38MURA
Residential Single Zone Heat Pump System
Sizes 18 to 60

Service Manual

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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 product 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, main electrical disconnect switch must be in the **OFF** position. There may be more than 1 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.

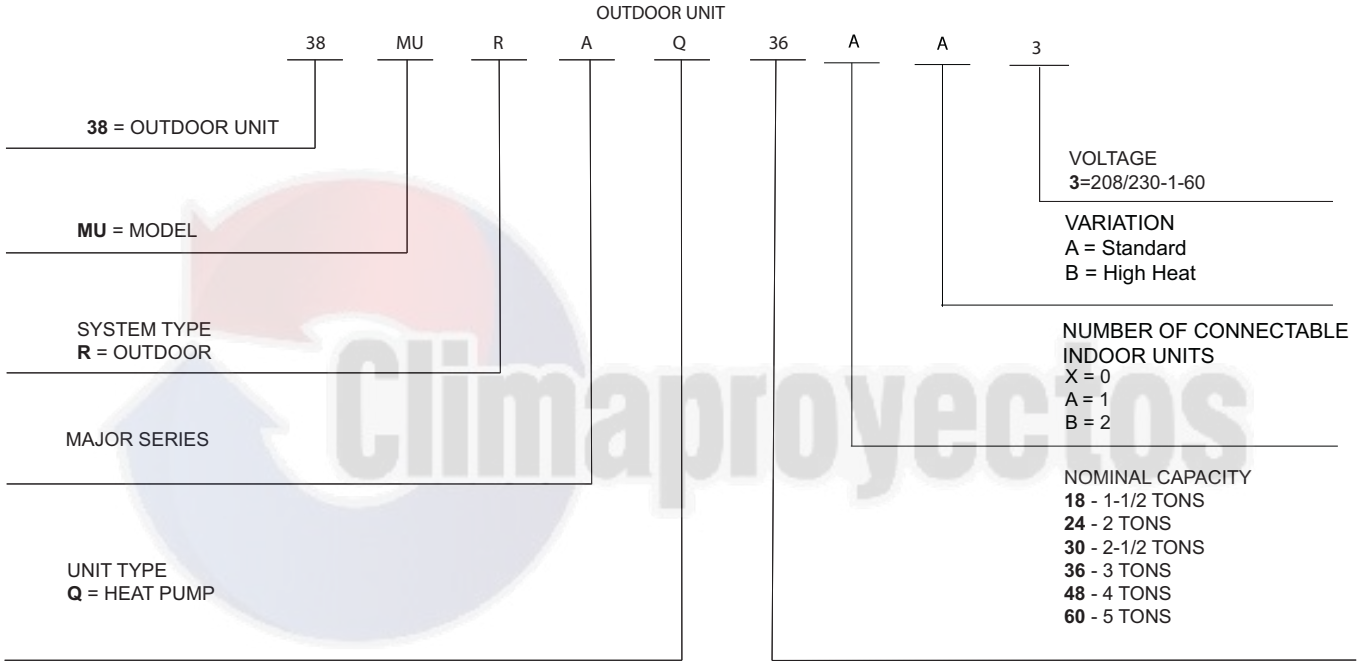
INTRODUCTION

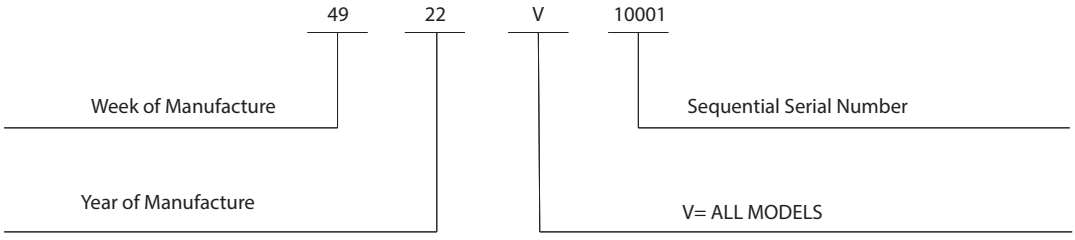
This service manual provides the necessary information to service, repair, and maintain the **38MURA** family of heat pumps. This manual has an “APPENDICIES” with data required to perform troubleshooting. Use the “TABLE of CONTENTS” to locate a desired topic.

MODEL / SERIAL NUMBER NOMENCLATURES

Table 1 —Unit Sizes

SYSTEM TONS	kBTUh	VOLTAGE	OUTDOOR MODEL
1.50	18,000	208/230-1	38MURAQ18AA3
1.50	18,000		38MURAQ18AB3
2.00	24,000		38MURAQ24AA3
2.00	24,000		38MURAQ24AB3
2.50	30,000		38MURAQ30AA3
2.50	30,000		38MURAQ30AB3
3.00	36,000		38MURAQ36AA3
3.00	36,000		38MURAQ36AB3
4.00	48,000		38MURAQ48AA3
4.00	48,000		38MURAQ48AB3
5.00	60,000		38MURAQ60AA3
5.00	60,000		38MURAQ60AB3





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.

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.

All field wiring construction should be finished by a qualified electrician.

Air conditioning equipment must be grounded according to the local electrical codes.

Current leakage protection switch should be installed.

NOTE: DO NOT connect the power wire to the terminal of the signal wire. Connection of power to any other terminal other than L1 or L2 will cause damage to the control board.

Any control signal cable should be run separately from the power wiring. Use of metallic conduit or shielded cable is recommended. Maintain a distance of 12 inches(300mm) from the power wiring.

NOTE: DO NOT run the power wiring and control wiring in the same conduit.

Size the wiring in accordance to the NEC / CEC or Table 2. Select different colors for different wire according to relevant regulations.

Ensure that the wire color of the outdoor and the terminal number are the same as those of the indoor unit.

Table 2 — For North America Wiring

Appliance Rated Current	AWG
≤ 6	18
6-10	16
10-16	14
16-25	12
25-32	10

⚠ 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.

WIRING DIAGRAMS

CBP	BOM Code	Wiring Label
38MURAQ18AA3	22023116000102	16022000C73977
38MURAQ24AA3	22023116000081	16022000C73984
38MURAQ30AA3	22023116000101	16022000C75547
38MURAQ36AA3	22023116000082	16022000C75547
38MURAQ48AA3	22023116000103	16022000C72885
38MURAQ60AA3	22023116000083	16022000C72885
38MURAQ18AB3	22023116000162	16022000C73984
38MURAQ24AB3	22023116000161	16022000C75547
38MURAQ30AB3	22023116000163	16022000C75547
38MURAQ36AB3	22023116000164	16022000C72962
38MURAQ48AB3	22023116000141	16022000C72962
38MURAQ60AB3	22023116000281	16022000C72962

Standard Models

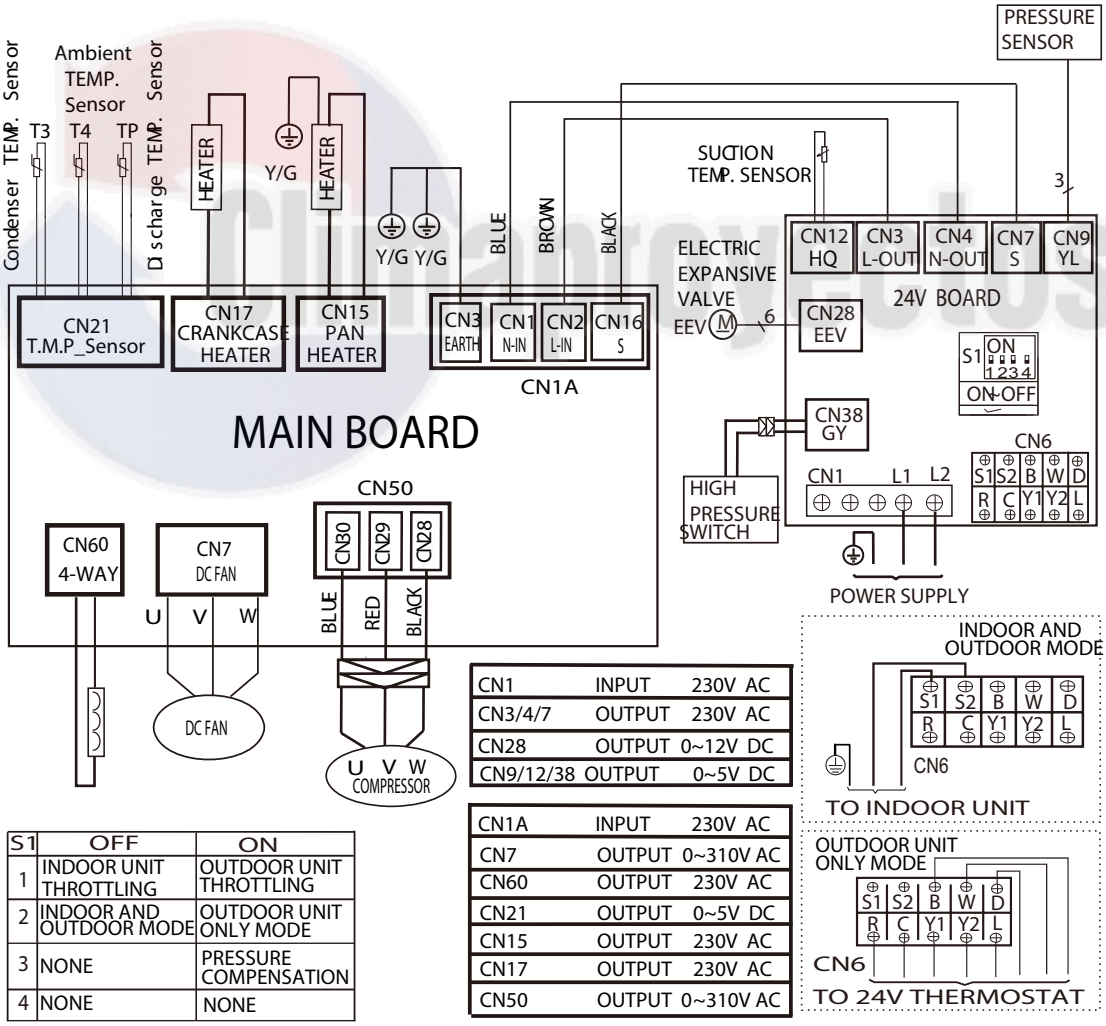


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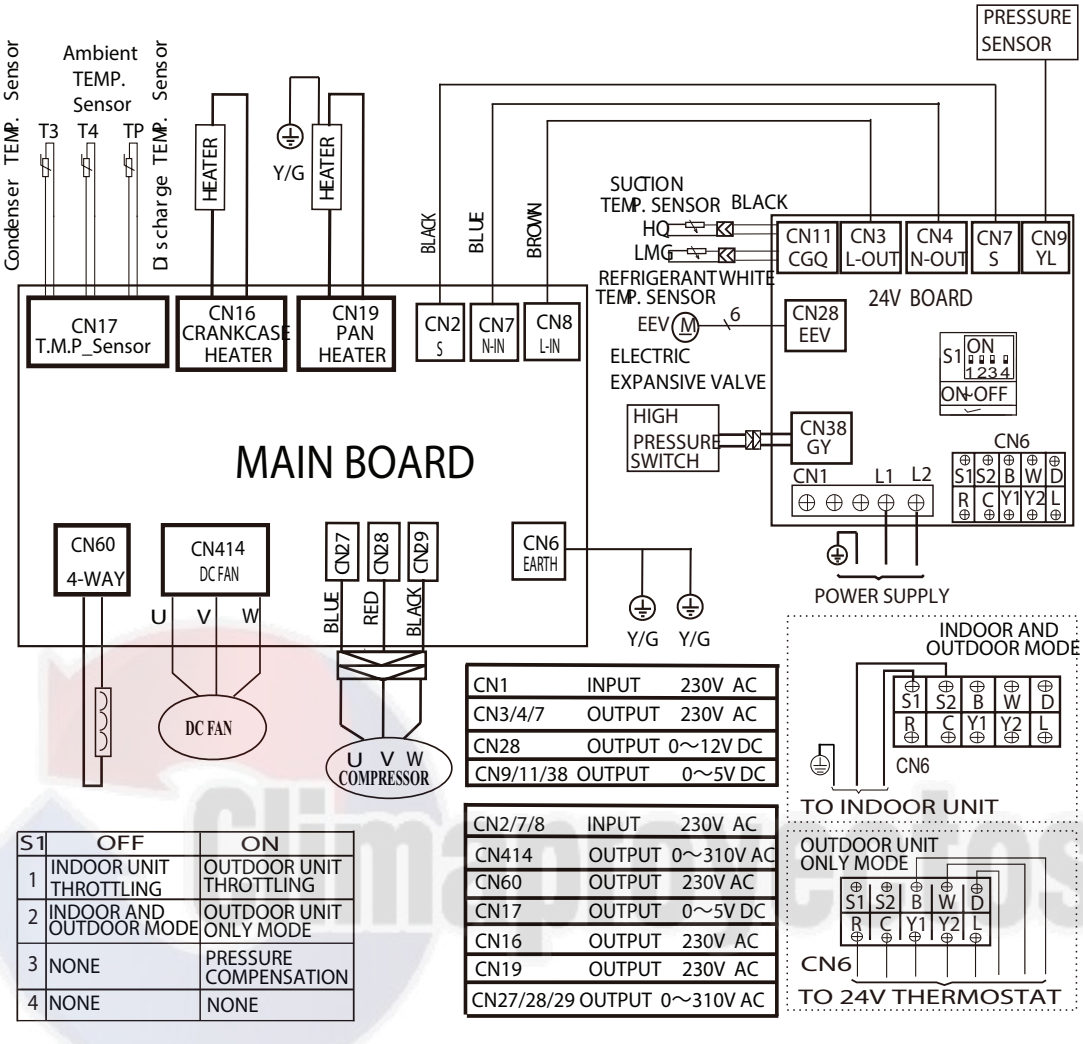
Fig. 1 — Wiring Diagram Size 18K

WIRING DIAGRAM (CONT)



CN1	INPUT	230V AC
CN3/4/7	OUTPUT	230V AC
CN28	OUTPUT	0~12V DC
CN9/11/38	OUTPUT	0~5V DC

CN2/7/8	INPUT	230V AC
CN414	OUTPUT	0~310V AC
CN60	OUTPUT	230V AC
CN17	OUTPUT	0~5V DC
CN16	OUTPUT	230V AC
CN19	OUTPUT	230V AC
CN27/28/29	OUTPUT	0~310V AC

S1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

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Fig. 2 — Wiring Diagram - Size 24K

WIRING DIAGRAM (CONT)

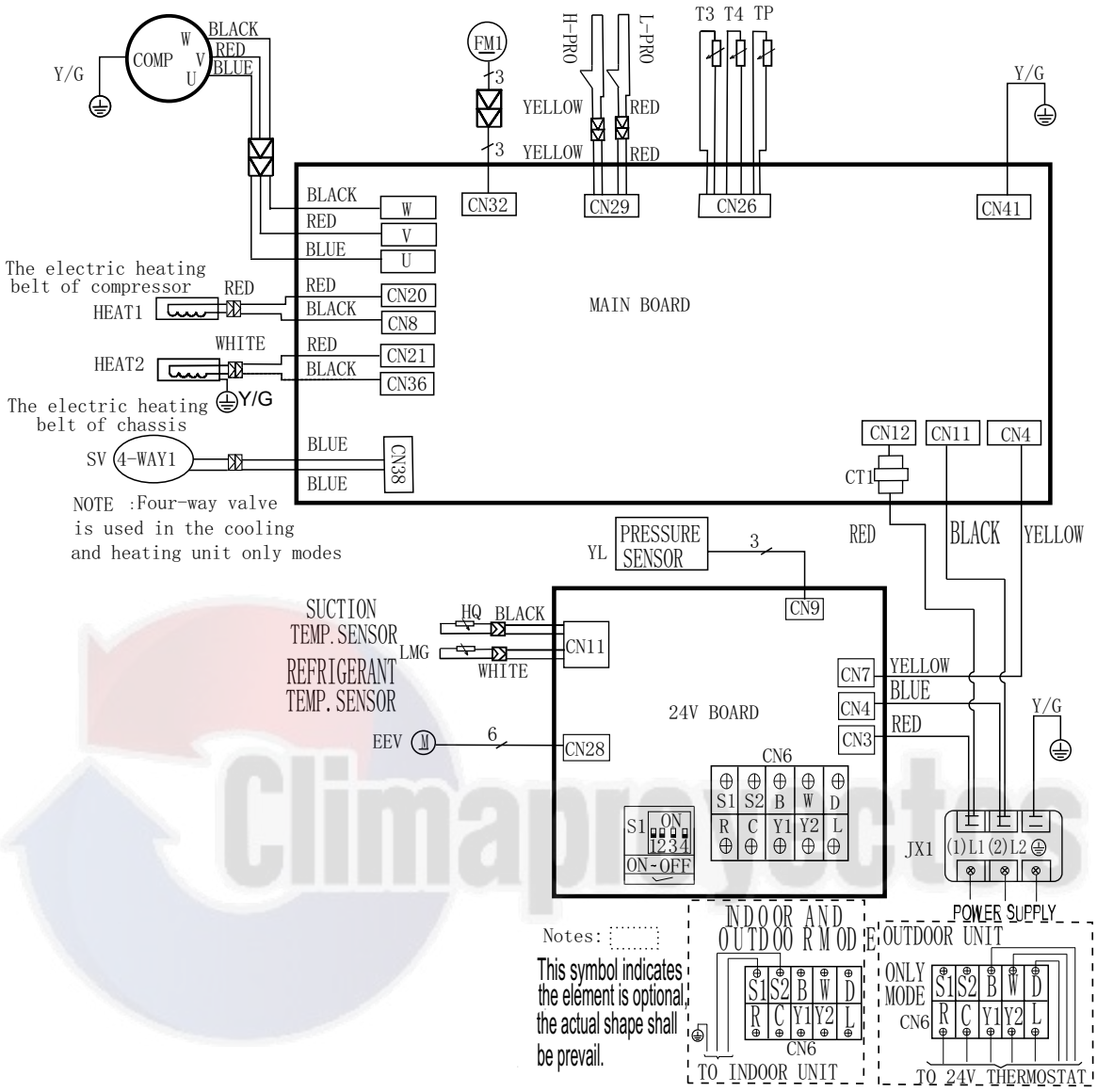

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Fig. 3 — Wiring Diagram Sizes 30K-36K

Table 3 — Wiring Diagram Sizes 30K-36K

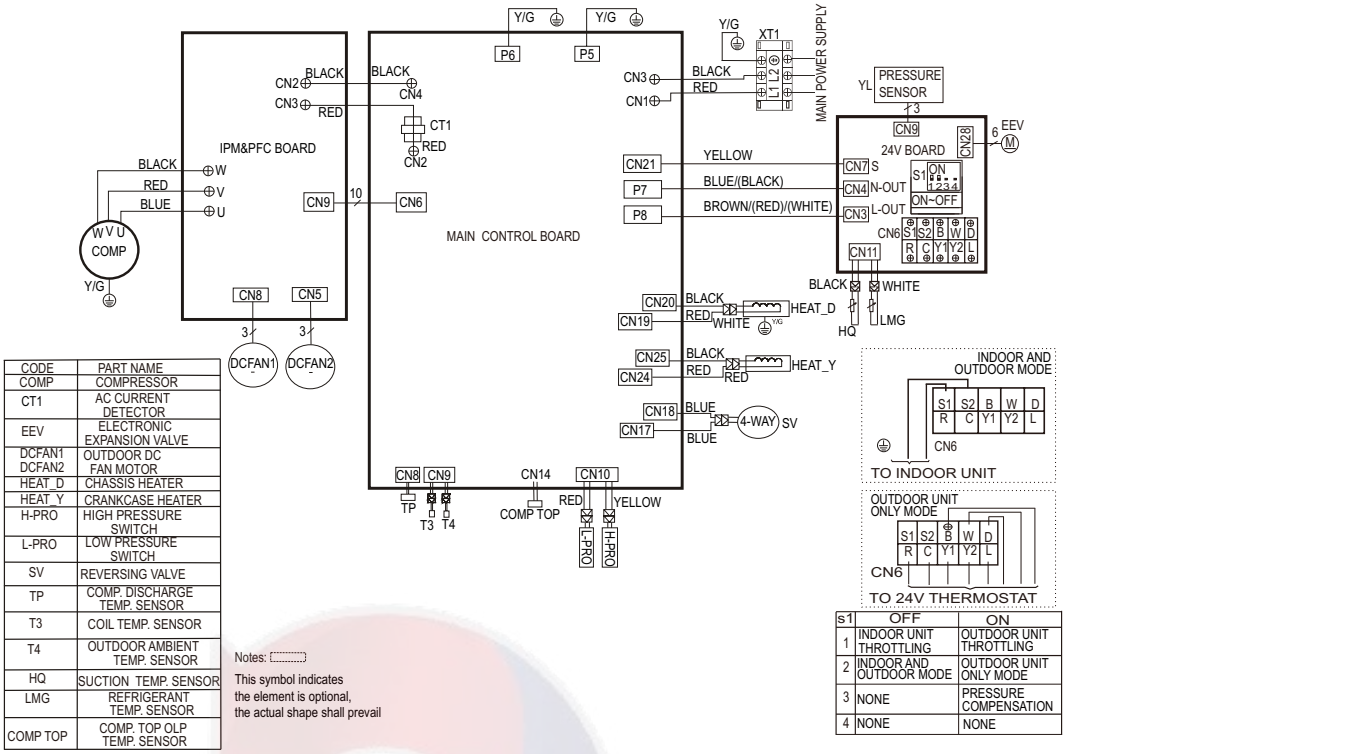
OUTDOOR UNIT MAIN BOARD	
CODE	**PART NAME**
CN11,CN12	Input:230VAC High voltage
CN4	Output: Connection of the high voltage--- (24V BOARD'S CN7) "S"
CN41	Ground
CN26	Input:Pin2,Pin3,Pin5(5VDC),Pin4,Pin1,Pin6(0-5VDC)--- "T3","T4","Tp"
CN29	Input:Pin1,Pin3(0-5VDC),Pin2,Pin4(0VDC)---H/L Pressure Switch
CN32	Connection to DC FAN
U,V,W	Connection to compressor voltage among phases 0-310VAC
CN20,CN8	Output:230VAC High voltage---COMPRESSOR HEATER
CN21,CN36	Output:230VAC High voltage---CHASSIS HEATER
CN38	Output:230VAC High voltage----REVERSE VALVE

OUTDOOR UNIT 24V BOARD	
CN11	Input:Pin1,Pin3(5VDC),Pin2,Pin4(0-5VDC)
CN28	Output:Pin1-Pin4:Pulse waveform(0-12VDC),Pin5?Pin6?12VDC?---EEV
S1	Input:Pin1-Pin4(5VDC),Pin5-Pin8(0-5VDC)
CN6	INDOOR AND OUTDOOR MODE:'S1"S2' Connection to INDOOR UNIT, OUTDOOR UNIT ONLY MODE: 'B"W"D"R"C"Y1"Y2"L' Connection to 24V THERMOSTAT
CN9	Input:Pin2(0-5VDC),Pin3(5VDC),Pin1(0VDC)---PRESSURE SENSOR
CN7	Output: Connection of the high voltage---(MAIN BOARD'S CN7) "S"
CN4,CN3	Input:230VAC High voltage

CODE	PART NAME
JXI	TERMINAL BLOCK
EEV	ELECTRIC EXPANSIVE VALVE
FM1	OUTDOOR DC FAN
COMP	COMPRESSOR
HEAT1, HEAT2	CRANKCASE HEATING
CT1	AC CURRENT DETECTOR
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	4-WAY VALVE
TP	EXHAUST TEMPERA TURE SENSOR
T3	CONDENSER TEMPERA TURE SENSOR
T4	OUTDOOR AMBIENT TEMPERA TURE SENSOR
HQ	TUBE FOR SUCTION TEMPERA TURE SENSOR
LMG	TUBE FOR REFRIGERA NT TEMPERA TURE SENSOR

S1	OFF	ON
1	Indoor Unit Throttling	Outdoor Unit Throttling
2	Indoor and Outdoor Mode	Outdoor Unit Only Mode
3	None	Pressure Compensation
4	None	None

WIRING DIAGRAM (CONT)



CODE	PART NAME
COMP	COMPRESSOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSION VALVE
DCFAN1 DCFAN2	OUTDOOR DC FAN MOTOR
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
HQ	SUCTION TEMP. SENSOR
LMG	REFRIGERANT TEMP. SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR

S1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

OUTDOOR UNIT MAIN CONTROL BOARD	
CODE	PART NAME
CN1~CN3	Input:230VAC High voltage
P5 P6	Connection to the earth
P8~P7	Output:230VAC High voltage to 24V BOARD
CN21	Output:Pin1(Connection of the high voltage)"S"
CN17~CN18	Output:230VAC High voltage----REVERSING VALVE
CN24~CN25	Output:230VAC High voltage----CRANKCASE HEATER
CN19~CN20	Output:230VAC High voltage----CHASSIS HEATER
CN8	Input:Pin1(0-5VDC),Pin2(5VDC)
CN9	Input:Pin3 Pin4(5VDC),Pin2(0VDC),Pin1 Pin5(0-5VDC)
CN6	Communication:Pin1-Pin6 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin8(0-5VDC),Pin10(5VDC)--to IPM&PFC BOARD
CN2~CN4	Output:230VAC High voltage to IPM&PFC BOARD
CN10	Input:Pin2 Pin4(0VDC),Pin1 Pin3(0-5VDC)--H/L Pressure switch
CN14	Input:Pin1(5VDC),Pin2(0-5VDC)--COMP. TOP OLP TEMP.SENSOR

OUTDOOR UNIT IPM&PFC BOARD	
CODE	PART NAME
CN2~CN3	Input:230VAC High voltage
CN9	Communication:Pin1-Pin2 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin10(5VDC)--to outdoor main control board
U~V~W	Connect to compressor voltage among phases 0~250VAC
CN8 CN5	Connect to DCFAN voltage among phases 0~200VAC

24V BOARD	
CODE	PART NAME
CN3~CN4	Input:230VAC High voltage
CN7	(Connection of the high voltage)"S"
CN9	Input:Pin1(5VDC),Pin2(0-5VDC),Pin3(0VDC)--PRESSURE SENSOR
CN28	Output:Pin1-Pin4 Pulse waveform(0-12VDC), Pin5 Pin6(12VDC) to EEV
CN11	Input:Pin1 Pin3(5VDC),Pin2 Pin4(0-5VDC)

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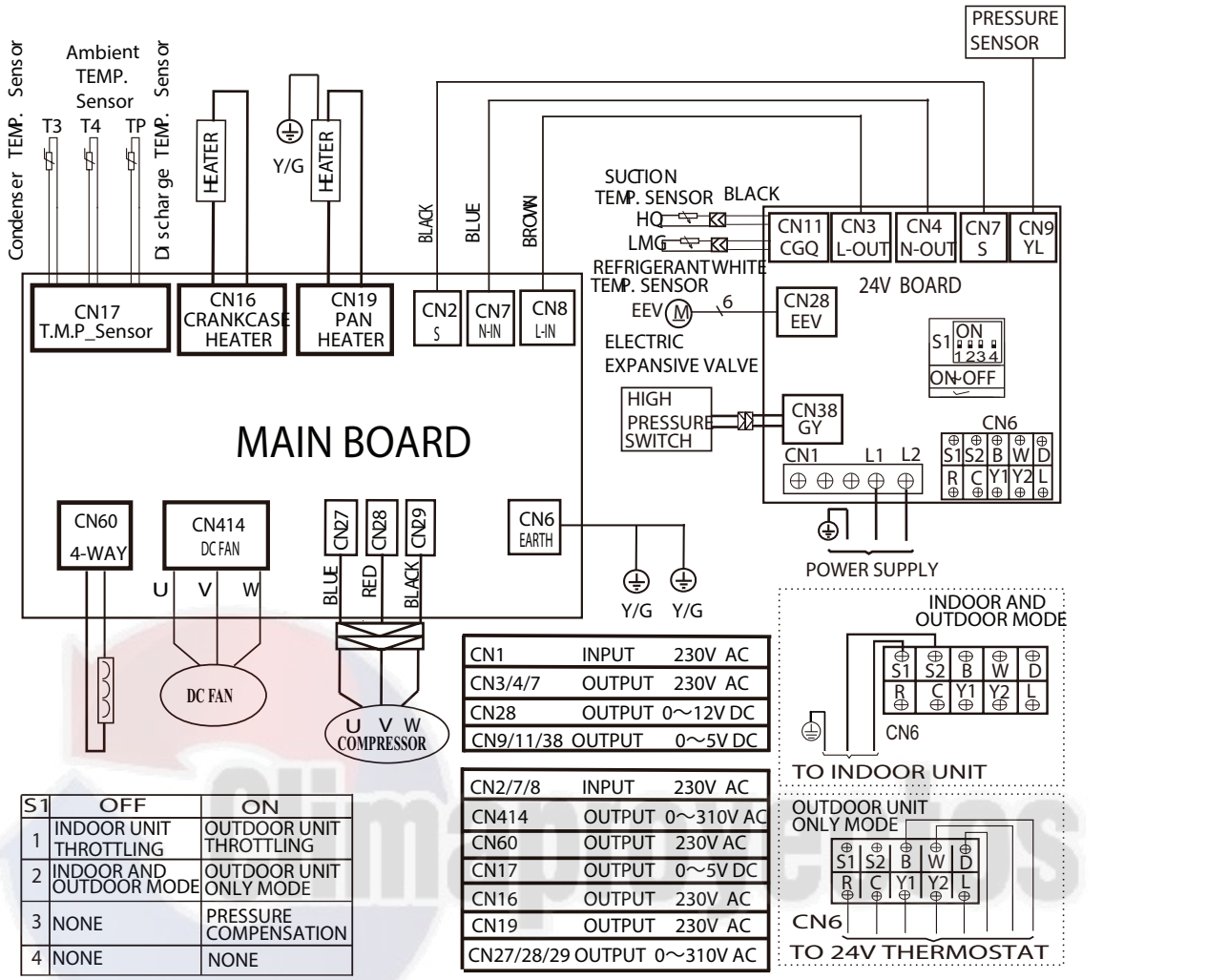
Fig. 4 — Wiring Diagram Sizes 48K-60K

