DLCLRA

SERVICE MANUAL

Outdoor Unit Single Zone Ductless System − Sizes 36 to 58

TABLE OF CONTENTS

SAFETY CONSIDERATIONS

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

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

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

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

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

Read this manual thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information. This is the safety−alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, and **CAUTION**.

These words are used with the safety−alert symbol. **DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

⚠ WARNING

EXPLOSION HAZARD

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

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

INTRODUCTION

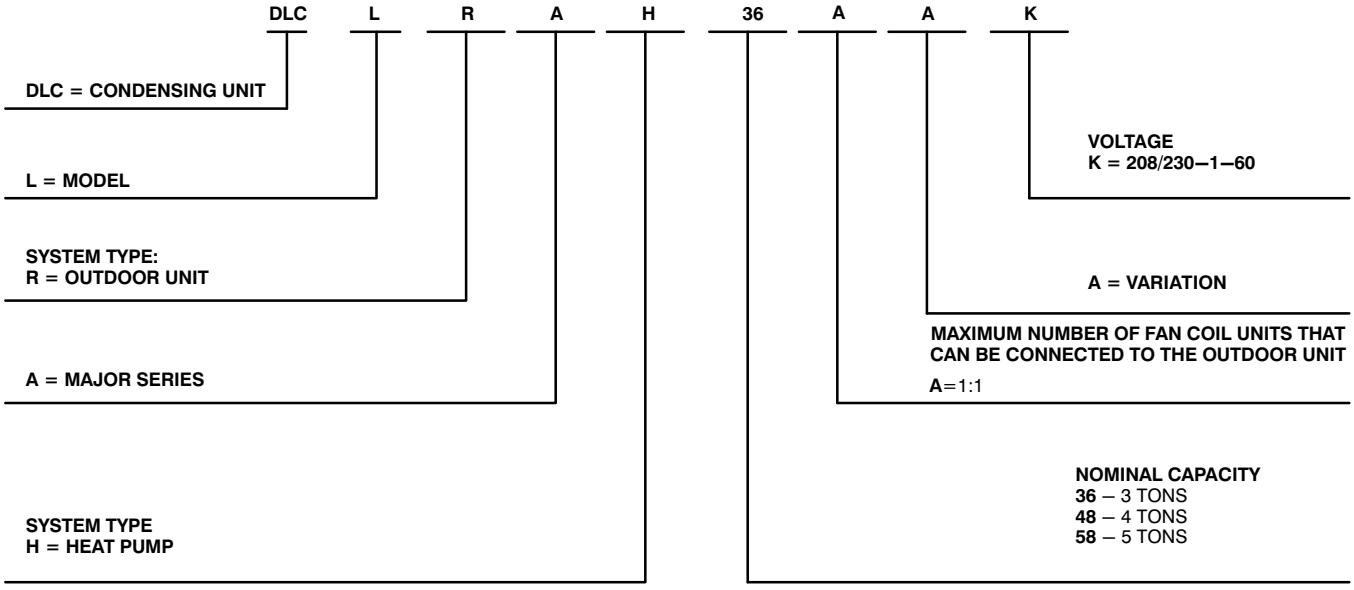
This Service Manual provides the necessary information to service, repair, and maintain the Outdoor Units. Section 2 of this manual has an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

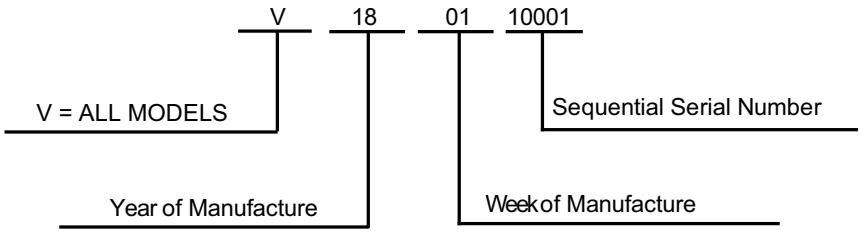
MODEL/SERIAL NUMBER NOMENCLATURE

Table 1—Unit Sizes

kBTUh	VOLTAGE – PHASE	OUTDOOR MODEL
36,000	208/230–1	DLCLRAH36AAK
48,000		DLCLRAH48AAK
58,000		DLCLRAH58AAK

OUTDOOR UNIT





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

SPECIFICATIONS − OUTDOOR

Table 2—Outdoor

Heat Pump					
System	**Size**		**36K**	**48K**	**58K**
	Outdoor Model		DLCLRAH36AAK	DLCLRAH48AAK	DLCLRAH58AAK
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	208/230−1−60	208/230−1−60	208/230−1−60
	MCA	A.	30	35	35
	MOCP − Fuse Rating	A.	50	50	50
Operating Range	Cooling Outdoor DB Min − Max	° F (° C)	−13~ 122 (−25~ 50)	−13~ 122 (−25~ 50)	−13~ 122 (−25~ 50)
	Heating Outdoor DB Min − Max	° F (° C)	−22~ 86 (−30~ 30)	−22~ 86 (−30~ 30)	−22~ 86 (−30~ 30)
Piping	Total Piping Length	ft (m)	213 (65)	213 (65)	213 (65)
	Piping Lift*	ft (m)	98 (30)	98 (30)	98 (30)
	Pipe Connection Size − Liquid	in (mm)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)
	Pipe Connection Size − Suction	in (mm)	5/8 (16)	5/8 (16)	3/4 (19)
Refrigerant	Type		R410A	R410A	R410A
	Charge	lbs (kg)	6.72 (3.05)	9.26 (4.2)	10.19 (4.62)
	Metering Device		EEV	EEV	EEV
Outdoor Coil	Face Area	Sq. Ft.	8.0	13.6	13.3
	No. Rows		2	2	3
	Fins per inch		18	18	18
	Circuits		4	8	14
Compressor	Type		Rotary Inverter	Rotary Inverter	Rotary Inverter
	Model		ATF310D43UMT	ATQ420D1UMU	ATQ420D1UMU
	Oil Type		ESTER OIL VG74	ESTER OIL VG74	ESTER OIL VG74
	Oil Charge	Fl. Oz.	28.2	39.5	39.5
	Rated Current	RLA	8.9	11.9	11.9
Outdoor	Unit Width	in (mm)	37.24 (946)	37.48 (952)	37.48 (952)
	Unit Height	in (mm)	31.89 (810)	52.48 (1333)	52.48 (1333)
	Unit Depth	in (mm)	16.14 (410)	16.34 (415)	16.34 (415)
	Net Weight	lbs (kg)	148.59 (67.4)	217.4 (98.6)	225.09 (102.1)
	Airflow	CFM	2,130	4,500	4,415
	Sound Pressure	dB(A)	63.0	62.5	64.0

