KEQ024BBGA		
Cassette	12,000	40GJQB12C—3	619KEQ012CBGA		
	18,000	40GJQB18C—3	619KEQ018CBGA		
	24,000	40GJQB24C—3	619KEQ024CBGA		
Ducted	9,000	40GJQB09D—3	619KEQ009DBGA	38GJQK48---3 38GJQL56---3	538KEQ048RKGA 538KEQ056RLGA
	12,000	40GJQB12D—3	619KEQ012DBGA		
	18,000	40GJQB18D—3	619KEQ018DBGA		
	21,000	40GJQB21D—3	619KEQ021DBGA		
	24,000	40GJQB24D—3	619KEQ024DBGA		
Floor Console	9,000	40GJQB09F—3	619KEQ009FBGA		
	12,000	40GJQB12F—3	619KEQ012FBGA		
	18,000	40GJQB18F—3	619KEQ018FBGA		

## DIMENSIONS

Table 5—Outdoor Unit

System Size	18	24	30	36	42	48	56
Voltage	208/230–1–60	208/230–1–60	208/230–1–60	208/230–1–60	208/230–1–60	208/230–1–60	208/230–1–60
Unit							
Height (H)	in	27.6	31.1	31.1	43.4	43.4	53.0
Width (W)	in	37.6	38.6	38.6	42.8	42.8	35.4
Depth (D)	in	15.6	16.8	17.3	17.3	17.3	13.4
Weight—Net	lbs	114.7	153.2	145.5	198.4	198.4	255.7
Packing							
Height	in	29.5	33.7	33.7	48.6	48.6	59.1
Width	in	40.5	42.6	42.6	46.2	46.2	39.1
Depth	in	18.0	19.2	19.2	19.4	19.4	17.8
Weight—Gross	lbs	124.6	164.3	154.3	216.1	216.1	282.2

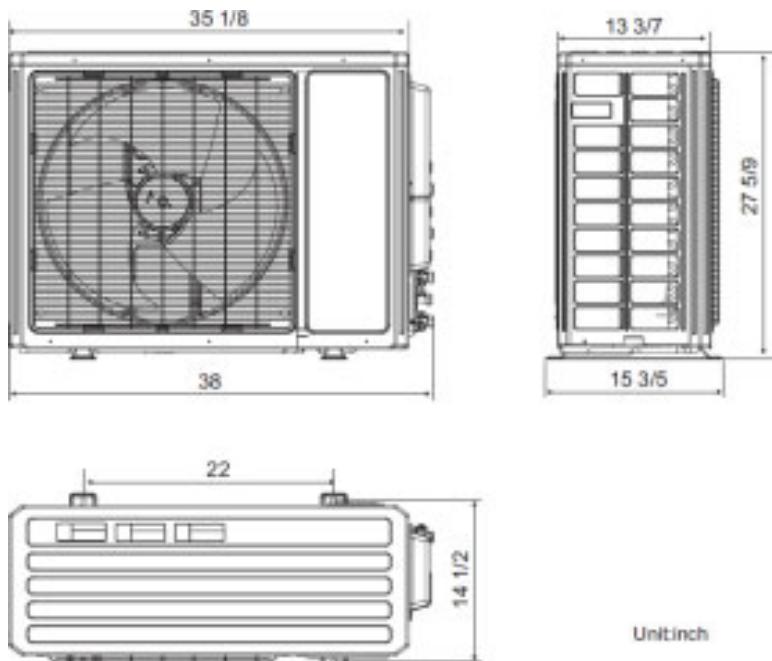


Fig. 1 – Size 18

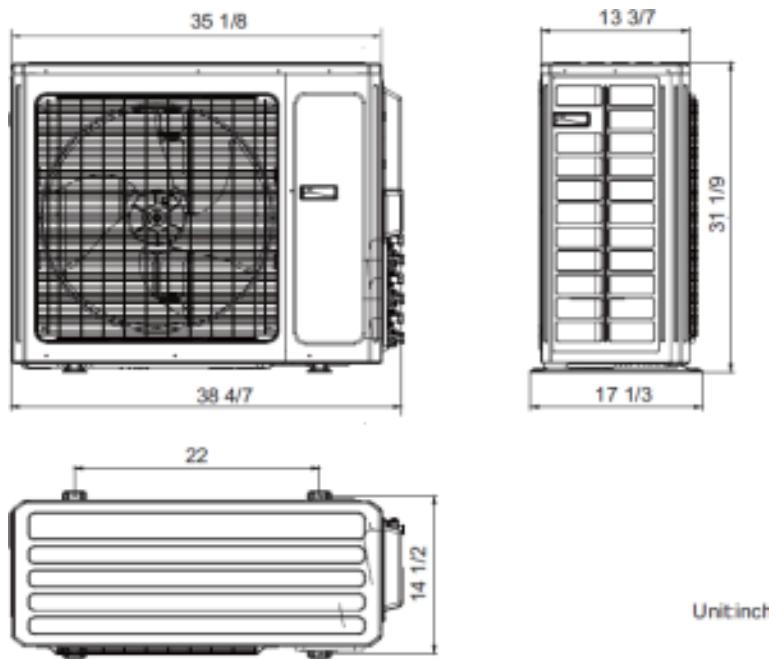


Fig. 2 – Size 24

## DIMENSIONS (CONTINUED)

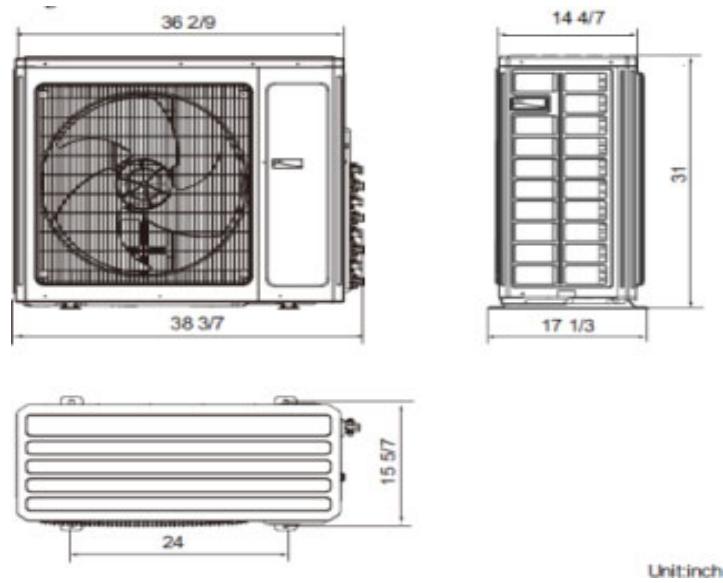


Fig. 3 – Size 30

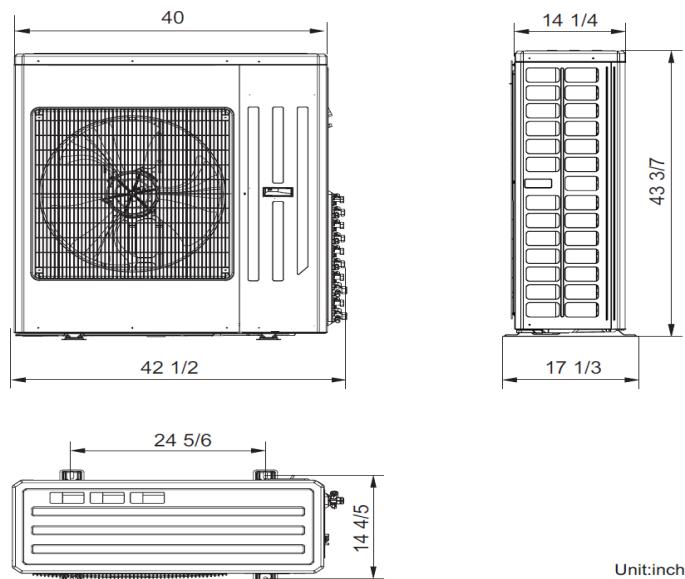


Fig. 4 – Sizes 36 and 42

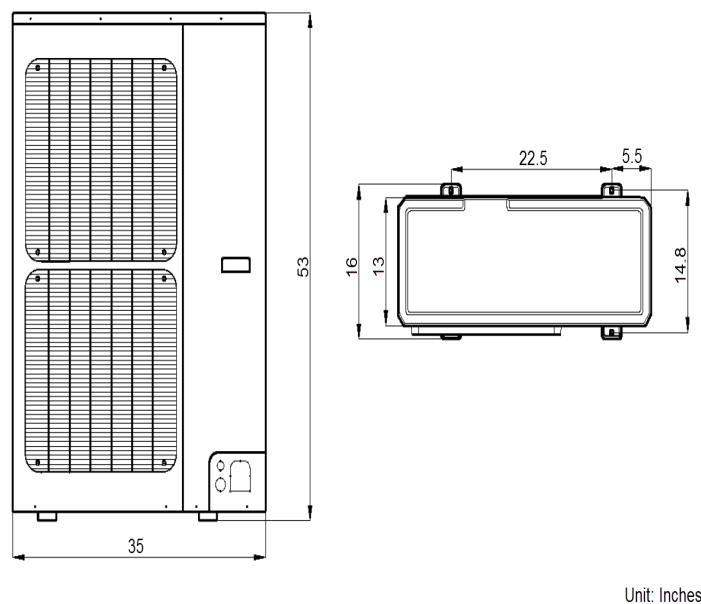


Fig. 5 – Sizes 48 and 56

## CLEARANCES

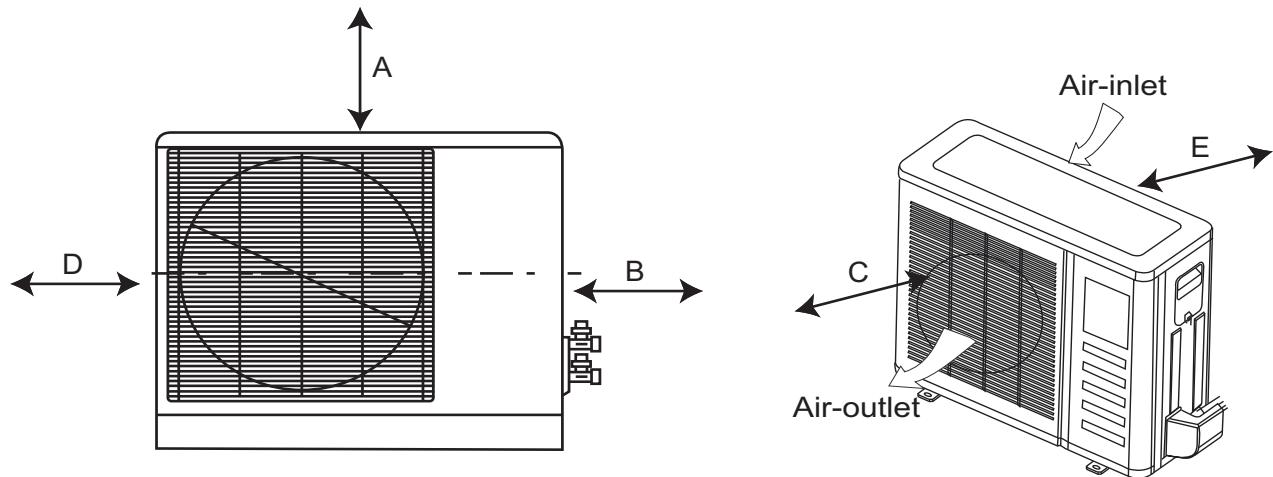


Fig. 6 – Outdoor Unit Clearance

Table 6—Outdoor Unit Clearance

UNIT	MINIMUM VALUE in. (mm)
A	24 (609)
B	24 (609)
C	24 (609)
D	4 (101)
E	4 (101)

NOTE: The outdoor unit must be mounted at least 2in. (50mm) above the maximum anticipated snow depth.

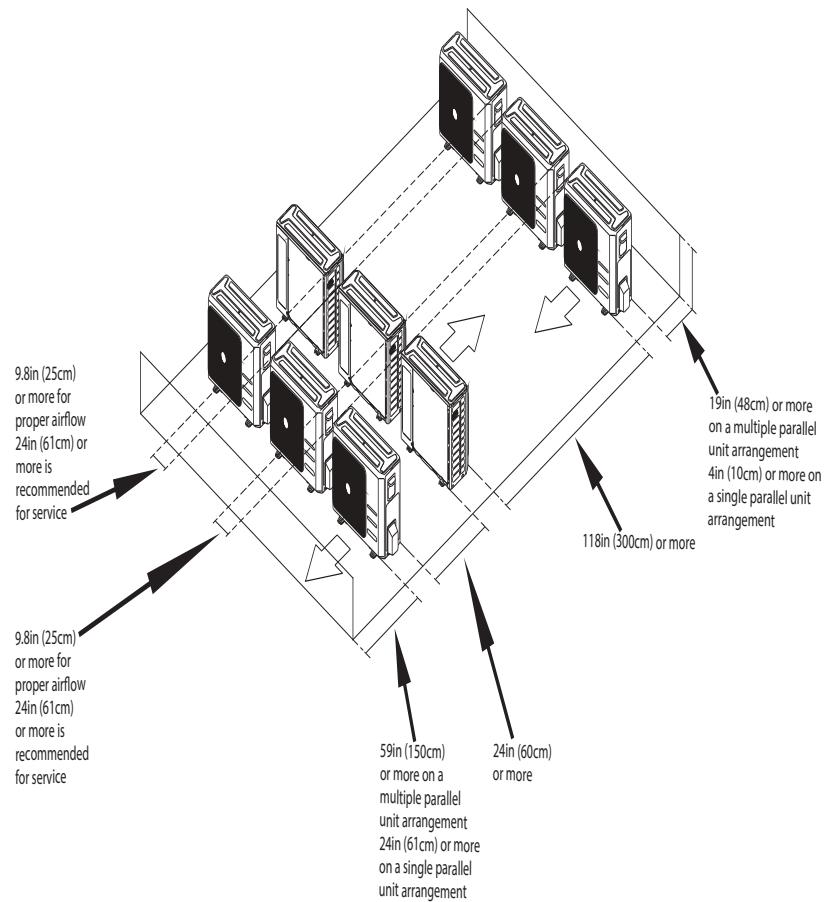


Fig. 7 – Clearances for Multiple Units

# ELECTRICAL DATA

Table 7—Multi Zone Outdoor Unit

UNIT SIZE	SYSTEM VOLTAGE	OPERATING VOLTAGE	COMPRESSOR	OUTDOOR FAN			MCA	MAX FUSE/CB AMP
	VOLT / PHASE / HZ	MAX / MIN	RLA	FLA	HP	W		
18	208–230/1/60	253 / 187	7.2	0.62	1/12	60	15	25
24			11.5	0.59	1/8	90	21	35
30			13.9	0.68	1/6	150	19	30
36			15.6	0.82	2/9	240	21	35
42			17.8	0.82	2/9	240	24	40
48			23	1	1/6	150	30	50
56			23	1	1/6	150	30	50

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

## LEGEND

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

## WIRING

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

### Sizes 18–42

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

The main power is supplied to the outdoor unit. The field supplied 14/3 stranded wire with ground with a 600 volt insulation rating, power/communication wiring from the outdoor unit to indoor unit consists of four (4) wires and provides the power for the indoor unit. Two wires are line voltage AC power, one is communication wiring (S) and the other is a ground wire. Wiring between indoor and outdoor unit is polarity sensitive. The use of BX wire is NOT recommended.

If installed in a high Electromagnetic field (EMF) area and communication issues exists, a 14/2 stranded shielded wire can be used to replace L2 and (S) between outdoor unit and indoor unit landing the shield onto ground in the outdoor unit only.

### Sizes 48–56

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

##### Power Wiring OUTDOOR UNIT & BRANCH BOXES:

Separate power supplies are required for the OUTDOOR UNIT and the BRANCH BOXES. The indoor units are powered by the BRANCH BOXES. The field supplied 14/3 stranded wire (with ground) with a 600 volt insulation rating, power/communication wiring from the BRANCH BOXES to INDOOR UNITS consists of four (4) wires and provides the indoor unit's power. Two wires are line voltage AC power; one is communication wiring (S) and the other is a ground wire.

Wiring between the indoor unit and the branch box is polarity sensitive. The use of BX wire is NOT recommended. Up to three (3) Branch Boxes can be powered from the same 15 amp breaker.

##### Communication Wiring:

A separate shielded copper conductor only, must be used as the communication wire from the OUTDOOR UNIT to the BRANCH BOX.

Please use a separate shielded 16GA stranded control wire.

See the wiring diagram in the wiring diagram section for sizes 48–56.

	<b>CAUTION</b>
<b>EQUIPMENT DAMAGE HAZARD</b>	
Failure to follow this caution may result in equipment damage or improper operation. Wires should be sized based on NEC and local codes.	

	<b>CAUTION</b>
<b>EQUIPMENT DAMAGE HAZARD</b>	
Failure to follow this caution may result in equipment damage or improper operation. Be sure to comply with local codes while running wire from the indoor unit to the outdoor unit. Every wire must be connected firmly. Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Ensure all wiring is tightly connected. No wire should touch the 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 the hole in the conduit panel.	

# ELECTRICAL PART

## Wiring Diagram

### Instruction

Table 8—Wiring

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	GREEN	COMP	Compressor
YE	Yellow	BN	Brown	( $\ominus$ )	Grouding wire
RD	Red	BU	Blue		
YEGN	Yellow/Green	BK	Black		
VT	Violet	OG	Orange		

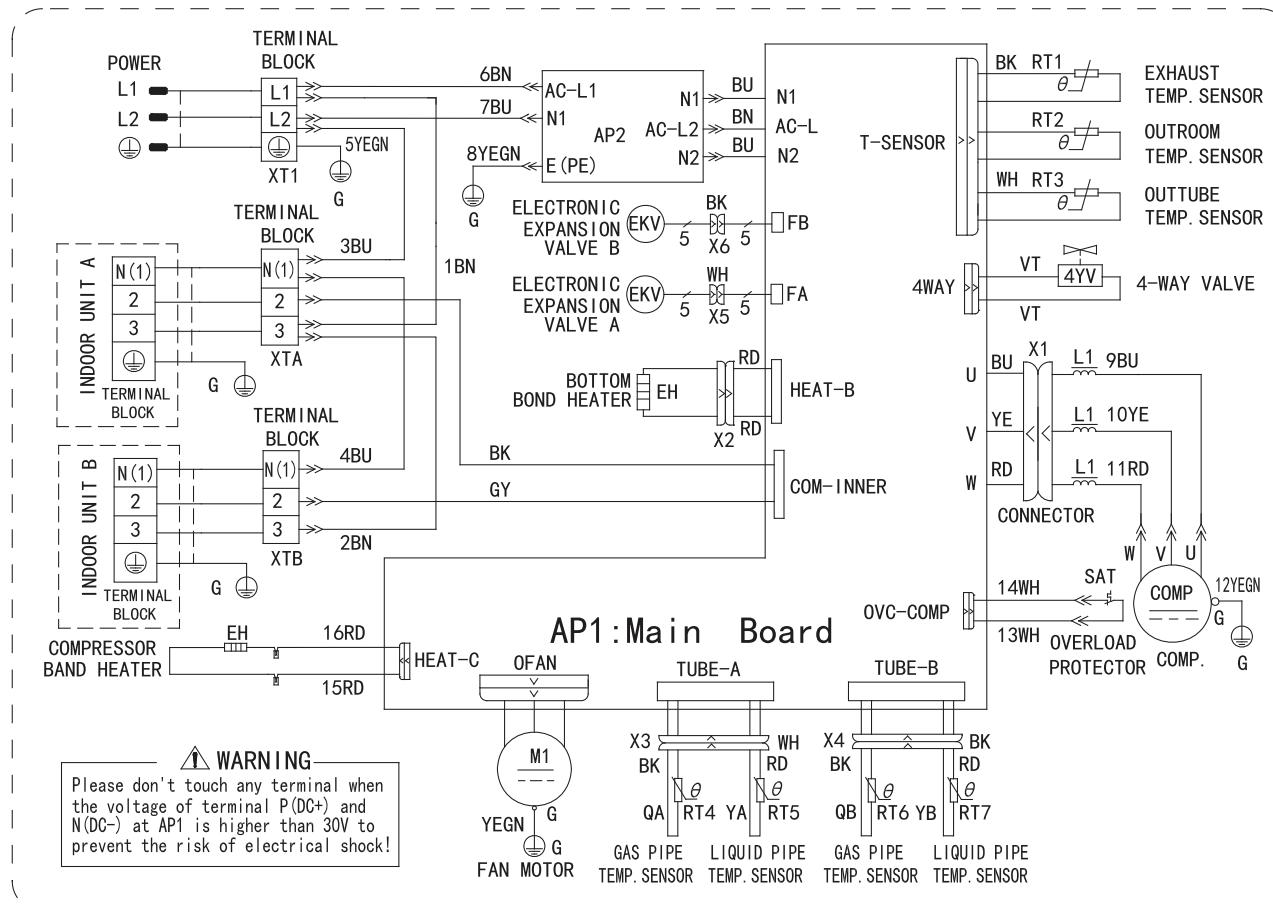
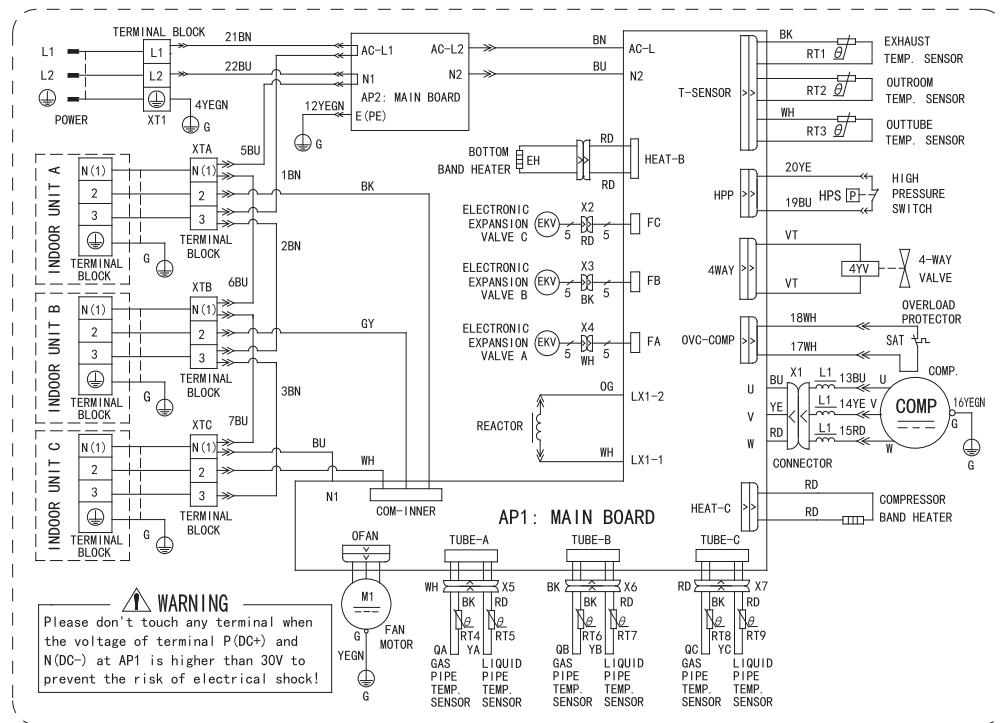


Fig. 8 – Wiring Diagram Outdoor Unit Size 18

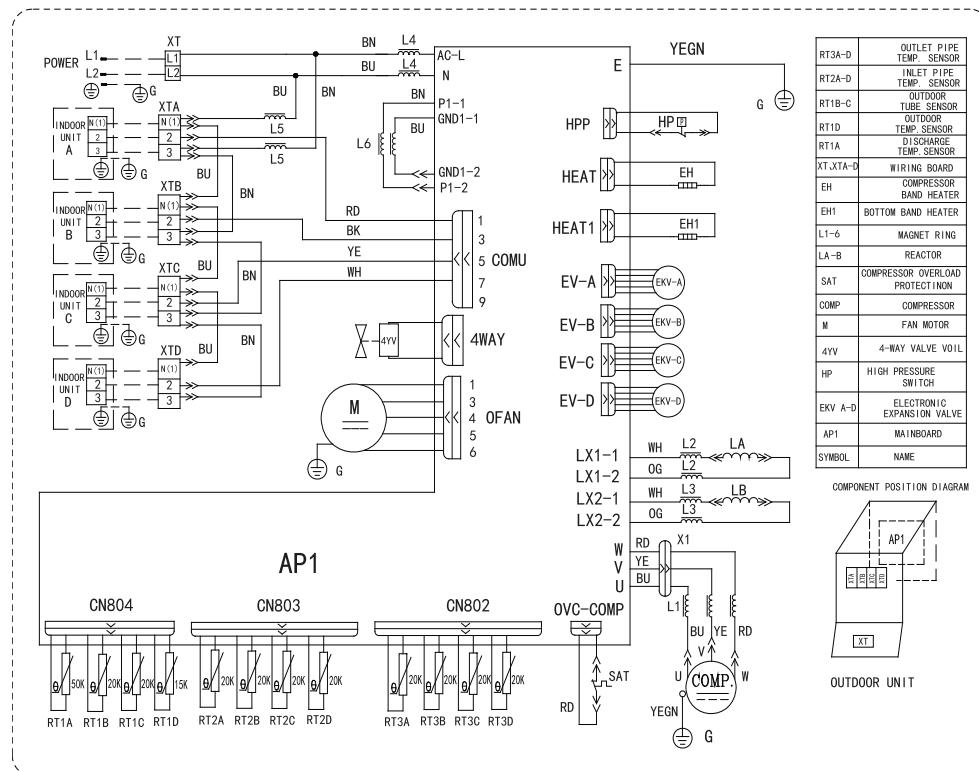
## **ELECTRICAL PART (CONT)**



These circuit diagrams are subject to change without notice, please refer to the one supplied with the unit.