WIRING DIAGRAM HIGH HEAT MODELS



CN1	INPUT	230V AC
CN3/4/7	OUTPUT	230V AC
CN28	OUTPUT	0～12V DC
CN9/11/38	OUTPUT	0～5V DC

CN2/7/8	INPUT	230V AC
CN414	OUTPUT	0～310V AC
CN60	OUTPUT	230V AC
CN17	OUTPUT	0～5V DC
CN16	OUTPUT	230V AC
CN19	OUTPUT	230V AC
CN27/28/29	OUTPUT	0～310V AC

S1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

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Fig. 5 — Wiring Diagram Sizes 18K HH

WIRING DIAGRAMS HIGH HEAT MODELS (CONT)

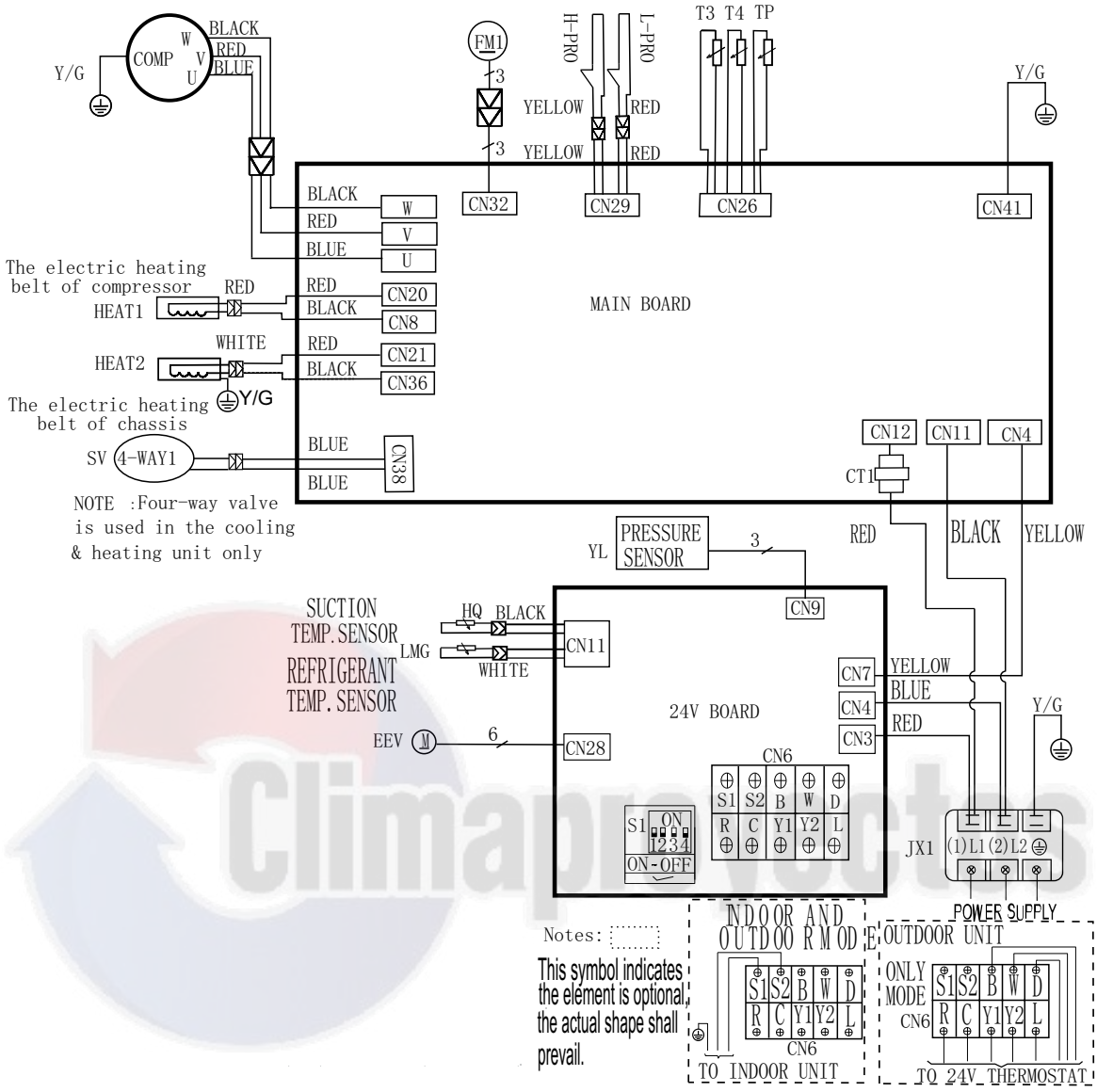

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Fig. 6 — Wiring Diagram Sizes 24K - 30K HH

Table 4 — Wiring Diagram Sizes 24K - 30K HH

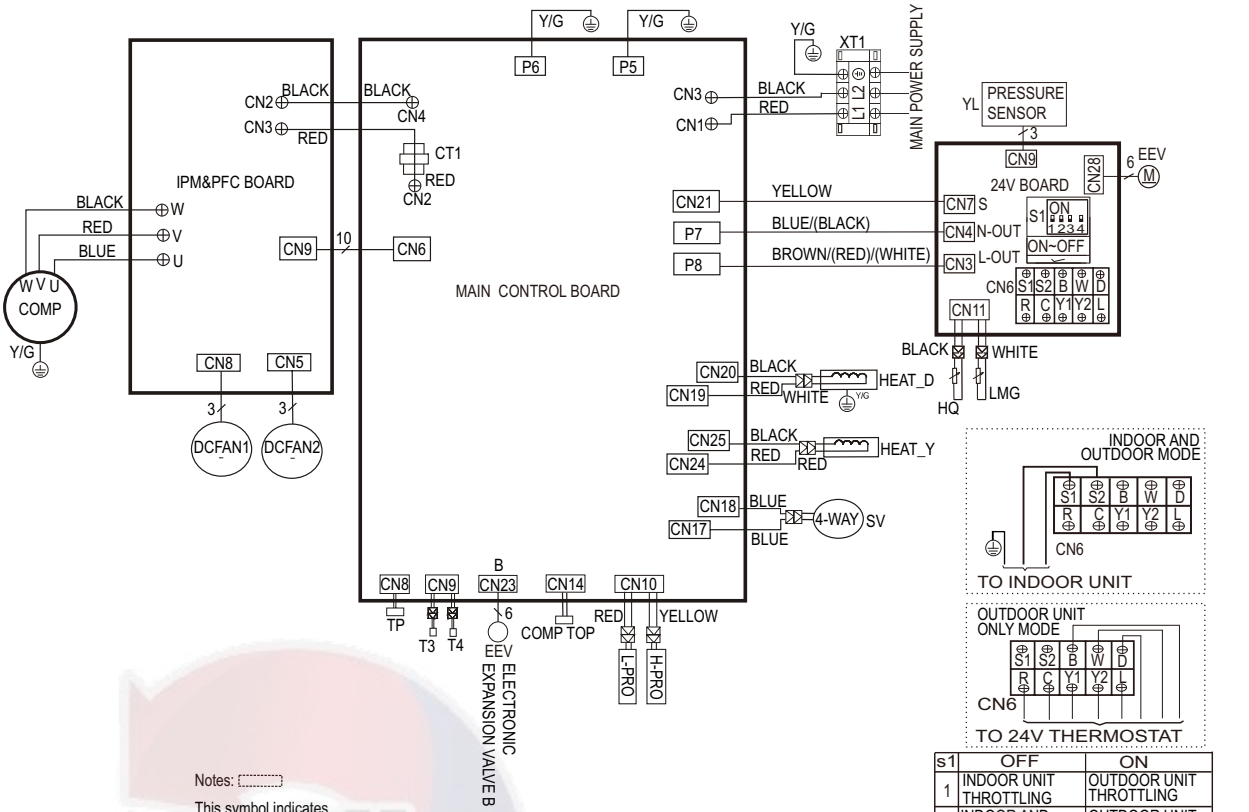
OUTDOOR UNIT MAIN BOARD	
CODE	**PART NAME**
CN11,CN12	Input:230VAC High voltage
CN4	Output: Connection of the high voltage--- (24V BOARD'S CN7) "S"
CN41	Ground
CN26	Input:Pin2,Pin3,Pin5(5VDC),Pin4,Pin1,Pin6(0-5VDC)--- "T3","T4","Tp"
CN29	Input:Pin1,Pin3(0-5VDC),Pin2,Pin4(0VDC)---H/L Pressure Switch
CN32	Connection to DC FAN
U,V,W	Connection to compressor voltage among phases 0-310VAC
CN20,CN8	Output:230VAC High voltage---COMPRESSOR HEATER
CN21,CN36	Output:230VAC High voltage---CHASSIS HEATER
CN38	Output:230VAC High voltage----REVERSE VALVE

OUTDOOR UNIT 24V BOARD	
CN11	Input:Pin1,Pin3(5VDC),Pin2,Pin4(0-5VDC)
CN28	Output:Pin1-Pin4:Pulse waveform(0-12VDC),Pin5?Pin6?12VDC?---EEV
S1	Input:Pin1-Pin4(5VDC),Pin5-Pin8(0-5VDC)
CN6	INDOOR AND OUTDOOR MODE:'S1"S2' Connection to INDOOR UNIT, OUTDOOR UNIT ONLY MODE: 'B"W"D"R"C"Y1"Y2"L' Connection to 24V THERMOSTAT
CN9	Input:Pin2(0-5VDC),Pin3(5VDC),Pin1(0VDC)---PRESSURE SENSOR
CN7	Output: Connection of the high voltage---(MAIN BOARD'S CN7) "S"
CN4,CN3	Input:230VAC High voltage

CODE	PART NAME
JXI	TERMINAL BLOCK
EEV	ELECTRIC EXPANSIVE VALVE
FM1	OUTDOOR DC FAN
COMP	COMPRESSOR
HEAT1, HEAT2	CRANKCASE HEATING
CT1	AC CURRENT DETECTOR
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	4-WAY VALVE
TP	EXHAUST TEMPERA TURE SENSOR
T3	CONDENSER TEMPERA TURE SENSOR
T4	OUTDOOR AMBIENT TEMPERA TURE SENSOR
HQ	TUBE FOR SUCTION TEMPERA TURE SENSOR
LMG	TUBE FOR REFRIGERA NT TEMPERA TURE SENSOR

S1	OFF	ON
1	Indoor Unit Throttling	Outdoor Unit Throttling
2	Indoor and Outdoor Mode	Outdoor Unit Only Mode
3	None	Pressure Compensation
4	None	None

WIRING DIAGRAMS HIGH HEAT MODELS (CONT)



Notes:

This symbol indicates the element is optional, the actual shape shall prevail

s1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

OUTDOOR UNIT MAIN CONTROL BOARD	
CODE	PART NAME
CN1~CN3	Input:230VAC High voltage
P5 P6	Connection to the earth
P8~P7	Output:230VAC High voltage to 24V BOARD
CN21	Output:Pin1(Connection of the high voltage)"S"
CN17~CN18	Output:230VAC High voltage----REVERSING VALVE
CN24~CN25	Output:230VAC High voltage----CRANKCASE HEATER
CN19~CN20	Output:230VAC High voltage----CHASSIS HEATER
CN8	Input:Pin1(0-5VDC),Pin2(5VDC)
CN9	Input:Pin3 Pin4(5VDC),Pin2(0VDC),Pin1 Pin5(0-5VDC)
CN6	Communication:Pin1-Pin6 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin8(0-5VDC),Pin10(5VDC)--to IPM&PFC BOARD
CN2~CN4	Output:230VAC High voltage to IPM&PFC BOARD
CN10	Input:Pin2 Pin4(0VDC),Pin1 Pin3(0-5VDC)--H/L Pressure switch
CN14	Input:Pin1(5VDC),Pin2(0-5VDC)--COMP. TOP OLP TEMP.SENSOR
CN23	Output:Pin1-Pin4 Pulse waveform(0-12VDC), Pin5 Pin6(12VDC) to EEV

OUTDOOR UNIT IPM&PFC BOARD	
CODE	PART NAME
CN2~CN3	Input:230VAC High voltage
CN9	Communication:Pin1-Pin2 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin10(5VDC)--to outdoor main control board
U~V~W	Connect to compressor voltage among phases 0~250VAC
CN8 CN5	Connect to DCFAN voltage among phases 0~200VAC

24V BOARD	
CODE	PART NAME
CN3~CN4	Input:230VAC High voltage
CN7	(Connection of the high voltage)"S"
CN9	Input:Pin1(5VDC),Pin2(0-5VDC),Pin3(0VDC)--PRESSURE SENSOR
CN28	Output:Pin1-Pin4 Pulse waveform(0-12VDC), Pin5 Pin6(12VDC) to EEV
CN11	Input:Pin1 Pin3(5VDC),Pin2 Pin4(0-5VDC)

CODE	PART NAME
COMP	COMPRESSOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSION VALVE
DCFAN1 DCFAN2	OUTDOOR DC FAN MOTOR
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
HQ	SUCTION TEMP. SENSOR
LMG	REFRIGERANT TEMP. SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR

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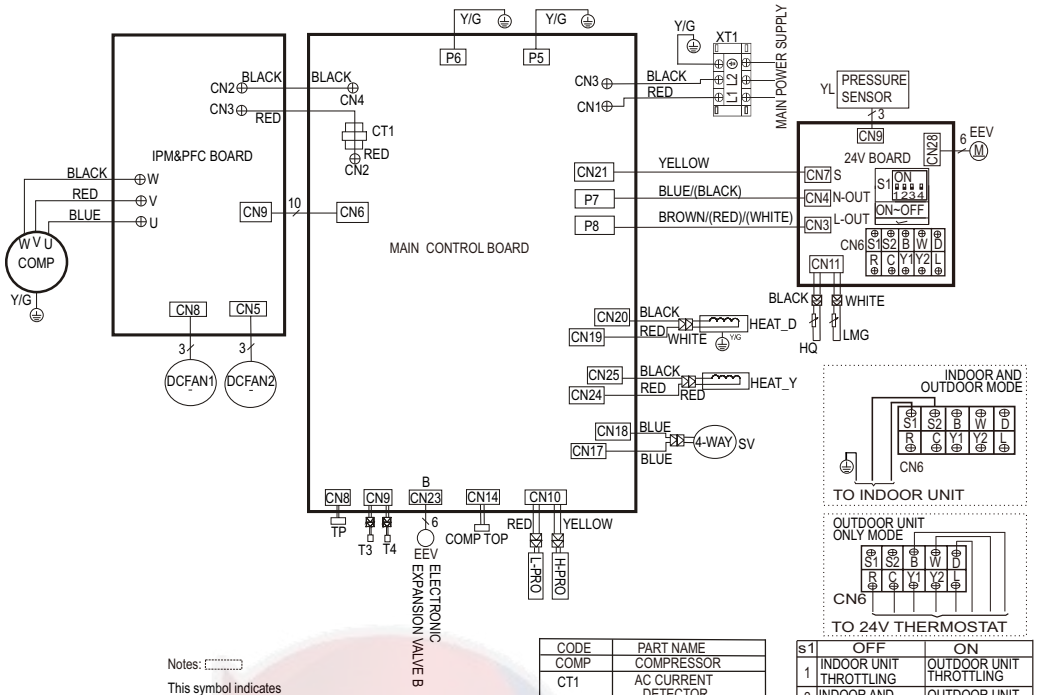
Fig. 7 —Wiring Diagram Sizes 36K-48K HH

WIRING DIAGRAMS HIGH HEAT MODELS (CONT)



Notes:

This symbol indicates the element is optional, the actual shape shall prevail

CODE	PART NAME
COMP	COMPRESSOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSION VALVE
DCFAN1 DCFAN2	OUTDOOR DC FAN MOTOR
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
HQ	SUCTION TEMP. SENSOR
LMG	REFRIGERANT TEMP. SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR

s1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

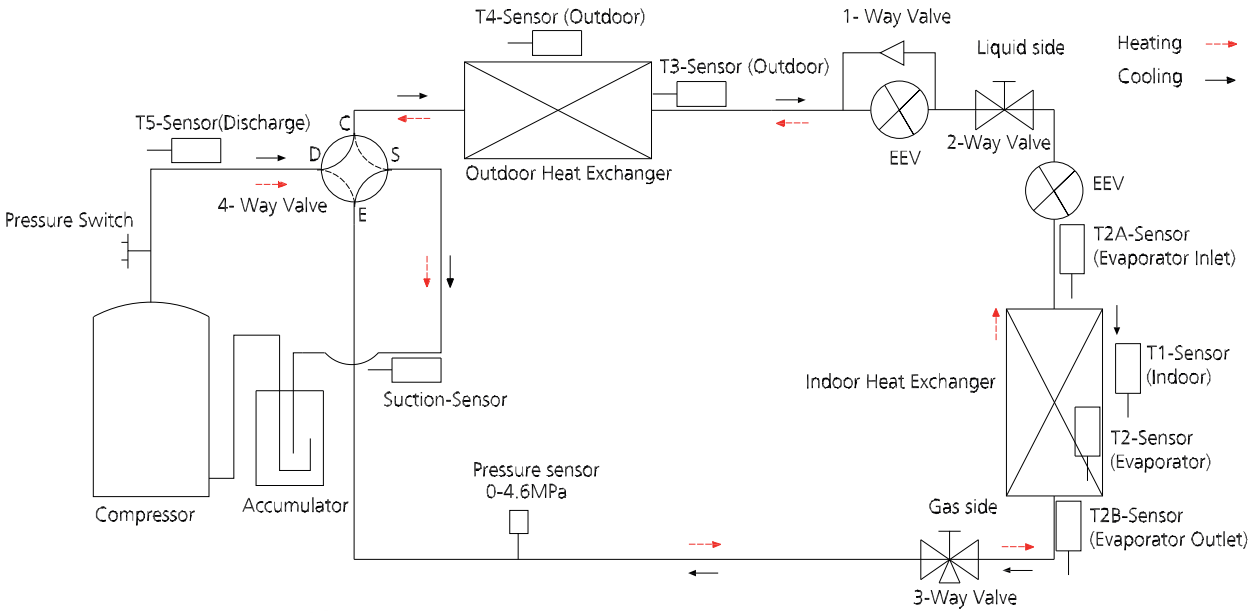
OUTDOOR UNIT MAIN CONTROL BOARD	
CODE	**PART NAME**
CN1~CN3	Input:230VAC High voltage
P5 P6	Connection to the earth
P8~P7	Output:230VAC High voltage to 24V BOARD
CN21	Output:Pin1(Connection of the high voltage)"S"
CN17~CN18	Output:230VAC High voltage----REVERSING VALVE
CN24~CN25	Output:230VAC High voltage----CRANKCASE HEATER
CN19~CN20	Output:230VAC High voltage----CHASSIS HEATER
CN8	Input:Pin1(0-5VDC),Pin2(5VDC)
CN9	Input:Pin3 Pin4(5VDC),Pin2(0VDC),Pin1 Pin5(0-5VDC)
CN6	Communication:Pin1-Pin6 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin8(0-5VDC),Pin10(5VDC)--to IPM&PFC BOARD
CN2~CN4	Output:230VAC High voltage to IPM&PFC BOARD
CN10	Input:Pin2 Pin4(0VDC),Pin1 Pin3(0-5VDC)--H/L Pressure switch
CN14	Input:Pin1(5VDC),Pin2(0-5VDC)--COMP. TOP OLP TEMP.SENSOR
CN23	Output:Pin1-Pin4 Pulse waveform(0-12VDC), Pin5 Pin6(12VDC) to EEV

OUTDOOR UNIT IPM&PFC BOARD	
CODE	**PART NAME**
CN2~CN3	Input:230VAC High voltage
CN9	Communication:Pin1-Pin2 Pulse waveform(0-5VDC),Pin7, Pin9(0VDC),Pin10(5VDC)--to outdoor main control board
U~V~W	Connect to compressor voltage among phases 0~250VAC
CN8 CN5	Connect to DCFAN voltage among phases 0~200VAC

24V BOARD	
CODE	**PART NAME**
CN3~CN4	Input:230VAC High voltage
CN7	(Connection of the high voltage)"S"
CN9	Input:Pin1(5VDC),Pin2(0-5VDC),Pin3(0VDC)--PRESSURE SENSOR
CN28	Output:Pin1-Pin4 Pulse waveform(0-12VDC), Pin5 Pin6(12VDC) to EEV
CN11	Input:Pin1 Pin3(5VDC),Pin2 Pin4(0-5VDC)

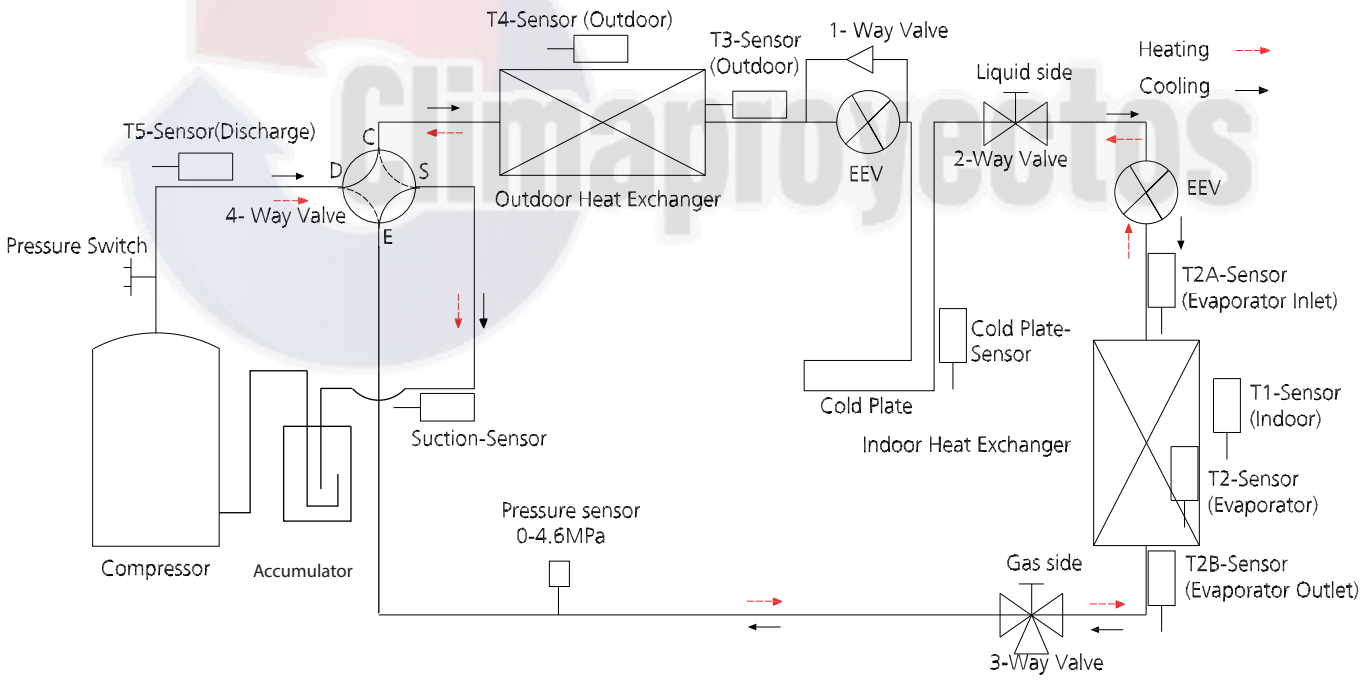
Fig. 8 — Wiring Diagram Size 60K HH

REFRIGERANT CYCLE DIAGRAMS



A230068

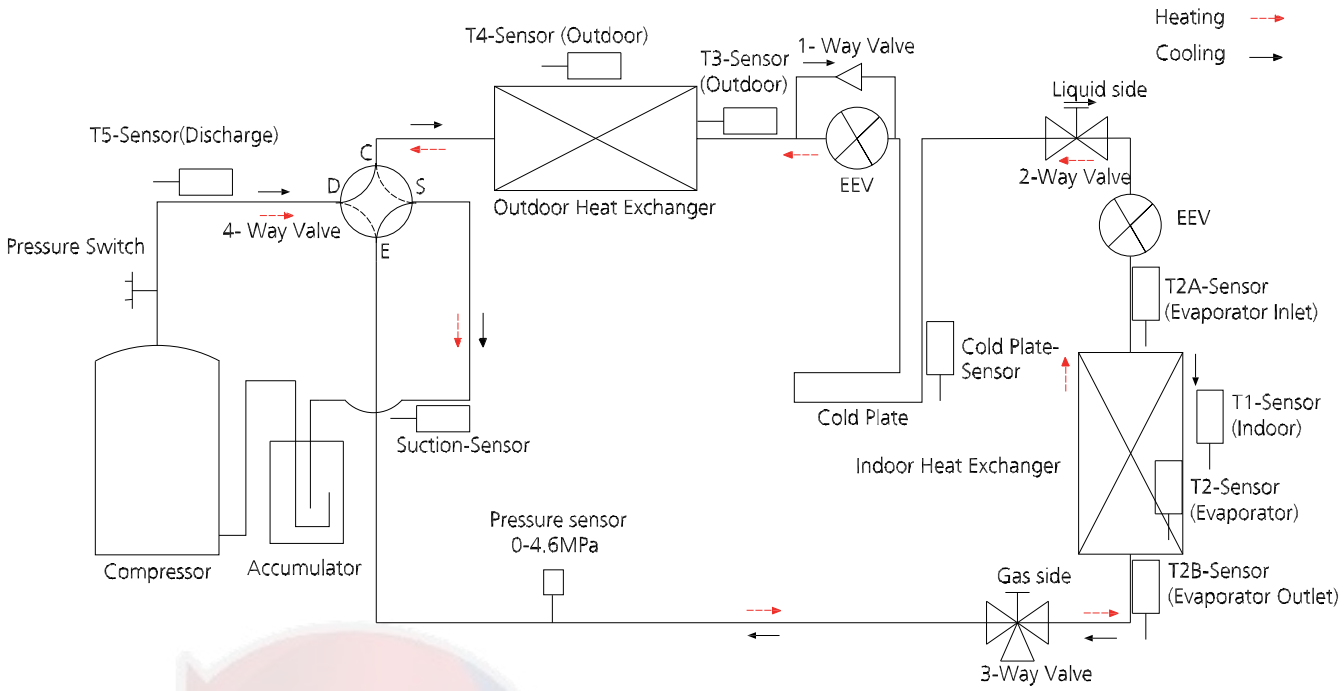
Fig. 9 —Refrigerant Cycle Diagram (Size 18K)



A230069

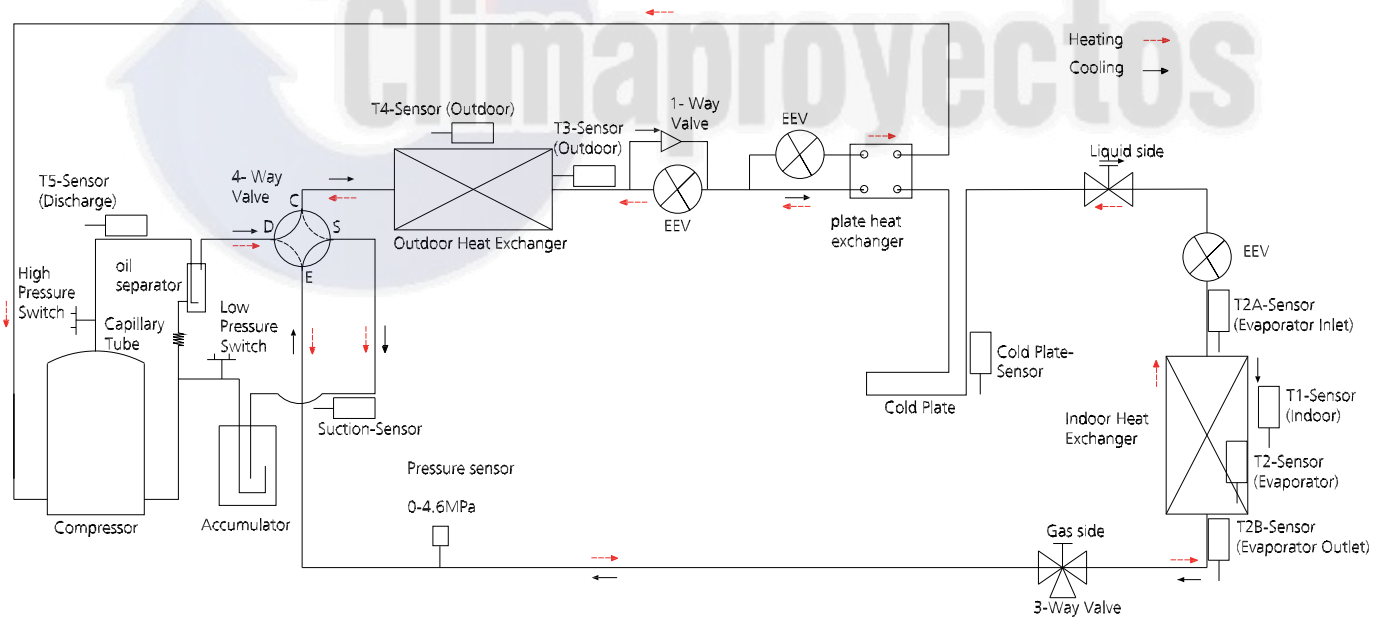
Fig. 10 — Refrigerant Cycle Diagram (Sizes 24K and 30K)

REFRIGERANT CYCLE DIAGRAMS (CONT)



A230070

Fig. 11 —Refrigerant Cycle Diagram (Sizes 36K and 48K)



A230071

Fig. 12 —Refrigerant Cycle Diagram (Size 60K)

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), consult the long-line applications section 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. Suction line 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.

Table 5 displays the following maximum lengths allowed.