* Condensing unit above or below indoor unit

DIMENSIONS − OUTDOOR

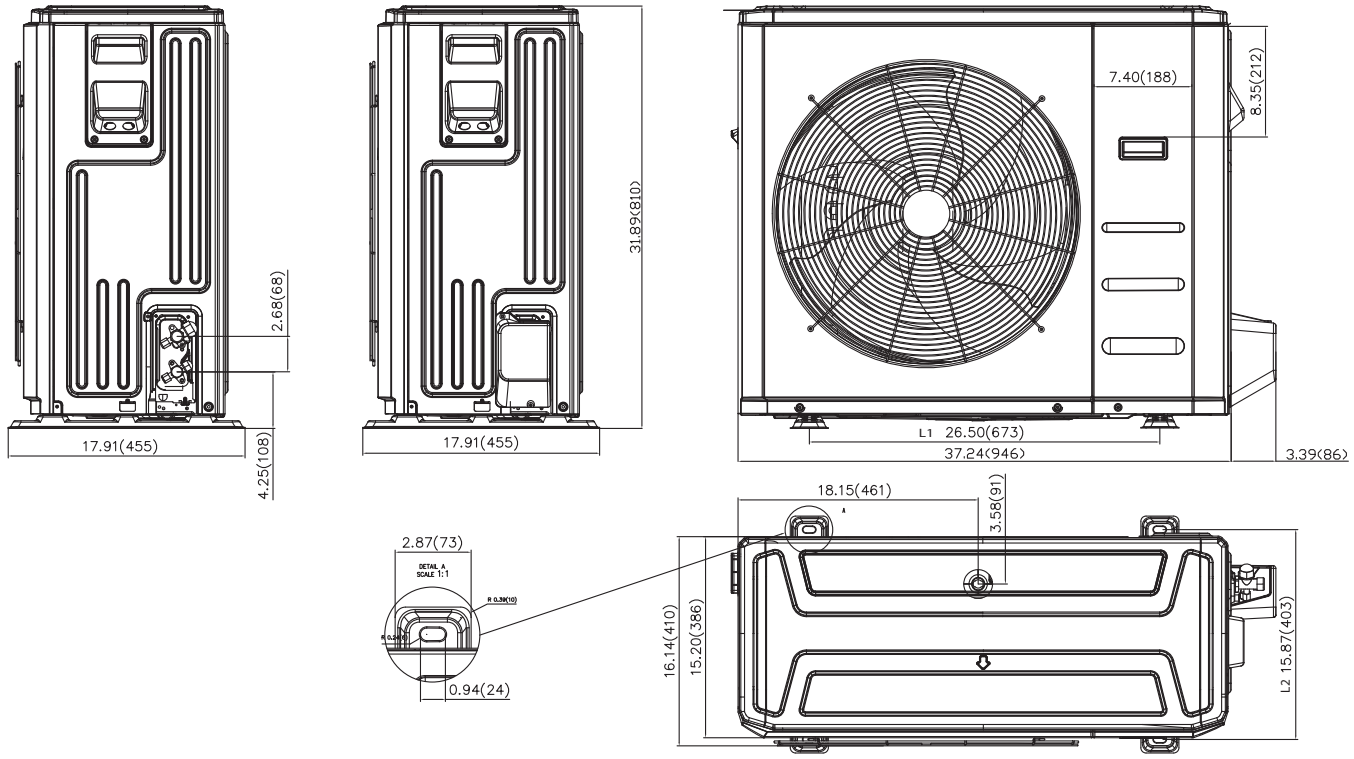


Fig. 1 — Sizes 36K

Table 3—Dimensions

UNIT SIZE	WIDTH in (mm)	DEPTH in (mm)	HEIGHT in (mm)	L1 in (mm)	L2 in (mm)	OPERATING WEIGHT lb (kg)
36K	37.24 (946)	16.14 (410)	31.89 (810)	26.50 (673)	15.87 (403)	136.47 (61.9)

DIMENSIONS − OUTDOOR (CONT)

