DLCERB

Service Manual

Outdoor Unit Single Zone Ductless System - Sizes 09 to 36

TABLE OF CONTENTS

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 coil cleaning. All other operations should be performed by trained service personnel.

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

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

Read this manual thoroughly and follow all warnings or cautions included in the 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, the main electrical disconnect switch must be in the **OFF** position. There may be more than one disconnect switch. Lock out and tag the 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.

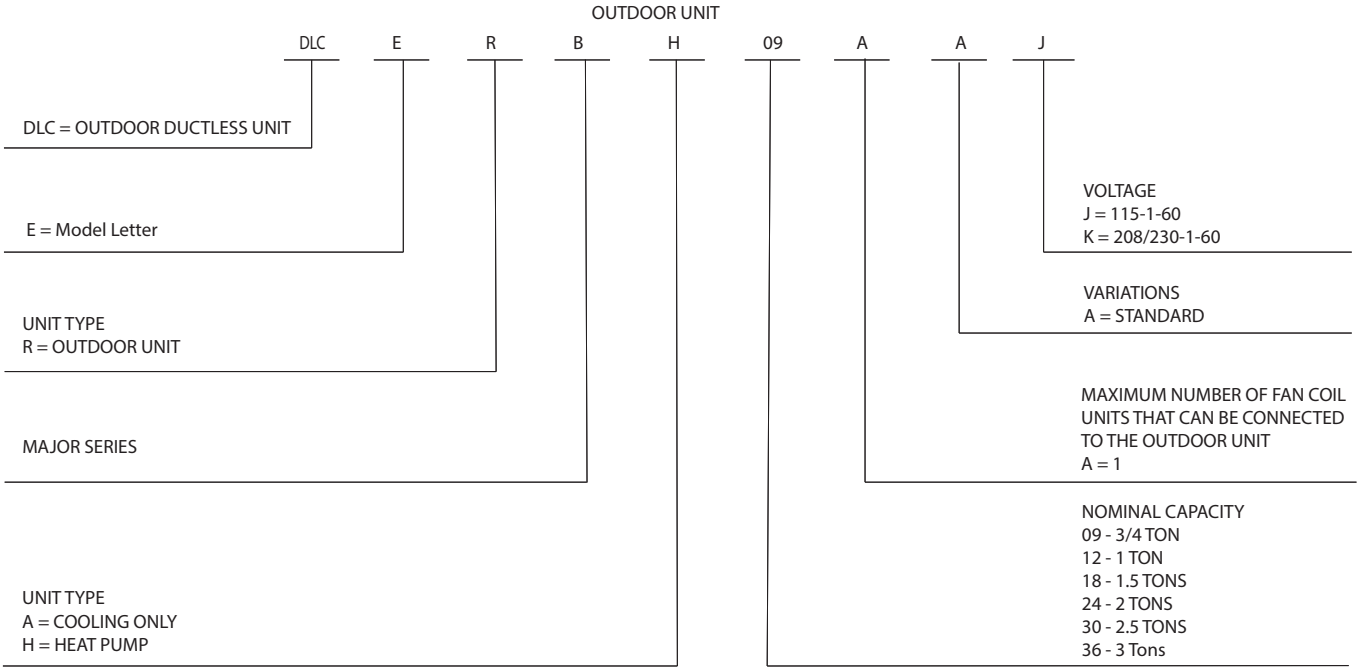
INTRODUCTION

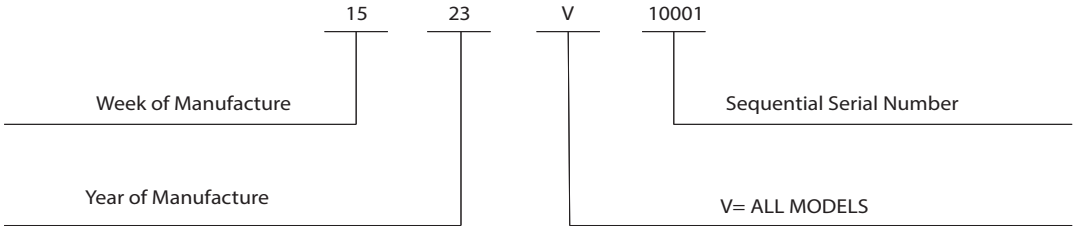
This service manual provides the necessary information to service, repair, and maintain the outdoor units. This manual has an **"APPENDICES"on page 105** with data for troubleshooting. Use the **"TABLE OF CONTENTS"on page 1** to locate a desired topic.

MODEL / SERIAL NUMBER NOMENCLATURES

Table 1 — Unit Sizes

	SYSTEM TONS	BTUh	VOLTAGE - PHASE	OUTDOOR MODEL
Heat Pump	0.75	9,000	115-1-60	DLCERBH09AAJ
	1.00	12,000		DLCERBH12AAJ
	0.75	9,000	208/230-1	DLCERBH09AAK
	1.00	12,000		DLCERBH12AAK
	1.50	18,000		DLCERBH18AAK
	2.00	24,000		DLCERBH24AAK
	2.5	30,000		DLCERBH30AAK
	3.00	36,000		DLCERBH36AAK





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

SPECIFICATIONS

Table 2 — Specifications (Heat Pump)

SYSTEM	SIZE		9K	12K	9K	12K	18K	24K	30K	36K
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	MCA	A.	20	18.5	12.0	15	15	19	25	28
	MOCP - Fuse Rating	A.	30	25	15	15	20	30	30	35
	Max - Min Voltage Range	V	127~104		253-187					
Operating Range	Cooling Outdoor DB Min - Max	° F (° C)	0~122 (-17~50)							
	Heating Outdoor DB Min - Max	° F (° C)	0~86 (-17~30)							
Piping	Total Piping Length	ft (m)	82 (25)	82 (25)	82 (25)	82 (25)	98 (30)	164 (50)	164 (50)	213(65)
	Piping Lift*	ft (m)	32 (10)	32 (10)	32 (10)	32 (10)	65 (20)	82 (25)	82 (25)	98.4 (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)	3/8 (9.52)	3/8 (9.52)
	Pipe Connection Size - Suction	in (mm)	3/8 (9.52)	1/2 (12.7)	3/8 (9.52)	1/2 (12.7)	1/2 (12.7)	5/8 (16)	5/8 (16)	5/8 (16)
Refrigerant	Type		R410A							
	Charge	lbs (kg)	1.59 (0.72)	1.79 (0.81)	1.59 (0.72)	1.79 (0.81)	2.98 (1.35)	3.92 (1.78)	6.17(2.8)	7.5(3.4)
	Metering Device		Capillary Tube					Throttle Valve	EEV + Throttle Valve	
Outdoor Coil	Face Area	Sq. Ft.	4.04	4.04	4.04	4.04	4.67	5.90	8.14	8.14
	No. Rows		1	1	1	1	2	1.6	3	3
	Fins per inch		18	20	18	20	20	20	18	18
	Circuits		2	2	2	2	4	5	6	6
Compressor	Type		Rotary Inverter							
	Model		KSK103D33UEZ	KSN98D64UFZ3	KSK103D33UEZ3	KSN98D64UFZ3	KSN140D21UFZ	KTM240D43UKT	KTF250D22UMT	KTF250D22UMT
	Oil Type		VG74	VG74	VG74	VG74	VG74	VG74	VG74	VG74
	Oil Charge	Fl. Oz.	10.48	10.15	10.48	10.15	14.88	20.97	22.70	22.70
	Rated Input Current of the Power Conversion Equipment	A.	15	13.0	7	7.5	10	14.3	17	22
Outdoor	Unit Width	in (mm)	30.12 (765)	30.12 (765)	30.12 (765)	30.12 (765)	31.69 (805)	35.04 (890)	37.24(946)	37.24(946)
	Unit Height	in (mm)	21.85 (555)	21.85 (555)	21.85 (555)	21.85 (555)	21.81 (554)	26.50(673)	31.89(810)	31.89(810)
	Unit Depth	in (mm)	11.93 (303)	11.93 (303)	11.93 (303)	11.93 (303)	12.99 (330)	13.46 (342)	16.14(410)	16.14(410)
	Net Weight	lbs (kg)	57.76 (26.2)	62.17 (28.2)	55.11 (25.0)	59.30 (26.9)	73.85 (33.5)	97.88 (44.4)	142.86(64.8)	150.13(68.1)
	Airflow	CFM	1,294	1,235	1,294	1,235	1,235	1,765	2,235	2,235
	Sound Pressure	dB(A)	55.0	53.5	55	55.5	55	59.5	70	71

NOTE: See the current compatibility chart for a list of the indoor unit and outdoor unit match ups.

Table 3 — Specifications (Cooling Only)

SYSTEM	SIZE		12	12	18	24
ELECTRICAL	Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	MCA	A.	19	9	19	19
	Max-Min Voltage*	V	127-104	253-187	253-187	253-187
OPERATING RANGE	Cooling Outdoor DB Min - Max	° F (° C)	0~122 (-17~50)	0~122 (-17~50)	0~122 (-17~50)	0~122 (-17~50)
PIPING	Total Piping Length	ft (m)	82 (25)	82 (25)	98 (30)	164 (50)
	Piping Lift**	ft (m)	33 (10)	33 (10)	66 (20)	66 (20)
	Pipe Connection Size - Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)
	Pipe Connection Size - Suction	in (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	5/8 (16)
REFRIGERANT	Type		R410A			
	Charge	lbs (kg)	1.43 (0.65)	1.43 (0.65)	1.98 (0.9)	3.92 (1.78)
	Metering Device		Capillary			
OUTDOOR COIL	Face Area	Sq. Ft.	3.75	3.75	4.15	5.90
	No. Rows		1	1	2	1.6
	Fins per inch		21	21	21	20
	Circuits		2	2	2	5
COMPRESSOR	Compressor Type		Rotary Inverter			
	Model		KSK103D33UEZ3	KSK103D33UEZ3	KSN140D58UFZ	KTM240D43UKT
	Oil Type		VG74	VG74	VG74	VG74
	Oil Charge	Fl. Oz.	10.5	10.5	14.9	21.0
	Rated Input Current of the Power Conversion Equipment	A.	14.3	14.3	11.0	14.3
OUTDOOR	Unit Width	in (mm)	28.35 (720)	28.35 (720)	30.12 (765)	35.04 (890)
	Unit Height	in (mm)	19.49 (495)	19.49 (495)	21.85 (555)	26.50 (673)
	Unit Depth	in (mm)	10.63 (270)	10.63 (270)	11.93 (303)	13.46 (342)
	Net Weight	lbs (kg)	51.15 (23.2)	48.72 (22.1)	61.51 (27.9)	97.88 (44.4)
	Airflow	CFM	1,059	1,059	1,235	1,765
	Sound Pressure	dB(A)	52.0	52.5	55.5	59.5

* Permissible limits of the voltage range at which the unit operates satisfactorily.

SYSTEM PERFORMANCE

Table 4 — Heat Pump

INDOOR MODEL		9K (115V)	12K (115V)	09K (208/230V)	12K (208/230V)	18K (208/230V)	24K (208/230V)	30K (208/230V)	36K (208/230V)
Energy Star	-	NO	NO	NO	NO	NO	NO	NO	NO
Cooling System Tons	-	0.75	1.0	0.75	1.0	1.5	2.0	2.5	3.0
Cooling Rated Capacity	Btu/h	9,000	12,000	9,000	12,000	18,000	24,000	30,000	36,000
Cooling Capacity Range	Btu/h	2,650~10,300	3,800~12,100	2,900~10,500	3,800~13,350	3,900~20,000	6,200~24,600	8,200~30,670	8,300~37,500
SEER	-	21.5	20	21.5	20.5	19.5	18.5	21	18
EER	-	12.5	10.3	12.6	10.8	11	9.5	12.2	9.5
Heating Rated Capacity (DOE H12 - 47°F)	Btu/h	10,000	12,000	10,000	12,000	18,800	24,000	30,000	36,000
Heating Rated Capacity (DOE H32 - 17°F)	Btu/h	5,800	7,000	5,800	7,000	11,400	16,300	20,000	20,000
Heating Maximum Capacity (17°F)	Btu/h	7,800	9,000	7,500	9,000	12,500	14,800	21,100	25,000
Heating Maximum Capacity (5°F)	Btu/h	7,500	6,272	7,300	8,000	11,700	15,400	17,800	20,000
Heating Capacity Range	Btu/h	2,700~10,500	2,730~12,500	2,400~10,500	2,730~13,900	6,300~19,400	6,800~26,800	11,800~30,800	10,900~37,360
HSPF	-	9.1	8.7	9.4	9.2	8.7	8.6	8.7	7.8
COP (DOE H12 - 47°F)	W/W	3.26	3.05	3.24	3.38	3.05	2.99	2.75	2.78
COP (DOE H32 - 17°F)	W/W	2.5	2.5	2.5	2.5	2.52	2.3	2.39	2.3
COP (5°F)	W/W	2.15	1.68	2.2	1.8	2.05	1.76	1.8	1.76

Table 5 — Cooling Only

NON-DUCTED HEAT PUMP SYSTEMS		12K (115 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)
Cooling Rated Capacity (DOE A2 - 95°F)	Btu/h	11,500	11,500	17,000	24,000
SEER	Btu/h. W	20.5	20.5	19	17.1
EER (DOE A2 - 95°F)	Btu/h. W	11.2	11.2	10.9	9.3
Cooling Rated Capacity (DOE B2 - 82°F)	Btu/h	12,800	12,500	18,000	24,000
EER (DOE B2 - 82°F)	Btu/h. W	11.94	11.19	13	11
Cooling Capacity Range	Btu/h	3,200-12,800	3,200-12,900	4,500-18,000	6,760-24,300

DIMENSIONS

Table 6 — Heat Pump

SYSTEM SIZE		9K (115v)	12K (115V)	9K (208/230V)	12K (208/230V)	18K (208/230V)	24K (208/230V)	30K (208/230V)	36K (208/230V)
Height (H)	in (mm)	21.85(555)	21.85(555)	21.85(555)	21.85(555)	21.81(554)	26.50(673)	31.89(810)	31.89(810)
Width (W)	in (mm)	30.12(765)	30.12(765)	30.12(765)	30.12(765)	31.69(805)	35.04(890)	37.24(946)	37.24(946)
Depth (D)	in (mm)	11.93(303)	11.93(303)	11.93(303)	11.93(303)	12.99(330)	13.46(342)	16.14(410)	16.14(410)
Weight - Net	lbs. (kg)	57.76(26.2)	62.17(28.2)	55.11(25.0)	59.30(26.9)	73.85(33.5)	97.88(44.4)	142.86(64.8)	150.13(68.1)
		PACKAGING							
Height (H)	in (mm)	24.02(610)	24.02(610)	24.02(610)	24.02(610)	24.21(615)	29.13(740)	34.84(885)	34.84(885)
Width (W)	in (mm)	34.92(887)	34.92(887)	34.92(887)	34.92(887)	36.02(915)	39.17(995)	42.91(1090)	42.91(1090)
Depth (D)	in (mm)	13.27(337)	13.27(337)	13.27(337)	13.27(337)	14.57(370)	15.67(398)	19.69(500)	19.69(500)
Weight - Gross	lbs. (kg)	63.49(28.8)	67.68(30.7)	60.85(27.6)	64.82(29.4)	79.81(36.2)	104.50(47.4)	152.56(69.2)	158.95(72.1)
Carton Material		**CARTON BOX**							
Material Thickness	in (mm)	0.197(5)	0.197(5)	0.197(5)	0.197(5)	0.197(5)	0.295(7.5)	0.295(7.5)	0.295(7.5)

Table 7 — Cooling Only

SYSTEM SIZE		12K (115 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)
Height (H)	in (mm)	19.49(495)	19.49(495)	21.85(555)	26.50(673)
Width (W)	in (mm)	28.35(720)	28.35(720)	30.12(765)	35.04(890)
Depth (D)	in (mm)	10.63(270)	10.63(270)	11.93(303)	13.46(342)
Weight - Net	lbs. (kg)	51.15(23.2)	48.72(22.1)	61.51(27.9)	97.88(44.4)
		PACKAGING			
Height (H)	in (mm)	21.26(540)	21.26(540)	24.02(610)	29.13(740)
Width (W)	in (mm)	32.87(835)	32.87(835)	34.92(887)	39.17(995)
Depth (D)	in (mm)	11.81(300)	11.81(300)	13.27(337)	15.67(398)
Weight - Gross	lbs. (kg)	55.11(25)	52.1(23.9)	66.8(30.3)	104.50(47.4)
Carton Drawing No.	--	818*288*520	818*288*520	877*327*590	985*388*720
Carton Material	--	**CARTON BOX**			
Material Thickness	in (mm)	0.197(5)	0.197(5)	0.197(5)	0.295(7.5)

DIMENSIONS (CONT)

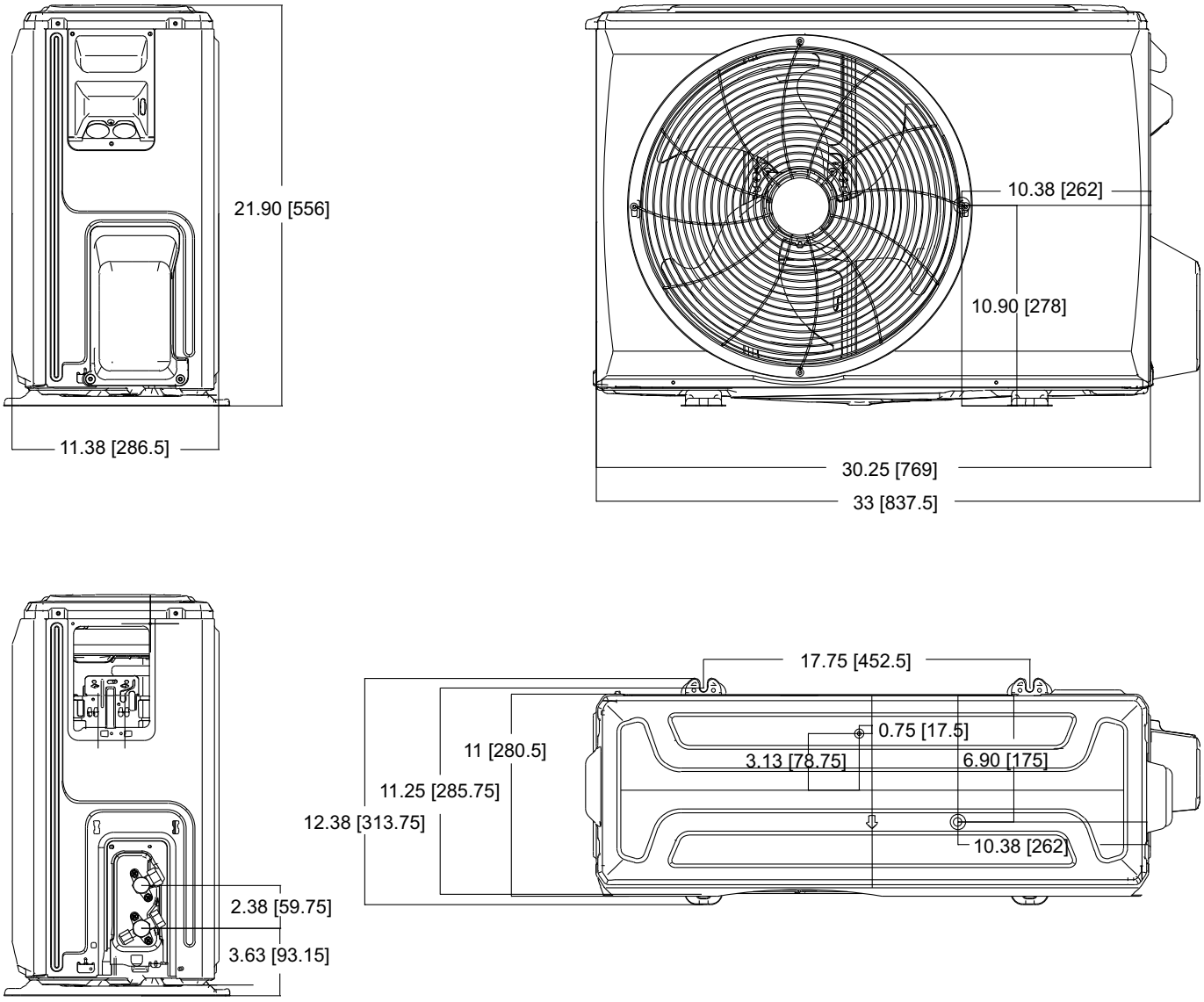


Fig. 1 — Sizes 12K (115V) and 9K/12K (208/230V) Heat Pump and 18K Cooling Only

DIMENSIONS (CONT)

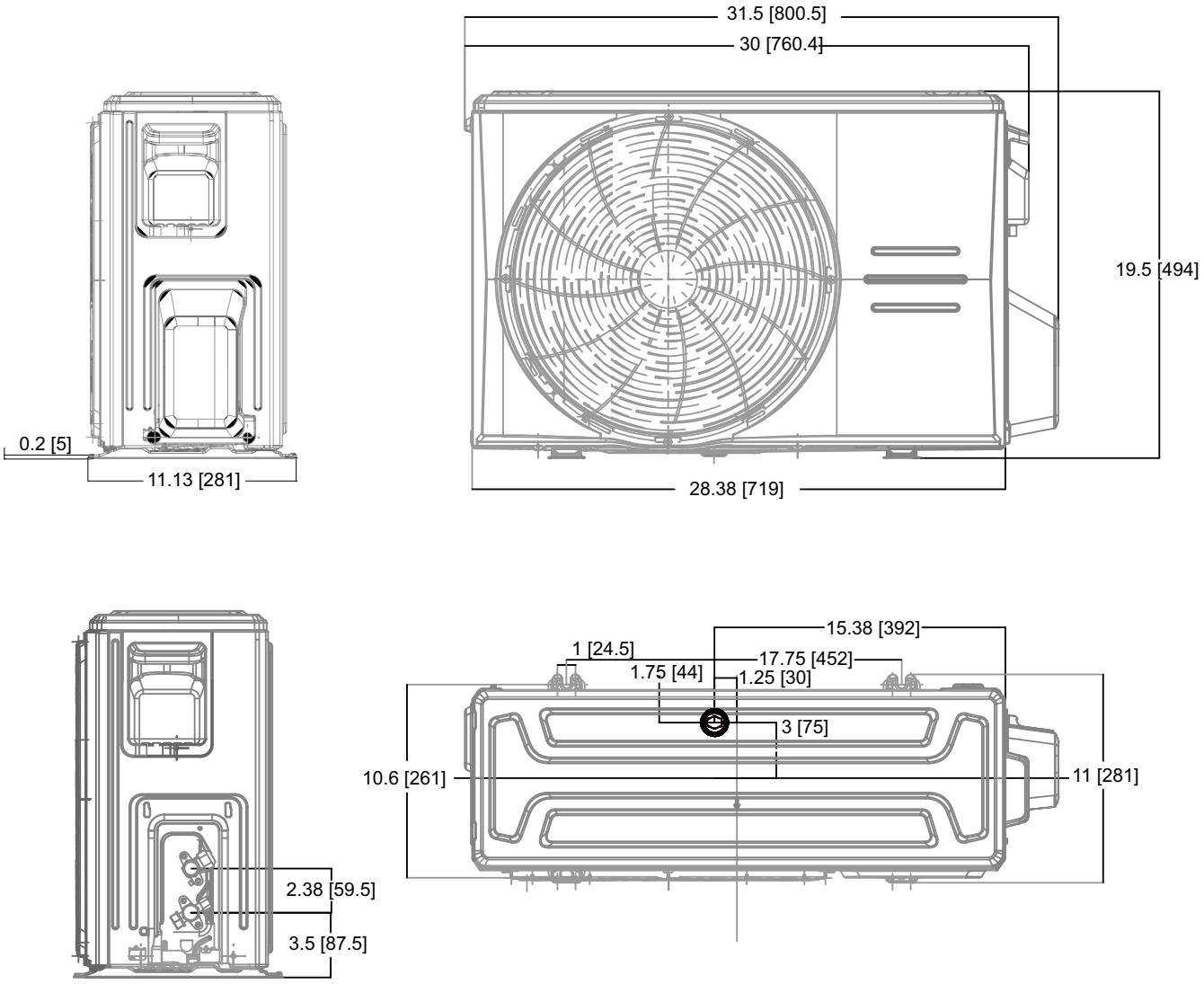


Fig. 2 — Sizes 12K (115V) and 12K (208/230V) Cooling Only

DIMENSIONS (CONT)

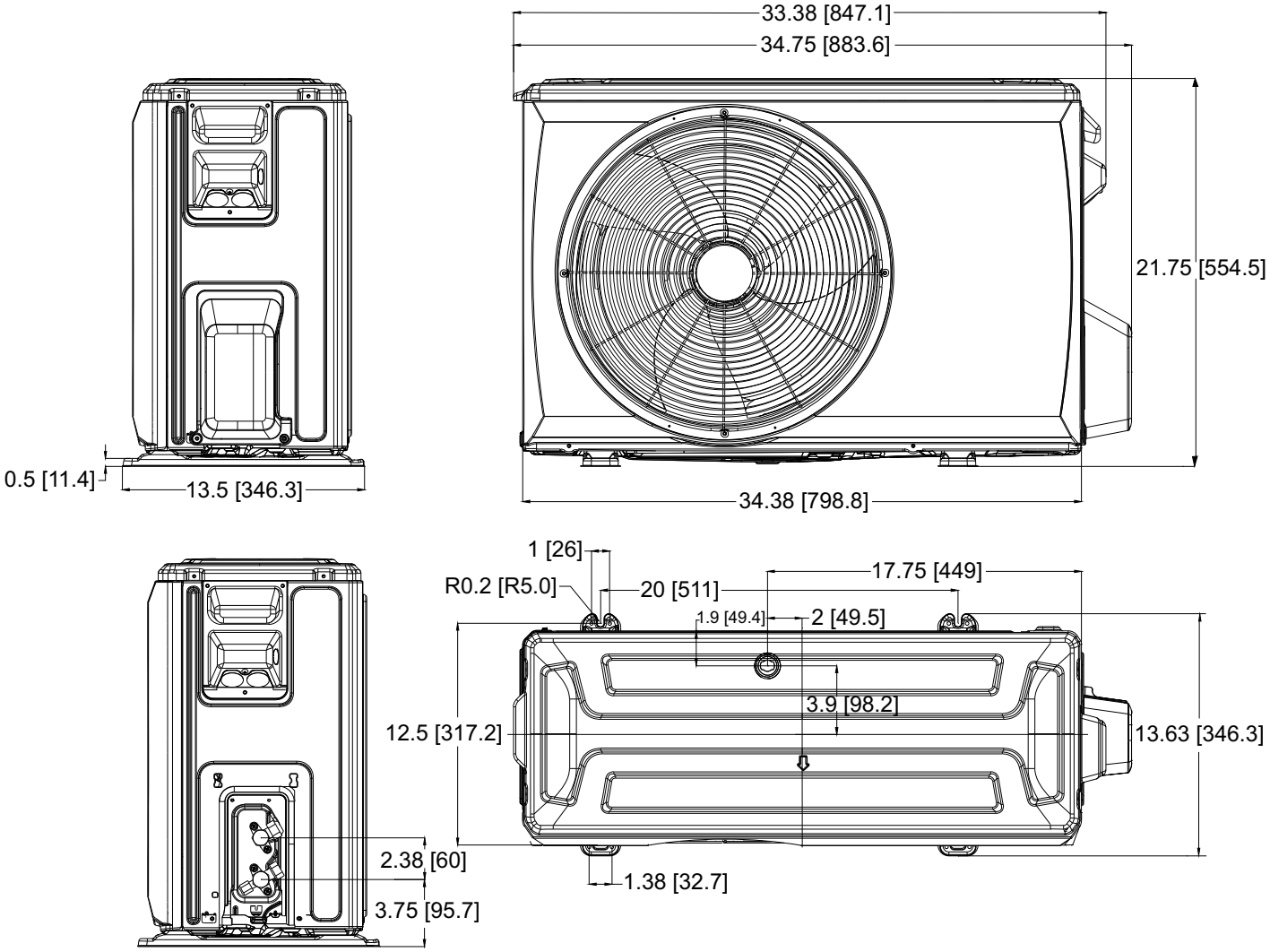


Fig. 3 — Size 18K Heat Pump

DIMENSIONS (CONT)

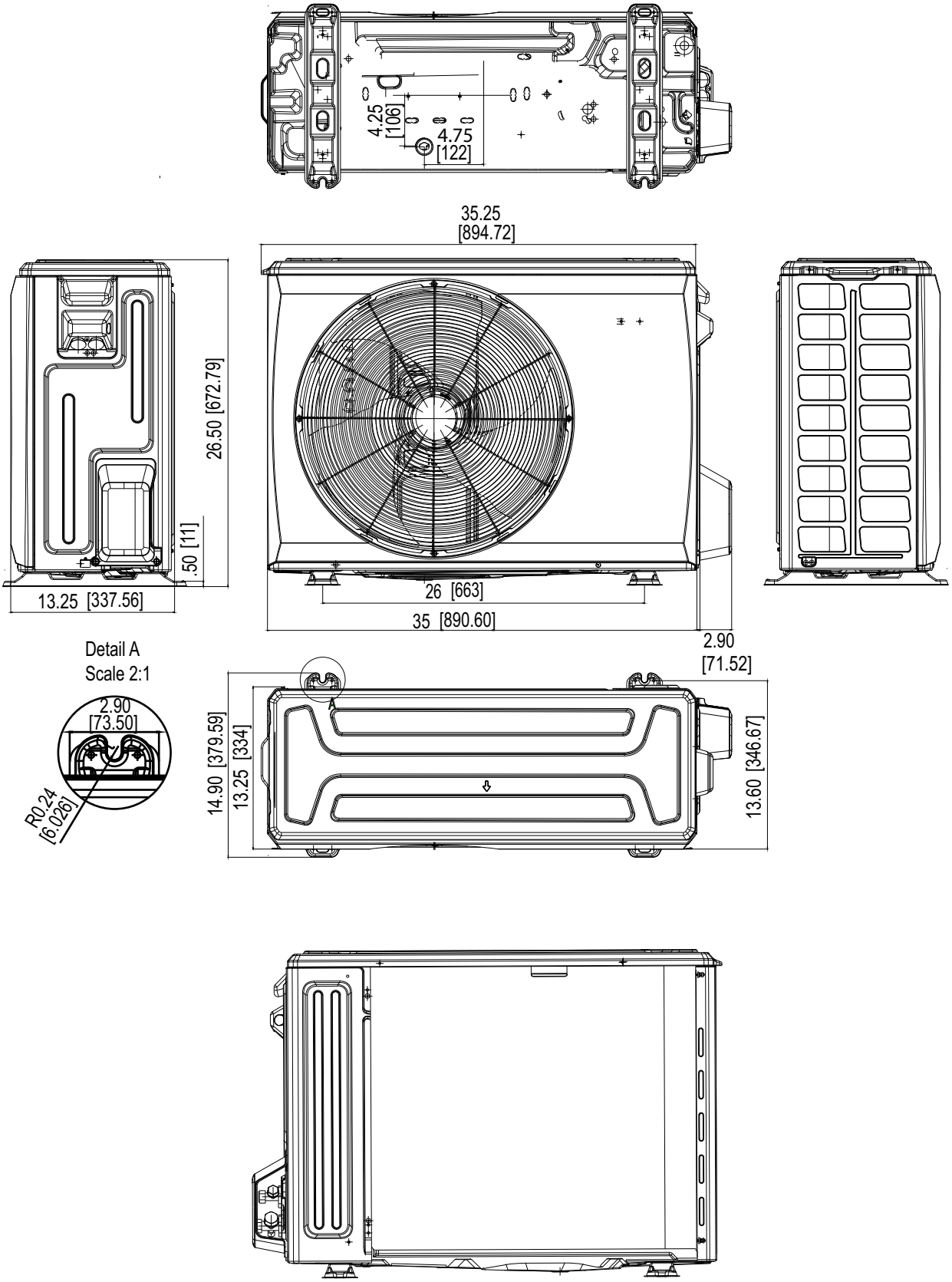


Fig. 4 — Size 24K Heat Pump

DIMENSIONS (CONT)

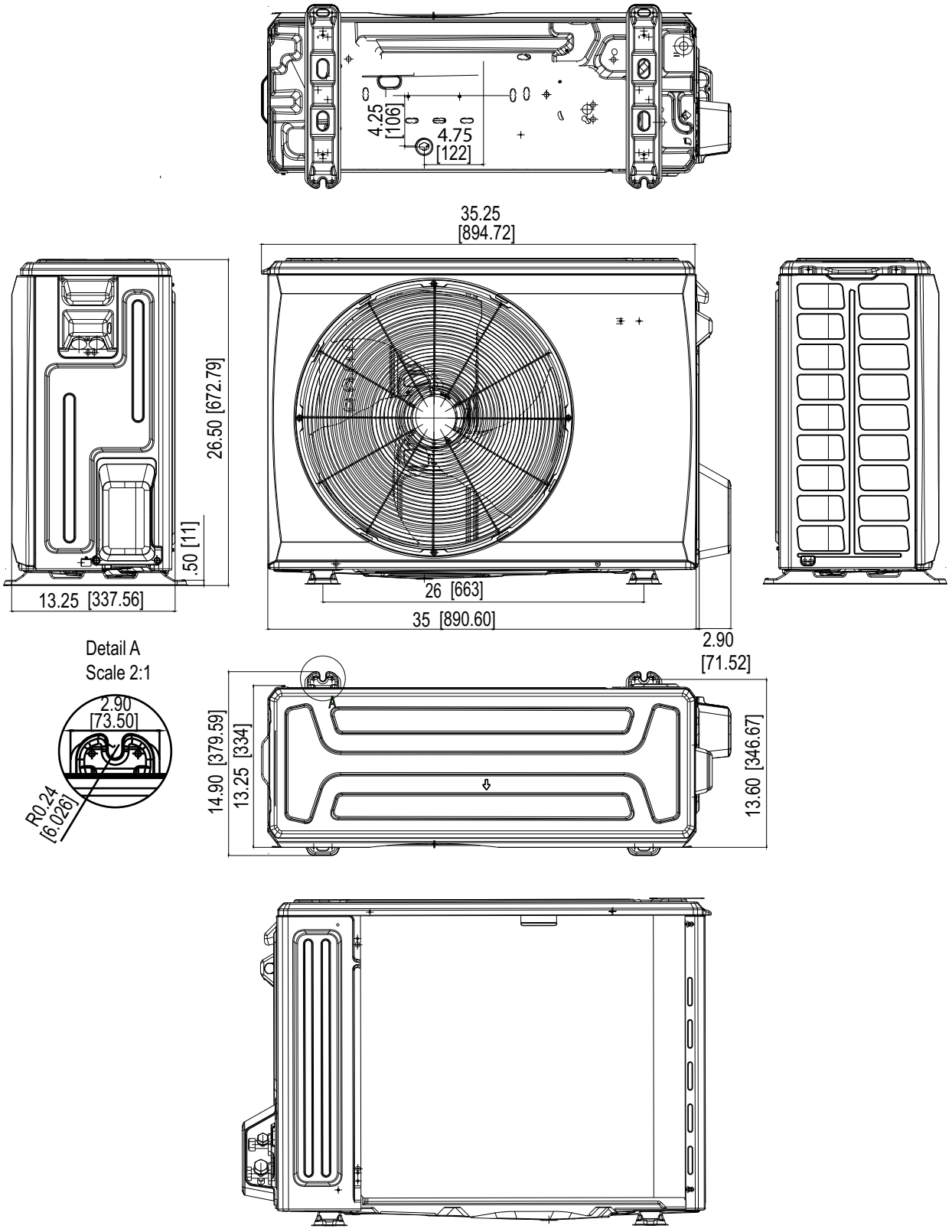


Fig. 5 — Size 24K Cooling Only

DIMENSIONS (CONT)

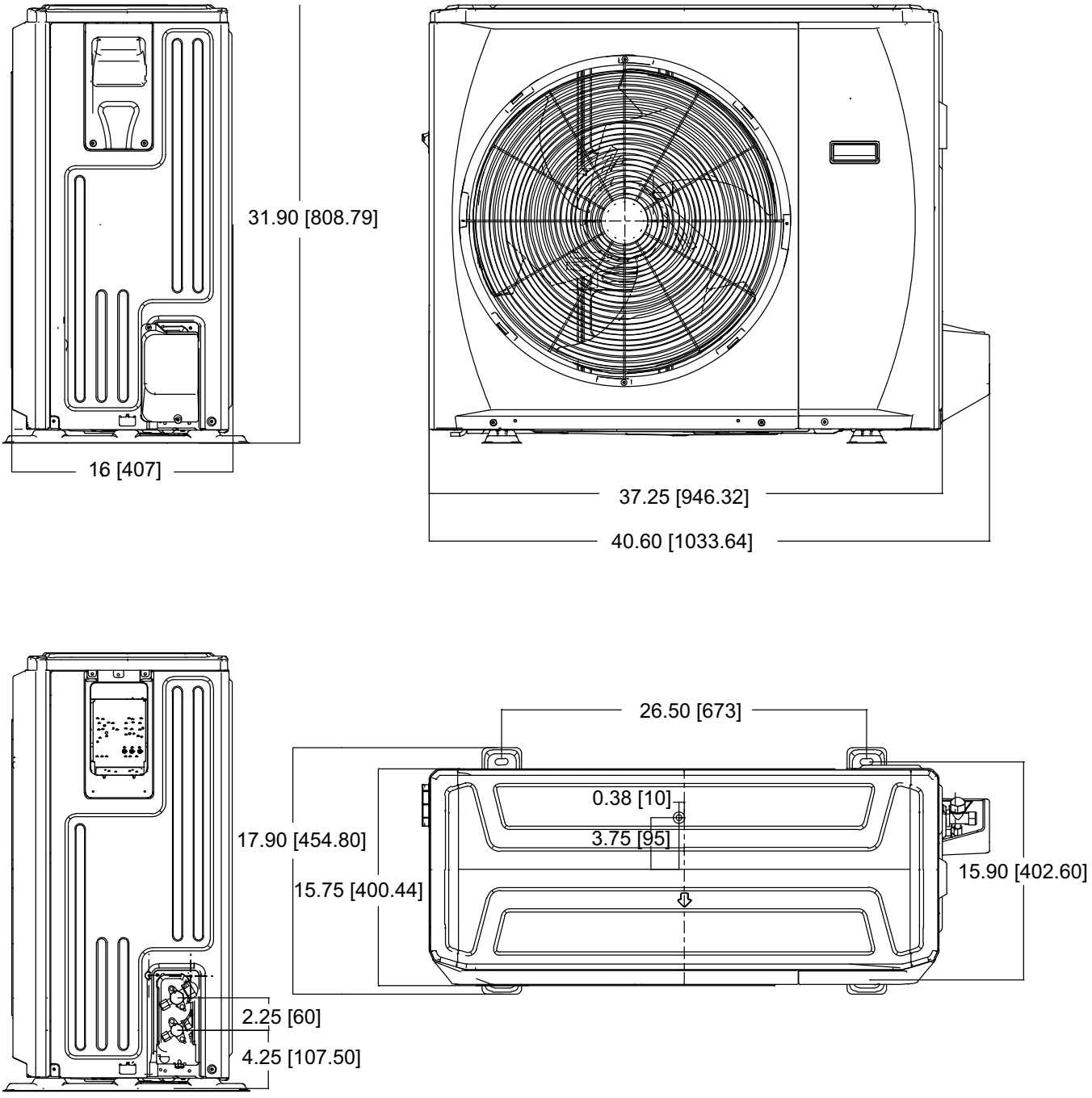


Fig. 6 — Size 30K Heat Pump

DIMENSIONS (CONT)

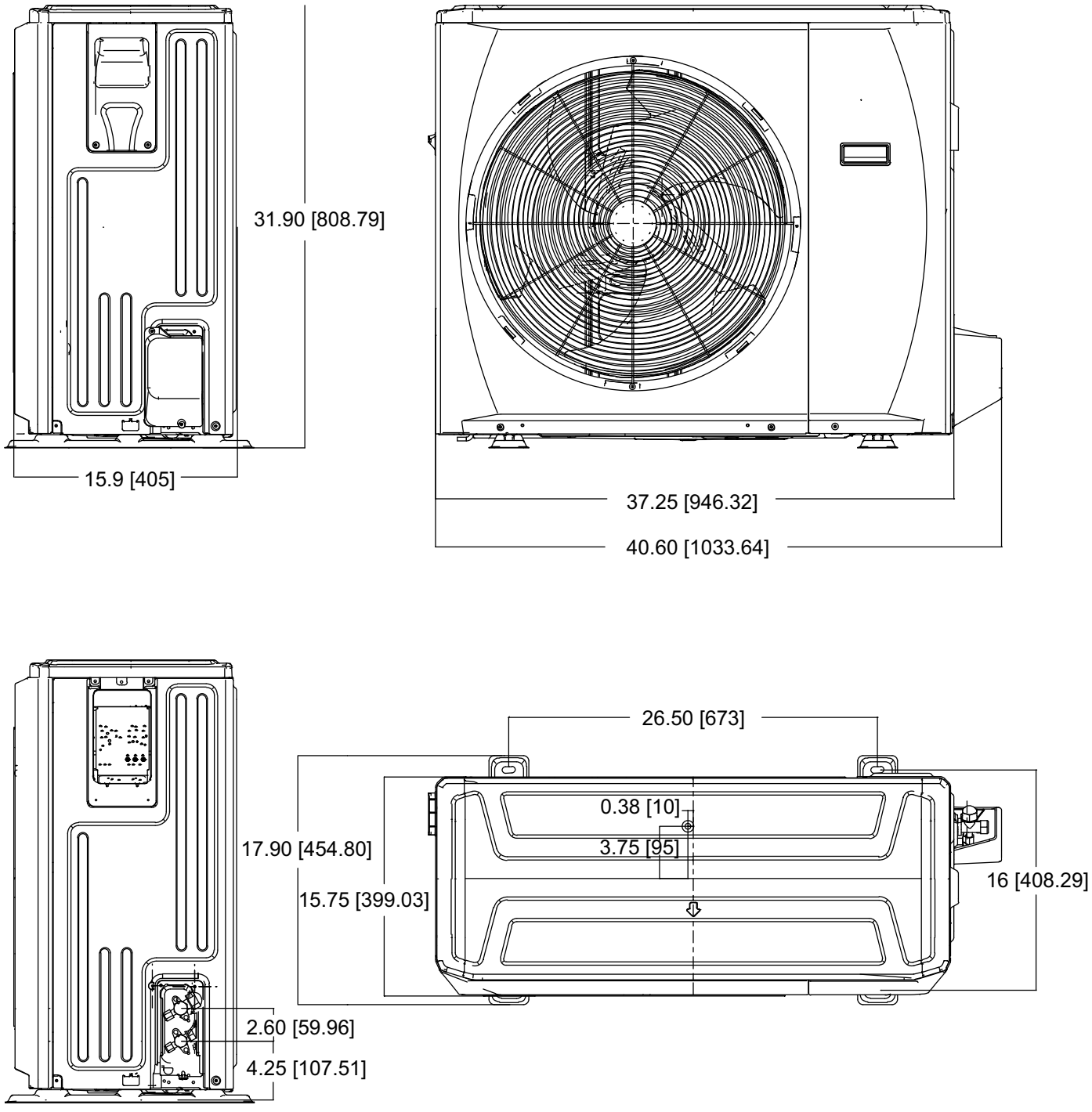


Fig. 7 — Size 36K Heat Pump

CLEARANCES

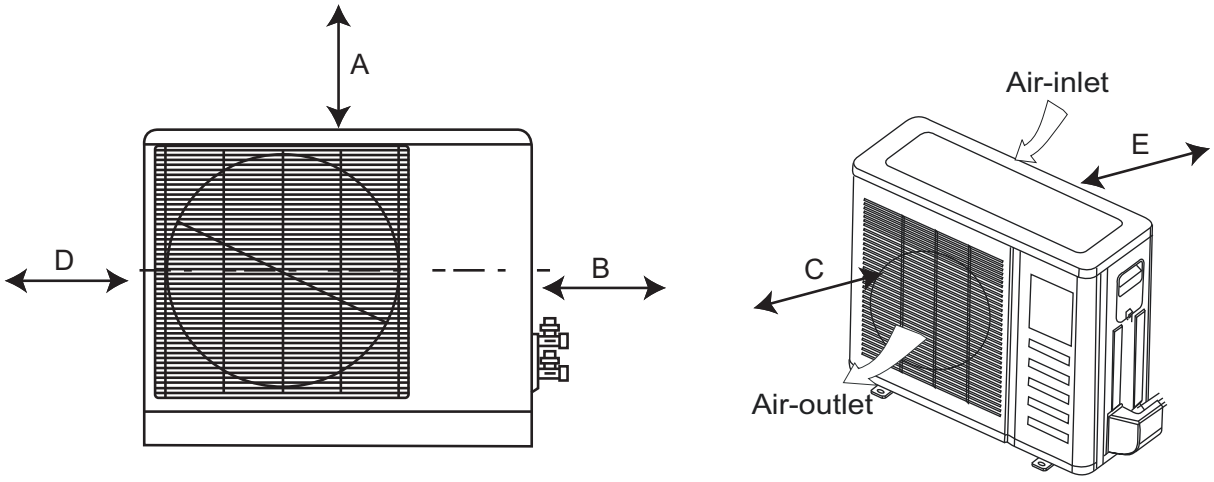


Fig. 8 — Clearances

Table 8 — Clearances

UNIT	MINIMUM VALUE IN. (MM)
A	24 (609)
B	24 (609)
C	24 (609)
D	4 (101)
E	6 (152)

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

NOTE: The inverter driven outdoor units cannot be stacked on top of one another.