Table 5 — Piping and Refrigerant

SYSTEM SIZE		18K	24K	30K	36K	48K	60K
		(208/230V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)
Minimum Piping Length	ft. (m)	10 (3)	10 (3)	10 (3)	10 (3)	10 (3)	10 (3)
Standard Piping Length	ft. (m)	25 (7.5)					
Maximum outdoor-indoor height difference (OU higher than IU)	ft. (m)	65.6 (20)	82(25)	82(25)	98.4(30)	98.4(30)	98.4(30)
Maximum outdoor-indoor height difference (IU higher than OU)	ft. (m)	65.6(20)	82(25)	82(25)	98.4(30)	98.4(30)	98.4(30)
Maximum Piping Length with no additional refrigerant charge per System	ft. (m)	25 (7.5)	25 (7.5)	25 (7.5)	25 (7.5)	25 (7.5)	25 (7.5)
Total Maximum Piping Length per system	ft. (m)	98.4 (30)	164 (50)	164(50)	213(65)	213 (65)	213(65)
Additional refrigerant charge	Oz/ft (g/m)	0.69 (65)					
Suction Pipe (size - connection type)	In (mm)	Ø3/4” (19)	Ø3/4” (19)	Ø3/4” (19)	Ø3/4” (19)	Ø3/4” (19)	Ø7/8” (22)
Liquid Pipe (size - connection type)	In (mm)	Ø3/8” (9.52)	Ø3/8” (9.52)	Ø3/8” (9.52)	Ø3/8” (9.52)	Ø3/8” (9.52)	Ø3/8” (9.52)
Refrigerant Type	Type	R410A	R410A	R410A	R410A	R410A	R410A
‡ Charge Amount	lb. (kg)	3.53(1.6)	4.63(2.1)	6.72 (3.05)	8.16(3.7)	10.4(4.7)	10.8 (4.9)

NOTE: ‡ AHU compatible only

- **‡ The charge amount listed in Table 5 is for piping runs up to 25 ft. (7.6 m).**
- **For piping runs longer than 25 ft. (7.6 m), add the refrigerant up to the allowable length as specified in Table 5.**

SYSTEM EVACUATION AND CHARGING

CAUTION

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

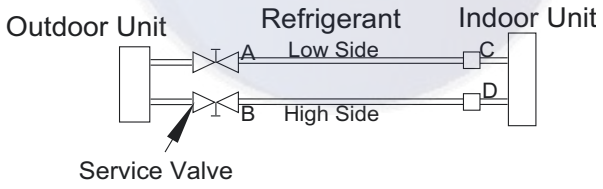
Never use the system compressor as a vacuum pump.

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

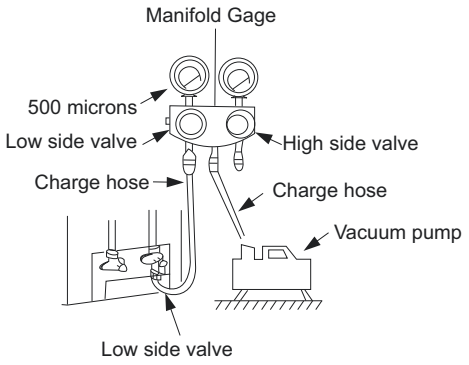
Using Vacuum Pump

1. Completely tighten all flare nuts and connect the manifold gage charge hose to a charge port of the low side service valve (see Fig. 13).
2. Connect the charge hose to the vacuum pump.
3. Fully open the low side of the manifold gage (see Fig.14).
4. Start the vacuum pump.
5. Evacuate using the triple evacuation method.
6. After 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 5 on page 16.
8. Disconnect charge hose from charge connection of the low side service valve.
9. Fully open service valves B and A.
10. Securely tighten caps of service valves.



A230072

Fig. 13 — Service Valve

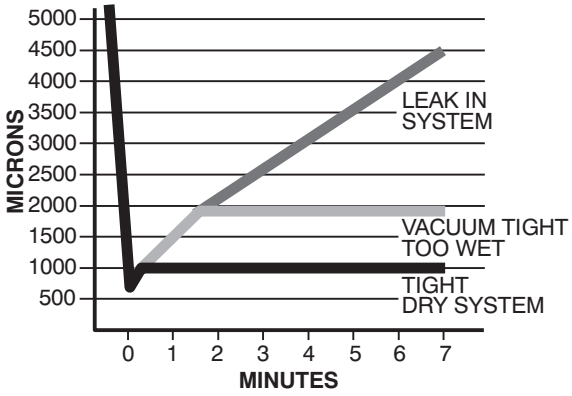


A230073

Fig. 14 — 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 the vacuum depth. The deep vacuum method is the most effective way of assuring a system is free of air and liquid water (see Fig. 15).



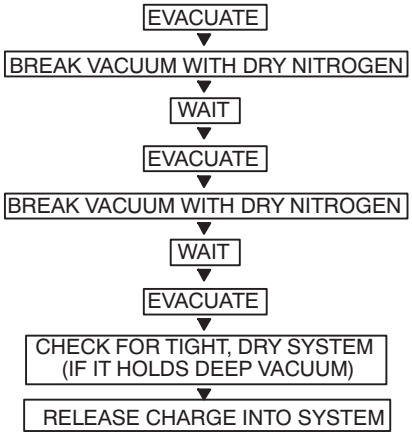
A230074

Fig. 15 — Deep Vacuum Graph

Triple Evacuation Method

Proceed as follows (see Fig. 16).

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 will be allowed to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 16. The system is now free of any contaminants and water vapor.



A230075

Fig. 16 — Triple Evacuation Method

Final Tubing Check

IMPORTANT: Ensure the factory tubing on both indoor and outdoor unit 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, ensuring 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**
- **T2B: Coil temperature of indoor heat exchanger outlet**
- **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 all 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), preheat function is activated.

Zero crossing detection error protection

If the AC detects 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 operate 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 operating.

Refrigerant leakage detection

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

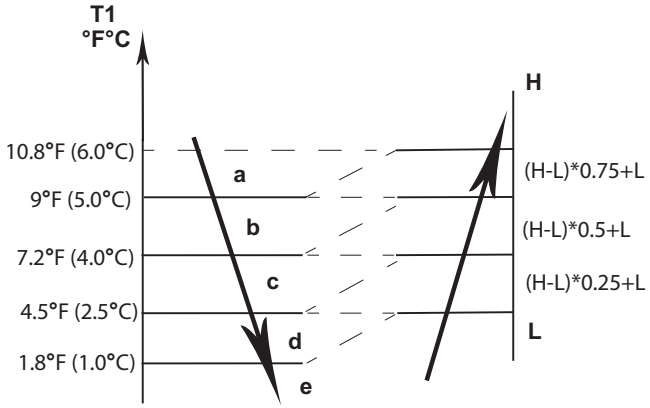
Open condition:

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**, **MEDIUM**, **LOW** or **AUTO**.
4. The louver operates same as in the **COOLING** mode.
5. Auto fan



A230076

Fig. 17 — AUTO FAN Mode

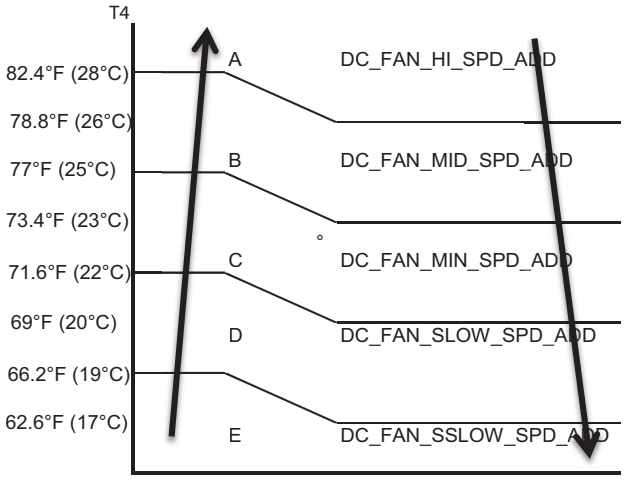
COOLING Mode

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 AC runs in the mute mode, the compressor runs with low frequency.
- When the current is more than 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.



A230077

Fig. 18 — 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 operating, the indoor fan motor runs in the minimum or setting speed (see Fig. 19).

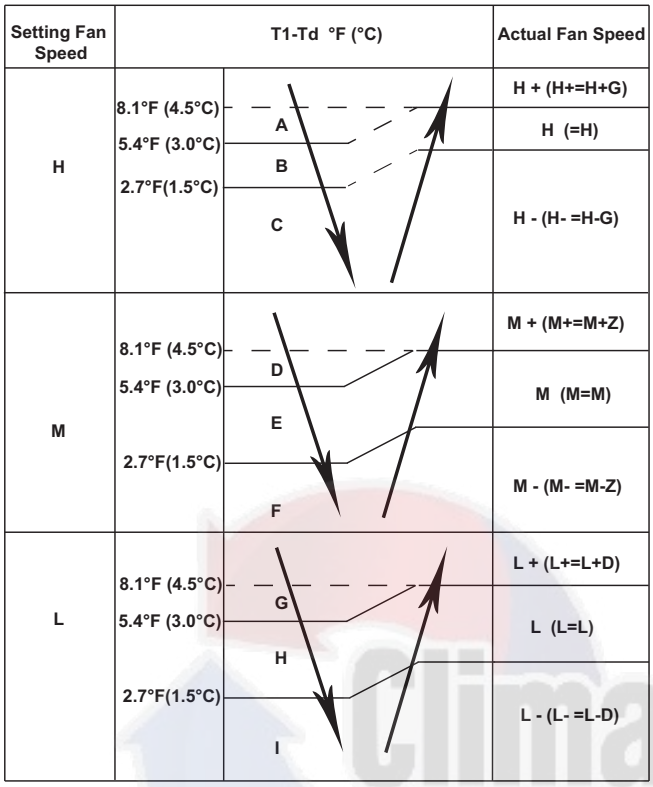


Fig. 19 — Indoor Fan Running Rules

The **AUTO** fan adheres to the following rules (see Fig. 20):

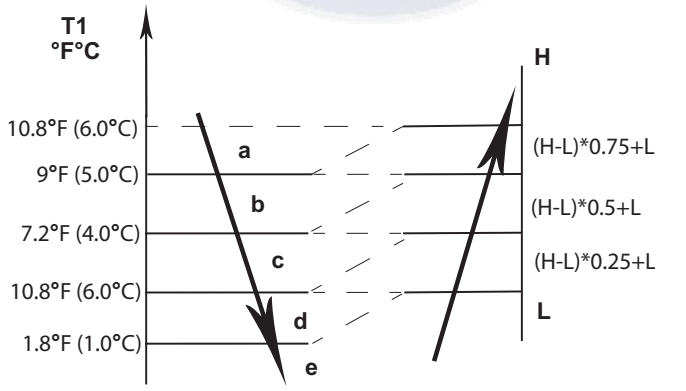


Fig. 20 — AUTO FAN Running Rules

Compressor Temperature Protection

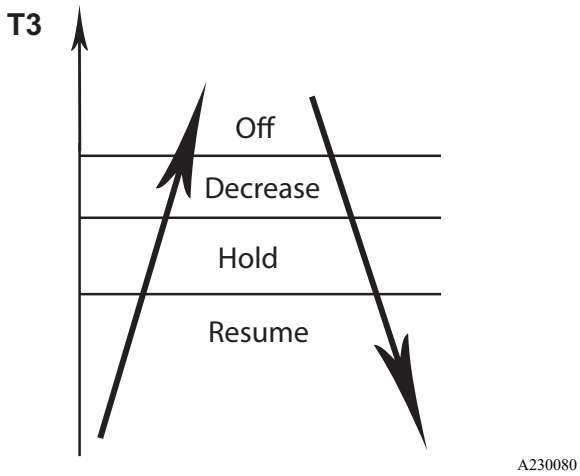


Fig. 21 —Compressor Temperature Protection

- **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.

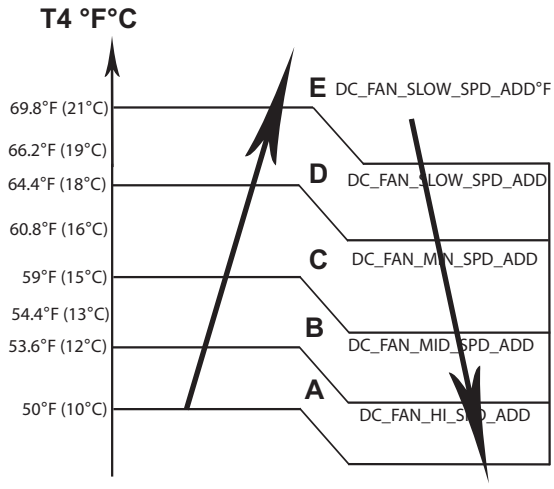


Fig. 22 — Outdoor Fan Running Rules

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.

NOTE: 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 and 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. 23.

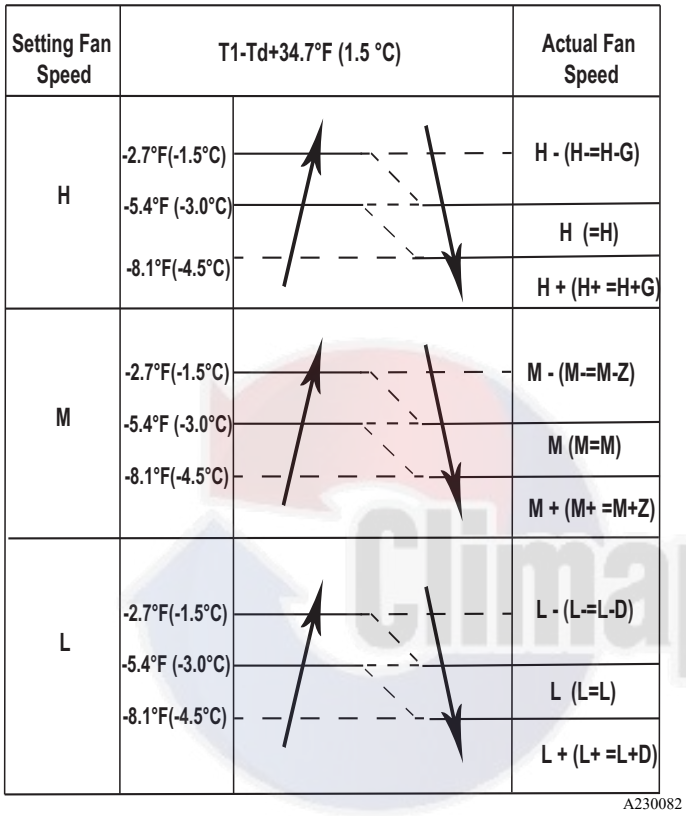


Fig. 23 — Indoor Fan Running Rules

AUTO FAN ACTION in the HEATING Mode

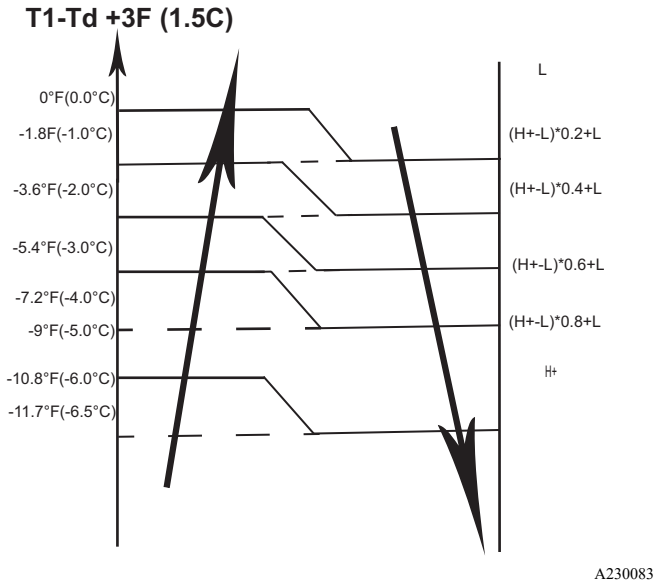


Fig. 24 — Auto Fan Action in HEATING Mode

OUTDOOR UNIT POINT CHECK FUNCTION

A check switch is included on the outdoor PCB. Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed (see Table 6).

Table 6 — Outdoor Unit Point Check Function

PRESS #	DISPLAY	REMARK
00	Normal display	Displays running frequency, running state, or malfunction code
01	Indoor unit capacity demand code	**Actual data*HP*10 -** If capacity demand code is higher than 99, the digital display tube displays a single digit and a tens digit. (For example, the digital display tube displays **"5.0"**, which means the capacity demand is 15. The digital display tube displays **"60"**, it means the capacity demand is 6.0) GA algorithm models display "--"
02	The frequency after the capacity requirement adapter	
03	Room temperature (T1)	If the temperature is lower than 0 degrees, the digital display tube displays **"0"**. If the temperature is higher than 70 degrees, the digital display tube displays **"70"**.
04	Indoor unit evaporator temperature (T2)	If the temperature is lower than -9 degrees, the digital display tube displays **"-9"**. If the temperature is higher than 70 degrees, the digital display tube displays **"70"**. If the indoor unit is not connected, the digital display tube displays: **"--"**
05	Condenser pipe temperature(T3)	
06	Outdoor ambient temperature(T4)	
07	Compressor discharge temperature (TP)	The display value is between 0~199 degrees. If the temperature is lower than 0 degrees, the digital display tube displays **"0"**. If the temperature is higher than 99 degrees, the digital display tube displays a single digit and a tens digit. For example, the digital display tube displays **"0.5"**, which means the compressor discharge temperature is 105 degrees. the digital display tube displays **"1.6"**, which means the compressor discharge temperature is 116 degrees.
08	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
09	AD value of voltage	
10	Indoor unit running mode code	Standby:0,Cooling:1, Heating:2, Fan only 3, Drying:4, Forced 11 cooling:6, Defrost:7
11	Outdoor unit running mode code	
12	EXV open angle	**Actual data/4** If the value is higher than 99, the digital display tube displays a single digit and a tens digit. For example, the digital display tube displays **"2.0"**, which means the EXV open angle is 120×4=480p.
13	Frequency limit symbol	Bit7: Frequency limit caused by IGBT radiator Bit6: Reserved Bit5: Reserved Bit4: Frequency limit caused by low temperature of T2.(LH00) Bit3: Frequency limit caused by T3.(LC01) Bit2: Frequency limit caused by TP.(LC02) Bit1: Frequency limit caused by current(LC03) Bit0: Frequency limit caused by voltage (LC05) The display value is a hexadecimal number. For example, the digital display displays 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by T4, T3, or the current.
14	Outdoor unit fan speed	If it is higher than 99, the digital display tube displays a single digit and a tens digit. For example, the digital display tube displays **"2.0"**, which means the fan speed is 120. This value is multiplied by 8, and it is the current fan speed: 120*8=960
15	The average value of the temperature values detected by the high and low pressure sensors in the last 10 seconds of the compressor frequency calculation period	The displayed value is the actual value plus 60 (that is, when the displayed value is 10, the actual value is -50). When the displayed value is higher than 99, the digital display tube displays a single digit and a tens digit. If it displays **2.0**, it means 120. When there is no pressure sensor, it is displayed as --
16	The temperature value detected by the high and low pressure sensor	
17	AD value detected by the high and low pressure sensor	If it is higher than 199, the digital display tube displays a single digit and tens digit. For example, the digital display tube displays **"2.0"**, which means 220. Otherwise, if the temperature is higher than 99 degree, the digital display tube displays a tens digit. For example, the digital display tube displays **"2.0"**, which means 120. When there is no pressure sensor, it is displayed as --
18	The currently running communication protocol version	00-99

INFORMATION INQUIRY

To enter the engineer mode, in power-on or standby mode, and in non-locked state using hand held remote,

1. Press the key combination **On/Off + Fan** for 7 seconds:
2. After entering the engineer mode, the remote control displays the following icons **"Auto, Cool, Dry, Heat"**, plus the battery icon; at the same time, it also displays the numeric code of the current engineer mode (for the initial engineer mode, the numeric code displayed is 0), and all other icons are inactive. In engineer mode, the value of the current numeric code can be adjusted circularly through the **Up/Down** key, with the setting range of 0 to 30. Each time the current numeric code is adjusted, the special code of the engineer mode is transmitted with a delay of 0.6s. The code can also be transmitted by pressing "**OK**", and the special code of the engineer mode sent contains information of the currently displayed numeric code (if the numeric code is 0, the code to enter the engineer mode is transmitted). In engineer mode, other keys or operations are invalid except for the **On/Off** key, the **Up/Down** key, the **OK** key or executing the operation to exit the engineer mode.

Table 7 — Inquiry Information

Inquiry Information (Sheet 1 of 2)

CODE	QUERY CONTENT	ADVANCED FUNCTION SETTING
0	Error Code	
1	T1 Temperature	Press "**On/Off**" for 2s to enter the Power Down Memory Selector, the code displayed is **"Ch",** press **"OK"** to send the Query Power Down Memory Selector code; press the **Up/Down** key to select 1 or 0 and press **"OK"** to confirm, 1 indicates that the power down memory exists, and 0 indicates that no power down memory exists; and press "**On/Off**" for 2s to exit. (Set within 1 minute after power on)
2	T2 Temperature	Press "**On/Off**" for 2s to enter the Internal Fan Control Selector after the preset temperature is reached, the code displayed is **"Ch"**, press **"OK"** to send the Query Internal Fan Control Selector code; press the **Up/Down** key to select 1 to 11: 1 - Stop the fan, 2 - Min. air speed, 3 - Set the air speed, 4 - Terminal running for 5min, press **"OK" t**o confirm, and press "**On/Off**" for 2s to exit. (Set within 1 minute after power on)
3	T3 Temperature	Press **"On/Off"** for 2s to enter the Mode Selector, press the Up/Down key to select CH (cool and heat, **Auto+Cool+Dry+Heat+Fan**), **CC** (Cool only without **Auto**, **Cool+Dry+Fan**), press **"OK"** to confirm, and the mode selected can be memorized when the remote control is powered down and powered on; and press **"On/Off"** for 2s to exit. When the remote control does not burn any parameters, the mode setting will not be memorized. (Set within 1 minute after power on)
4	T4 Temperature	Press the **"On/Off"** for 2s to enter the Min. Set Temperature Selector, press the **Up/Down** key to select "16°C~24°C", press "**OK**" to confirm, and the Minimum Set Temperature can be memorized when the remote control is powered on and power lost; and press **"On/Off"** for 2 seconds to exit. When the remote control does not burn any parameters, the minimum set temperature will not be memorized. Set within 1 minute after power on.
5	TP Temperature	Press **"On/Off"** for 2 seconds to enter the Maximum Set Temperature Selector, press the **Up/Down** key to select "25°C~30°C", press **"OK"** to confirm, and the Maximum Set Temperature can be memorized when the remote control is powered on and power lost; and press **"On/Off"** for 2s to exit. When the remote control does not burn any parameters, the maximum set temperature will not be memorized. Set within 1 minute after power on.
6	Compressor Target Frequency FT	/
7	Compressor Running Frequency Fr	Press **"On/Off"** for 2 seconds to enter the Twins Selector, the code displayed is **"Ch"**, press **"OK"** to send the Query Twins Selector code; press the **Up/Down** key to select, 0 indicates that there is no Twins, 1 indicates the host, and 2 indicates the slave. Press **"OK"** to confirm, and press **"On/Off"** for 2s to exit.
8	Current dL	/
9	Current AC Voltage Uo	/
10	Current indoor capacity test state Sn	/
11	/	Press **"On/Off"** for 2 seconds to enter the Minimum Desired Cooling Frequency Selector, the code displayed is "**Ch**", press "**OK**" to send the Query Minimum Desired Cooling Frequency Selector code; press the **Up/Down** key to select the minimum cooling frequency desired and press "**OK**" to confirm; press **"On/Off"** for 2s to exit (for some models).
12	Set Speed Pr of the outdoor fan	Press **"On/Off"** for 2 seconds to enter the Minimum Desired Heating Frequency Selector, the code displayed is "**Ch**", press "**OK**" to send the Query Minimum Desired Heating Frequency Selector code; press the **Up/Down** key to select the minimum desired heating frequency value, press "**OK**" to confirm; and press the **"On/Off"** for 2s to exit (for some models).
13	Opening Lr of EEV	Press **"On/Off"** for 2 seconds to enter the Maximum Running Frequency Selector of the restricted area 6 in the **COOLING** mode T4, the code displayed is **"Ch"**, press **"OK"** to send the Query Maximum Running Frequency Selector code of the restricted area 6 in the cooling mode T4; press the **Up/Down** key to select the limit, then press **"OK"** to confirm; and press **"On/Off"** for 2 seconds to exit (for some models).
14	Actual Running Speed "**ir**" of the indoor fan	/
15	Indoor Humidity Hu	Press **"On/Off"** for 2 seconds to enter the Outdoor Forced Running Frequency Selector, the code displayed is **"Ch"**, press **"OK"** to send the Query Outdoor Forced Running Frequency Selector code; press the **Up/Down** key to select the outdoor forced running frequency, then press **"OK"** to confirm; and press **"On/Off"** for 2 seconds to exit (for some models).

Inquiry Information (Sheet 2 of 2)

CODE	QUERY CONTENT	ADVANCED FUNCTION SETTING
16	Set Temperature TT after compensation	Press **"On/Off"** for 2 seconds to enter One-Key Recovery, the code displayed is "rS", then press **"OK"** to send the One-Key Recovery code, the mode selector of the remote control **recovers** to "**COOLING** and **HEATING**", the minimum temperature recovers to 16°C, and the maximum temperature recovers to 30°C; and press **"On/Off"** for 2 seconds to exit (for some models).
17	/	nA
18	/	/
19	DC bus voltage	Press **"On/Off"** for 2 seconds to enter the Cooling Frequency Threshold Settings; press the **Up/Down** key to select the cooling frequency threshold, press **"OK"** to confirm; and press the "**On/Off**" for 2 seconds to exit (set within 1 minute after power on).
20	Indoor Target Frequency oT	Press **"ON/OFF"** for 2 seconds to enter the Heating Frequency Threshold Settings; press the Up/Down key to select the heating frequency threshold, press **"OK"** to confirm; and press "**On/Off**" for 2 seconds to exit (set within 1 minute after power on).
21		Press **"ON/OFF"** for 2 seconds to enter the Cooling Temperature Compensation Value Settings, the code displayed is **"Ch"**, then press **"OK"** to send the Query Cooling Temperature Compensation Value code; press the **Up/Down** key to select the cooling temperature compensation value, then press **"OK"**; and press **"ON/OFF"** for 2 seconds to exit.
22		Press **"ON/OFF"** for 2 seconds to enter the Heating Temperature Compensation Value Settings, the code displayed is **"Ch"**, press **"OK"** to send the Query Heating Temperature Compensation Value code; press the **Up/Down** key to select the heating temperature compensation value, then press **"OK"**; and press **"ON/OFF"** for 2 s to exit.
23	Reserved	/
24		
25		
26		
27		
28		
29		
30		

In the channel 1~30 settings of the engineer mode, press the **On/Off** key to return the previous engineer mode.

End of engineer mode:

1. In the engineer mode, press the key combination of **"On/Off + Air speed"** for 2 seconds;
2. The engineer mode ends if there are no valid key operations for continuous 60 seconds.

GENERAL TROUBLESHOOTING

Table 8 — Error Display

DISPLAY	MALFUNCTION OR PROTECTION	PAGE #
EC 51	Outdoor EEPROM malfunction	25
EL 01	Indoor / outdoor units communication error	26
EL 16	Communication malfunction between adapter board and outdoor main board	49
PC 00	IPM module protection	32
PC 02	Top temperature protection of compressor or High temperature protection of IPM module	34
PC 06	Temperature protection of compressor discharge	37
PC 08	Outdoor overcurrent protection	38
PC 0A	High temperature protection of condenser	44
PC 0F	PFC module protection	45
PC 10	Outdoor unit low AC voltage protection	33
PC 11	Outdoor unit main control board DC bus high voltage protection	--
PC 12	Outdoor unit main control board DC bus high voltage protection /341 MCE error	33
PC 30	High pressure protection	39
PC 31	Low pressure protection	35
PC 40	Communication malfunction between IPM board and outdoor main board	40
PC 41	Outdoor compressor current sampling circuit failure	41
PC 43	Outdoor compressor lack phase protection	42
PC 44	Outdoor unit zero speed protection	38
PC 45	Outdoor unit IR chip drive failure	43
PC 46	Compressor speed has been out of control	38
PC 49	Compressor overcurrent failure	38
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	29
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	29
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	29
EC 57	Refrigerant pipe temperature sensor error	29
EC 5C	High pressure sensor is in open circuit or has short circuited	29
EC 71	Over current failure of outdoor DC fan motor	27
EC 72	Lack phase failure of outdoor DC fan motor	47
EC 73	Zero-speed failure of outdoor DC fan motor	--
EC 07	Outdoor fan speed has been out of control	27
PC OL	Low ambient temperature protection	43
LC 06	High temperature protection of IPM module	34

DIAGNOSIS AND SOLUTION

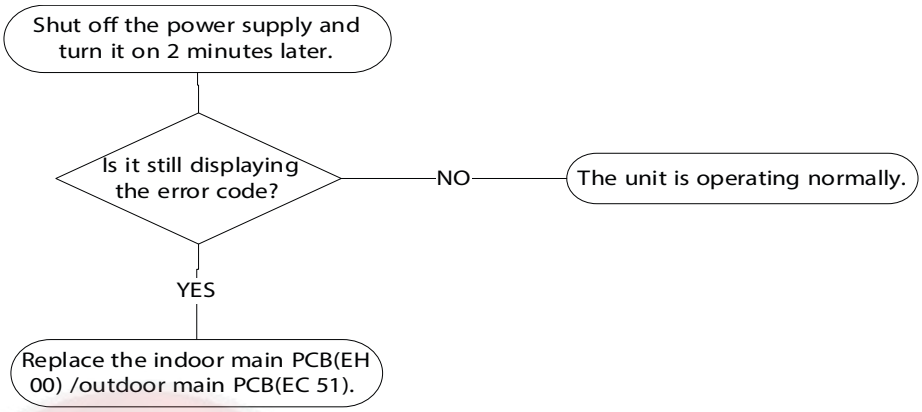
EH 00 / EC 51 (EEPROM Parameter Error Diagnosis and Solution)

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

Recommended parts to repair:

- **Indoor PCB**
- **Outdoor PCB**

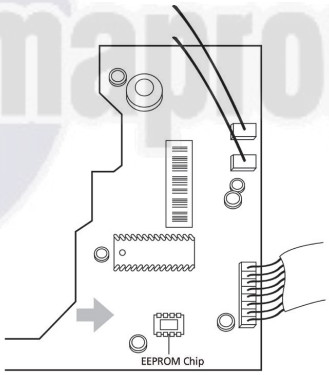
Troubleshooting



A230085

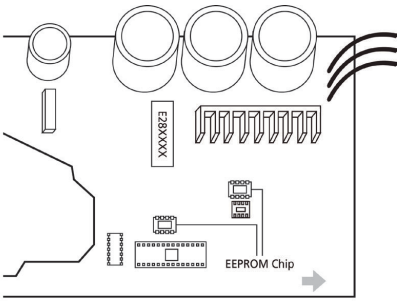
Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. The location of the EEPROM chip on the indoor and outdoor PCB is shown in Figures 25 and 26.