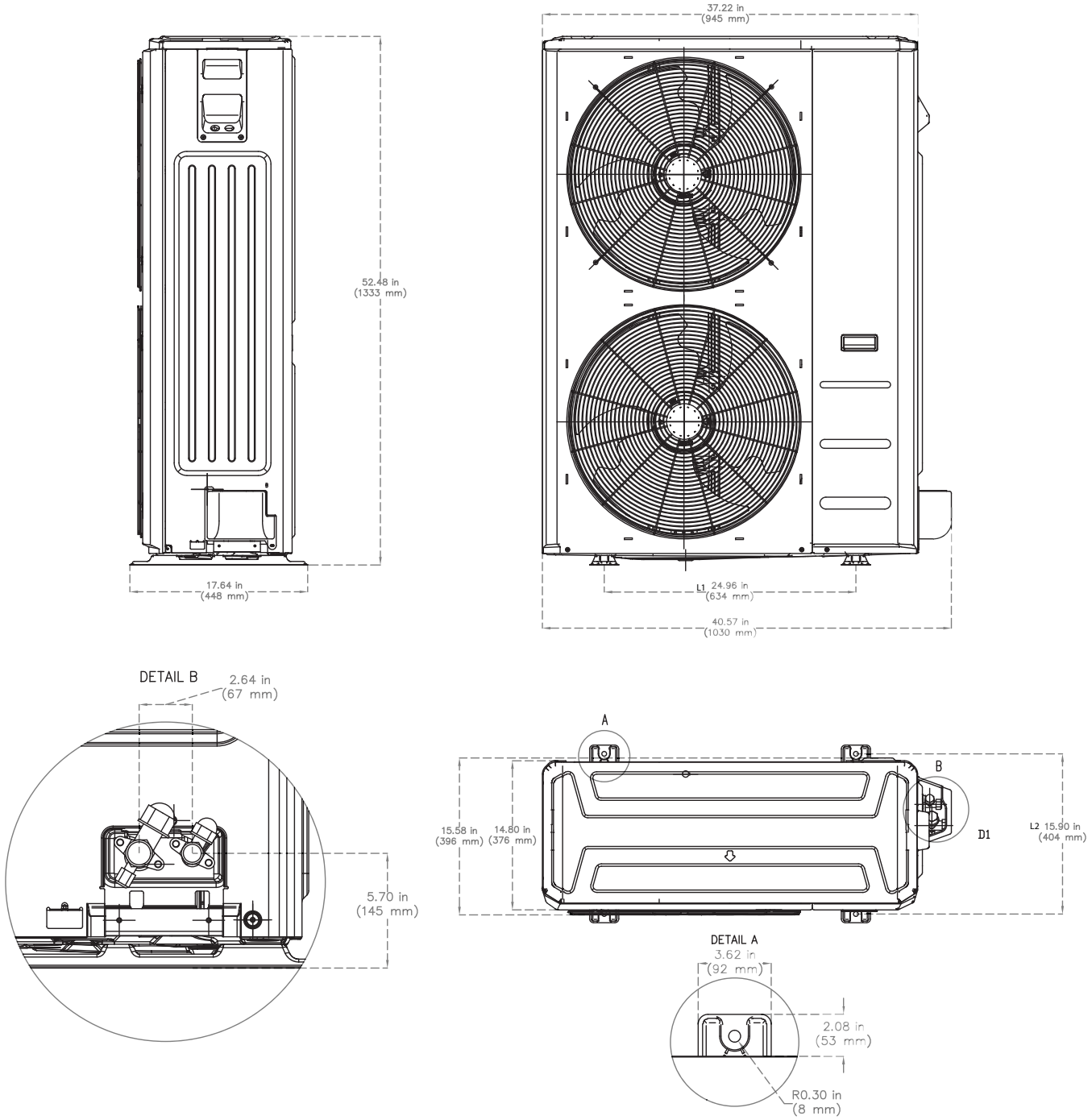


Fig. 2 — Sizes 48K

Table 4—Dimensions

UNIT SIZE	WIDTH in (mm)	DEPTH in (mm)	HEIGHT in (mm)	L1 in (mm)	L2 in (mm)	OPERATING WEIGHT lb (kg)
48K	37.22 (945)	15.58 (396)	52.48 (1333)	24.96 (634)	15.90 (404)	217.4 (98.6)
58K	37.22 (945)	15.58 (396)	52.48 (1333)	24.96 (634)	15.90 (404)	225.09 (102.1)

CLEARANCES − OUTDOOR

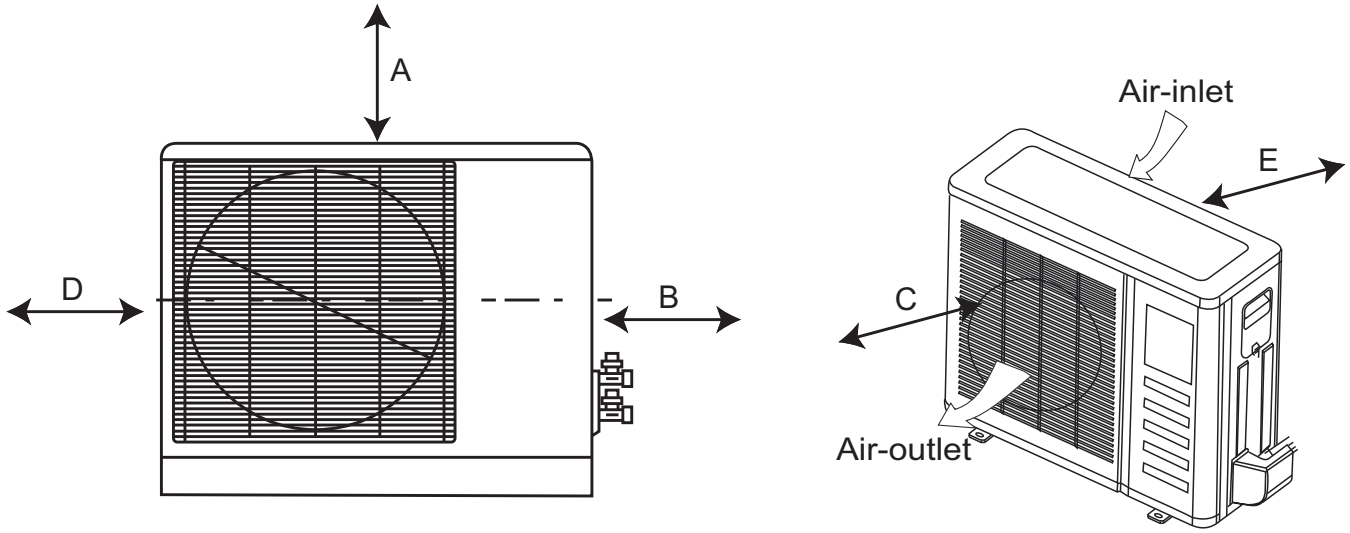


Fig. 3 — Outdoor Unit Clearance

UNIT	MINIMUM VALUE in. (mm)
A	24 (610)
B	24 (610)
C	24 (610)
D	4 (101)
E	4 (101)

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

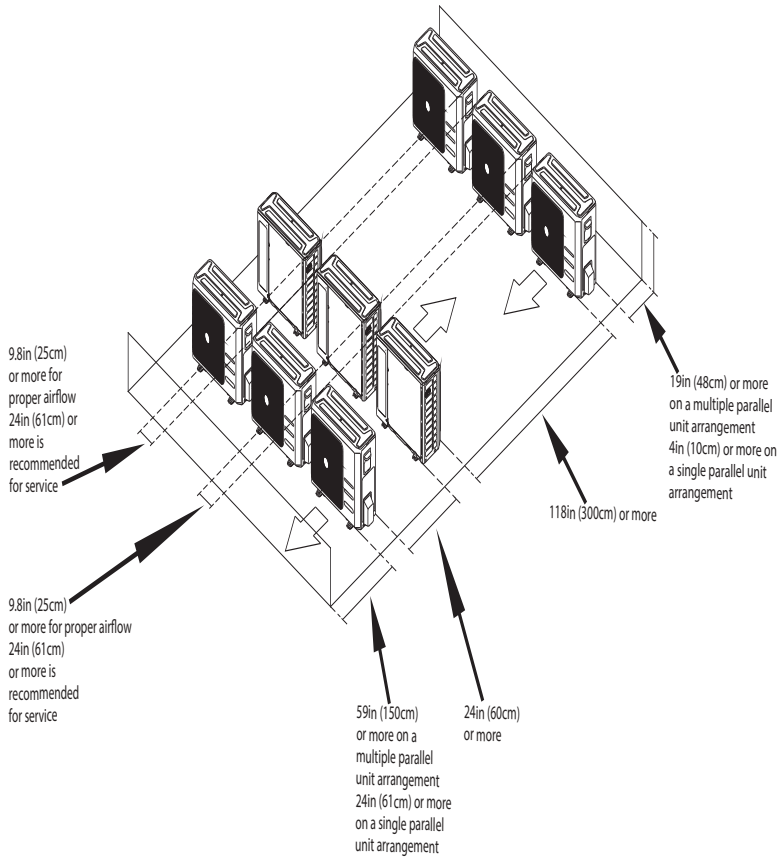


Fig. 4 — Clearances for multiple units

ELECTRICAL DATA

Table 5—Single Zone Outdoor Unit

OUTDOOR UNIT SIZE		36K	48K	58K
Power Supply	Volts–PH–Hz	208/230–1–60	208/230–1–60	208/230–1–60
	Max – Min* Oper. Voltage	253–187	253–187	253–187
	MCA	30	35	35
	Max Fuse/ CB AMP	50	50	50
Compressor	Volts–PH–Hz	208/230–1–60	208/230–1–60	208/230–1–60
	RLA	8.85	11.86	11.86

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

LEGEND
MCA - Minimum Circuit Amps
RLA - Rated Load Amps

WIRING

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

Recommended Connection Method for Power and Communication Wiring:

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

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Wires should be sized based on NEC and local codes.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

Be sure to comply with local codes while running wire from the indoor unit to the outdoor unit.