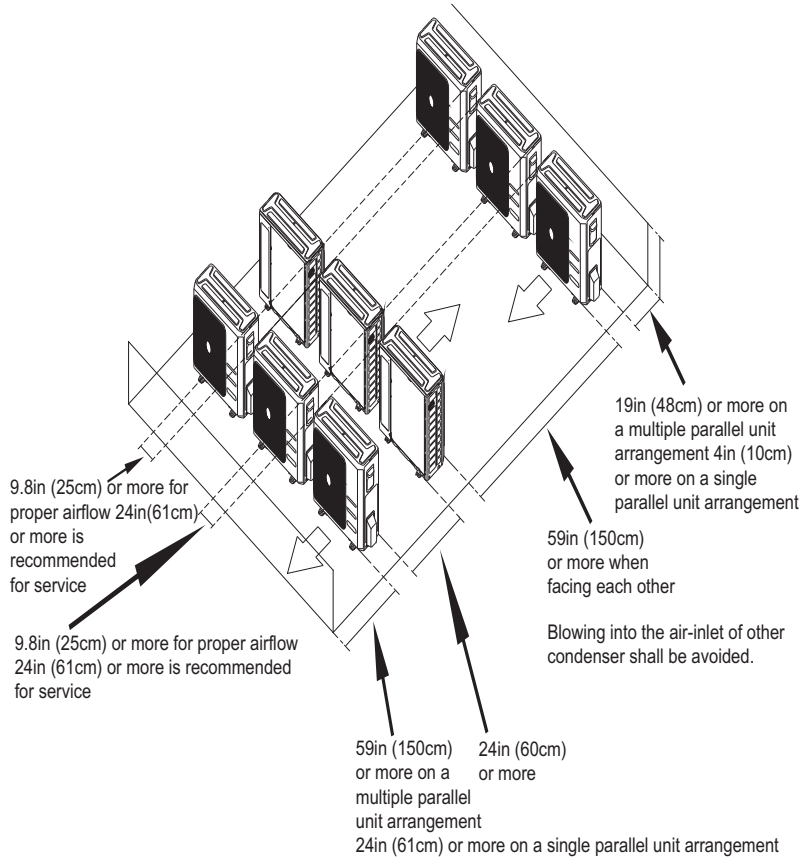


Fig. 9 — Clearances for Multiple Units

ELECTRICAL DATA

Table 9 — Heat Pump

OUTDOOR UNIT		9K (115V)	12K (115V)	9K (208/230V)	12K (208/230V)	18K (208/230V)	24K (208/230V)	30K (208/230V)	36K (208/230V)
Minimum Circuit Ampacity (MCA)	A	20	18.5	12.0	15	15	19	25	28
Recommended Breaker Size	A	20	20	15	15	20	20	30	30
Maximum Overcurrent Protection Ampacity (MOPA)	A	30	25	15	15	20	30	30	35
Voltage-Phase-Frequency		115-1-60		208/230-1-60					
Min – Max Voltage Range*		104-127		187-253					
		COOLING							
Running current	(A)	6.3	10.5	3.41	5.2	7	11.12	12.1	18.5
Power consumption	(W)	725	1,212	782	1,176	1,610	2,570	2,700	4,235
Power factor	(%)	79.2	81.8	97.6	97.5	99.1	99.3	96.2	98.7
		HEATING							
Running current range	(A)	7.82	10.4	4.1	5.0	7.2	10.25	12.2	18.3
Power consumption	(W)	900	1,172	944	1,131	1,650	2,230	2,700	4,200
Power factor	(%)	80.5	81.5	98	96.3	99.17	99.2	96.3	98.7

*Permissible limits of the voltage range at which the unit operates satisfactorily.

Table 10 — Cooling Only

OUTDOOR UNIT		12K (115V)	12K (208/230V)	18K (208/230V)	24K (208/230V)
Minimum Circuit Ampacity (MCA)	A	19	9	16	19
Recommended Breaker Size	A	20	10	20	20
Maximum Overcurrent Protection Ampacity (MOPA)	A	30	15	20	30
Voltage-Phase-Frequency		115-1-60	208/230-1-60		
Min – Max Voltage Range*		104-127	187-253		
		COOLING			
Running current	(A)	8.9	4.3	7	11.12
Power consumption	(W)	1,020	891	1,600	2,570
Power factor	(%)	98	82	99.2	99.3

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.

Recommended Connection Method for Power and Communication Wiring:

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Wires should be sized based on NEC and local codes.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Be sure to comply with local codes while running wire from 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.

CONNECTION DIAGRAMS

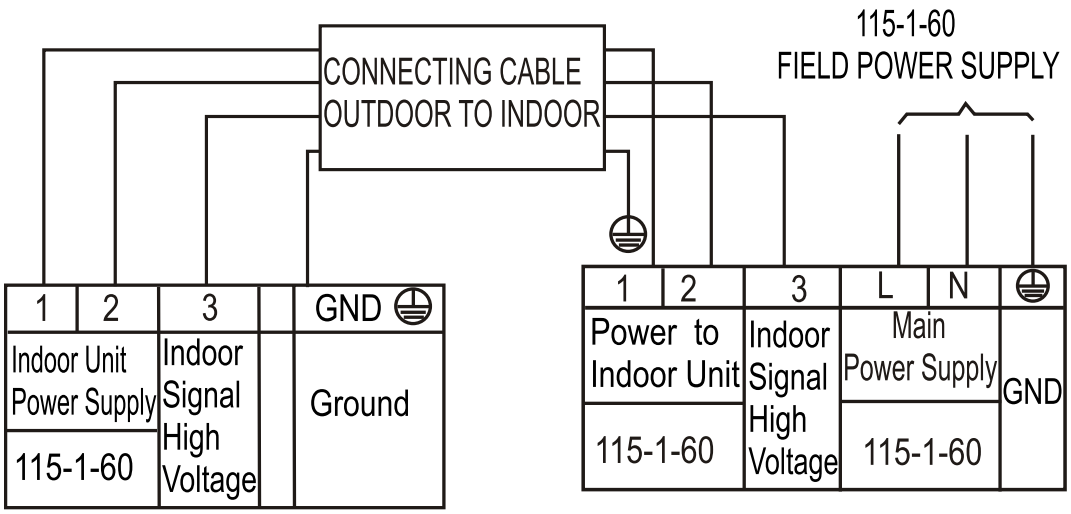


Fig. 10 — Connection Diagram Sizes 9K-12K (115V)

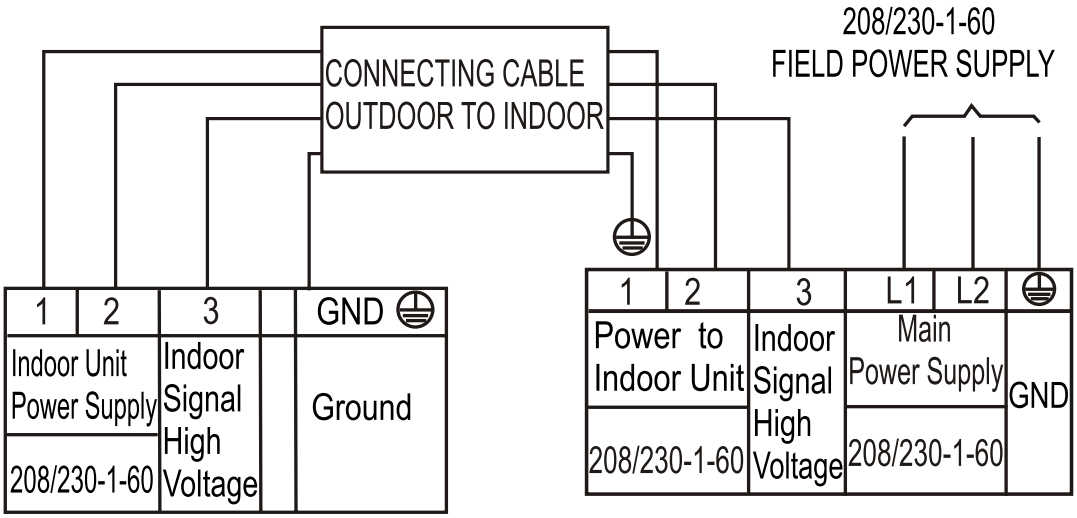


Fig. 11 — Connection Diagram Sizes 9K-36K (208-230V)

NOTES:

1. Do not use thermostat wire for any connection between indoor and outdoor units.
2. All connections between the indoor and outdoor units must be made as shown in Figures 10 - 11. The connections are sensitive to polarity and will result in a fault code.

WIRING DIAGRAMS

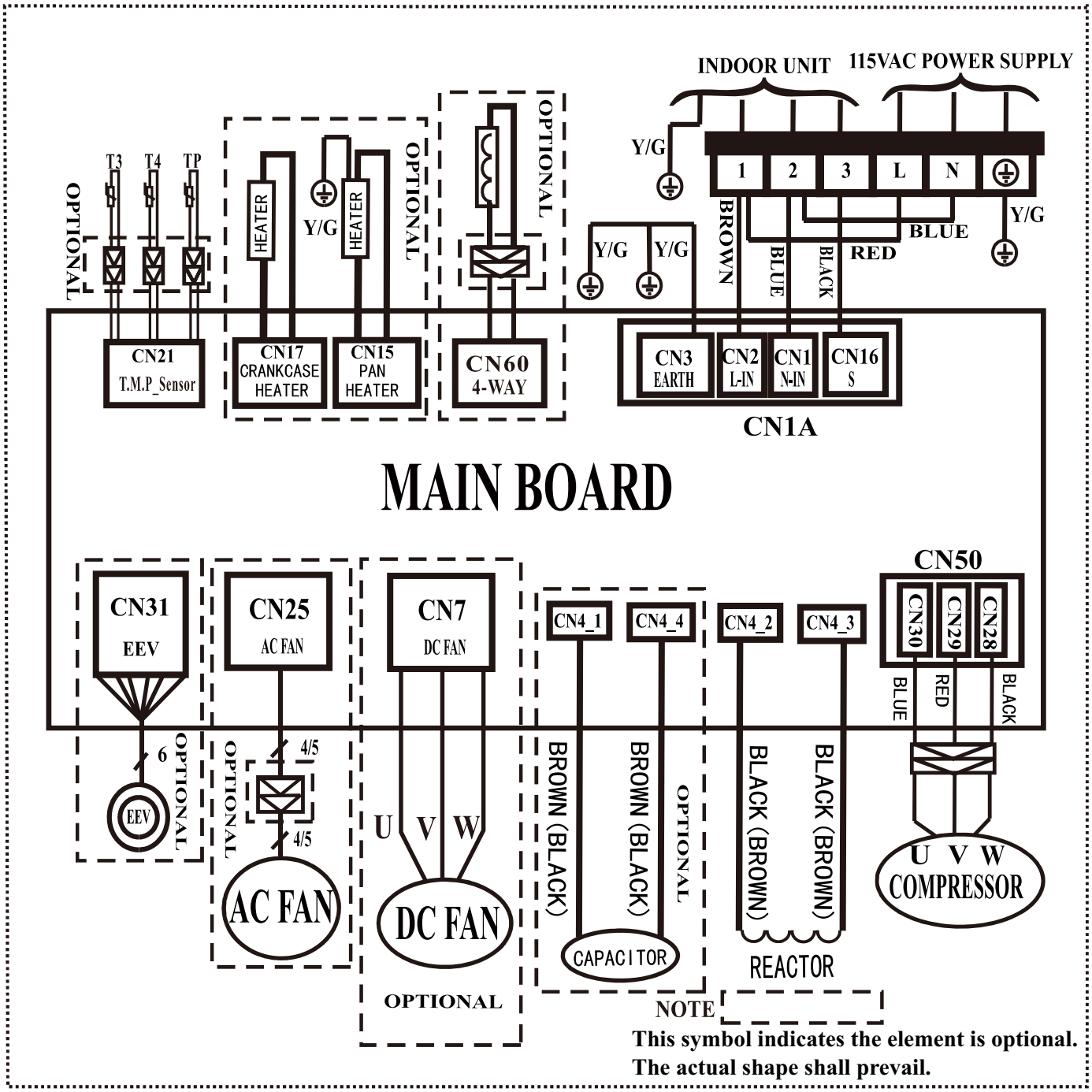


Fig. 12 — Wiring Diagram Sizes 9K and 12K (115V) - Heat Pump

Table 11 — Wiring Diagram Sizes 9K and 12K (115V) - Heat Pump

		CN1A	INPUT	**115V**	AC
		CN4_2/4_3	INPUT	**115V**	AC
		CN7	OUTPUT	0-155V	AC
		CN60	OUTPUT	115V	AC
T3	Condenser TEMP. Sensor	CN21	INPUT	0-5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN15	OUTPUT	115V	AC
		CN17	OUTPUT	115V	AC
		CN50	OUTPUT	0-155V	AC

WIRING DIAGRAMS (CONT)

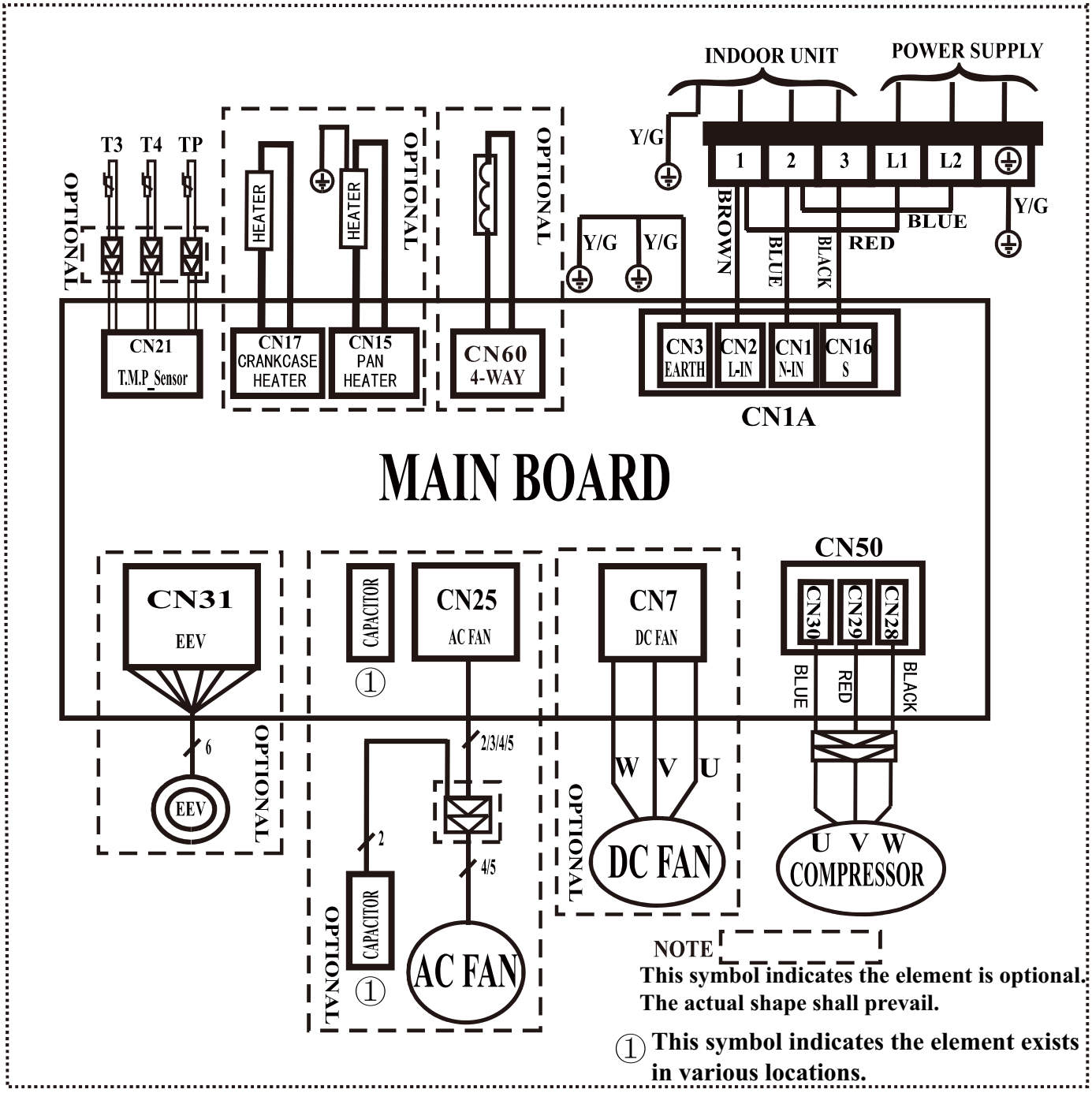


Fig. 13 — Wiring Diagram Sizes 09-18K (208-230V) Heat Pump

Table 12 — Wiring Diagram Sizes 09-18K (208-230V) Heat Pump

		CN1A	INPUT	230V	AC
		CN7	OUTPUT	0-310V	AC
		CN60	OUTPUT	230V	AC
T3	Condenser TEMP. Sensor	CN21	INPUT	0-5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN15	OUTPUT	230V	AC
		CN17	OUTPUT	230V	AC
		CN50	OUTPUT	0-310V	AC

WIRING DIAGRAMS (CONT)

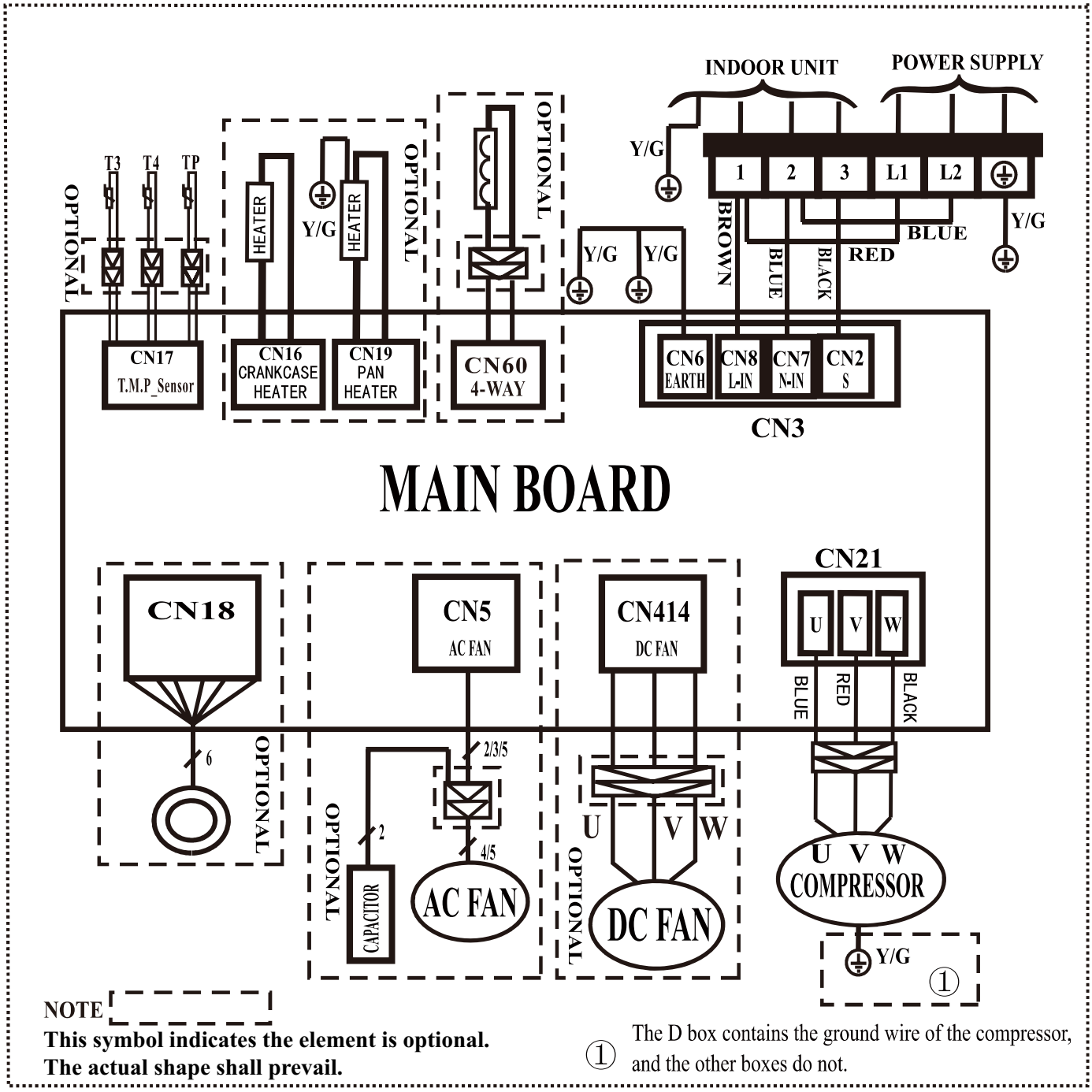
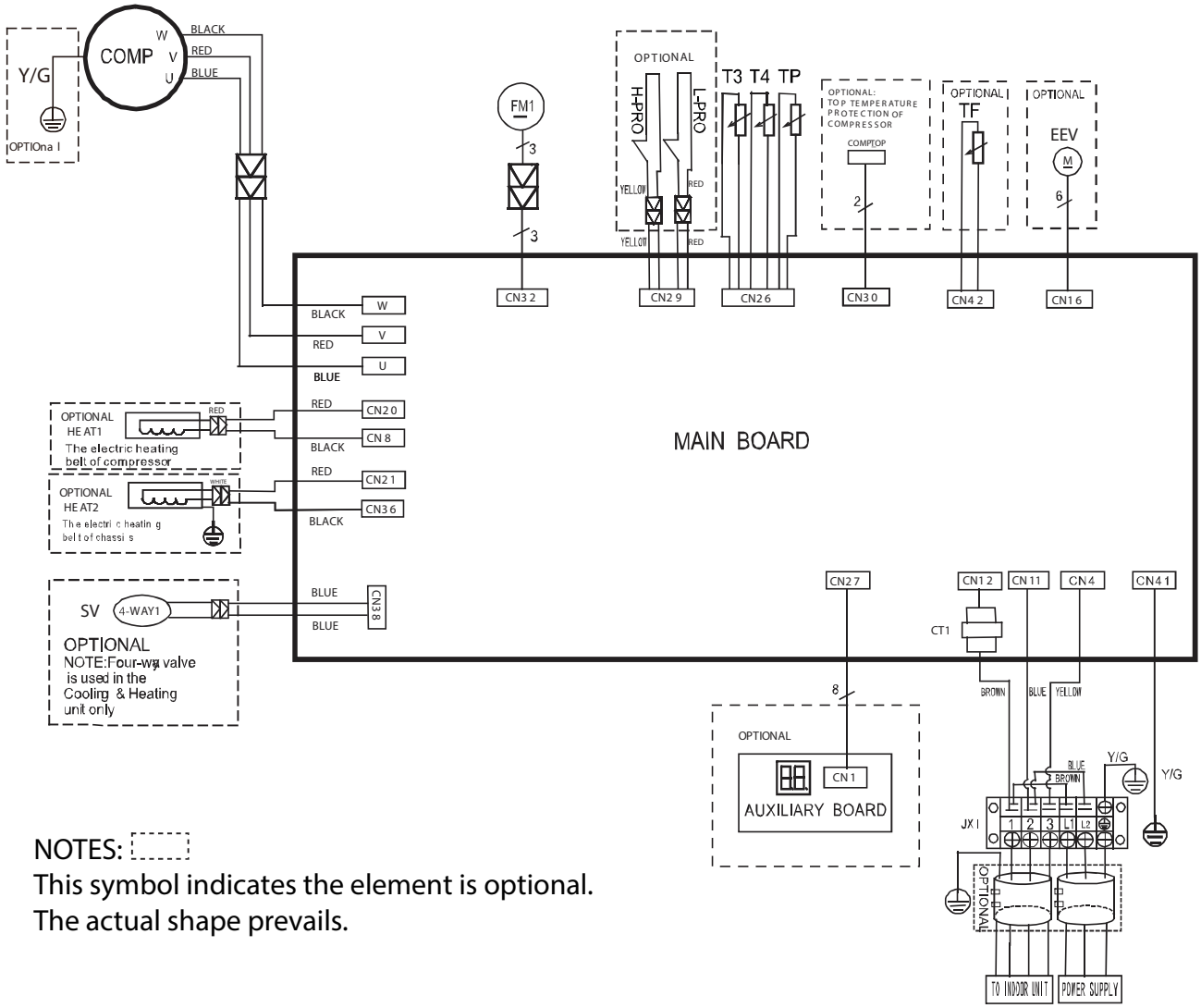


Fig. 14 — Wiring Diagram Size 24K (230V) - Heat Pump

Table 13 — Wiring Diagram Size 24K (230V) - Heat Pump

		CN2/7/8	INPUT	230V	AC
		CN414	OUTPUT	0-310V	AC
		CN60	OUTPUT	230V	AC
T3	Condenser TEMP. Sensor	CN17	INPUT	0-5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN16	OUTPUT	230V	AC
		CN19	OUTPUT	230V	AC
		CN27/28/29	OUTPUT	0-310V	AC

WIRING DIAGRAMS (CONT)



NOTES:
This symbol indicates the element is optional.
The actual shape prevails.

Fig. 15 — Wiring Diagram Sizes 30K-36K (230V) - Heat Pump

Table 14 — Wiring Diagram Sizes 30K-36K (230V) - Heat Pump

CODE	PART NAME
JXI	Terminal Block
COMP_TOP	Compressor OLP Temperature Sensor
EEV	Electric Expansive Valve
FM1	Outdoor DC Fan
COMP	Compressor
HEAT1,HEAT2	Crankcase Heating
CTI	AC Current Detector
H-PRO	High Pressure Switch
L-PRO	Low Pressure Switch
SV	4-WAY VALVE
TP	Exhaust Temperature Sensor
T3	Condenser Temperature Sensor
T4	Outdoor Ambient Temperature Sensor
TF	Tube for Heatsink Temperature Sensor

WIRING DIAGRAMS (CONT)

Cooling Only

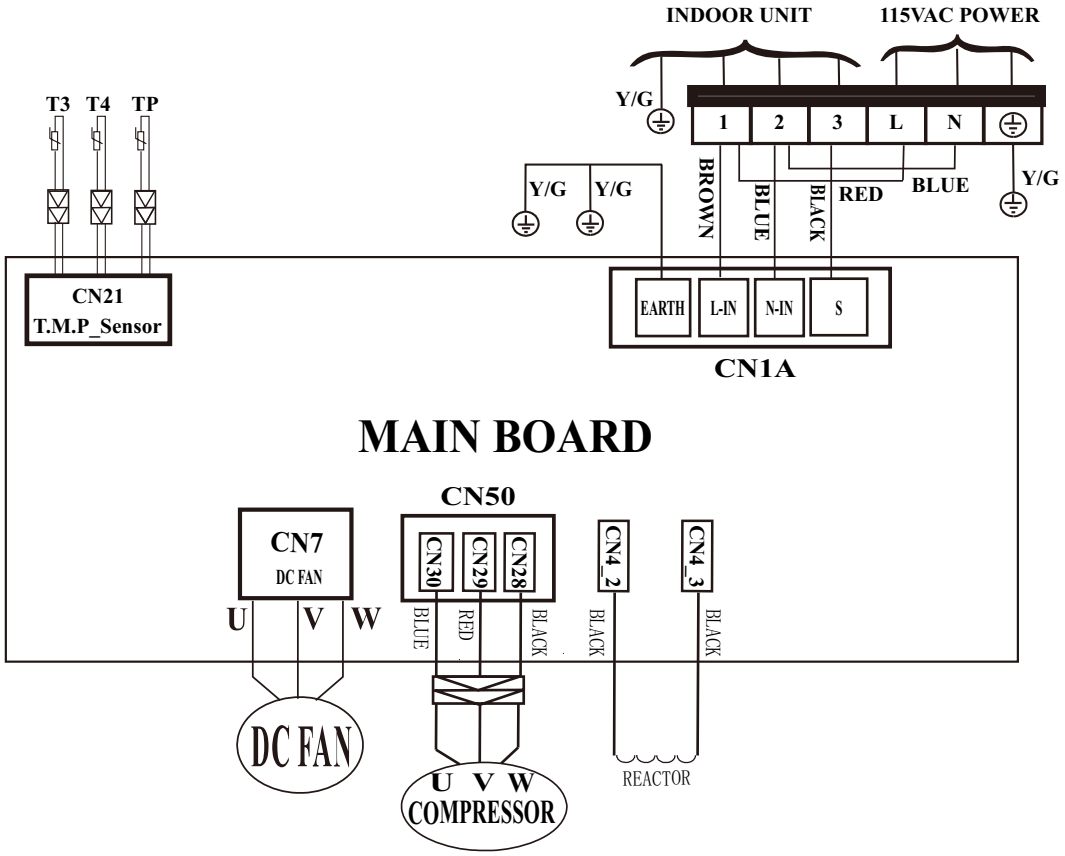


Fig. 16 — Wiring Diagram Size 12K (115V) - Cooling Only

Table 15 — Wiring Diagram Size 12K (115V) - Cooling Only

		CN1A	INPUT	115V	AC
		CN4_2/4_3	INPUT	115V	AC
T3	Condenser TEMP. Sensor	CN21	INPUT	0~5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN7	OUTPUT	0~155V	AC
		CN50	OUTPUT	0~155V	AC

WIRING DIAGRAMS (CONT)

Cooling Only (Cont)

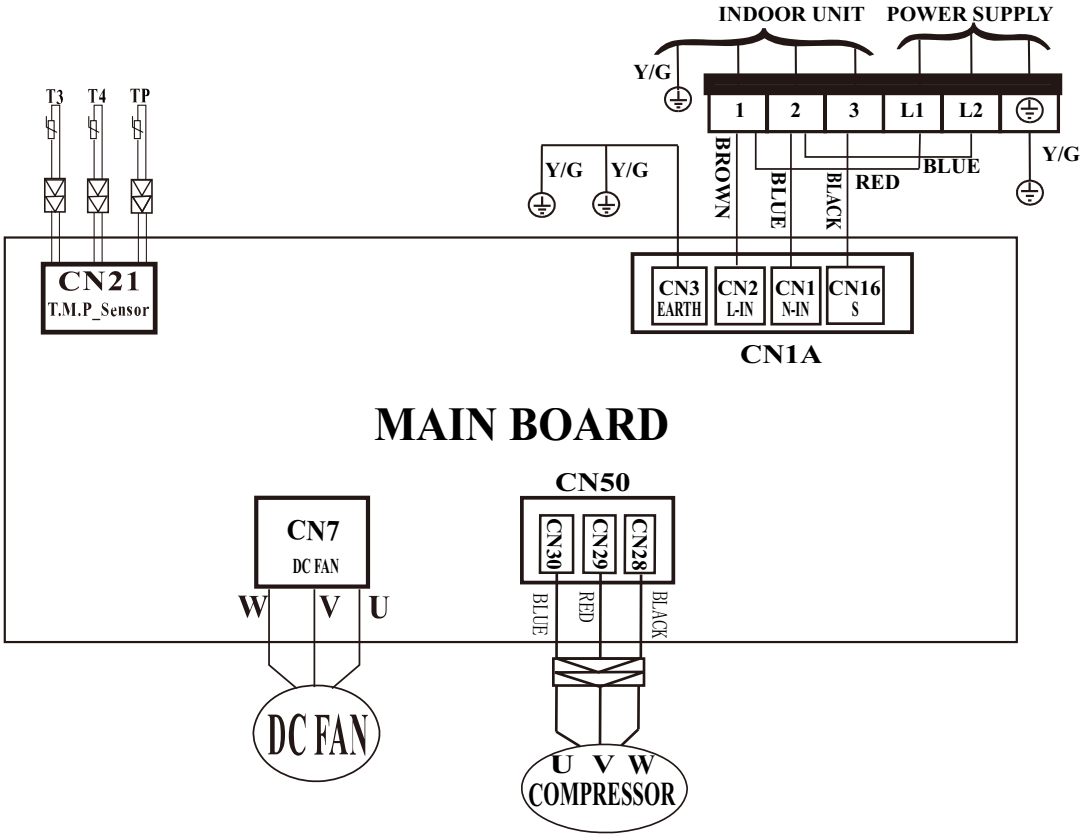


Fig. 17 — Wiring Diagram Sizes 12K/18K (208/230V) - Cooling Only

Table 16 — Wiring Diagram Sizes 12K/18K (208/230V) - Cooling Only

		CN1A	INPUT	230V	AC
		CN7	OUTPUT	0~310V	AC
T3	Condenser TEMP. Sensor	CN21	INPUT	0~5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN50	OUTPUT	0~310V	AC

WIRING DIAGRAMS (CONT)

Cooling Only (Cont)

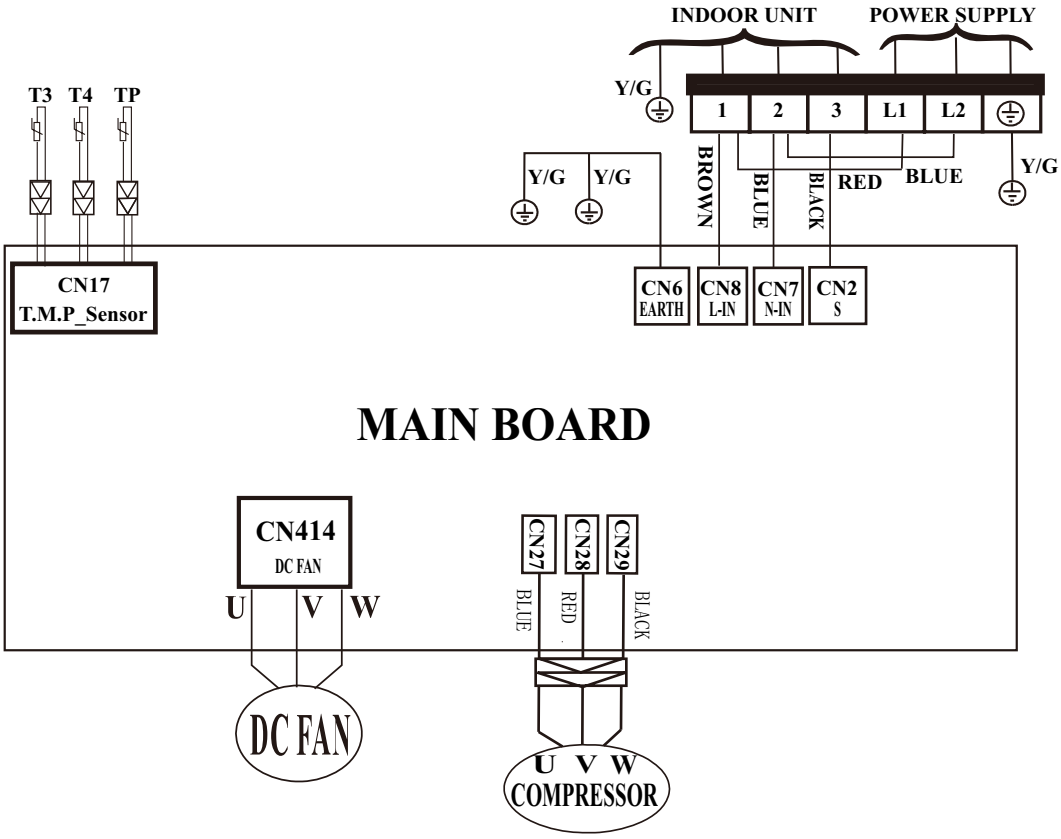


Fig. 18 — Wiring Diagram Size 24K (230V) - Cooling Only

Table 17 — Wiring Diagram Size 24K (230V) - Cooling Only

		CN2/7/8	INPUT	230V	AC
		CN414	OUTPUT	0~310V	AC
T3	Condenser TEMP. Sensor	CN17	INPUT	0~5V	DC
T4	Ambient TEMP. Sensor				
TP	Discharge TEMP. Sensor				
		CN27/28/29	OUTPUT	0~310V	AV

REFRIGERATION CYCLE DIAGRAMS

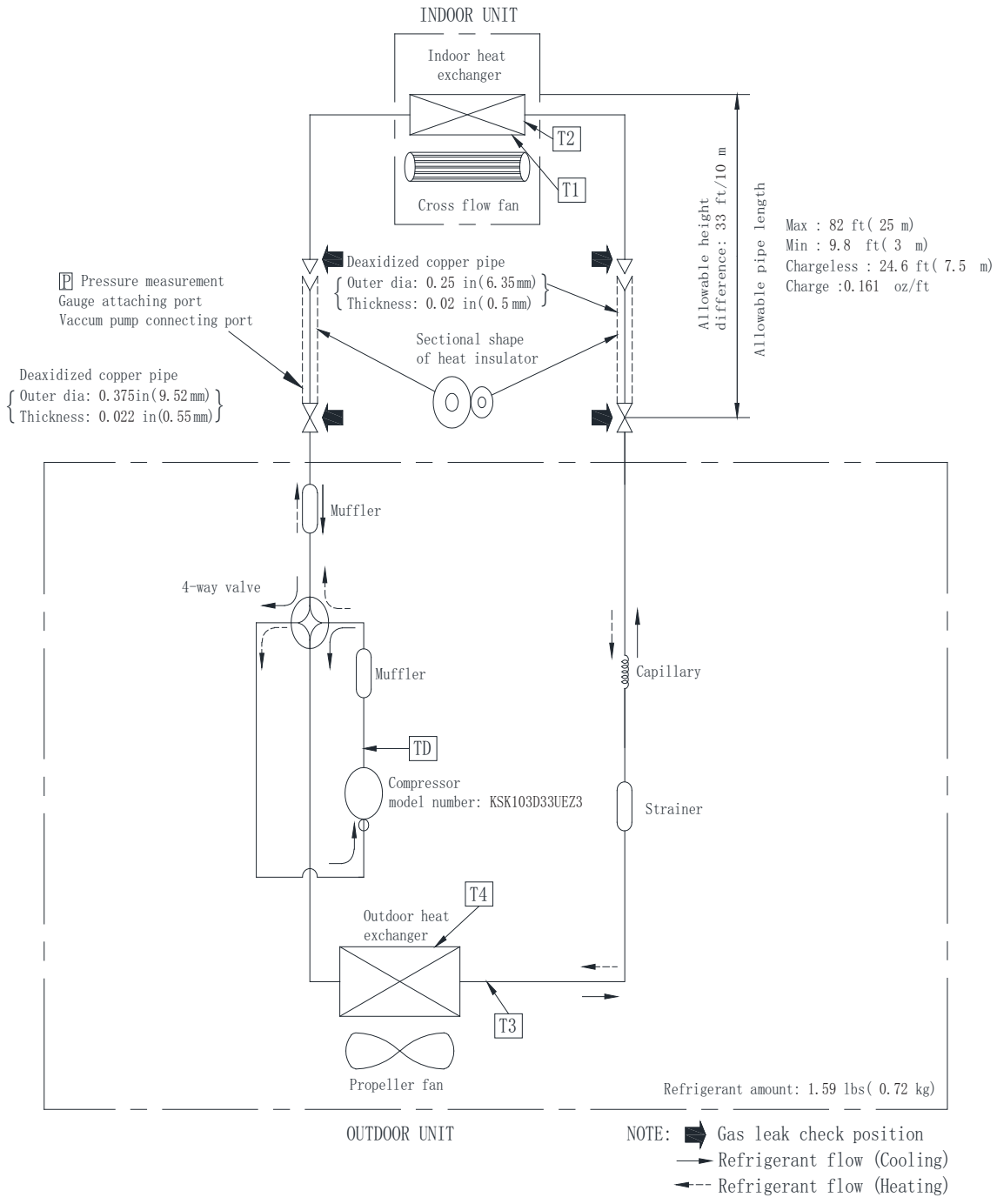


Fig. 19 — Size 09K - 115V

REFRIGERATION CYCLE DIAGRAMS (CONT)