**Fig. 9 – Wiring Diagram Outdoor Unit Size 24**

**NOTE:** These circuit diagrams are subject to change without notice, refer to the one supplied with the unit.



**Fig. 10 – Wiring Diagram Outdoor Unit Size 30**

## ELECTRICAL PART (CONT)

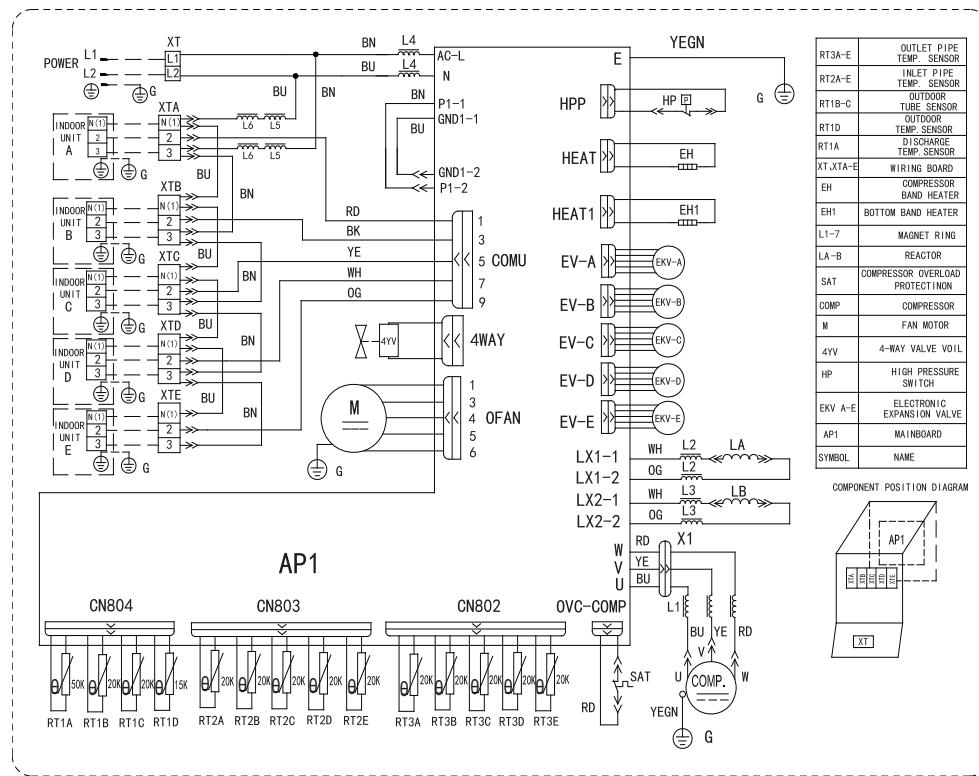


Fig. 11 – Wiring Diagram Outdoor Unit Sizes 36 and 42

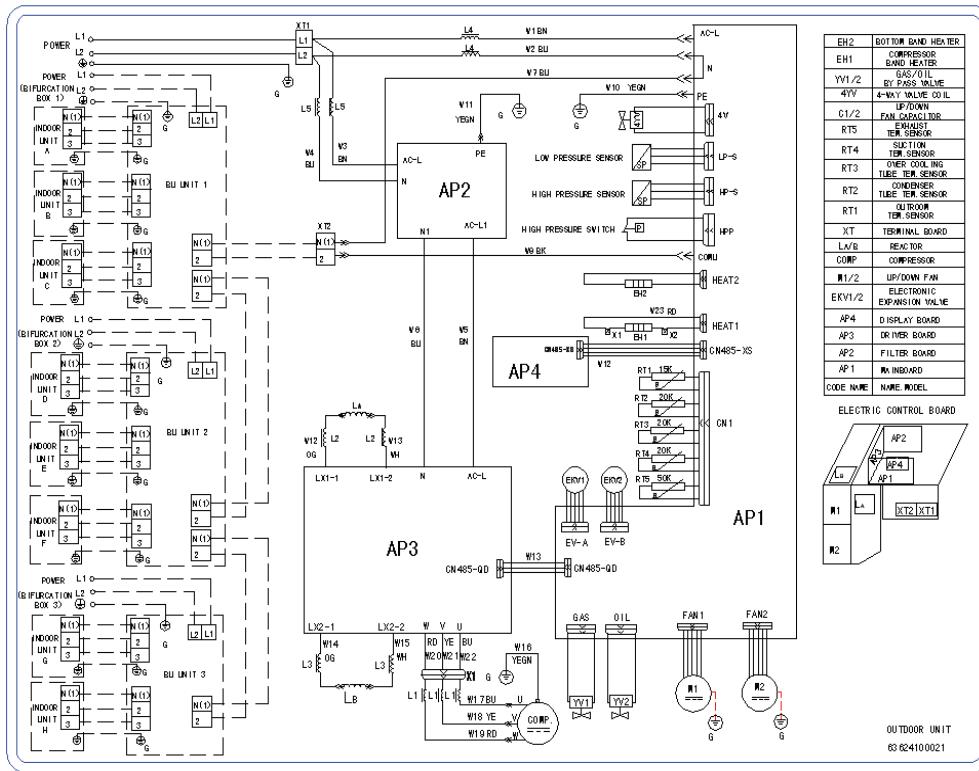


Fig. 12 – Wiring Diagram Outdoor Unit Sizes 48 and 56

NOTE: Please refer to the following for field terminal block labels N(1) is L2, 2 is S, 3 is L1.

## ELECTRICAL PART (CONT)

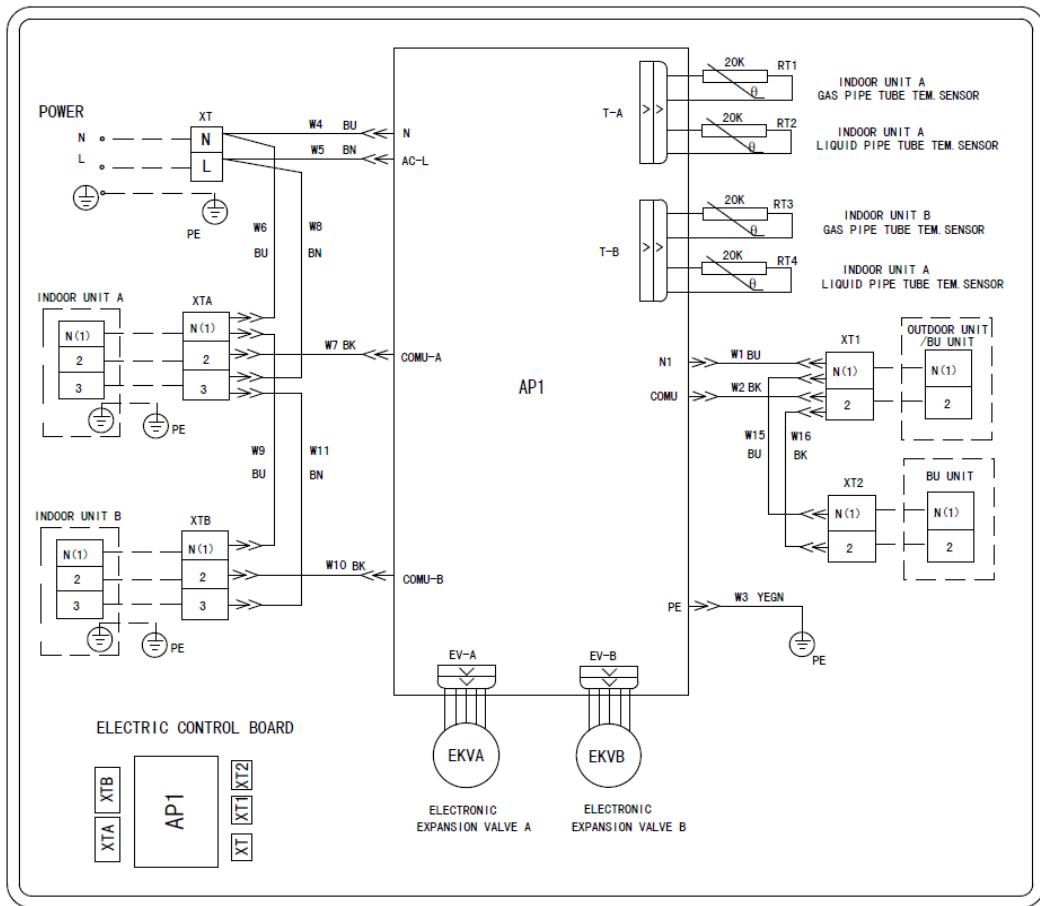


Fig. 13 – Wiring Diagram Branch Boxes

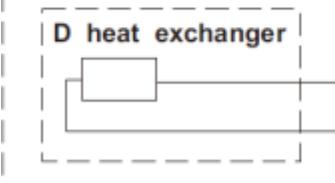
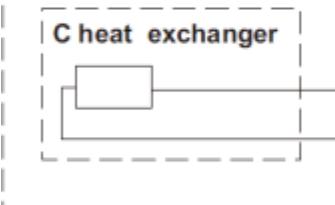
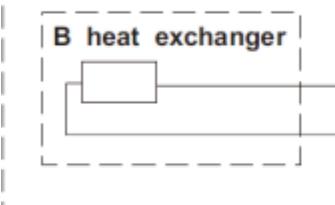
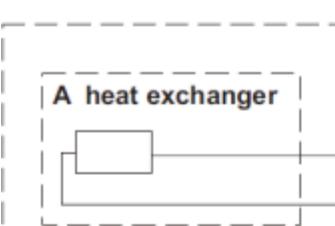
# ENVIRONMENTAL SPECIFICATIONS

Table 9—Outdoor Unit

System Size		18	24	30	36	42	48	56
Voltage		208/230—1—60	208/230—1—60	208/230—1—60	208/230—1—60	208/230—1—60	208/230—1—60	208/230—1—60
Cooling Operating Range	Outdoor Min—Max DB	°F	0~118	0~118	0~118	0~118	5~118	5~118
	Indoor Min—Max DB	°F	64~95	64~95	64~95	64~95	64~95	64~95
	Indoor Min—Max WB	°F	55	55	55	55	55	55
Heating Operating Range	Outdoor Min—Max DB	°F	-4~75	-4~75	-4~86	-4~86	-4~86	-4~75
	Outdoor Min—Max WB	°F	-5~75	-5~75	-5~75	-5~75	-5~75	-5~75
	Indoor Min—Max DB	°F	32~86	32~86	32~86	32~86	32~86	32~86
Non-operating environment	Temp Range (DB)	°F	32~86	32~86	32~86	32~86	32~86	32~86
Operation Humidity		dBA	0~80%	0~80%	0~80%	0~80%	0~80%	0~80%
Ambient Humidity		%	0~80%	0~80%	0~80%	0~80%	0~80%	0~80%

## REFRIGERATION CYCLE DIAGRAMS

indoor



outdoor

filter

fan

outdoor heat exchanger

4-way valve

high pressure switch  
Note: Not available for 14K/18K model

discharge silencer

discharge temperature sensor

inverter compressor

gas -liquid separator

Note: Not available for 14K/18K model

A1:A-unit electronic expansion valve B1:B-unit electronic expansion valve

C1:C-unit electronic expansion valve D1:D-unit electronic expansion valve

A2:A-unit gas pipe temperature sensor B2:B-unit gas pipe temperature sensor

C2:C-unit gas pipe temperature sensor D2:D-unit gas pipe temperature sensor

A3:A-unit liquid pipe temperature sensor B3:B-unit liquid pipe temperature sensor

C3:C-unit liquid pipe temperature sensor D3:D-unit liquid pipe temperature sensor

Fig. 14 – Refrigeration Cycle Diagrams Sizes 18 and 24

## REFRIGERATION CYCLE DIAGRAMS (CONT)

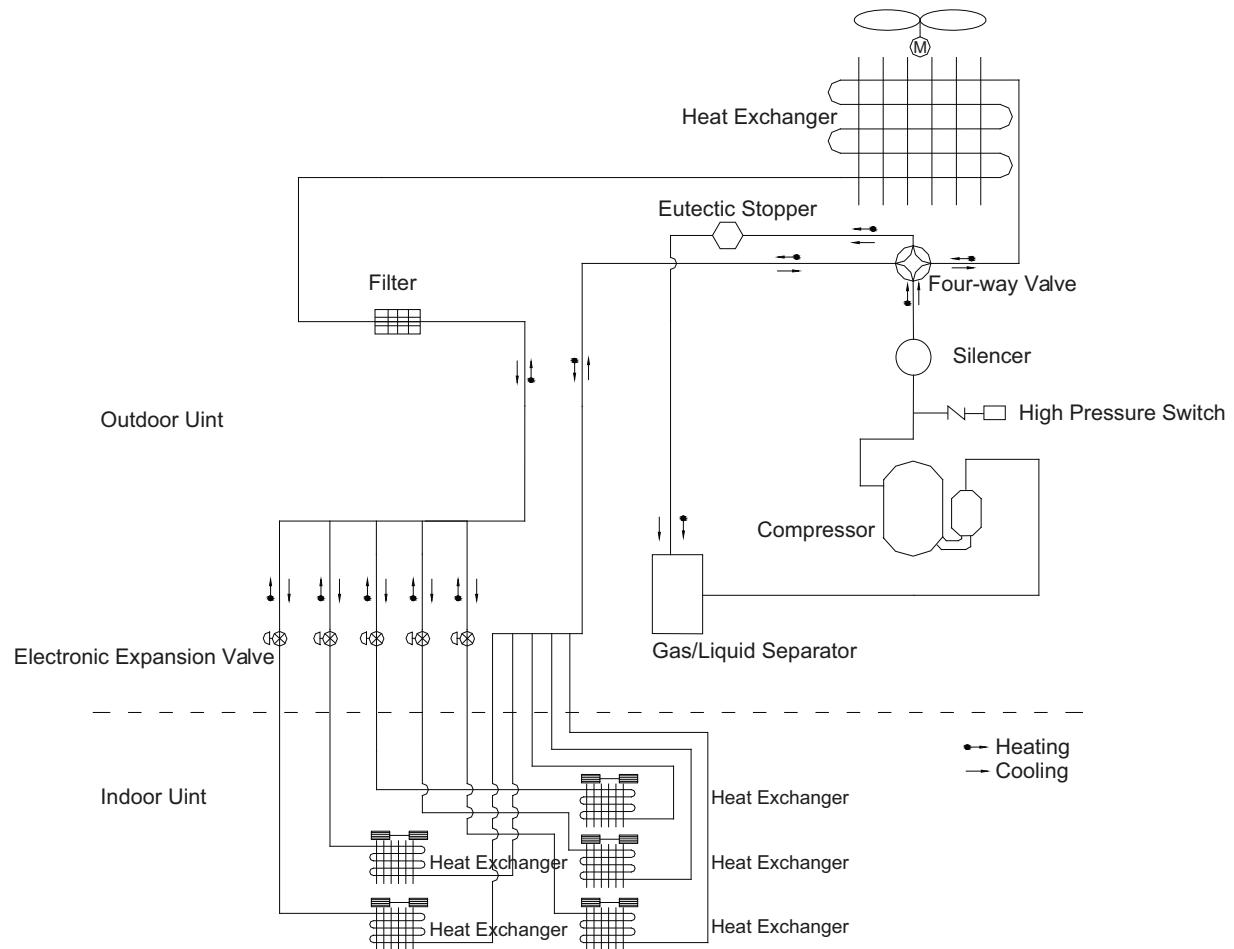


Fig. 15 – Refrigeration Cycle Diagrams 30, 36, and 42

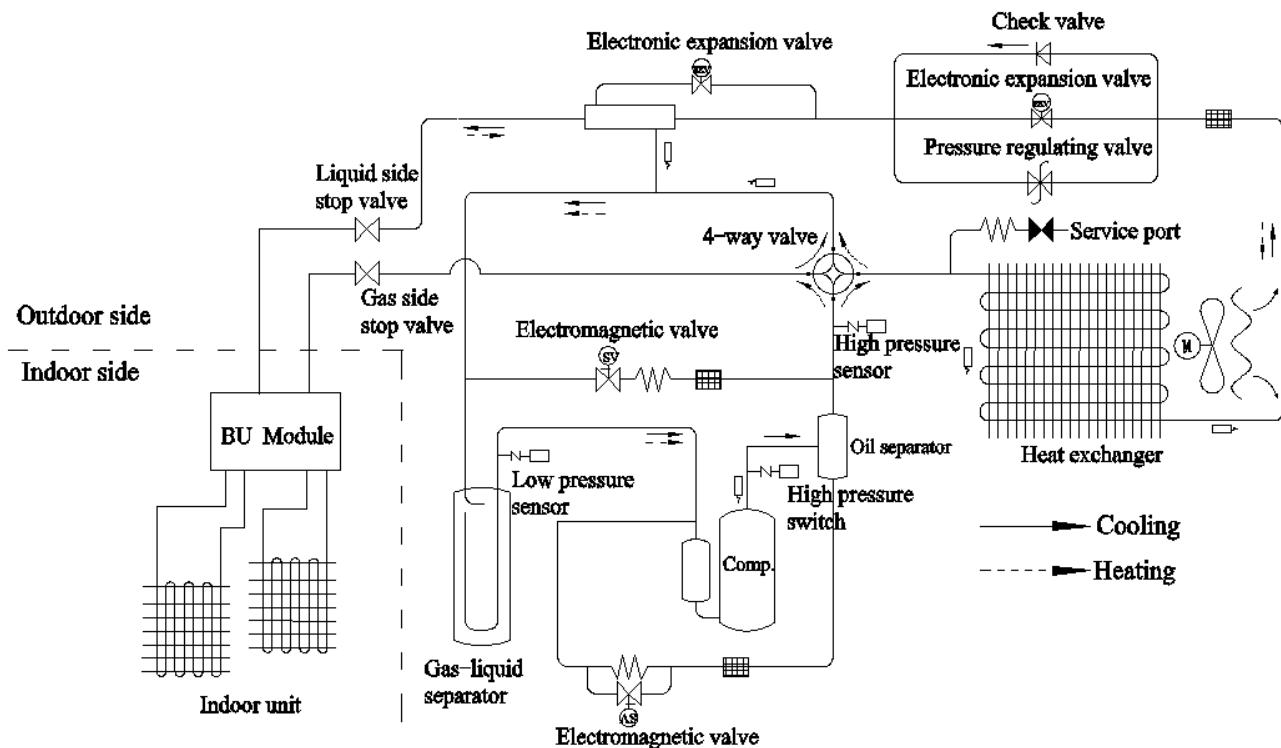


Fig. 16 – Refrigeration Cycle Diagrams Sizes 48 and 56

# REFRIGERANT LINES

## General refrigerant line sizing:

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

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

- The maximum piping lengths are listed in Table 10.

**Table 10—Maximum Piping Lengths**

System Size		Outdoor Unit							
			18	24	30	36	42	48	56
Piping	Min. Piping Length	ft	10	10	10	10	10	10	10
	Standard Piping Length	ft	32	98	131.2	131.2	131.2	98.42	98.42
	Max. outdoor-indoor height difference	ft	33	33	49.2	49.2	49.2	98.42	98.42
	Max. height distance between indoor and indoor	ft	33	33	24.6	24.6	24.6	49.21	49.21
	Max. height distance between indoor and outdoor and indoor	ft	32	32	49.2	49.2	49.2	98.42	98.42
	Max. height distance between indoor and outdoor and outdoor up	ft	33	33	49.2	49.2	49.2	98.42	98.42
	Max. equivalent piping outdoor to last indoor	ft	33	65	82	82	82	229	229
	Max. Piping Length with no additional refrigerant charge	ft	32	98	131.2	131.2	131.2	98.42	98.42
	Max. Piping Length	ft	65	196	229.7	246	246	442.9	475.7
	Gas Pipe (size – connection type)	in	3/8	3/8	3/8	3/8	3/8	5/8	5/8
Refrigerant	Liquid Pipe (size – connection type)	in	1/4	1/4	1/4	1/4	1/4	3/8	3/8
	Refrigerant Type		R-410A						
	Heat Pump Models Charge Amount	Lbs	3.53	4.85	6.17	8.05	8.05	10.91	10.91

**NOTE:** The refrigerant charge included is adequate for the sum of all liquid pipes connected to the outdoor unit.

**Table 11—Additional Charge**

Unit Size	Total Line Length ft		Additional Charge, 1/4" Liquid Line / 3/8" Liquid Line, oz/ft. ft (m)									
			10 – 32 (3 – 10)	>32 – 66 (10 – 20)	>66 – 98 (20 – 30)	>98 – 131.2 (30 – 40)	>131.2 – 196 (40 – 60)	>196 – 230 (60 – 70)	>230 – 246 (70 – 75)	>246 – 443 (75 – 135)	>443 – 476 (135 – 145)	
18	10	66	None	0.20 / 0.20								
24	10	196		None	None	0.20 / 0.20		0.20 / 0.20				
30	10	230		None	None	None	0.24 / 0.58	0.24 / 0.58				
36	10	246		None	None	None	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58			
42	10	246		None	None	None	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58		
48	10	443		None	None	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	
56	10	476		None	None	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58	0.24 / 0.58

Additional Refrigerant Calculation Sizes 30K, 36K and 42K:

Sum Total Liquid Pipe 1/4" (ft) x 0.24 + Sum Total Pipe 3/8" (ft) x 0.58 – 31 oz

Additional Refrigerant Calculation Sizes 48K and 56K:

Sum Total Liquid Pipe 1/4" (ft) x 0.24 + Sum Total Pipe 3/8" (ft) x 0.58 – 51.7 oz

**NOTE:** If the calculation results in a negative number no additional refrigerant is required.

- Both lines must be insulated. Use a minimum of 1/2-in (12.7 mm) thick insulation. Closed-cell insulation is recommended in all long-line applications.
- Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so that vibration or noise is not transmitted into the structure.

# 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.

**NOTE:** A 500 psi pressure test for 1 hour is required.

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 the torque flare nuts A, B, C, D, connect manifold gage charge hose to a charge port of the low side service valve (see Fig. 17).
- 2 Connect charge hose to vacuum pump.
- 3 Fully open the low side of manifold gage (see Fig. 18).
- 4 Start the vacuum pump.
- 5 Evacuate using the triple evacuation method to obtain a deep vacuum.
- 6 After evacuation is complete, fully close the low side of manifold gage and stop operation of vacuum pump.
- 7 The factory charge contained in the outdoor unit is good for up to 25 ft. (8 m) of line length. For refrigerant lines longer than 25 ft (8 m), add refrigerant as specified in the *ADDITIONAL REFRIGERANT CHARGE* table in this document.
- 8 Disconnect charge hose from charge connection of the low side service valve.
- 9 Fully open service valves B and A.
- 10 Securely tighten caps of service valves.