Every wire must be connected firmly. Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Ensure all wiring is tightly connected.

No wire should touch the refrigerant tubing, compressor or any moving parts.

Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.

Connecting cable with conduit shall be routed through the hole in the conduit panel.

CONNECTION DIAGRAM

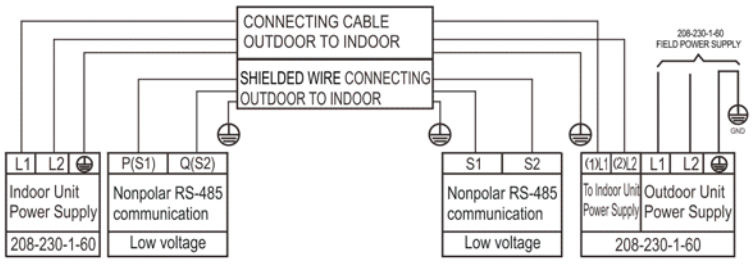


Fig. 5 – Connection Diagrams

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

WIRING DIAGRAMS

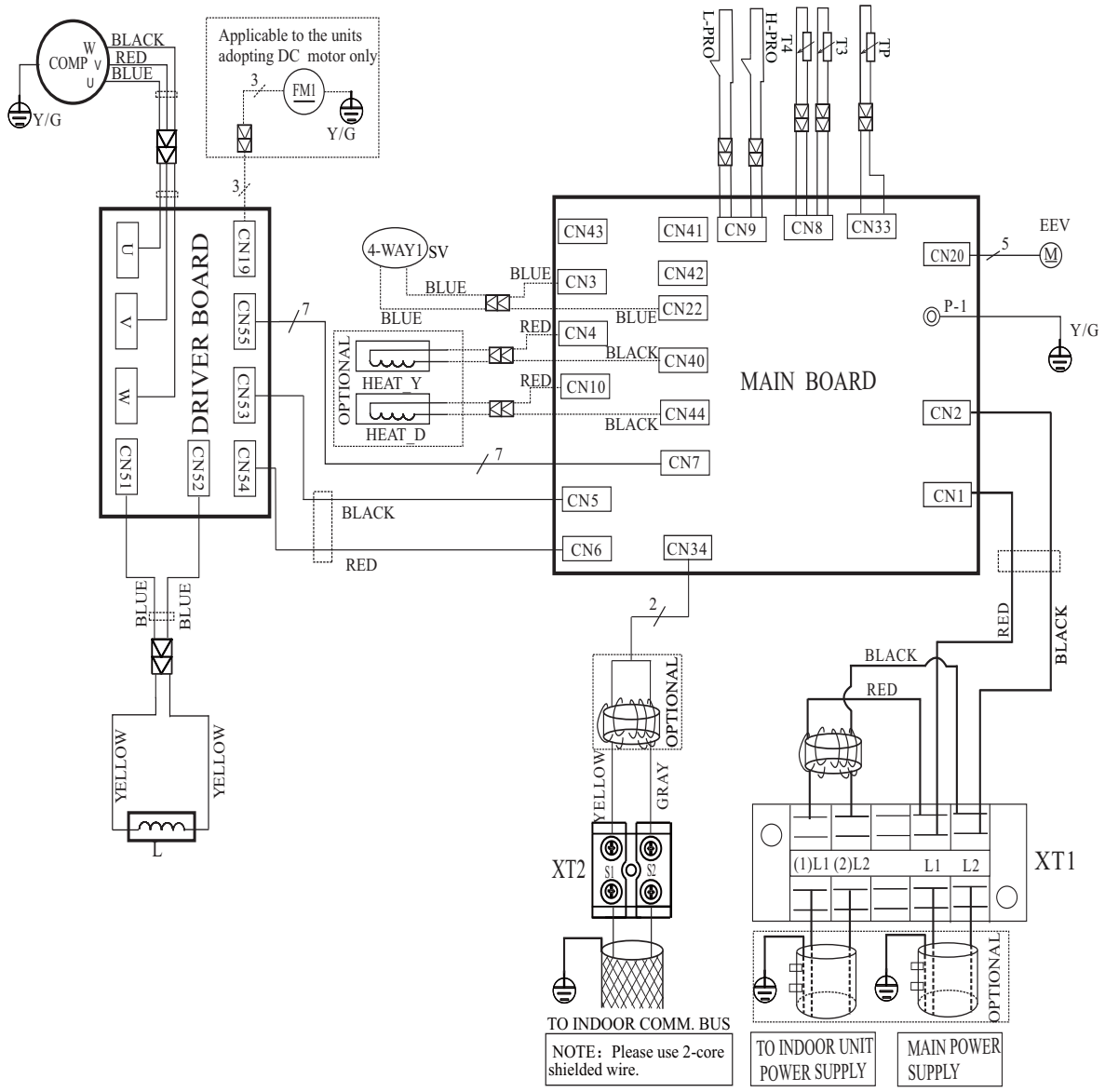


Fig. 6 — Wiring Diagram Size 36K

OUTDOOR UNIT MAIN BOARD	
CODE	**PART NAME**
CN1～CN2	Input: 230VAC High voltage
CN5～CN6	Output: 230VAC High voltage
P—1	Connection to the earth
CN10～CN44	Output: 230VAC High voltage Chassis Crankcase Heater
CN4～CN40	Output: 230VAC High voltage Compressor Crankcase Heat
CN3～CN22	Output: 230VAC High voltage
CN43	Output: Pin3～Pin2, Pin4～Pin2 (230 VAC High voltage) For AC FAN
CN41～CN42	Output To AC FAN Capacitor
CN34	Output:—24VDC—24VDC
CN33	Input: Pin 1 (0—5VDC),Pin 2 (5VDC) Discharge Temperature Sensor
CN8	Input: Pin3, Pin4 (5VDC),Pin2 (0VDC),Pin1,Pin5 (0—5VDC) T3 & T4
CN9	Input: Pin2, Pin4 (0VDC),Pin1,Pin3 (0—5VDC) H/L Pressure Switch
CN20	Output: Pin1—Pin4: Pulse waveform(0—12VDC),Pin5, Pin6 (12VDC)
CN7	Output: Pin1 (12VDC),Pin2 (5VDC),Pin3 (EARTH)

WIRING DIAGRAMS (CONT)

OUTDOOR UNIT PFC and IPM BOARD	
CODE	**PART NAME**
CN53～CN54	Input: 230VAC High voltage
CN55	Output: Pin1 (12VDC),Pin2 (5VDC),Pin3 (EARTH)
CN19	Pin1～Pin3: Connect to FAN voltage among phases 0～200VAC
U～V～W	Connect to compressor voltage among phases 0～200VAC
CN51～CN52	CN51～EARTH ,CN52～EARTH Output: 224—380VDC High voltage