A230086

Fig. 25 —EEPROM Chip



A230087

Fig. 26 —EEPROM Chip

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. This figures (pictures) are only for reference, actual appearance may vary. Troubleshooting and repair of the compressor driven chip EEPROM parameter error and communication error between outdoor main chip and compressor driven chip are the same as EC 51.

DIAGNOSIS AND SOLUTION (CONT)

EL 01 (Indoor and Outdoor Unit Communication Error Diagnosis and Solution)

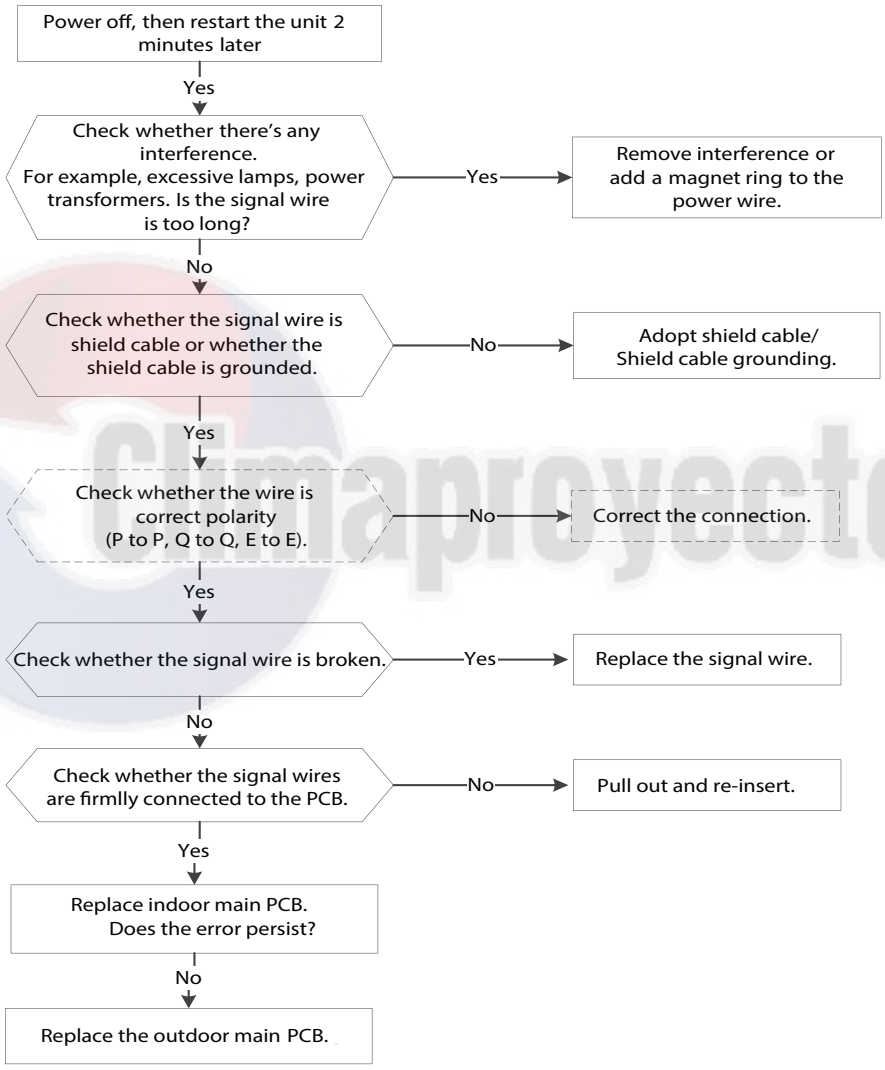
Description: Indoor unit can not communicate with outdoor unit.

Recommended parts to repair:

- **Signal wires**
- **Magnet ring**
- **Indoor PCB**
- **Outdoor PCB**

Troubleshooting

XYE Communication:



A230088

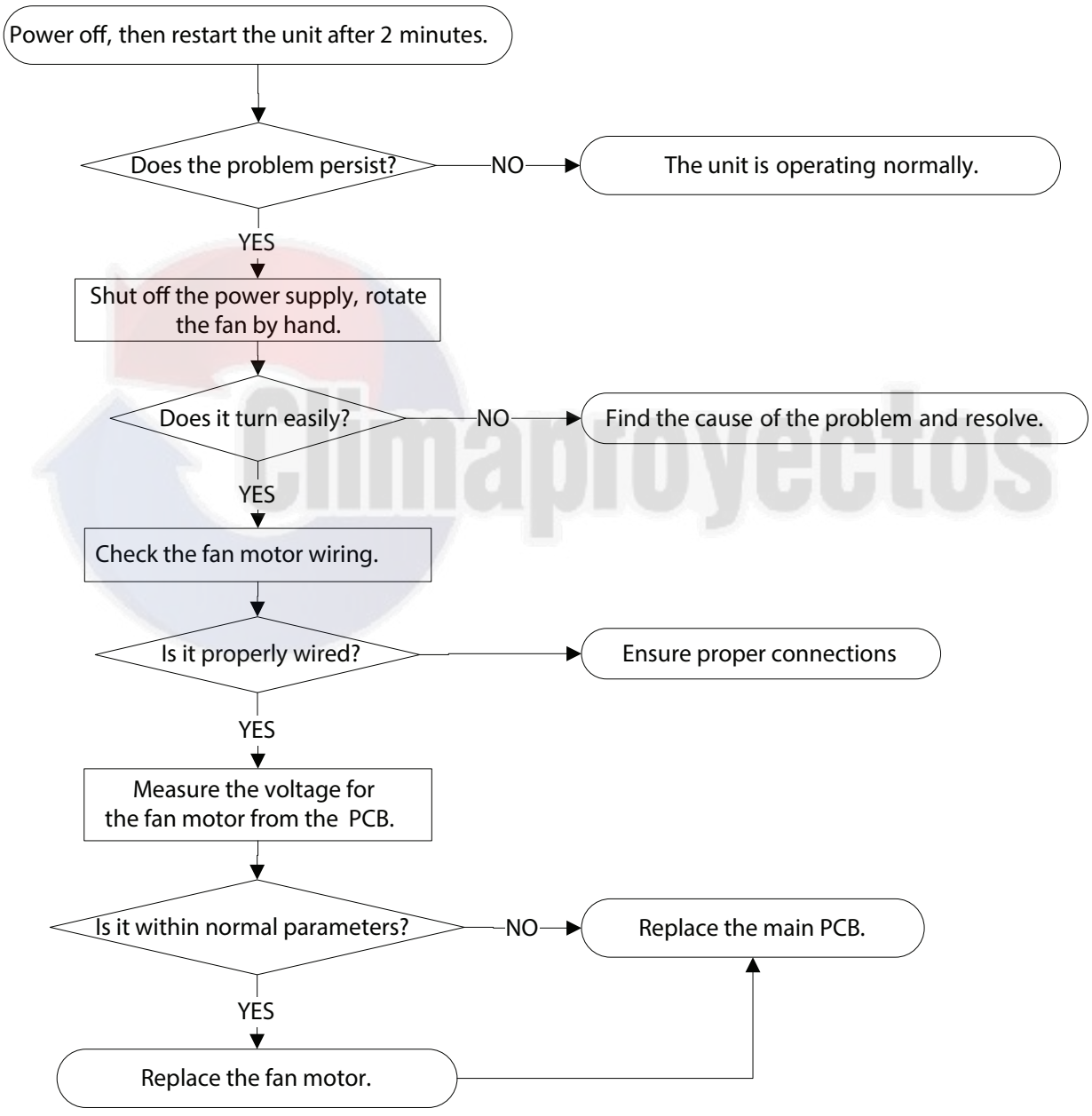
DIAGNOSIS AND SOLUTION (CONT)

EH 03 / EC 07 (Fan Speed Is Operating Outside of Normal Range) / EC 71 (Over Current Failure of Outdoor DC Fan Motor) / EC73 (Zero-speed failure of outdoor DC fan motor) Diagnosis and Solution)

Recommended parts to repair:

- **Connection wires**
- **Fan assembly**
- **Fan motor**
- **PCB**

Troubleshooting

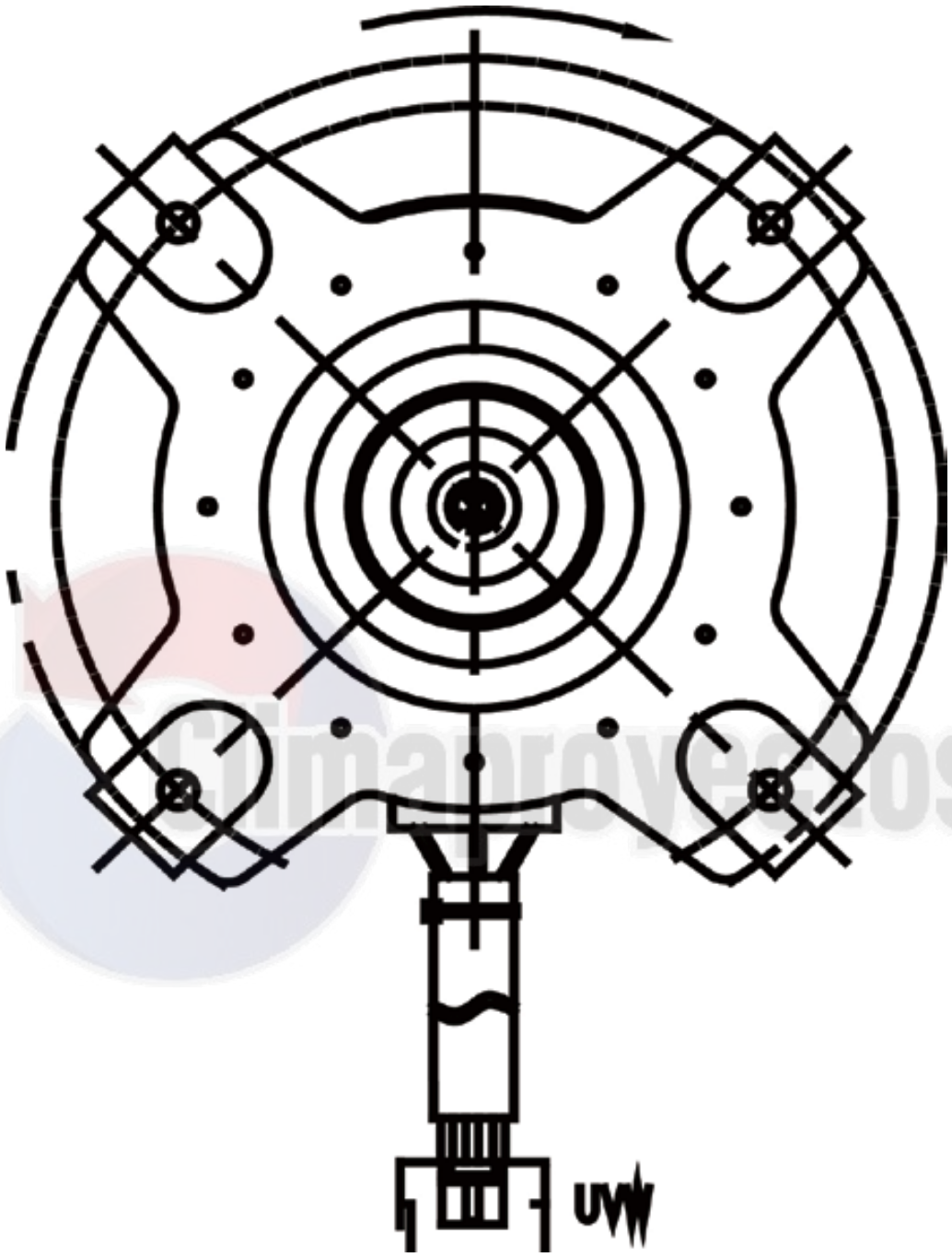


A230092

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.

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

Release the UVW connector. Measure the U-V, U-W, V-W resistance. 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.



A230094

Fig. 27 — Outdoor DC Fan Motor

DIAGNOSIS AND SOLUTION (CONT)

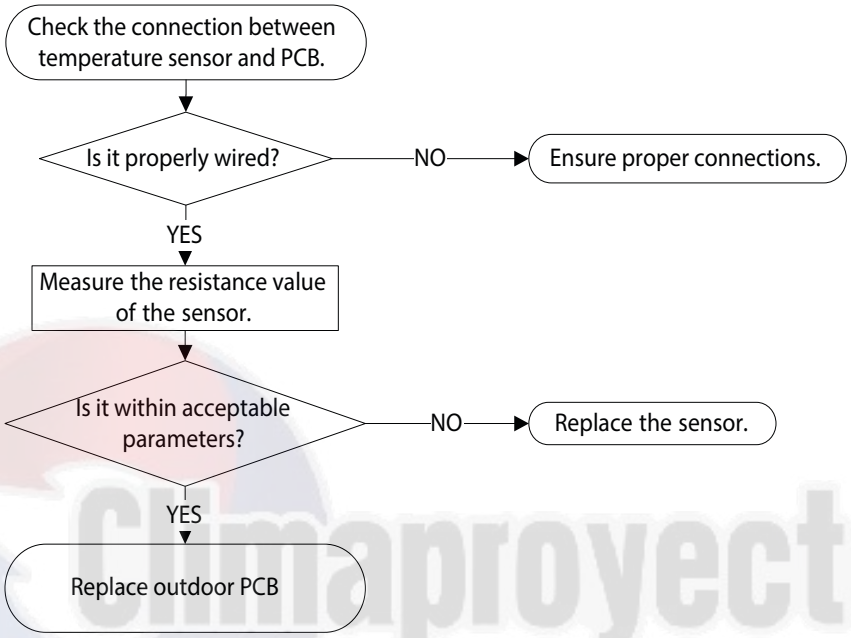
EC 53 / EC 52 / EC 54 / EC 56 / EC 57 / EC 50 / EC 5C (Open Circuit or Short Circuit of Temperature Sensor Diagnosis and Solution)

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

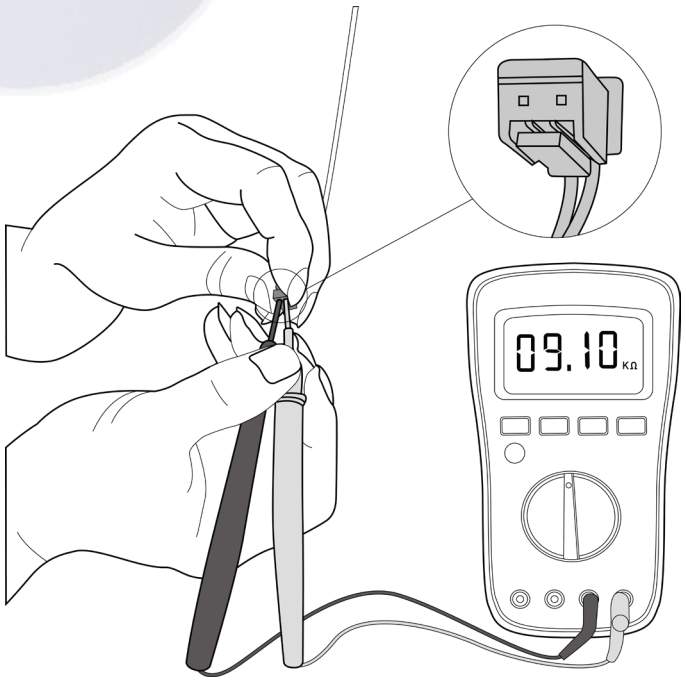
Recommended parts to repair:

- **Connection wires**
- **Sensors**
- **PCB**

Troubleshooting



A230095



A230096

Fig. 28 —Test

NOTE: For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole. This picture and the value are only for reference, actual appearance and value may vary.

DIAGNOSIS AND SOLUTION (CONT)

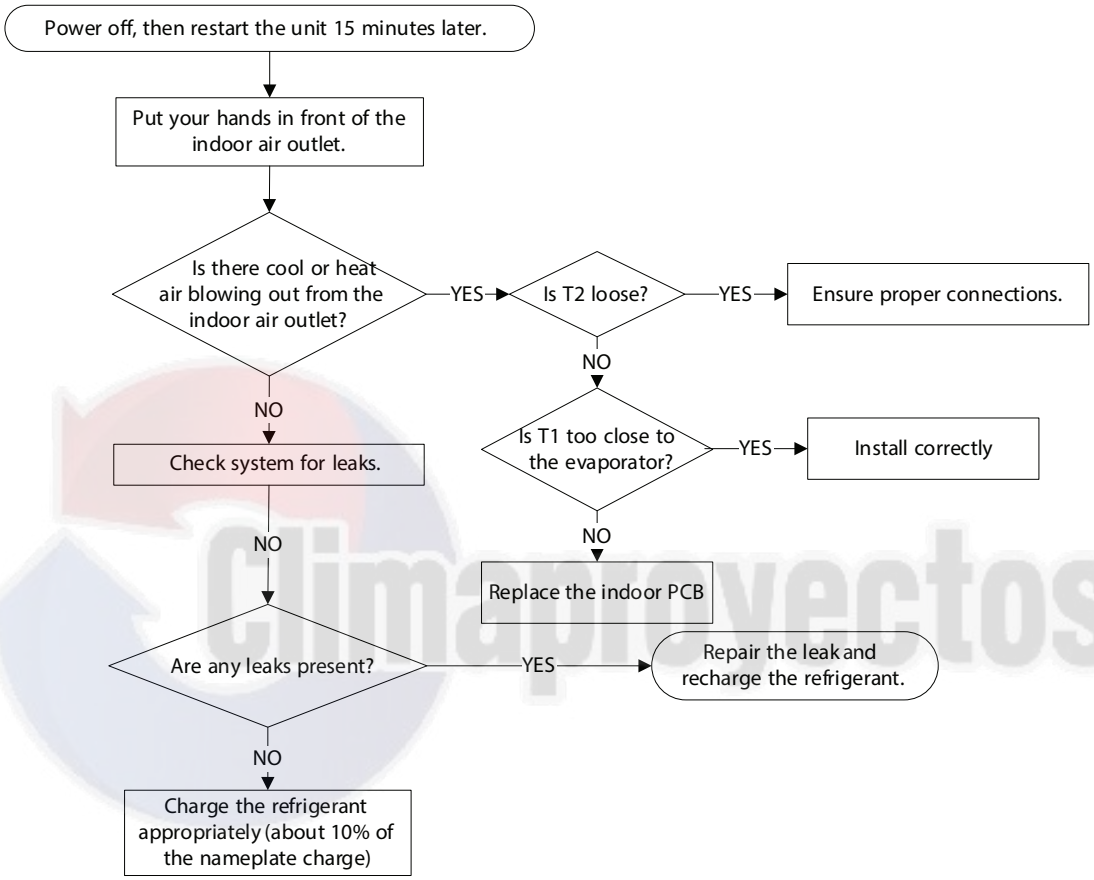
EL 0C (Refrigerant Leakage Detection Diagnosis and Solution)

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

Recommended parts to repair:

- **Indoor PCB**
- **Additional refrigerant**

Troubleshooting



A230097

DIAGNOSIS AND SOLUTION (CONT)

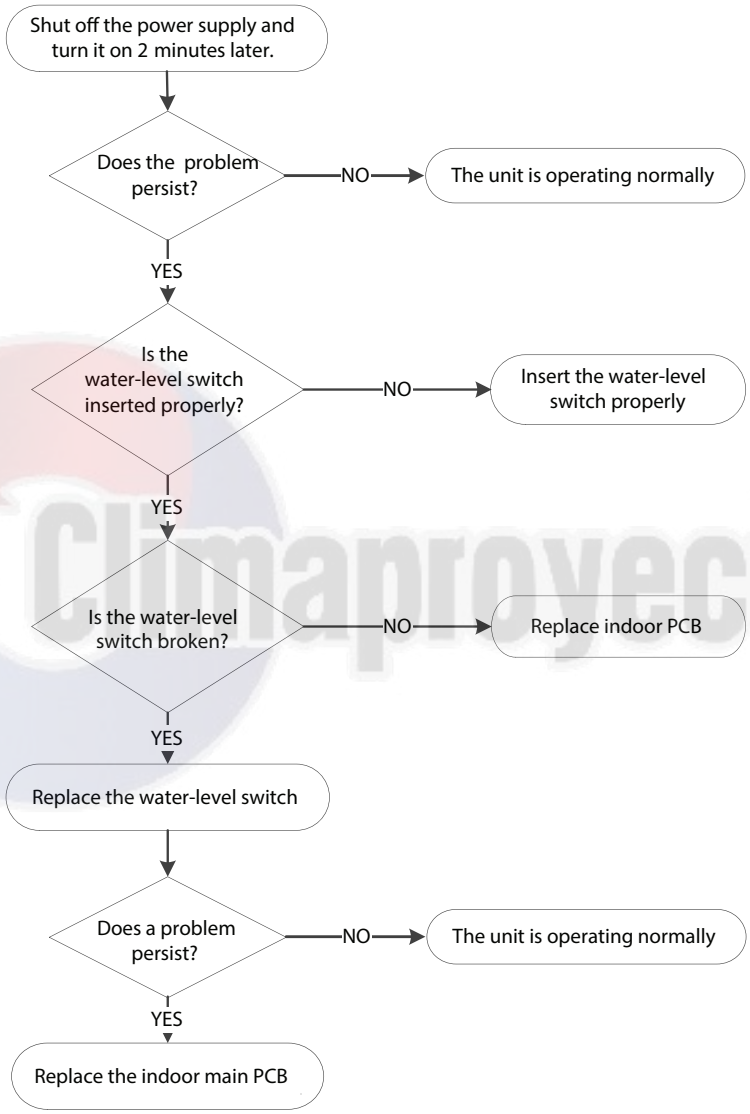
EH 0E (Water-Level Malfunction Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays the failure code.

Recommended parts to repair:

- **Connection wires**
- **Water-level switch**
- **Water pump**
- **Indoor PCB**

Troubleshooting



A230098

DIAGNOSIS AND SOLUTION (CONT)

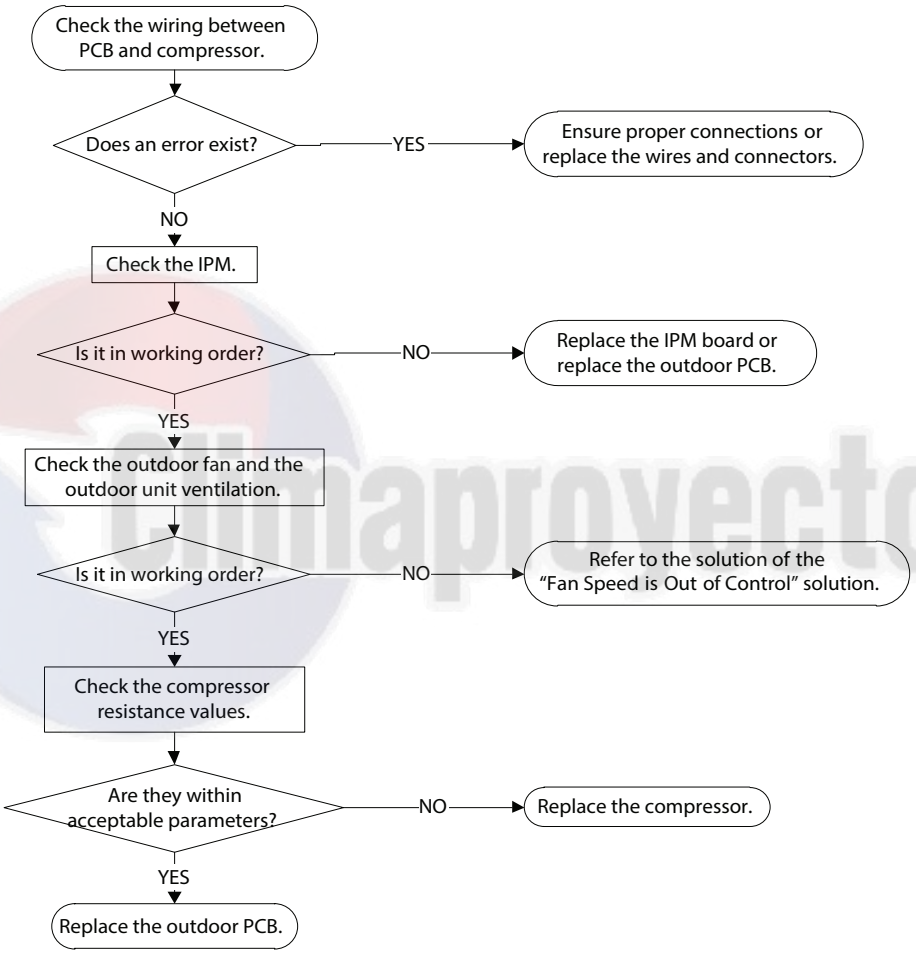
PC 00 (IPM malfunction or IGBT over-strong current protection Diagnosis and Solution)

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the display LED shows “PC 00” and the air conditioner turns off.

Recommended parts to repair:

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

Troubleshooting



A230099

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)

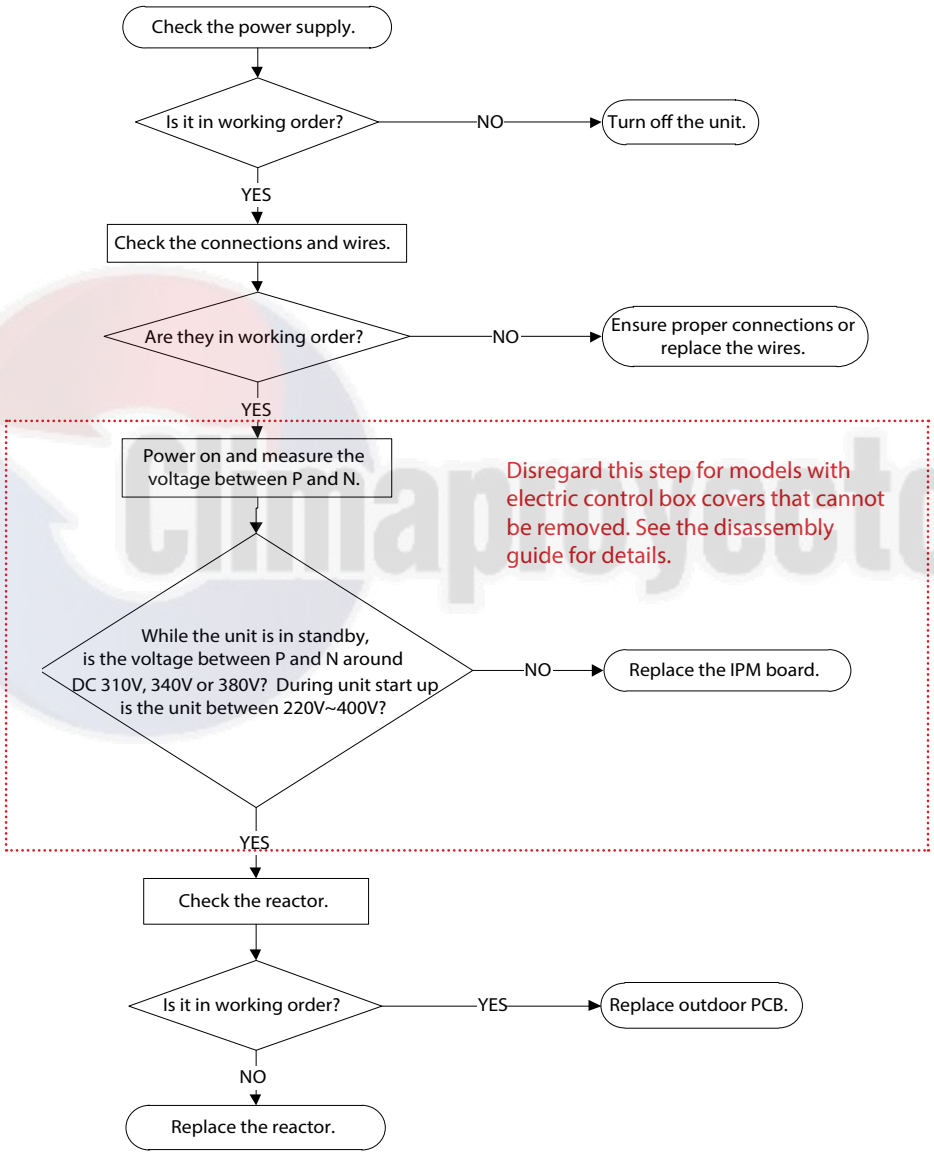
PC 01 (Over voltage or too low voltage protection) / PC 10 (Outdoor unit low AC voltage protection) / PC 11 (Outdoor unit main control board DC bus high voltage protection) / PC 12 (Outdoor unit main control board DC bus high voltage protection/341 MCE error) Diagnosis and Solution)

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

Recommended parts to repair:

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

Troubleshooting



A230100

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)

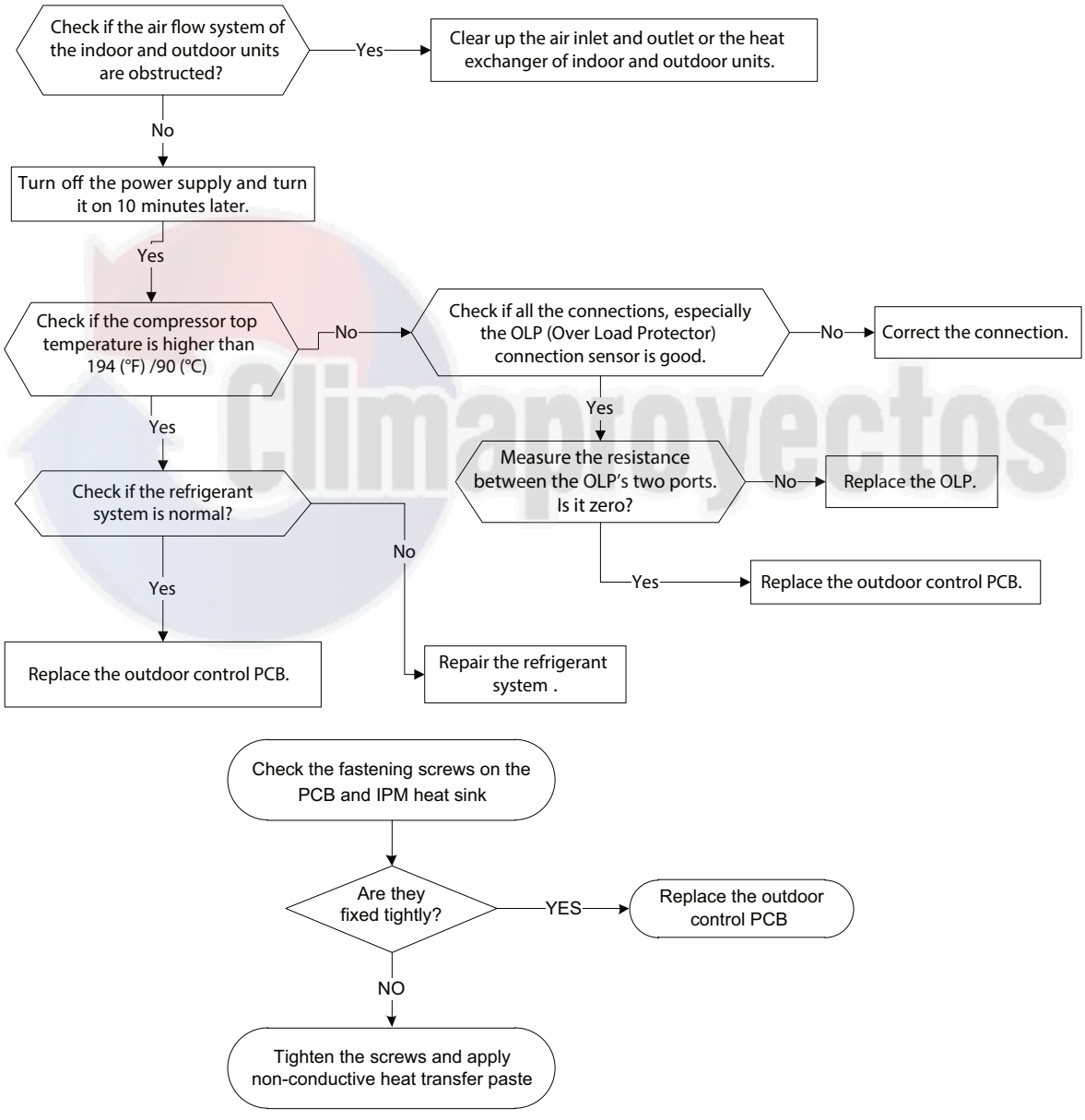
PC 02 / LC 06 (Top temperature protection of compressor or High temperature protection of IPM module Diagnosis and Solution)

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.