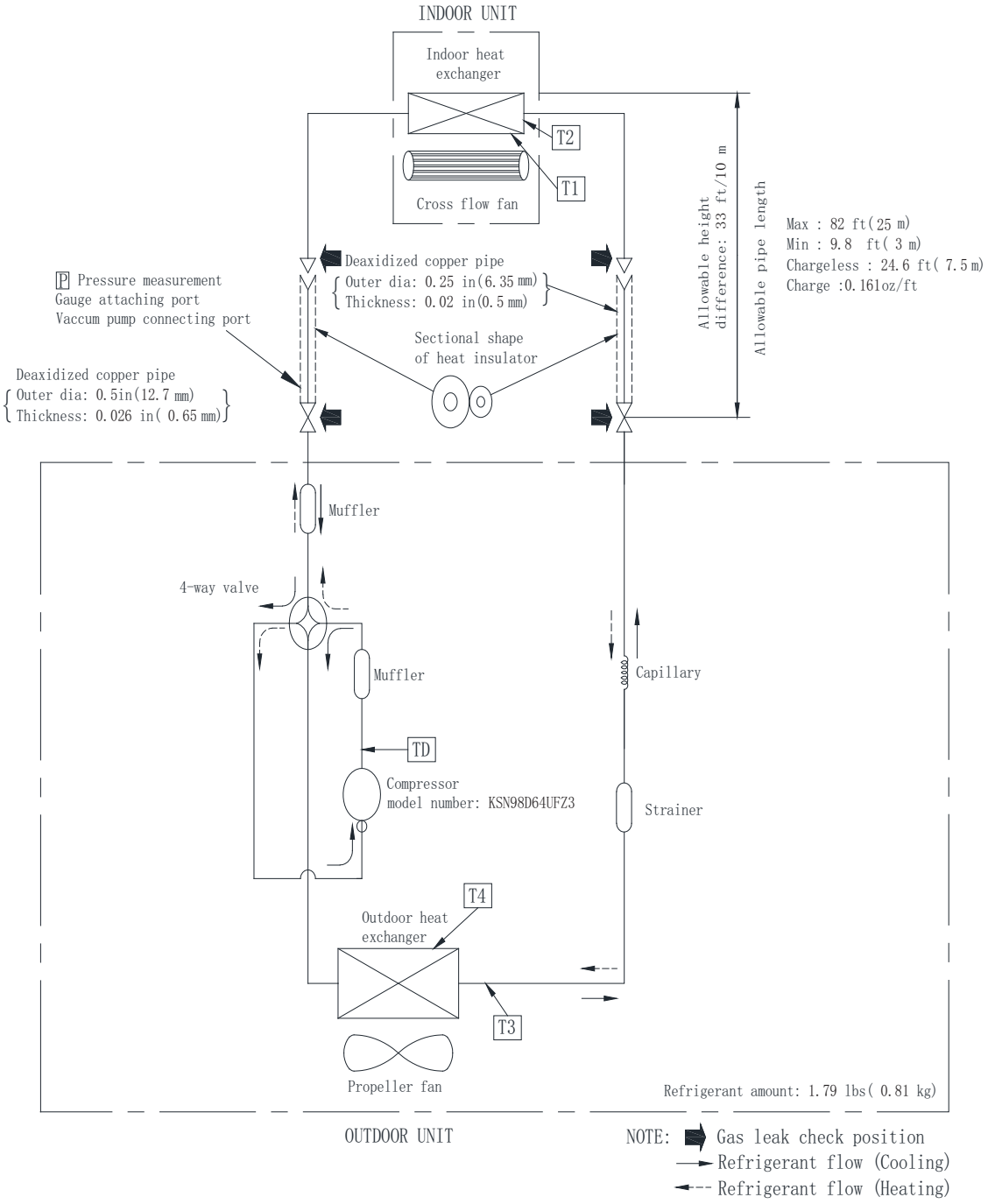


Fig. 20 — Size 12K (115V/230V)

REFRIGERATION CYCLE DIAGRAMS (CONT)

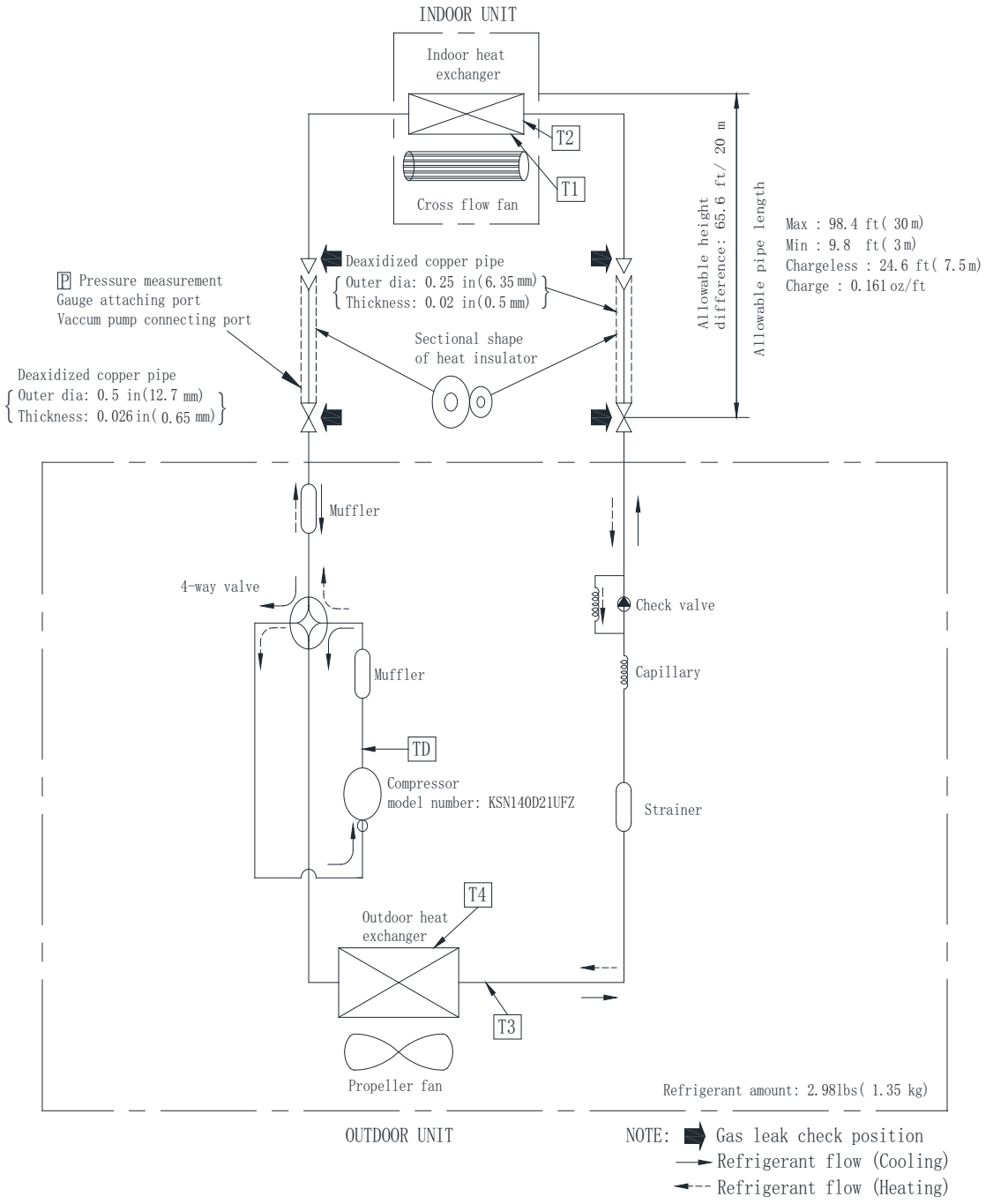


Fig. 21 — Size 18K - 208/230V

REFRIGERATION CYCLE DIAGRAMS (CONT)

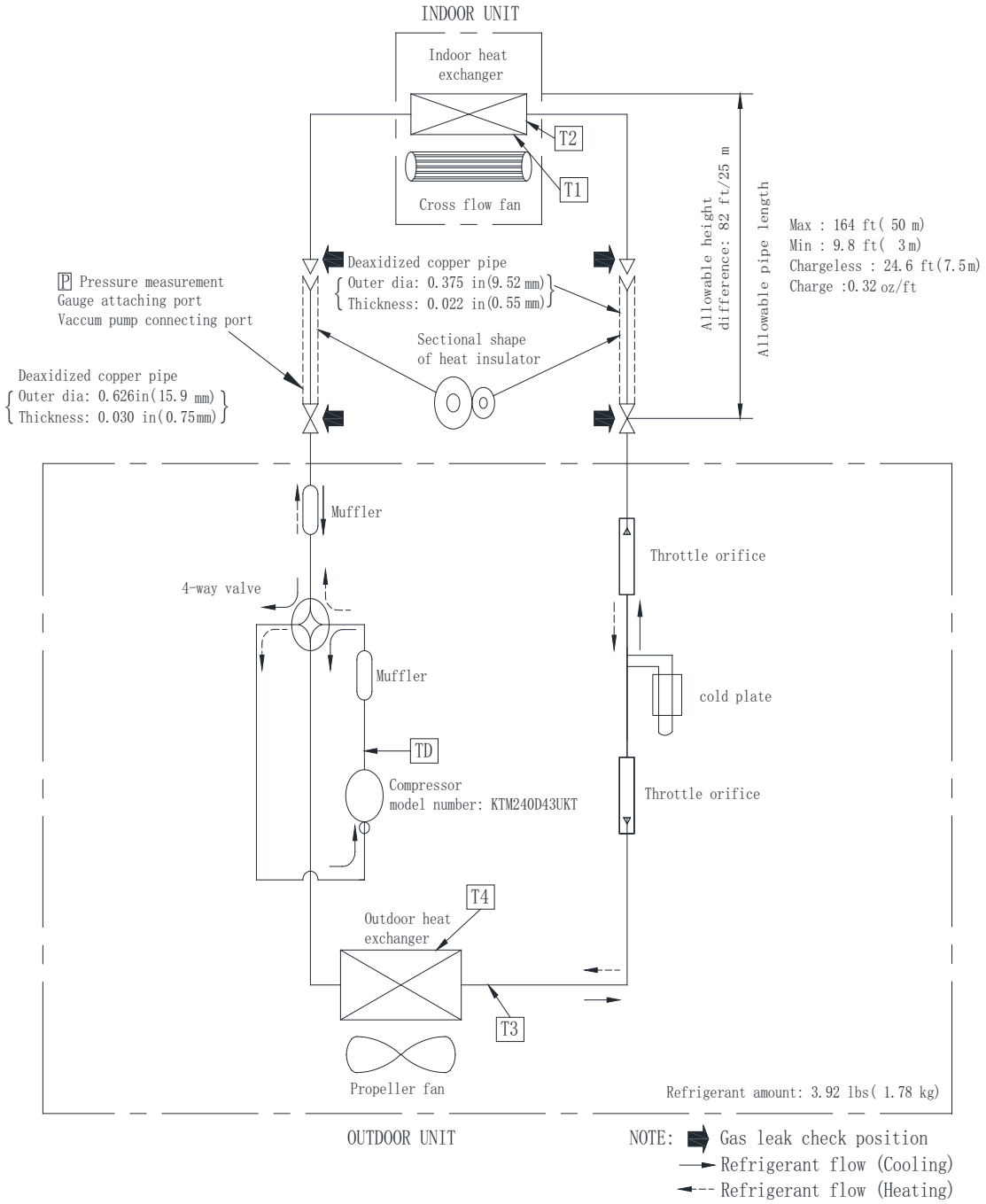


Fig. 22 — Size 24K- 208/230V

REFRIGERATION CYCLE DIAGRAMS (CONT)

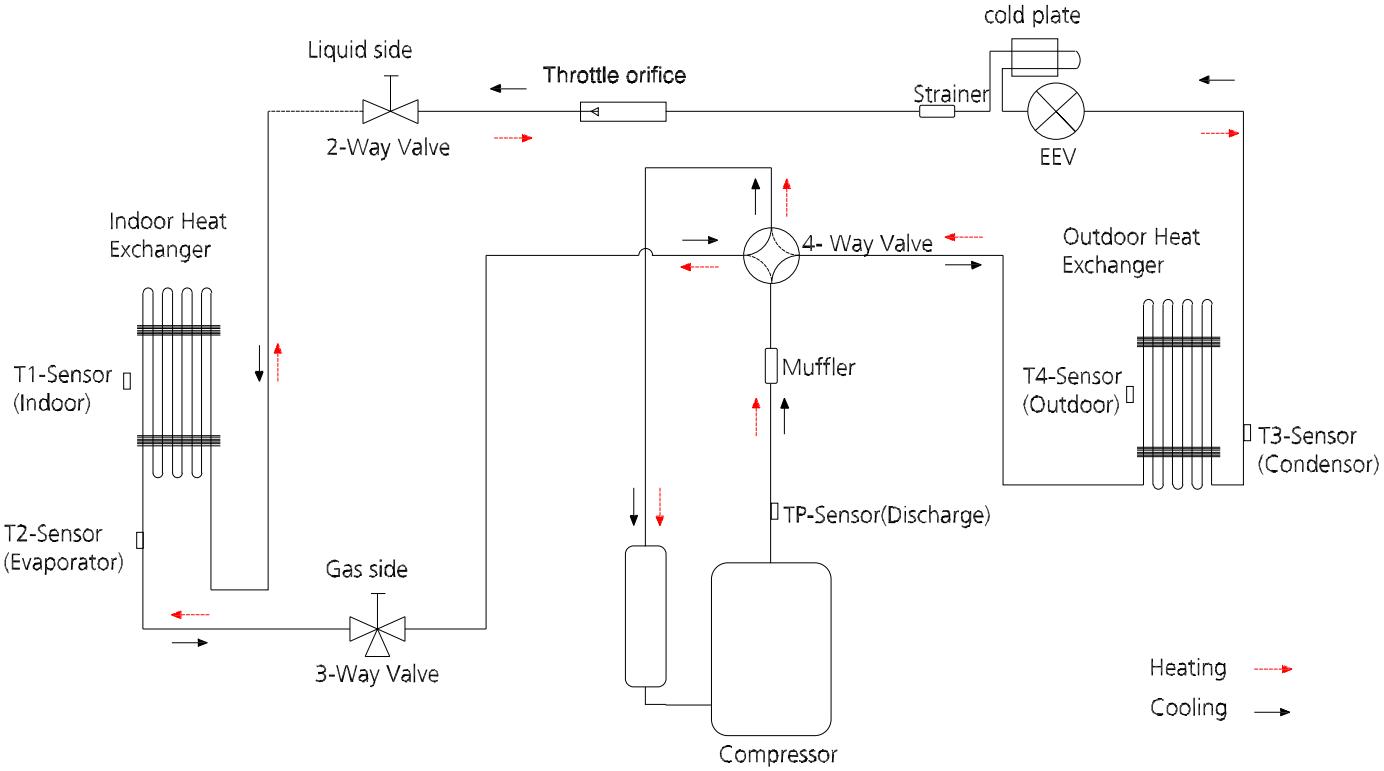


Fig. 23 — Size 30K- 208/230V

REFRIGERATION CYCLE DIAGRAMS (CONT)

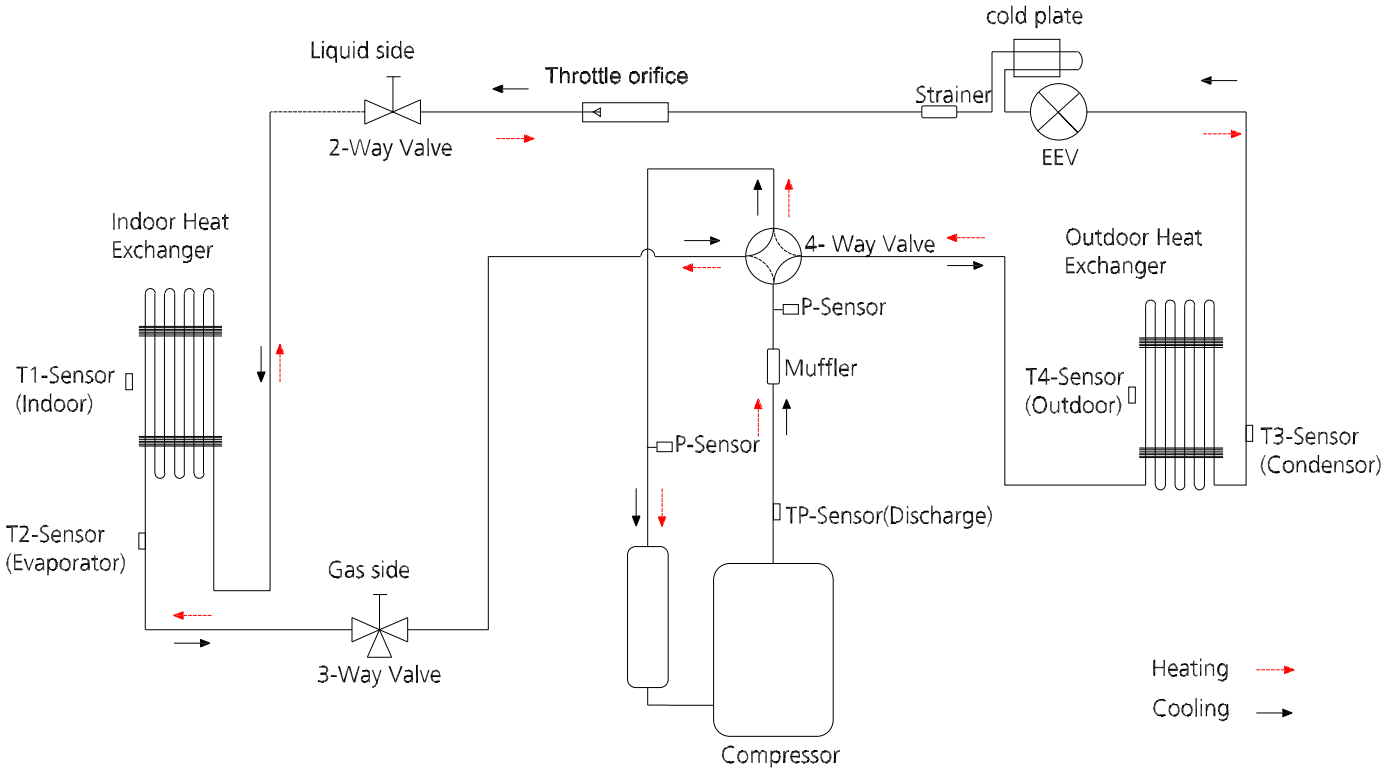


Fig. 24 — Size 36K- 208/230V

REFRIGERANT LINES

General Refrigerant Line Sizing

1. The outdoor units are shipped with a full charge of R410A refrigerant. All charges, line sizing, and capacities are based on runs of 25ft. (7.6 m). For runs over 25 ft. (7.6 m), refer to “Long-Line Applications”on page 30 for the proper charge adjustments.
2. The minimum refrigerant line length between the indoor and outdoor units is 10 ft. (3 m).
3. Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, not more than 36 in (914 mm) should be buried. Provide a minimum 6in (152 mm) vertical rise to the service valves to prevent refrigerant migration.
4. Both lines must be insulated. Use a minimum of 1/2in. (12.7 mm) thick insulation. Closed-cell insulation is recommended in all long-line applications.
5. Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so vibration or noise is not transmitted into the structure.

IMPORTANT: Both refrigerant lines must be insulated separately.

PIPING AND REFRIGERANT

Tables 18 and 19 lists the maximum lengths allowed.

Table 18 — Heat Pump

SYSTEM SIZE			9K (115 V)	12K (115 V)	9K (208/230 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)	30K (208/230 V)	36K (208/230 V)
PIPING	Min. Piping Length	ft. (m)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)
	Standard Piping Length	ft. (m)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)
	Max. outdoor-indoor height difference (OU higher than IU)	ft. (m)	32.8 (10)	32.8 (10)	32.8 (10)	32.8 (10)	65.6 (20)	82 (25)	82 (25)	98.4 (30)
	Max. outdoor-indoor height difference (IU higher than OU)	ft. (m)	32.8 (10)	32.8 (10)	32.8 (10)	32.8 (10)	65.6 (20)	82 (25)	82 (25)	98.4 (30)
	Max. Piping Length with no additional refrigerant charge per System (Standard Piping length)	ft. (m)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)
	Total Max.Piping Length per system	ft. (m)	82 (25)	82 (25)	82 (25)	82 (25)	98.4 (30)	164 (50)	164 (50)	213 (65)
	Additional refrigerant charge (between Standard – Max. piping length)	Oz/ft (g/m)	0.161(15)	0.161(15)	0.161(15)	0.161(15)	0.161(15)	0.322(30)	0.322(30)	0.322(30)
	Suction Pipe (size - connection type)	In (mm)	ø3/8” (9.52)	ø1/2” (12.7)	ø3/8” (9.52)	ø1/2” (12.7)	ø1/2” (12.7)	ø5/8” (15.9)	ø5/8” (15.9)	ø5/8” (15.9)
	Liquid Pipe (size - connection type)	In (mm)	ø1/4” (6.35)	ø1/4” (6.35)	ø1/4” (6.35)	ø1/4” (6.35)	ø1/4” (6.35)	ø3/8” (9.52)	ø3/8” (9.52)	ø3/8” (9.52)
REFRIGERANT	Refrigerant Type	Type	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Charge Amount	lb. (kg)	1.59(0.72)	1.79(0.81)	1.59(0.72)	1.79(0.81)	2.98(1.35)	3.92(1.78)	6.17(2.8)	7.5(3.4)

Long-Line Applications

1. No change in line sizing is required.
2. Add refrigerant per Tables 18 and 19.

Table 19 — Cooling Only

SYSTEM SIZE			12K (115 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)
PIPING	Min. Piping Length	ft. (m)	9.8 (3)	9.8 (3)	9.8 (3)	9.8 (3)
	Standard Piping Length	ft. (m)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)
	Max. outdoor-indoor height difference (OU higher than IU)	ft. (m)	32.8 (10)	32.8 (10)	65.6 (20)	82 (25)
	Max. outdoor-indoor height difference (IU higher than OU)	ft. (m)	32.8 (10)	32.8 (10)	65.6 (20)	82 (25)
	Max. Piping Length with no additional refrigerant charge per System (Standard Piping length)	ft. (m)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)	24.6 (7.5)
	Total Max.Piping Length per system	ft. (m)	82 (25)	82 (25)	98.4 (30)	98.4 (30)
	Additional refrigerant charge (between Standard – Max piping length)	Oz/ft (g/m)	0.161(15)	0.161(15)	0.161(15)	0.322(30)
	Suction Pipe (size - connection type)	In (mm)	ø1/2” (12.7)	ø1/2” (12.7)	ø1/2” (12.7)	ø5/8” (15.9)
	Liquid Pipe (size - connection type)	In (mm)	ø1/4” (6.35)	ø1/4” (6.35)	ø1/4” (6.35)	ø3/8” (9.52)
REFRIGERANT	Refrigerant Type	Type	R410A	R410A	R410A	R410A
	Charge Amount	lb. (kg)	1.46(0.66)	1.46(0.66)	1.98 (0.9)	2.36(1.07)

SYSTEM EVACUATION AND CHARGING

CAUTION

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

Never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended Deep Vacuum Method of 500 microns. Always break a vacuum with dry nitrogen.

SYSTEM VACUUM AND CHARGE

Using Vacuum Pump

1. Completely tighten all flare nuts and connect manifold gage charge hose to a charge port of the low side service valve (see Fig. 25).
2. Connect the charge hose to the vacuum pump.
3. Fully open the low side of the manifold gage (see Fig. 26).
4. Start the vacuum pump.
5. Evacuate using the triple evacuation method.
6. After the evacuation is complete, fully close the low side of the manifold gage and stop the vacuum pump operation.
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 Table 18 and Table 19 on page 30.
8. Disconnect the charge hose from the charge connection of the low side service valve.
9. Fully open the B and A service valves.
10. Securely tighten the service valves caps.

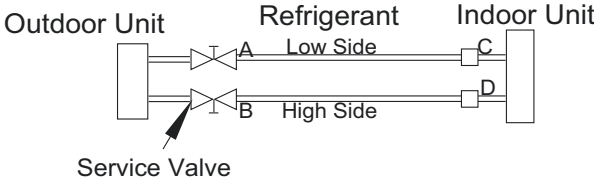


Fig. 25 —Service Valve

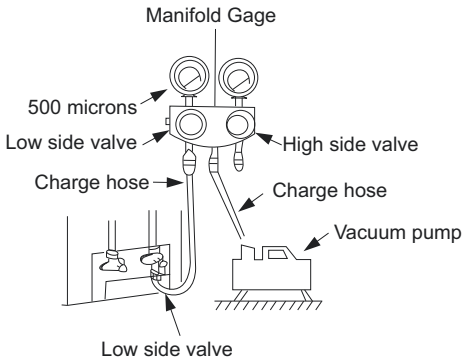


Fig. 26 —Manifold

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. 27).

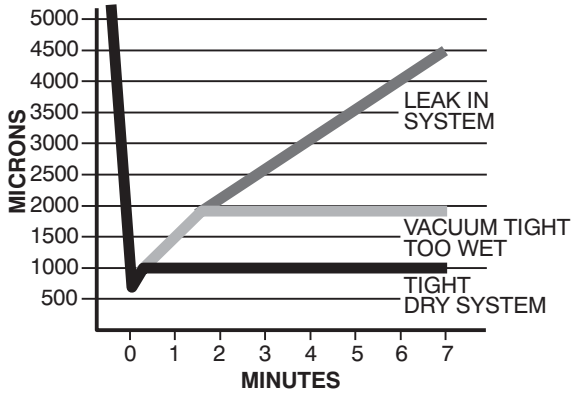


Fig. 27 —Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should be used. Refer to Fig. 28 and proceed as follows:

1. Pump the system down to 500 MICRONS of mercury and allow the pump to continue operating for an additional 15 minutes.
2. Close the service valves and shut off the vacuum pump.
3. Connect a nitrogen cylinder and regulator to the system and open until the system pressure is 2 psig.
4. Close the service valve and allow the system to stand for 10 minutes. During this time, dry nitrogen is able to diffuse through the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 28. The system should now be free of any contaminants and water vapor.

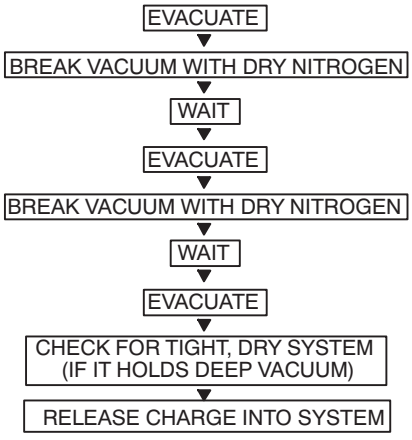


Fig. 28 —Triple Evacuation Method

Final Tubing Check

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

ELECTRONIC FUNCTIONS

ABBREVIATION:

- •T1: Indoor room temperature
- •T2: Coil temperature of indoor heat exchanger middle
- •T3: Coil temperature of condenser
- •T4: Outdoor ambient temperature
- •T5: Compressor discharge temperature
- •Td: Target temperature
- •Ts: Set Point Temperature

MAIN PROTECTION

Three minute delay for compressor restart

Less than a 1 minute delay for the initial start-up and a 3 minute delay for subsequent starts.

Compressor high temperature cutout

The unit stops working when the compressor high temperature cutout opens, and restarts after the compressor high temperature cutout closes.

Compressor discharge temperature protection

Compressor discharge temp. T5>239°F(115°C) for 5s, compressor stops.

Fan speed is out of control

When the indoor fan speed is too low (300RPM) or too high (1500RPM) for a certain time, the unit stops and the LED displays the failure.

Inverter module protection

The inverter module has a protection function for current, voltage and temperature. If any of these protections engage, the corresponding code displays on the indoor unit and the unit stops working.

Indoor fan delayed open function

When the unit starts up, the louver is active immediately and the indoor fan opens 10s later. If the unit is running in the **HEATING** mode, the indoor fan is also controlled by the anti-cold wind function.

Compressor preheating functions

Preheat parameters: When the T4 (outdoor ambient temperature) <37.4°F (3°C), the preheat function is activated.

Zero crossing detection error protection

If the AC detects that the time interval is not correct for a continuous 240s, the unit stops and the **LED** displays the failure. The correct zero crossing signal time interval should be between 6-13ms.

Sensor protection at open circuit and breaking disconnection

If only one temperature sensor malfunctions, the air conditioner continues to work however the error code displays on the LED, in the event of any emergency use. If more than one temperature sensor malfunctions, the air conditioner stops working.

Refrigerant leakage detection

This function is only active in the **COOLING** mode. The function helps prevent the compressor from being damaged by a refrigerant leakage or a compressor overload.

Open condition:

When the compressor is active, the evaporator T2 coil temperature value has no or very little change.

OPERATION MODES AND FUNCTIONS

FAN Mode

1. Outdoor fan and compressor stop
2. Temperature setting function is disabled and no setting temperature appears.
3. Indoor fan can be set to high/med/low/auto
4. The louver operates the same as in the **COOLING** mode.
5. Auto fan

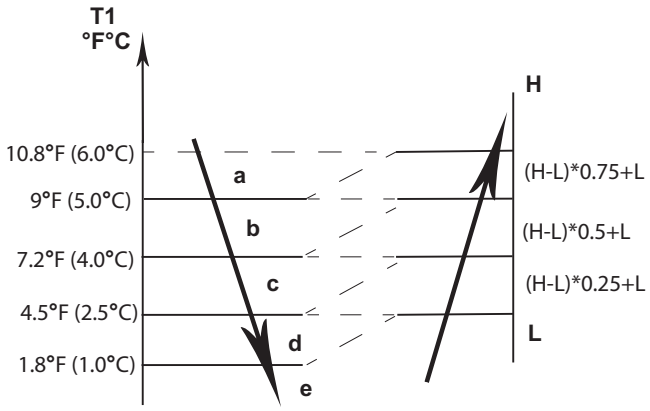


Fig. 29 —AUTO FAN Mode

COOLING Mode

Compressor Running Rules:

- When T1-Ts < -4°F (-2°C), the compressor stops.
- When T1-Ts > -1°F (-0.5°C), the compressor activates.
- When the unit runs in the **QUIET** mode, the compressor runs at a low frequency.
- When the current is more than the setting value, the current protection function activates, and the compressor stops.

Outdoor Fan Running Rules:

The outdoor unit runs at a different fan speed according to T4. For different outdoor units, the fan speeds differ.

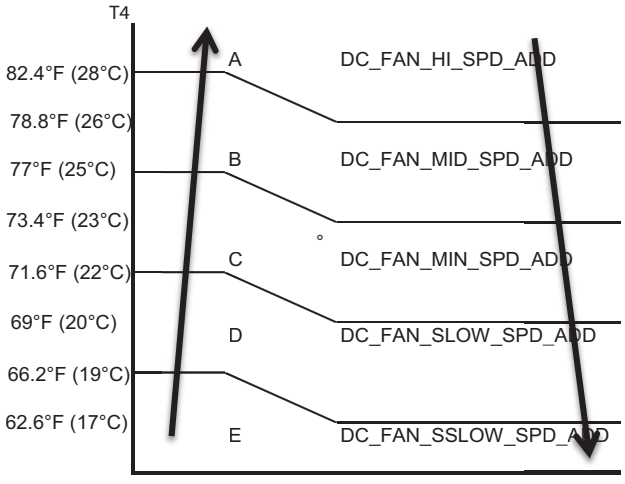


Fig. 30 —Outdoor Fan Running Rules

Indoor Fan Running Rules:

- In the **COOLING** mode, the indoor fan runs continuously and the user can select any of the following speeds: **HIGH**, **MEDIUM**, **LOW** and **AUTO**.
- When the setting temperature is reached, if the compressor stops running, the indoor fan motor runs in the minimum or the setting speed (see Fig. 31).

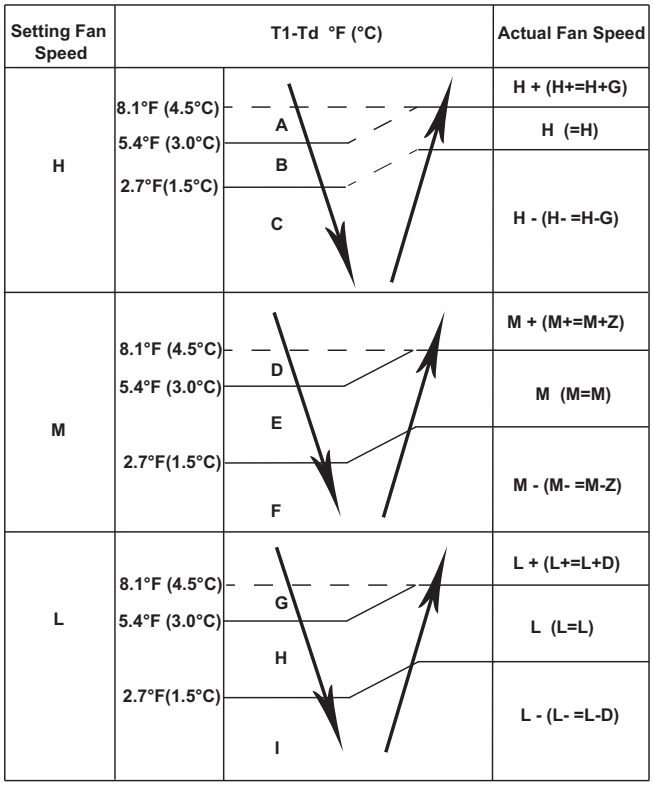


Fig. 31 — Indoor Fan Running Rules

The **AUTO** fan adheres to the following rules (see Fig. 32):

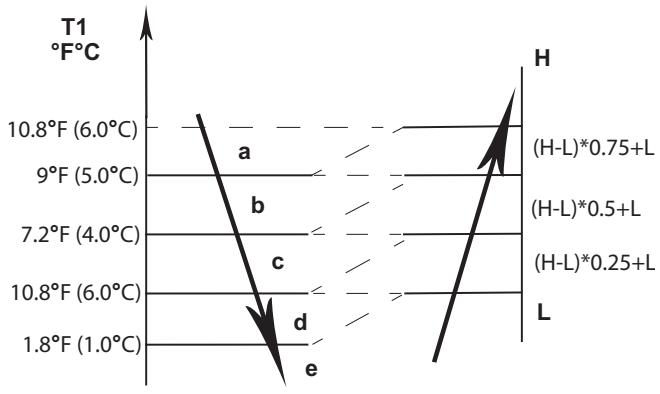


Fig. 32 — AUTO FAN Running Rules

Compressor Temperature Protection

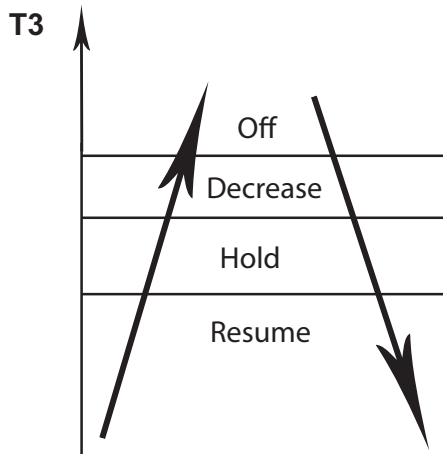


Fig. 33 — Compressor Temperature Protection

- **Off**: Compressor stops
- **Decrease**: Decrease the running frequency to the lower level
- **Hold**: Keep the current frequency
- **Resume**: No limitation for frequency

When the condenser temperature is higher than the setting value, the compressor stops.

Evaporator Temperature Protection

When the evaporator temperature is lower than the setting value, the compressor stops.

HEATING Mode

Compressor Running Rules:

- When T1-Ts>-ΔT, the compressor stops.
- When T1-Ts<ΔT-1.5, the compressor is on. ΔT is the programmed parameter for temperature compensation.
- When the AC runs in the **MUTE** mode, the compressor runs with a low frequency.
- When the current is more than the setting value, the current protection function activates and the compressor stops.

Outdoor Fan Running Rules:

The outdoor unit runs at a different fan speed according to T4. For different outdoor units, the fan speeds differ.

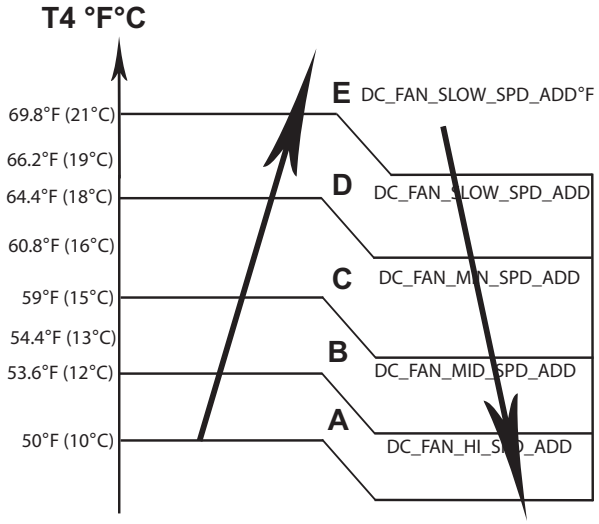


Fig. 34 — Outdoor Fan Running Rules

Indoor Fan Running Rules:

When the compressor is on, the user can set the indoor fan to either **HIGH/MED/LOW/AUTO/MUTE**. When the indoor unit coil temperature is low, the anti-cold air function starts and the indoor fan motor runs at the low speed. The speed can not be changed.

When the temperature is lower than the setting value, the indoor fan motor stops. When the indoor temperature reaches the setting temperature, the compressor stops, the indoor fan motor runs at the minimum speed or setting speed. The anti-cold air function is valid. The indoor fan is controlled as shown in Fig. 35.

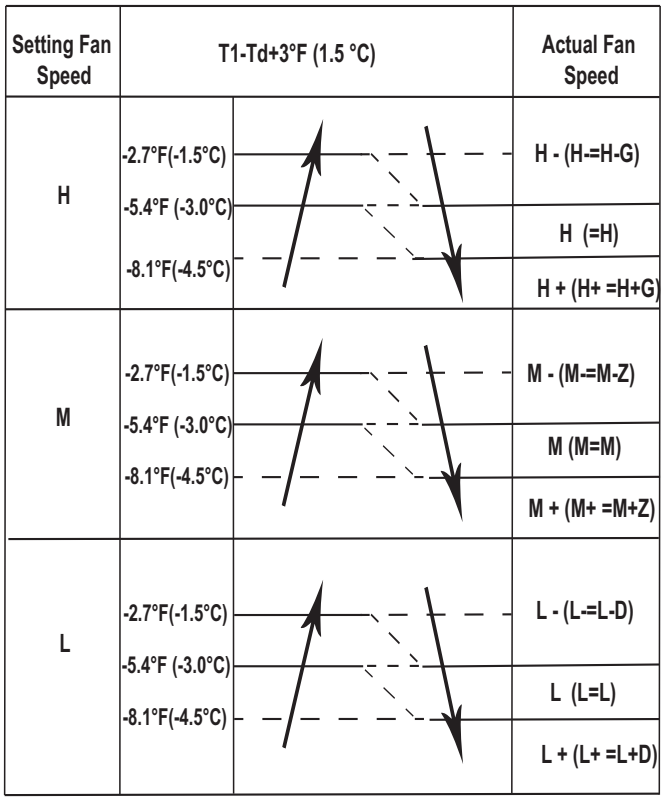


Fig. 35 — Indoor Fan Running Rules

Auto fan action in the **HEATING** mode.

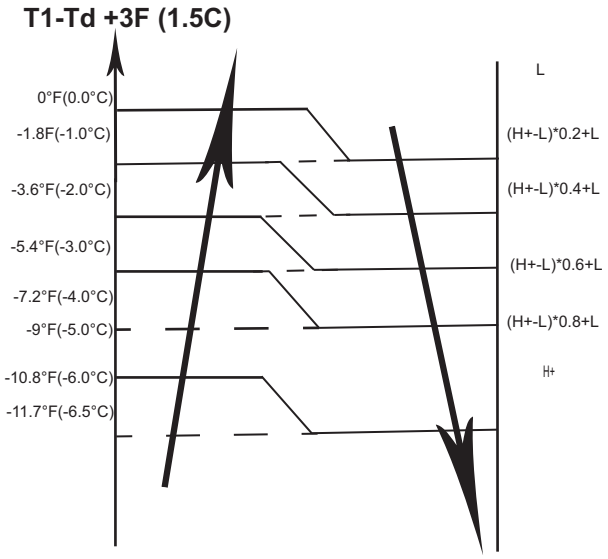


Fig. 36 — Auto Fan Action in HEATING Mode

DEFROST Mode

The air conditioning unit enters the **DEFROST** mode according to the value of temperature of T3 and the value range of temperature change of T3 plus the compressor running time (see Fig. 37).