CODE	PART NAME	CODE	PART NAME
COMP	COMPRESSOR	L	PFC INDUCTOR
CAP1	FAN MOTOR CAPACITOR	L—PRO	LOW PRESSURE SWITCH
HEAT	CRANKCASE HEATING	H—PRO	HIGH PRESSURE SWITCH
FM1	OUTDOOR DC FAN	SV	4—WAY VALVE
FAN1	OUTDOOR AC FAN	T3	CONDENSER TEMPERATURE SENSOR
EEV	ELECTRONIC EXPANSION VALVE	T4	OUTDOOR AMBIENT TEMPERATURE SENSOR

WIRING DIAGRAMS (CONT)

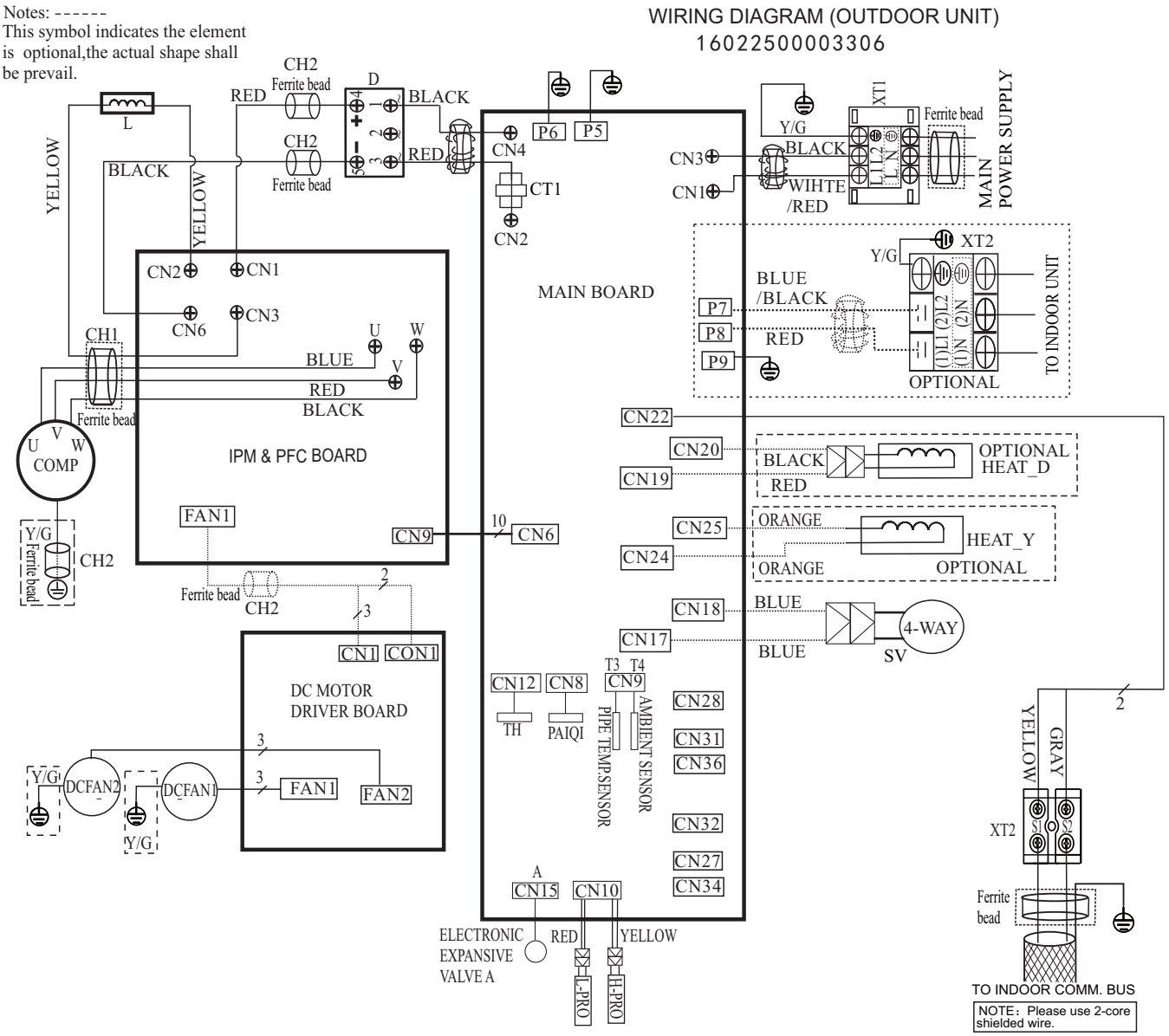


Fig. 7 — Wiring Diagram – Size 48K and 58K

OUTDOOR UNIT MAIN BOARD	
CODE	**PART NAME**
CN1~CN3	Input: 230VAC High voltage
P7~P8	Output: 230VAC High voltage to IDU
P5,P6,P9	Connection to the earth
CN22	Output:—24VDC—24VDC for IDU Communication
CN17~CN18	Output: 230VAC High voltage 4 way valve
CN19~CN20	Output: 230VAC High voltage Chassis Crankcase Heater
CN24~CN25	Output: 230VAC High voltage Compressor Crankcase Heater
CN2~CN4	Output: 230VAC High voltage to AC CURRENT DETECTOR
CN12	Input: Pin1 (0—5VDC),Pin2 (5VDC) Heatsink Temperature Sensor
CN8	Input: Pin1 (0—5VDC),Pin2 (5VDC) Compressor Top Sensor(PAIQI)
CN9	Input: Pin3,Pin4 (5VDC),Pin2 (0VDC),Pin1,Pin5 (0—5VDC) the ambient sensor and pipe sensor
CN10	Input: Pin2, Pin4 (0VDC),Pin1,Pin3 (0—5VDC) for the H/L pressure switch
CN15	Output: Pin1—Pin4: Pulse waveform (0—12VDC),Pin5, Pin6 (12VDC) EEV
CN6	Output: Pin1—Pin6: Pulse waveform (0—5VDC), Pin7, Pin9 (0VDC) Pin8 (0—5VDC), Pin10 (5VDC)

WIRING DIAGRAMS (CONT)

OUTDOOR UNIT PFC & IPM BOARD	
CODE	**PART NAME**
CN1～CN6	Output:224—380VDC High voltage to DIODE MODULE
CN2～CN3	Output:224—380VDC High voltage to PFC INDUCTOR
U～V～W	Connection to compressor voltage among phases 0～200VAC
CN9	Input:Pin1—Pin6: Pulse waveform (0—5VDC),Pin7, Pin9 (0VDC) Pin8 (0—5VDC),Pin10 (5VDC)
FAN1	Output: Pin1～Pin2: High voltage (224—380VDC), Pin4 (0—15VDC) Pin5 (0—5.6VDC), Pin6:Pulse waveform (0—15VDC)