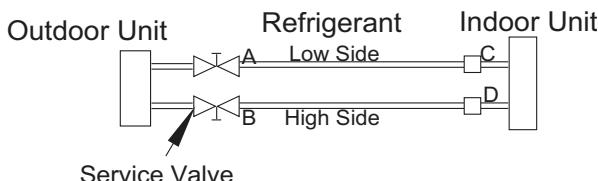


Fig. 17 – Service Valve

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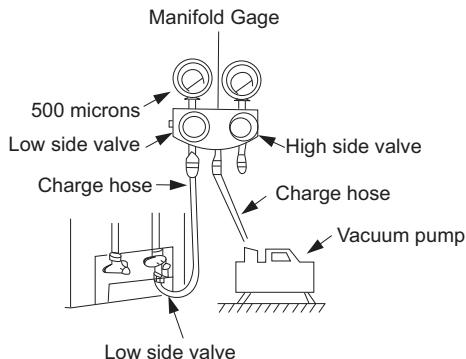
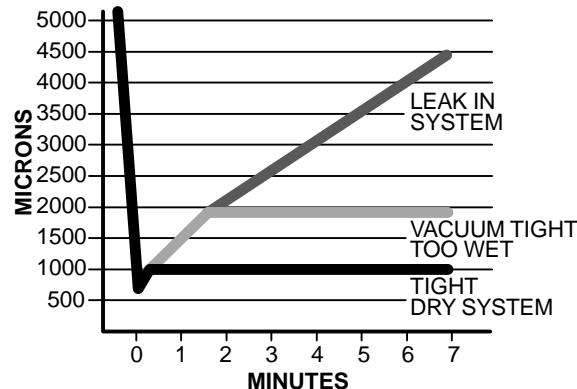


Fig. 18 – Manifold

### 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. 19).



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Fig. 19 – Deep Vacuum Graph

### Triple Evacuation Method

The triple evacuation process should be used in accordance to the following table

Refer to Fig. 20 and proceed as follows:

- 1 Evacuate to 1500 microns.
- 2 Pressure back to 0 psig with dry nitrogen.
- 3 Evacuate to 1000 microns.
- 4 Pressure back to 0 psig with dry nitrogen
- 5 Evacuate to 500 microns minimum.
- 6 Perform the hold test for 30 minutes.

### TRIPLE EVACUATION:

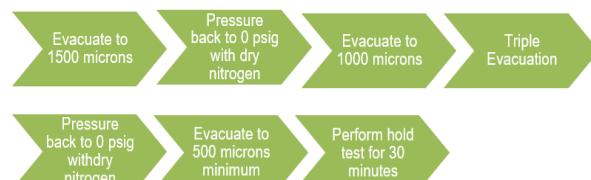


Fig. 20 – Triple Evacuation Method

### 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.

# CONTROL SYSTEM

The multi-zone unit is equipped with a microprocessor control to perform two functions:

- 1 Provide safety for the system
- 2 Control the system and provide optimum levels of comfort and efficiency.

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

## Main Logic

### Control Function of the Outdoor Unit

#### **Cooling Mode**

- 1 Cooling conditions and process: The compressor turns on and starts the unit for the cooling operation. When one of the indoor units reaches the cooling operation condition, the unit starts the cooling operation. In this case, the electronic expansion valve, the outdoor fan and the compressor start operation.
- 2 Stops while in the cooling operation
  - a. Compressor stops: The compressor stops gradually and the outdoor fan stops after 1 min.
  - b. Some of the indoor units shut down however the compressor does not stop. The compressor operates according to the required frequency. For the indoor unit with no load command, the corresponding electronic expansion valve is closed to **OP**.
- 3 Cooling mode switches to the **HEATING** mode. When the unit transfers to the **HEATING** mode, the 4-way valve is energized after the compressor runs for 40 seconds. The other commands are the same as stopping in the **COOLING** mode.
- 4 4-way valve: In this mode, the 4-way valve is closed.
- 5 Outdoor fan control in cooling mode: The outdoor fan starts 5 seconds before the compressor starts. The outdoor fan runs in high speed for 40 seconds after starting and then it runs in the set speed. The fan shall run in every speed for at least 80 seconds. When the number of indoor units change, the control part adjusts the outdoor fan according to the quantity of the indoor unit and outdoor temperature.) When the compressor stops, the outdoor fan runs at present speed and stops after 1 minute.

#### **Dry Mode**

- 1 The dry conditions and process are the same as those in the **COOLING** mode;
- 2 The status of the 4-way valve: closed;
- 3 The temperature setting range: 60F – 86F°F;
- 4 Protection function: the same as those in the **COOLING** mode;
- 5 In the **DRY** mode, the maximum value A of the capacity requirement percentage of single unit is 90% of that in the **COOLING** mode. The open condition of the electronic expansion valve, outdoor fan and compressor is the same as those in the **COOLING** mode.

#### **Heating Mode**

- 1 Heating conditions and process: When one of the indoor units reaches the heating operation condition, the unit starts the heating operation.
- 2 Stop in heating operation:
  - a. When all the indoor units stop running, the compressor stops and the outdoor fan stops after 1 minute;
  - b. Some of the indoor units stop. The compressor reduces the frequency immediately and operates according to the required frequency;
  - c. **HEATING** mode transfers to cooling mode (**DRY** mode), **FAN** mode: The compressor stops and the outdoor fan stops after one minute. The status of the 4-way valve: energized
- 3 Outdoor fan control in **HEATING** mode. The outdoor fan starts 5 seconds before the compressor starts. The outdoor fan then runs in high speed for 40 seconds; The fan will run at every speed for at least 80 seconds. When the compressor stops, the outdoor fan stops after 1 minute.
- 4 Defrosting Function: When the defrosting condition is met, the compressor frequency starts to decrease and waits for defrosting. The electronic expansion valve of all indoor units open at a large angle and the outdoor fan stops after the 4-way valve stops. The 4-way valve reverses direction. After the 4-way valve reverses the direction, the compressor frequency starts to rise and begins to calculate the time of defrosting. The compressor frequency rises to reach the defrosting frequency.
- 5 Oil-returned control in **HEATING** mode
  - a. Oil-returned condition: the whole unit is operating in a low frequency for a long time.
  - b. Oil-returned process in heating mode: the indoor unit displays “**H1**”.
  - c. Oil-returned finished condition in the **HEATING** mode The duration reaches 5 minutes.

#### **Fan Mode**

The compressor, the outdoor fan and the 4-way valve are closed; temperature setting range is 60F – 86F°F.

### Protection Function

#### **Mode Conflict Protection of the Indoor Unit**

When the setting mode differs between various indoor units, the unit runs in the following status:

- 1 The mode of the first operating indoor unit is the basic mode, when comparing the mode of the other indoor units to see if there is a conflict. **COOLING** mode (**DRY** mode) is in conflict with Heating mode.
- 2 Fan mode is in conflict with Heating mode and the **HEATING** mode is the basic mode. No matter which indoor unit operates first, the unit runs in the **HEATING** mode.

## Overload Protection Function

When the tube temperature is a little low, the compressor raises the operation frequency. When the tube temperature is a little high, the compressor frequency is restricted or lowers the operation frequency. When the tube temperature is too high, the compressor protection stops.

If the discharge temperature protection continuously appears for 6 times, the compressor can not resume running. The compressor can resume running after turning the power off and then on. (If the compressor's running time is longer than 7 minutes, the protection times record will clear).

## Discharge Protection Function

When the discharge temperature is a little low, the compressor raises the operation frequency. When the discharge temperature is a little high, the compressor frequency is restricted or lowers the operation frequency. When the discharge temperature is too high, the compressor protection stops.

If the discharge temperature protection continuously appears for 6 times, the compressor can not resume running. The compressor can resume running after turning the power off and then on. (If the running time of the compressor is longer than 7min, the protection times record will clear).

## Communication Malfunction

Detection of the quantity of installed indoor units and BU modules: After 3 minutes of energizing, if the outdoor unit does not receive the communication data of certain indoor units, the outdoor unit assumes the indoor unit is not installed and acts as it is not installed. If the outdoor unit receives the communication data from that indoor unit later, the outdoor unit will act as the unit is installed.

## Compressor High-Pressure Protection

- 1 When the unit determines the high-pressure switch has been cut off for 3 seconds (continuously), the compressor enters the high-pressure protection mode and stops when reaching set temperature. Meanwhile, the outdoor unit sends a "high-pressure protection" signal to the indoor units;
- 2 After the appearance of high-pressure protection, the compressor can resume running only after turning the power off and then back on.

## Compressor Low-Pressure protection

### 1 Low Pressure Protection for Shutdown

- a. After the compressor stops for five minutes, if it is detected that the low pressure protection is engaged, a low pressure protection signal is sent.
- b. If it is detected for three seconds (continuously) that the low pressure protection is engaged after the compressor stops for less than five minutes, then a low pressure protection signal is sent. However, if the low pressure protection occurs twice in one hour, it becomes unrecoverable and has to be recovered by powering the outdoor unit again.

### 2 Low Pressure Protection during the Operation

- a. When it is detected continuously for three seconds that the low pressure protection is engaged, then the whole unit should powers down and a low pressure protection signal is sent to the indoor unit.
- b. On condition that a low pressure protection error occurs and the whole unit stops for more than three minutes and it is detected continuously for six seconds that the low pressure protection switch is closed, the error can be eliminated. However, if the low pressure protection occurs twice in one hour, then it has to eliminate the error by powering the outdoor unit again.

## Compressor Overload Protection

If movement of the compressor overload switch is detected, the indoor unit displays the corresponding malfunction as it stops when the indoor temperature reaches the set temperature. When the compressor stops for more than 3 minutes and the compressor overload switch is reset, the unit resumes operation status automatically.

If the protection appears more than 6 times (if the compressor running time is longer than 30 minutes, the protection times record will be cleared), the unit can not resume operation status automatically, however it can resume running only after turning the power off and on.

## Other Function

### Refrigerant Recovery

The refrigerant can be recovered from the outdoor unit. When the unit is powered on and runs under the **COOL** mode, it is available within five minutes to enter the refrigerant recovery mode by operating the outdoor unit testing board with "**F0**" displayed.

### How to Quit the Refrigerant Recovery:

When the refrigerant recovery has started, it can be stopped by using the outdoor unit testing board or by cutting off the power.

# TROUBLESHOOTING

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

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

## Required Tools:

The following tools are needed when diagnosing the units:

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

## Recommended Steps

- 1 Refer to the diagnostic hierarchy charts below and determine the problem at hand.
- 2 Go to the chart listed in the diagnostic hierarchy and follow the steps in the chart for the selected problem.

The diagnostic codes for the indoor and outdoor units are listed in the appendix.

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

# 48K/56K BRANCH BOXES

## Test Operation

### Check After Installation

Table 12—Check after Installation

Items to be Checked	Possible Malfunction
Has the gas leakage been checked?	It may cause insufficient cooling(heating) capacity.
Is the thermal insulation of the unit sufficient?	It may cause condensation and dripping.
Does it drain well?	It may cause condensation and dripping.
Is the voltage in accordance with the rated voltage marked on the nameplate?	It may cause electric malfunction or the components may be burned out.
Are the power and signal wires run correctly?	It may cause electric malfunction or the components may be burned out.
Has the unit been safely grounded?	It may cause electrical leakage.
Does it meet NEC?	It may cause electric malfunction or the components may be burned out.
Are there any obstacles near the air inlet and outlet of the indoor and outdoor units?	It may cause insufficient cooling(heating) capacity.
Have the length of connection pipes and refrigerant charge amount been recorded?	It is not easy to decide the charge amount of refrigerant.

## Test Operation

### 1 Before the Test operation

- a. Do not switch on power before installation is finished completely.
- b. Electrical wiring must be connected correctly and securely.
- c. The stop valves of the outdoor unit should be fully open.
- d. Is the unit properly evacuated?

### 2 Test the Operation Method

- a. The test operation should be carried out by the professionally skilled personnel on the premise that all items listed above are in normal conditions.
- b. Set the status of the power supply switch as “ON” eight hours before the start of operation.
- c. Press **MODE**, to select the **COOL**, or **HEAT**.
  - The fan motor of the indoor unit will run automatically in one minute.
  - The fan motor and compressor of the outdoor unit will run automatically in one minute.
  - Ensure every combination of indoor units work well.



## CAUTION

If the unit cannot work nor has any abnormal noise after the compressor is started, turn off the unit for an immediate check.

# TROUBLESHOOTING (CONT)

## Testing Board Introduction

### Compose of the Testing Board

The testing board is in front of electrical box and can be observed. It has several following advantages: detect indoor unit numbers and indoor unit address, displays real running function and error code automatically. It is composed of the function section, data section and button section.

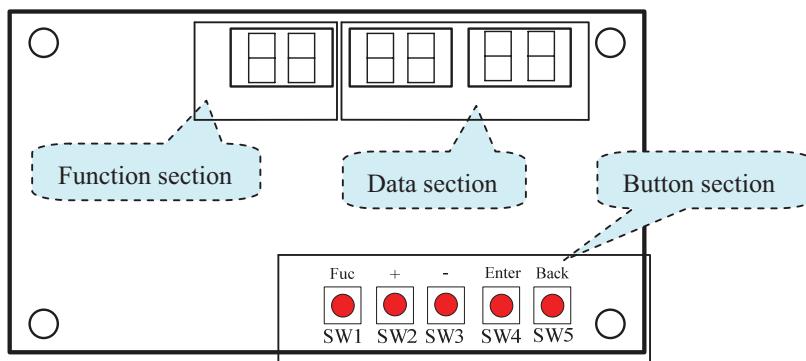


Fig. 21 – Testing Board

Table 13—Instruction of Function and Data Section

Running State	The Display of the Function Section	The Display of the Data Section																
Stop	1. The section displays the numbers of the indoor units which have established communication with the outdoor unit. For example, if there are seven established indoor units, the section displays "7". 2. It displays the address of the indoor units by turns. For example, the "1b" is represented of the indoor unit 1B. (BU module:1/2/3, Indoor unit: A/b/C/d/E)	1. If the function section displays the numbers of the indoor units, the data section displays the outside temperature. For example, the "35" is represented of 35°C. 2. If the function section displays the address of the indoor unit, the data section displays the model of the indoor unit, for example, the "35" is represented of 35 model.																
Normal	The code of running state: <table border="1"> <tr> <td>Code</td> <td>Running State</td> <td>Code</td> <td>Running State</td> </tr> <tr> <td>UE</td> <td>Pressure equalization</td> <td>UH</td> <td>Heating</td> </tr> <tr> <td>UP</td> <td>Pump Down</td> <td>F7</td> <td>Oil Returning</td> </tr> <tr> <td>UC</td> <td>Cooling</td> <td>H1</td> <td>Defrosting</td> </tr> </table>	Code	Running State	Code	Running State	UE	Pressure equalization	UH	Heating	UP	Pump Down	F7	Oil Returning	UC	Cooling	H1	Defrosting	It displays the target speed of the compressor. If the speed is zero, it will display "0". For example, the speed is the fifteenth; it displays "15". The range of the speed is from 0 to 60.
Code	Running State	Code	Running State															
UE	Pressure equalization	UH	Heating															
UP	Pump Down	F7	Oil Returning															
UC	Cooling	H1	Defrosting															
Malfunction	If the malfunction occurs in the system, the section displays the error code. If there are several malfunctions, it displays the error codes by turns at intervals of 2 seconds.	1. If the malfunction occurs in the outdoor unit, the section displays nothing; 2. If the malfunction occurs in the indoor units, the section displays the address of the indoor unit.																

## TROUBLESHOOTING (CONT)



### CAUTION

In the event of abnormal conditions, please shut off the power supply immediately and then contact the appointed service center; otherwise, the abnormal running may damage the unit and cause electric shock or fire hazard. Do not repair the air conditioning personally but instead contact the professionally skilled personnel at the appointed service center, as the incorrect repair would cause electric shock or fire hazard etc.

#### Check before Contacting Service Center

**Table 14—Self-Check**

Conditions	Causes	Corrective actions
The unit does not run at all	Broken fuse or breaker is off	Replace the damaged fuse or close the breaker
	Power off	Restart the unit after power supply resumes
	Power supply plug is loose	Plug the power supply properly
	The batteries voltage of the remote controller is insufficient	Replace with new batteries
	Remote controller is out of the control scope	The distance shall be within 26 ft.
The unit stops soon after it starts	Air inlet or outlet of indoor unit or outdoor unit is blocked	Remove the obstacles
Cooling or heating is abnormal	Air inlet or outlet of indoor unit or outdoor unit is blocked	Remove the obstacles
	Temperature setting is improper	Adjust the setting of remote controller or wire controller
	Air speed is set too low	Adjust the setting of remote controller or wire controller
	Improper airflow direction	Adjust the setting of remote controller or wire controller
	Door or window is open	Close the door or window
	Under direct sunshine	Hang curtain or blenders over the window
	Too many people in the room	
	Too many heat sources indoors	Reduce the heat sources
	The filter screen is dirt or blocked	Clean the filter screen

If the air conditioner still runs abnormally after the above check and handling, please contact the local appointed service center and also give a description of the error occurred as well as the model of the unit.

#### Proper Operation

The conditions listed in Table 15 are not classified as errors.

**Table 15—Proper Operation**

Conditions	Causes	
The unit does not run	Restart the unit soon after it is stopped	
	As soon as power supply is on	
The unit blows out mist	When the cooling operation starts	The hi-humidity air indoor is cooled quickly
The unit generates noise	The unit “clatters” as soon as it starts running	The sound generated during the initialization of the electronic expansion valve
	The unit “swishes” during the cooling operation	The sound when the refrigerant gas runs inside the unit
	The unit “swishes” when it is started or stopped	It is the sound when the refrigerant gas stops running
	The unit “swishes” when it is in and after the running	It is the sound when the draining system is operating
	The unit “squeaks” when it is in and after the running	It is the sound of friction generated by the plastic which swells due to the temperature change
The unit blows out dust	When the unit restarts after it is not used for a long time	The dust inside the unit is blown out again
The unit emits odors	When the unit is running	The odors absorbed in are blown out

# TROUBLESHOOTING (CONT)

## Error Description

If some error occurs when the unit is running, the error code displays and checks for more details about the meaning of each error.

Table 16—Error Description

Definition Errors	Main Control Display for Outdoor Unit			Indoor Unit Code	Testing Board Code
	Yellow LED	Red LED	Green LED		
The compressor is start up	Flash 1 time				
IPM current protection	Flash 3 times			H5	H5
IPM temperature protection	Flash 5 times			P8	P8
PFC current protection	Flash 7 times				HC
PFC temperature protection	Flash 8 times			P8	P8
Low voltage protection	Flash 9 times			PL	PL
High voltage protection	Flash 10 times			PH	PH
Low pressure protection	Flash 11 times				E3
High pressure protection	Flash 12 times				E8
High pressure switch protection	Flash 13 times				E1
Capacitor charging error	Flash 14 times				PU
AC current protection	Flash 15 times			E5	E5
Memory card error	Flash 16 times				EE
Compressor demagnetizing protection	Flash 17 times			HE	HE
Compressor de-synchronizing	Flash 18 times			H7	H7
Compressor phase lack	Flash 19 times			U2	U2
Compressor phase circuit detection error	Flash 20 times			U1	U1
Compressor power protection	Flash 21 times			L9	L9
Compressor overload protection	Flash 22 times			H3	H3
Compressor discharge temp. protection	Flash 23 times			E4	E4
Lack of refrigerant or jam protection	Flash 31 times			F0	F0
Normal operation		Flash 1 time			
Frequency limitation for AC current		Flash 2 times			F8
Oil returning		Flash 3 times			F7
Defrosting		Flash 4 times		H1	H1
Frequency limitation for IPM temp.		Flash 5 times			EU
Frequency limitation for PFC temp.		Flash 6 times			EU
Frequency limitation for compressor overload		Flash 8 times			LU
Frequency limitation for compressor discharge temperature		Flash 9 times			F9
Frequency limitation for low pressure		Flash 10 times			Pn
Frequency limitation for high pressure		Flash 11 times			Fb
Discharge temperature sensor error		Flash 12 times		F5	F5
Outdoor temperature sensor error		Flash 13 times		F3	F3
Suction temperature sensor error		Flash 15 times			dc
Condenser temperature sensor error		Flash 16 times		A7	A7
Sub-cool temperature sensor error		Flash 17 times			bC
Low pressure sensor error		Flash 18 times			dL
High pressure sensor error		Flash 19 times			e1
Fan motor error for indoor unit		Flash 20 times		Hb	Hb
Driving board is connected			Flash 1 time		
Testing board is connected			Flash 2 times		
Computer is connected			Flash 4 times		
Indoor unit 1 is connected			Flash 5 times		
Indoor unit 2 is connected			Flash 6 times		
Indoor unit 3 is connected			Flash 7 times		
Indoor unit 4 is connected			Flash 8 times		
Indoor unit 5 is connected			Flash 9 times		

# TROUBLESHOOTING (CONT)

## Error Description (CONT)

Definition Errors	Main Control Display for Outdoor Unit			Indoor Unit Code	Testing Board Code
	Yellow LED	Red LED	Green LED		
Indoor unit 6 is connected			Flash 10 times		
Indoor unit 7 is connected			Flash 11 times		
Indoor unit 8 is connected			Flash 12 times		
Indoor unit 9 is connected			Flash 13 times		
Indoor unit anti-freeze protection				E2	E2
Indoor temperature sensor error				F1	F1
Indoor evaporator midway temperature sensor error				F2	F2
Temperature sensor error for liquid pipe of BU module				b5	b5
Temperature sensor error for gas pipe of BU module				b7	b7
Running mode conflicts				E7	E7
Communication error				E6	E6 indoor unit address
Communication error between the main board and driving board					P6
Communication error between the main board and testing board					CE
Gas sensor error of indoor unit					Fn
Humidity sensor error of indoor unit					L1
Water full error of indoor unit				E9	E9
Jumper terminal error of indoor unit				C5	C5
Phase lack of power supply					dJ
Fan motor error of outdoor unit					L3
Refrigerant recovery mode				F0	F0

- Display mode of Red LED and Yellow LED: At intervals of half a second, flash for half a second; if there are several malfunctions, it displays the error codes by turns at intervals of one second.
- Display mode of Green LED: At intervals of 1/4 second, flash for 1/4 second; and it displays the running states by turns at intervals of half a second.

## Maintenance

Check, maintenance and regular care should be performed by professional personnel, which prolongs the unit service life.

### Outdoor Condenser

Outdoor condenser is required to be cleaned every two months. Use vacuum cleaner with nylon brush to clean up dust on the surface of condenser. Blow away dust by compressed air if it is available.

### Drain Pipe

In order to drain condensate smoothly, please check the drain pipe regularly.

### Check before the Seasonal Use

- Check the air inlet and outlet of the indoor and outdoor units to confirm there is no blockage.
- Check the ground wire to confirm the grounding is reliable.
- Check the batteries of the wireless remote controller to ensure that they have been replaced.
- Check the filter screen that it has been set soundly.
- If the air-conditioning unit shall be operated again after a long-term shut off, set the status of the power supply switch as “ON” eight hours before the start of operation, so as to ensure the successful startup of the air-conditioning unit.
- Check the outdoor unit to ensure the installation of it is steady. Contact the appointed service center if there is any abnormal condition.

### Maintenance after Seasonal Use

- Turn off the power supply of the air conditioning unit and set the status of the power supply switch as “OFF”.
- Clean the filter screen and the housing of the indoor and outdoor units.
- Remove the dust and the foreign matters of the outdoor unit.
- In the event of rusting, please use the anti-rust paint to stop spreading of rust.

Refer to the *Installation and Operation* manual of each indoor unit respectively for detailed maintenance.

## TROUBLESHOOTING (CONT)

This unit has on-board diagnostics. Error codes are displayed on the wired remote controller and the outdoor unit microprocessor board with colored LED lights. Table 17 lists the error codes on both.