During the **DEFROST** mode, the compressor keeps running however the indoor and outdoor motors stop.

Forced DEFROSTING Mode:

1. Press and hold **AUTO/COOL** for 5s to enter the mode. The indoor fan stops and the defrosting lamp dF illuminates. Use the remote control to exit this mode and turn off the unit to stop the normal **DEFROSTING** mode.
2. To exit the **FORCED DEFROSTING** mode, press and hold **AUTO/COOL** for 5s again.

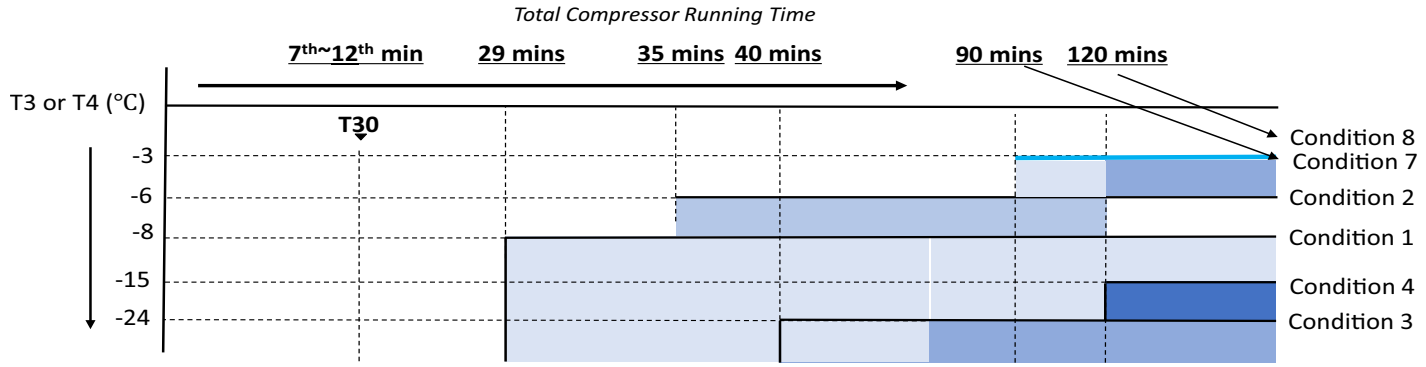


Fig. 37 — Defrost Chart

Condition 1*	Total compressor running time is 29 minutes	T3 ≤ -5 °C and T3 ≤ T30 – 1.5 °C and T4 > -22 °C
Condition 2**	Total compressor running time is 35 minutes	T3 ≤ -3 °C and T3 ≤ T30 – 2.5 °C and T4 > -22 °C
Condition 3	Total compressor running time is 29 minutes	T3 ≤ -24°C and last for 3 minutes, and T4 > -22 °C
Condition 4	Total compressor running time is 120 minutes	T3 ≤ -15°C and T4 > -22 °C
Condition 5***	Cumulative running time is 30 minutes	T4-T3 > (0.5*T4 + 3 °C) and T3 ≤ -6 °C, T4 > -22 °C
Condition 6	Cumulative running time is 8 hours	T4 ≤ -22 °C, T4 without malfunction
Condition 7	Cumulative running time 90 minutes and Ts-T1 ≤ 5°C	T3 or T4 ≤ -3°C last for 30 seconds
Condition 8	Cumulative running time is 120 minutes	T3 or T4 ≤ -3°C last for 30 seconds

T30: After the compressor starts up, take the lowest temperature of T3 between the 7th to the 12th minute.

*Sizes 18k – 36K: T3 ≤ -7 °C, 208/230 V models: T3 ≤ T30 – 2.5 °C

**Sizes 18k – 36K: T3 ≤ -5°C, 208/230 V models: T3 ≤ T30 – 3 °C

***Size 36K: T4-T3 > (0.5*T4 + 0°C, 208/230 V models: T3 ≤ -12 °C

Defrost Exit Conditions: Any of the following conditions cancels the **DEFROST** mode and changes the unit's operating mode to **NORMAL HEATING**:

NOTE: T3 temperature refers to the sensor reading at the time when the DEFROST mode begins.

- T3 temperature rises above 59°F (15°C).
- T3 temperature remains above 46°F (8°C) for more than 80 seconds.
- The unit has been in the **DEFROST** mode for 10 minutes.

The indoor unit defrost lamp illuminates and the dF logo appears.

Evaporator Coil Temperature Protection

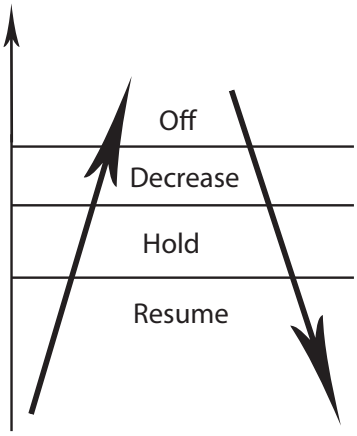


Fig. 38 — Evaporator Coil Temperature Protection

When the evaporator temperature is higher than the setting protection value, the compressor stops.

AUTO Mode

AUTO mode can be selected with the remote controller and the setting temperature can be changed between 60.0°F~86°F (16°C~30°C).

In the **AUTO** mode, the unit chooses either **COOLING**, **HEATING** or the **FAN-ONLY** mode accT2, T4 and relative humidity.

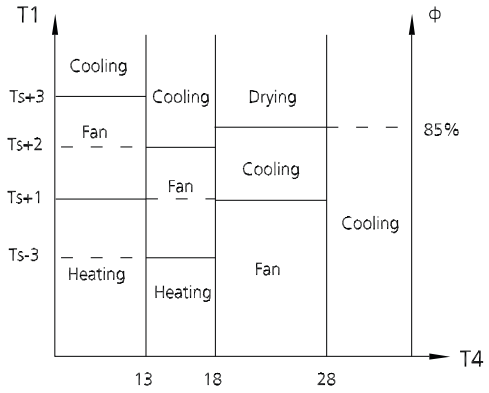


Fig. 39 — AUTO Mode

Heating*: COOLING ONLY models run at fan speed. The indoor fan runs in the **AUTO** fan speed for the relevant mode. The louver operates the same as in the relevant mode.

If the unit switches mode between **HEATING** and **COOLING**, the compressor repeatedly stops for a certain time and then chooses the mode according to T1-Ts. If the setting temperature is modified, the unit selects a running function again.

DRYING mode

The indoor fan speed is fixed at **BREEZE** and cannot be changed. The louver angle is the same as in the **COOLING** mode.

Low Indoor Room Temperature Protection

In the **DRYING** mode, if the room temperature is lower than 50°F(10°C), the compressor stops and does not resume until the room temperature exceeds 53.6°F (12°C).

Evaporator anti-freezing protection, condenser high temperature protection and outdoor unit frequency limit are active and are the same as that in the **COOLING** mode. The outdoor fan operates the same as in **COOLING** mode.

FORCED OPERATION Function

Enter FORCED OPERATION function:

When the machine is off, press **TOUCH** to engage the **FORCED AUTO** mode. Press **TOUCH** again, within 5 seconds, to engage the **FORCED COOLING** mode. In **FORCED AUTO**, **FORCED COOLING** or any other operation mode, press **TOUCH** to turn off the unit.

In the **FORCED OPERATION** mode, all general protections and the remote controller are available.

Operation Rules:

FORCED COOLING mode:

The compressor runs at the F2 frequency and the indoor fan runs as a breeze. After running for 30 minutes, the unit enters the **AUTO** mode at a 75.2°F (24°C) setting temperature.

FORCED AUTO mode:

The **FORCED AUTO** mode is the same as the normal **AUTO** mode with a 75.2°F (24°C) setting temperature.

AUTO-RESTART function

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

If the memorization condition is the **FORCED COOLING** mode, the unit runs in the **COOLING** mode for 30 minutes and enters the **AUTO** mode as a setting temperature of 75.2°F (24°C).

If the air conditioner turns off before the unit powers off and the air conditioner is required to restart immediately, the compressor delays for 1 minute when the power is on. Under other conditions, the compressor has a 3 minute delay when it restarts.

Refrigerant Leakage Detection

With this technology, the display area displays **EC** when the outdoor unit detects a refrigerant leak.

46°F (8°C) Heating

When the compressor is running, the indoor fan motor runs without the anti-cold air function. When the compressor is off, the indoor fan motor is off.

POINT CHECK FUNCTION

At the indoor unit-point the wireless remote at the indoor unit display, press **LED** 3 times, then press **SWING** 3 times. Press the remote controller **LED** three times, then press **SWING** three times within ten seconds (the buzzer rings for two seconds). The air conditioner enters the information enquiry status.

Press **LED** or **SWING** to check the next or previous code in the sequence, respectively. When the air conditioner enters the Information Enquiry status, it displays the code name for 2 seconds. When the air conditioner enters the Information Enquiry status, it displays the code value in the next 25 seconds.

Table 20 — Enquiry Information

DISPLAYED CODE	EXPLANATION	DISPLAYED VALUE	MEANING	ADDITIONAL NOTES
T1	Room temperature	-1F,-1E,-1d,-1c,- 1b,-1A -19—99 A0,A1,…A9 b0,b1,…b9 c0,c1,…c9 d0,d1,…d9 E0,E1,…E9 F0,F1,…F9	-25,-24,-23,-22, -21,-20 -19—99 100,101,…109 110,111,…119 120,121,…129 130,131,…139 140,141,…149 150,151,…159	1. All displayed temperatures use actual values. 2. All temperatures are displayed in **°C** regardless of remote used. 3. T1, T2, T3, T4, and T2B display ranges from -25 to 70 °C. TP displays ranges from -20 to 130 °C. 4. The frequency displays ranges from 0 to 159HZ. 5. If the actual values exceed or fall short of the defined range, the values closest to the maximum and minimum values appear.
T2	Indoor coil temperature			
T3	Outdoor coil temperature			
T4	Ambient temperature			
T2b	Outlet temperature of indoor coil			
TP	Discharge temperature			
FT	Targeted frequency			
Fr	Actual frequency			
IF	Indoor fan speed	0, 1,2,3,4	OFF, Low speed, Medium speed, High speed, Turbo. Actual fan speed is equal to the display value converted to the decimal value and multiplied by 10. This is measured in RPM.	**N/A** - Used for some large capacity motors. Used for some small capacity motors. The display value is 14-FF (hexadecimal). The corresponding fan speed ranges from 200 to 2550RPM.
0F	Outdoor fan speed	14-FF		
LA	EXV opening angle	0-FF	Actual EXV opening value is equal to the display value converted to decimal value and then multiplied by 2.	-
CT	Compressor continuous running time	0-FF	0-255 minutes	If the actual value exceeds or falls short of the defined range, the value closest to the maximum and minimum is displayed.
ST	Causes of compressor stop	0-99	For a detailed explanation, contact technical support.	-
DISPLAYED CODE	**EXPLANATION**	**DISPLAYED VALUE**	**MEANING**	**ADDITIONAL NOTES**
A0	Reserved	0-FF 2-28 5-20 5-25	-	-
A1				
b0				
b1				
b2				
b3				
b4				
b5				
b6				
dL				
Ac				
Ub				
Td				
dA				
d5				
dT				

TROUBLESHOOTING

Safety

Electricity power remains in the capacitors even if the power supply is shut off.

NOTE: Remember to discharge the electricity power in the capacitor.

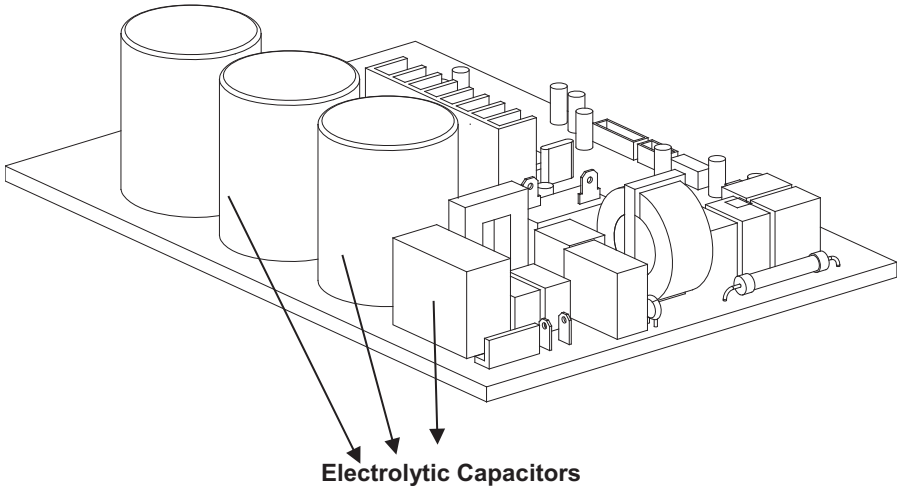


Fig. 40 —Electrolytic Capacitors

For other models, connect the discharge resistance (approximately 100Ω 40W) or a soldering iron (plug) between the +, - terminals of the electrolytic capacitor on the contrary side of the outdoor PCB.

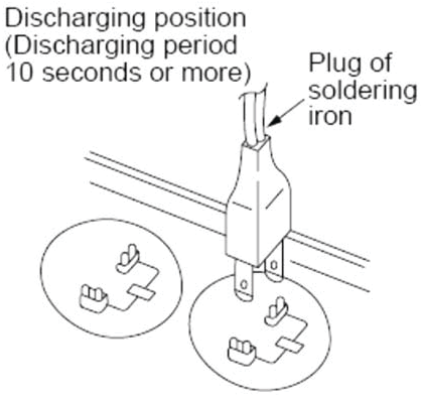


Fig. 41 —Discharge Position

NOTE: Fig. 41 is for reference only. The plug on your unit may differ.

Diagnostic Guide

Table 21 — Diagnostic Guide

RUNNING LAMP	TIMER LAMP	DISPLAY	INFORMATION	SOLUTION
--	--	dF	Defrost	Normal Display (not an error code)
--	--	SC	Self clean (for some units)	
--	--	CL	Filter cleaning reminder (power on display for 15 seconds)	
--	--	CL	Active clean (for some units)	
--	--	F	Filter replacement reminder (power on display for 15 seconds)	
--	--	FP	Heating in room temperature under 8°C/12°C	
--	--	FC	Forced cooling	
--	--	AP	AP mode of WIFI connection	
--	--	CP	Remote switched off	
✪1 time	OFF	EH 00/EH 0A	Indoor unit EEPROM parameter error	Page 46
✪2 times	OFF	EL 01	Indoor/outdoor unit communication error	Page 48
✪3 times	OFF	EH 02	Zero-crossing signal detection error	Page 50
✪4 times	OFF	EH 03	The indoor fan speed is operating outside of the normal range	Page 51
✪5 times	OFF	EC 51	Outdoor unit EEPROM parameter error	Page 47
✪5 times	OFF	EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	Page 55
✪5 times	OFF	EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	Page 55
✪5 times	OFF	EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	Page 55
✪5 times	OFF	EC 56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited (for free-match indoor units)	Page 55
✪6 times	OFF	EH 61	Evaporator coil middle temperature sensor T2 is in open circuit or has short circuited	Page 54
✪12 times	OFF	EC 07	The outdoor fan speed is operating outside of the normal range	Page 52
✪9 times	OFF	EH 0b	Indoor PCB/Display board communication error	Page 57
✪8 times	OFF	EL 0C	Refrigerant leakage detection	Page 56
✪7 times	FLASH	PC 00	IPM malfunction or IGBT over-strong current protection	Page 58
✪2 times	FLASH	PC 01	Over voltage or over low voltage protection	Page 59
✪3 times	FLASH	PC 02	Top temperature protection of compressor or High temperature protection of IPM module or High pressure protection	Page 60
✪7 times	FLASH	PC 03	High pressure protection or low pressure protection	Page 62
✪5 times	FLASH	PC 04	Inverter compressor drive error	Page 64
✪1 time	FLASH	PC 08	Current overload protection	Page 66
✪6 times	FLASH	PC 40	Communication error between outdoor main chip and compressor driven chip	Page 67
✪1 time	ON	--	Indoor units mode conflict (match with multi outdoor unit)	Page 65
-	-	FH 0P	AP mode is active but there is no WIFI kit installed	Page 68

O (light) X (off) ✪ (flash)

PCB

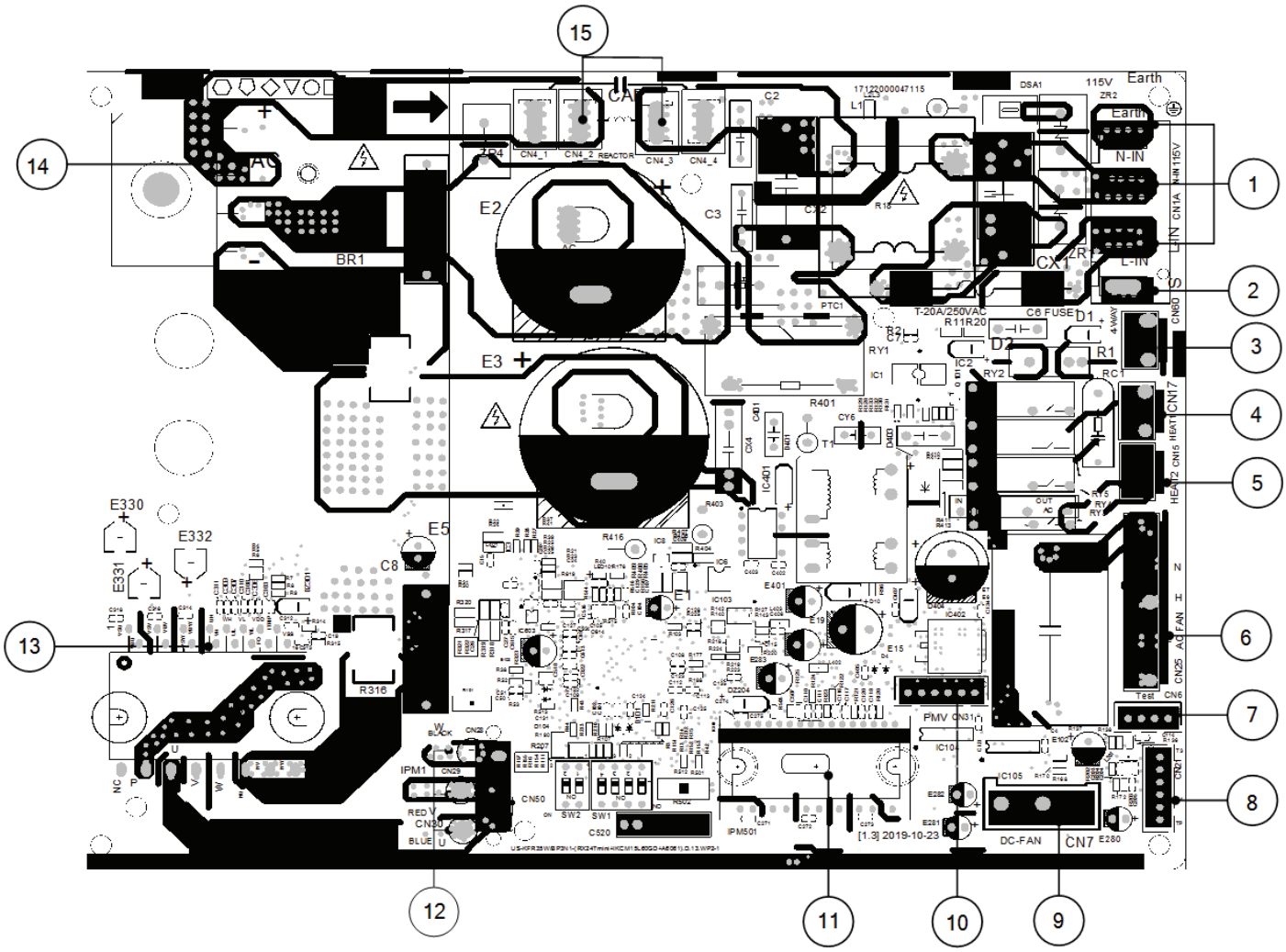


Fig. 42 — Size 12K (115V)

Table 22 — Size 12K (115V)

NO.	NAME	CN#	MEANING
1	Power Supply	CN3	Earth: connect to Ground
		CN1	N_in: connect to N-line (100-130V AC input)
		CN2	L_in: connect to L-line (100-130V AC input)
2	S	CN16	S: connect to indoor unit communication
3	4-WAY	CN60	connect to 4 way valve, 100-130V AC when is ON.
4	HEAT1	CN17	connect to compressor heater, 100-130V AC when is ON
5	HEAT2	CN15	connect to chassis heater, 100-130V AC when is ON
6	AC-FAN	CN25	connect to AC fan
7	TESTPORT	CN6	used for testing
8	TP T4 T3	CN21	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
9	DC-FAN	CN7	connect to DC fan
10	PMV	CN31	connect to Electric Expansion Valve
11	FAN_IPM	IPM 501	IPM for DC fan
12	W	CN28	connect to compressor
	V	CN29	0V AC (standby)
	U	CN30	10-230V AC (running)
13	COMP_IPM	IPM 1	IPM for compressor
14	BR1	BR1	Bridge
15	CN4	CN4_2	connect to reactor
		CN4_3	

PCB (CONT)

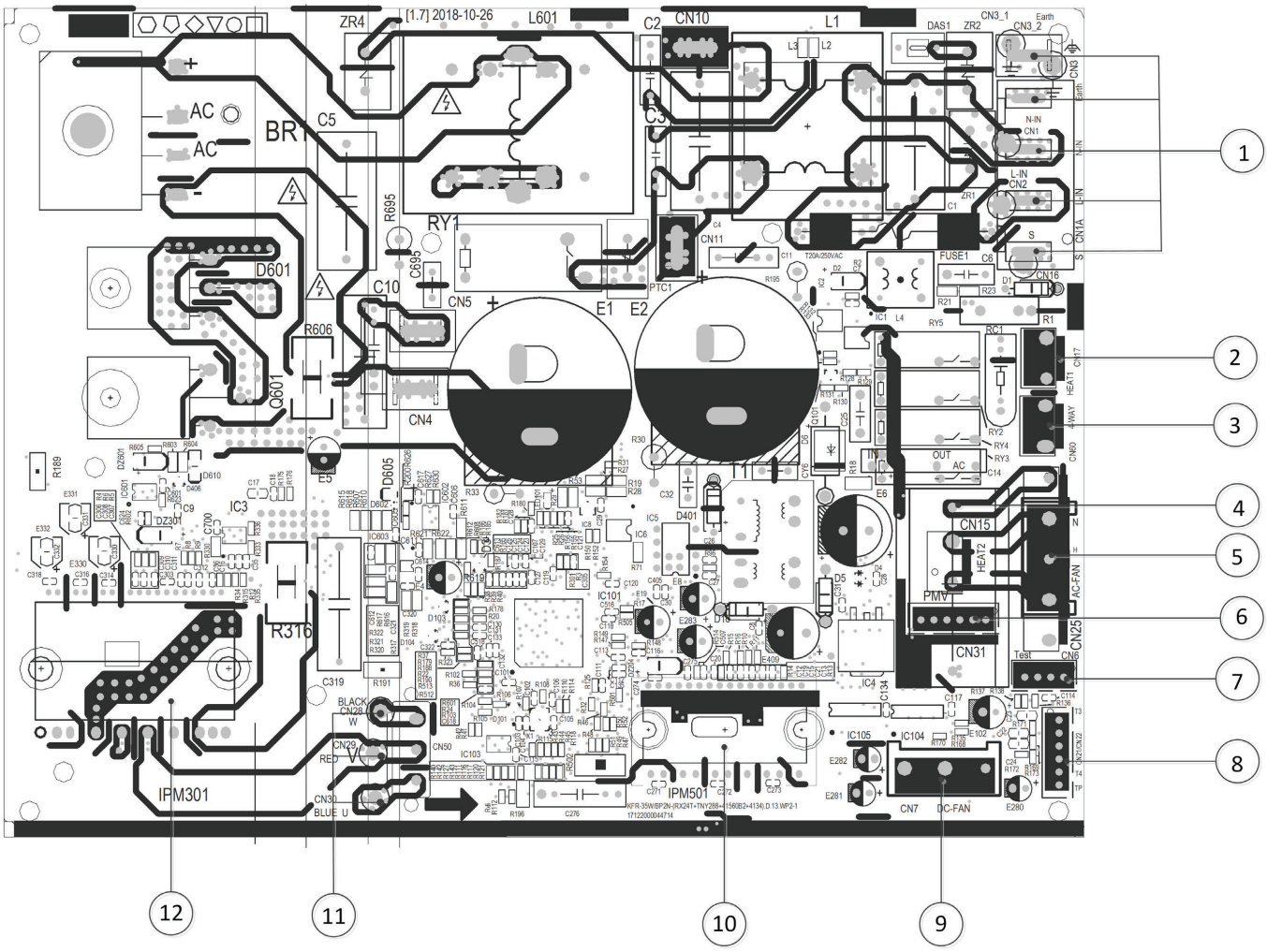


Fig. 43 — Size 09K (208/230V)

Table 23 — Size 09K (208/230V)

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

PCB (CONT)

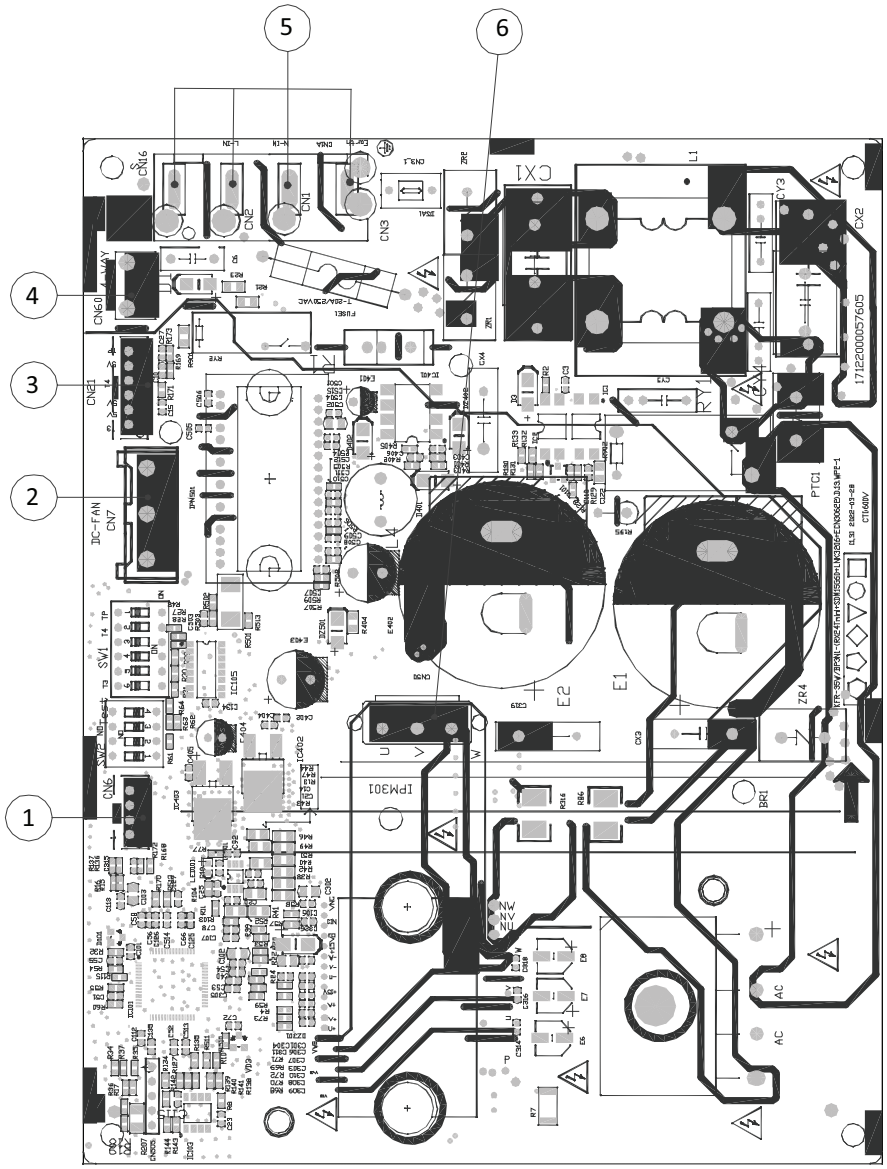


Fig. 44 —Size 12K (208/230V)

Table 24 — Size 12K (208/230V)

NO.	NAME	CN#	MEANING
1	TESTPORT	CN6	used for testing
2	DC-FAN	CN7	connect to DC fan
3	TP T4 T3	CN21	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
4	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
5	CN1A	CN16	S: connect to indoor unit communication
		CN2	L_in: connect to L-line (208-230V AC input)
		CN1	N_in: connect to N-line (208-230V AC input)
		CN3	Earth
6	CN50	W	connect to compressor
		V	0V AC (standby)
		U	10-200V AC (running)

PCB (CONT)

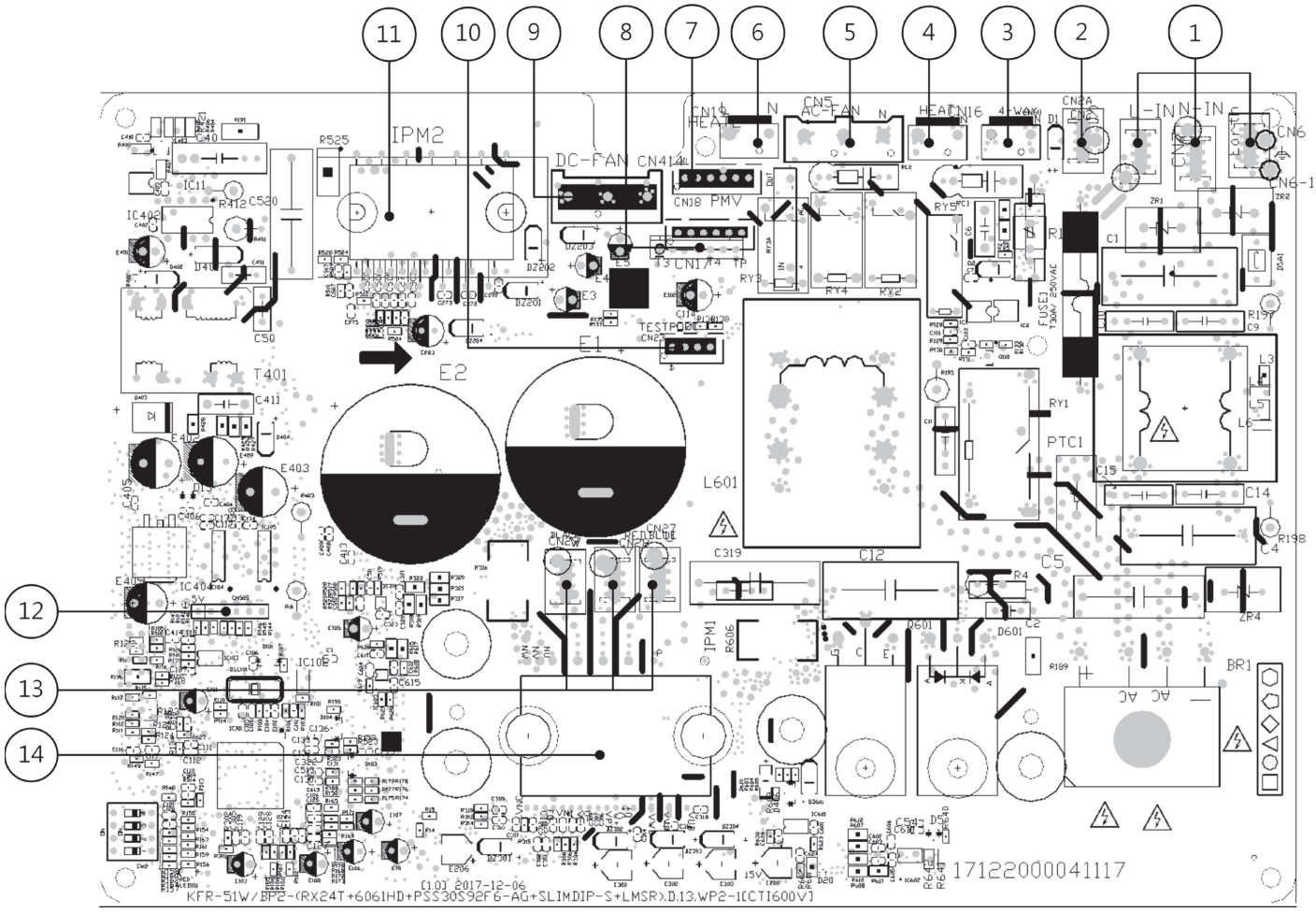


Fig. 45 — Size 18K (208/230V)

Table 25 — Size 18K (208/230V)

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

PCB (CONT)

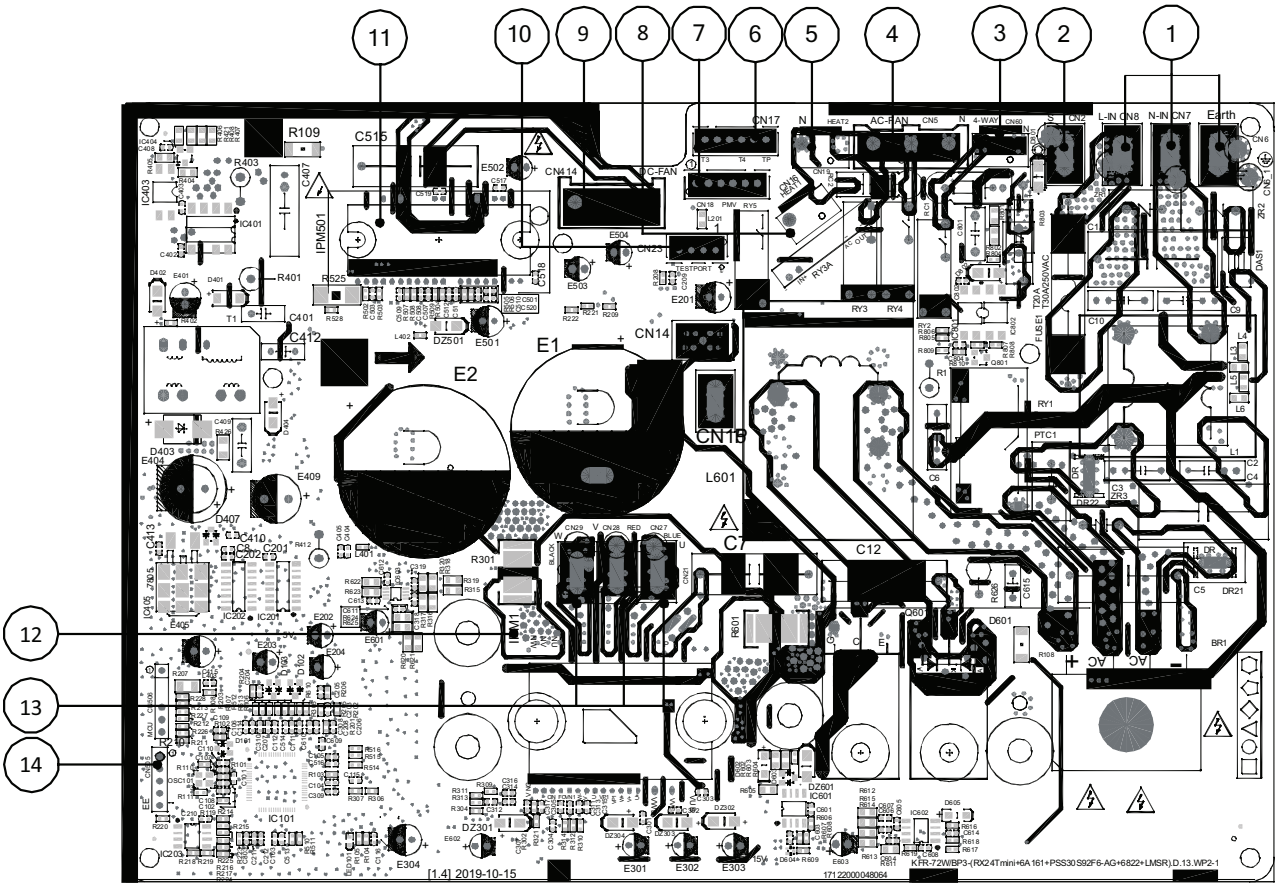


Fig. 46 — Size 24K (208/230V)

Table 26 — Size 24K (208/230V)

NO.	NAME	CN#	MEANING
1	Power Supply	CN6	Earth: connect to Ground
		CN7	N_in: connect to N-line (208-230V AC input)
		CN8	L_in: connect to L-line (208-230V AC input)
2	S	CN2	S: connect to indoor unit communication
3	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
4	AC-FAN	CN5	connect to AC fan
5	HEAT2	CN19	connect to chassis heater, 208-230V AC when is ON
6	TP T4 T3	CN17	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
7	PMV	CN18	connect to Electric Expansion Valve
8	HEAT1	CN16	connect to compressor heater, 208-230V AC when is ON
9	DC-FAN	CN414	connect to DC fan
10	TESTPORT	CN23	used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
13	U	CN27	connect to compressor
	V	CN28	0V AC (standby)
	W	CN29	200-300V AC (running)
14	EE_PORT	CN505	EEPROM programmer port

PCB (CONT)

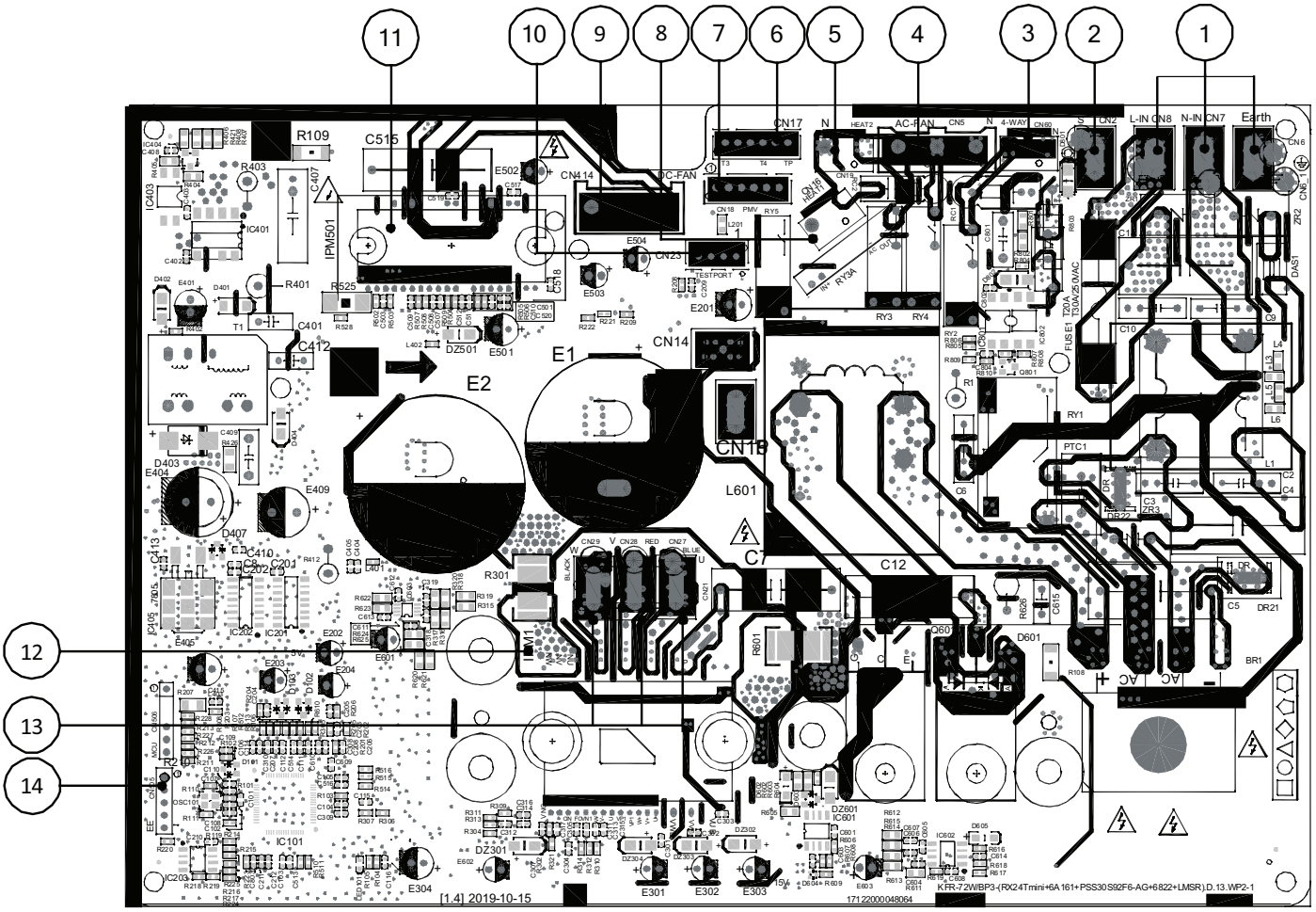


Fig. 47 — Sizes 30K - 36K (208/230V)

Table 27 — Sizes 30K - 36K (208/230V)

NO.	NAME	CN#	MEANING
1	Power Supply	CN6	Earth: connect to Ground
		CN7	N_in: connect to N-line (208-230V AC input)
		CN8	L_in: connect to L-line (208-230V AC input)
2	S	CN2	S: connect to indoor unit communication
3	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
4	AC-FAN	CN5	connect to AC fan
5	HEAT2	CN19	connect to chassis heater, 208-230V AC when is ON
6	TP T4 T3	CN17	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
7	PMV	CN18	connect to Electric Expansion Valve
8	HEAT1	CN16	connect to compressor heater, 208-230V AC when is ON
9	DC-FAN	CN414	connect to DC fan
10	TESTPORT	CN23	used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
13	U	CN27	connect to compressor
	V	CN28	0V AC (standby)
	W	CN29	200-300V AC (running)
14	EE_PORT	CN505	EEPROM programmer port

DIAGNOSIS AND SOLUTION

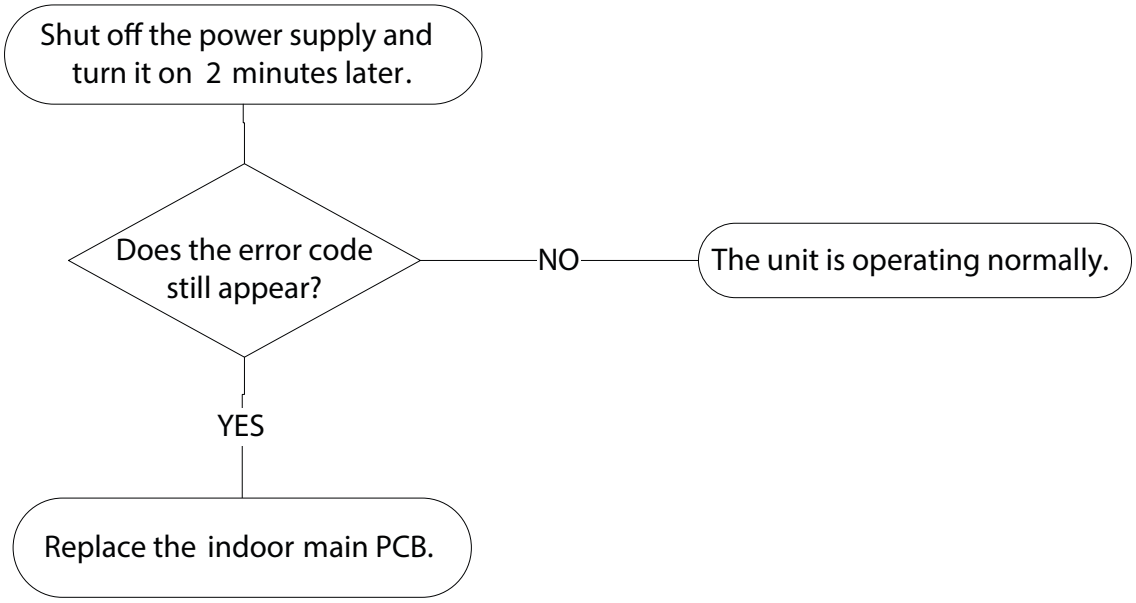
EH 00/EH 0A: Indoor EEPROM parameter error diagnosis and solution

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

Possible causes:

- Indoor PCB

Troubleshooting



Remarks:

EEPROM: A read-only memory, whose contents can be erased and reprogrammed using a pulsed voltage. Figure 48 shows the location of the EEPROM chip on the indoor PCB.