OUTDOOR UNIT DC MOTOR DRIVER BOARD	
CODE	**PART NAME**
CON1	Output:Pin1～Pin2:High voltage (224—380VDC)
CN1	Input: Pin4: Pulse waveform (0—15VDC) ,Pin3 (0—6.5VDC) Pin2 (0VDC),Pin1 (15VDC)
FAN1	Pin1—Pin3: Connect to FAN voltage among phases 0～200VAC
FAN2	Pin1—Pin3: Connect to FAN voltage among phases 0～200VAC

CODE	**PART NAME**
COMP	COMPRESSOR
CAP1,CAP2	FAN MOTOR CAPACITOR
CT1	AC CURRENT DETECTOR
D	DIODE MODULE
EEV	ELECTRONIC EXPANSION VALVE
FM1,FM2	OUTDOOR DC FAN
FAN1,FAN2	OUTDOOR AC FAN
HEAT	CRANKCASE HEATING
H—PRO	HIGH PRESSURE SWITCH
L	PFC INDUCTOR
L—PRO	LOW PRESSURE SWITCH
KM	AC CONTACTOR
SV	4—WAY VALVE
TP	EXHAUST TEMPERATURE SENSOR
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
TH	HEATSINK TEMPERATURE SENSOR
PAIQI	COMPRESSOR TOP SENSOR (GAS PIPE SENSOR)
CH 1 CH 2 CH 3	FERRITE BEAD

FAN AND MOTOR SPECIFICATIONS

System Size			36K	48K	58K
Outdoor Fan Propeller	Material	––	AS	AS	AS
	Type	––	ZL–560*139*12–3KN	ZL–554*148*12–3KFN	ZL–554*148*12–3KFN
	Diameter	In(mm)	22.05(560)	21.81(554)	21.81(554)
	Height	In(mm)	5.47(139)	5.83(148)	5.83(148)
Outdoor Fan Motor	Model	––	WZDK120–38G–W	ZKFN–85–8–22	ZKFN–85–8–22
	Type	––	DC	DC	DC
	Phase	––	1	1	1
	FLA	A	1.21	1.17	1.17
	Insulation Class	––	E	E	E
	Safe Class	––	IPX0	IPX0	IPX0
	Input	W	150	126	126
	Output	W	120	85	85
	Range of current	A	1.21±10%	1.17±10%	1.17±10%
	Rated current	A	1.21	1.17	1.17
	Capacitor	□F	N/A	N/A	N/A
	Rated HP	HP	0.16	0.14	0.14
	Speed	rev/min	850/800/750	900/850/750	900/850/750
	Rated RPM	rev/min	1050	900	900
	Max. input	W	150	126	126

REFRIGERATION CYCLE DIAGRAMS

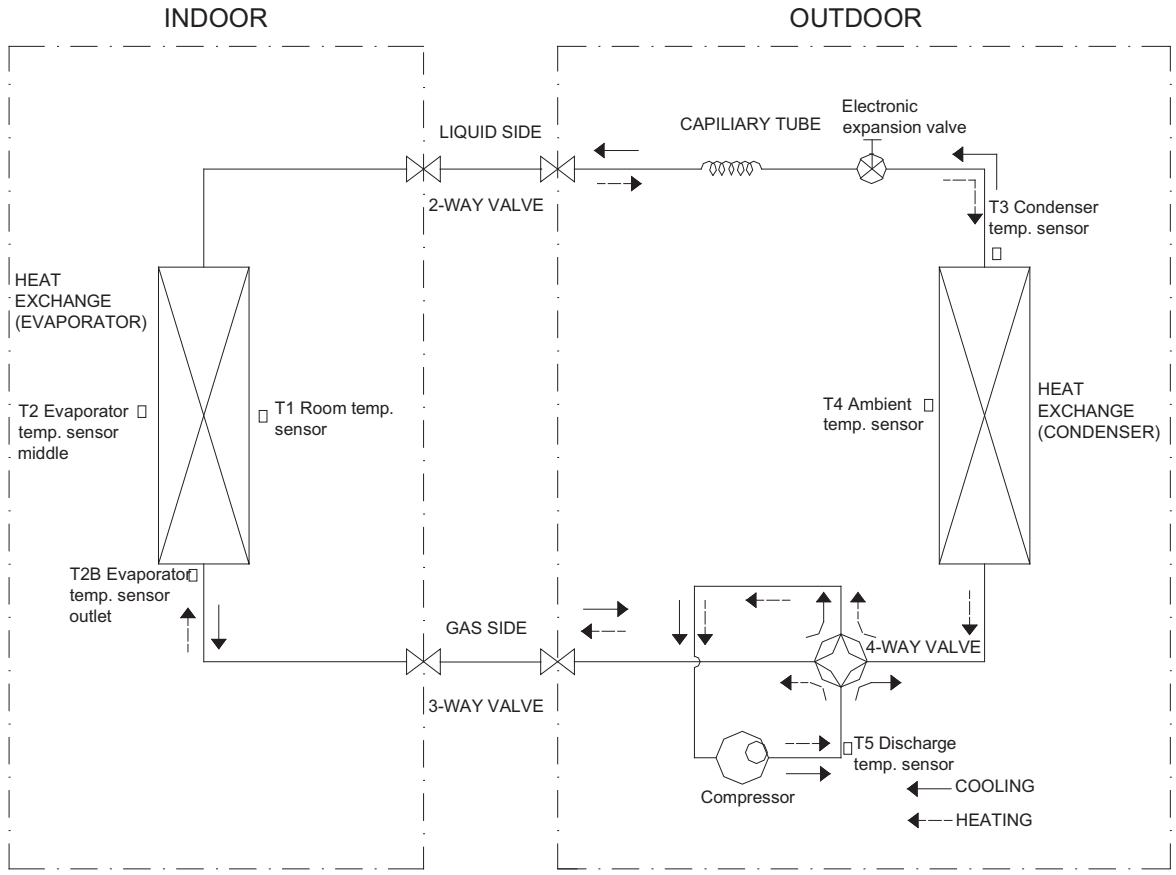


Fig. 8 – Refrigerant Cycle Diagrams

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 25 ft. (7.6 m) per number of zones. For runs over 25 ft. (7.6 m), consult long−line section on this page for proper charge adjustments.
2. Minimum refrigerant line length between the indoor and outdoor units is 10 ft. (3 m).
3. Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, not more than 36−in (914 mm) should be buried. Provide a minimum 6−in (152 mm) vertical rise to the service valves to prevent refrigerant migration.
4. Both lines must be insulated. Use a minimum of 1/2−in. (12.7 mm) thick insulation. Closed−cell insulation is recommended in all long−line applications.
5. Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so that vibration or noise is not transmitted into the structure.

IMPORTANT: Both refrigerant lines must be insulated separately.