Recommended parts to repair:

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

Troubleshooting



A230101

DIAGNOSIS AND SOLUTION (CONT)

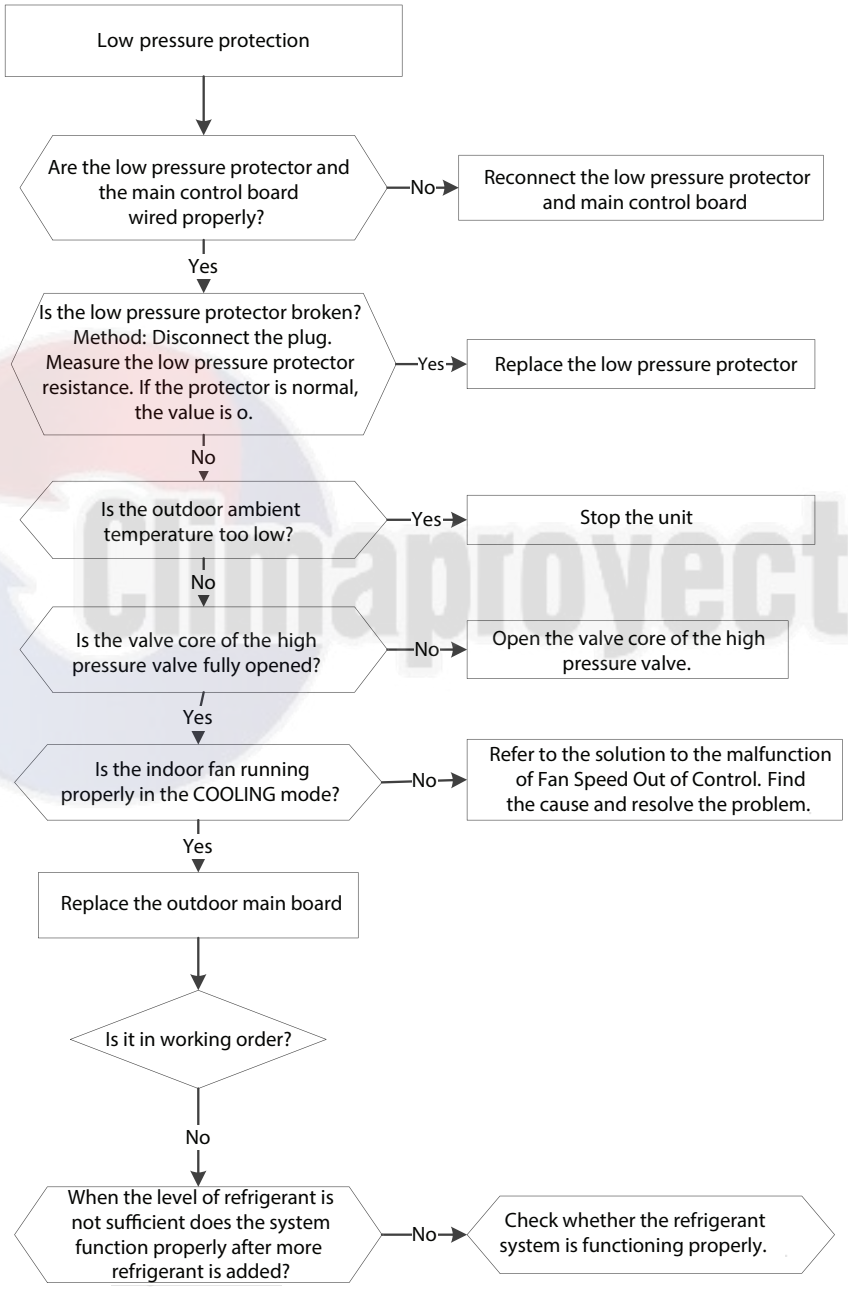
PC 03 / PC 31 (Low Pressure Protection Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays a failure code.

Recommended parts to repair:

- **Connection wires**
- **Low pressure protector**
- **Indoor fan assembly**
- **Outdoor PCB**

Troubleshooting



A230102

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

DIAGNOSIS AND SOLUTION (CONT)

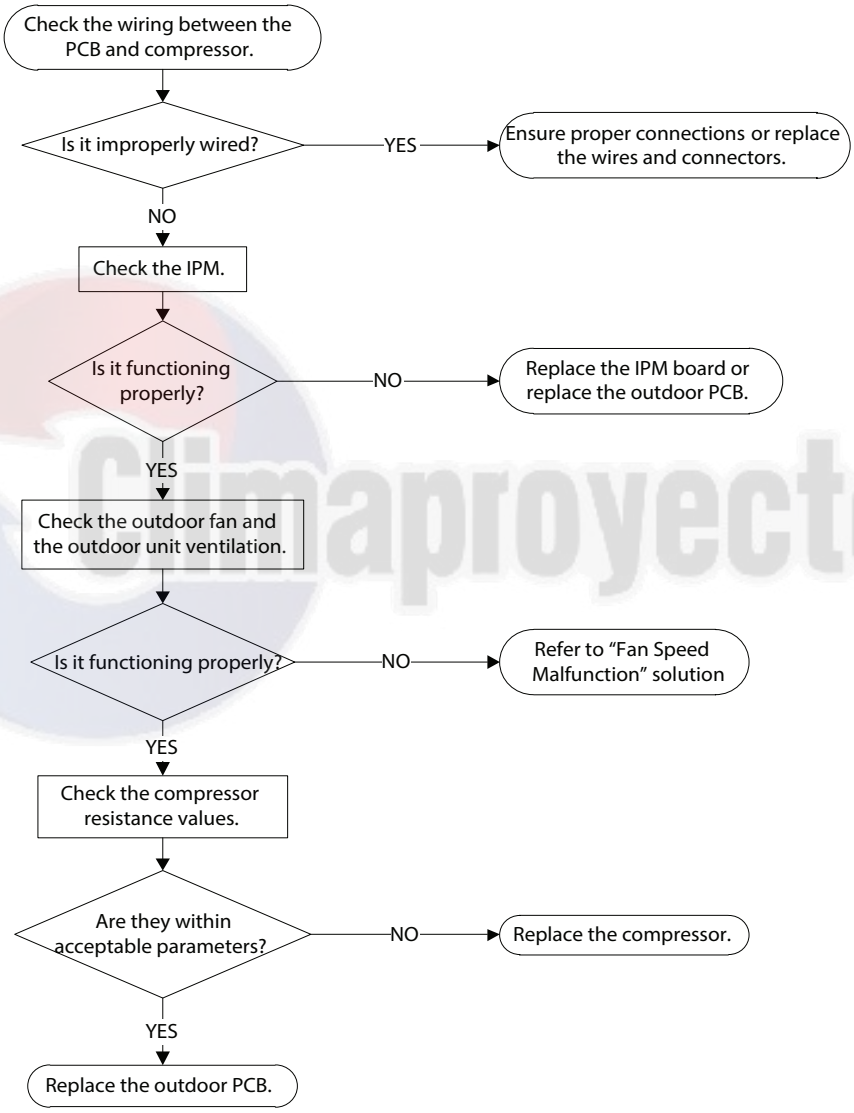
PC 04 (Inverter compressor drive error Diagnosis and Solution)

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

Recommended parts to repair:

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

Troubleshooting



A230103

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)

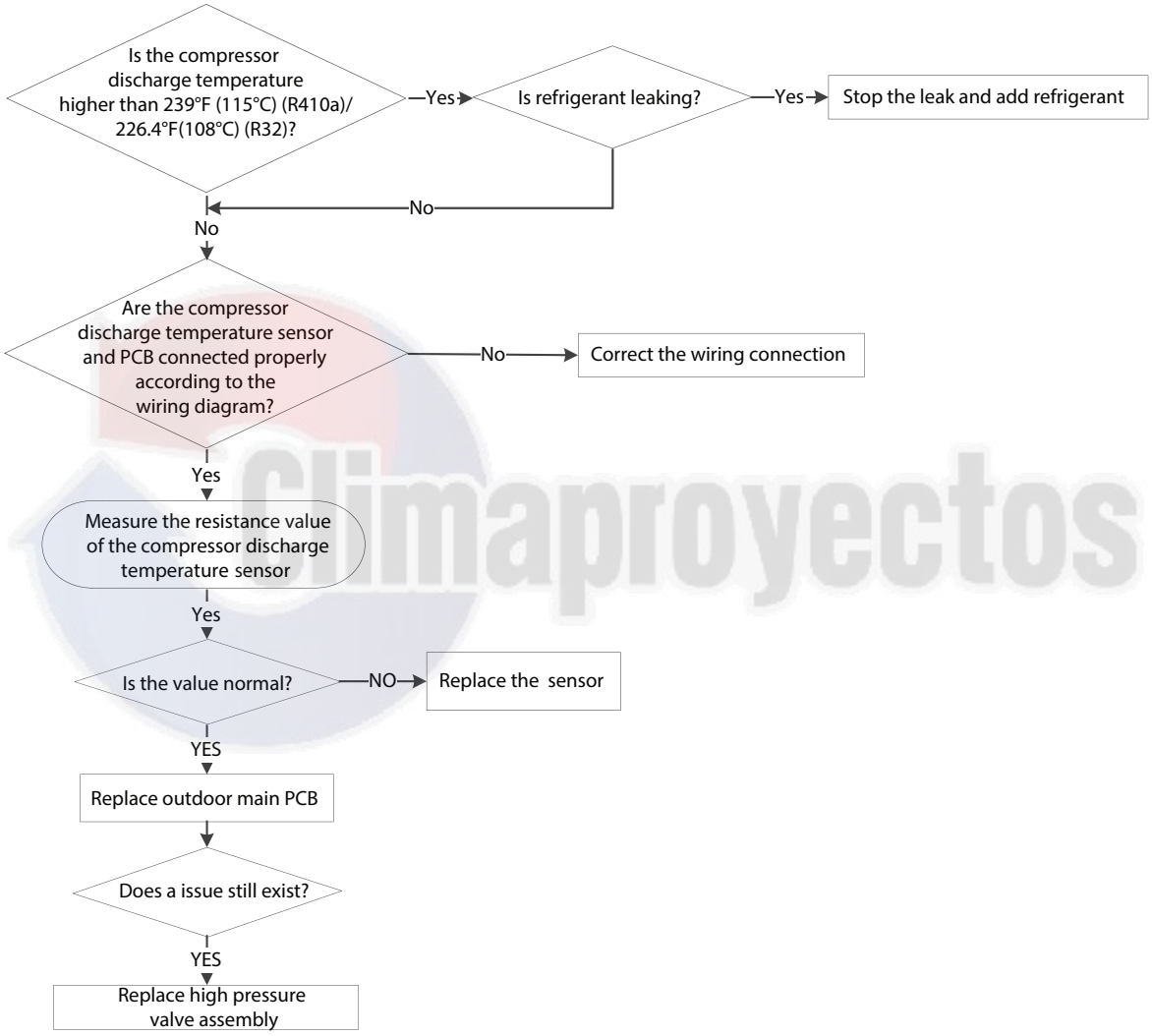
PC 06 (Discharge temperature protection of compressor Diagnosis and Solution)

Description: If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation, and the LED displays a failure code.

Recommended parts to repair:

- **Connection wires**
- **Discharge temperature sensor**
- **Additional refrigerant**
- **Outdoor main PCB**

Troubleshooting



A230104

NOTE: For certain models, the outdoor unit uses combination sensor, T3,T4 and TP are the same of sensor. The images within this document and the values are for reference only. The actual appearance and values may vary.

DIAGNOSIS AND SOLUTION (CONT)

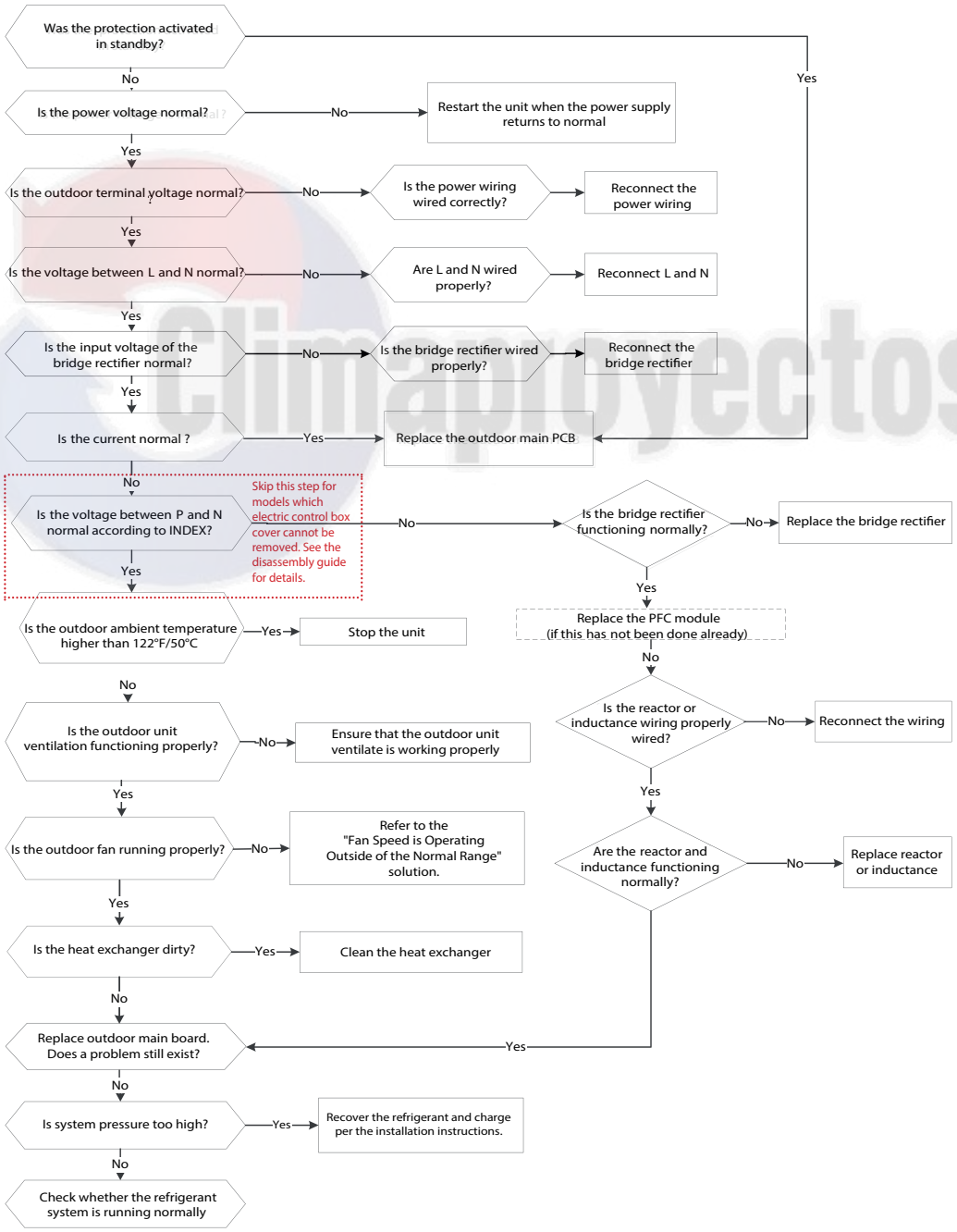
PC 08 (Current overload protection) / PC 44 (Outdoor unit zero speed protection) / PC 46 (Compressor speed has been out of control) / PC 49 (Compressor overcurrent failure) Diagnosis and Solution)

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

Recommended parts to repair:

- **Connection wires**
- **Rectifier**
- **PFC circuit or reactor**
- **Blocked refrigeration piping system**
- **Pressure switch**
- **Outdoor fan**
- **IPM module board**
- **Outdoor PCB**

Troubleshooting



A230105

DIAGNOSIS AND SOLUTION (CONT)

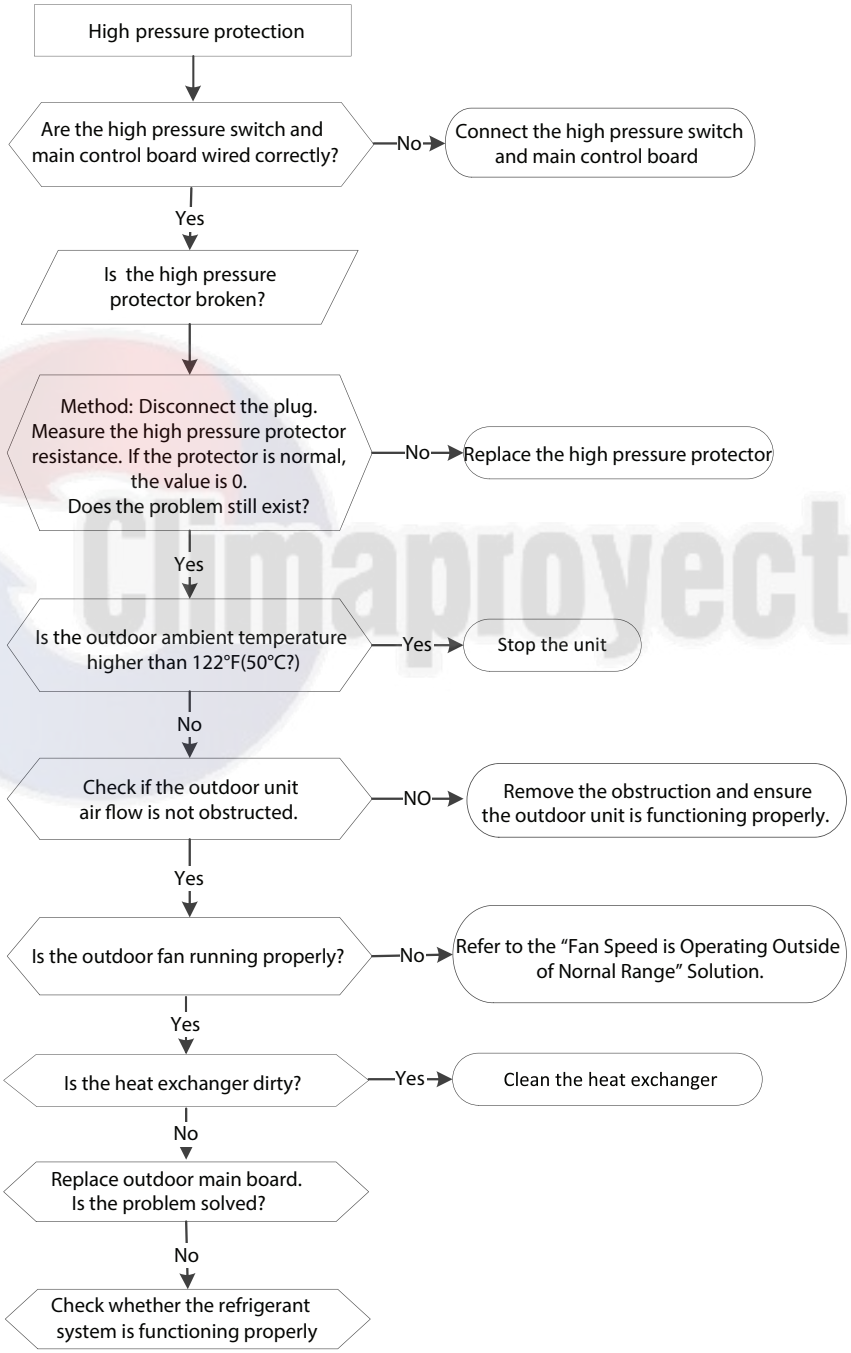
PC 30 (High pressure protection Diagnosis and Solution)

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

Recommended parts to repair:

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

Troubleshooting



A230106

DIAGNOSIS AND SOLUTION (CONT)

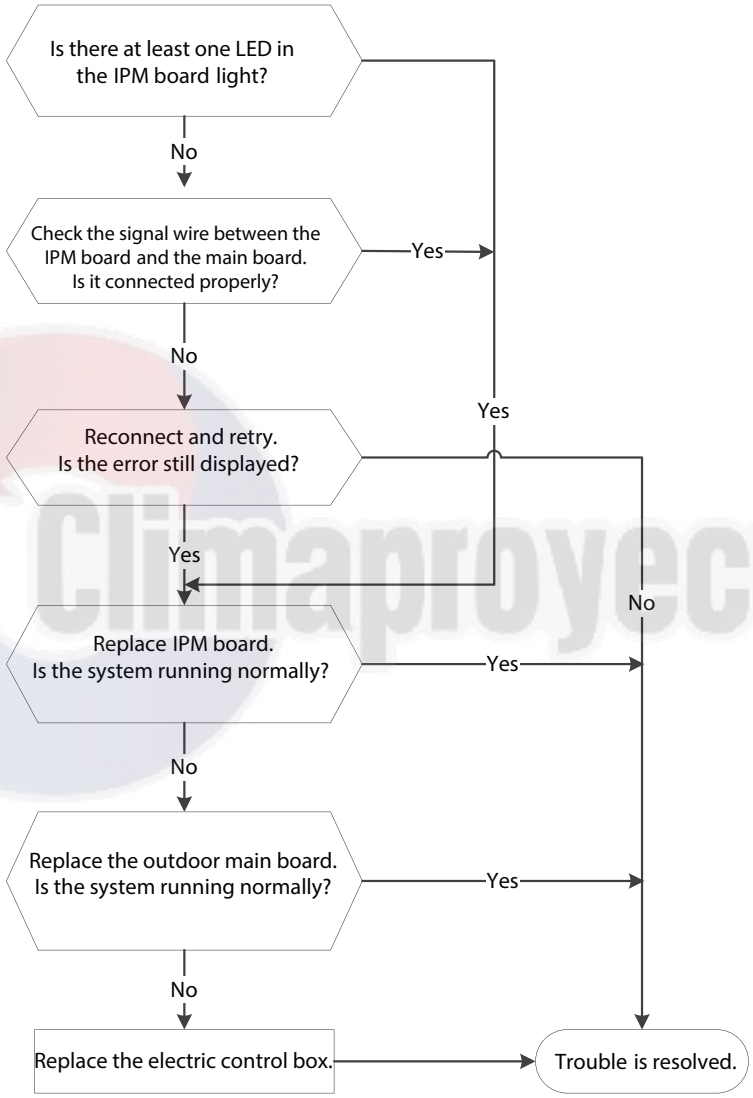
PC 40 (Communication error between outdoor main PCB and IPM board Diagnosis and Solution)

Description: The main PCB cannot detect the IPM board.

Recommended parts to repair:

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

Troubleshooting



A230107

DIAGNOSIS AND SOLUTION (CONT)

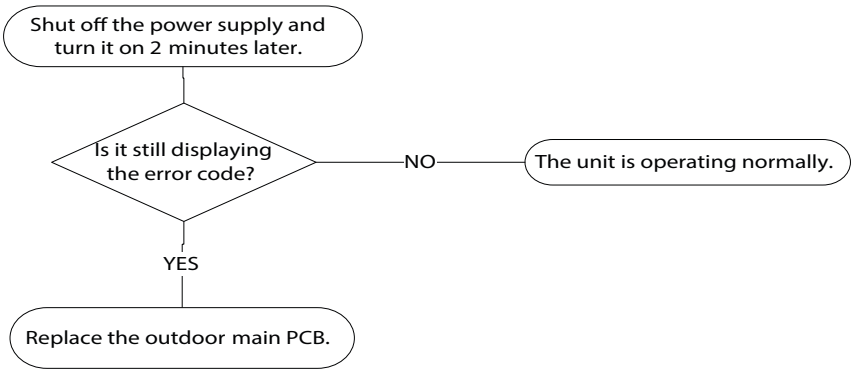
PC 41 (Outdoor compressor current sampling circuit failure Diagnosis and Solution)

Description: Three-phase sampling offset voltage error, the static bias voltage is normally 2.5V.

Recommended parts to repair:

- **Outdoor main PCB**

Troubleshooting



A230108

DIAGNOSIS AND SOLUTION (CONT)

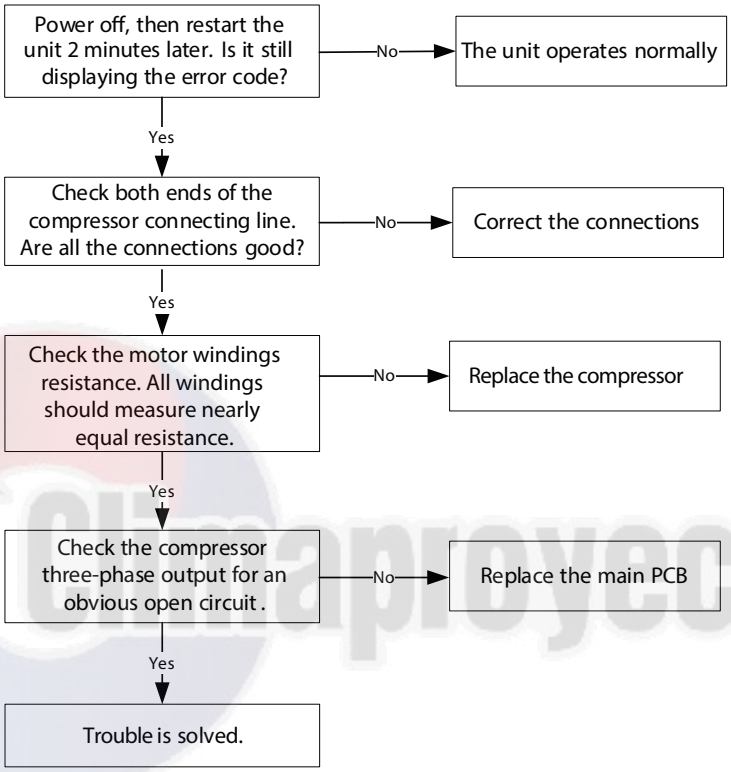
PC 43 (Outdoor compressor missing phase protection Diagnosis and Solution)

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

Recommended parts to repair:

- **Connection wire**
- **Compressor**
- **Outdoor PCB**

Troubleshooting



A230109

DIAGNOSIS AND SOLUTION (CONT)

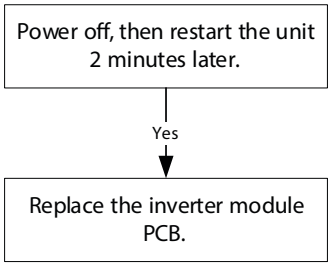
PC 45 (Outdoor unit IR chip drive failure Diagnosis and Solution)

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

Recommended parts to repair:

- **Inverter module PCB**

Troubleshooting



A230110

PC 0L (Low Ambient Temperature Protection)

Description: It is a protection function. When the compressor is off, the outdoor ambient temperature (T4) is lower than -63°F(-35°C). (-31°F) for 10 seconds, the air conditioner stops operation and displays the failure code. When the compressor is on, the outdoor ambient temperature (T4) is lower than -72°F (-40°C) for 10 seconds, the air conditioner stops and displays the failure code.

When the outdoor ambient temperature (T4) is no lower than -57.6°F (-32°C) for 10 seconds, the unit exits the protection mode.