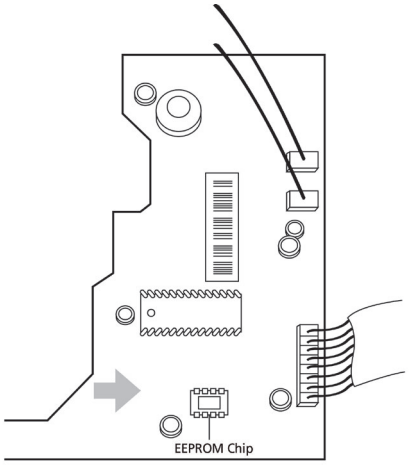


Fig. 48 — Indoor PCB

NOTE: Figures (pictures) are for reference only; actual appearances may vary.

DIAGNOSIS AND SOLUTION (CONT)

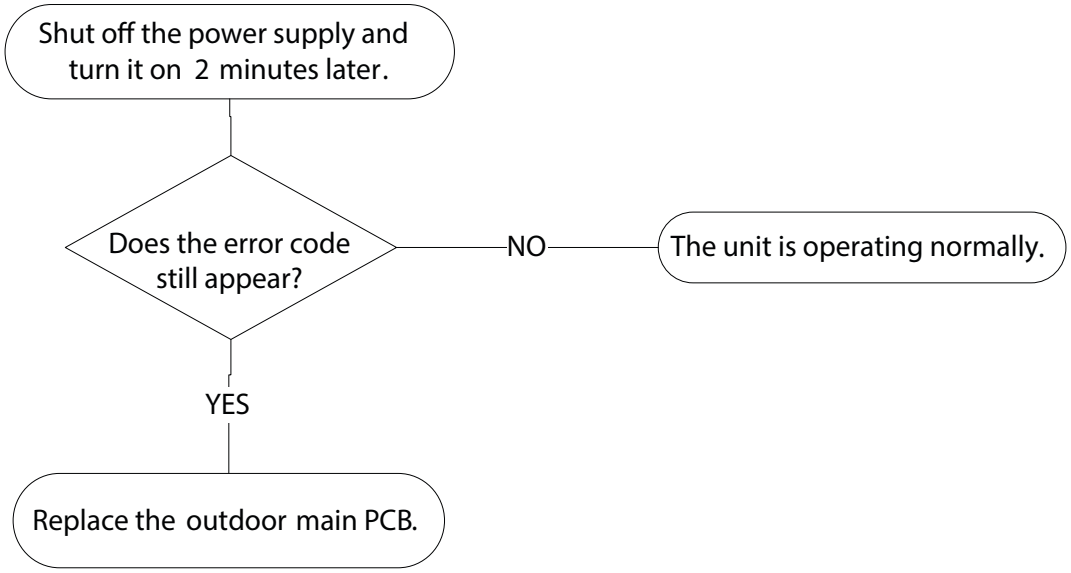
EH 00/EH 0A: Outdoor EEPROM parameter error or communication error between the outdoor main chip and the compressor driven chip diagnosis and solution

Description: Outdoor PCB main chip does not receive feedback from EEPROM chip or compressor driven chip.

Possible causes:

- Outdoor PCB

Troubleshooting



REMARKS: A read-only memory, whose contents can be erased and reprogrammed using a pulsed voltage. Figure 49 shows the location of the EEPROM chip on the outdoor PCB.

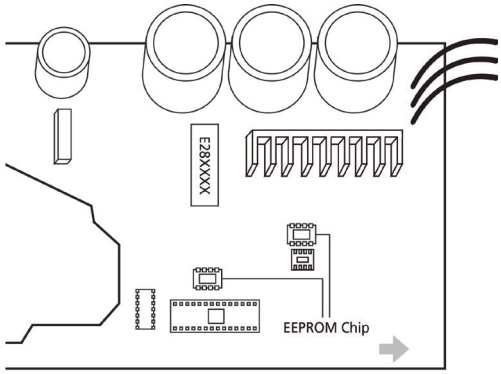


Fig. 49 — EEPROM chip on the outdoor PCB

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

DIAGNOSIS AND SOLUTION (CONT)

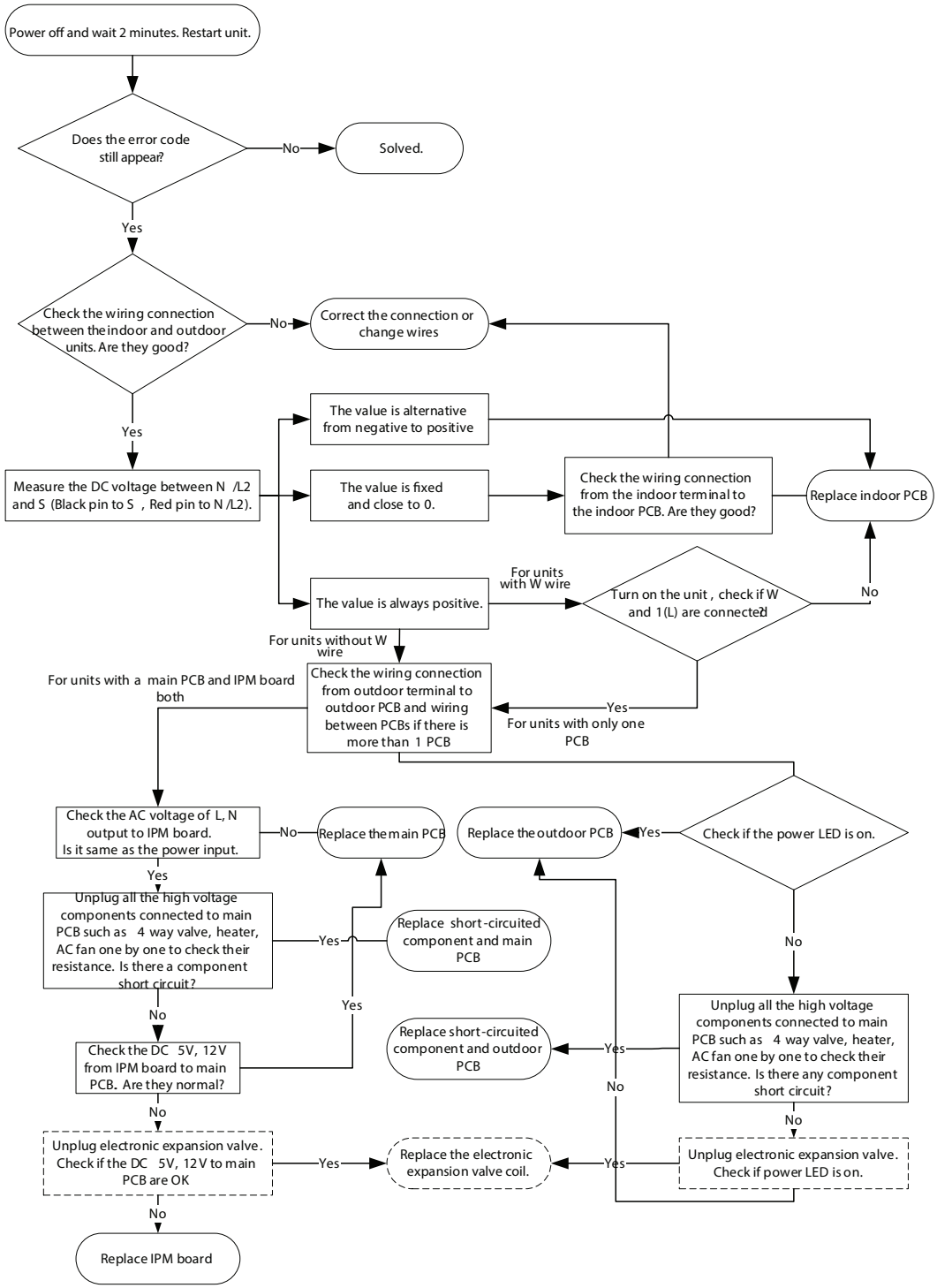
EL 01: Indoor and outdoor unit communication error diagnosis and solution

Description: Indoor unit can not communicate with outdoor unit

Possible causes:

- Indoor PCB
- Outdoor PCB
- Short-circuited component

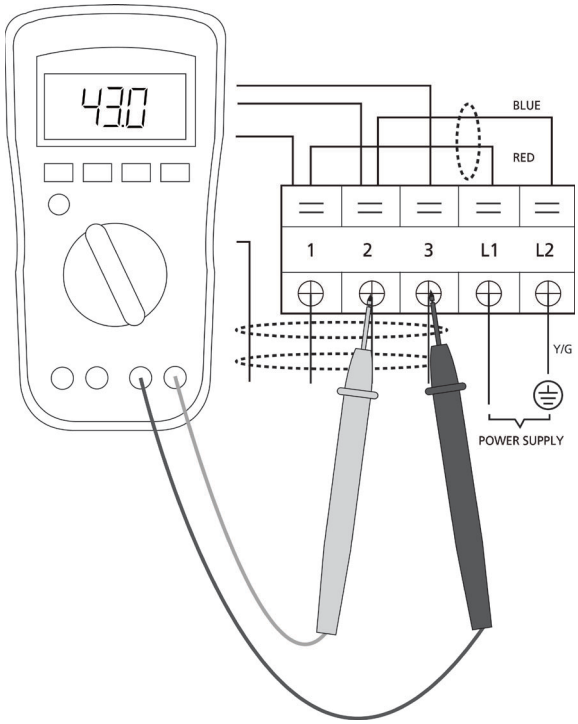
Troubleshooting



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

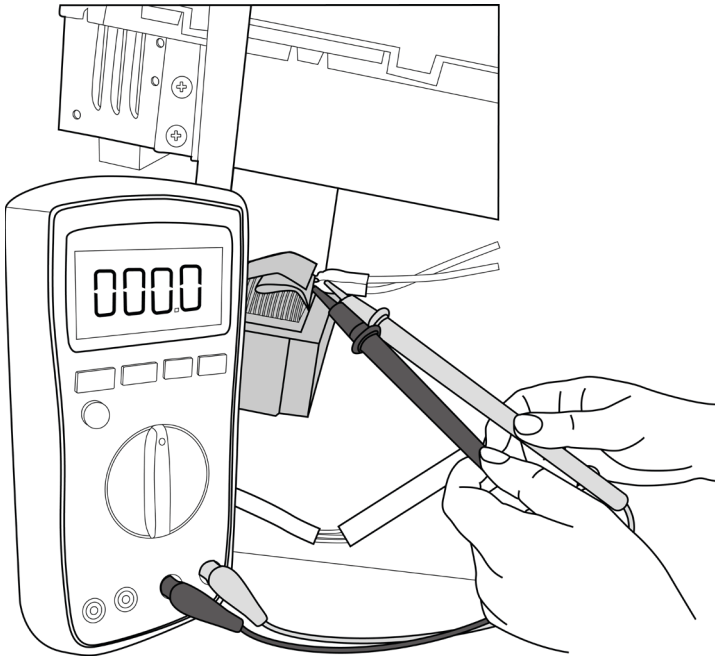
REMARKS:

- Use a multimeter to test the DC voltage between 2 port (or S or L2 port) and 3 port (or N or S port) of the outdoor unit.
- The multimeter's red pin connects to the 2 port (or S or L2 port) while the black pin is for the 3 port (or N or S port).
- When the AC is normal running, the voltage moves alternately between -25V to 25V.
- If the outdoor unit has a malfunction, the voltage moves alternately with a positive value.
- If the indoor unit has a malfunction, the voltage maintains a certain value.



S and N
or
L2 and S
or
2 and 3

- Use a multimeter to test the reactor's resistance, which does not connect with the capacitor.
- The normal value should be around zero ohm. Otherwise, the reactor has malfunctioned.



DIAGNOSIS AND SOLUTION (CONT)

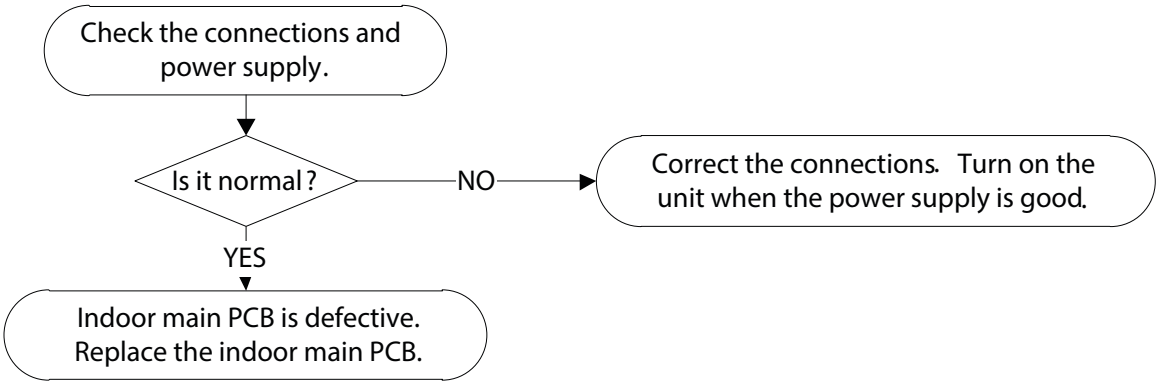
EH 02: Zero crossing detection error diagnosis and solution

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

Possible causes:

- Connection wires
- Indoor Main PCB

Troubleshooting



NOTE: The E2 zero crossing detection error is only valid for the unit with an AC fan motor, for other models this error is invalid.

DIAGNOSIS AND SOLUTION (CONT)

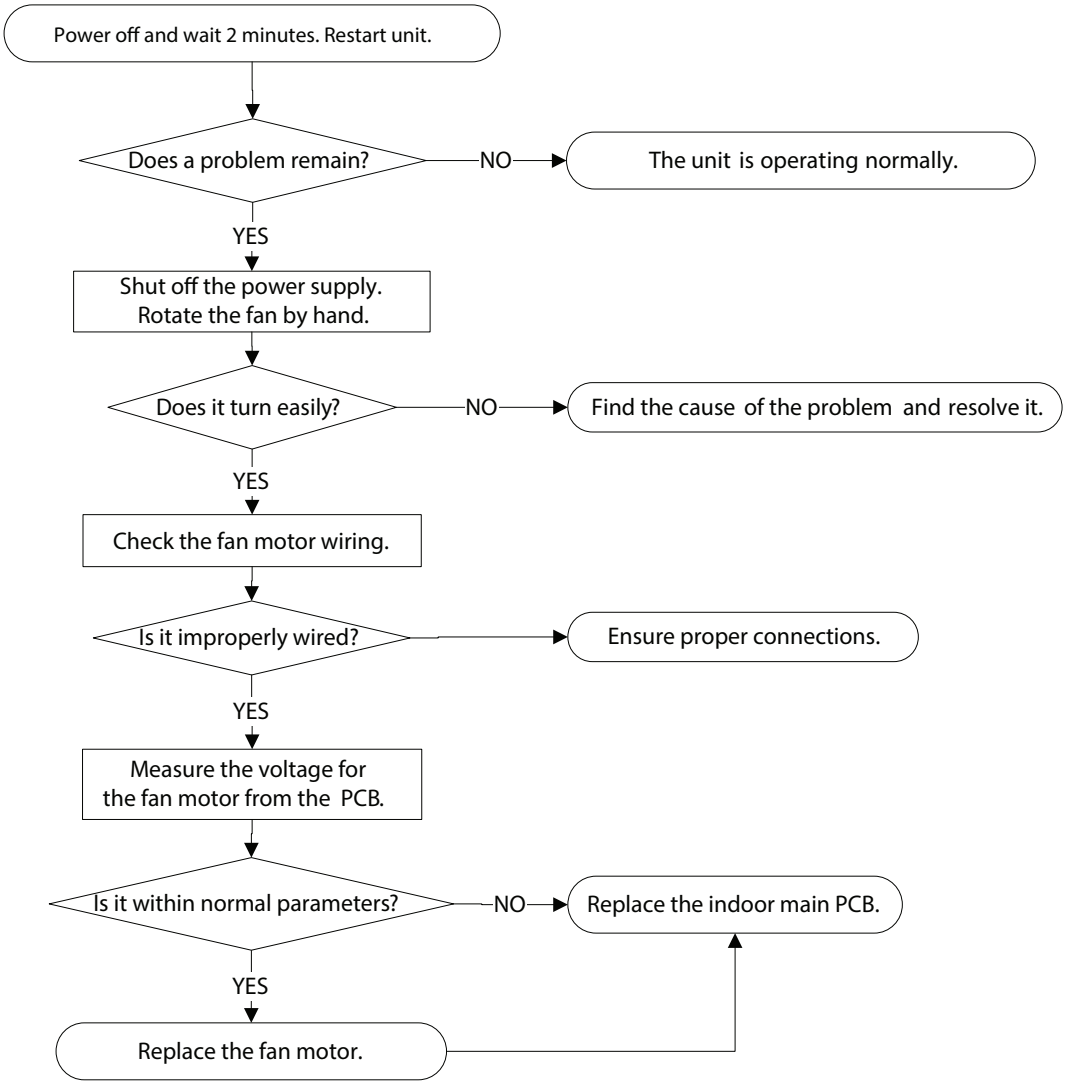
EH 03: The Indoor fan speed is operating outside of the normal range diagnosis and solution

Description: When the indoor fan speed remains too low or too high for a certain time, the LED displays the failure code and the air conditioner turns off.

Possible causes:

- Connection wires
- Fan assembly
- Fan motor
- Indoor main PCB

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

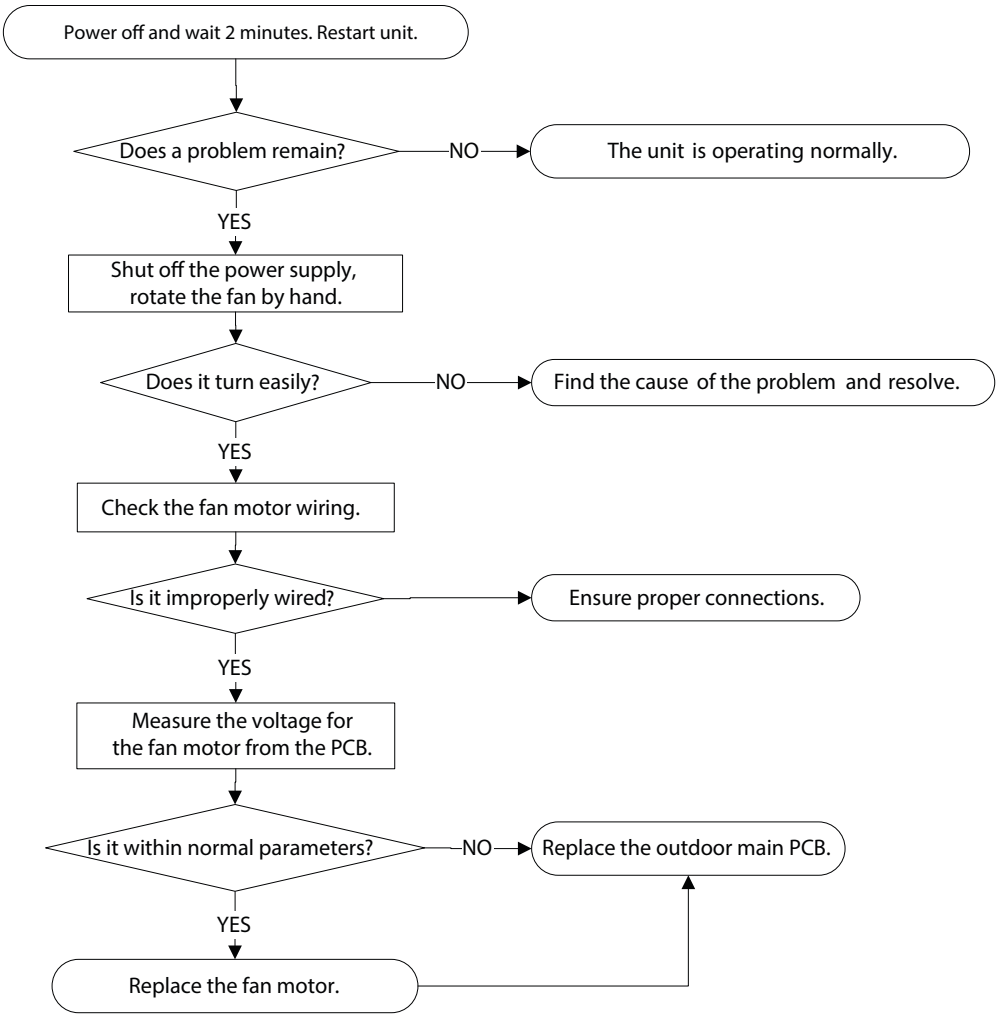
EC 07: The outdoor fan speed is operating outside of normal range diagnosis and solution

Description: When the outdoor fan speed remains too low or too high for a certain time, the LED displays the failure code and the AC turns off.

Possible causes:

- Connection wires
- Fan assembly
- Fan motor
- Outdoor main PCB

Troubleshooting

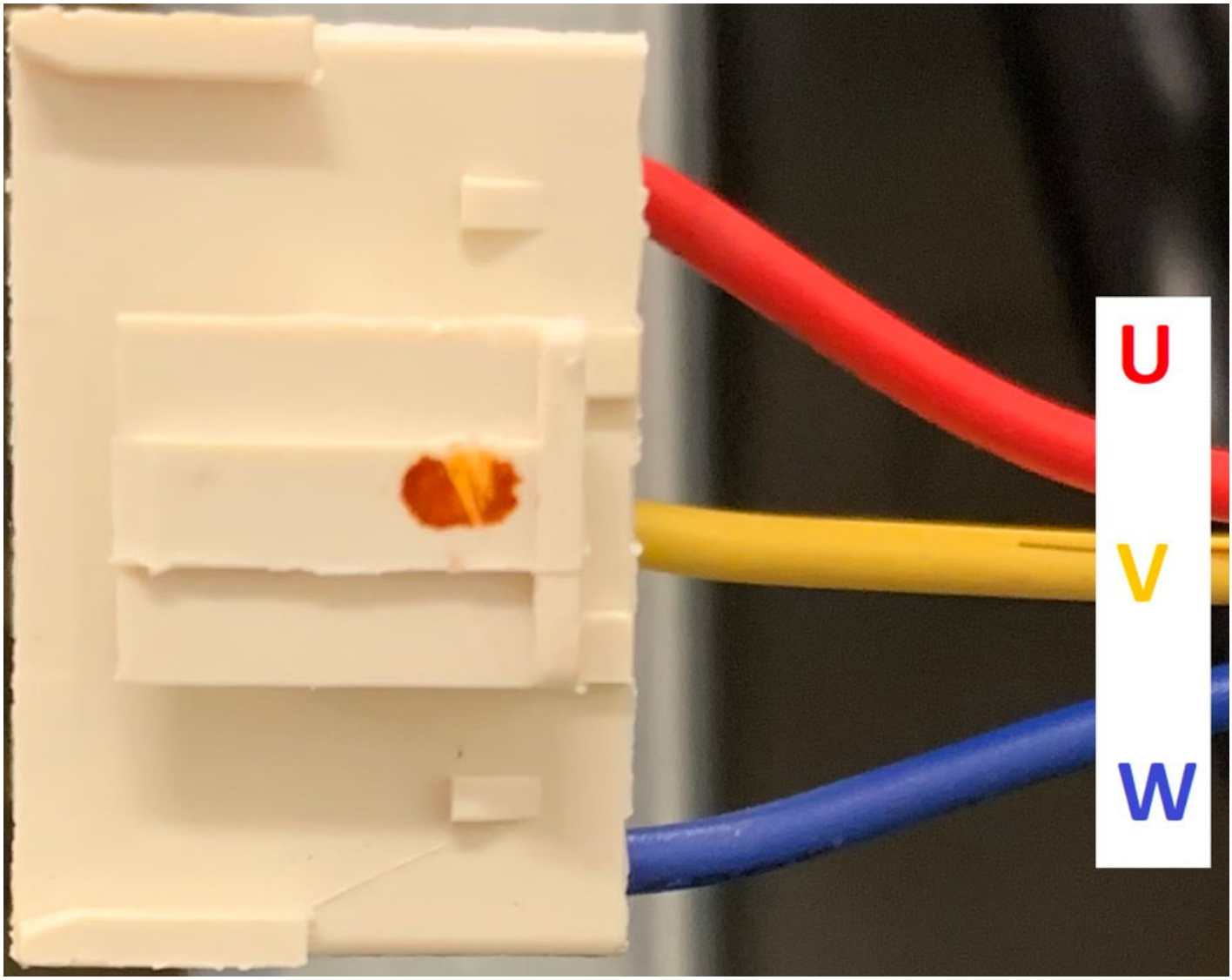


NOTE: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Index

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

Release the UVW connector. Measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other, the fan motor has malfunctioned and needs to be replaced. Otherwise, the PCB has malfunctioned and needs to be replaced.



DIAGNOSIS AND SOLUTION (CONT)

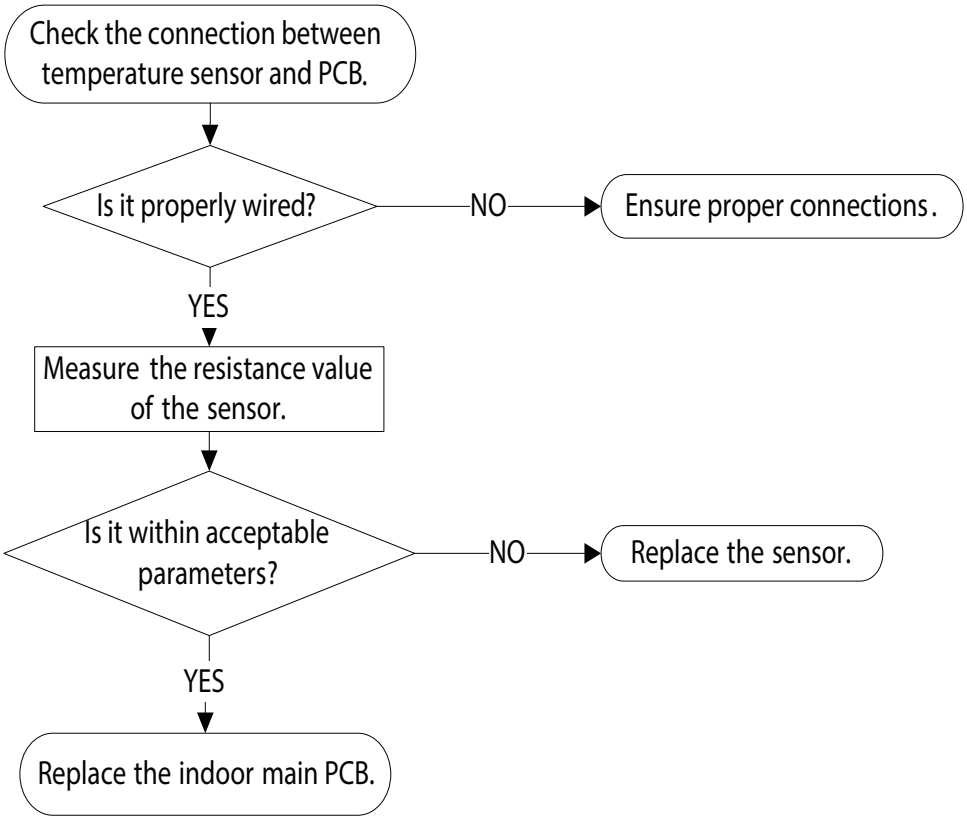
EH 60/EH 61: Open circuit or short circuit of indoor temperature sensor (T1, T2) diagnosis and solution

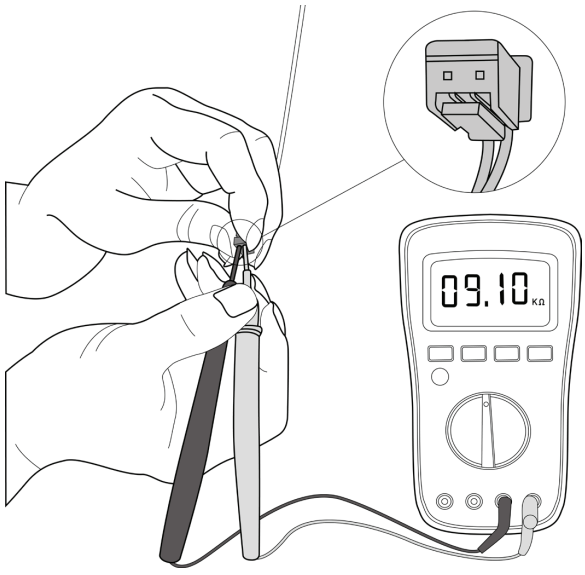
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure code.

Possible causes:

- Connection wires
- Sensors
- Indoor main PCB

Troubleshooting





NOTE: Figures and values within this document are for reference only. Actual appearances and values may vary.

DIAGNOSIS AND SOLUTION (CONT)

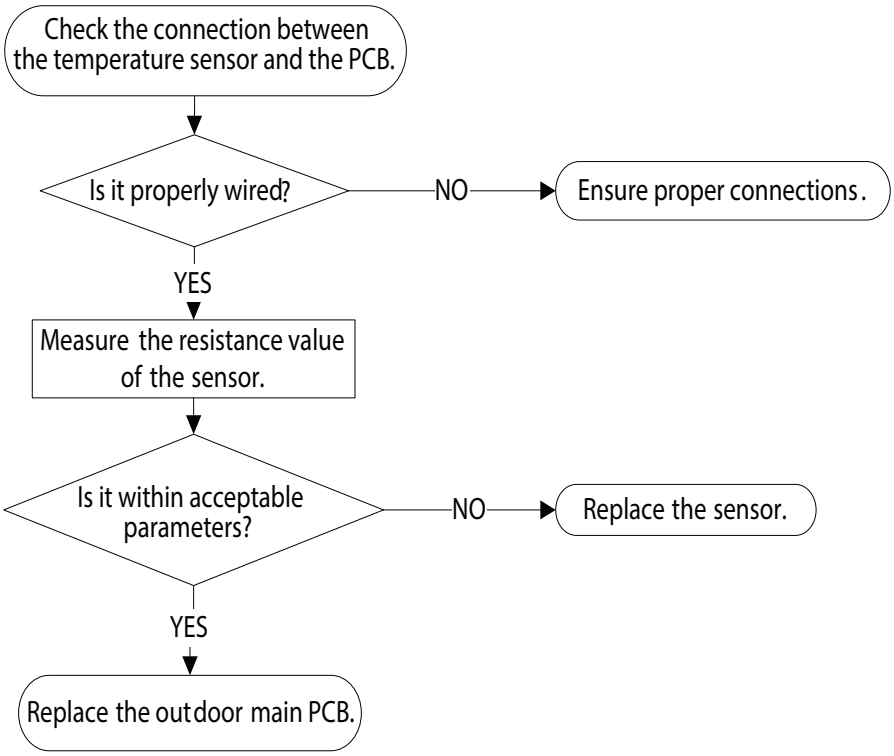
EC 52/EC 53/EC 54/EC 56: Open or short circuit of outdoor temperature sensor (T3, T4, TP, T2B,TH) diagnosis and solution

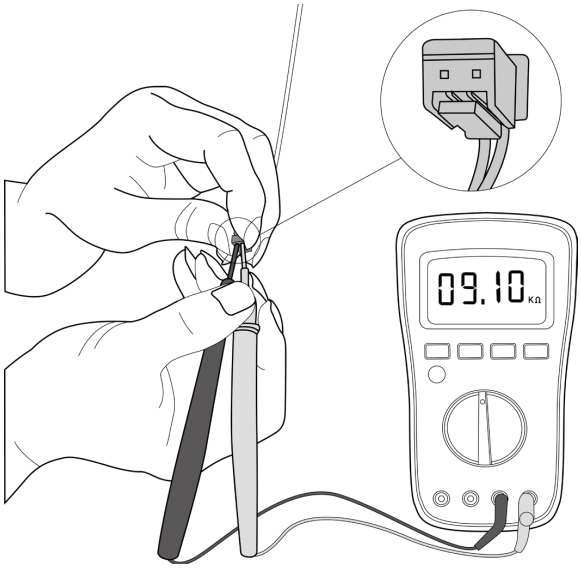
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure code.

Possible causes:

- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting





NOTE: For certain models, the outdoor PCB cannot be removed separately. In this case, the outdoor electric control box should be replaced as a whole. For certain models, the outdoor unit uses combination sensor, T3,T4 and TP are the same of sensor.

DIAGNOSIS AND SOLUTION (CONT)

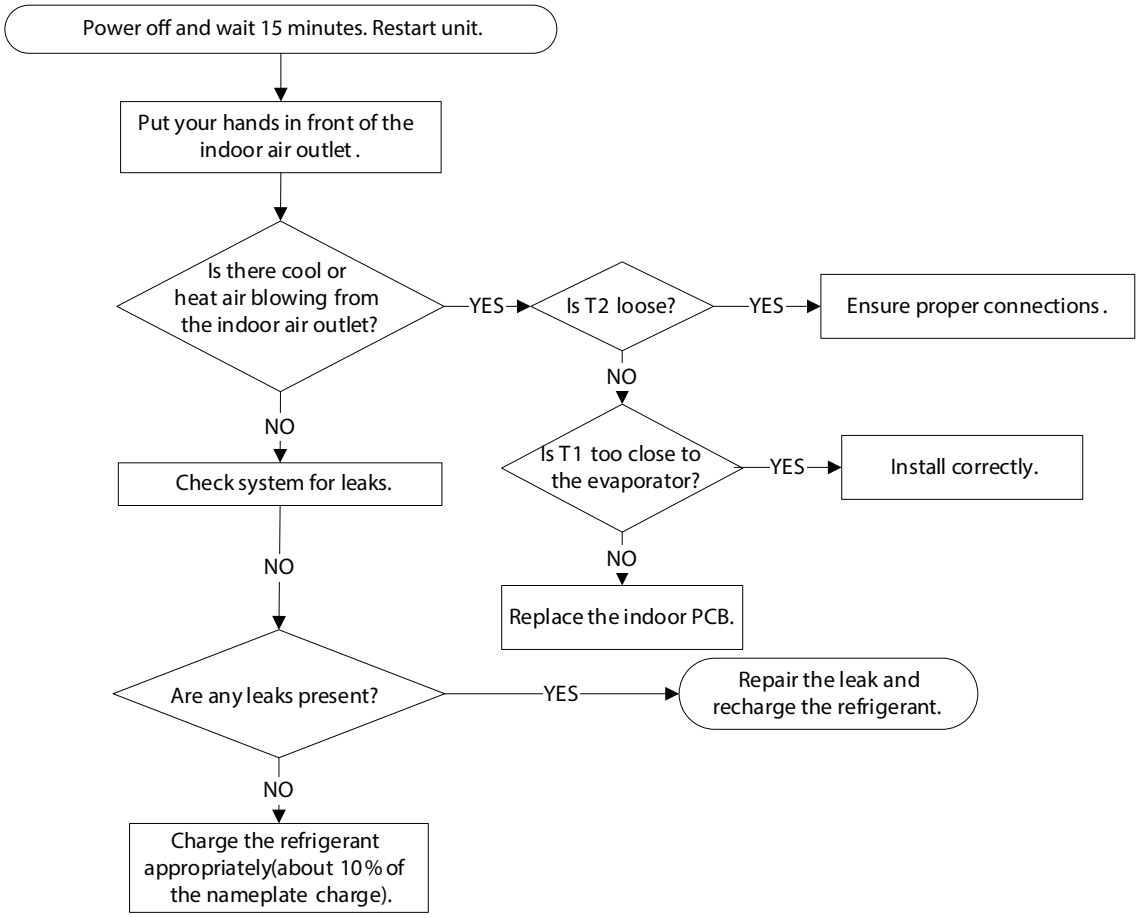
EL 0C: Refrigerant Leakage Detection diagnosis and solution

Description: Judging the abnormality of the refrigeration system according to the number of compressor stops and the changes in the operating parameters caused by excessive exhaust temperature.