- Table 6 provides the maximum lengths allowed:

Table 6—Piping and Refrigerant

SYSTEM SIZE			36K	48K	58K
PIPING	Min. Piping Length	ft(m)	10(3)	10(3)	10(3)
	Standard Piping Length	ft(m)	25(7.5)	25(7.5)	25(7.5)
	Max. outdoor−indoor height difference (OU higher than IU)	ft(m)	98(30)	98(30)	98(30)
	Max. outdoor−indoor height difference (IU higher than OU)	ft(m)	98(30)	98(30)	98(30)
	Max. Piping length with no additional refrigerant charge	ft(m)	26(8)	26(8)	26(8)
	Max. Piping Length	ft(m)	213(65)	213(65)	213(65)
	Additional refrigerant charge (between Standard − Max piping length)	Oz/ft(g/m)	0.32(30)	0.33(30)	0.32(30)
	Gas Pipe (size−connection type)	in(mm)	5/8(16)	5/8(16)	3/4(19)
	Liquid Pipe (size−connection type)	in(mm)	3/8(9.52)	3/8(9.52)	3/8(9.52)
REFRIGERANT	Refrigerant Type	−−	R410A	R410A	R410A
	Charge Amount	Lbs(kg)	6.72(3.05)	9.26(4.2)	10.19(4.62)

Long Line Applications:

1. No change in line sizing is required.
2. Add refrigerant per Table 7.

Table 7—Additional Charge Table Per Zone

UNIT SIZE	TOTAL LINE LENGHT ft		ADDITIONAL CHARGE, oz/ft. Ft (m)	
	Min	Max	>10−25 (3−8)	>25−213 (8−65)
36	10	213	None	0.32
48				
58				

SYSTEM EVACUATION AND CHARGING

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Never use the system compressor as a vacuum pump.

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

NOTE: **All units (except the 18,000 BTU model) have a Master Suction and Liquid Line Service Valve.**

SYSTEM VACUUM AND CHARGE

Using Vacuum Pump

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

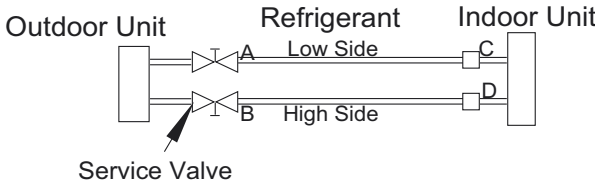


Fig. 9 — Service Valve

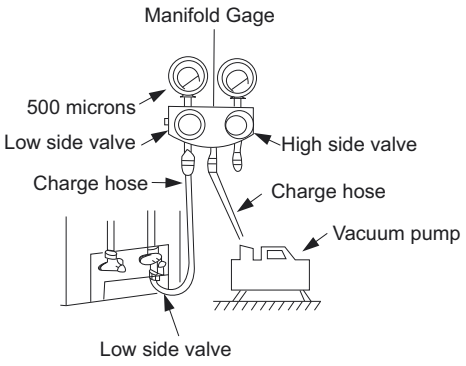


Fig. 10 — Manifold

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water (see Fig. 11).

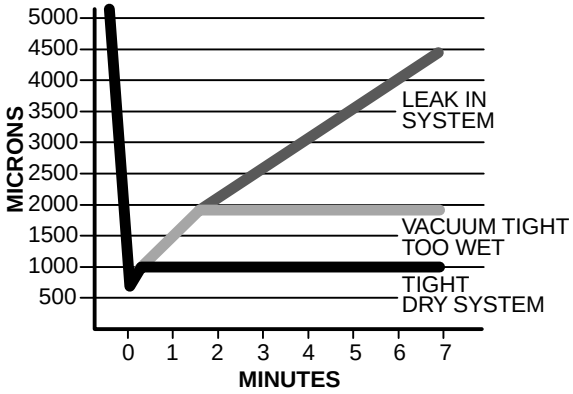


Fig. 11 — Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should be used. Refer to Fig. 12 and proceed as follows:

1. Pump system down to 500 MICRONS of mercury and allow pump to continue operating for an additional 15 minutes. Unit must maintain 500 microns or less for 30 minutes or more to ensure a dry system.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 10 minutes. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 12. System will then be free of any contaminants and water vapor.

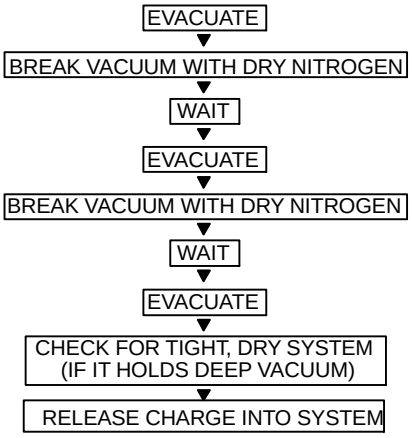


Fig. 12 — Triple Evacuation Method

Final Tubing Check

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

ELECTRONIC FUNCTIONS

Main Protection

Three Minute Delay for Compressor Restart

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

Compressor Top Temperature Protection

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

Compressor Discharge Temperature Protection

When the compressor discharge temp. increases, the running frequency is limited per the following rules:

- Compressor discharge temp. T5>239°F(115°C) for 5s, compressor stops and restarts up until T5<194°F (90°C)
- 110<T5<239°F(115°C), decrease the frequency to the lower level every 2 minutes.
- 221°F(105°C)<T5<230°F(110°C), keep running at the current frequency.
- T5<221°F(105°C), no limit for frequency.

Fan Speed is Out of Control

When the indoor fan speed remains low (lower than 300RPM) for 50s, the indoor fan shuts off and restarts 30s later. If the protection mode engages 3 times when the fan motor restarts continuously, the unit stops and the LED displays the failure.

When the outdoor fan speed remains low (lower than 100RPM) or too high (higher than 1500RPM) for 60s, the unit stops and the LED displays the failure. The malfunction clears 30s later.

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 controlled also by the anti−cold wind function.

Compressor Preheating Functions

Preheating Permitting Condition:

If T4<37.4°F(3°C) and the machine connects to power supply newly within 5 seconds or if T4<37.4°F(3°C) and the compressor has stopped for over 3 hours, the compressor heating cable will work.

Preheating Mode:

A weak current flow through the compressor coil from the compressor wiring terminal, then the compressor is heated without operation.

Preheating Release Condition:

If T4≥41°F(5°C) or the compressor starts running, the preheating function stops.

Condenser High Temperature T3 Protection:

- 131°F(55°C)<T3<140°F(60°C), the compressor frequency decreases to the lower level until to F1 and then runs at F1. If T3<129.2°F(54°C), the compressor keeps running at the current frequency.
- T3<125.6°F(52°C), the compressor does not limit the frequency and resumes the former frequency.
- T3>140°F(60°C) for 5 seconds, the compressor stops until T3<125.6°F(52°C).

Evaporator Low Temperature T2 Protection:

- T2<32°F(0°C), the compressor stops and restarts when T2≥41°F(5°C).
- 32°F(0°C)≦T2<39.2°F(4°C), the compressor frequency is limited and decreases to the lower level
- 39.2°F(4°C)≤T2<44.6°F(7°C), the compressor retains the current frequency
- T2>44.6°F(7°C), the compressor frequency is not limited.