DIAGNOSIS AND SOLUTION (CONT)

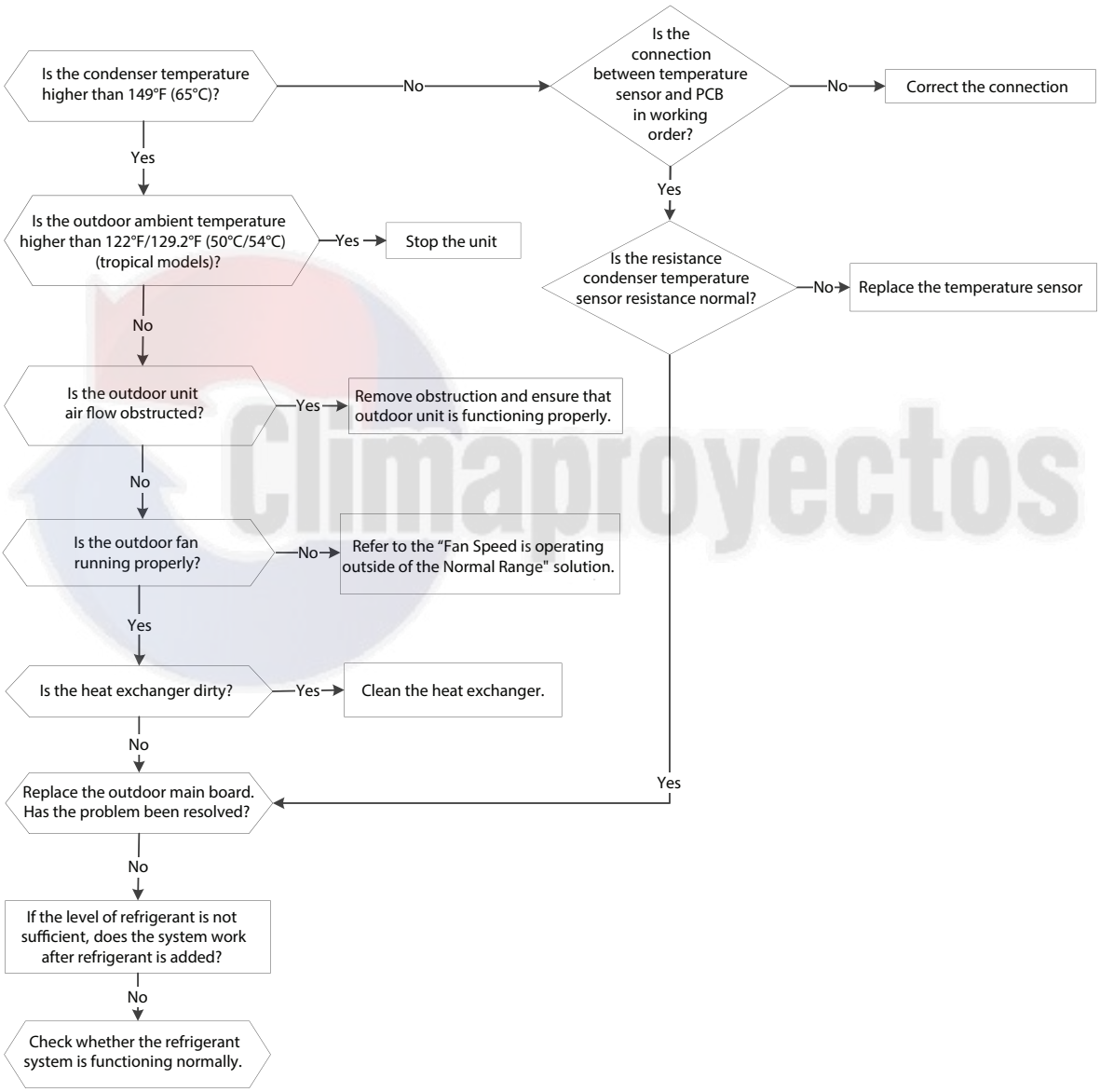
PC 0A (High temperature protection of condenser Diagnosis and Solution)

Description: When the outdoor pipe temperature is more than 149°F(65°C), the unit stops. It starts again only when the outdoor pipe temperature is less than 125.6°F (52°C).

Recommended parts to repair:

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

Troubleshooting



A230111

DIAGNOSIS AND SOLUTION (CONT)

PC 0F (PFC module protection Diagnosis and Solution)

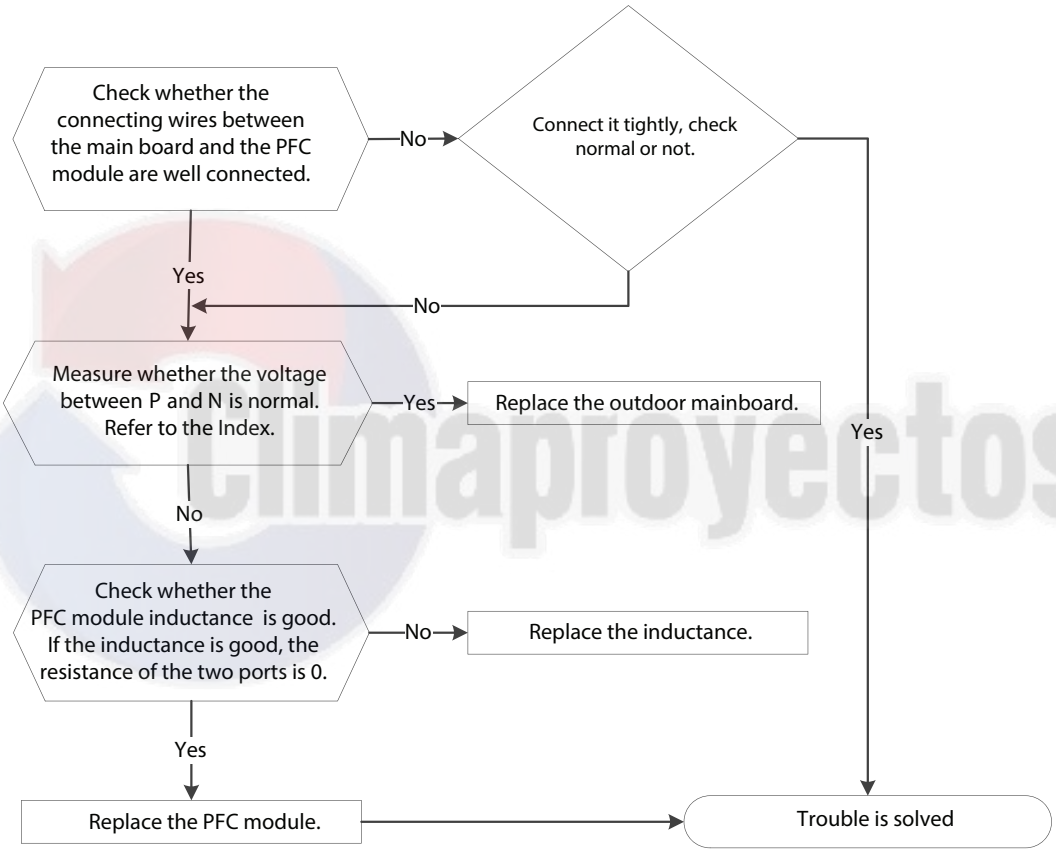
Description: When the voltage signal that IPM send to compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Recommended parts to repair:

- **Connection wires**
- **Inductance**
- **Outdoor main PCB**
- **PFC module**

Troubleshooting

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



A230112

DIAGNOSIS AND SOLUTION (CONT)

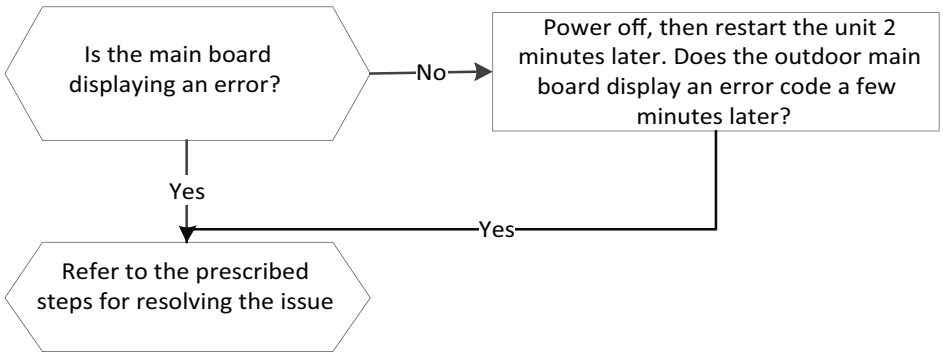
EC 0d (Outdoor unit malfunction Diagnosis and Solution)

Description: The indoor unit detect the outdoor unit is error.

Recommended parts to repair:

- **Outdoor unit**

Troubleshooting



A230113

DIAGNOSIS AND SOLUTION (CONT)

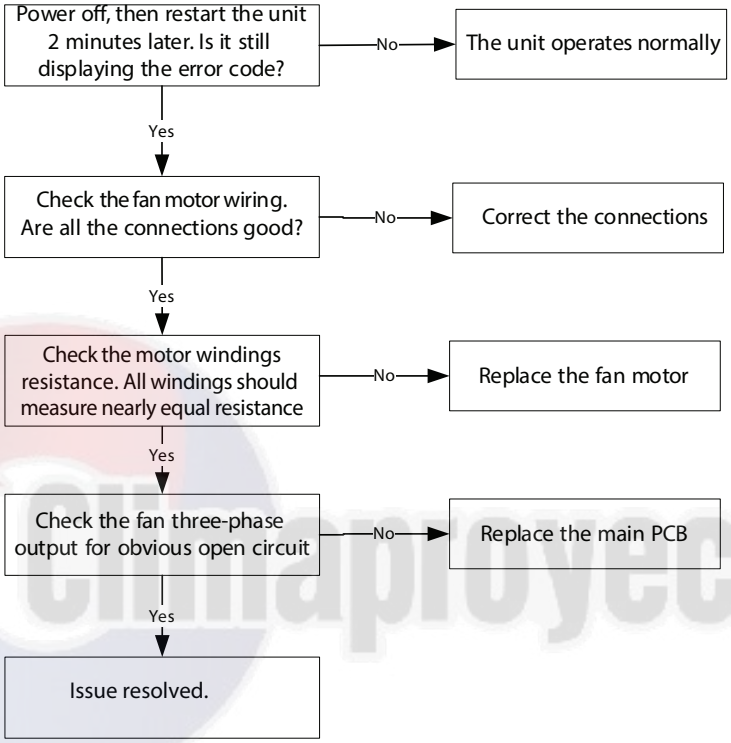
EC 72 (Missing phase failure of outdoor DC fan motor Diagnosis and Solution)

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

Recommended parts to repair:

- **Connection wire**
- **Fan motor**
- **Outdoor PCB**

Troubleshooting



A230114

DIAGNOSIS AND SOLUTION (CONT)

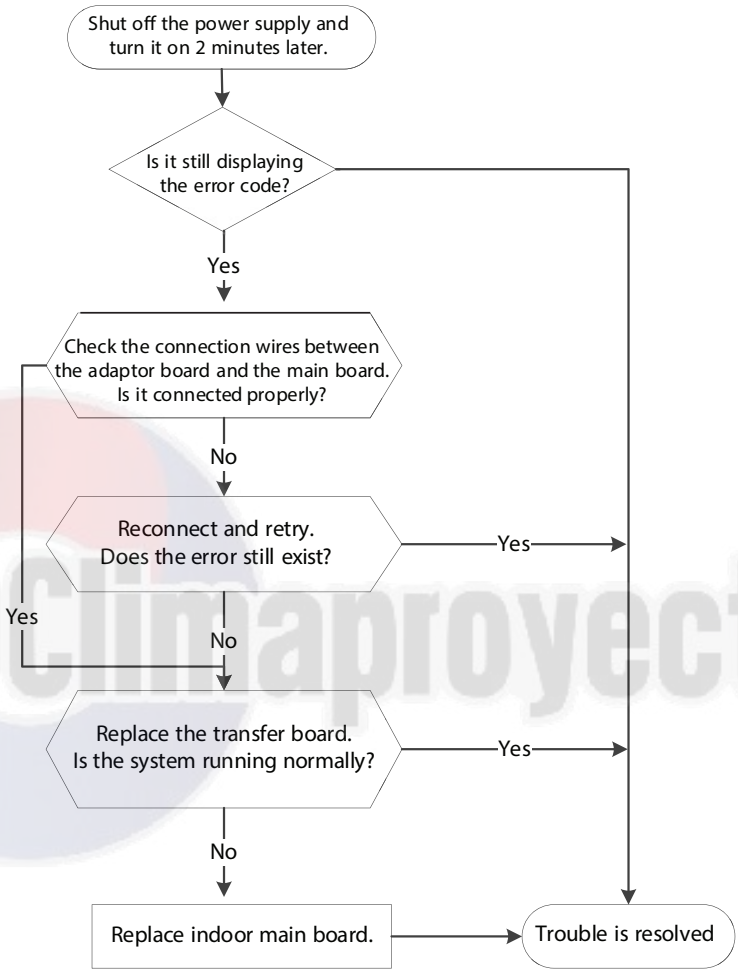
EH 0b (Communication error between indoor two chips Diagnosis and Solution)

Description: The indoor PCB main chip does not receive feedback from another chip.

Recommended parts to repair:

- **Indoor main board**
- **Adapter board**

Troubleshooting



A230115

DIAGNOSIS AND SOLUTION (CONT)

FL 09 Indoor and outdoor mismatch malfunction Diagnosis and Solution

Description: Indoor and outdoor units are mismatched, the LED displays the code. Replace the matching indoor or outdoor unit.

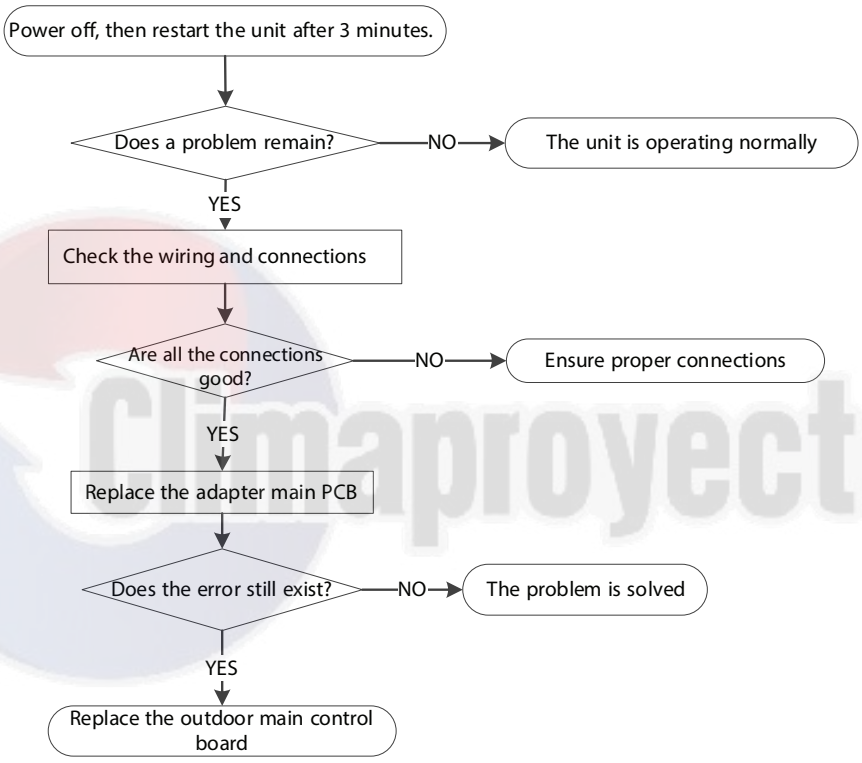
EL 16 (Communication malfunction between adapter board and outdoor main board Diagnosis and Solution)

Description: The adapter PCB cannot detect the main control board.

Recommended parts to repair:

- **Connection wires**
- **Adapter board**
- **Outdoor main PCB**

Troubleshooting



A230117

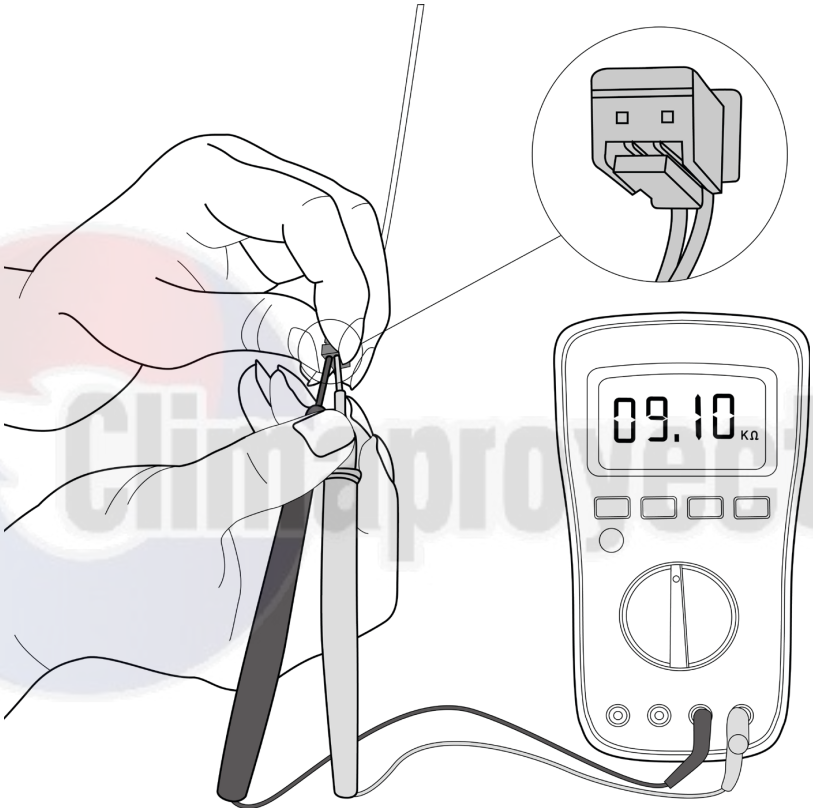
CHECK PROCEDURES

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 the PCB.
2. Measure the sensor's resistance value with a multi-meter.
3. Check the corresponding temperature sensor resistance value table (see Table 15 on page 79 and Table 16 on page 80).

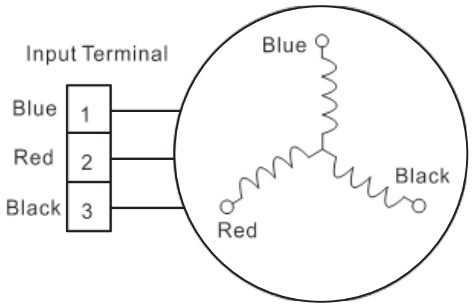


A230118

Fig. 29 — Measure the Sensor's Resistance Value

Compressor Check

1. Disconnect the compressor power cord from the outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in tables 9 through 12:



A230119

Fig. 30 — Compressor Check

Table 9 — Resistance Value

Resistance Value	ASM135D23UFZ	ATQ420D1UMU	ASN98D22UFZ	ATF235D22UMT	ATQ360D1UMU
Blue-Red	1.75Ω	0.37Ω	1.57Ω	0.75Ω	0.37Ω
Blue-Black					
Red-Black					

Table 10 — Resistance Value

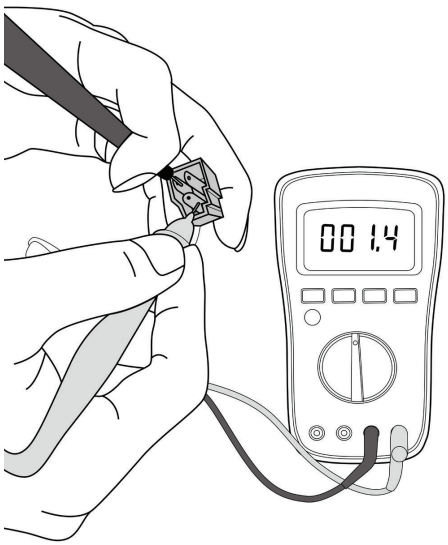
Resistance Value	ATM115D43UFZ2	ATF250D22UMT KTF250D22UMT	ATF310D43UMT	KSK103D33UEZ3	ASM98D32UFZ
Blue-Red	1.87Ω	0.75Ω	0.65Ω	2.13Ω	2.2Ω
Blue-Black					
Red-Black					

Table 11 — Resistance Value

Resistance Value	ASN140D21UFZ	ASK89D29UEZD	KSN140D21UFZ	KTM240D57UMT	KSN140D58UFZ
Blue-Red	1.28Ω	1.99Ω	1.28Ω	0.62Ω	1.86
Blue-Black					
Red-Black					

Table 12 — Resistance Value

Resistance Value	KTF310D43UMT	KTQ420D1UMU	ATN150D30UFZA KTM240D43UKT	EAPQ420D1UMUA
Blue-Red	0.65Ω	0.37Ω	1.03Ω	0.37Ω
Blue-Black				
Red-Black				



A230120

Fig. 31 —Test

IPM Continuity Check

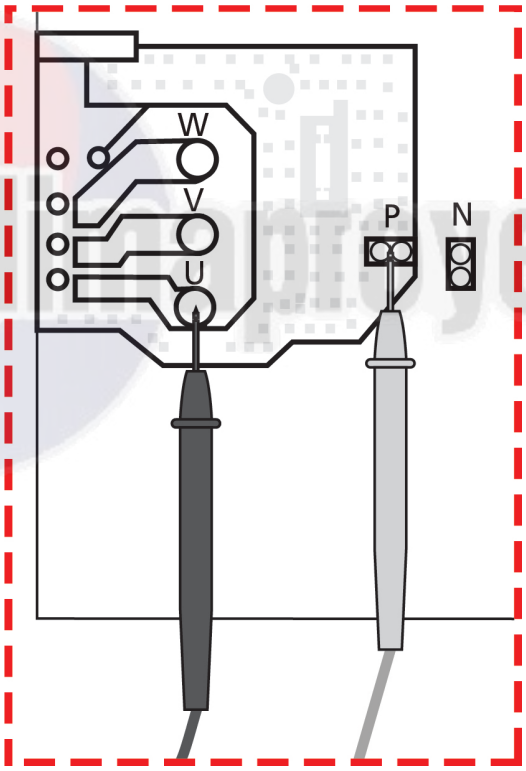
WARNING

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

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

Table 13 — Resistance Value

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



A230121

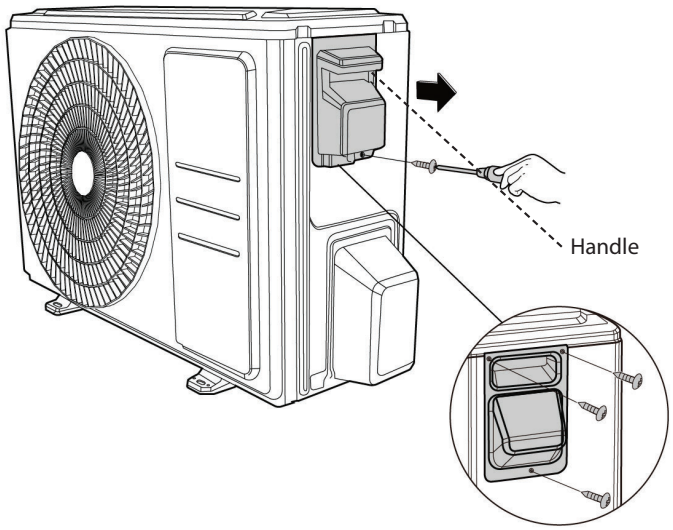
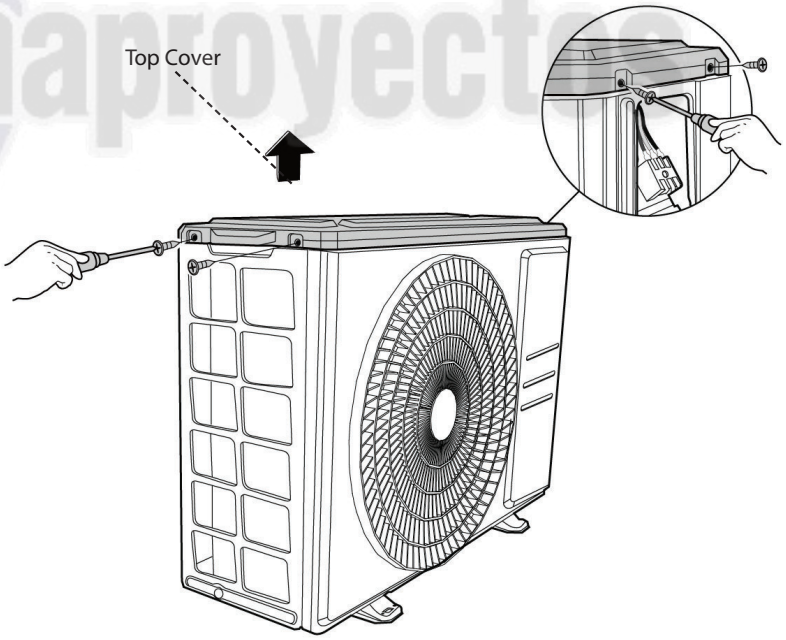
Fig. 32 — Resistance Value

Table 14 — Voltage Range

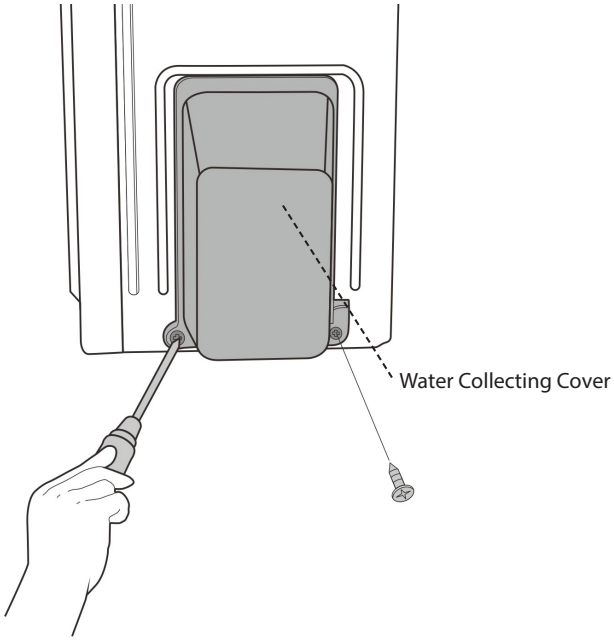
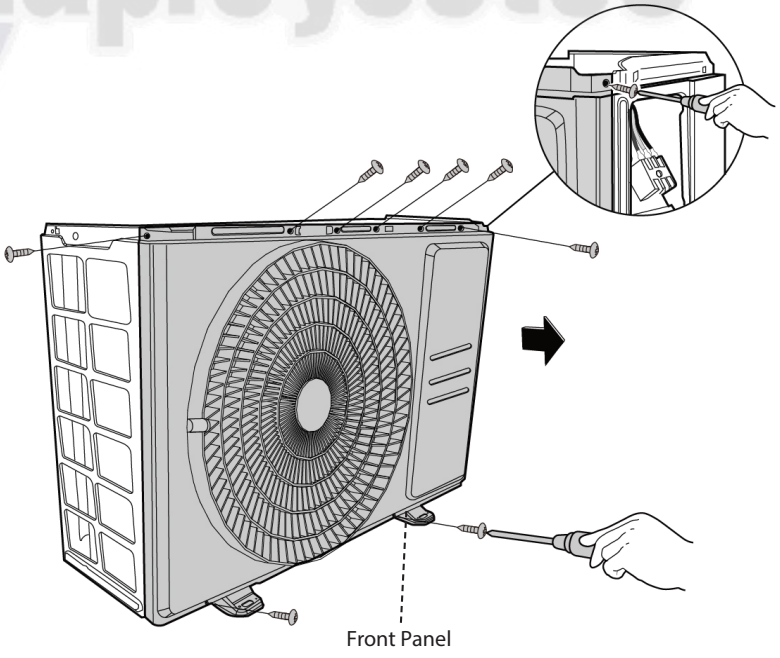
208-240V (1-phase)		
In standby		
around 310VDC		
In operation		
With passive PFC module	With partial active PFC module	With fully active PFC module
>200VDC	>310VDC	>370VDC

DISASSEMBLY INSTRUCTIONS

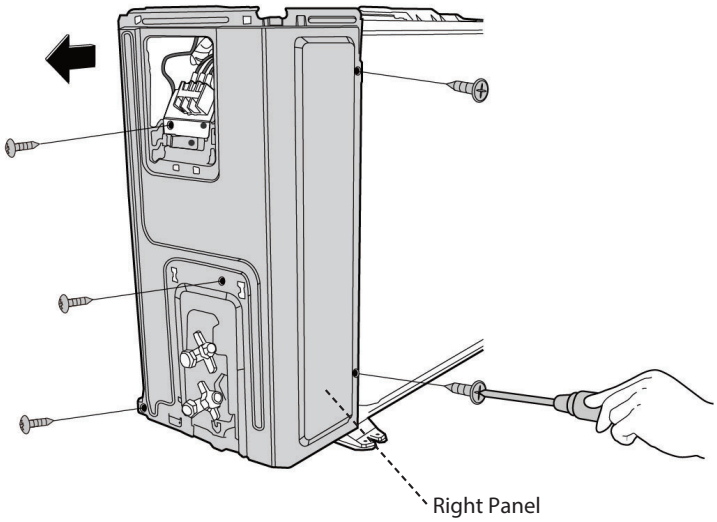
Panel Plate Size 18K Standard Heat

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

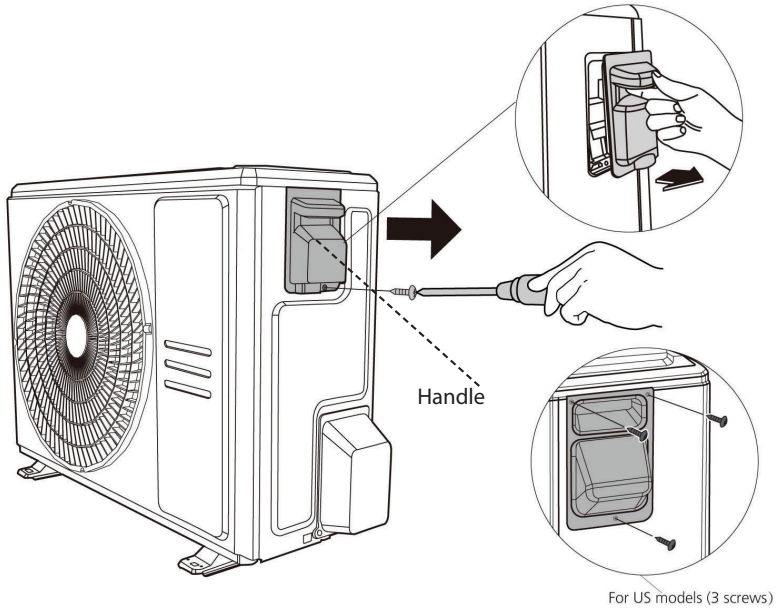
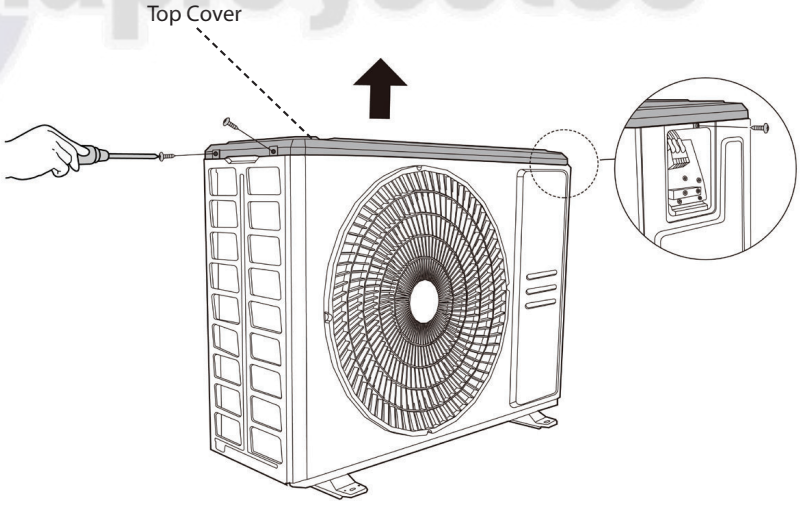
Outdoor Unit Size 18K Standard Heat (CONT)