Possible causes:

- Indoor PCB
- Additional refrigerant

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

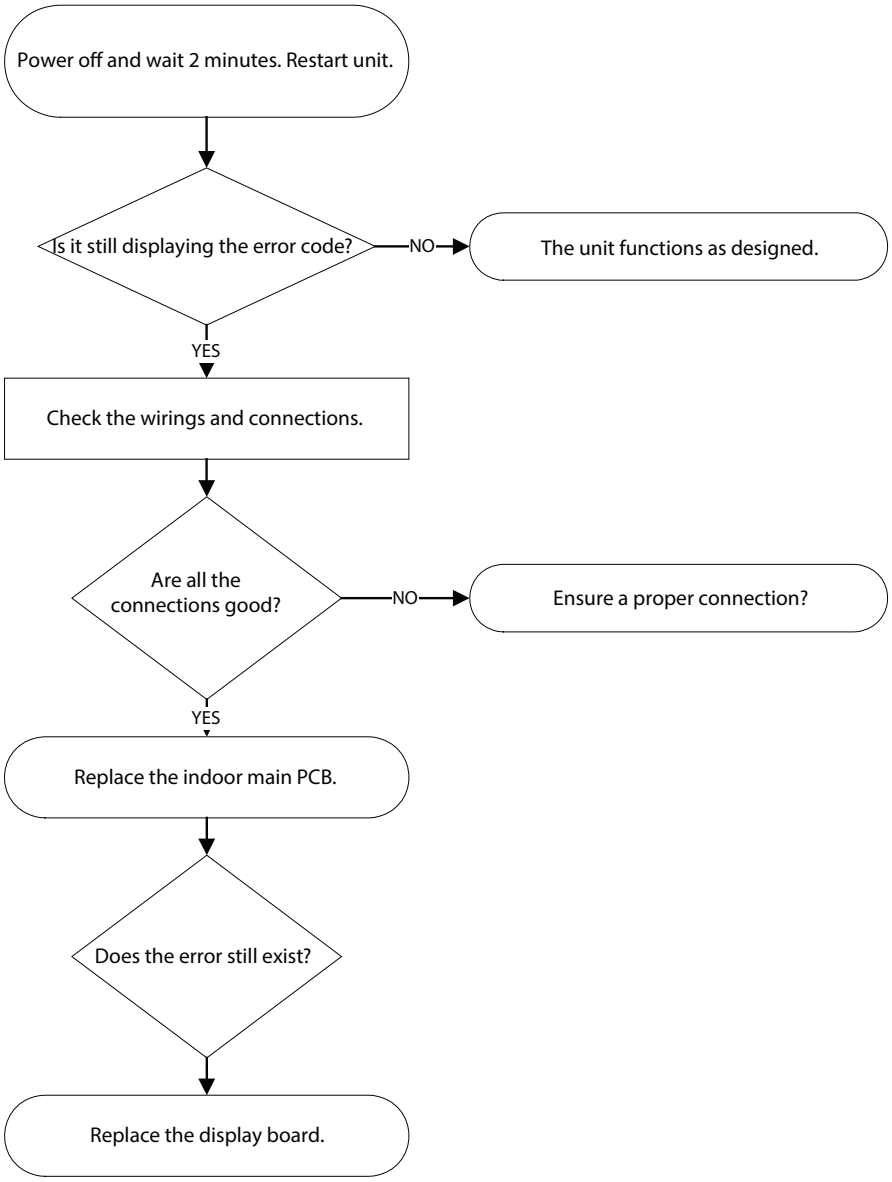
EH0b: Indoor PCB / Display board communication error diagnosis and solution

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

Possible causes:

- Communication wire
- Indoor PCB
- Display board

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

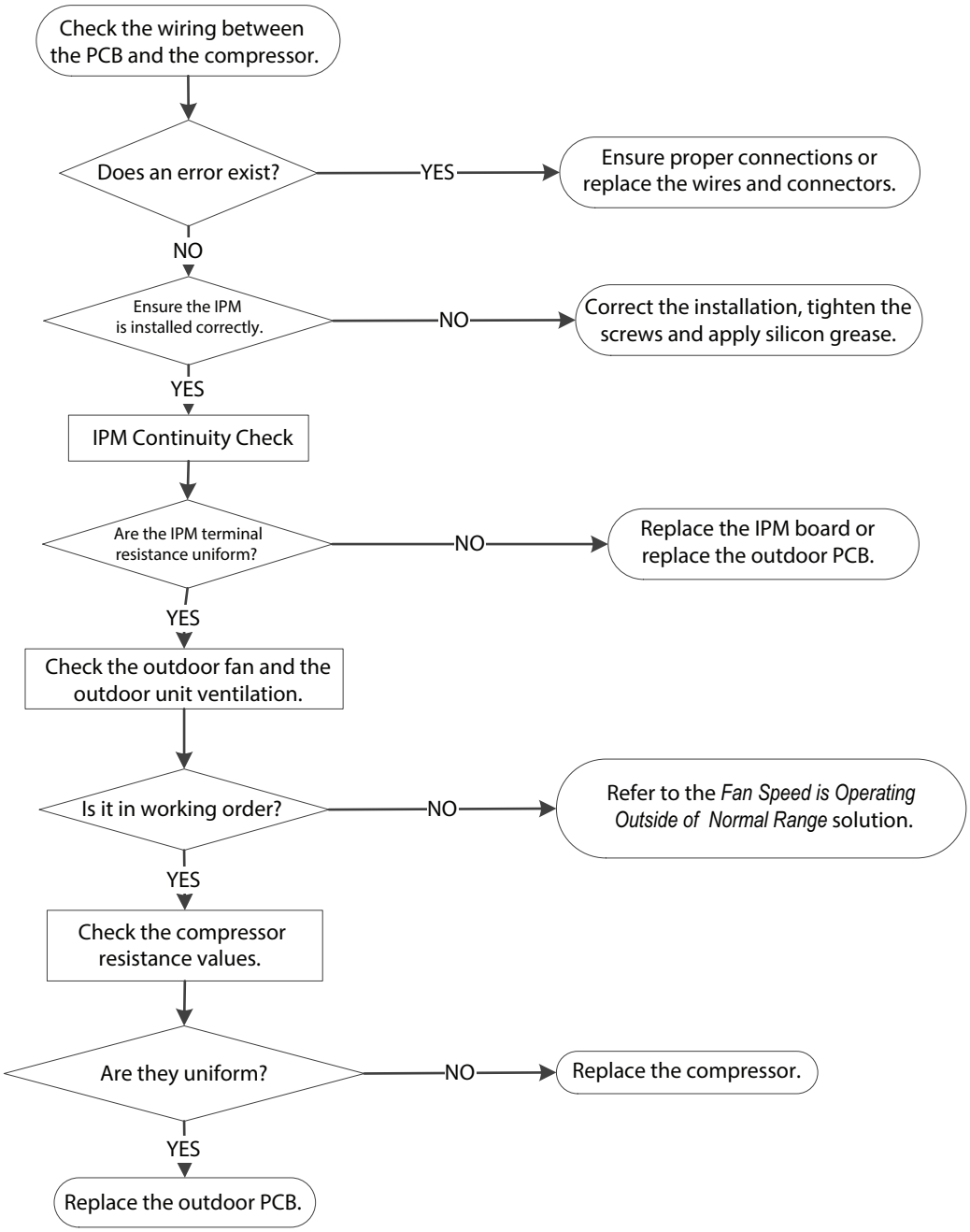
PC 00: IPM malfunction or IGBT over-strong current protection diagnosis and solution

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Possible causes:

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

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

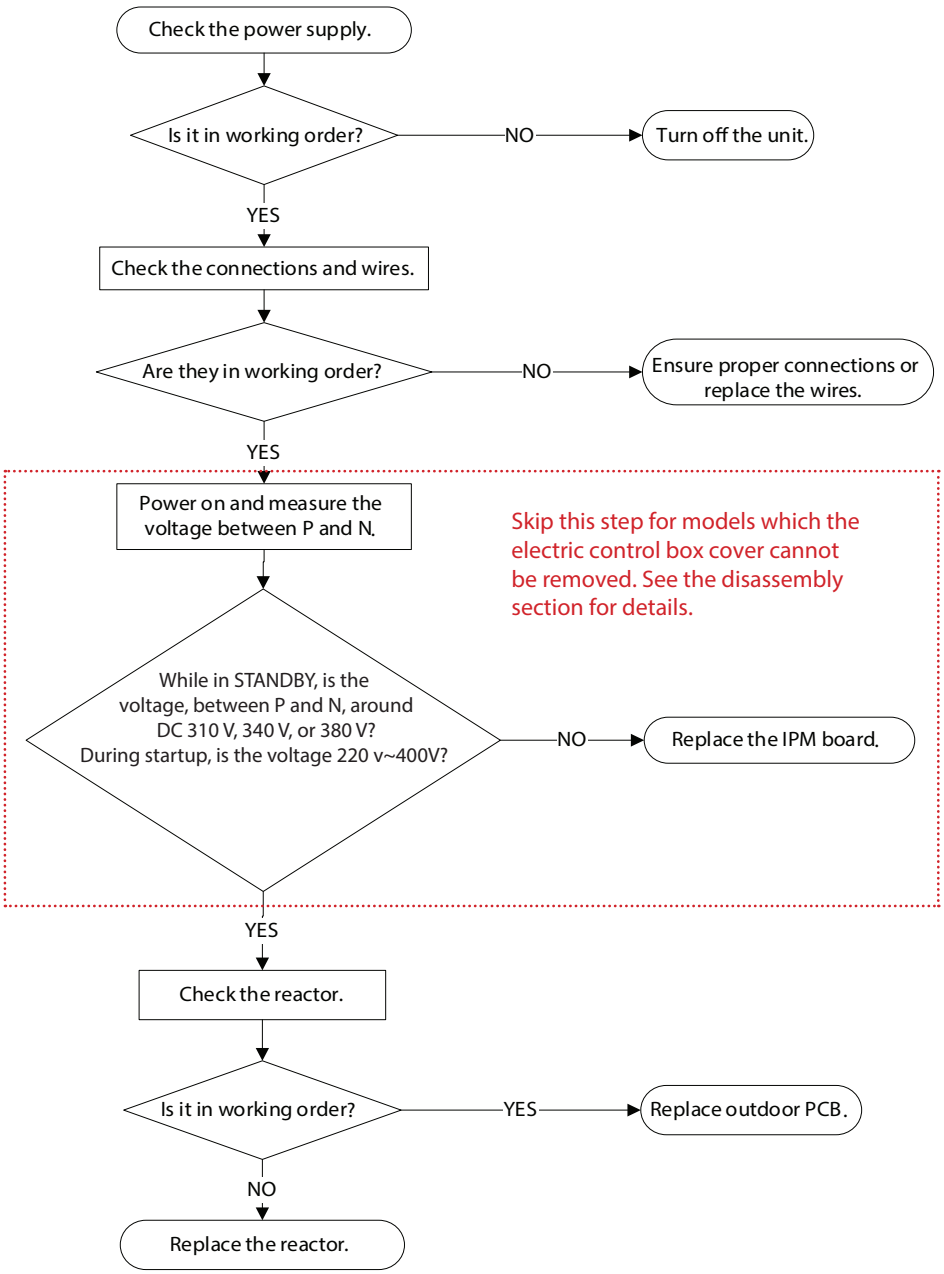
PC 01: Over voltage or too low voltage protection diagnosis and solution

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

Possible causes:

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

Troubleshooting



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

DIAGNOSIS AND SOLUTION (CONT)

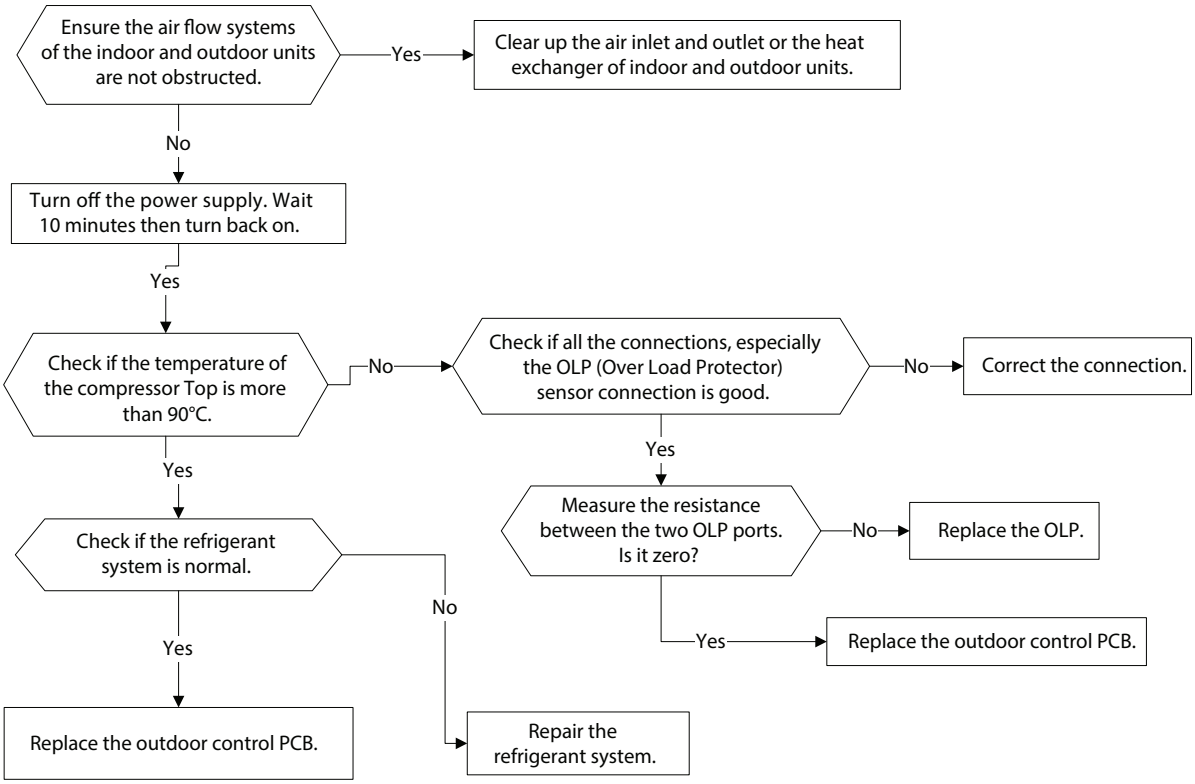
PC 02: Top temperature protection of compressor or High temperature protection of IPM module or High pressure protection diagnosis and solution

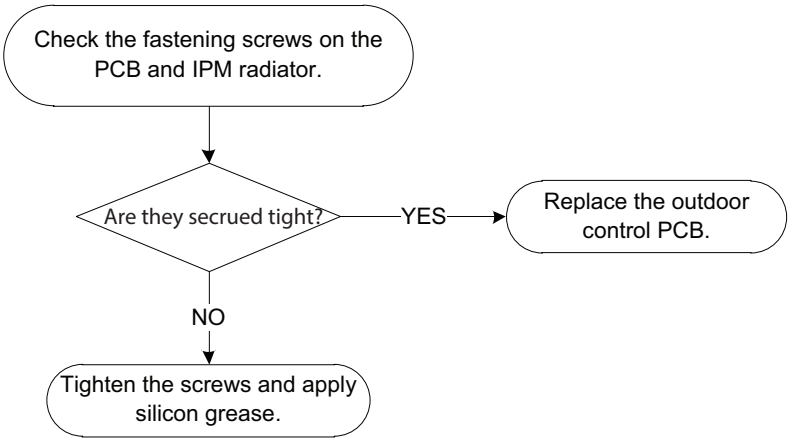
Description: For some models with overload protection, if the sampling voltage is not 5V, the LED displays the failure. If the temperature of IPM module is higher than a certain value, the LED displays the failure code. For some models with high pressure switch, the outdoor pressure switch cuts off the system because high pressure is higher than 4.4 MPa, the LED displays the failure code.

Possible causes:

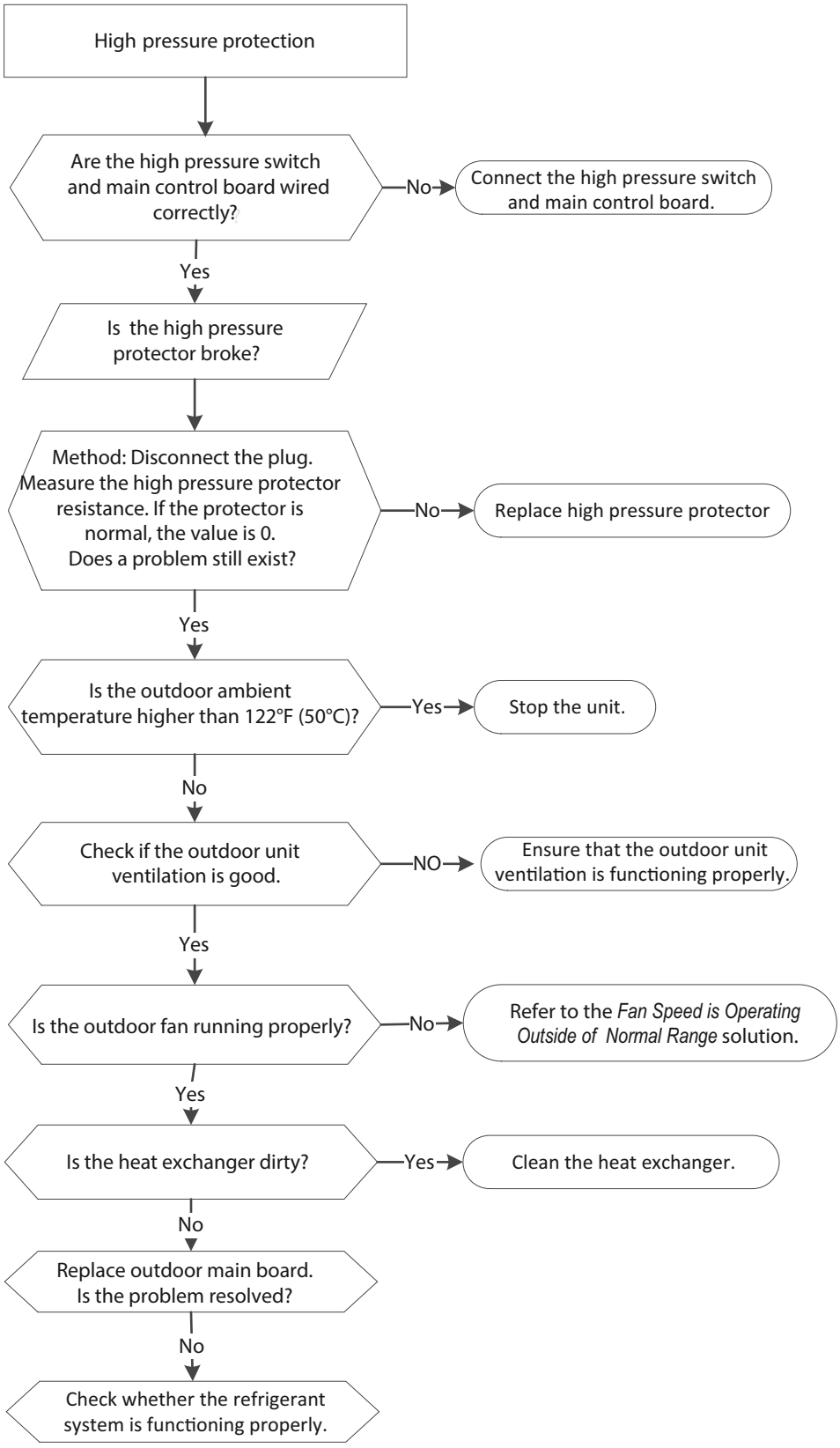
- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blocks

Troubleshooting





PC 02 (CONT)


High pressure protection
Are the high pressure switch and main control board wired correctly?
No
Connect the high pressure switch and main control board.
Yes
Is the high pressure protector broke?
Method: Disconnect the plug. Measure the high pressure protector resistance. If the protector is normal, the value is 0. Does a problem still exist?
No
Replace high pressure protector
Yes
Is the outdoor ambient temperature higher than 122°F (50°C)?
Yes
Stop the unit.
No
Check if the outdoor unit ventilation is good.
NO
Ensure that the outdoor unit ventilation is functioning properly.
Yes
Is the outdoor fan running properly?
No
Refer to the Fan Speed is Operating Outside of Normal Range solution.
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger.
No
Replace outdoor main board. Is the problem resolved?
No
Check whether the refrigerant system is functioning properly.

DIAGNOSIS AND SOLUTION (CONT)

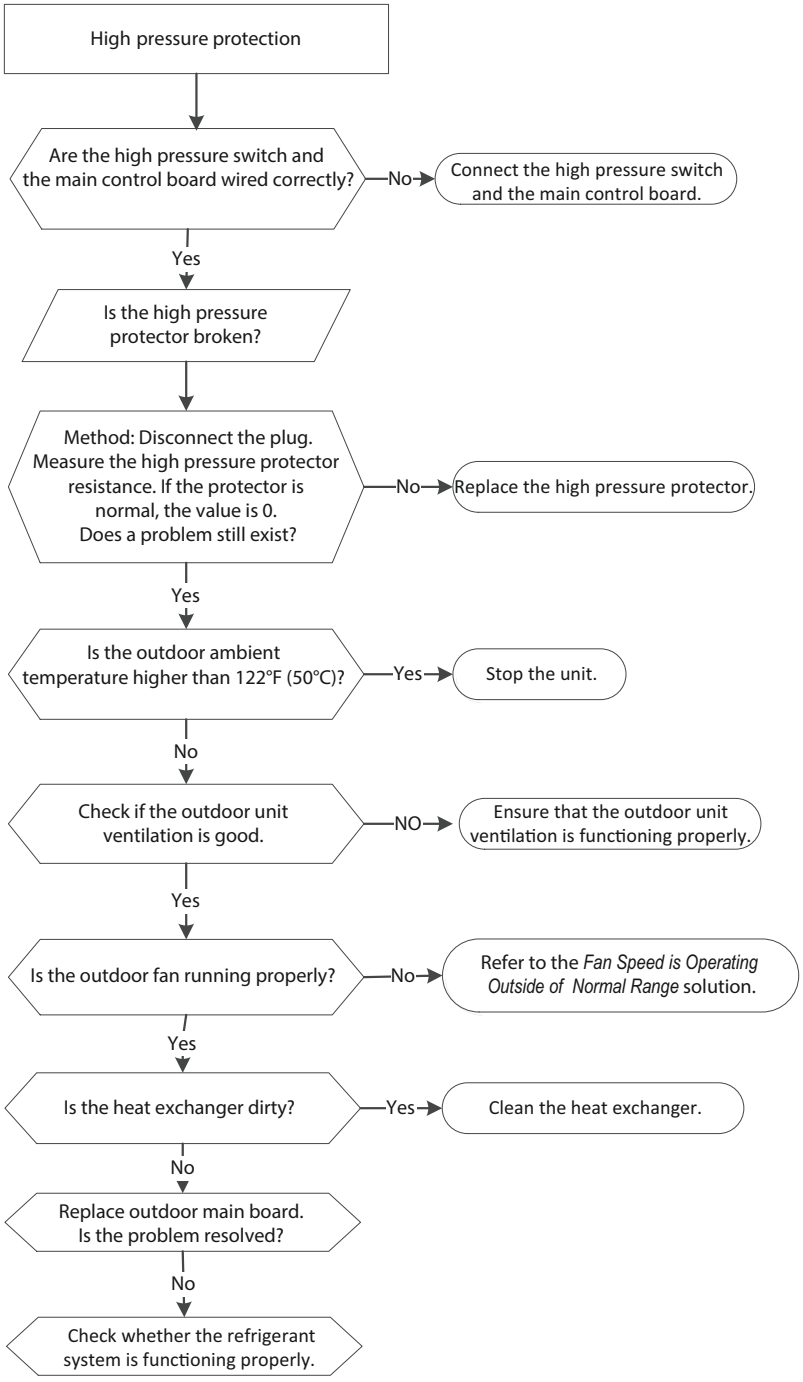
PC 03: High pressure protection or Low pressure protection diagnosis and solution

Description: Outdoor pressure switch cut off the system because high pressure is higher than 4.4 MPa or outdoor pressure switch cut off the system because low pressure is lower than 0.13 MPa, the LED displays the failure code.

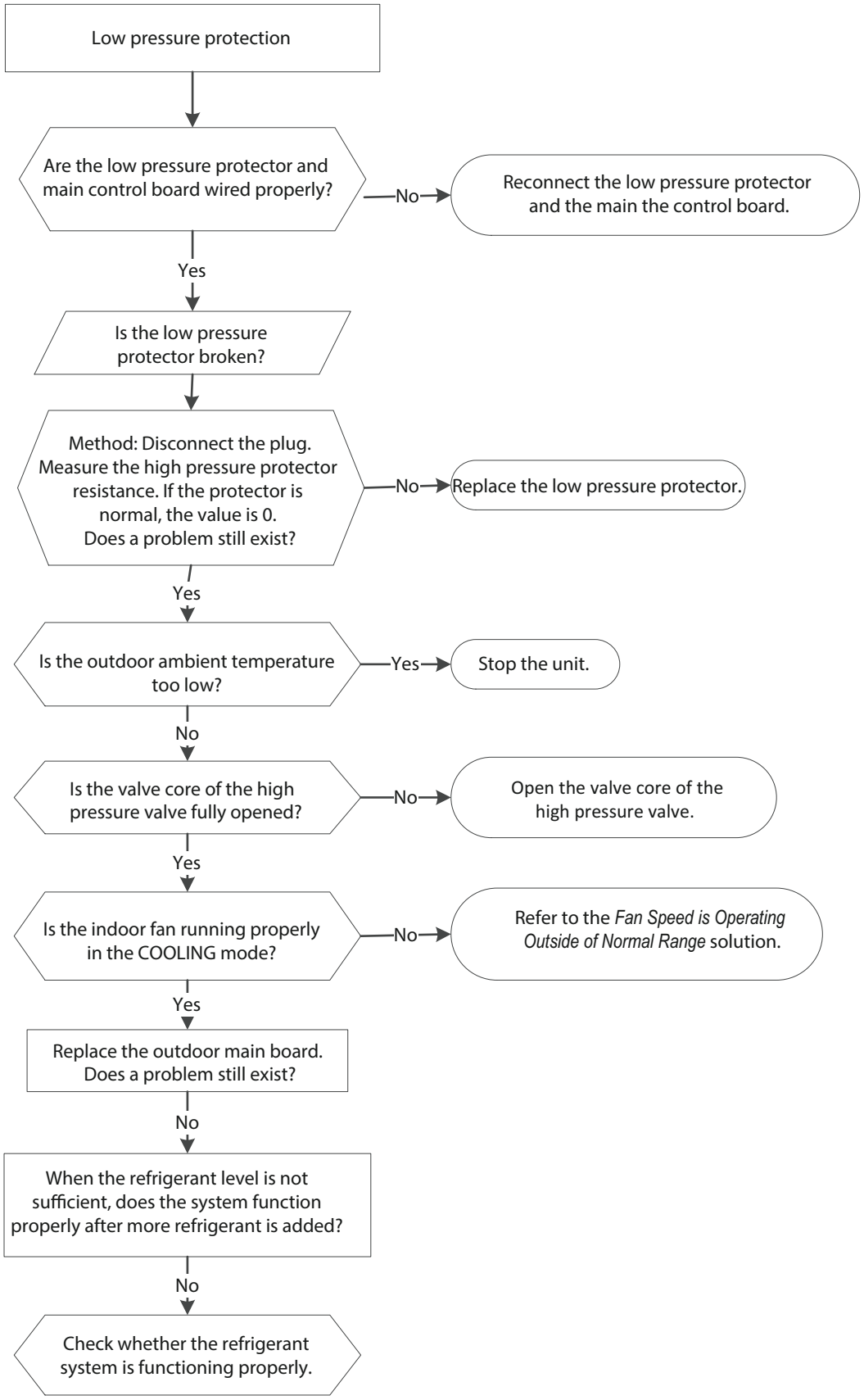
Possible causes:

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

Troubleshooting



PC 03 (CONT)


Low pressure protection
Are the low pressure protector and main control board wired properly?
No
Reconnect the low pressure protector and the main the control board.
Yes
Is the low pressure protector broken?
Method: Disconnect the plug. Measure the high pressure protector resistance. If the protector is normal, the value is 0. Does a problem still exist?
No
Replace the low pressure protector.
Yes
Is the outdoor ambient temperature too low?
Yes
Stop the unit.
No
Is the valve core of the high pressure valve fully opened?
No
Open the valve core of the high pressure valve.
Yes
Is the indoor fan running properly in the COOLING mode?
No
Refer to the *Fan Speed is Operating Outside of Normal Range* solution.
Yes
Replace the outdoor main board. Does a problem still exist?
No
When the refrigerant level is not sufficient, does the system function properly after more refrigerant is added?
No
Check whether the refrigerant system is functioning properly.

DIAGNOSIS AND SOLUTION (CONT)

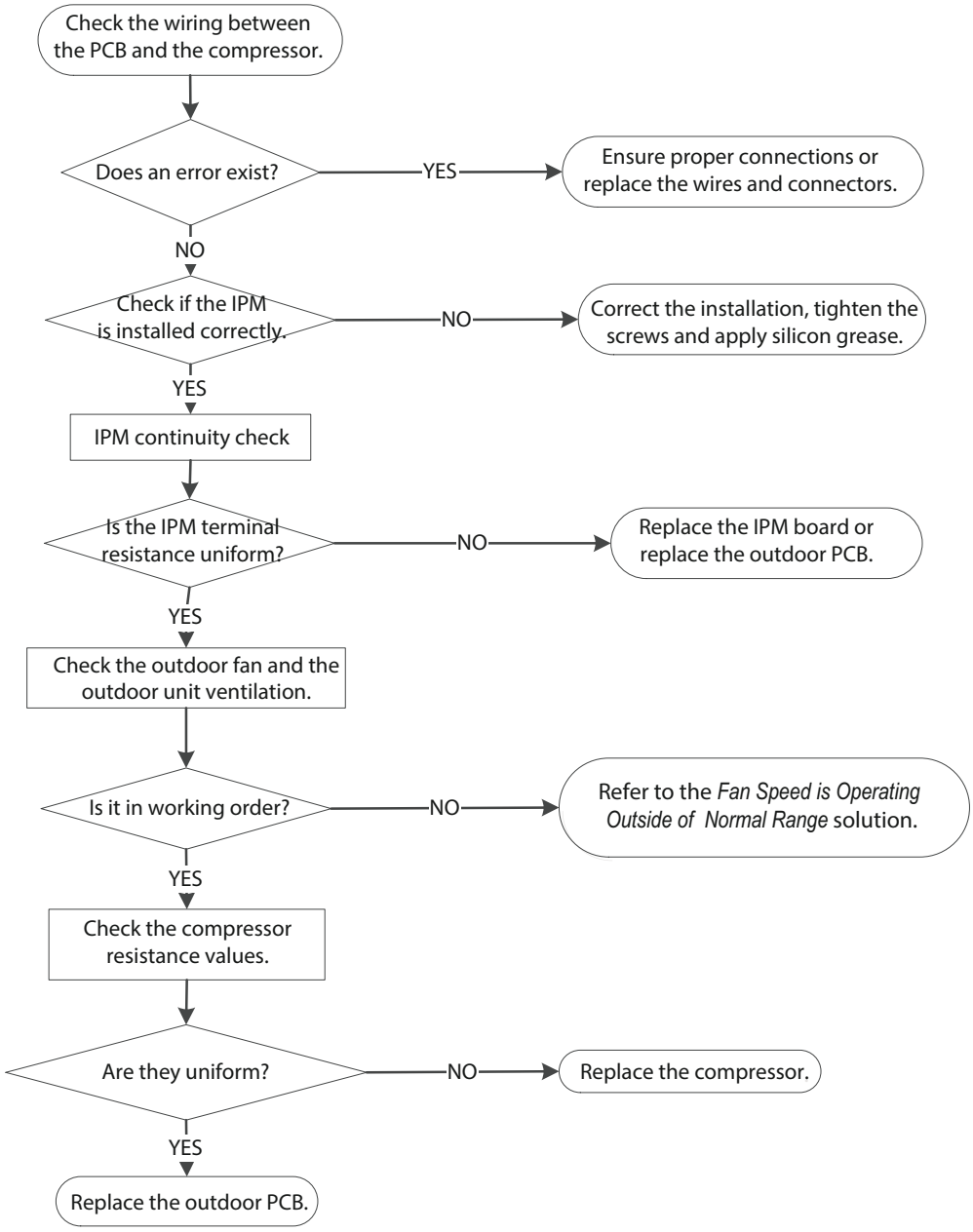
PC 04: Inverter compressor drive error diagnosis and solution

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

Possible causes:

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

Troubleshooting



Timer Lamp: ON -Indoor units mode conflict (match with multi outdoor unit)

Description: The indoor units cannot work cooling mode and heating at same time. Heating mode has a priority.

- Suppose indoor unit **A** is working in **COOLING** mode or **FAN** mode, and indoor unit **B** is set to **HEATING** mode, then **A** changes to **OFF** and **B** enters and runs in **HEATING** mode.
- Suppose indoor unit **A** working in **HEATING** mode, and indoor unit **B** is set to **COOLING** mode or **FAN** mode, then **B** changes to **STANDBY** and **A** does not change modes.

Table 28 — Indoor units mode conflict (match with multi outdoor unit)

	COOLING MODE	HEATING MODE	FAN	OFF
COOLING MODE	No	Yes	No	No
HEATING MODE	Yes	No	Yes	No
FAN	No	Yes	No	No
OFF	No	No	No	No

NOTE:

- **NO**: No mode conflict
- **YES**: Mode conflict

DIAGNOSIS AND SOLUTION (CONT)

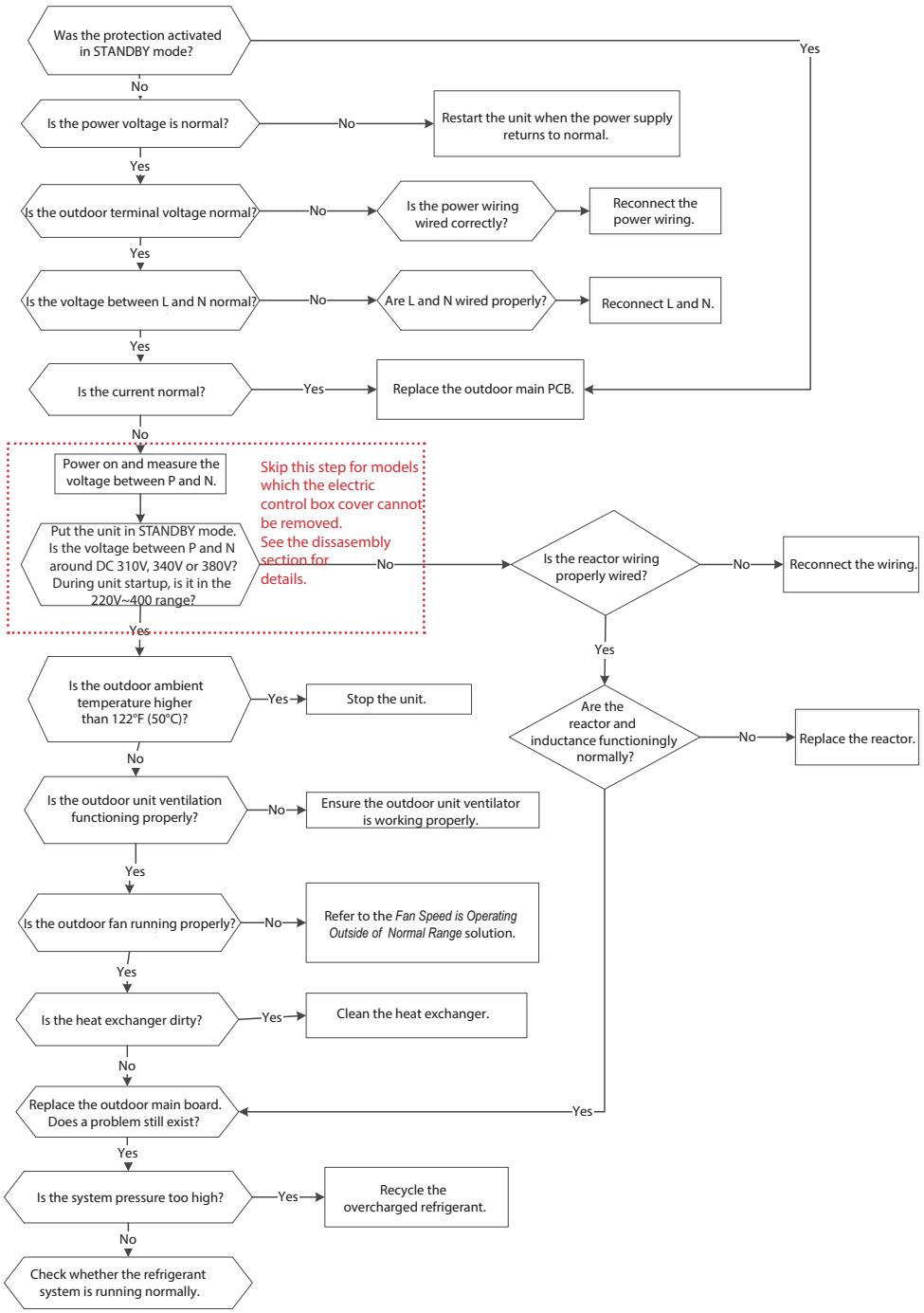
PC 08: Current overload protection diagnosis and solution

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

Possible causes:

- Connection wires
- Reactor
- Outdoor fan
- Outdoor PCB

Troubleshooting



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

DIAGNOSIS AND SOLUTION (CONT)

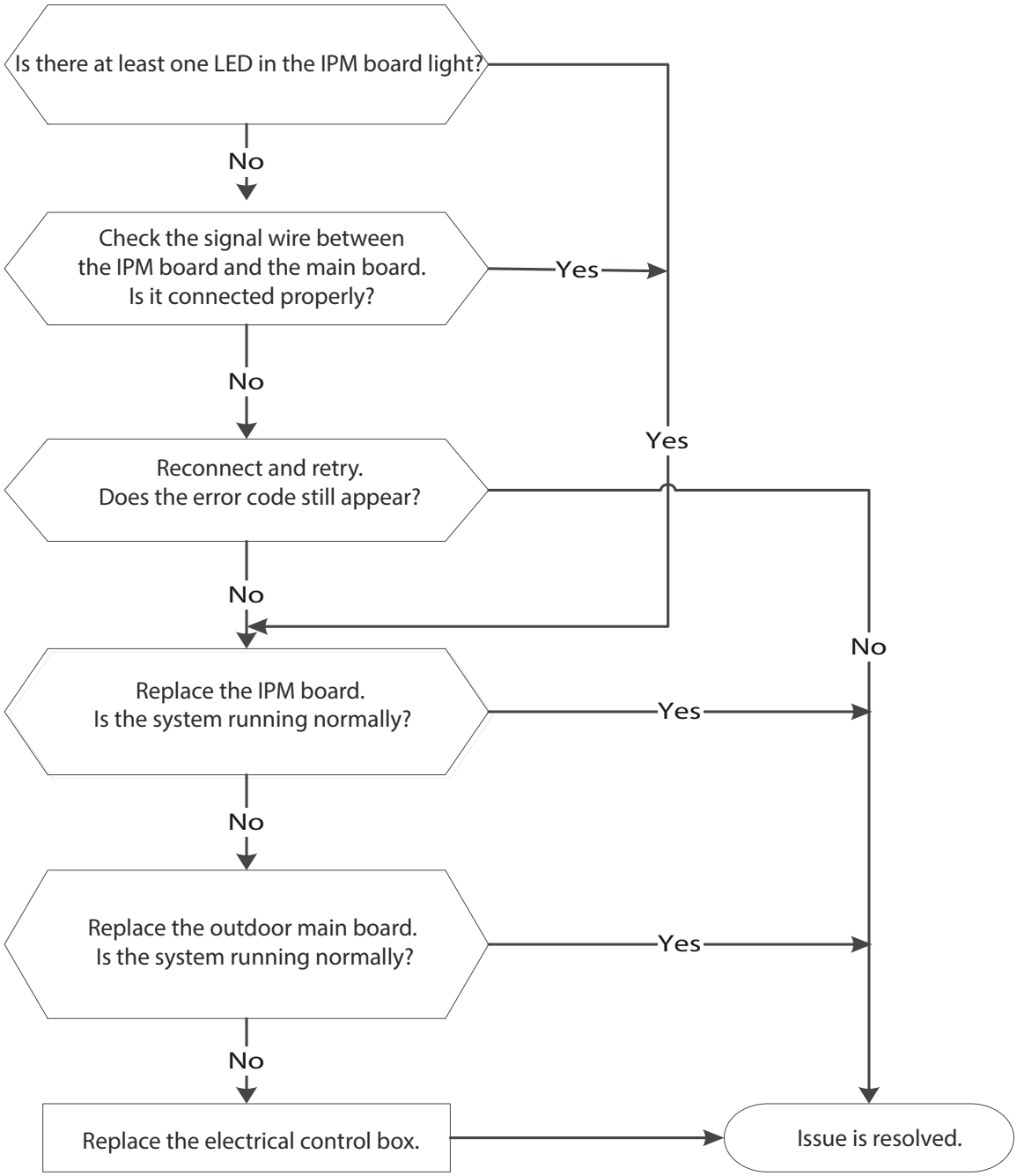
PC 40: Communication error between outdoor main PCB and IPM board diagnosis and solution

Description: The main PCB cannot detect the IPM board.

Possible causes:

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

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

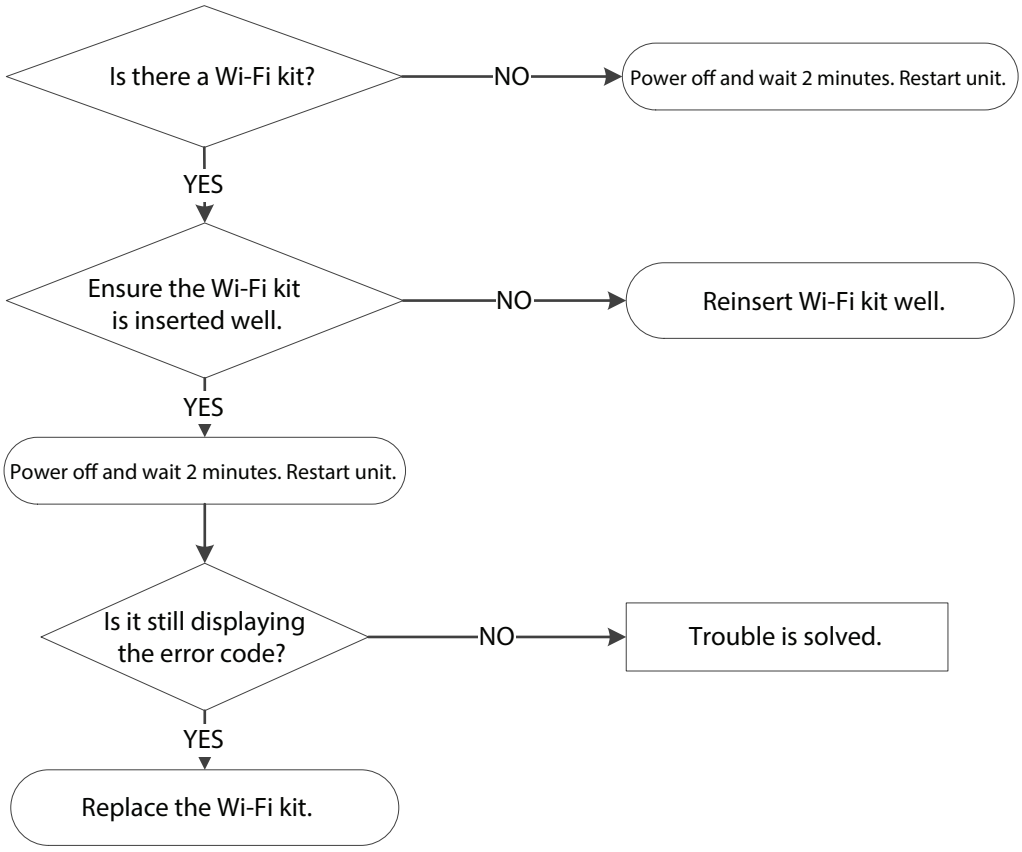
FH 0P: AP mode is active but there is no WIFI kit installed

Description: AP mode is active but cannot detect WIFI kit.

Possible causes:

- WI-FI kit

Troubleshooting



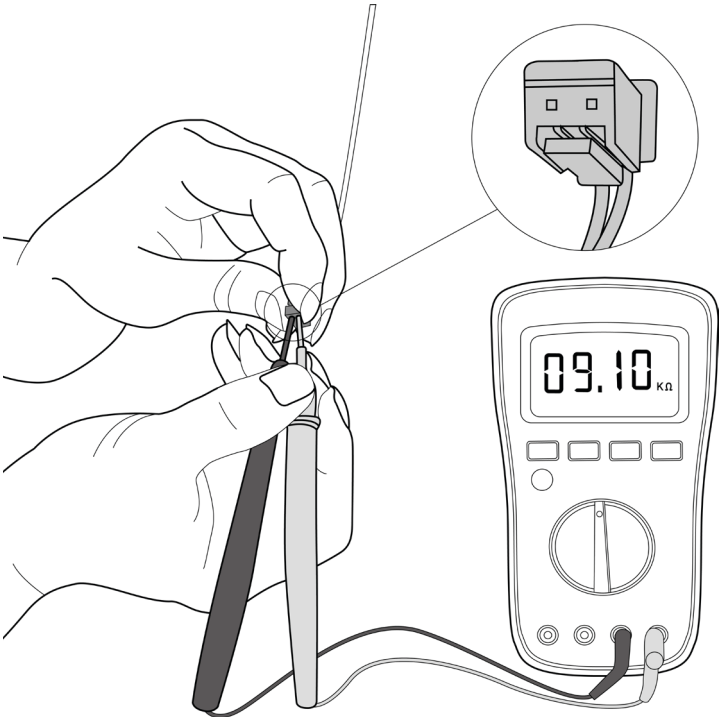
Check Procedures

Temperature Sensor Check

WARNING

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

1. Disconnect the temperature sensor from PCB.
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table.



Compressor Check

1. Disconnect the compressor power cord from outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in Tables 29, 30, and 31.