### SIZES 18 AND 24

Table 17—Malfunction Status

Malfunction Name	Malfunction Type	Nixie Tube
Zero cross detection circuit malfunction(for indoor unit)	Hardware malfunction	U8
Malfunction protection of jumper cap(for indoor unit)	Hardware malfunction	C5
Feedback of without I DU motor(for indoor unit)	Hardware malfunction	H6
Indoor ambient temperature sensor is open/short circuited	Hardware malfunction	F1
Indoor evaporator temperature sensor is open/short circuited	Hardware malfunction	F2
Liquid valve temperature sensor is open/short circuited	Hardware malfunction	b5
Gas valve temperature sensor is open/short circuited	Hardware malfunction	b7
Modular temperature sensor is open/short circuited	Hardware malfunction	P7
Outdoor ambient temperature sensor is open/short circuited	Hardware malfunction	F3
Outdoor condenser middle pipe temperature sensor is open/short circuited	Hardware malfunction	F4
Outdoor discharge temperature sensor is open/short circuited	Hardware malfunction	F5
Communication malfunction	Hardware malfunction	E6
Malfunction of phase current detection circuit for compressor	Hardware malfunction	U1
Module high temperature protection	Viewing malfunction code through remote controller within 200s; displayed directly on nixie tube after 200s	P8
Refrigerant lacking or blockage protection of system (not available for residential ODU)		F0
Charging malfunction of capacitor	Hardware malfunction	PU
High pressure protection of system	Hardware malfunction	E1
Low pressure protection of system (reserved)	Hardware malfunction	E3
Compressor overload protection	Viewing malfunction code through remote controller within 200s; displayed directly on nixie tube after 200s	H3
Indoor unit and outdoor unit do not match	Hardware malfunction	LP
Malfunction of memory chip	Hardware malfunction	E E
Wrong connection of communication wire or malfunction of electronic expansion valve	Hardware malfunction	dN
Malfunction protection of outdoor fan 1	Hardware malfunction	L3
Detection status of wrong connection of communication wire or malfunction of electronic expansion valve	Operation status	dd
Mode conflict	Operation status	E7
Refrigerant recycling mode	Operation status	F0
X-fan	Operation status	AL
Defrosting or oil return in heating mode	Operation status	H1
Start failure of compressor	Viewing malfunction code through remote controller within 200s; displayed directly on nixie tube after 200s	Lc
High discharge temperature protection of compressor		E4
Overload protection		E8
Whole unit over-current protection		E5
Compressor phase current protection		P5
Compressor de-synchronizing		H7
Compressor phase-lacking/phase-inverse protection		Ld
IPM modular protection		H5
DC bus-bar low voltage protection		PL
DC bus-bar high voltage protection		PH
PFC protection		HC
The four-way valve is abnormal		U7

## TROUBLESHOOTING (CONT)

This unit has on-board diagnostics. Error codes are displayed on the wired remote controller and the outdoor unit microprocessor board with colored LED lights. The table below explains the error codes on both.

### Sizes 30, 36 and 42

Table 18—Malfunction Status

Name of Malfunction	Indicator Display			Indoor Display
	Yellow light	Red Light	Green Light	
Compressor runs	Flash 1 time			
Defrost	Flash 2 times			H1
Anti-freezing protection	Flash 3 times			E2
IPM protection	Flash 4 times			H5
AC over-current protection	Flash 5 times			E5
Over-burden protection	Flash 6 times			H4
Compressor exhaust high temperature protection	Flash 7 times			E4
Compressor overload protection	Flash 8 times			H3
Power protection	Flash 9 times			L9
EEPROM reads and write protection	Flash 11 times			
Low PN voltage protection	Flash 12 times			PL
Over voltage protection for PN	Flash 13 times			PH
PFC protection	Flash 14 times			HC
PFC module temperature protection	Flash 15 times			oE
Low pressure protection	Flash 17 times			E3
High pressure protection	Flash 18 times			E1
Limit/decline frequency (electric current)		Flash 1 time		
Frequency limit (exhaust)		Flash 2 times		
Frequency limit (Over-burden)		Flash 3 times		
Outdoor ambient sensor malfunction		Flash 6 times		F3
Outdoor tube sensor malfunction		Flash 5 times		F4
Exhaust sensor malfunction		Flash 7 times		F5
Attain the temperature of switch on		Flash 8 times		
Frequency limit (power)		Flash 13 times		
Outdoor fan malfunction		Flash 14 times		
Frequency limit (PFC module temperature)		Flash 15 times		
PFC module sensor malfunction		Flash 16 times		oE
Liquid pipe temperature sensor malfunction of A		Flash 17 times		
Gas pipe temperature sensor malfunction of A		Flash 18 times		
Liquid pipe temperature sensor malfunction of B		Flash 19 times		
Gas pipe temperature sensor malfunction of B		Flash 20 times		
Liquid pipe temperature sensor malfunction of C		Flash 21 times		
Gas pipe temperature sensor malfunction of C		Flash 22 times		
Liquid pipe temperature sensor malfunction of D		Flash 23 times		
Gas pipe temperature sensor malfunction of D		Flash 24 times		
Liquid pipe temperature sensor malfunction of E		Flash 25 times		
Gas pipe temperature sensor malfunction of E		Flash 26 times		
Exit of the condenser tube sensor malfunction		Flash 27 times		
Correspondence is normal			Flash 7 times (n = indoor unit number)	
Communication failure between indoor unit and outdoor unit (indoor unit all Communication failure)			Often bright	
Indoor ambient sensor malfunction				F1
Indoor evaporate sensor malfunction				F2
Mode conflict				E7
Accept fluorine mode				F0
Jumper cap malfunction protection				C5

## TROUBLESHOOTING (CONT)

This unit has on-board diagnostics. Error codes are displayed on the wired remote controller and the outdoor unit microprocessor board with colored LED lights. The table below explains the error codes on both.

### SIZES 48 – 56

Table 19—Malfunction Status

Errors of Definition	Yellow LED	Main Control Display for Outdoor Unit		Indoor Unit Code	Testing Board Code
		Red LED	Green LED		
The compressor is start up	Flash 1 time				
IPM current protection	Flash 3 times			H5	H5
IPM temperature protection	Flash 5 times			P8	P8
PFC current protection	Flash 7 times			HC	HC
PFC temperature protection	Flash 8 times			P8	P8
Low voltage protection	Flash 9 times			PL	PL
High voltage protection	Flash 10 times			PH	PH
Low pressure protection	Flash 11 times			E3	E3
High pressure protection	Flash 12 times			E8	E8
High pressure switch protection	Flash 13 times			E1	E1
Capacitor charging error	Flash 14 times			PU	PU
Current protection	Flash 15 times			E5	E5
Memory card error	Flash 16 times			EE	EE
Compressor demagnetizing protection	Flash 17 times			HE	HE
Compressor de-synchronizing	Flash 18 times			H7	H7
Compressor phase lack	Flash 19 times			U2	U2
Compressor phase circuit detection error	Flash 20 times			U1	U1
Compressor current protection	Flash 21 times			L9	L9
Compressor overload protection	Flash 22 times			H3	H3
Compressor discharge temperature protection	Flash 23 times			E4	E4
Lack of refrigerant or jam protection	Flash 31 times			F0	F0
Normal operation	Flash 1 time				
Frequency limitation for current protection	Flash 2 times			F8	
Oil returning mode	Flash 3 times			F7	F7
Defrosting mode	Flash 4 times			H1	H1
Frequency limitation for IPM temperature protection	Flash 5 times			EU	EU
Frequency limitation for PFC temperature protection	Flash 6 times			EU	EU
Frequency limitation for compressor overload protection	Flash 8 times			LU	
Frequency limitation for discharge temp. protection	Flash 9 times			F9	
Frequency limitation for low pressure protection	Flash 10 times			Pn	
Frequency limitation for high pressure protection	Flash 11 times			F6	F6
Discharge temperature sensor error	Flash 12 times			F5	F5
Outside temperature sensor error	Flash 13 times			F3	F3
Suction temperature sensor error	Flash 15 times			dc	
Condenser temperature sensor error	Flash 16 times			A7	A7
Sub-cool temperature sensor error	Flash 17 times			bC	
Low pressure sensor error	Flash 18 times			dL	
High pressure sensor error	Flash 19 times			e1	
Fan motor protection	Flash 20 times			H6	H6
Driving board is connected		Flash 1 time			
Testing board is connected		Flash 2 times			
Computer is connected		Flash 4 times			
Indoor unit 1 is connected		Flash 5 times			
Indoor unit 2 is connected		Flash 6 times			

## TROUBLESHOOTING (CONT)

This unit has on-board diagnostics. Error codes are displayed on the wired remote controller and the outdoor unit microprocessor board with colored LED lights. Table 20 explains the error codes on both.

### SIZES 48 – 56

Table 20—Troubleshooting

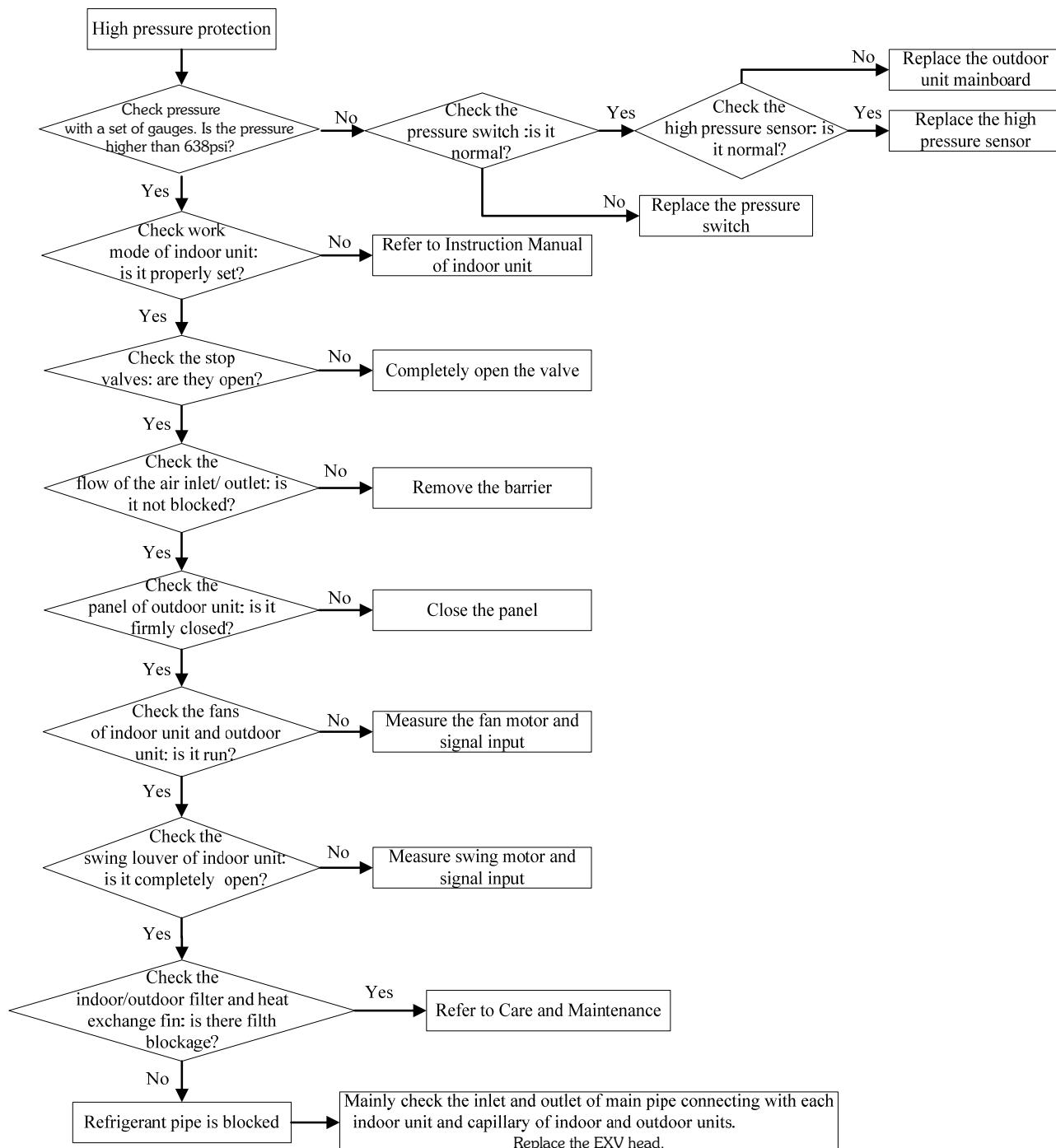
Errors of Definition	Main Control Display for Outdoor Unit			Indoor Unit Code	Testing Board Code
	Yellow LED	Red LED	Green LED		
Indoor unit 3 is connected			Flash 7 times		
Indoor unit 4 is connected			Flash 8 times		
Indoor unit 5 is connected			Flash 9 times		
Indoor unit 6 is connected			Flash 10 times		
Indoor unit 7 is connected			Flash 11 times		
Indoor unit 8 is connected			Flash 12 times		
Indoor unit 9 is connected			Flash 13 times		
Indoor anti-freeze protection				E2	E2
Inside temperature sensor error				F1	F1
Evaporator midway temp sensor error				F2	F2
Liquid pipe of Branch Box temperature sensor error				b5	b5
Gas pipe of Branch Box temperature sensor error				b7	b7
Mode conflicts				E7	E7
Communication error	BU 1	Indoor unit A			
		Indoor unit B			
		Indoor unit C			
	BU 2	Indoor unit A			
		Indoor unit B			
		Indoor unit C			
	BU 3	Indoor unit A			
		Indoor unit B			
		Indoor unit C			
Communication error between the main board and driving board					P6
Communication error between the main board and testing board					CE
Indoor unit gas sensor error					Fn
Indoor unit humidity sensor error					L1
Indoor unit water full protection					E9
Jumper terminal error				C5	C5
Power supply phase lack					dJ
Outdoor unit fan motor error					L3
Refrigerant recovery mode				F0	F0

# DIAGNOSIS AND SOLUTION

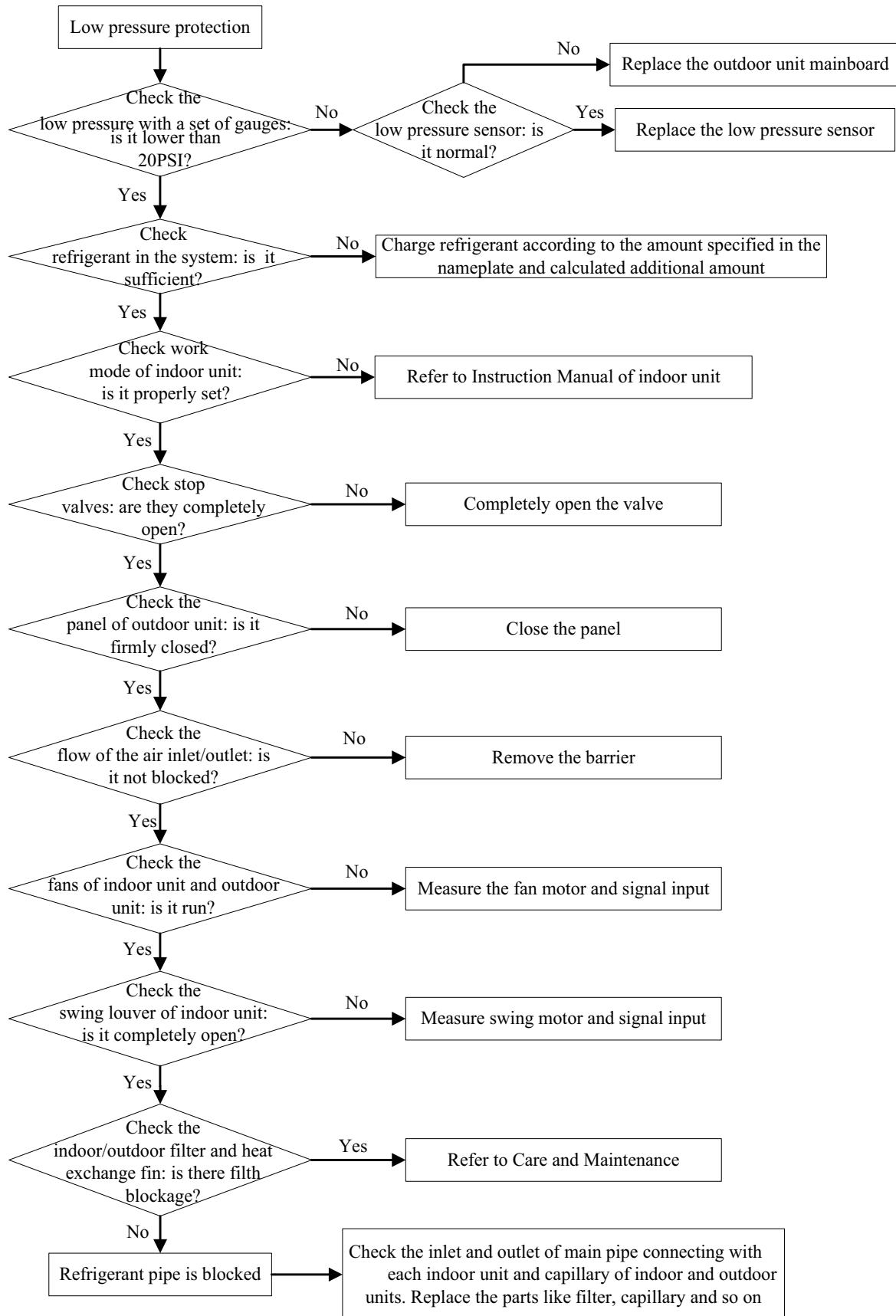
Service personnel shall collect the malfunction information as much as possible and research them thoroughly, list these electrical parts which may cause malfunction, service personnel shall be able to determine the specific reason and solve the faulted parts. Observe the status of the complete device and do not observe the partial.

It is advised to start from the simple operation during analyzing, judging and confirming malfunction reason, then conduct the complicated operations such removal of device, part replacement and refrigerant filling. Find the malfunction reason carefully as unit may occur several malfunction at the same time and one malfunction may develop into several malfunction, so entire system analysis shall be established to make the judged result exact and credible.

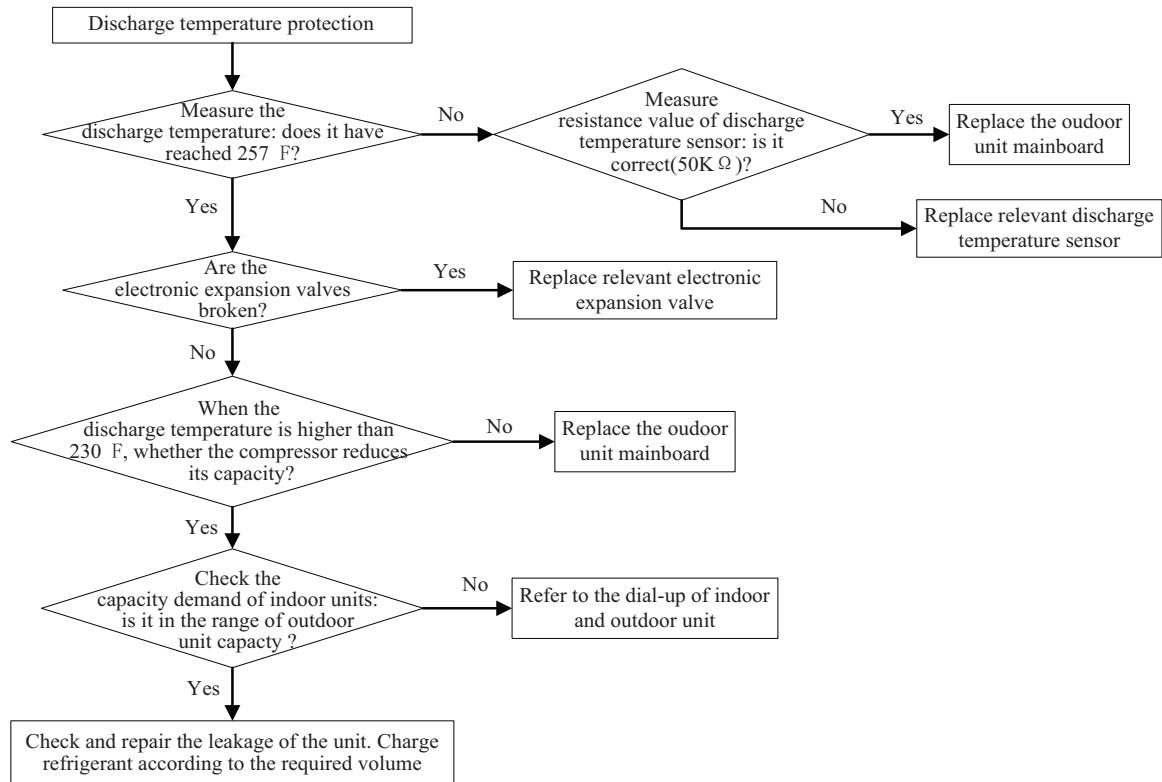
## Malfunction Display: High Pressure Protection



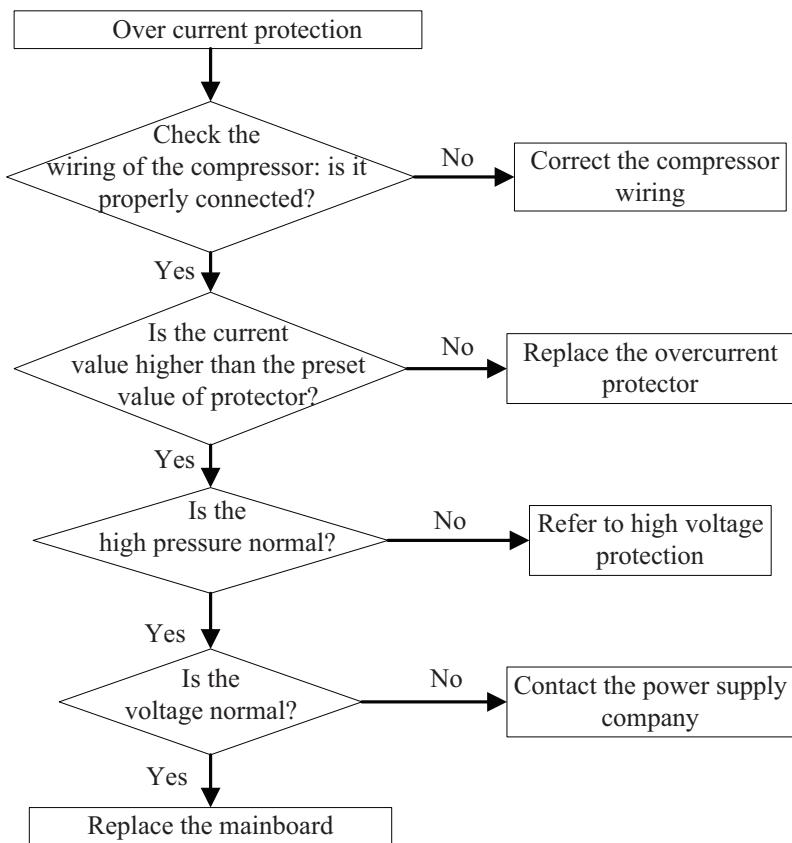
## Malfunction Display: Low Pressure Protection



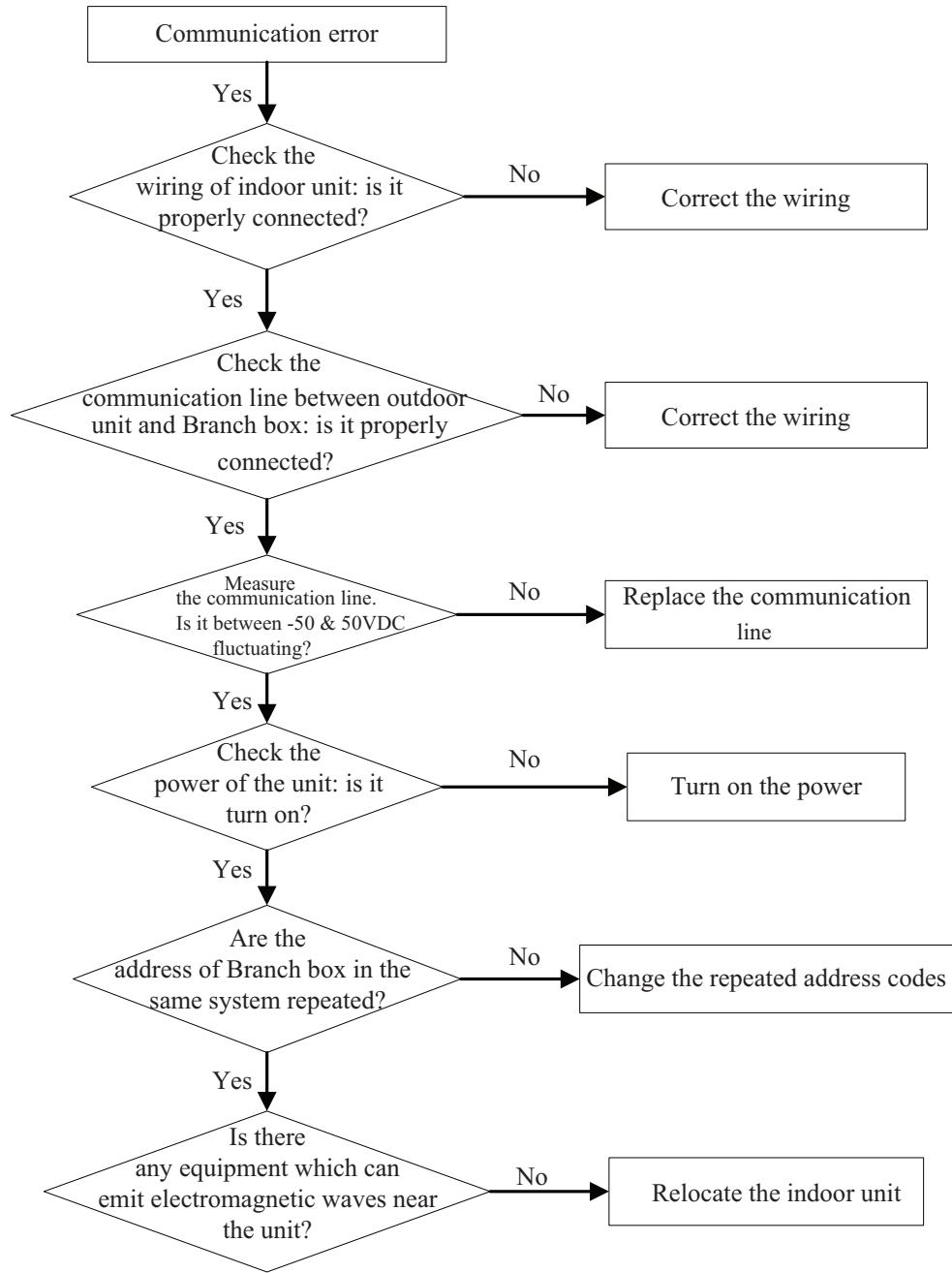
## Malfunction Display: Discharge Temperature Protection