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

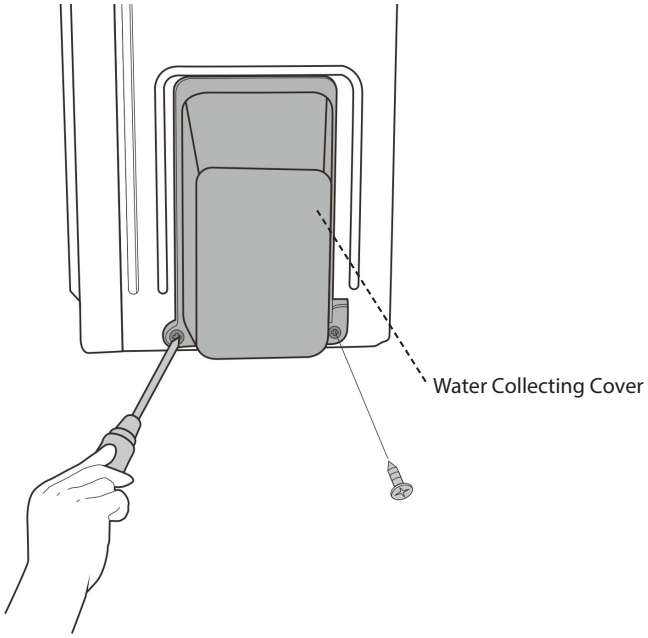
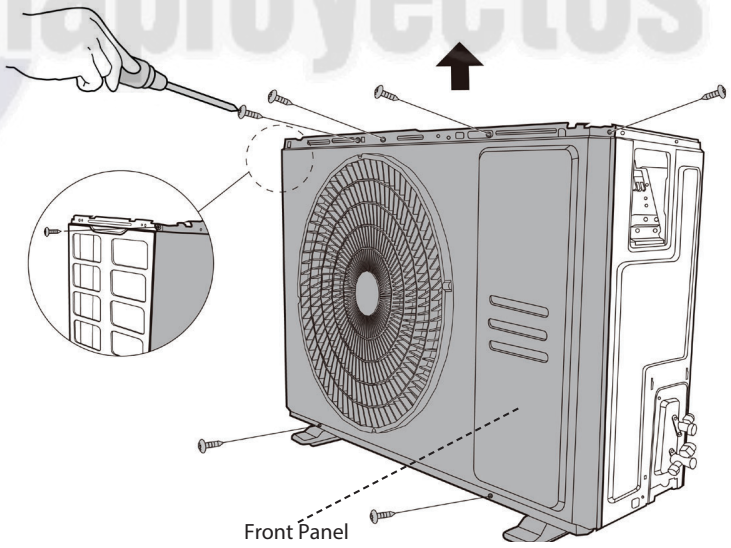
Outdoor Unit Size 18K Standard Heat (CONT)

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

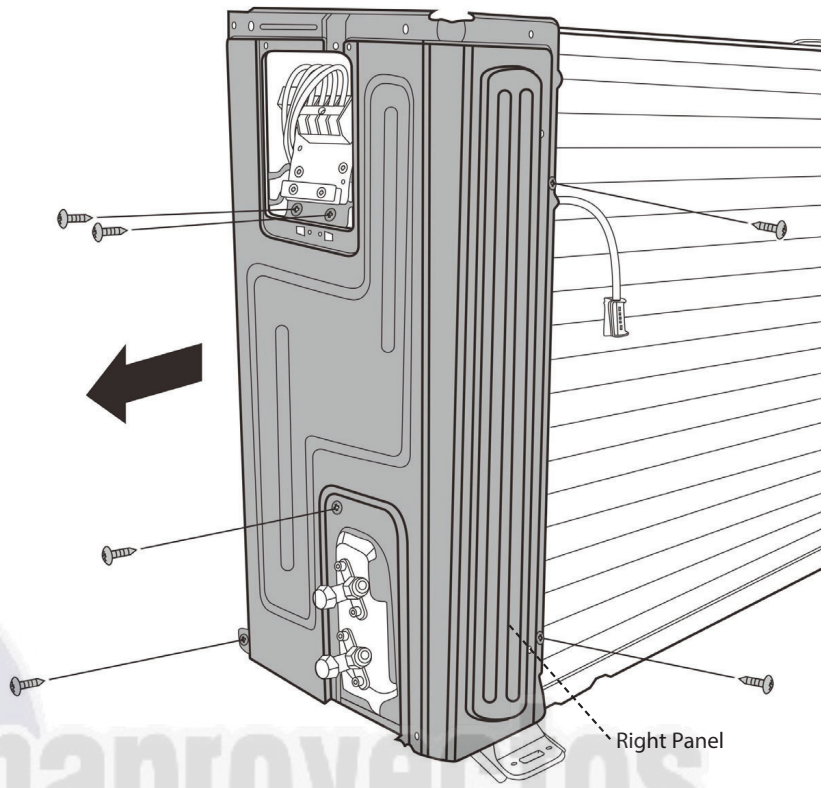
Outdoor Unit Sizes 18K High Heat and 24K Standard Heat

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.	

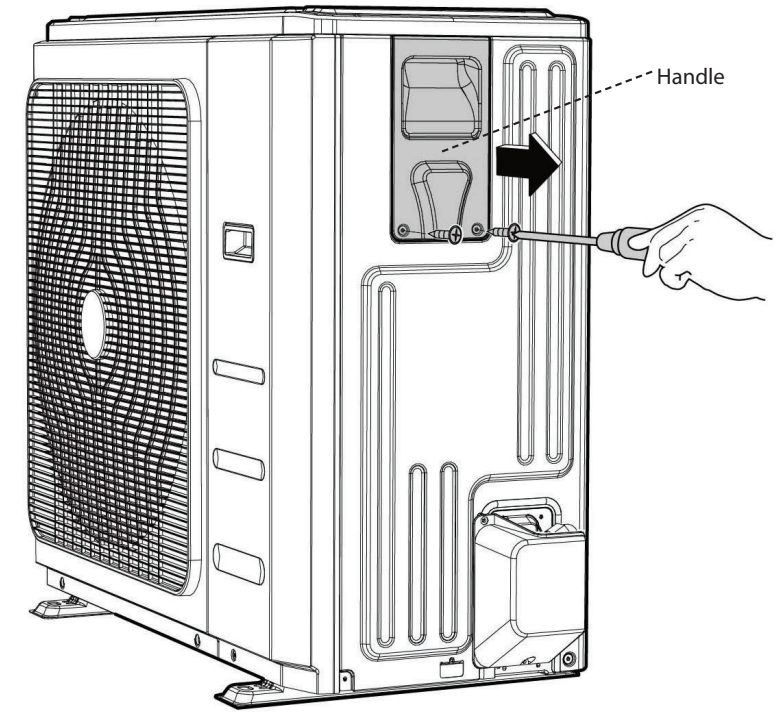
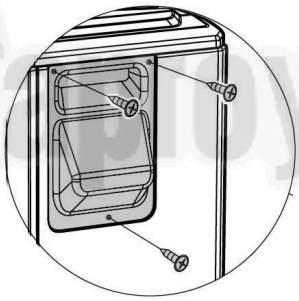
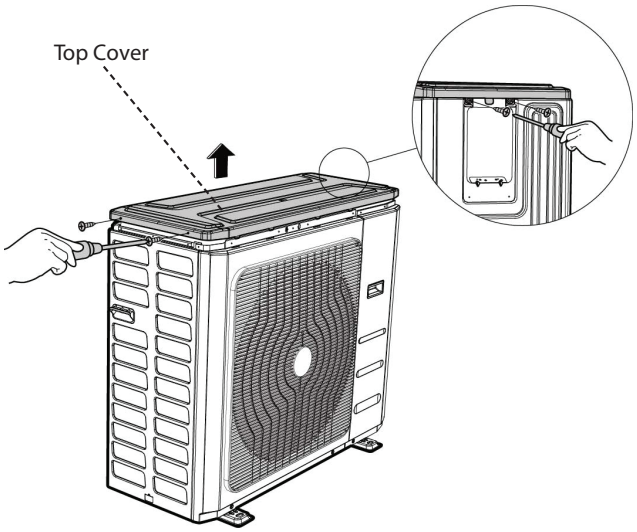
Outdoor Unit Sizes 18K High Heat and 24K Standard Heat (CONT)

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

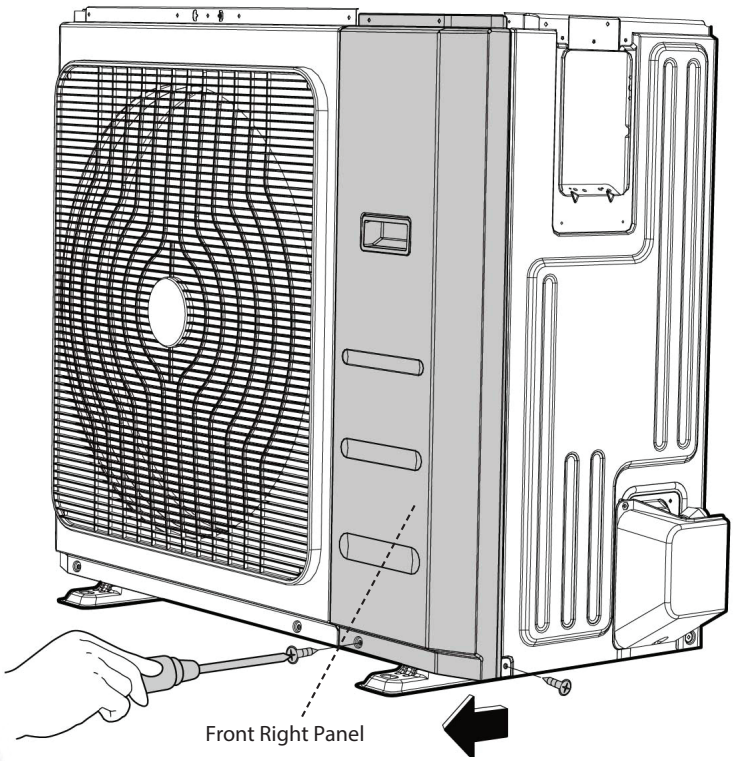
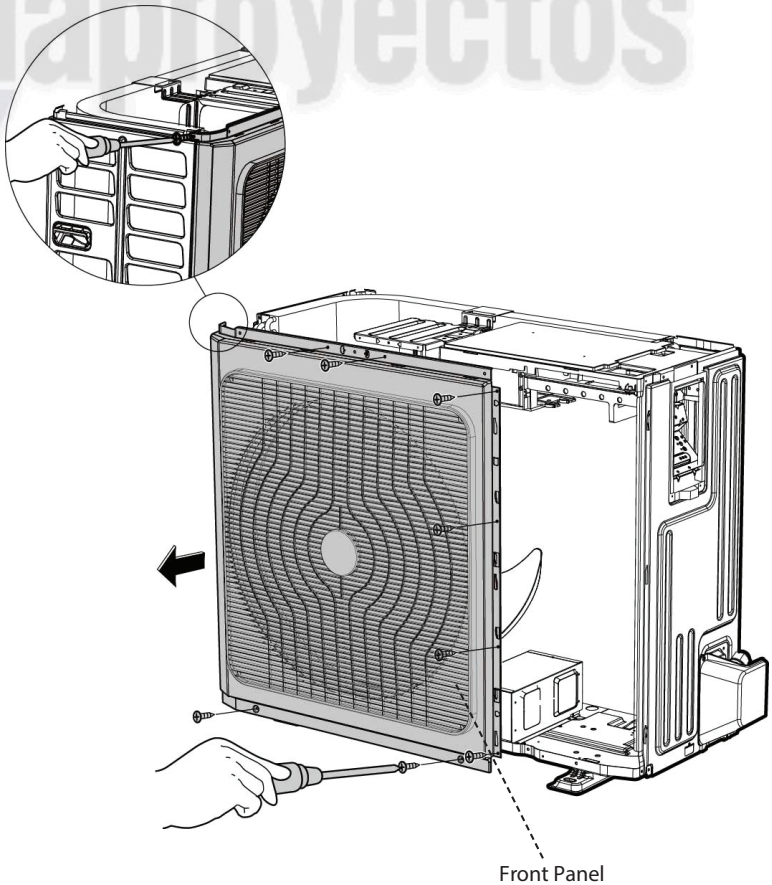
Outdoor Unit Sizes 18K High Heat and 24K Standard Heat (CONT)

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

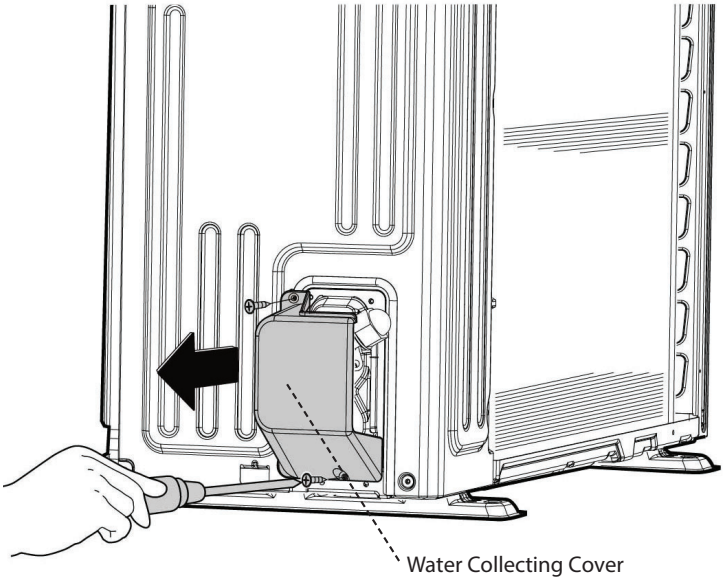
Outdoor Unit Sizes 24K High Heat, 30K Standard and High Heat and 36K Standard Heat

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the handle screws (2) then 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.	

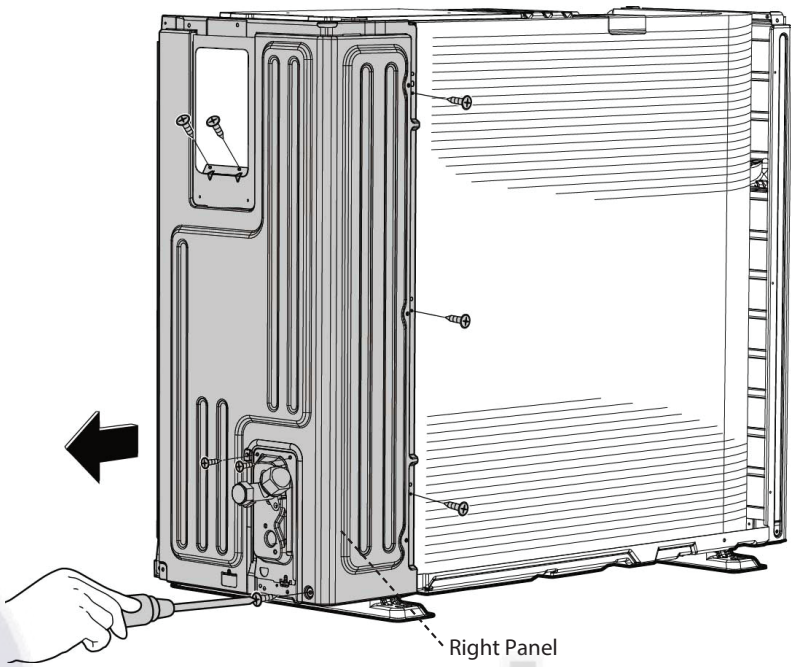
Outdoor Unit Sizes 24K High Heat, 30K Standard and High Heat and 36K Standard Heat (CONT)

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

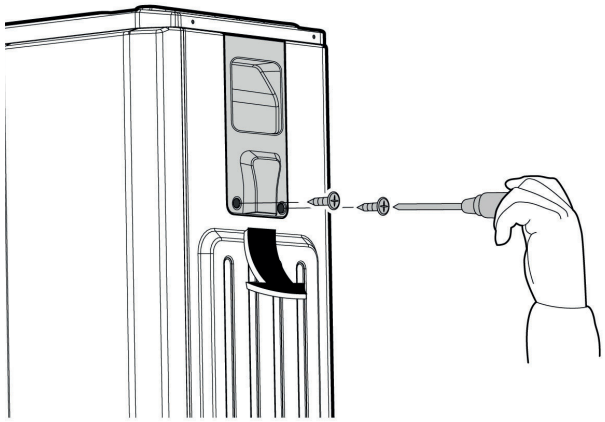
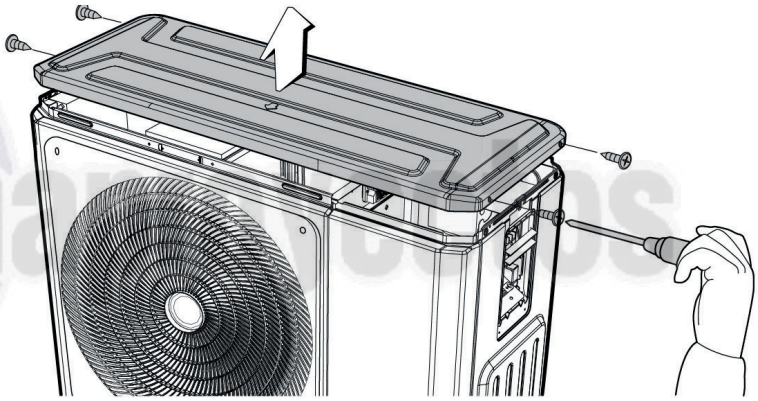
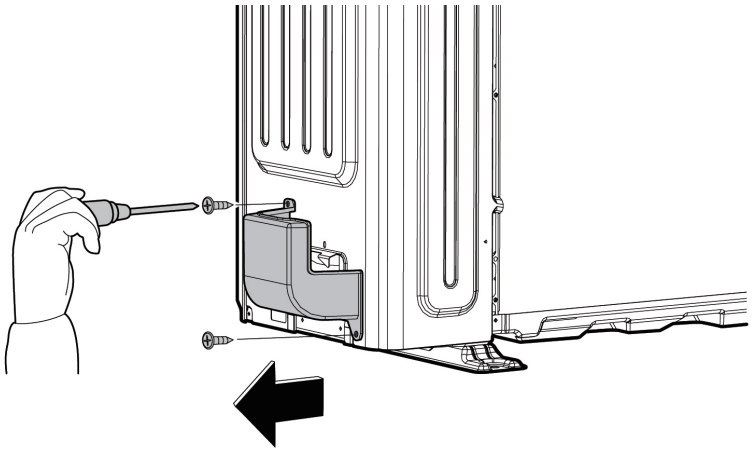
Outdoor Unit Sizes 24K High Heat, 30K Standard and High Heat and 36K Standard Heat (CONT)

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

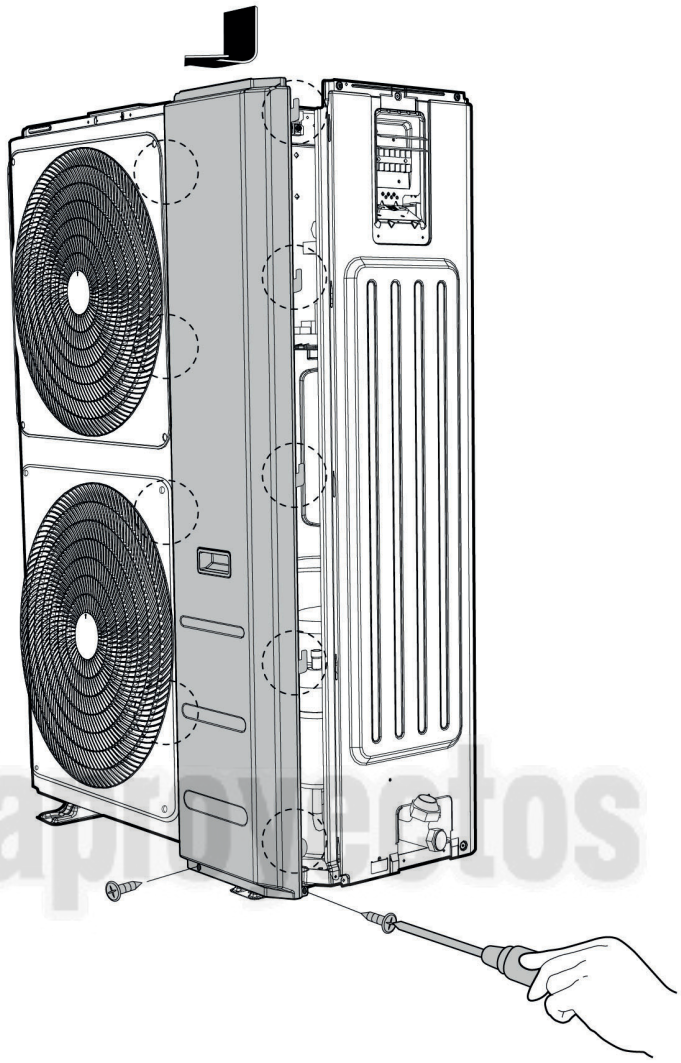
Outdoor Unit Sizes 24K High Heat, 30K Standard and High Heat and 36K Standard Heat (CONT)

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

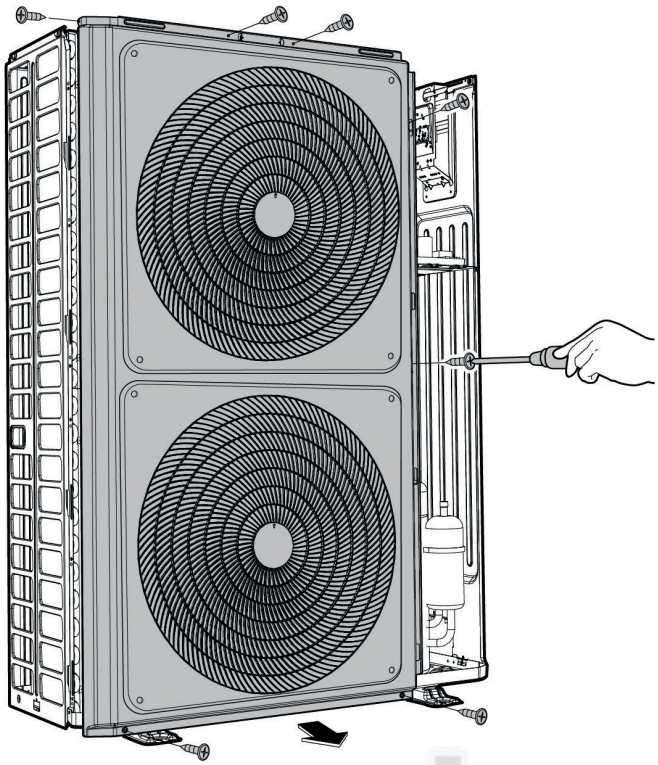
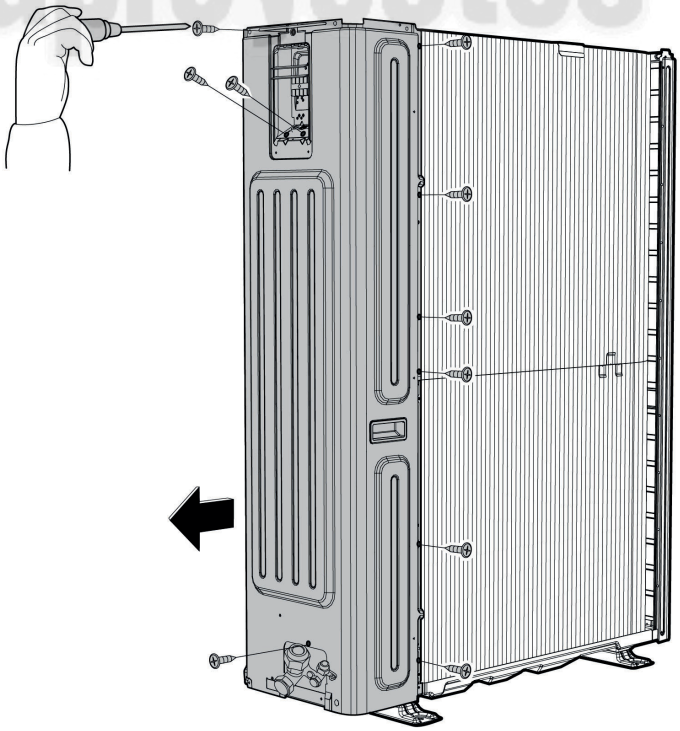
Outdoor Unit Sizes 36K High Heat, 48K Standard and High Heat and 60K Standard and High Heat

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 covers. Two of the screws are located under the handle.	
4) Remove the water collecting cover screws (2) then remove the water collecting cover.	

Outdoor Unit Sizes 36K High Heat, 48K Standard and High Heat and 60K Standard and High Heat (CONT)

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

Outdoor Unit Sizes 36K High Heat, 48K Standard and High Heat and 60K Standard and High Heat (CONT)

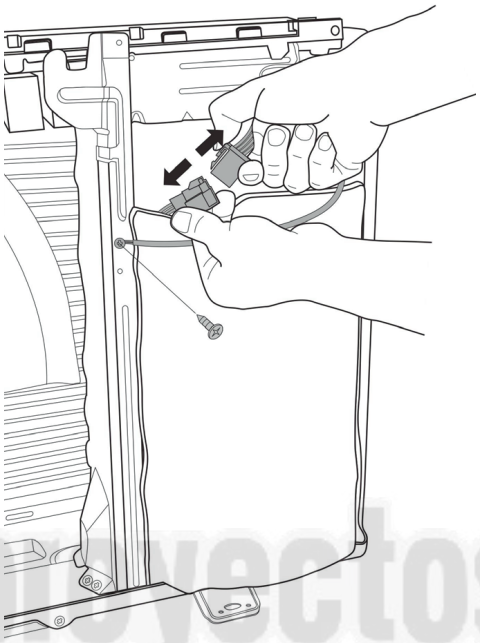
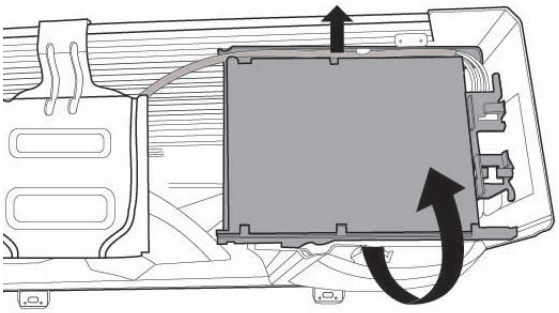
Procedure	Illustration
6) Remove thefront panel screws (7) and then remove the front panel.	
7) Remove the right panel screws (10) then remove the right panel.	

REMOVE THE ELECTRICAL PARTS

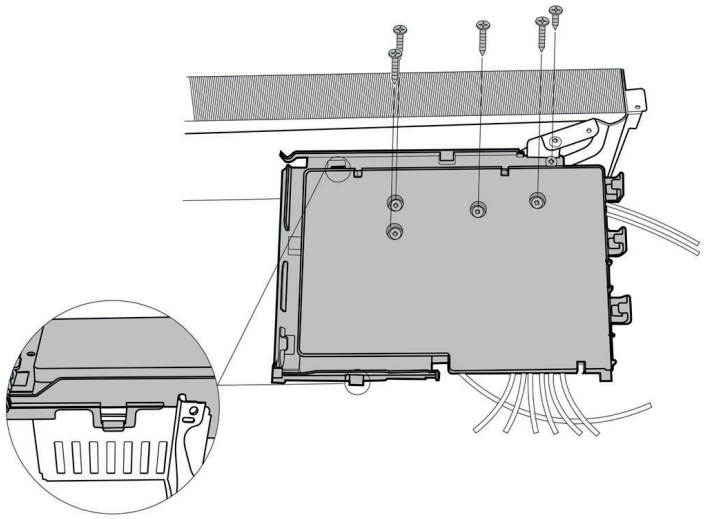
WARNING

Anti-static gloves must be worn when you disassemble the electronic box.