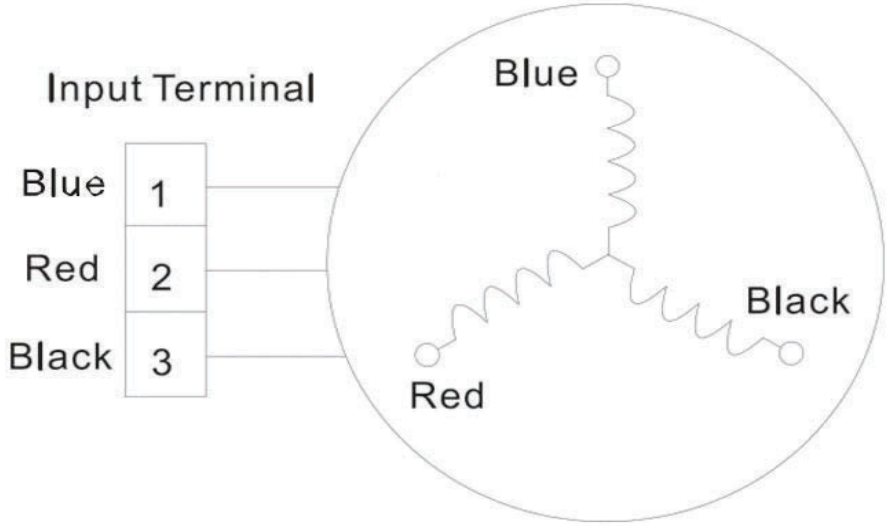


Fig. 50 — Tester

Table 29 — Compressor Checking

RESISTANCE VALUE	KSK103D33UEZ3(YJ)
Blue - Red	2.13 Ω
Blue - Black	
Red - Black	

Table 30 — Compressor Checking

RESISTANCE VALUE	KTM240D43UKT
Blue - Red	0.62 Ω
Blue - Black	
Red - Black	

Table 31 — Compressor Checking

RESISTANCE VALUE	KTF250D22UMT	KSN140D58UFZ
Blue - Red	0.75 Ω	1.86 Ω
Blue - Black		
Red - Black		

DIAGNOSIS AND SOLUTION (CONT)

IPM Continuity Check

WARNING

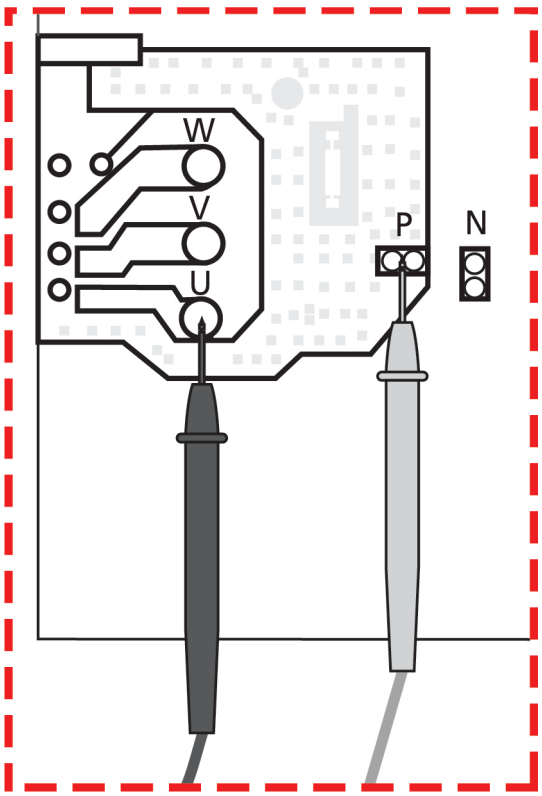
Electricity remains in the capacitors even when the power supply is turned off. Ensure the capacitors are fully discharged before troubleshooting.

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

1. Turn off outdoor unit and disconnect power supply.
2. Discharge electrolytic capacitors and ensure all energy-storage unit has been discharged.
3. Disassemble outdoor PCB or disassemble IPM board.
4. Measure the resistance value between P and U(V, W, N); U(V, W) and N.

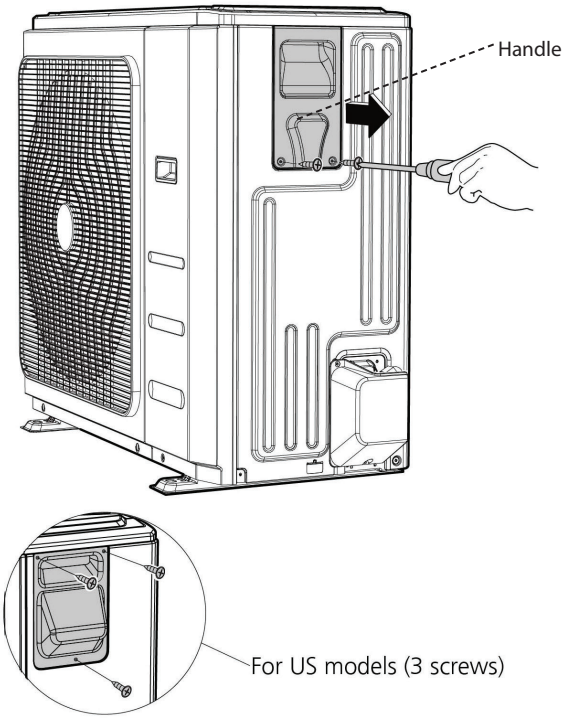
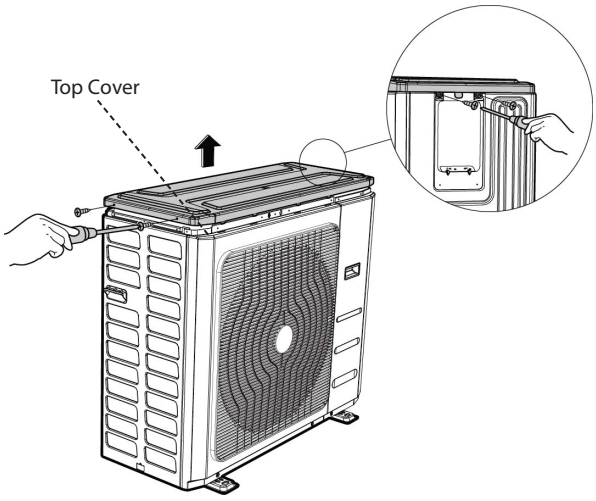
Table 32 — IPM Continuity Check

DIGITAL TESTER		NORMAL RESISTANCE VALUE	DIGITAL TESTER		NORMAL RESISTANCE VALUE
(+)Red	(-)Black		(+)Red	(-)Black	
P	N	∞ (Several MΩ)	U	N	∞ (Several MΩ)
	U		V		
	V		W		
	W		-		



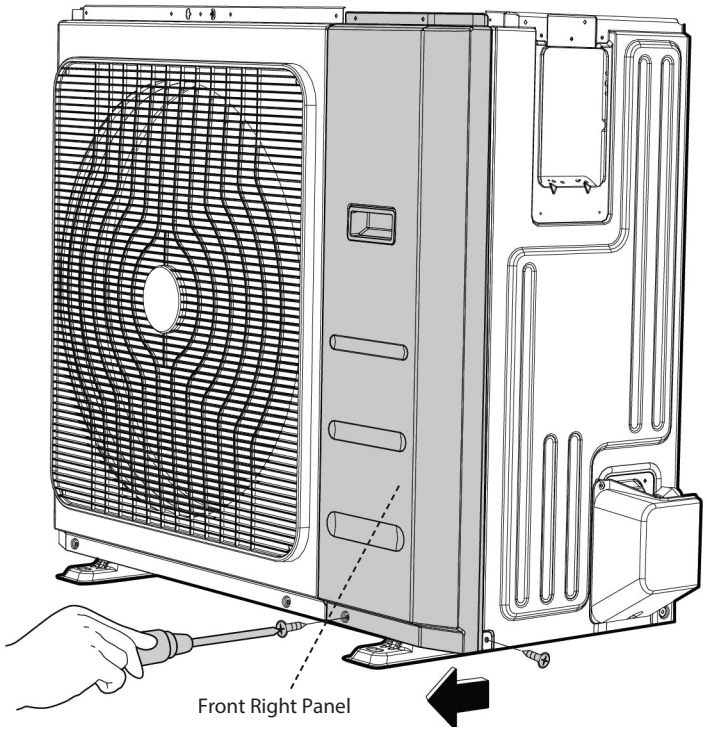
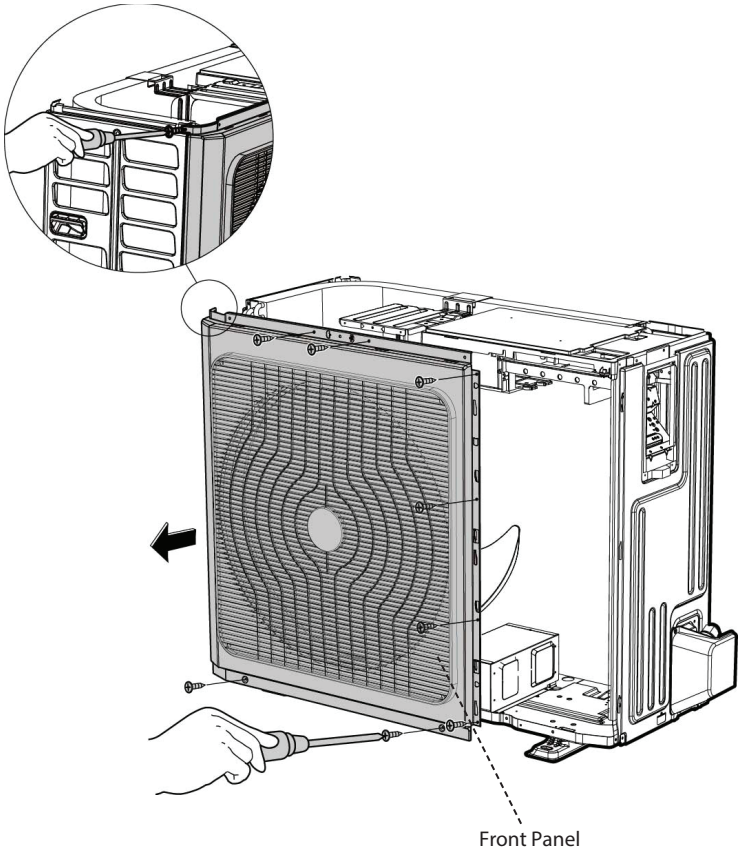
NOTE: Figures (pictures) are for reference only; actual appearances may vary.

DISASSEMBLY INSTRUCTIONS
PANEL PLATE - SIZES 9K (115V) - 12K (208/230V)

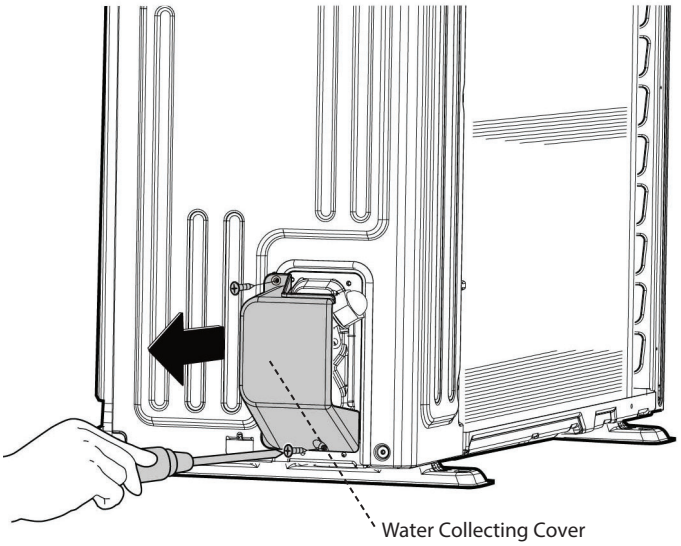
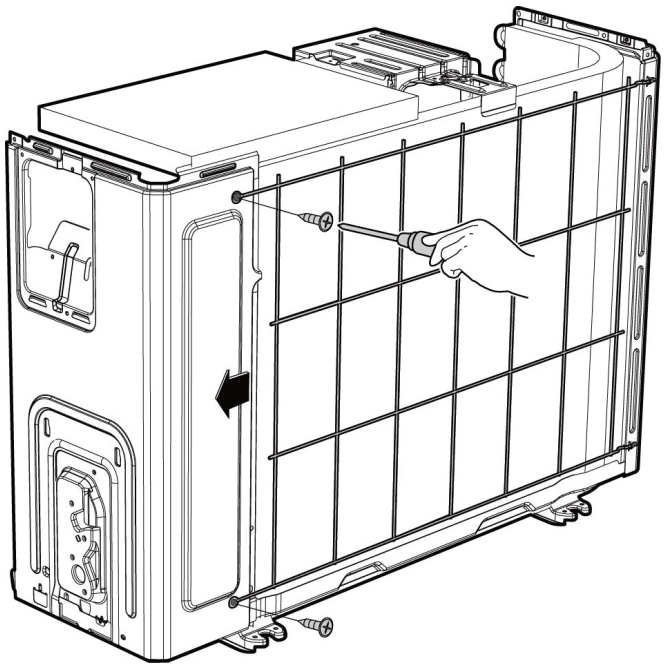
Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the handle screws (2) then remove the handle.	
3) Remove the top cover screws (4) then remove the top cover. Two of the screws are located under the handle.	

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

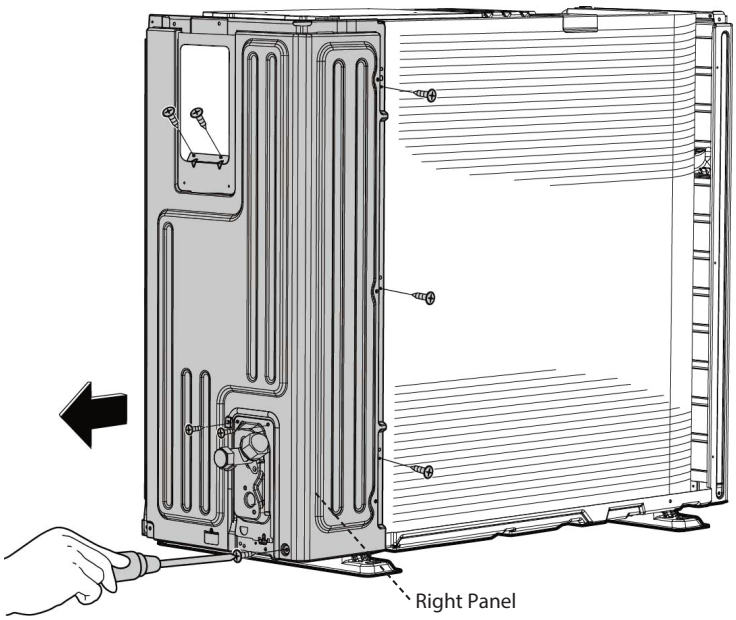
DISASSEMBLY INSTRUCTIONS
PANEL PLATE - SIZES 9K (115V) - 12K (208/230V) (CONT)

Procedure	Illustration
4) Remove the front right panel screws (2) then remove the front right panel.	
5) Remove the front panel screws (9) then remove the front panel.	

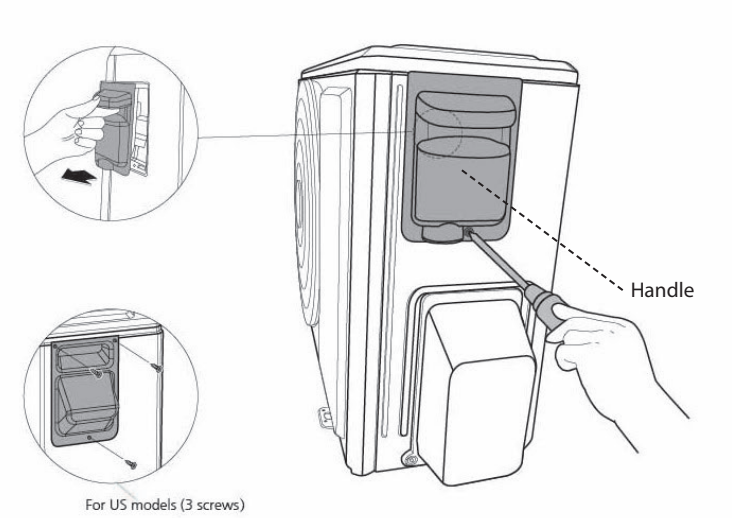
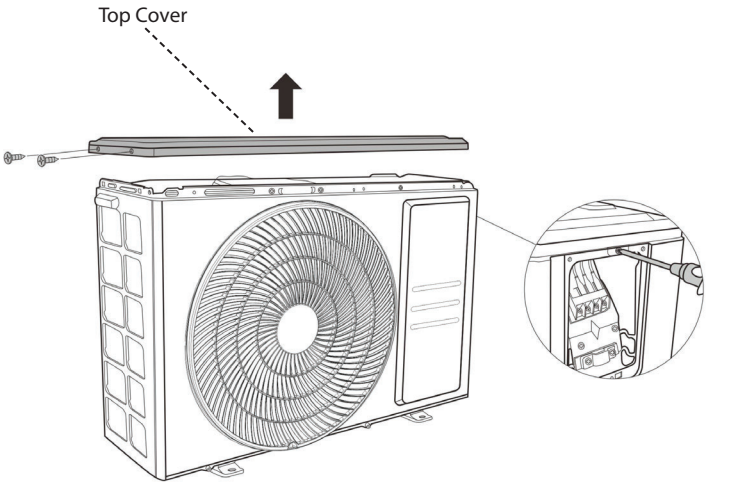
DISASSEMBLY INSTRUCTIONS
PANEL PLATE - SIZES 9K (115V) - 12K (208/230V) (CONT)

Procedure	Illustration
6) Remove the water collecting cover screws (2) then remove the water collecting cover .	
7) Remove the rear net screws (2) then remove the rear net.	

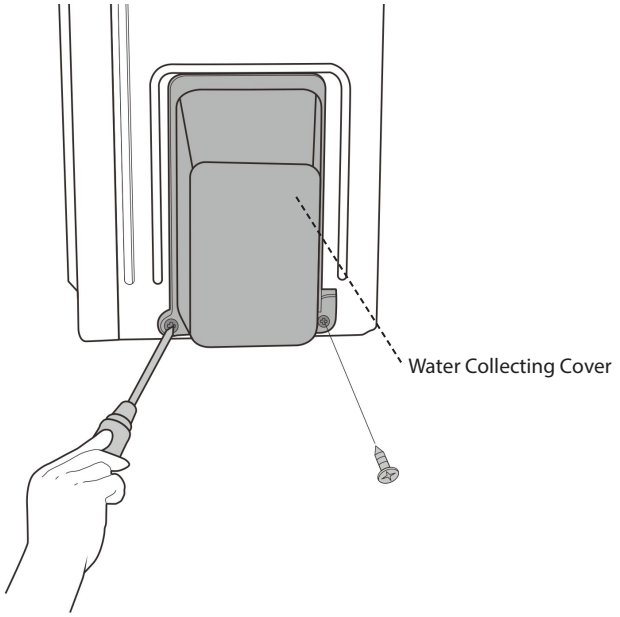
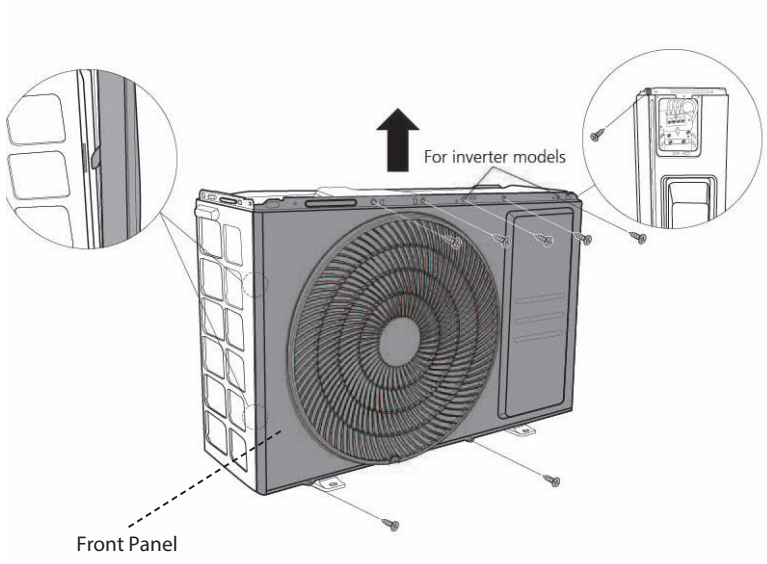
DISASSEMBLY INSTRUCTIONS
PANEL PLATE - SIZES 9K (115V) - 12K (208/230V) (CONT)

Procedure	Illustration
8) Remove the right panel screws (8) then remove the right panel.	

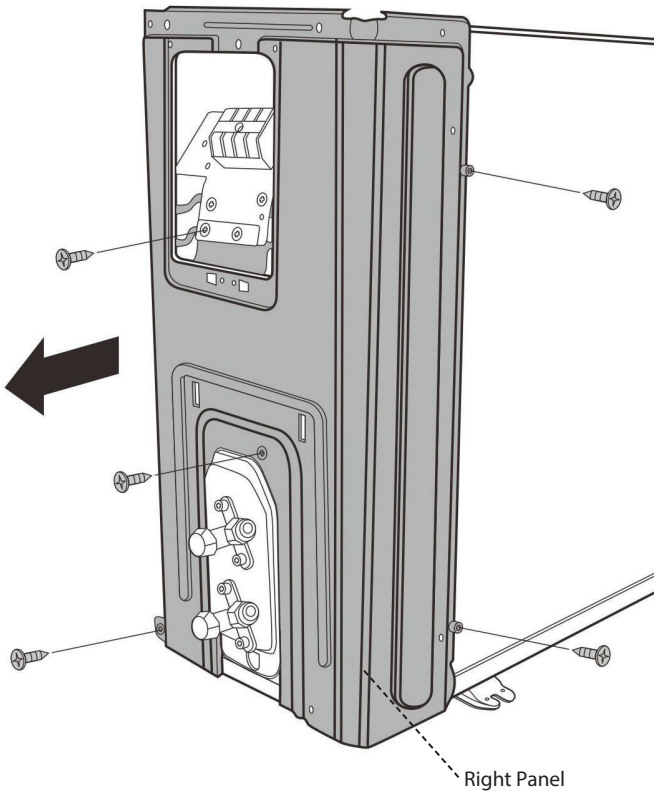
DISASSEMBLY INSTRUCTIONS
SIZE 18K

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the handle screw (1) then remove the handle.	
3) Remove the top cover screws (3) then remove the top cover. One of the screws is located under the handle.	

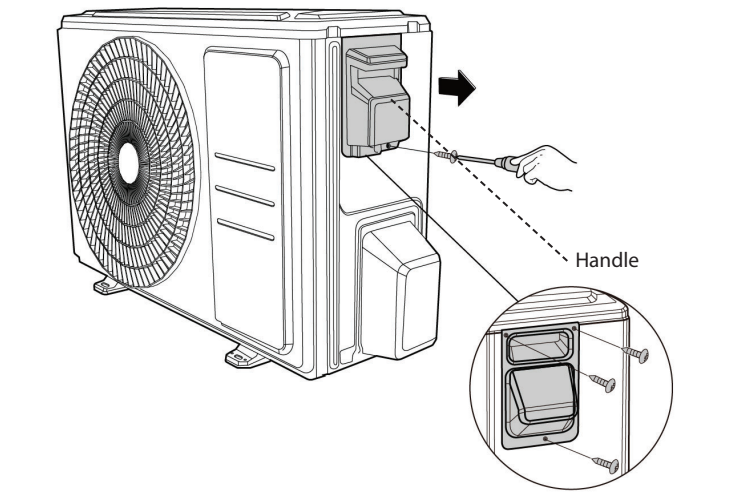
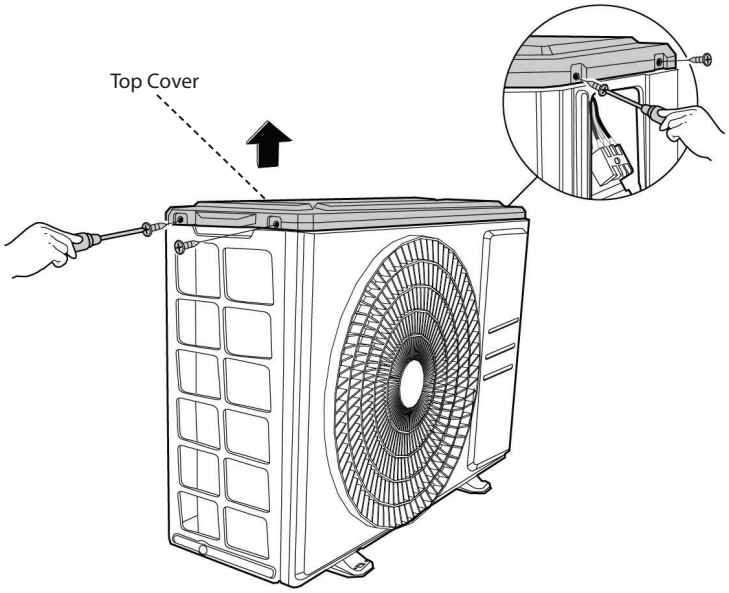
DISASSEMBLY INSTRUCTIONS
SIZE 18K (CONT)

Procedure	Illustration
4) Remove the water collecting cover screws (2) then remove the water collecting cover.	
5) Remove the front panel screws then remove the front panel (6 screws (on/off models) or 8 screws (inverter models)).	

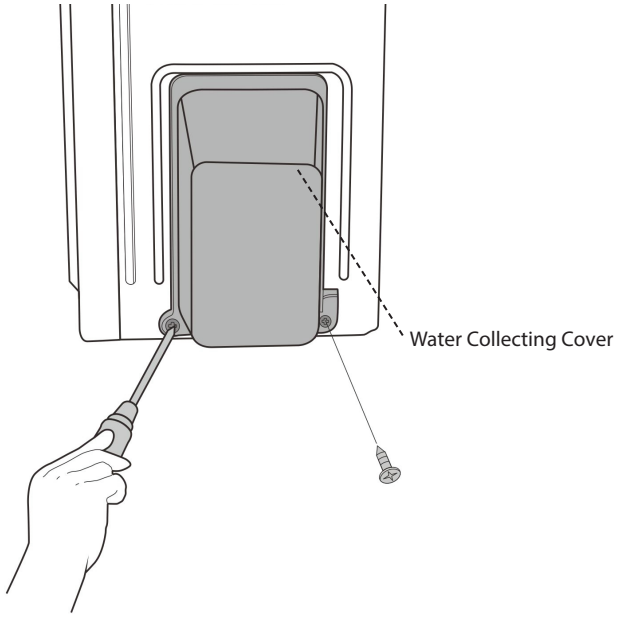
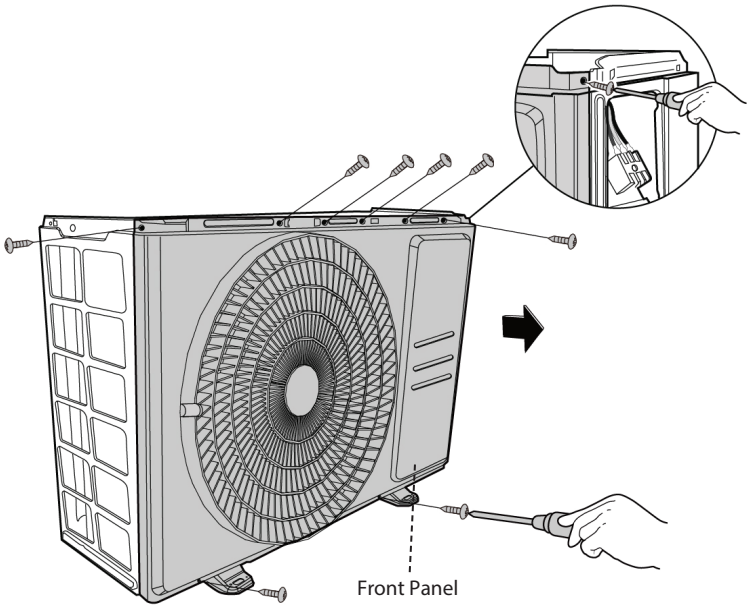
DISASSEMBLY INSTRUCTIONS
SIZE 18K (CONT)

Procedure	Illustration
6) Remove the right panel screws (5) then remove the right panel.	

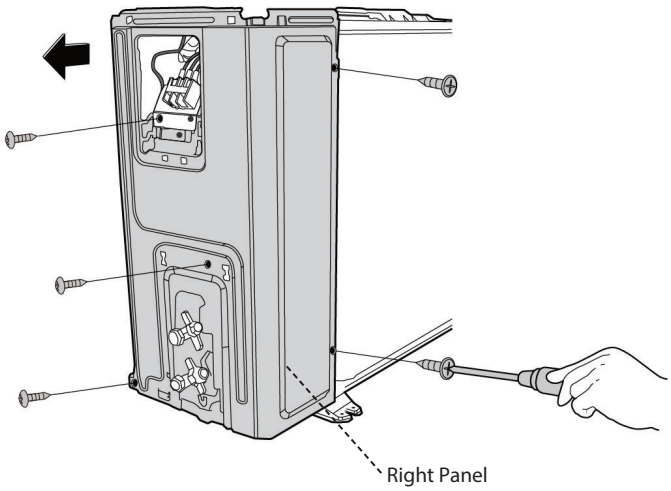
DISASSEMBLY INSTRUCTIONS
SIZE 24K

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the handle screw (1) then remove the handle.	
3) Remove the top cover screws (4) then remove the top cover. One of the screws is located under the handle.	

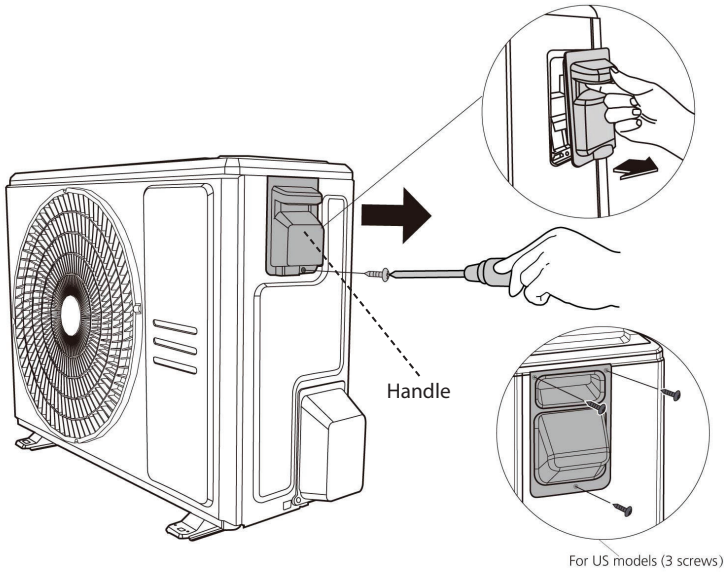
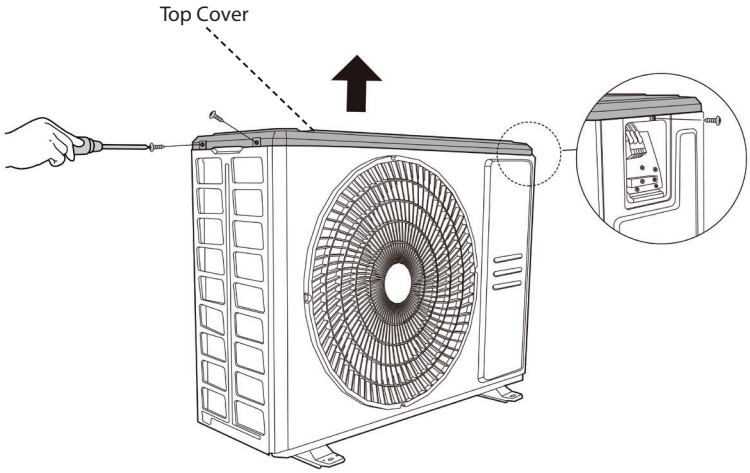
DISASSEMBLY INSTRUCTIONS
SIZE 24K (CONT)

Procedure	Illustration
4) Remove the water collecting cover screws (2) then remove the water collecting cover.	
5) Remove the front panel screws then remove the front panel (7 screws (on/off models) or 9 screws (inverter models).	

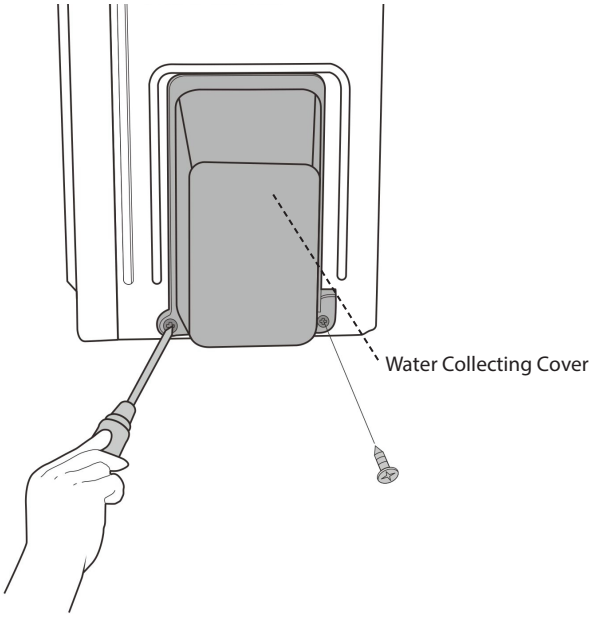
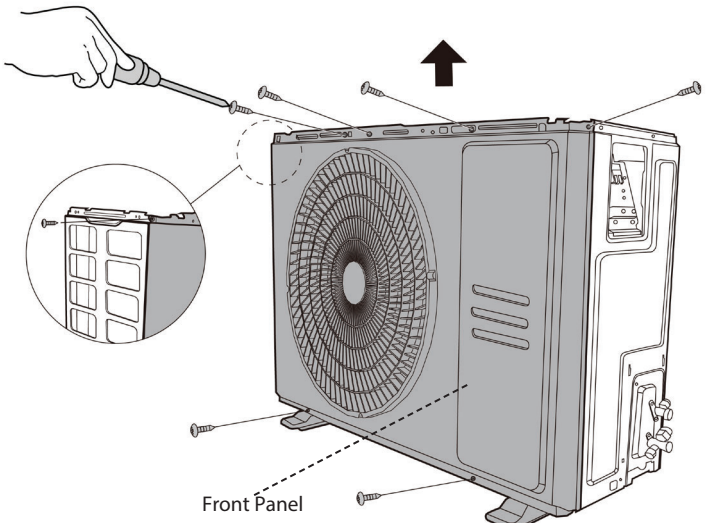
DISASSEMBLY INSTRUCTIONS
SIZE 24K (CONT)

Procedure	Illustration
6) Remove the right panel screws (5) then remove the right panel.	

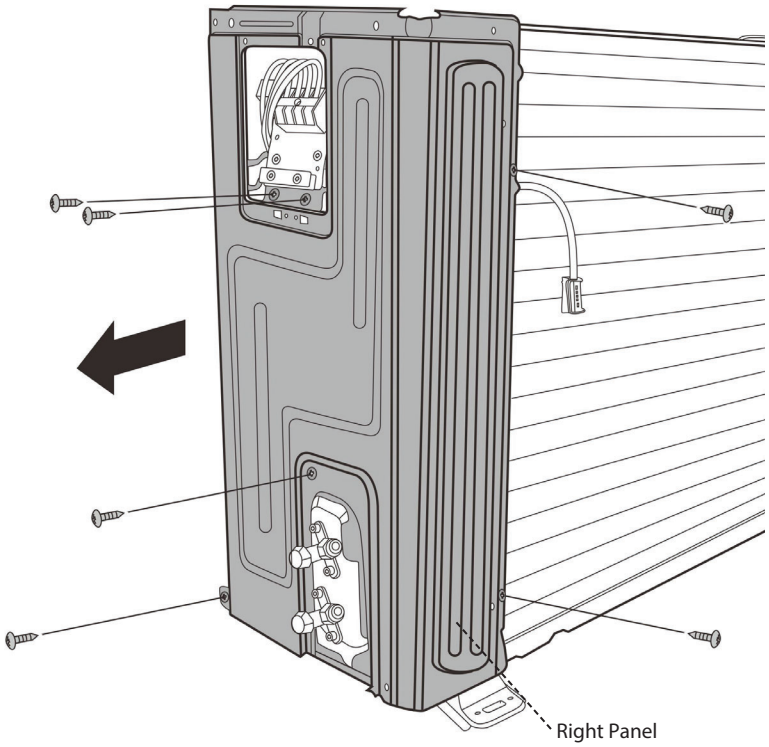
DISASSEMBLY INSTRUCTIONS
SIZE 36K

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the handle screw (1) then remove the handle.	
3) Remove the top cover screws (3) then remove the top cover. One of the screws is located under the handle.	

DISASSEMBLY INSTRUCTIONS
SIZE 36K (CONT)

Procedure	Illustration
4) Remove the water collecting cover screws (2) then remove the water collecting cover.	
5) Remove the front panel screws then remove the front panel (7 screws (on/off models) or 9 screws (inverter models).	

DISASSEMBLY INSTRUCTIONS
SIZE 36K (CONT)

Procedure	Illustration
6) Remove the right panel screws then remove the right panel.	

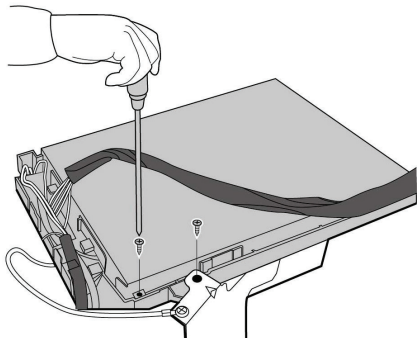
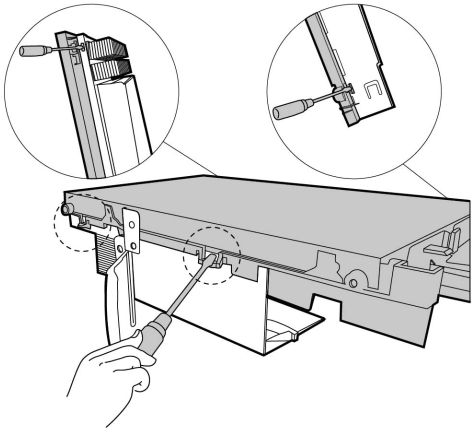
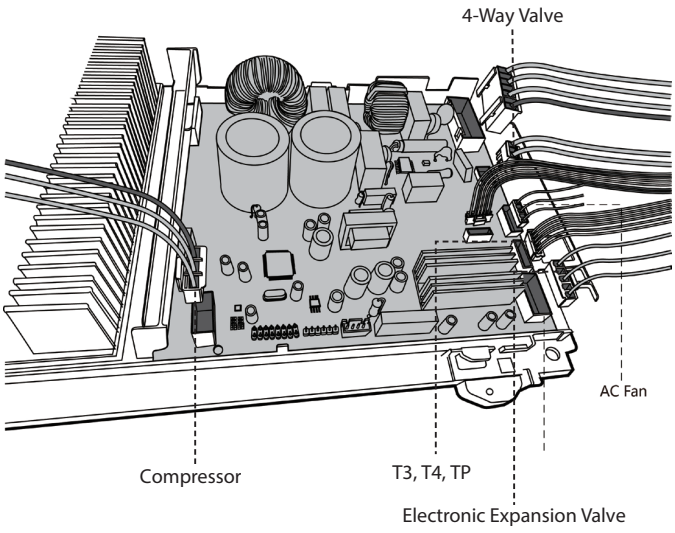
Electrical Parts

WARNING

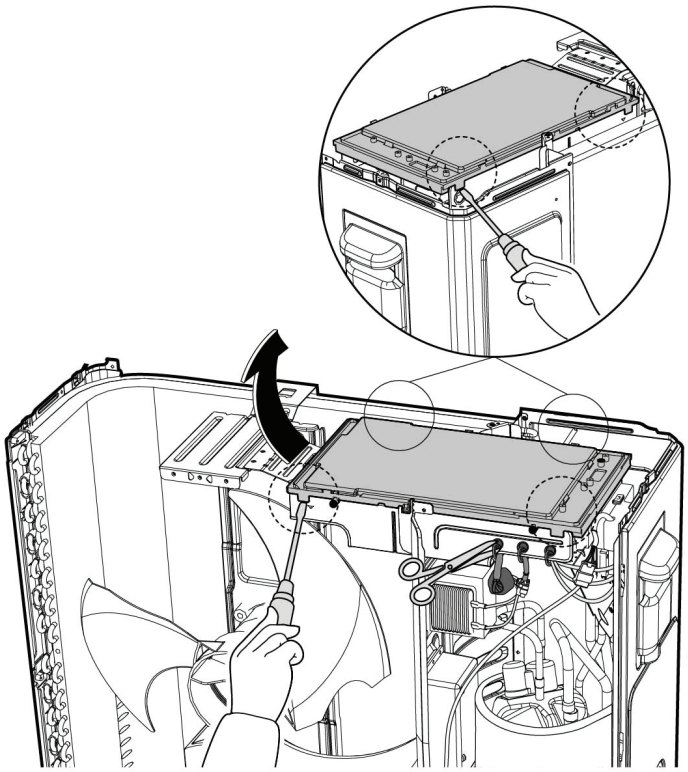
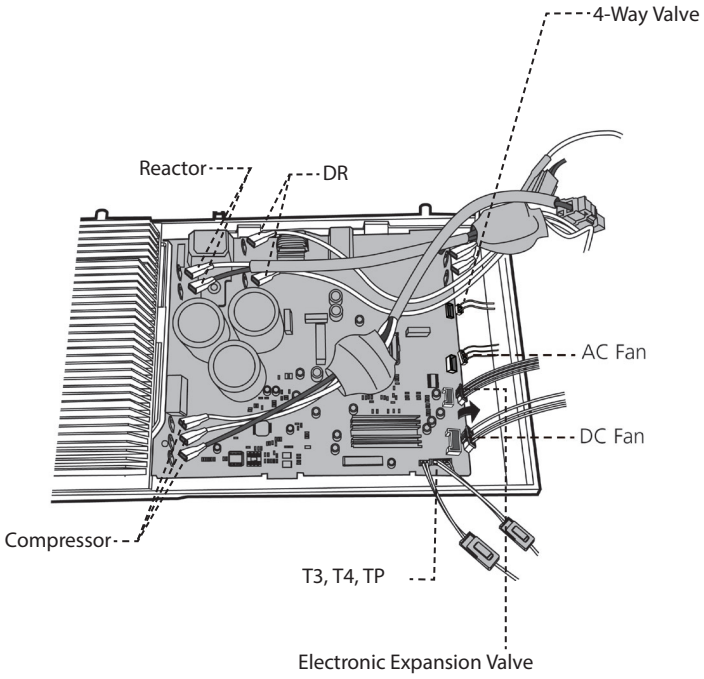
ELECTRICAL SHOCK HAZARD
Anti-static gloves must be worn when disassembling the electronic box.