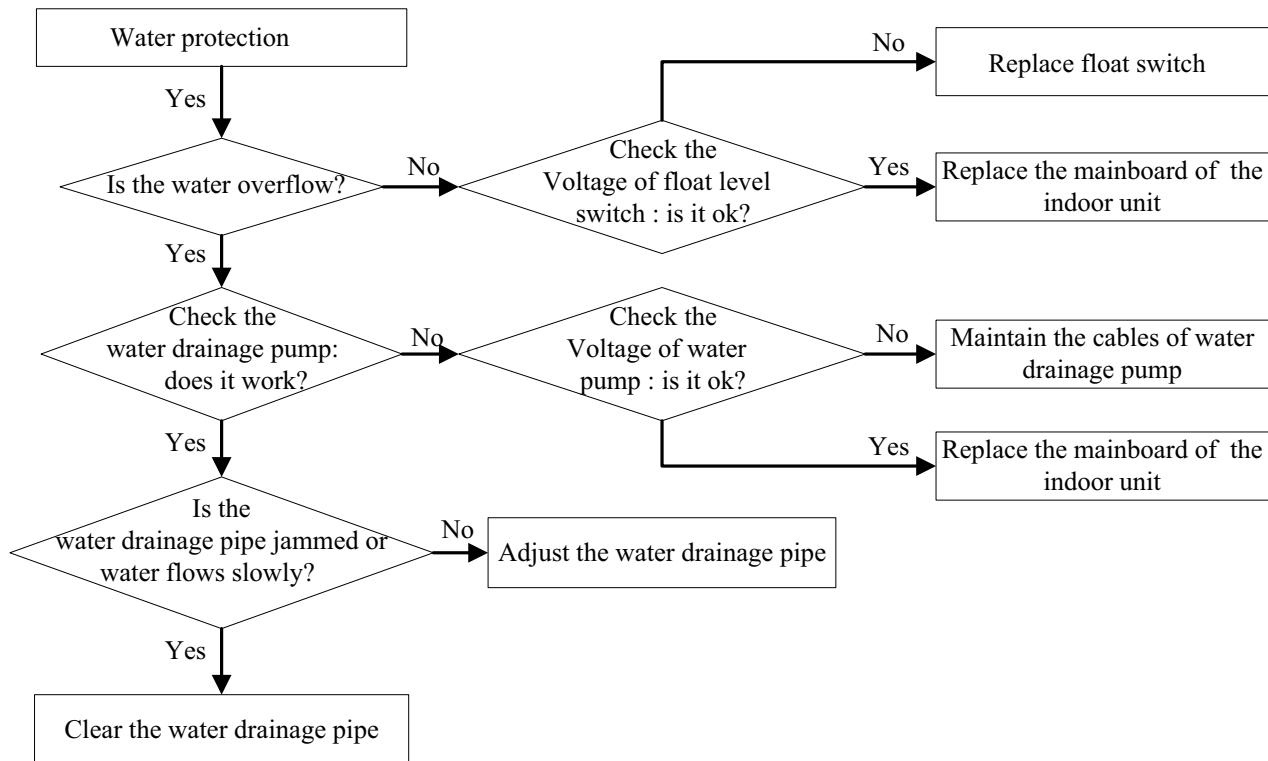
## Malfunction Display: Over Current Protection



## Malfunction Display: Communication Error



## **Malfunction Display: Indoor Unit Water Protection**

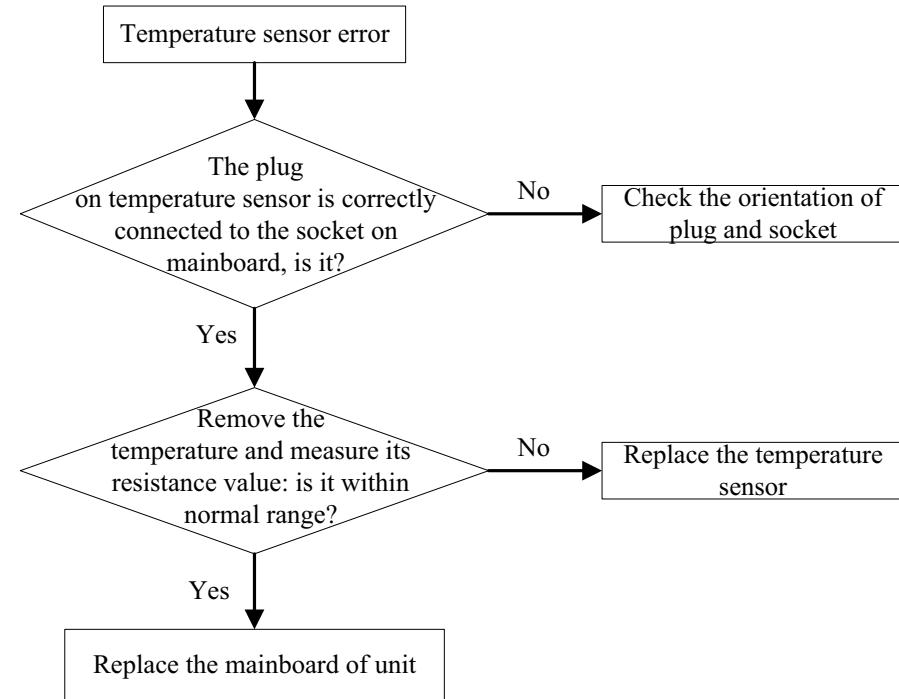


## Malfunction Display: Temperature Sensor Error

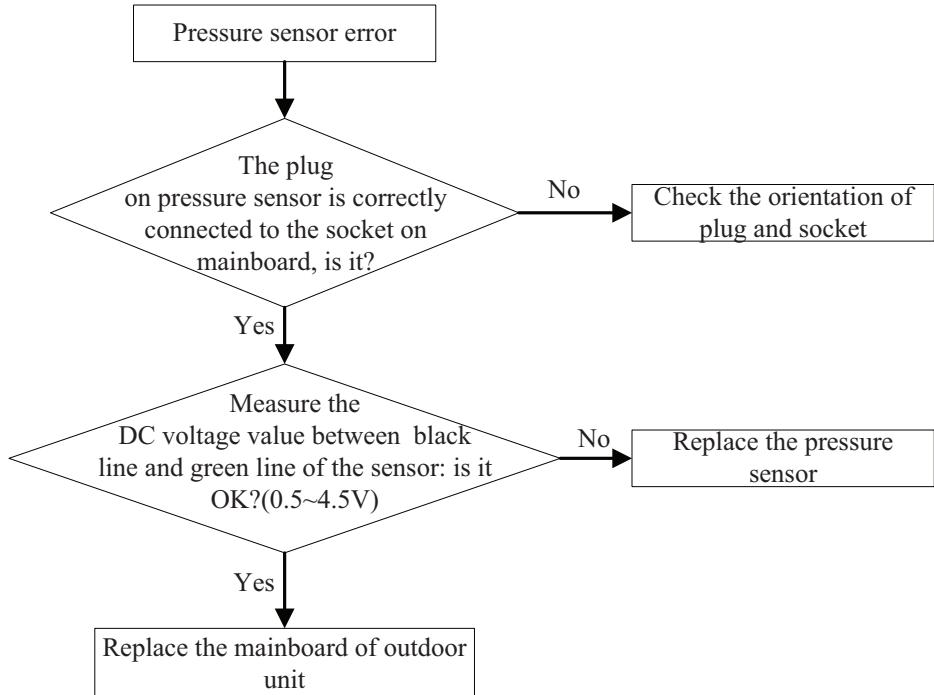
The resistance value of discharge temperature sensor is 50 KΩ;

The resistance value of outside temperature sensor and inside temperature sensor are all 15 KΩ;

The others are 20 KΩ.



## Malfunction Display: High/Low Pressure Sensor Error



**NOTE:** High pressure switch is energized at 638PSI and de-energized at 464PSI. Low pressure switch is energized at 20PSI and de-energized at 44PSI.

## IPM Continuity Check

Turn off the power, let the large capacity electrolytic capacitors discharge completely, and dismount the IPM. Use a digital tester to measure the resistance between P and UWN; UVW and N.

Table 21—IPM continuity check

Digital Tester		Normal Resistance Value	Digital Tester		Normal Resistance Value	
(+)Red	(-)Black	$\infty$ (Several MΩ)	(+)Red	(-)Black	$\infty$ (Several MΩ)	
P	N		U	N		
	U		V			
	V		W			
	W		(+)Red			

## Indoor AC Fan Motor

Measure the resistance value of each winding by using the tester.

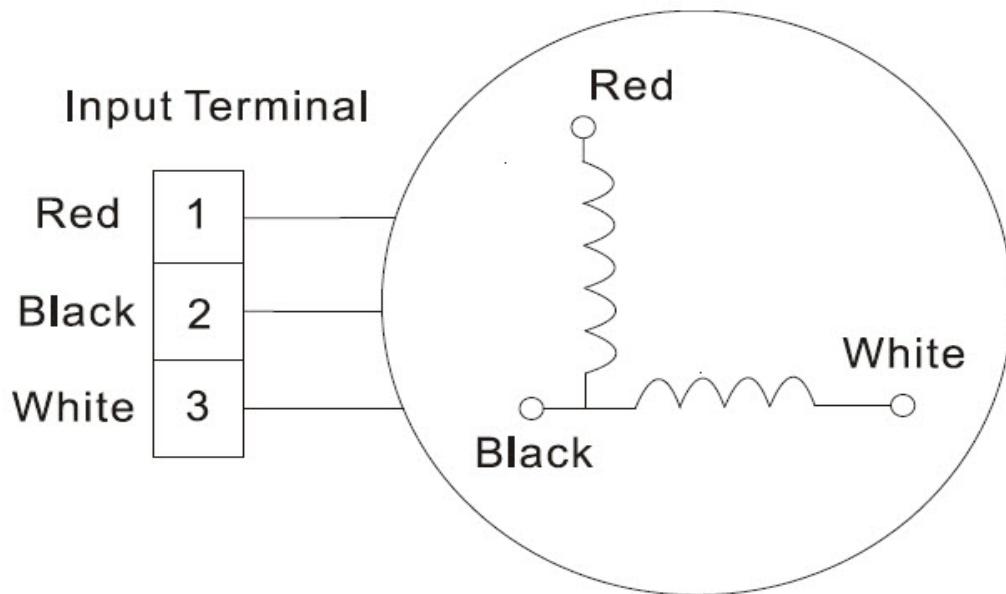


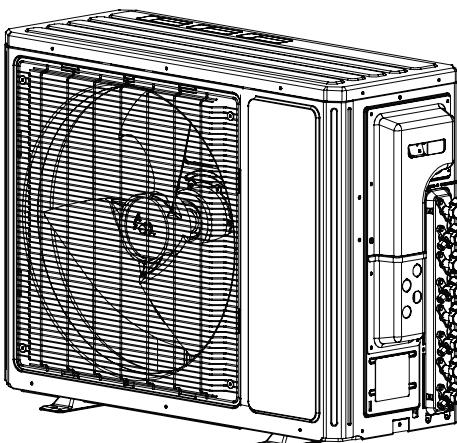
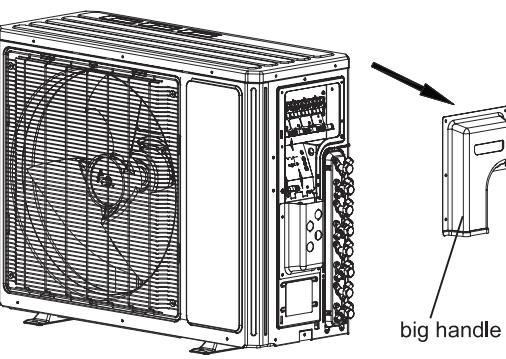
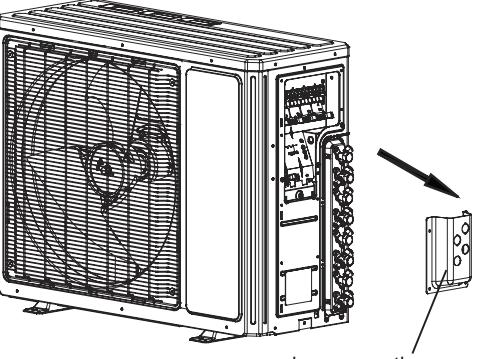
Fig. 22 – Indoor AC Fan Motor

Table 22—Resistance Value

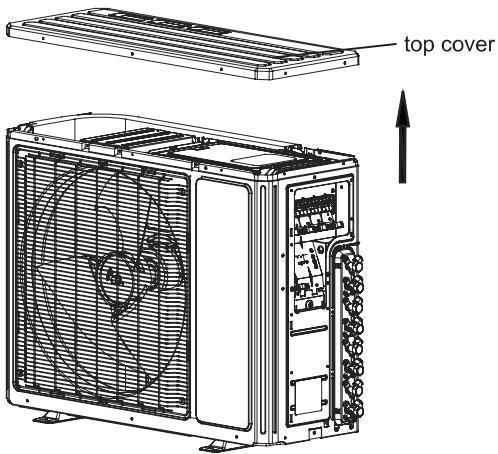
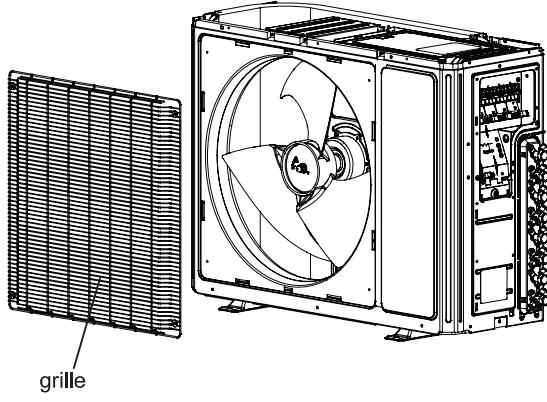
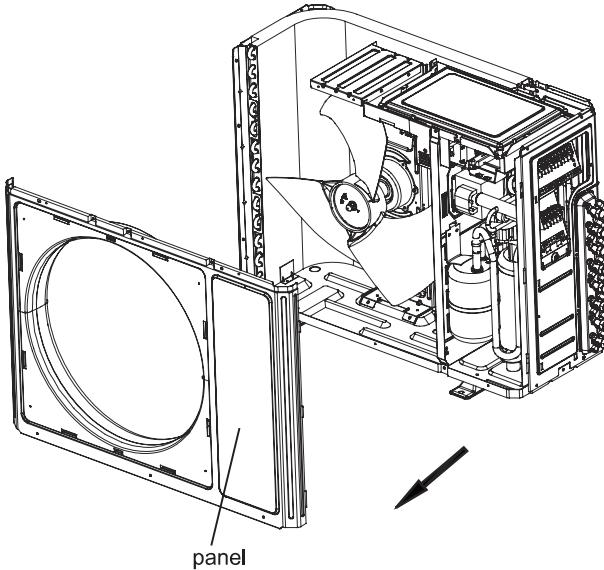
Terminal	Resistance Value	
	100.58%	(20°C /68°F)
Black - Red	100.8%	(20°C /68°F)
White - Black	64.58%	(20°C /68°F)

## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24)

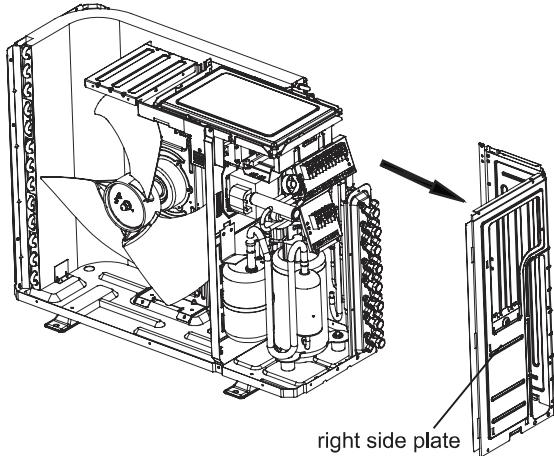
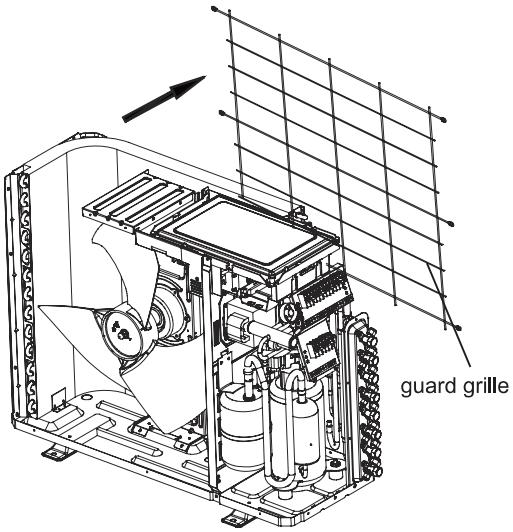
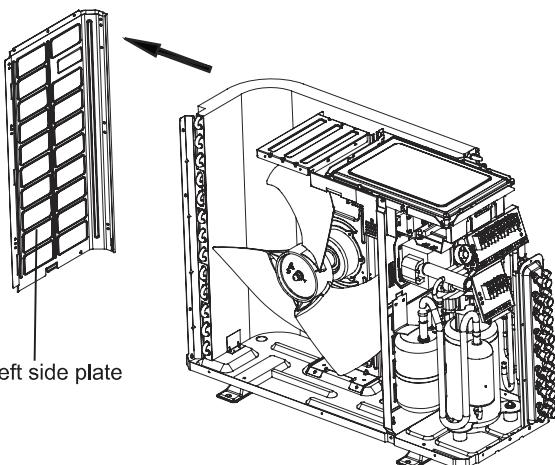
NOTE: This part is for reference only and the photos may differ from your unit.

Steps	Procedure
1.Remove big handle and wire connection cover	<p>Before disassembly</p> 
	<p>Remove the screws fixing handle and right side plate to remove the handle.</p> 
	<p>Remove the screws fixing wire connection cover and right side plate to remove the wire connection cover.</p> 

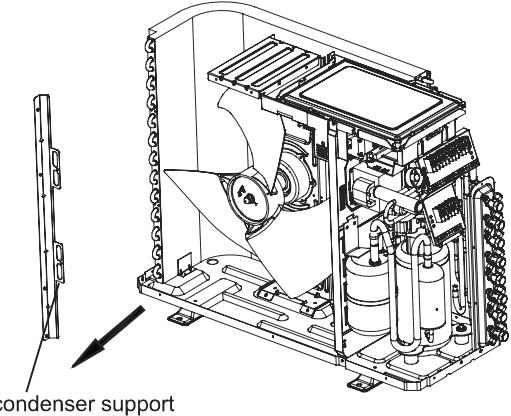
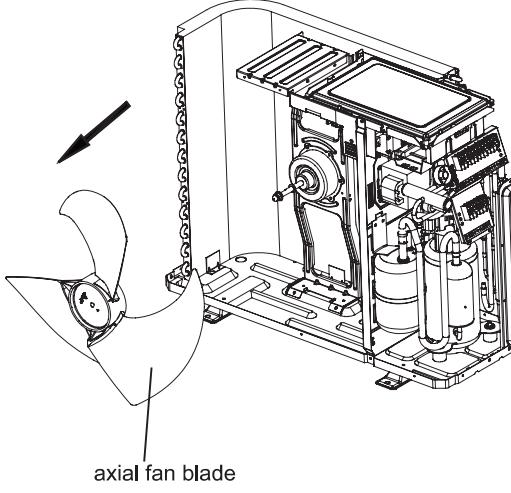
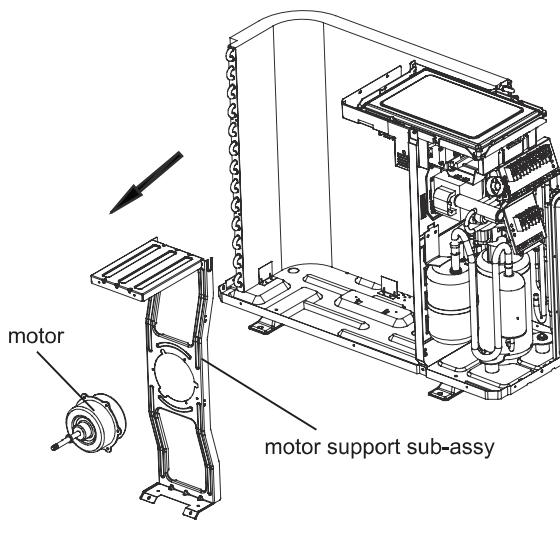
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
2.Remove top cover	<p>Remove the screws fixing top cover, panel and left &amp; right side plate, to remove top cover.</p> 
3.Remove grille	<p>Remove the screws fixing grille and panel, to remove the grille on the panel.</p> 
4.Remove panel	<p>Remove the screws fixing panel, chassis and motor support, to remove the panel.</p> 

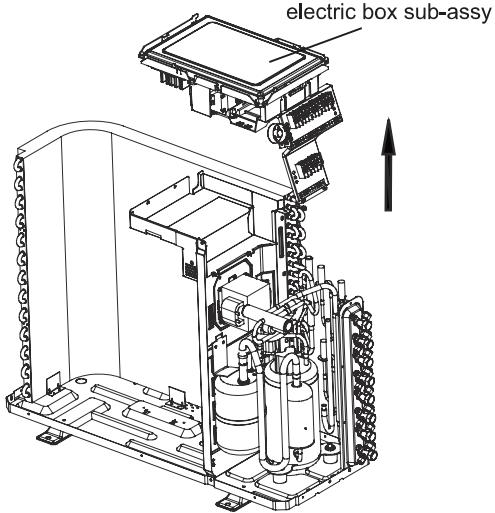
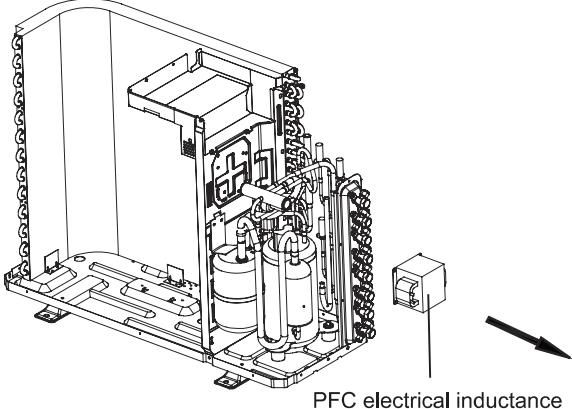
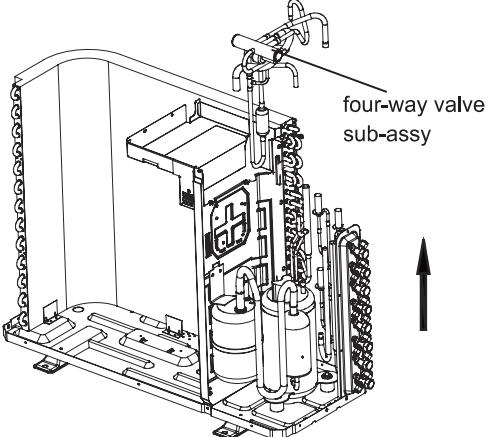
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
5.Remove right side plate	<p>Remove the screws fixing right side plate, valve support and guard grille, to remove the right side plate.</p> 
6.Remove guard grille	<p>Remove the screws fixing guard grille and left side plate to remove guard grille.</p> 
7.Remove left side plate	<p>Remove the screws fixing chassis and condenser support, to remove the left side plate.</p> 