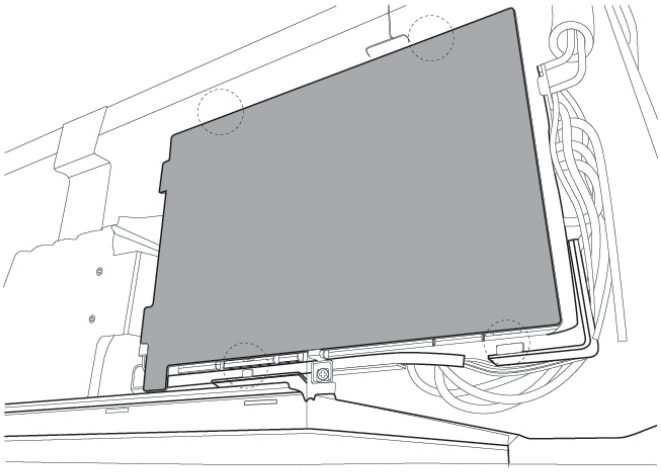
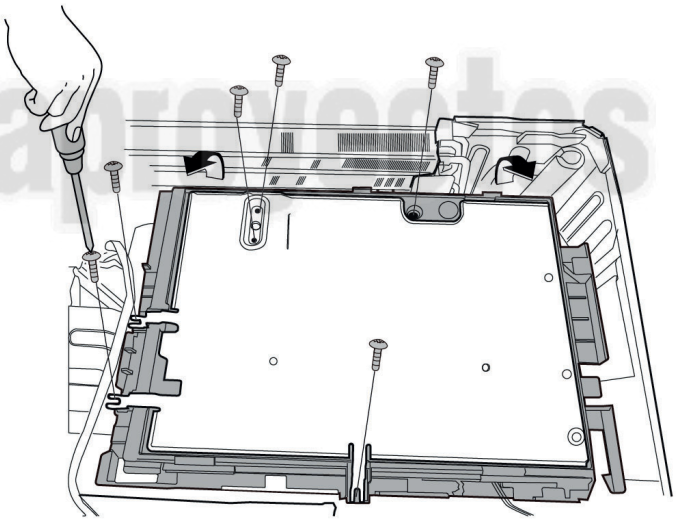
Model 18K Standard Heat

Procedure	Illustration
1) Disconnect the compressor connector 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.	

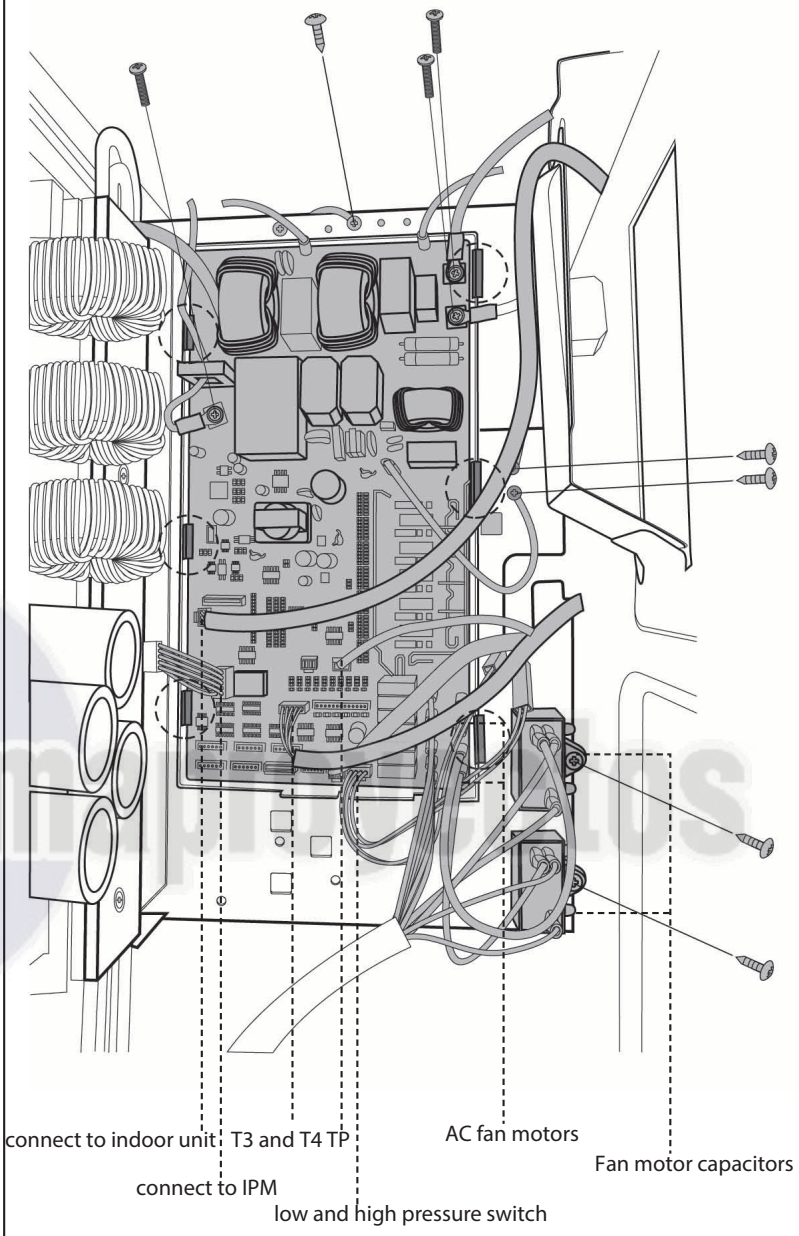
Models: 18K High Heat, 24K Standard Heat

Procedure	Illustration
1) Remove the screws, loosen the hooks, then open the electronic control box cover (5 screws and 2 hooks). Note: The electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	

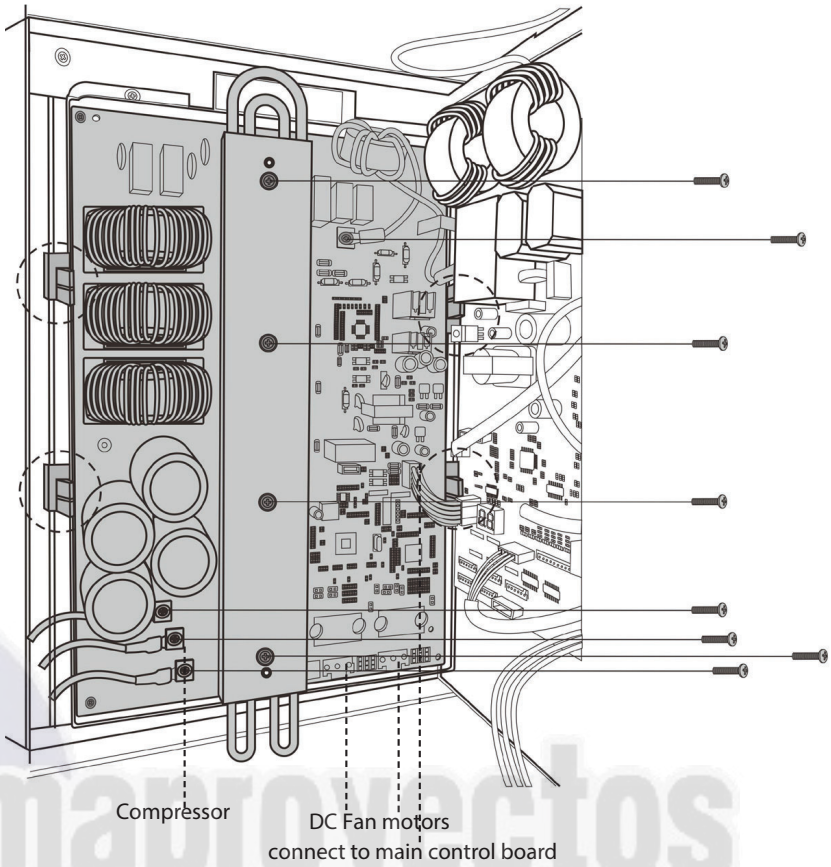
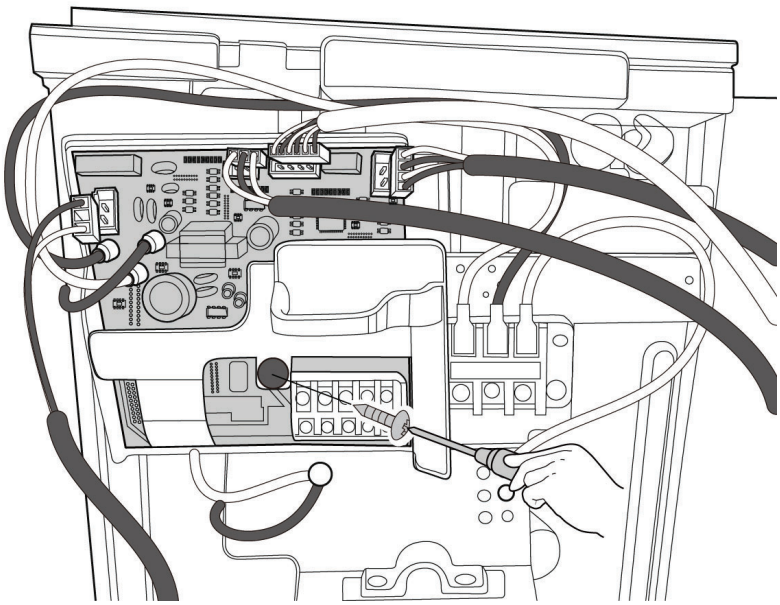
Models: 24K High Heat, 30K Standard and High Heat and 36K Standard Heat

Procedure	Illustration
1) Loosen the hooks (4) then open the electronic control box cover.	
2) Remove 6 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.	

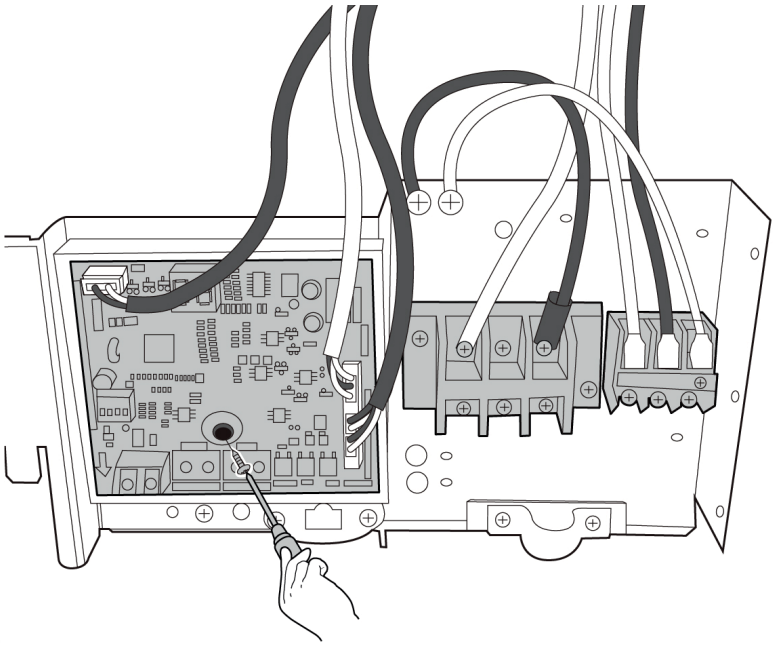
Models: 36K High Heat, 48K Standard and High Heat and 60K Standard and High Heat

Procedure	Illustration
1) Remove 2 screws to disconnect the power supply wires. 2) Remove the 3 screws to disconnect the ground wires. 3) Disconnect the wires connected to the main control board. 4) Disconnect the wires between the main control board and the IPM module board. 5) Remove the 4 screws and loosen the 6 hooks and then remove the main control board. 6) Remove 1 screw to remove the fan motor capacitor (1 screw for each capacitor).	

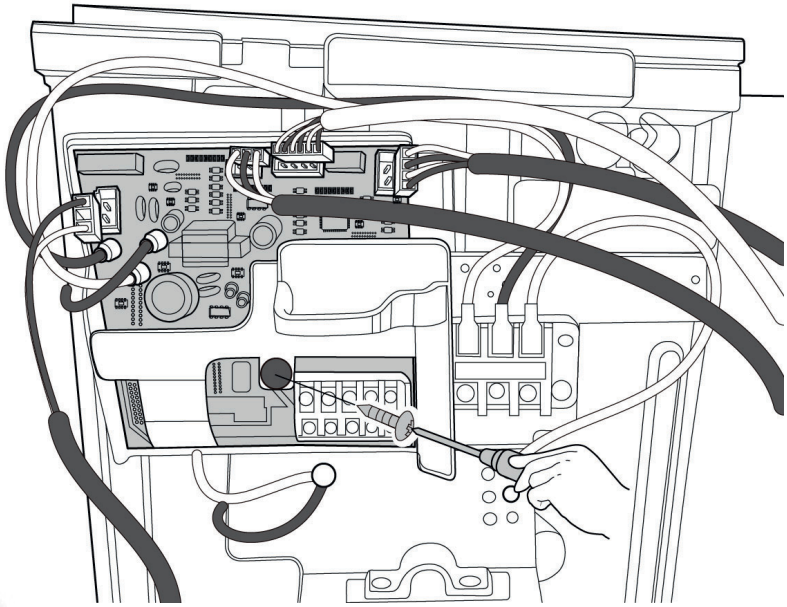
PCB Board 8

Procedure	Illustration
1) Remove 2 screws to disconnect the power supply wires. 2) Remove 3 screws to disconnect the wires connected to the compressor. 3) Remove 3 screws to remove the radiator. 4) Disconnect the wires between the IPM module board and the main control board. 5) Remove the 4 screws and loosen the 4 hooks then remove the IPM module board.	
6) Remove the 1 screw and disconnect the wires then remove the 24V board.	

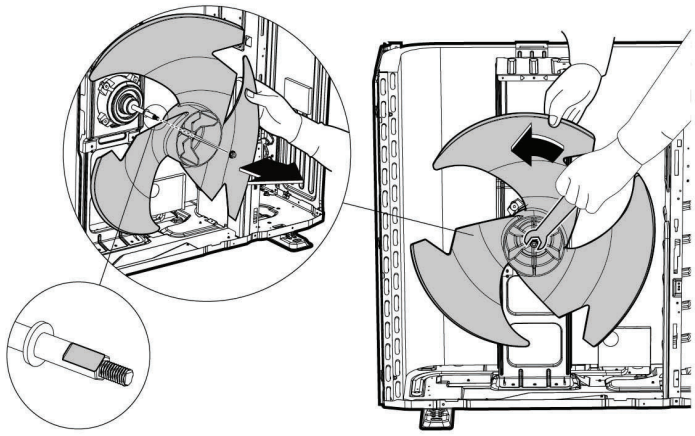
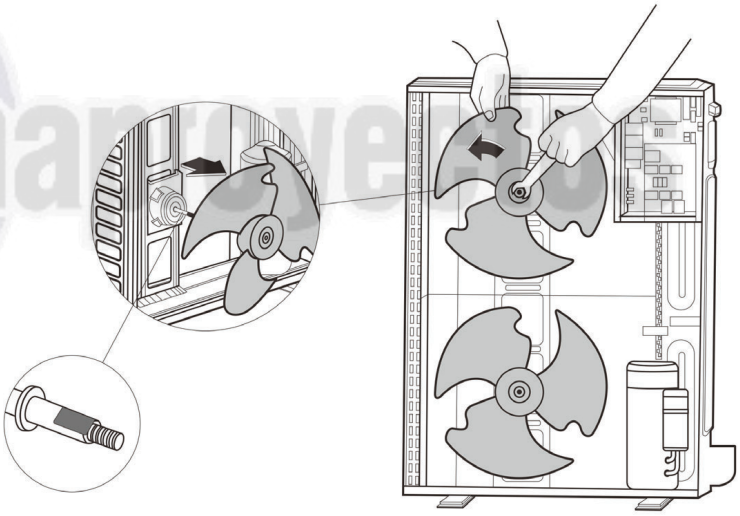
PCB Board 8 (CONT)

Procedure	Illustration
1) Remove the 1 screw and disconnect the wires then remove the key board.	

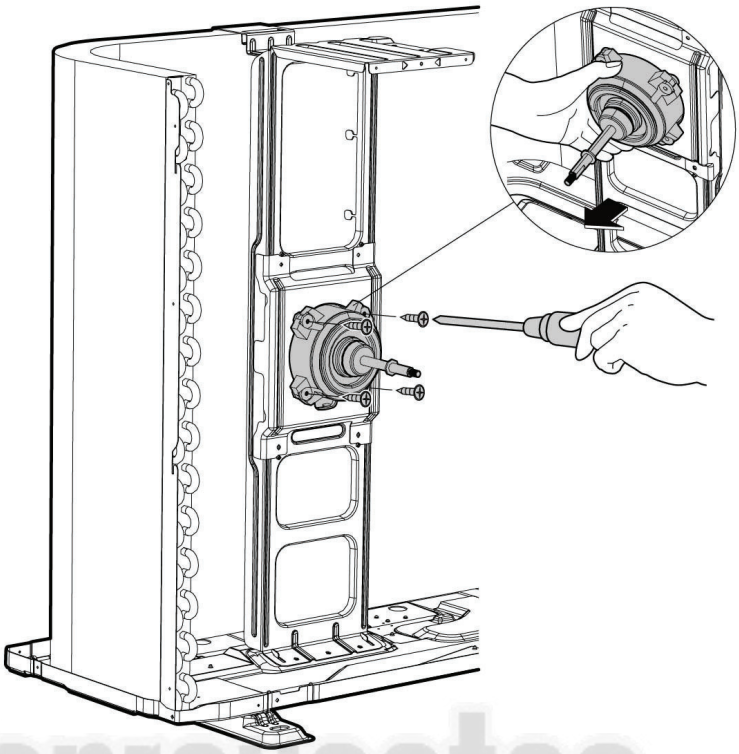
PCB Board 14 (CONT)

Procedure	Illustration
3) Remove the screw (1) and disconnect the wires then remove the 24V board.	

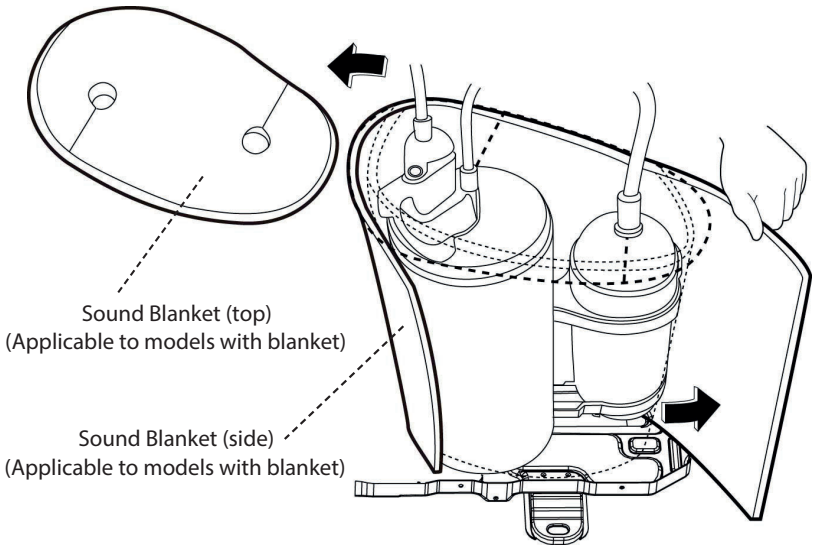
Fan Assembly

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

Fan Assembly (CONT)

Procedure	Illustration
3) Remove the fan motor screws (4). 4) Remove the fan motor.	

Sound Blanket

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

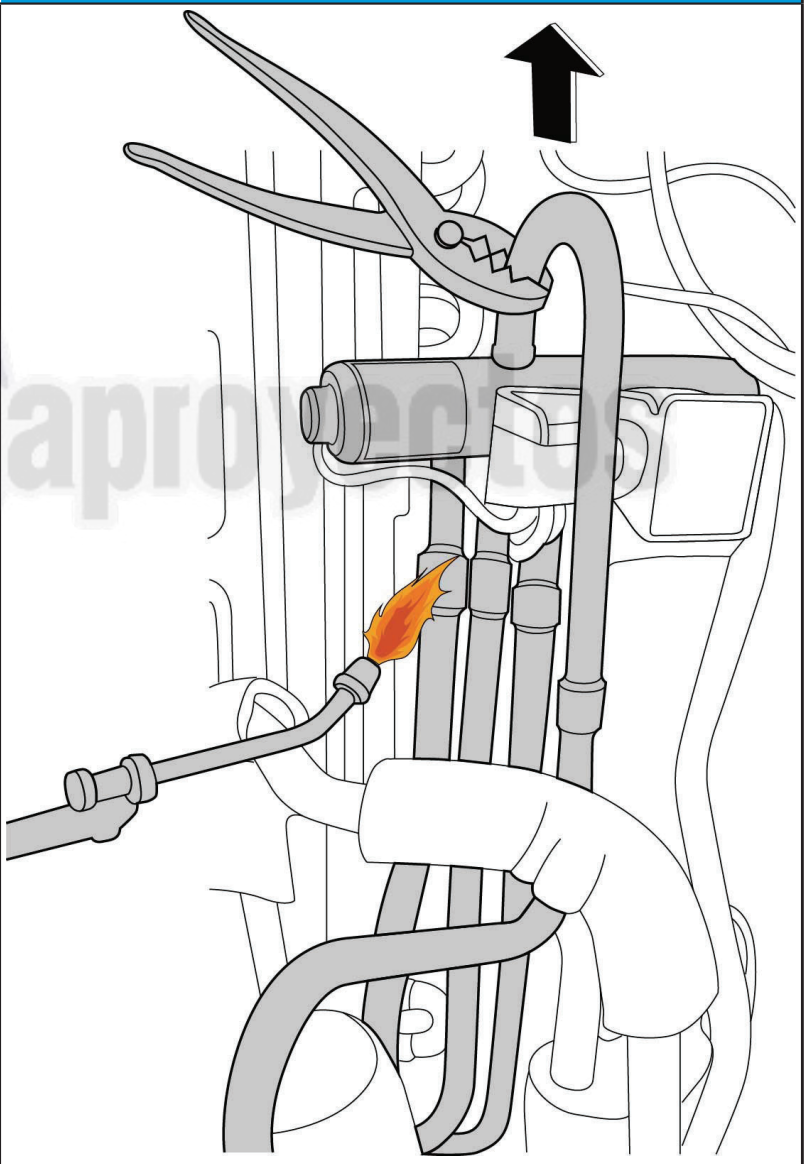
Four-Way Valve (For Heat Pump Models)

WARNING

Evacuate the system and confirm there is no refrigerant left in the system before removing the four-way valve and the compressor.

For R32 and R290, evacuate the system with the refrigerant recovery equipment; flush the system with nitrogen, then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.

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

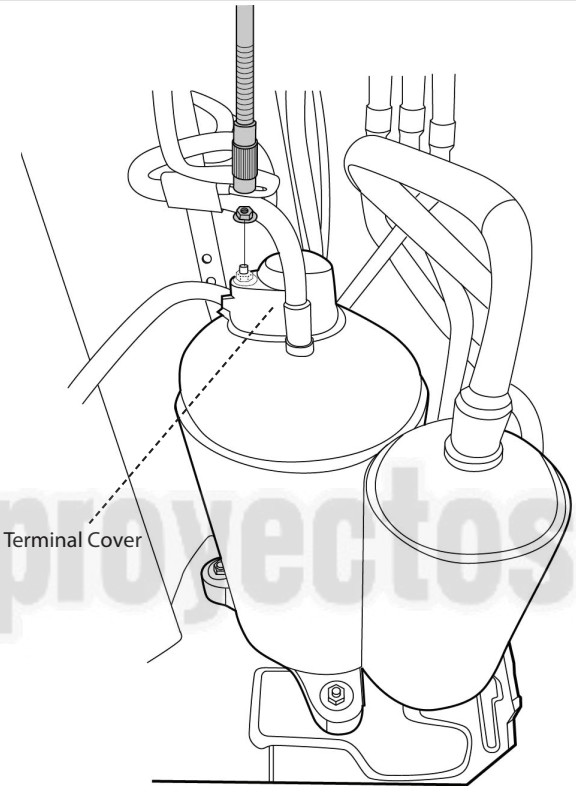
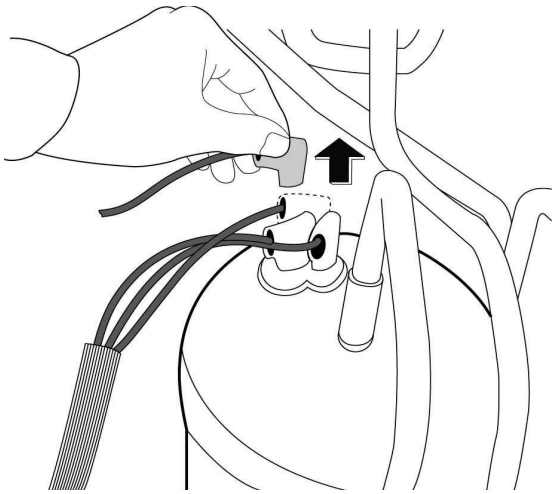
Procedure	Illustration
1) Heat up the brazed parts and then detach the the four-way valve and the pipe. 2) Remove the four-way valve assembly with pliers.	

Compressor

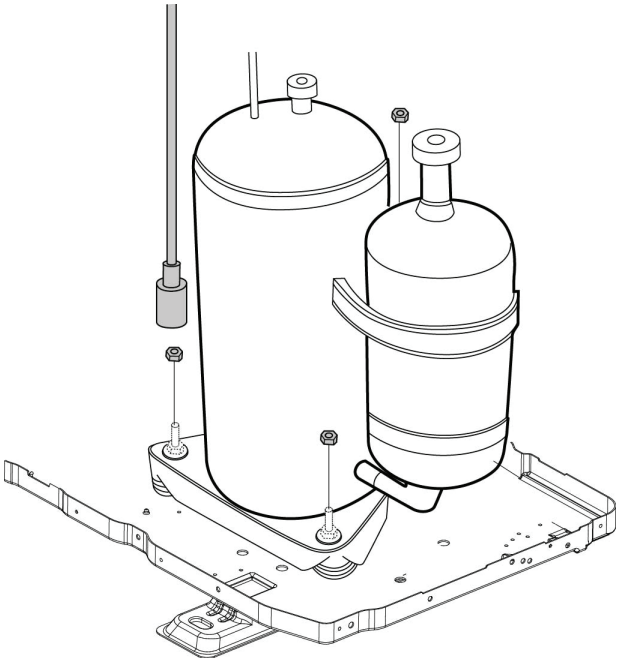
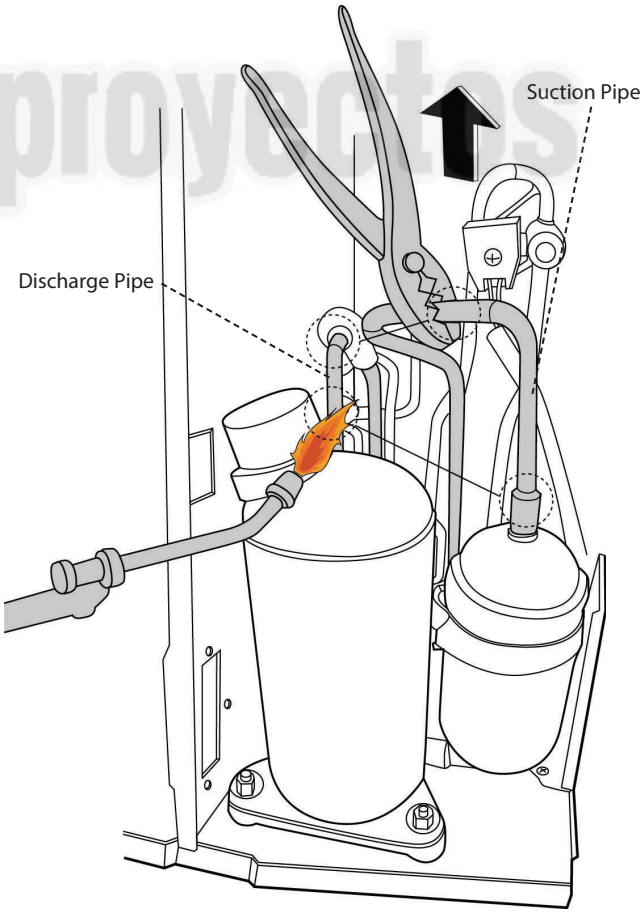
WARNING

Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve and the compressor.

For R32 and R290, evacuate the system with the refrigerant recovery equipment; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.

Procedure	Illustration
1) Remove the flange nut of the terminal cover and 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 the discharge pipe and the suction pipe. 5) Lift the compressor from the base pan assembly with pliers.	

APPENDICIES

Appendix 1

Table 15 — 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 16 — 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			

Appendix 3

Table 17 — Degree Temperature Unit Reference C-F

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-5	23	21	69.8	51	123.8	82	179.6	113	235.4
-4	24.8	22	71.6	52	125.6	83	181.4	114	237.2
-3	26.6	23	73.4	53	127.4	84	183.2	115	239
-2	28.4	24	75.2	54	129.2	85	185	116	240.8
-1	30.2	25	77	55	131	86	186.8	117	242.6
0	32	25.5	77.9	56	132.8	87	188.6	118	244.4
0.5	32.9	26	78.8	57	134.6	88	190.4	119	246.2
1	33.8	27	80.6	58	136.4	89	192.2	120	248
1.5	34.7	28	82.4	59	138.2	90	194	121	249.8
2	35.6	29	84.2	60	140	91	195.8	122	251.6
2.5	36.5	30	86	61	141.8	92	197.6	123	253.4
3	37.4	31	87.8	62	143.6	93	199.4	124	255.2
3.5	38.3	32	89.6	63	145.4	94	201.2	125	257
4	39.2	33	91.4	64	147.2	95	203	126	258.8
4.5	40.1	34	93.2	65	149	96	204.8	127	260.6
5	41	35	95	66	150.8	97	206.6	128	262.4
6	42.8	36	96.8	67	152.6	98	208.4	129	264.2
7	44.6	37	98.6	68	154.4	99	210.2	130	266
8	46.4	38	100.4	69	156.2	100	212	131	267.8
9	48.2	39	102.2	70	158	101	213.8	132	269.6
10	50	40	104	71	159.8	102	215.6	133	271.4
11	51.8	41	105.8	72	161.6	103	217.4	134	273.2
12	53.6	42	107.6	73	163.4	104	219.2	135	275
13	55.4	43	109.4	74	165.2	105	221	136	276.8
14	57.2	44	111.2	75	167	106	222.8	137	278.6
15	59	45	113	76	168.8	107	224.6	138	280.4
16	60.8	46	114.8	77	170.6	108	226.4	139	282.2
17	62.6	47	116.6	78	172.4	109	228.2	140	284
18	64.4	48	118.4	79	174.2	110	230	141	285.8
19	66.2	49	120.2	80	176	111	231.8	142	287.6
20	68	50	122	81	177.8	112	233.6	143	289.4

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