PCB Board 1

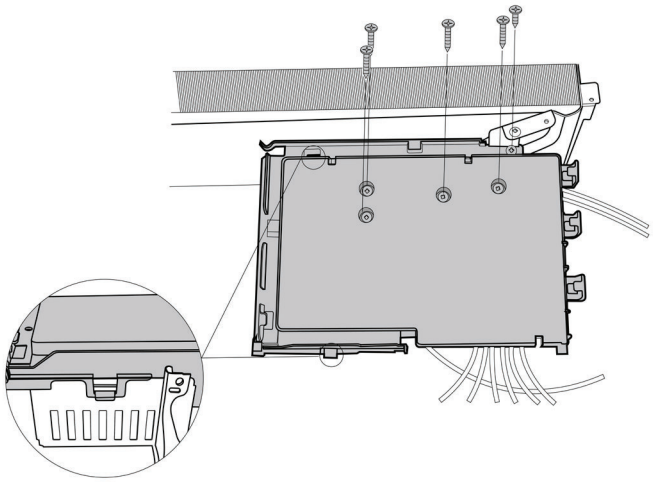
NOTE: Remove the air outlet grille before disassembling electrical parts.

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

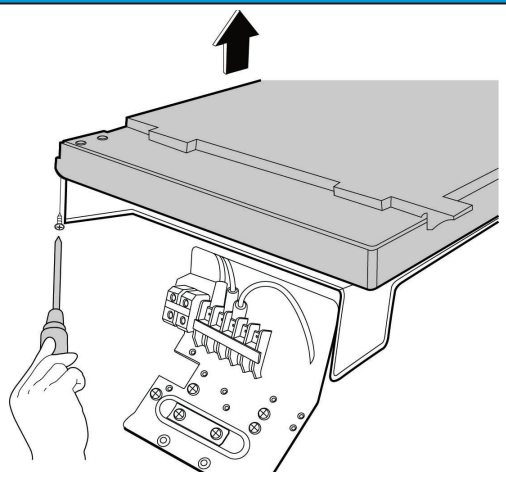
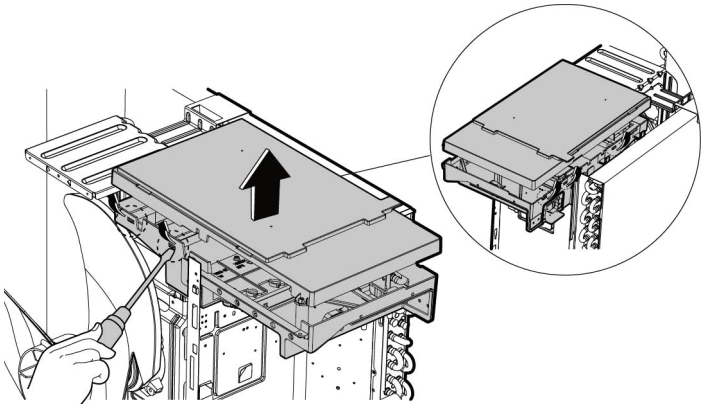
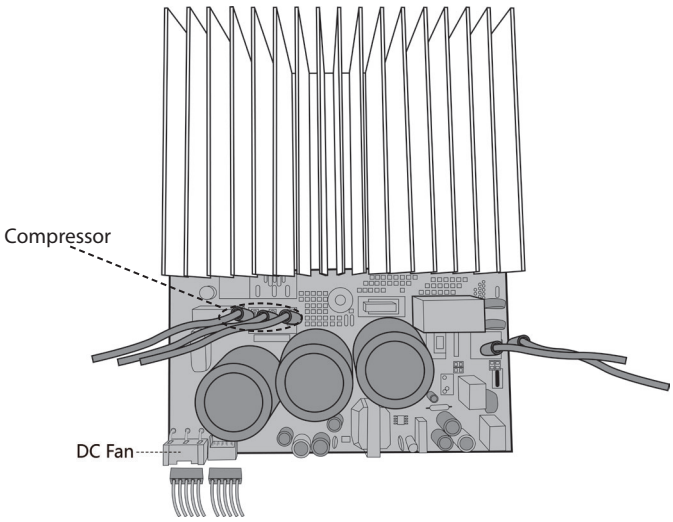
PCB Board 2

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

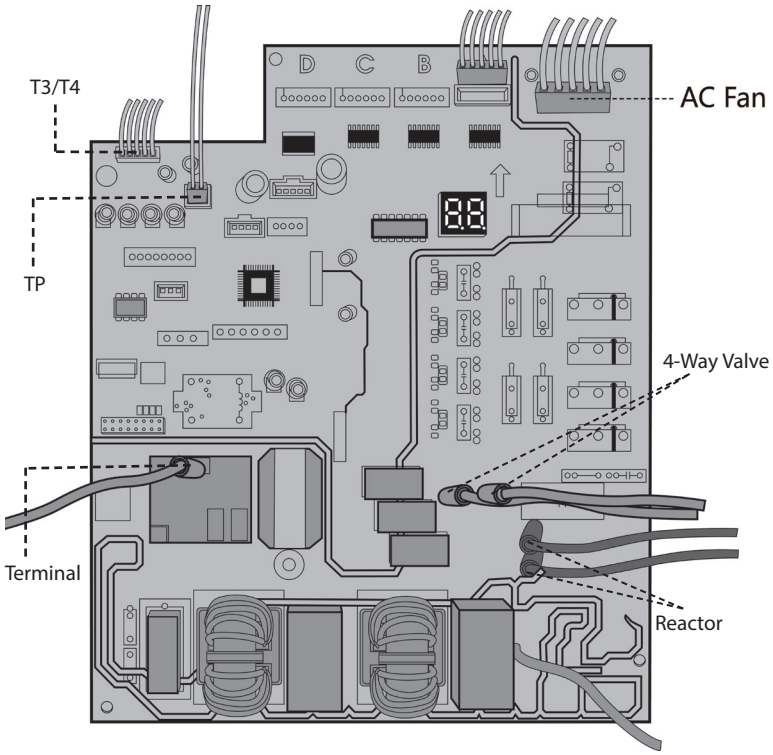
PCB Board 3

Procedure	Illustration
1) Remove the 5 screws and loosen two hooks, then remove the electronic control box subassembly. NOTE: The Electric Control box cover cannot be removed. The voltage between P and N cannot be measured.	

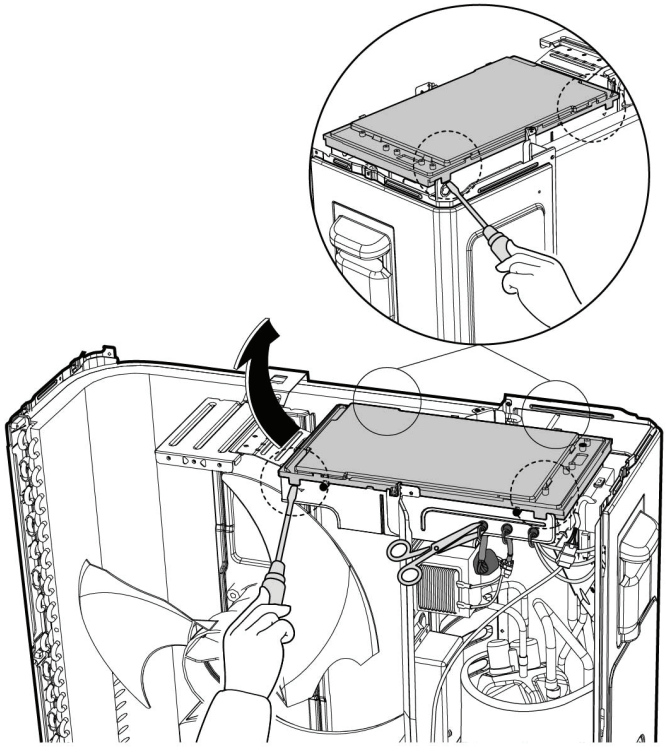
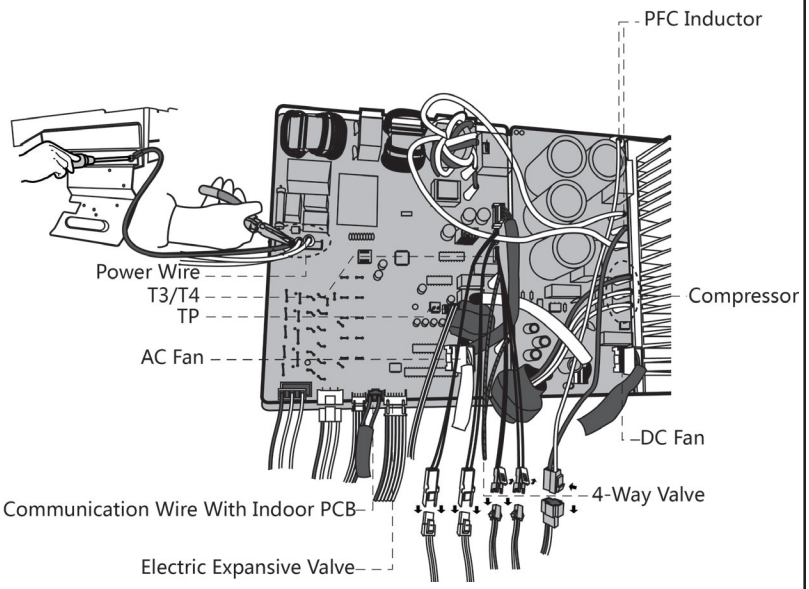
PCB Board 4

Procedure	Illustration
1) Remove the screw (1) from the top cover.	
2) Loosen the hooks (5) then open the electronic control box cover.	
3) Disconnect the fan motor connector from the IPM board. 4) Remove the compressor connector.	

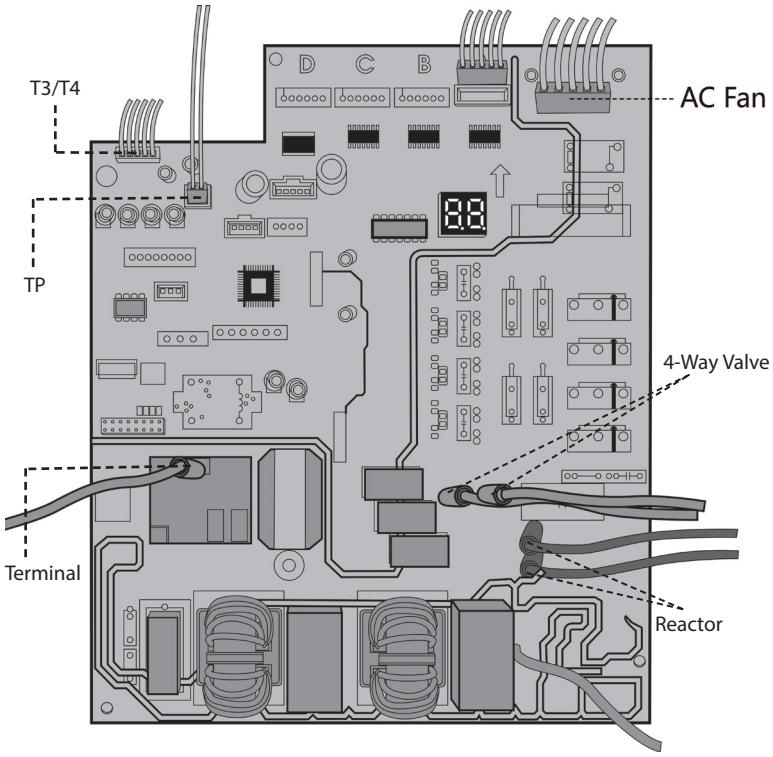
PCB Board 4 (CONT)

Procedure	Illustration
5) Pull out the wire connected to the terminal. 6) Pull out the connectors of the condenser coil temp. sensor(T3), outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP). 7) Disconnect the electronic expansion valve wire. 8) Remove the connector for 4-way valve. 9) Remove the reactor connector. 10) Remove the electronic control box.	

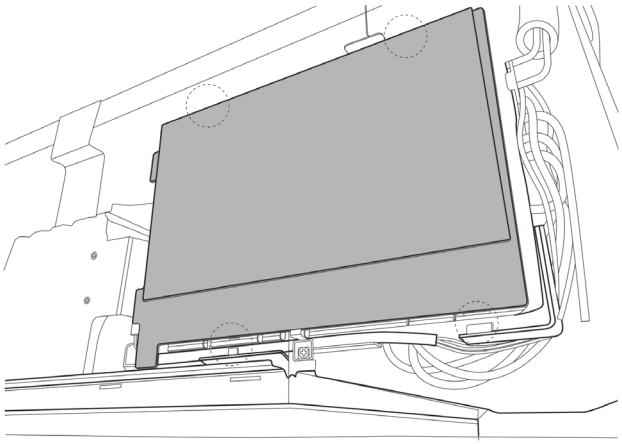
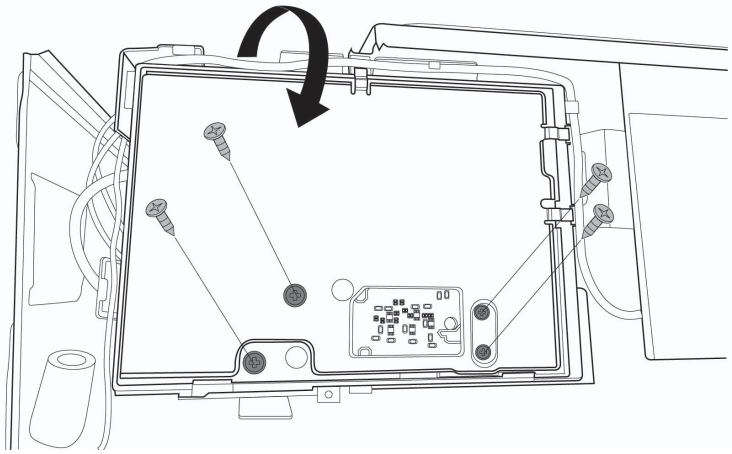
PCB Board 5

Procedure	Illustration
1) Loosen the hooks (4) then open the electronic control box cover.	
2) Disconnect the outdoor DC fan connector from the electronic control board. 3) Remove the compressor connector. 4) Pull out the two blue wires connected to the 4-way valve. 5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP). 6) Disconnect the electronic expansion valve wire. 7) Disconnect the communication wire indoor PCB. 8) Disconnect the PFC inductor. 9) Remove the electronic control box.	

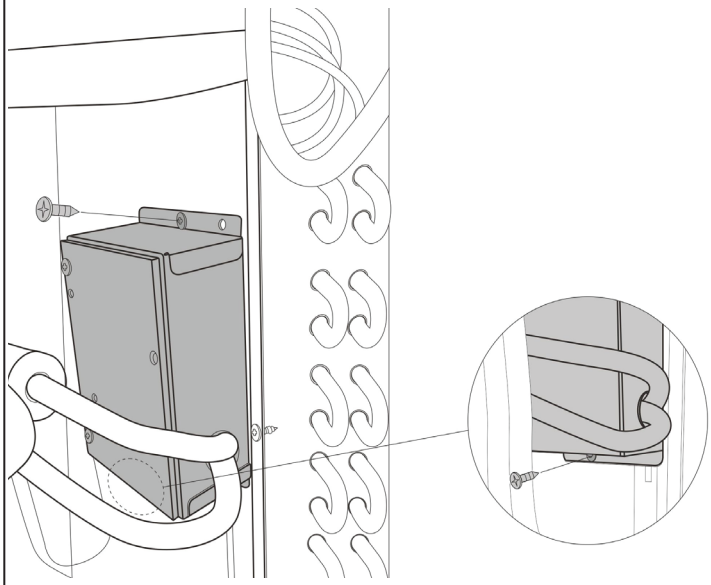
PCB Board 6

Procedure	Illustration
1) Pull out the wire connected to the terminal. 2) Pull out the connectors of the condenser coil temp. sensor(T3), outdoor ambient temp. sensor(T4) and discharge temp. sensor. 3) Disconnect the electronic expansion valve wire. 4) Remove the 4-way valve connector. 5) Remove the reactor connector. 6) Remove the electronic control box.	

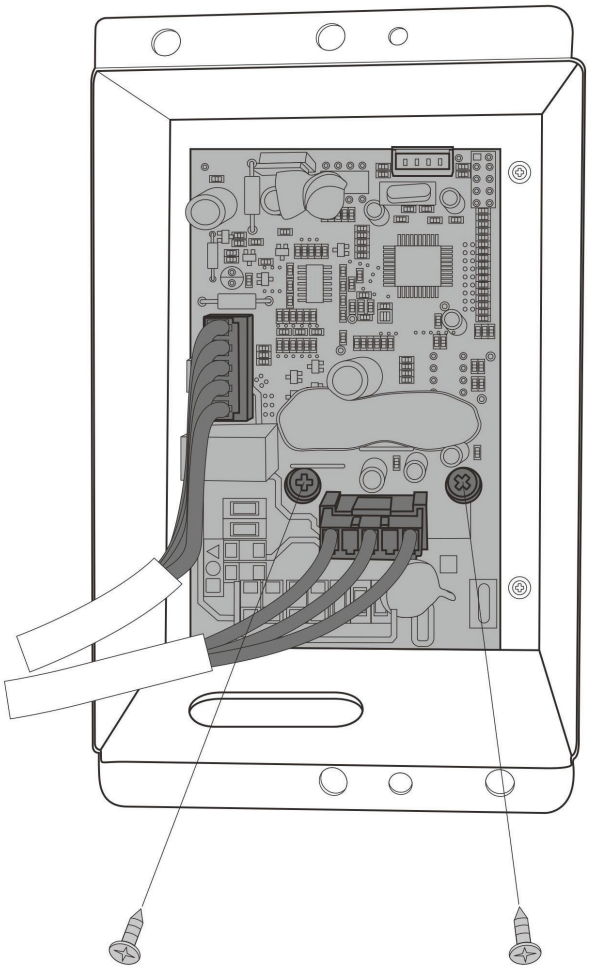
PCB Board 7

Procedure	Illustration
1) Loosen the hooks (4) then open the cover.	
2) Remove 4 screws on the electronic control board then remove the electronic control box subassembly. NOTE: Electronic installing box cannot be opened, so the voltage between P and N cannot be measured.	

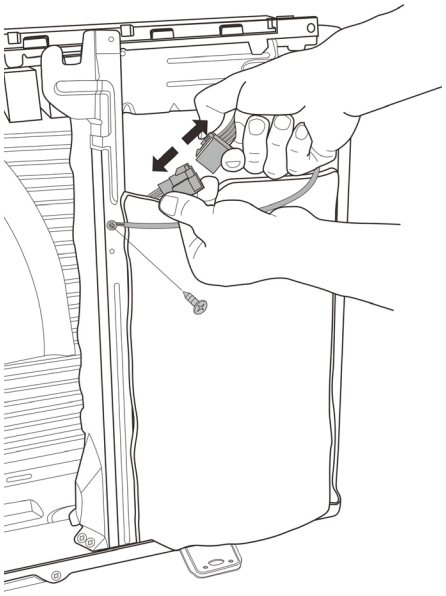
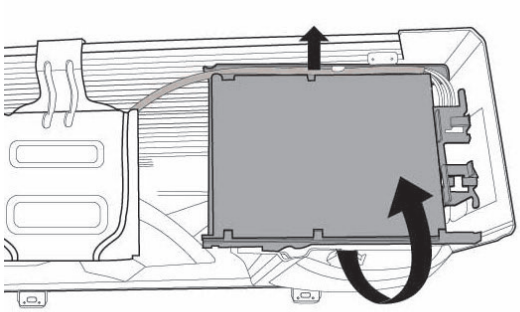
PCB Board 7 (CONT)

Procedure	Illustration
3) Remove two screws then remove the electronic control box subassembly on the partition board assembly.	

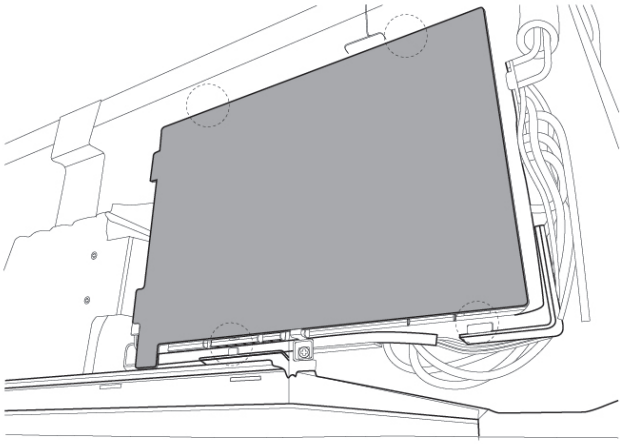
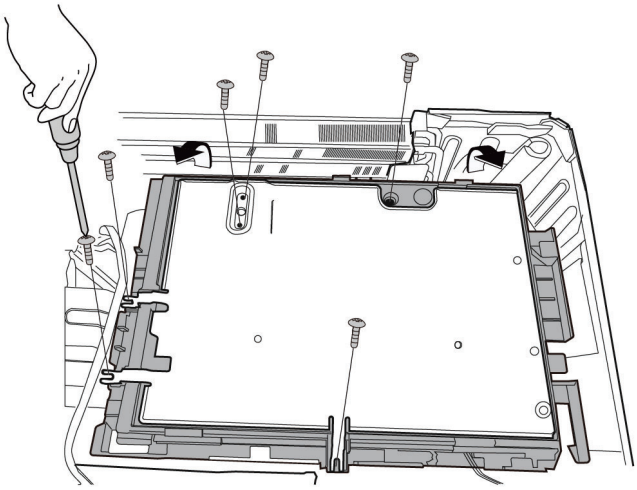
PCB Board 7 (CONT)

Procedure	Illustration
4) Remove screws (2) and the connectors (2), then remove the inverter control board.	

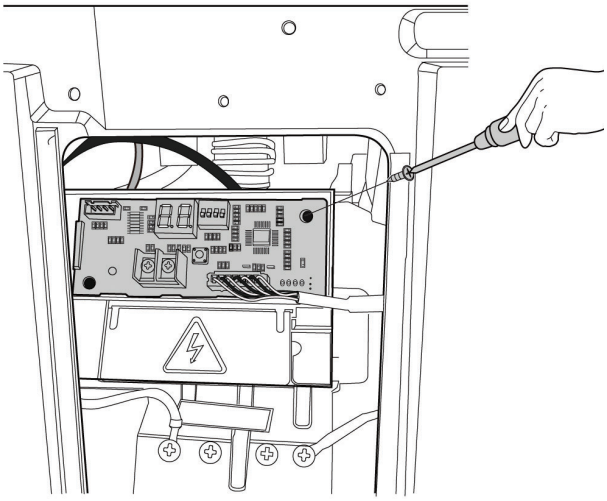
PCB Board 8

Procedure	Illustration
1) Disconnect the connector for compressor and release the ground wire (1 screw).	
2) Remove the electronic control box subassembly. NOTE: Electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	

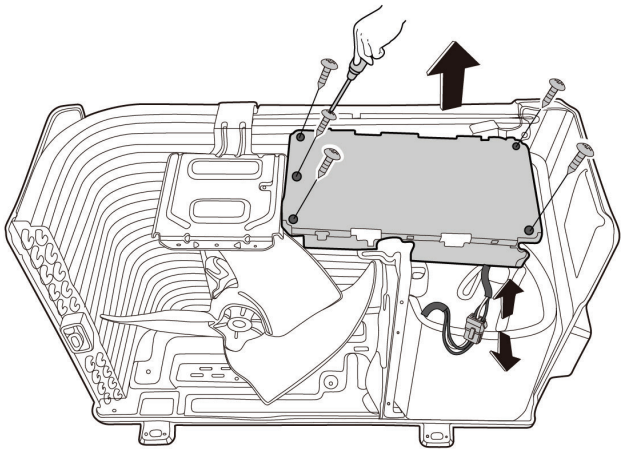
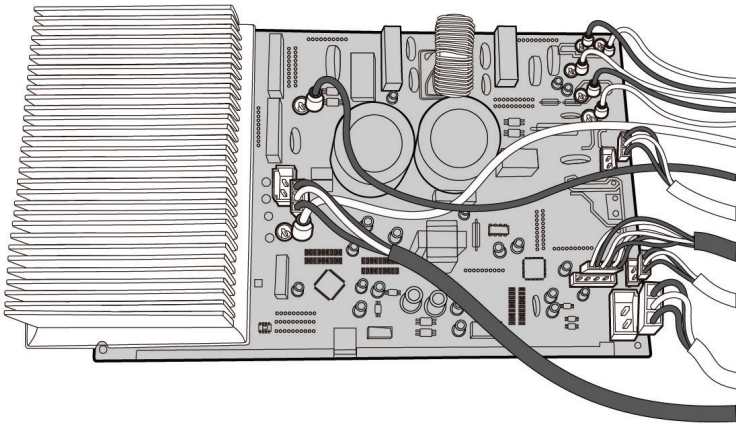
PCB Board 9

Procedure	Illustration
1) Loosen the hooks (4) then open the cover.	
2) Remove the screws (6) on the electronic control board then remove the electronic control box subassembly. NOTE: Electronic installing box cannot be opened, so the voltage between P and N cannot be measured.	

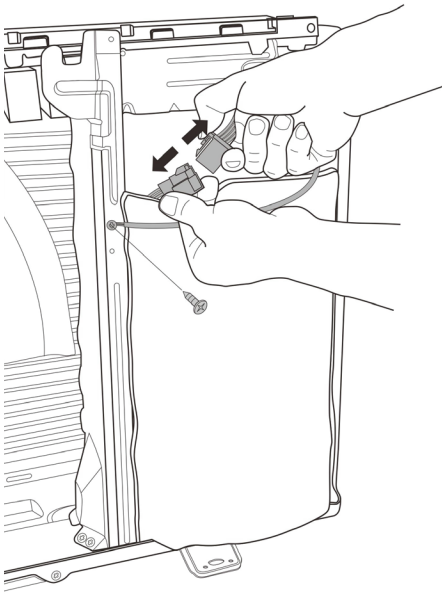
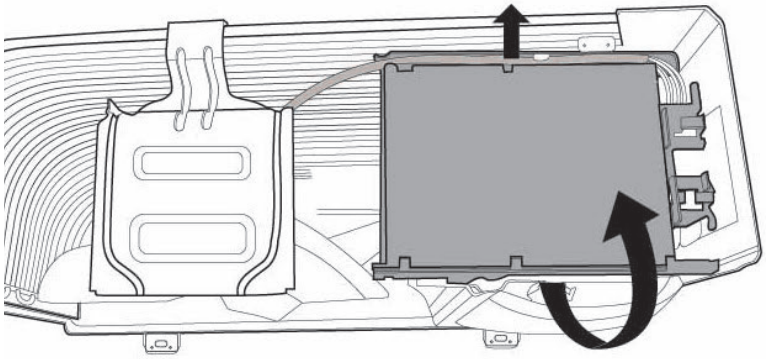
PCB Board 9 (CONT)

Procedure	Illustration
3) Pull out the connector, remove one screw and remove the key board subassembly on the terminal board.	

PCB Board 10

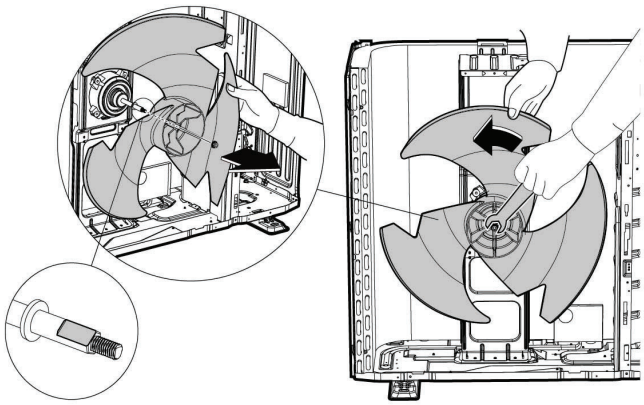
Procedure	Illustration
1) Disconnect the compressor connector. 2) Remove the electronic control box cover screws (5). 3) Turn over the electronic control box subassembly.	
4) Disconnect the connectors from electronic control board. 5) Remove the electronic control board.	

PCB Board 11

Procedure	Illustration
1) Disconnect the compressor connector and release the ground wire (1 screw).	
2) Remove the electronic control box subassembly. NOTE: The electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	

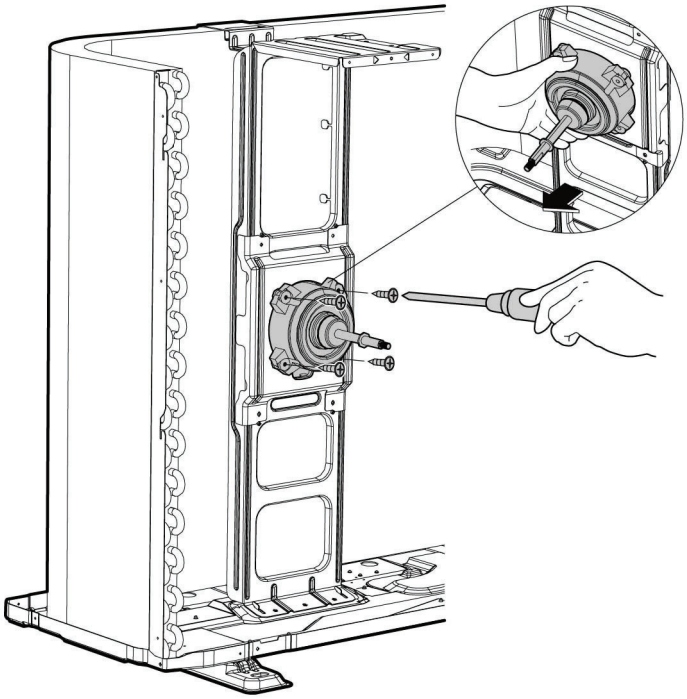
FAN ASSEMBLY

NOTE: Remove the panel plate before disassembling fan.

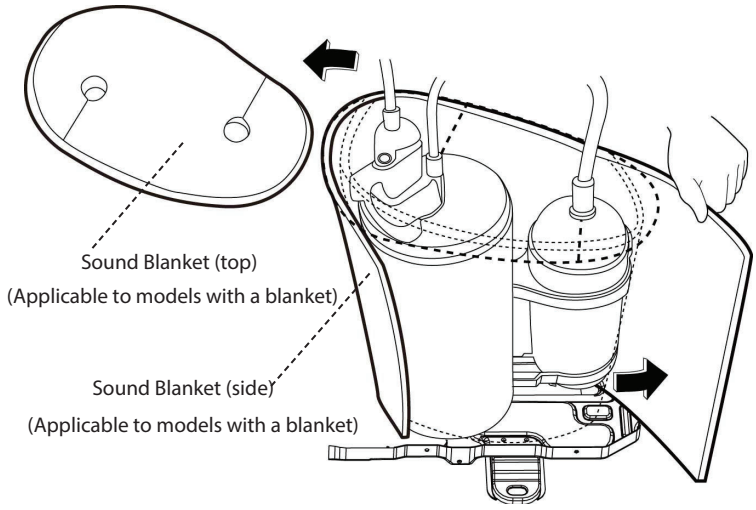
Procedure	Illustration
1) Remove the nut securing the fan with a spanner. 2) Remove the fan.	

FAN MOTOR

NOTE: Remove the panel plate and the fan motor connection on the PCB before disassembling fan motor.

Procedure	Illustration
1) Remove the fan motor screws (4). 2) Remove the fan motor.	

SOUND BLANKET

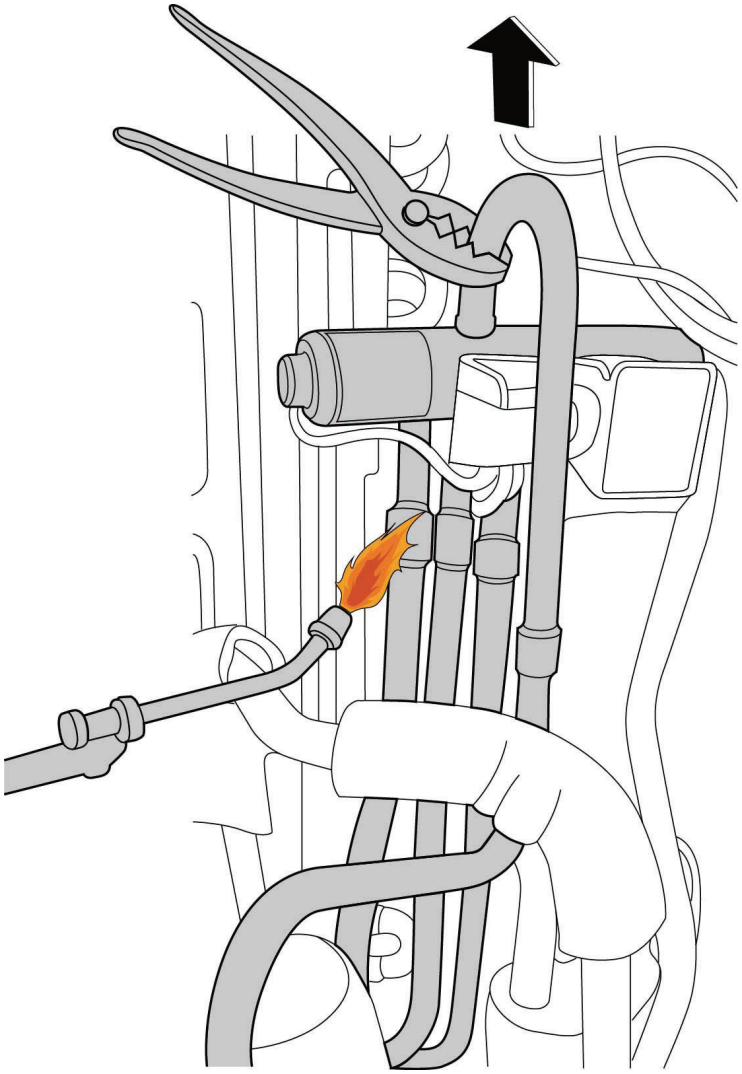
Procedure	Illustration
1) Remove the sound blanket (side and top).	

4-WAY VALVE

WARNING

Evacuate the system and confirm that there is no refrigerant left in the system before removing the 4-way valve and the compressor. **R32** and **R290**, evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by authorized technicians.

NOTE: Remove the panel plate, connection of 4-way valve on PCB before disassembling sound blanket.

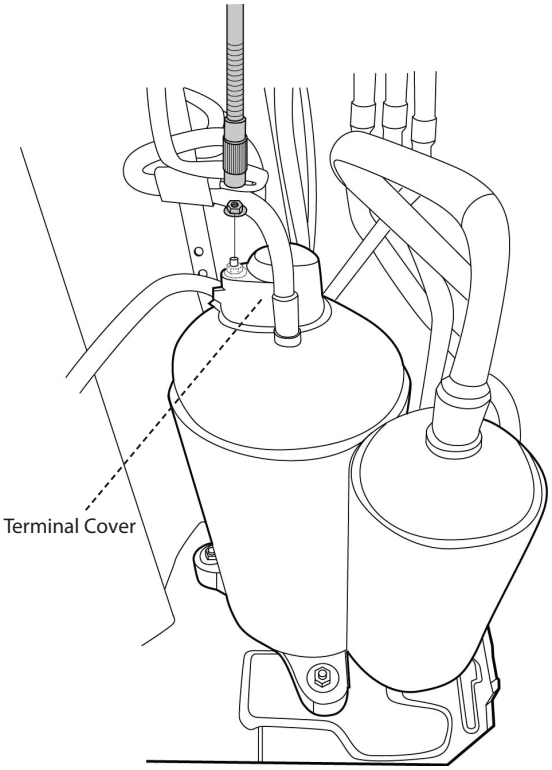
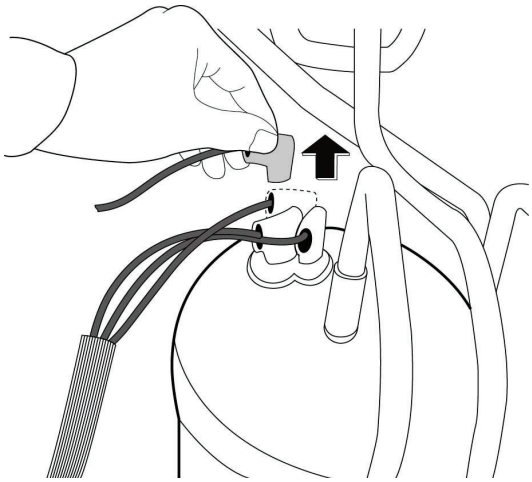
Procedure	Illustration
1) Heat up the brazed parts then detach the 4-way valve and the pipe. 2) Remove the 4-way valve assembly with a pair of pliers.	

COMPRESSOR

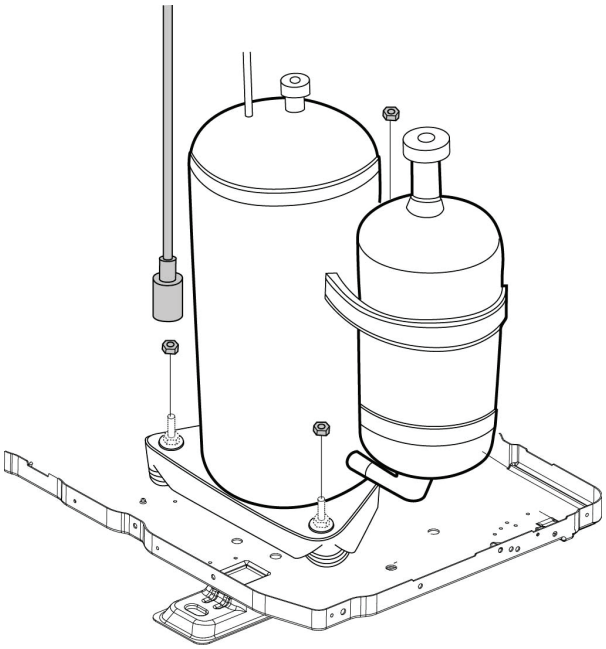
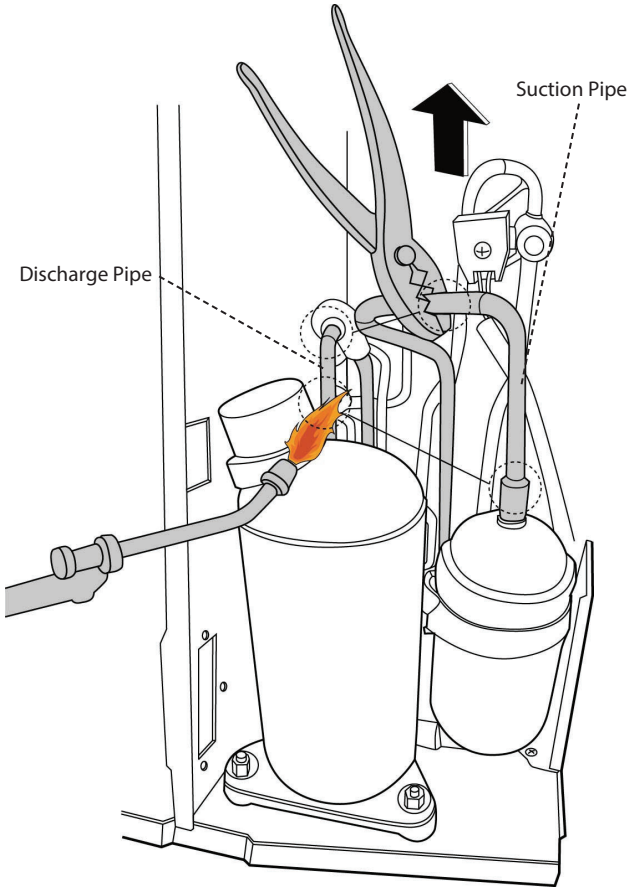
WARNING

Evacuate the system and confirm that there is no refrigerant left in the system before removing the 4-way valve and the compressor. For **R32** and **R290**, evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by authorized technicians.

NOTE: Remove the panel plate, connection of compressor on PCB before disassembling sound blanket.

Procedure	Illustration
1) Remove the terminal cover's flange nut then remove the terminal cover.	
2) Disconnect the connectors.	

COMPRESSOR (CONT)

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

APPENDICES

Appendix 1

Table 33 — Temperature Sensor Resistance Value Table for T1, T2, T3, T4 (°C--K)

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

Appendix 2

Table 34 — Temperature Sensor Resistance Value Table for T5 (° C- -K)

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