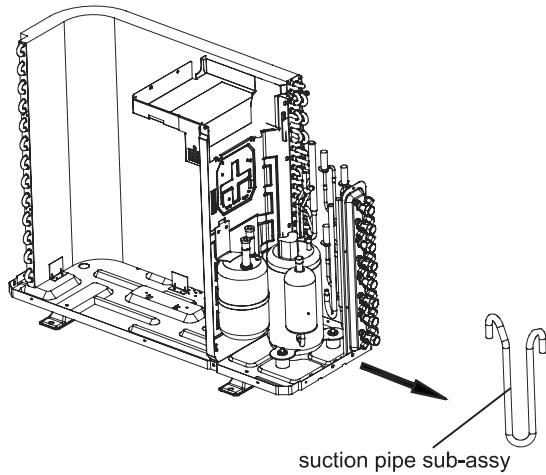
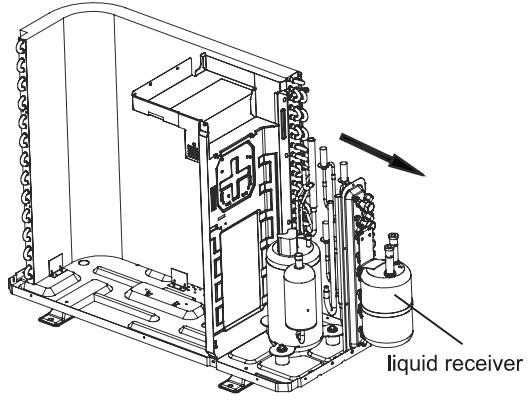
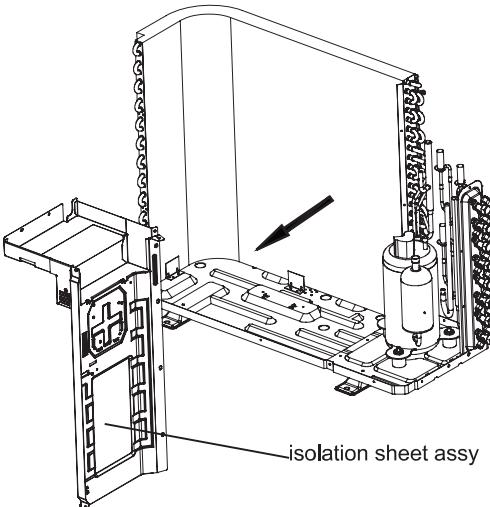
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
8.Remove condenser support	<p>Remove the screws fixing support and chassis, to remove the condenser support.</p> 
9.Remove axial fan blade	<p>Remove the screw nuts fixing fan blade with spanner, to remove the fan blade.</p> 
10.Remove motor and motor support sub-assy	<p>Remove the tapping screws fixing motor, pull out the pin of leading wire for motor and remove the screws fixing motor support and chassis, to remove the motor and motor support sub-assy.</p> 

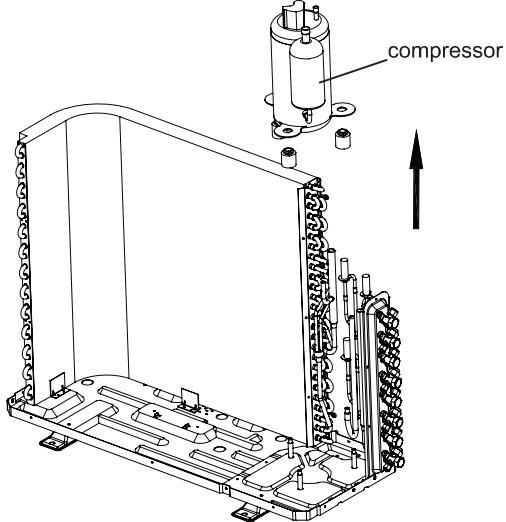
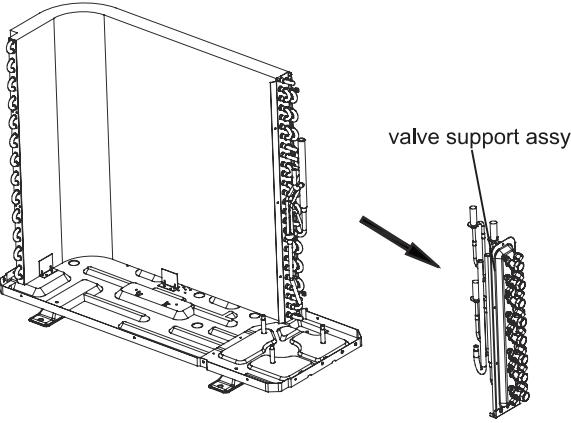
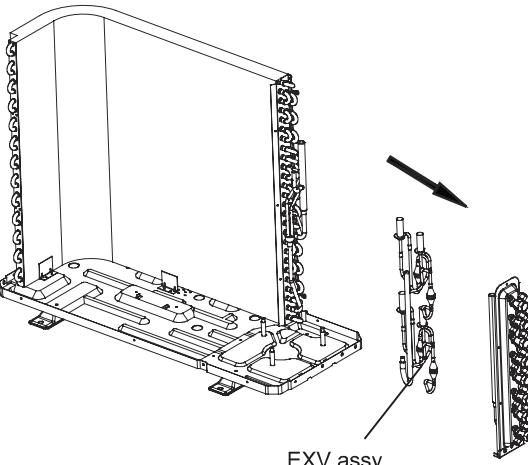
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
11.Remove electric box sub-assy	<p>Remove the tapping screws fixing isolation sheet, loosen the wire binds, pull out the terminal, lift to remove the electric box sub-assy.</p> 
12.Remove PFC electrical inductance	<p>Remove the screws fixing PFC electrical inductance and isolation sheet, to remove the PFC electrical inductance.</p> 
13.Remove four-way valve sub-assy	<p>Welding cut the welding point jointing the four-way valve with blowtorch to remove the four-way valve sub-assy. (Note: please make sure there's no refrigerant in the unit before remove any tube or compressor)</p> 

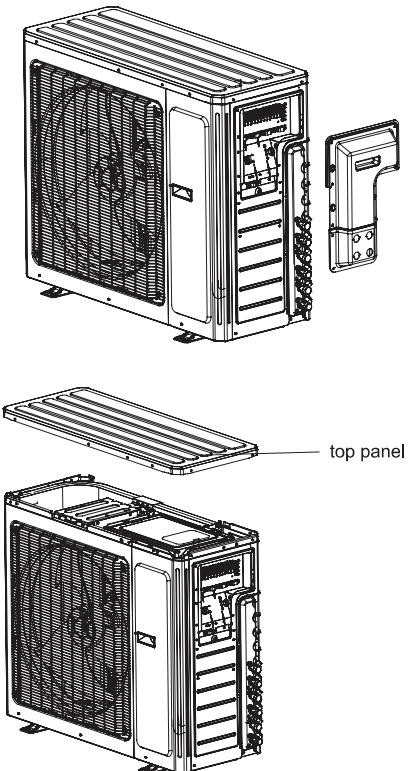
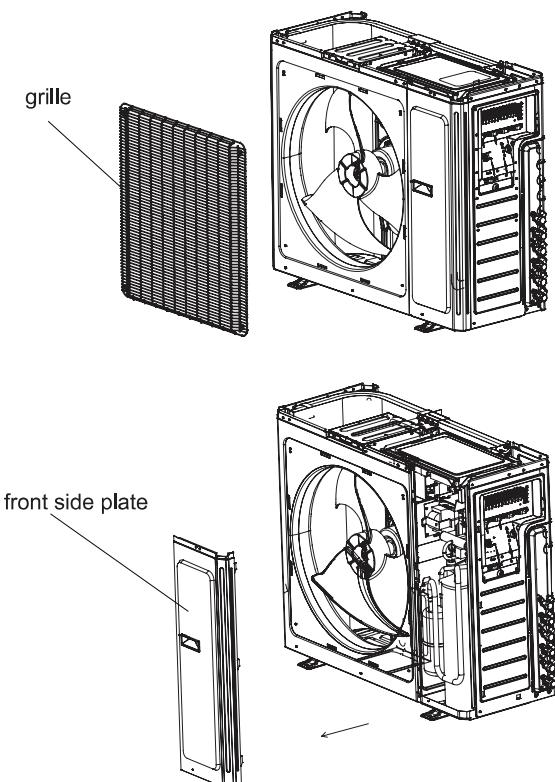
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
14. Remove suction pipe sub-assy	<p>Welding cut the welding point jointing the suction pipe sub-assy, compressor and liquid receiver, to remove the suction pipe sub-assy.</p> 
15. Remove liquid receiver	<p>Remove the screws fixing isolation sheet and liquid receiver and lift to remove the liquid receiver.</p> 
16. Remove the isolation sheet assy	<p>Remove the screws fixing isolation sheet and condenser side plate, to remove the isolation sheet assy.</p> 

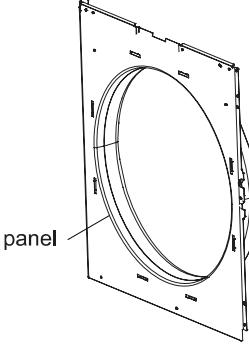
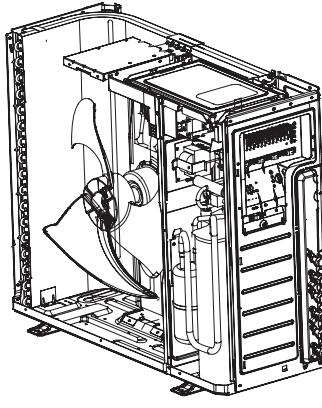
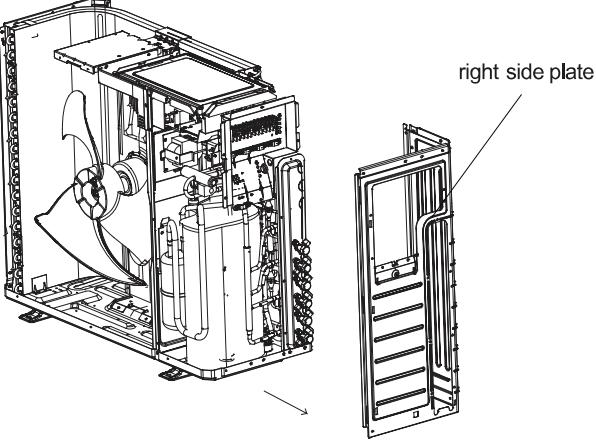
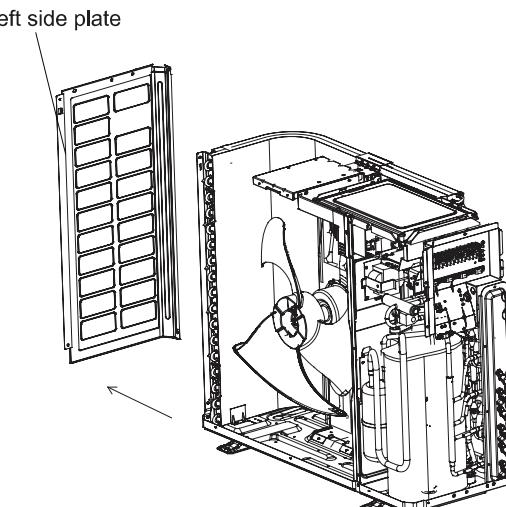
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
17.Remove compressor	<p>Remove the screw nuts fixing compressor foots and chassis with spanner, as well as the foot cushion, to remove the compressor.</p>
	
18.Remove valve support assy	<p>Remove the screws fixing valve support assy and chassis sub-assy, to remove the valve support assy.</p>
	
19.Remove EXV assy	<p>Welding cut the welding point jointing EXV sub-assy and refrigerant collection pipe, to remove the EXV assy. (Note: fully pack the big valve with wet cloth when welding cutting, to avoid high temperature damage of valve)</p>
	

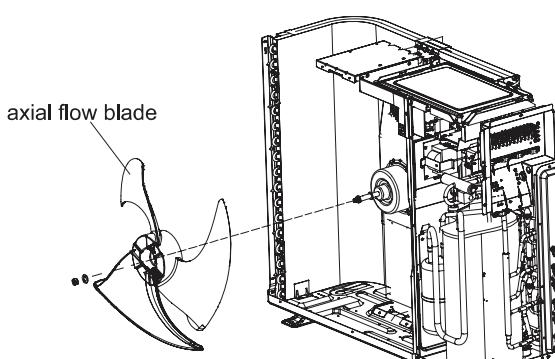
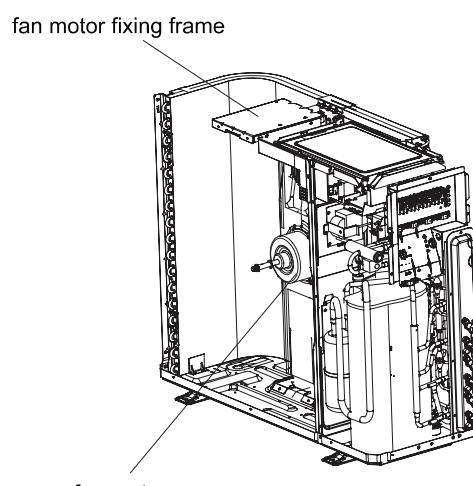
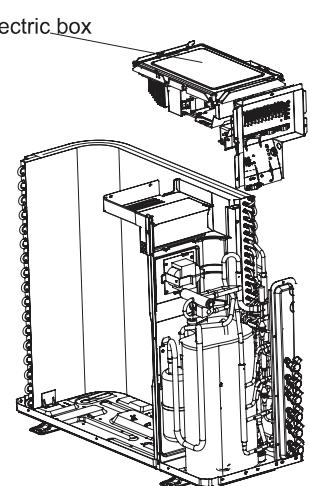
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

Steps	Procedure
1. Remove valve cover and top panel	<p>1 Twist off the screws used for fixing and valve cover, pull valve cover up ward to remove it.</p> <p>2 Remove the 3 screws connecting the top panel with the front panel and the right side plate, and then remove the top panel.</p> 
2. Remove grille, front side plate and panel.	<p>1 Remove the 2 screws connecting the grille and the panel, and then remove the grille.</p> <p>2 Remove the 1 screw connecting the front side plate and the panel, and then remove the front side plate.</p> 

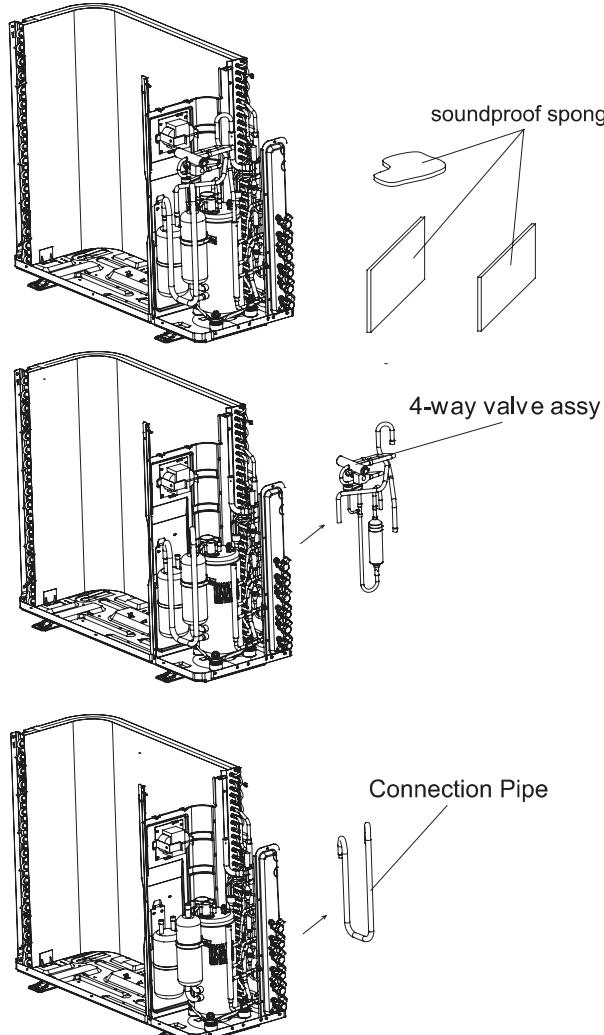
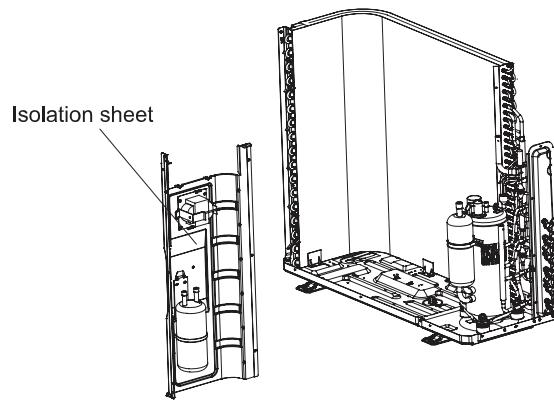
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

3	Remove the 5 screws connecting the panel with the chassis and the motor support, and then remove the panel.	 
3. Remove right side plate and left 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.	

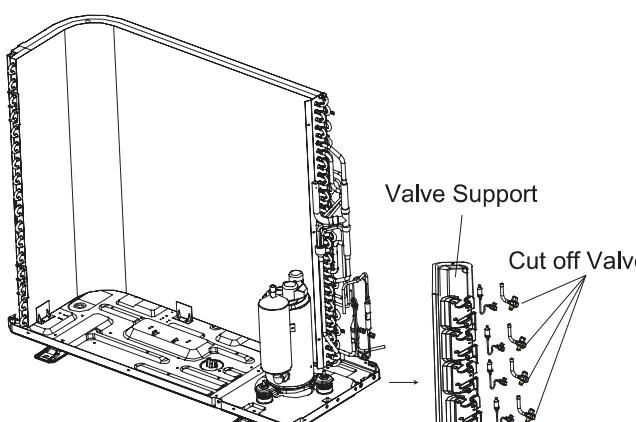
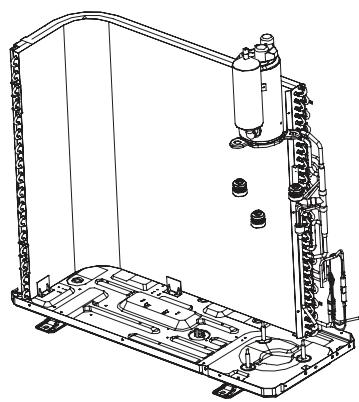
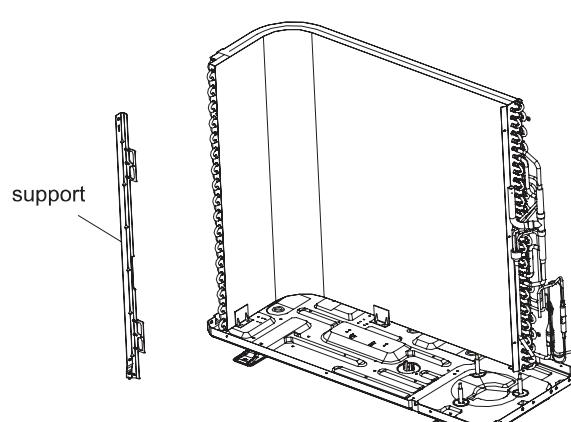
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

4. Remove fan motor and axial flow blade	<p>1 Remove the nuts fixing the blade and then remove the axial flow blade.</p>  <p>2 Remove the 4 tapping screws fixing the motor; disconnect the leading wire insert 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.</p> 
5. Remove electric box	<p>Remove the screws fixing the electric box sub-assy; loosen the wire bundle; pull out the wiring terminals and then pull the electric box upwards to remove it.</p> 

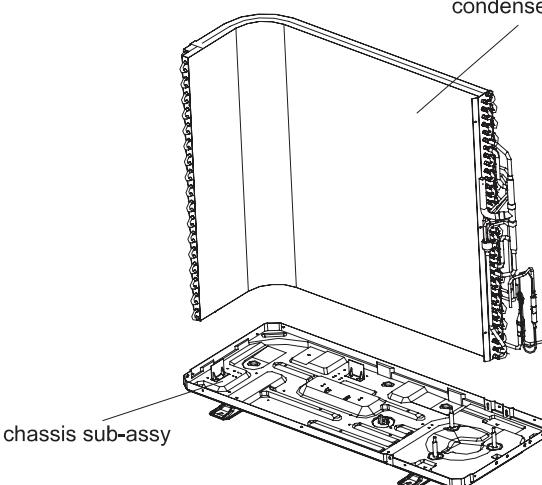
## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

6. Remove soundproof sponge and 4-way valve assy	<p>1 Since the piping ports on the soundproof sponge are torn easily, remove the soundproof sponge carefully</p> <p>2 Discharge the refrigerant completely; unsolder the pipelines connecting the compressor and the condenser assy, and then remove the 4-way valve assy.</p> 
7. Remove Isolation sheet	<p>Remove the 3 screws fixing the isolation sheet and then remove the Isolation sheet.</p> 

## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

8. Remove Cut off Valve and Valve Support	<p>Remove the 2 bolts fixing the valve subassemblies. Unsolder the welding joint connecting the gas valve and the return air pipe. Remove the gas valve. (Note: When unsoldering the soldering joint, wrap the gas valve with wet cloth completely to avoid damage to the valve caused by high temperature.) Unsolder the welding joint connecting the liquid valve and the connecting pipe. Remove the liquid valve. Remove screws fixing valve support and then remove the valve support; remove the screw fixing the condenser and then pull the condenser upwards to remove it.</p> 
9. Remove compressor	<p>Remove the 3 foot nuts fixing the compressor and then remove the compressor.</p> 
10. Remove support	<p>1 Remove the screws connecting the support and condenser assy, and then remove the support.</p> 

## DISASSEMBLY INSTRUCTIONS (SIZES 18 AND 24 (CONT))

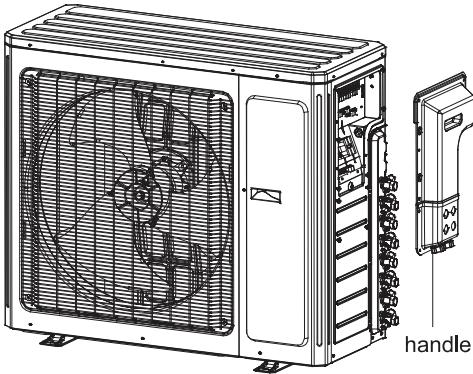
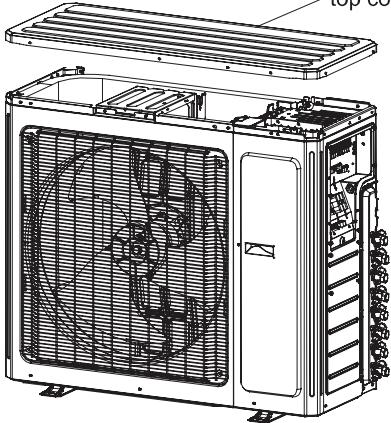
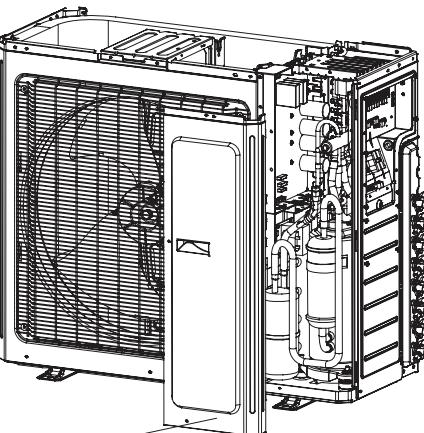
11.Remove condenser sub-assy	<p>Remove the chassis sub-assy and condenser sub-assy.</p> 

# DISASSEMBLY INSTRUCTIONS (SIZE 30)

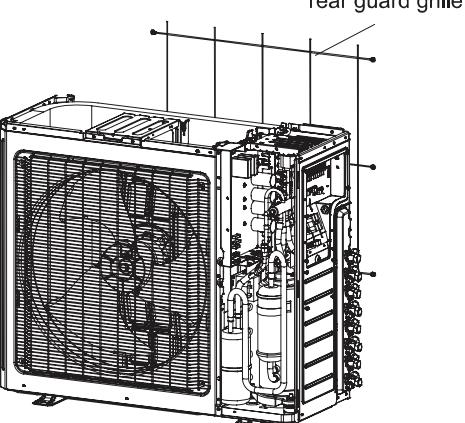
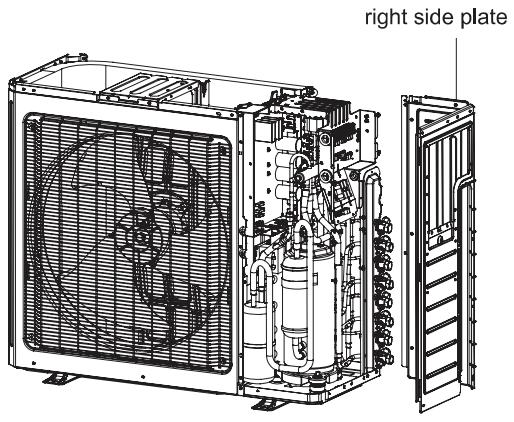
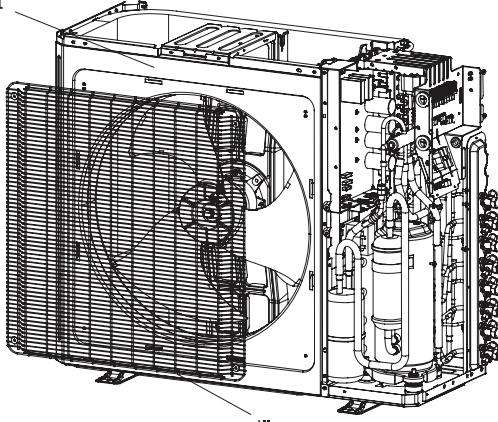
## ⚠ CAUTION

### ELECTRICAL OPERATION HAZARD

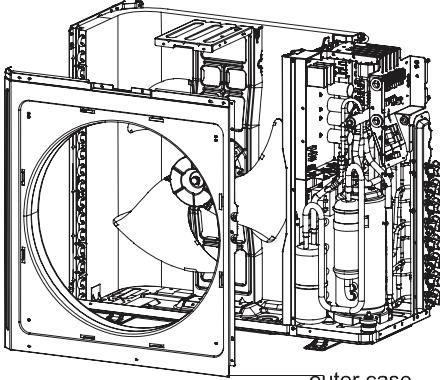
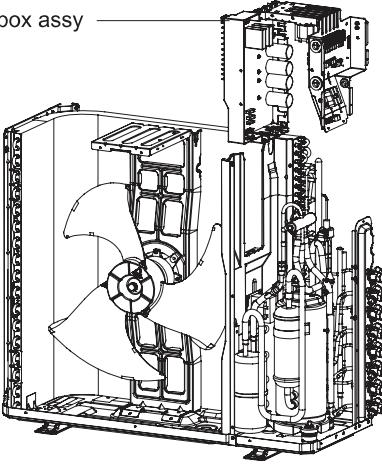
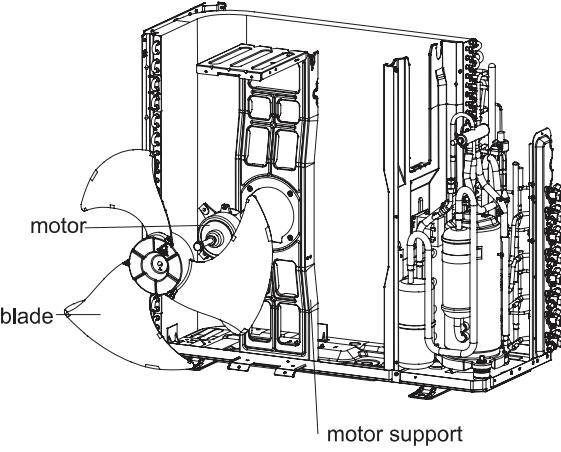
Be sure to wait for a minimum of 20 minutes after turning off all power supplies and discharge the refrigerant completely before removal

Steps	Procedure
1. Remove the handle	<p>Remove the screws connecting the handle with right side plate and then remove the handle.</p> 
2. Remove top cover	<p>Remove the screws connecting the top cover with outer case, right side plate and left side plate; lift the top cover upwards to remove it.</p> 
3. Remove front side plate	<p>Remove the screws connecting the front side plate with chassis and middle isolation sheet, and then remove the front side plate.</p> 

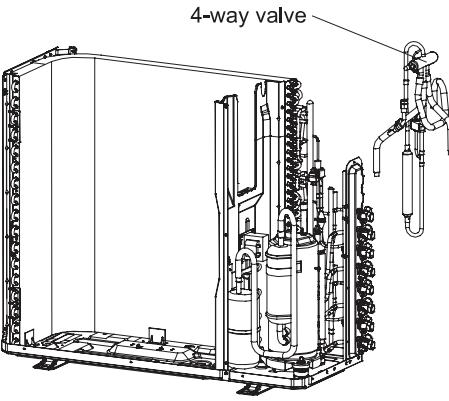
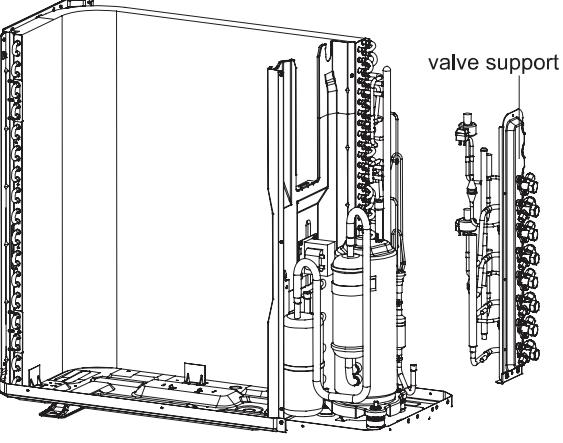
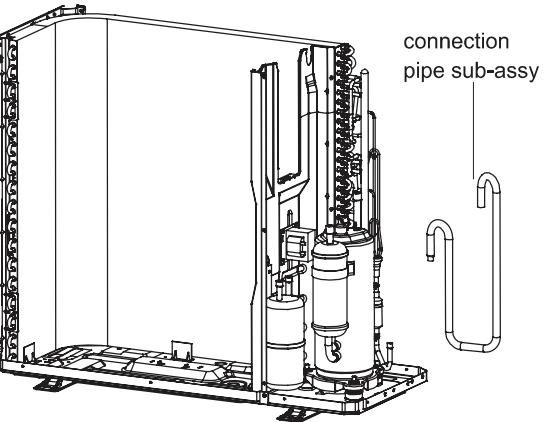
## DISASSEMBLY INSTRUCTIONS (SIZE 30 (CONT))

Steps	Procedure
4.Remove rear guard grille	<p>Remove the 6 screws connecting the grille with right side plate and left side plate, and then remove the rear guard grille.</p> 
5.Remove right side plate	<p>Remove the screws connecting the right side plate with electric box assy, valve support, chassis and condenser side plate, and then remove the right side plate.</p> 
6.Remove grille and cabinet	<p>Remove the 4 screws connecting the grille and outer case, and then remove the panel grille.</p> 

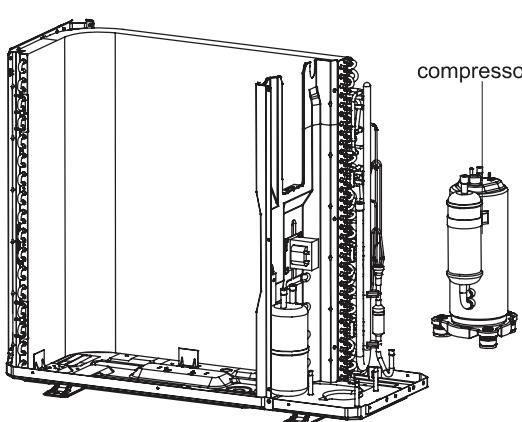
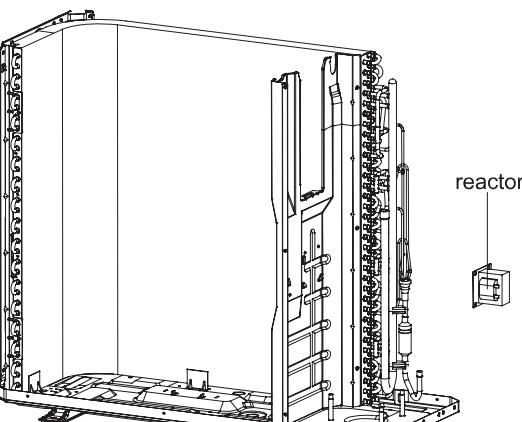
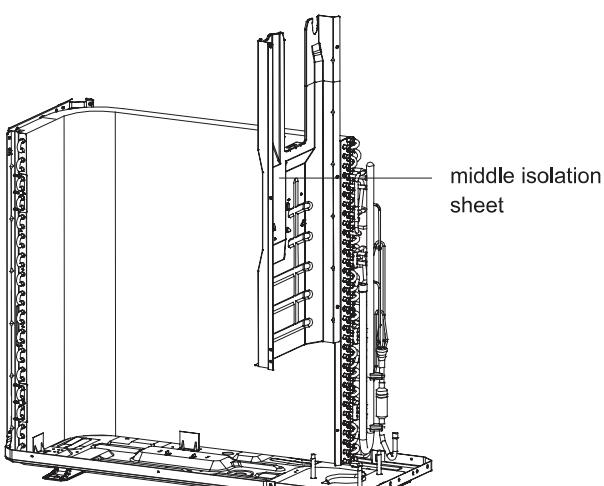
## DISASSEMBLY INSTRUCTIONS (SIZE 30 (CONT))

Steps	Procedure
7. Remove outer case	<p>Remove screws connecting outer case and motor support, middle isolation sheet and chassis, pull the outer case upwards slightly, loosen clasps between outer case and right side plate, left side plate, and then remove the outer case.</p>  <p>outer case</p>
8. Remove electric box assy	<p>1. Remove the grounding wire screw on the electric box assy and then remove the grounding wire.</p> <p>2. Disconnect the wiring terminals of reactor, compressor, high and low pressure switch, compressor overload protector, temperature sensor, outdoor fan motor and 4-way valve. (See fig 2) Note: keep pressing the circlip when disconnecting the wiring terminal of reactor; keep pressing the retainer when disconnecting other wiring terminals.</p> <p>3. Remove the wire inside the wiring groove.</p>  <p>electric box assy</p>
9. Remove blade, motor, motor support, reactor	<p>1. Remove nuts fixing axial flow blade with wrench, and then remove the axial flow blade.</p> <p>2. Remove 2 screws connecting motor support and chassis, loosen damper block and then remove the motor support.</p> <p>3. Remove 4 screws fixing motor, and then remove the motor</p> <p>4. Remove 4 screws fixing reactor sub-assy and motor support, and then remove the reactor sub-assy.</p>  <p>motor</p> <p>blade</p> <p>motor support</p>

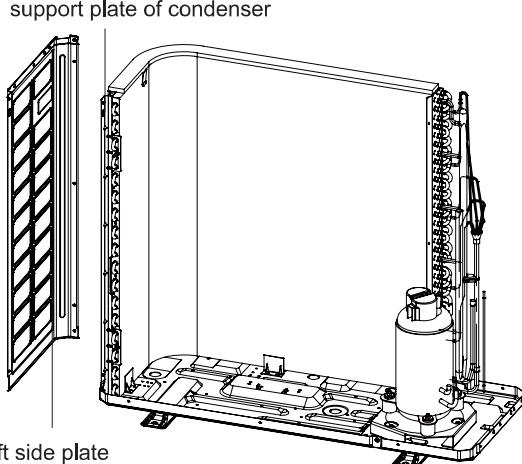
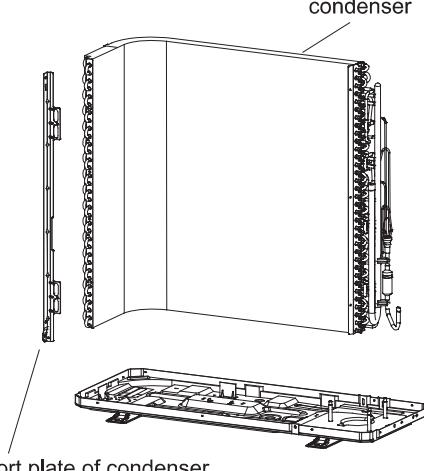
## DISASSEMBLY INSTRUCTIONS (SIZE 30 (CONT))

Steps	Procedure
10 Remove 4-way valve	<p>Unsolder the spot weld between 4-way valve and vapour liquid separator, compressor cut-off valve sub-assy and condenser, and then remove the 4-way valve.</p> <p>Note: When unsoldering the spot weld, wrap the 4-way valve with wet cloth completely to avoid damage to valve due to high temperature.</p> 
11. Remove valve support	<p>Unsolder all spot welds connected with valve support and then remove the valve support.</p> <p>Note: When unsoldering the spot weld, wrap the gas valve and liquid valve with wet cloth completely to avoid damage to valve due to high temperature.</p> 
12. Remove connection pipe sub-assy	<p>Remove all spot welds connected with connection pipe, and then remove the connection pipe sub-assy.</p> 

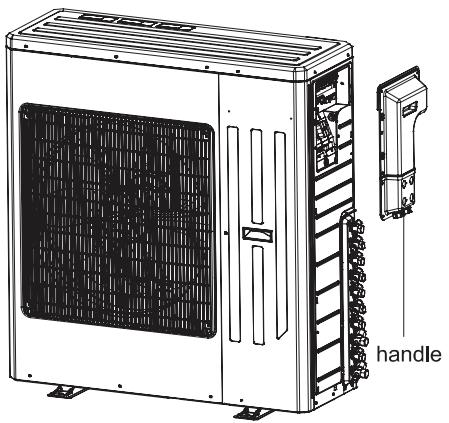
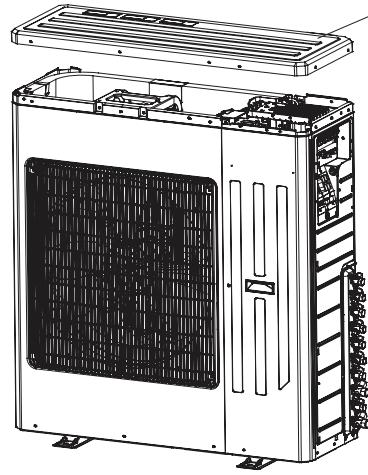
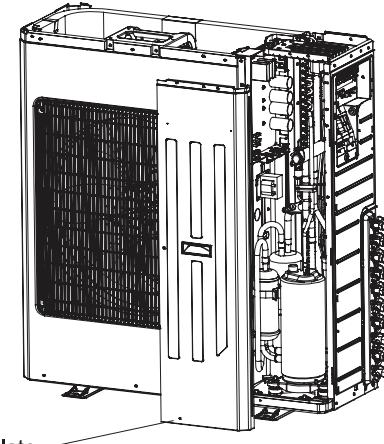
## DISASSEMBLY INSTRUCTIONS (SIZE 30 (CONT))

Steps	Procedure
13. Remove compressor	<p>Remove the 3 foot nuts fixing compressor and then lift the compressor upwards to remove the compressor and damping cushion.</p> <p>Note:</p> <p>Keep the ports of discharge pipe and suction pipe from foreign objects.</p> 
14. Remove the reactor	<p>Remove 4 screws fixing reactor sub-assy and motor support, and then remove the reactor sub-assy.</p> 
15. Remove middle isolation sheet	<p>Remove screws connecting middle isolation sheet and support plate of condenser, chassis, and then remove the middle isolation sheet.</p> 

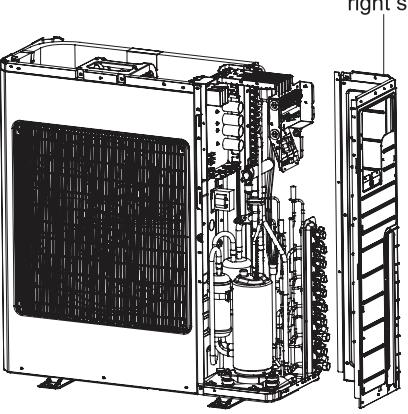
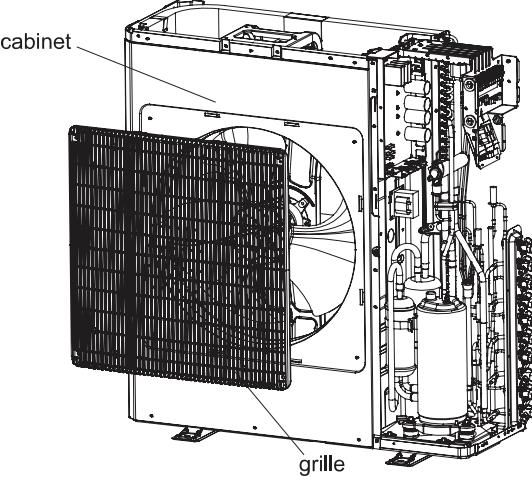
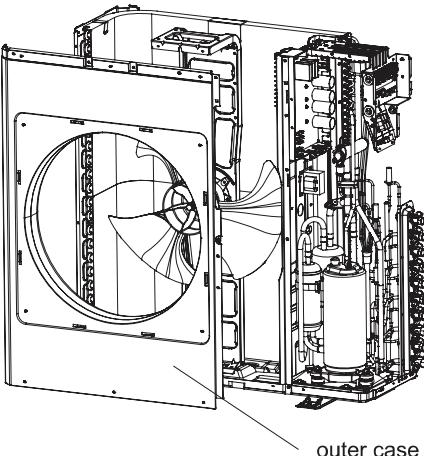
## DISASSEMBLY INSTRUCTIONS (SIZE 30 (CONT))

Steps	Procedure
16. Remove left side plate	<p>Remove screws connecting left side plate and support plate of condenser, chassis, and then remove the left side plate.</p> 
17. Remove condenser	<p>Remove 5 screws connecting condenser and chassis, and then remove the condenser. Remove 2 screws connecting support plate of condenser and condenser, and then remove the support plate of condenser.</p> 

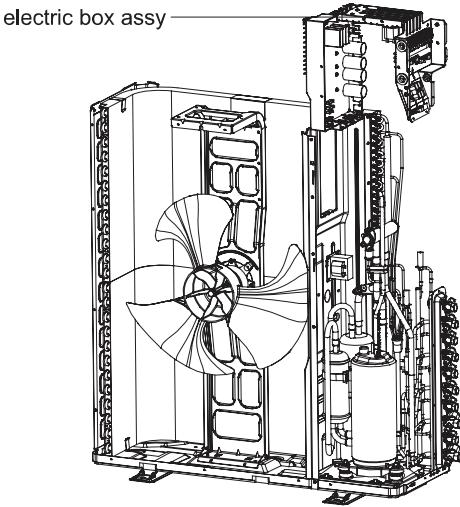
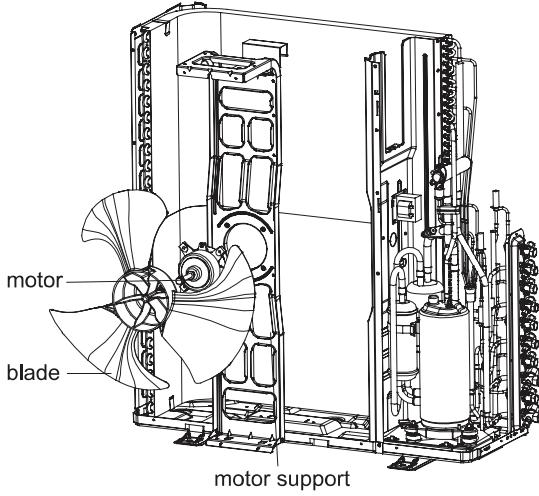
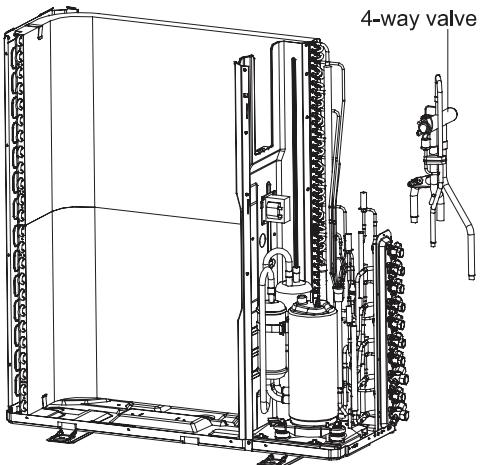
## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42)

Steps	Procedure
1. Remove the handle	<p>Remove the screws connecting the handle with right side plate and then remove the handle.</p> 
2. Remove top cover	<p>Remove the screws connecting the top cover with outer case, right side plate and left side plate; lift the top cover upwards to remove it.</p> 
3. Remove front side plate	<p>Remove the screws connecting the front side plate with chassis and middle isolation sheet, and then remove the front side plate.</p> 

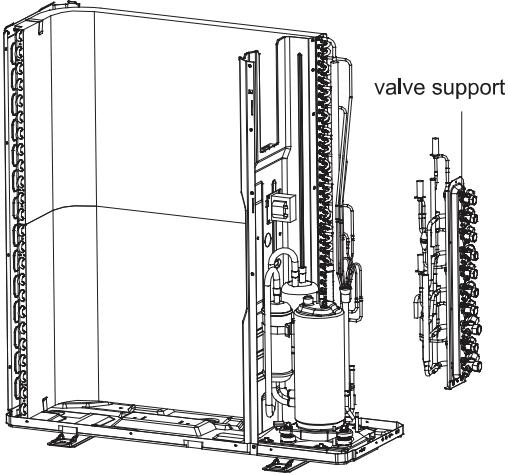
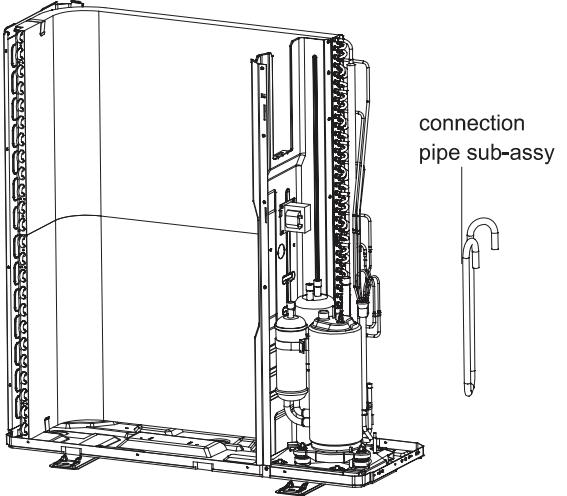
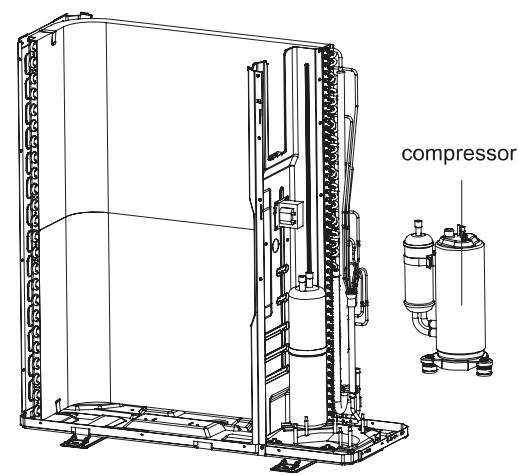
## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42 (CONT))

Steps	Procedure
4. Remove right side plate	<p>Remove the screws connecting the right side plate with electric box assy, valve support, chassis and condenser side plate, and then remove the right side plate.</p>
	
5. Remove grille and cabinet	<p>Remove the 4 screws connecting the grille and outer case, and then remove the panel grille.</p>
	
6. Remove outer case	<p>Remove screws connecting outer case and motor support, middle isolation sheet and chassis, pull the outer case upwards slightly, loosen clasps between outer case and right side plate, left side plate, and then remove the outer case.</p>
	

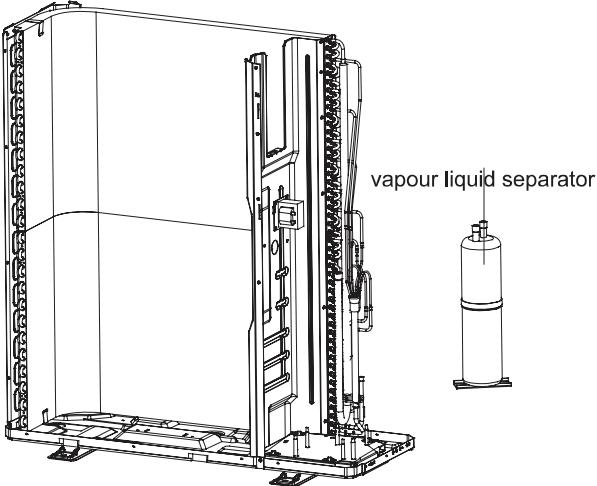
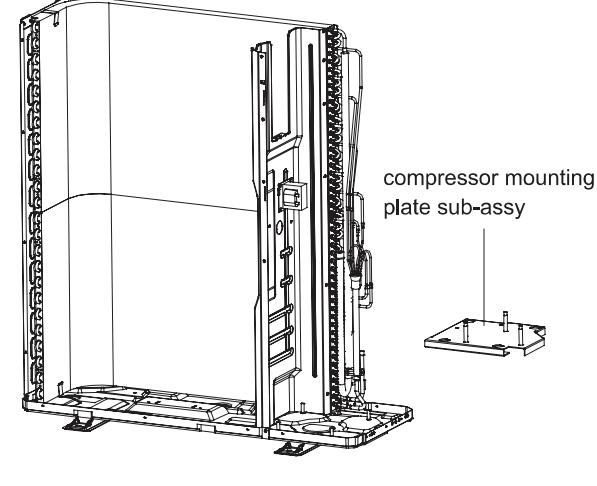
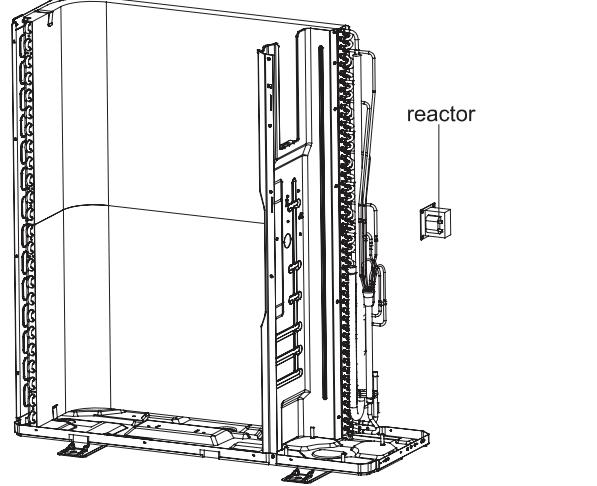
## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42 (CONT))

Steps	Procedure
7 . Remove electric box assy	<p>1.Remove the grounding wire screw on the electric box assy and then remove the grounding wire.</p> <p>2.Disconnect the wiring terminals of reactor, compressor, high and low pressure switch, compressor overload protector, temperature sensor, outdoor fan motor and 4-way valve. (See fig 2) Note: keep pressing the circlip when disconnecting the wiring terminal of reactor; keep pressing the retainer when disconnecting other wiring terminals.</p> <p>3.Remove the wire inside the wiring groove.</p> 
8 . Remove blade, motor, motor support, reactor	<p>1.Remove nuts fixing axial flow blade with wrench, and then remove the axial flow blade.</p> <p>2.Remove 2 screws connecting motor support and chassis, loosen damper block and then remove the motor support.</p> <p>3.Remove 4 screws fixing motor, and then remove the motor</p> <p>4.Remove 4 screws fixing reactor sub-assy and motor support, and then remove the reactor sub-assy.</p> 
9 Remove 4-way valve	<p>Unsolder the spot weld between 4-way valve and vapour liquid separator, compressor cut-off valve sub-assy and condenser, and then remove the 4-way valve.</p> <p>Note: When unsoldering the spot weld, wrap the 4-way valve with wet cloth completely to avoid damage to valve due to high temperature.</p> 

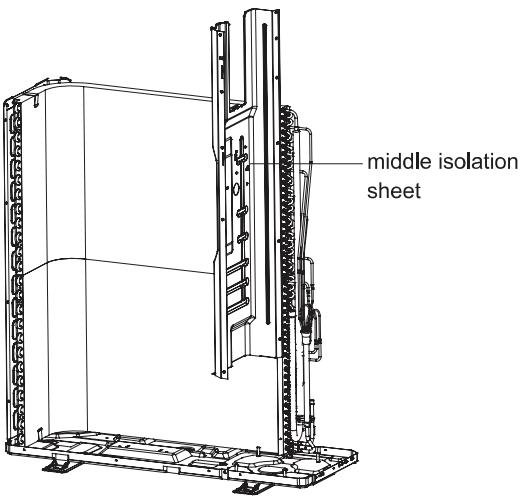
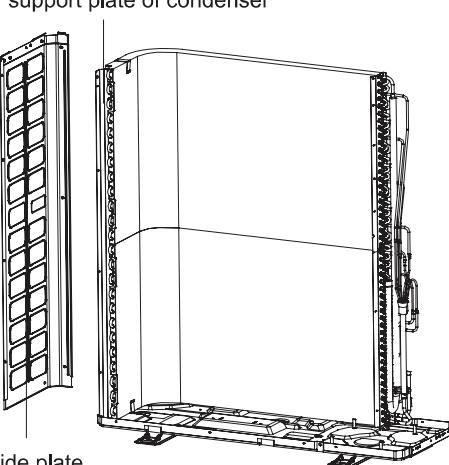
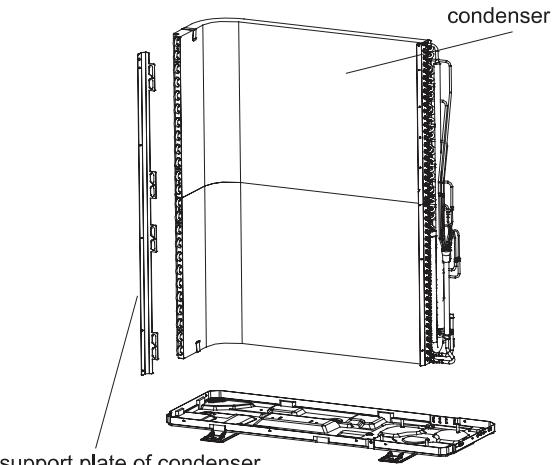
## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42 (CONT))

Steps	Procedure
10 . Remove valve support	<p>Unsolder all spot welds connected with valve support and then remove the valve support.</p> <p>Note:When unsoldering the spot weld, wrap the gas valve and liquid valve with wet cloth completely to avoid damage to valve due to high temperature.</p> 
11. Remove connection pipe sub-assy	<p>Remove all spot welds connected with connection pipe, and then remove the connection pipe sub-assy.</p> 
12. Remove compressor	<p>Remove the 3 foot nuts fixing compressor and then lift the compressor upwards to remove the compressor and damping cushion.</p> <p>Note: Keep the ports of discharge pipe and suction pipe from foreign objects.</p> 

## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42 (CONT))

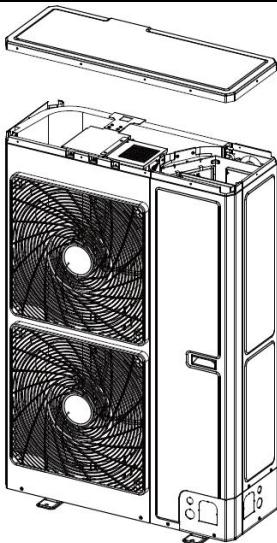
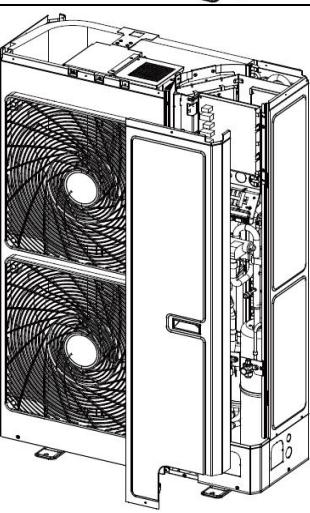
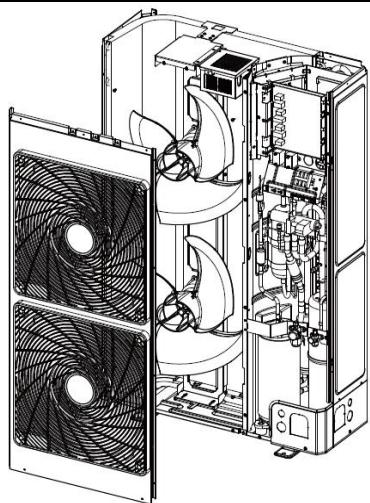
Steps	Procedure
13 .Remove vapour liquid separator	<p>Unsolder spot welds connected with vapour liquid separator, remove 2 foot nuts fixing vapour liquid separator and compressor mounting plate sub-assy, and then remove the vapour liquid separator.</p> 
14.Remove compressor mounting plate sub-assy	<p>Remove the 4 foot nuts fixing compressor mounting plate sub-assy and chassis, to remove the compressor mounting plate sub-assy.</p> 
15 . Remove the reactor	<p>4.Remove 4 screws fixing reactor sub-assy and motor support, and then remove the reactor sub-assy.</p> 

## DISASSEMBLY INSTRUCTIONS (SIZES 36 AND 42 (CONT))

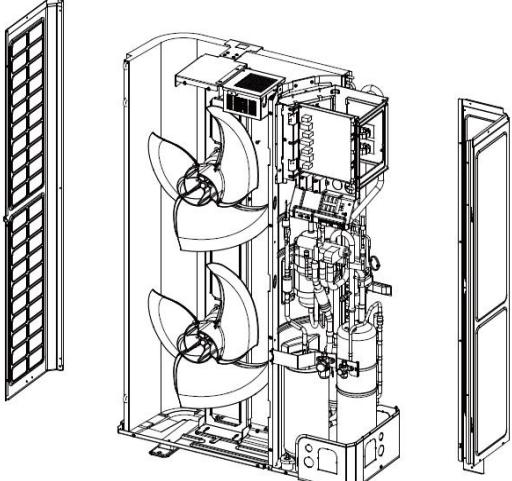
Steps	Procedure
16. Remove middle isolation sheet	<p>Remove screws connecting middle isolation sheet and support plate of condenser, chassis, and then remove the middle isolation sheet.</p> 
17. Remove left side plate	<p>Remove screws connecting left side plate and support plate of condenser, chassis, and then remove the left side plate.</p> 
18. Remove condenser	<p>Remove 5 screws connecting condenser and chassis, and then remove the condenser. Remove 2 screws connecting support plate of condenser and condenser, and then remove the support plate of condenser.</p> 

## DISASSEMBLY INSTRUCTIONS (SIZES 48 AND 56)

NOTE: Prior to the assembly of the plates, ensure the power supply is off.

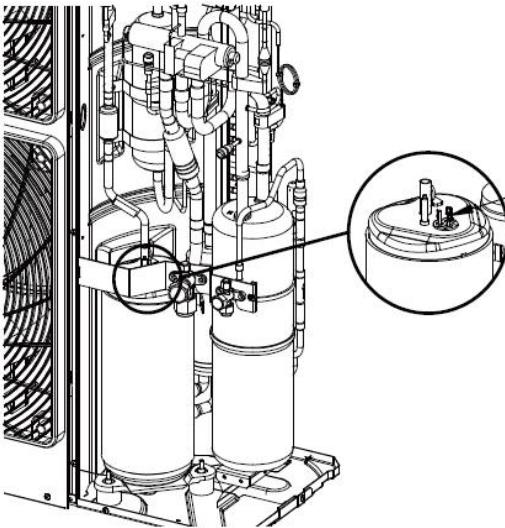
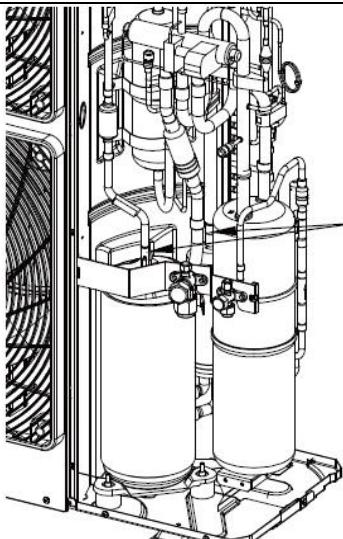
Steps	Illustrations	Operation Instructions
1. Disconnect the coping plate		<ul style="list-style-type: none"> <li>a) Unscrew the fixed screws of the coping plate;</li> <li>b) Remove the coping plate.</li> </ul>
2. Disconnect the front side plate		<ul style="list-style-type: none"> <li>a) Unscrew the fixed screw of the front side plate;</li> <li>b) Remove the front side plate.</li> </ul>
3. Disconnect the outer case		<ul style="list-style-type: none"> <li>a) Unscrew the fixed screws of the outer case;</li> <li>b) Remove the outer case.</li> </ul>

## DISASSEMBLY INSTRUCTIONS (SIZES 48 AND 56 (CONT))

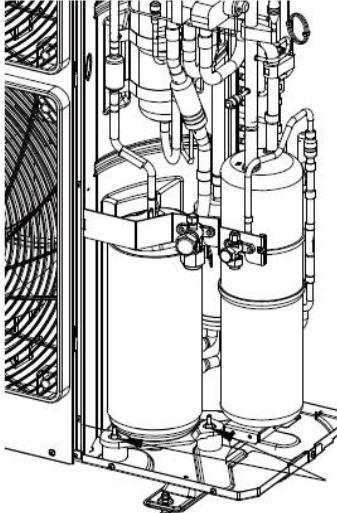
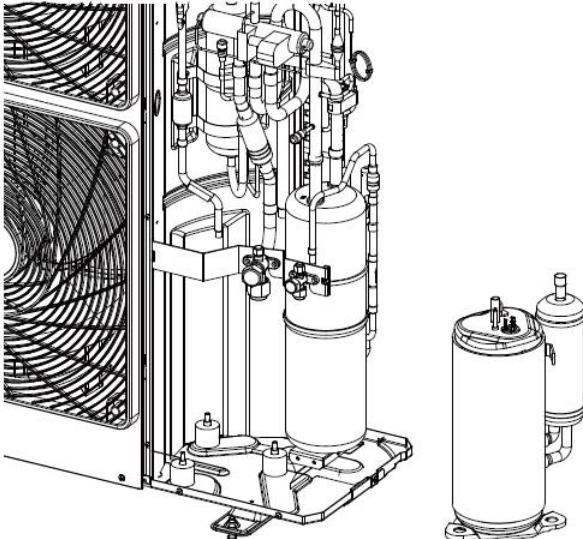
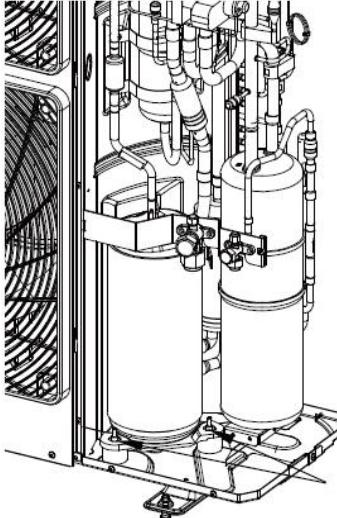
4. Disconnect the left side plate and rear side plate		<ul style="list-style-type: none"> <li>a) Unscrew the fixed screws of left side plate and rear side plate;</li> <li>b) Remove left side plate and rear side plate.</li> </ul>
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### Assembly and Disassembly of the Compressor

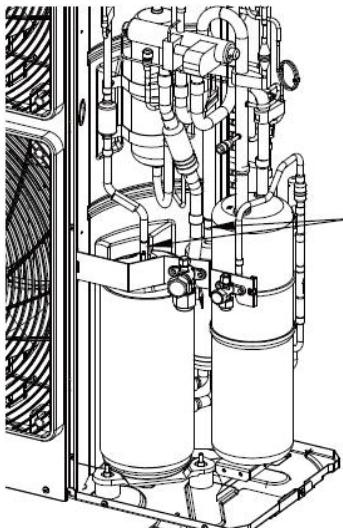
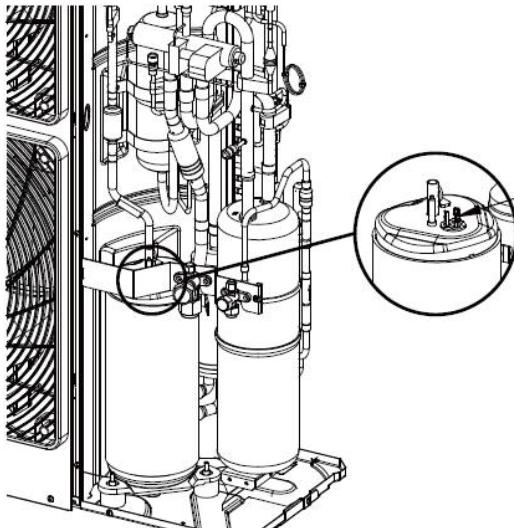
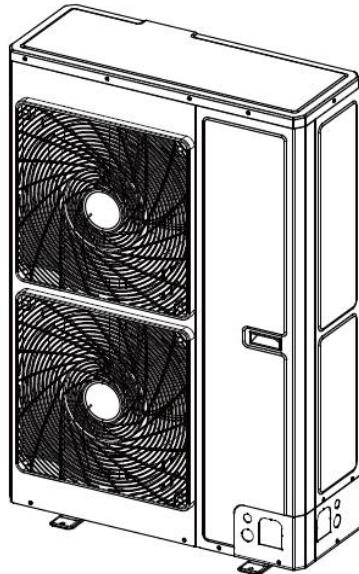
**Remarks:** Prior to the assembly of the compressor, make sure there is no refrigerant in the pipeline and the power supply is cut off.

Steps	Illustrations	Operation Instructions
1. Remove the power code of the compressor		<ul style="list-style-type: none"> <li>a) Unscrew the fixed screws of power code;</li> <li>b) Remove the power code.</li> </ul> <p>Note: when removing the power cord, please label the power cord and the terminals to avoid misconnecting next time.</p>
2. Remove the connecting pipe of the compressor		<ul style="list-style-type: none"> <li>a) Solder the joint of connecting pipe of the compressor.</li> <li>b) Pull out the connecting pipe</li> </ul> <p>Note: never let the flame contact any other component.</p>

## DISASSEMBLY INSTRUCTIONS (SIZES 48 AND 56 (CONT))

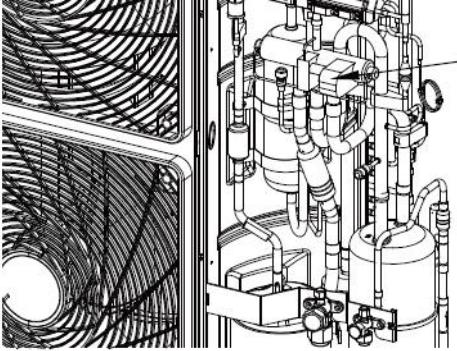
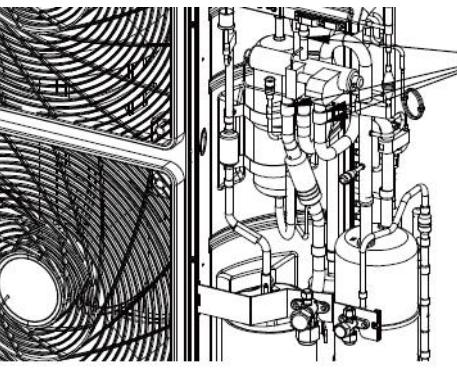
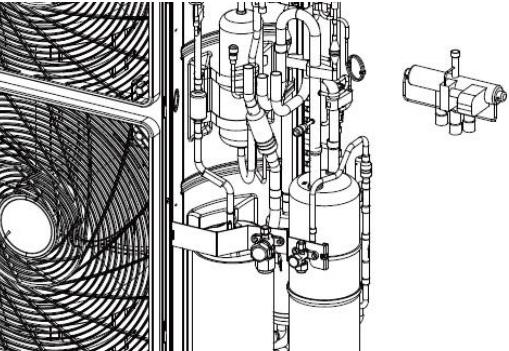
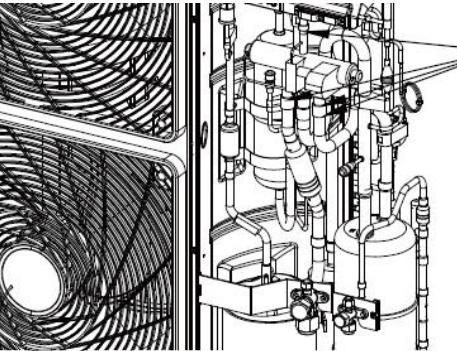
3. Loose the fixed screws of the compressor base	 <p>Screw off the fixing screw of the compressor base</p>	Unscrew the fixed screw of the compressor base
4. Remove the compressor away from the seating		<p>Remove and replace the compressor.</p> <p>Note: never let the flame contact any other component during the replacement.</p>
5. Fix the new compressor on the seating	 <p>Tighten the screws on the base of the compressor</p>	Tighten the screws on the seating of the new compressor.

## DISASSEMBLY INSTRUCTIONS (SIZES 48 AND 56 (CONT))

<p>6.Solder the pipeline with the suction and discharge ports of the compressor</p>		<p>Solder the connecting pipe to make them connected Note: never let the flame contact any other component.</p>
<p>7.Reconnect the power cords</p>		<p>a) Tighten the fixing screw of the power cord. b) Connect the power cord. Note: mark the color of the power cord and corresponding terminal.</p>
<p>8.Put back the electric heating belt and the discharge temperature sensor etc.</p>		
<p>9.Check and screw back the plates</p>		<p>a) Check if the pipe is well connected. b) Check if the parts and wire well connected. c) If there is no problem, fix the cover.</p>

## DISASSEMBLY AND ASSEMBLY OF 4-WAY VALVE

Prior to the assembly of the compressor, ensure there is no refrigerant in the pipeline and the power supply is cut off.

Steps	Illustrations	Operation Instructions
1.Remove the magnet coil of the 4-way valve	 Remove the magnet coil of the 4-way	a) Unscrew the fixed screws of the magnet coil; b) Remove the magnet coil.
2.Disconnect the 4-way valve and the connecting pipe	 Solder off the four joints	Solder off the connecting pipes. Note: never let the flame contact any other component.
3.Replace the new 4-way valve	 Install the new 4-way valve	
4.Solder the new 4-way valve and install the magnet coil.	 Solder the four joints	Solder the connecting pipes Note: To avoid heat damage the internal structure of the 4-way, wrap it to be brazed with sufficient wet cloths.

## APPENDIX

### List of Resistance for Temperature Sensor

Table 23—Ambient Temperature Sensor Resistance for Indoor and Outdoor (15K)

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

## APPENDIX (CONT)

### List of Resistance for Temperature Sensor

Table 24—Tube Temperature for Indoor and Outdoor Resistance Table(2K)

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

## APPENDIX (CONT)

### List of Resistance for Temperature Sensor

Table 25—Discharge Temperature Sensor for Outdoor Resistance Table (5K)

Temp(°C)	Resistance(kD)	Temp(°C)	Resistance(kD)	Temp(°C)	Resistance(kD)	Temp(°C)	Resistance(kD)
-29	853.5	10	98	49	18.34	88	4.75
-28	799.8	11	93.42	50	17.65	89	4.61
-27	750	12	89.07	51	16.99	90	4.47
-26	703.8	13	84.95	52	16.36	91	4.33
-25	660.8	14	81.05	53	15.75	92	4.20
-24	620.8	15	77.35	54	15.17	93	4.08
-23	580.6	16	73.83	55	14.62	94	3.96
-22	548.9	17	70.5	56	14.09	95	3.84
-21	516.6	18	67.34	57	13.58	96	3.73
-20	486.5	19	64.33	58	13.09	97	3.62
-19	458.3	20	61.48	59	12.62	98	3.51
-18	432	21	58.77	60	12.17	99	3.41
-17	407.4	22	56.19	61	11.74	100	3.32
-16	384.5	23	53.74	62	11.32	101	3.22
-15	362.9	24	51.41	63	10.93	102	3.13
-14	342.8	25	49.19	64	10.54	103	3.04
-13	323.9	26	47.08	65	10.18	104	2.96
-12	306.2	27	45.07	66	9.83	105	2.87
-11	289.6	28	43.16	67	9.49	106	2.79
-10	274	29	41.34	68	9.17	107	2.72
-9	259.3	30	39.61	69	8.85	108	2.64
-8	245.6	31	37.96	70	8.56	109	2.57
-7	232.6	32	36.38	71	8.27	110	2.50
-6	220.5	33	34.88	72	7.99	111	2.43
-5	209	34	33.45	73	7.73	112	2.37
-4	198.3	35	32.09	74	7.47	113	2.30
-3	199.1	36	30.79	75	7.22	114	2.24
-2	178.5	37	29.54	76	7.00	115	2.18
-1	169.5	38	28.36	77	6.76	116	2.12
0	161	39	27.23	78	6.54	117	2.07
1	153	40	26.15	79	6.33	118	2.02
2	145.4	41	25.11	80	6.13	119	1.96
3	138.3	42	24.13	81	5.93	120	1.91
4	131.5	43	23.19	82	5.75	121	1.86
5	125.1	44	22.29	83	5.57	122	1.82
6	119.1	45	21.43	84	5.39	123	1.77
7	113.4	46	20.6	85	5.22	124	1.73
8	108	47	19.81	86	5.06	125	1.68
9	102.8	48	19.06	87	4.90	126	1.64