Operation Modes and Functions

Fan Mode

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

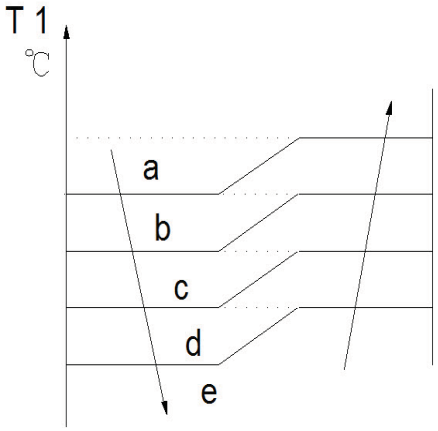


Fig. 13 — Fan Mode

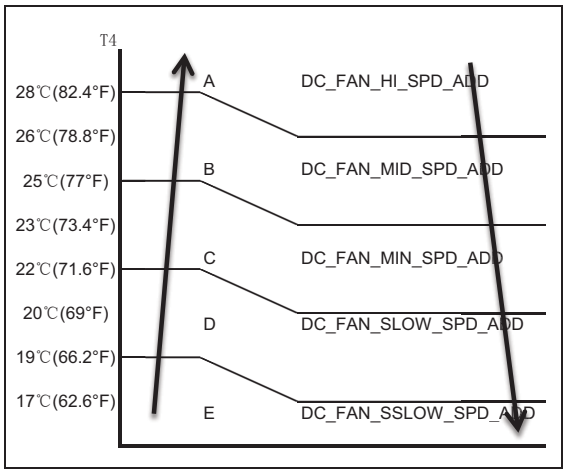


Fig. 14 — Outdoor Fan Running Rules

Defrosting Mode

If any one of the following conditions are met, AC will enter the defrosting mode. After the compressor starts and continues to run, mark the minimum value of T3 from the 10th minute to 15th minute as T30.

- If the compressor cumulate running time is up to 29 minutes and T3< TCDI1, T3+T30SUBT3ONE≦T30.
- If the compressor cumulate running time is up to 35 minutes and T3< TCDI2, T3+T30SUBT3TWO≦T30.
- If the compressor cumulate running time is up to 29 minutes and T3< TCDI3 for 3 minutes.
- If the compressor cumulate running time is up to 120 minutes and T3<5°F(−15°C).

Condition of Ending Defrosting:

If any one of the following items is satisfied, the defrosting mode completes and the machine enters the normal Heating mode.

- T3 rises to be higher than TCDE1.
- T3 keeps to be higher than TCDE2 for 80 seconds.

Defrosting Action:

−−−−The machine has run for 10 minutes in defrosting mode.

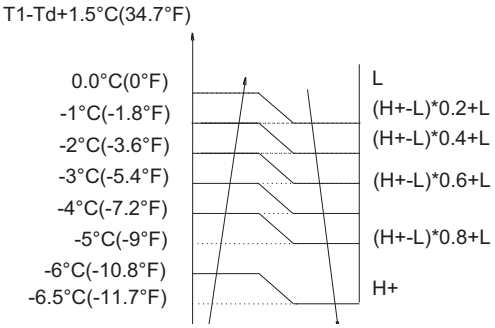


Fig. 15 — Defrosting Mode

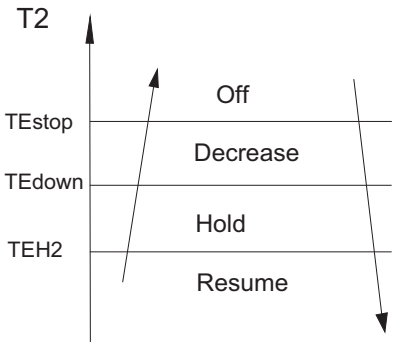


Fig. 16 — Defrosting Action

Evaporator Coil Temperature Protection

Off: Compressor stops.

Decrease: Decrease the running frequency to the lower level.

Hold: Keep the current frequency.

Resume: No limitation for frequency.

Auto−mode

This mode can be chosen with remote controller and the setting temperature can be changed between 17~30°C(63~86°F).

In auto mode, the unit will choose cooling, heating, or fan−only mode according to ΔT (ΔT =T1−Ts).

ΔT=T1−Ts	Running mode
ΔT>2°C (3.6°F)	Cooling
−2°C (-3.6°F)≤ΔT≤2°C (3.6°F)	Fan−only
ΔT<-2°C (-3.6°F)	Heating

The indoor fan will run at auto fan of the relevant mode.

The louver operates the same as in relevant mode.

If the unit switches between heating and cooling mode, the compressor will keep stopping for 15 minutes and then choose the mode according to T1−Ts.

If the setting temperature is modified, the unit will choose running function again.

Drying mode

Drying mode works the same as cooling mode in breeze speed.

All protections are active and the same as that in cooling mode.

Point Check Function

Press the remote controller LED DISPLAY or LED or MUTE button three times, and then press the AIR DIRECTION or SWING button three times in ten seconds (the buzzer rings for two seconds). The air conditioner enters the information enquiry status.

The user can press the LED DISPLAY or AIR DIRECTION button to check the next or front item's information. When the air conditioner enters the enquiry information status, it displays the code name in 2 seconds. Refer to Table 8 for details.

Table 8—Enquiry Information

ENQUIRY INFO	DISPLAYING CODE	MEANING
T1	T1	T1 temp.
T2	T2	T2 temp.
T3	T3	T3 temp.
T4	T4	T4 temp.
T2B	Tb	T2B temp.
TP	TP	TP temp.
TH	TH	TH temp.
Targeted Frequency	FT	Targeted Frequency
Actual Frequency	Fr	Actual Frequency
Indoor Fan Speed	IF	Indoor Fan Speed
Outdoor Fan Speed	OF	Outdoor Fan Speed
EXV Opening Angle	LA	EXV Opening Angle
Compressor Continuous Running Time	CT	Compressor Continuous Running Time
Compressor Stop Issues	ST	Compressor Stop Issues

When the air conditioner enters the information enquiry status, the LED displays the code value within 25 seconds (see Table 9).

Table 9—Enquiry Information

ENQUIRY INFO	DISPLAY VALUE	MEANING	REMARK
T1,T2,T3,T4,T2B,TP,TH, Targeted Frequency, Actual Frequency	−1F,−1E,−1d,−1c,−1b,−1A	−25,−24,−23,−22,−21,−20	1. The displaying temperature is the actual value. 2. Temp. is °C no matter the remote. 3. T1,T2,T3,T4,T2B display range: −25~70. 4. Freq. display range: 0~159HZ. 5. If the actual value exceeds the range, it displays the maximum value or minimum value.
	−19—99	−19—99	
	A0,A1,0A9	100,101,0109	
	b0,b1,0b9	110,111,0119	
	c0,c1,0c9	120,121,0129	
	d0,d1,0d9	130,131,0139	
	E0,E1,0E9	140,141,0149	
	F0,F1,0F9	150,151,0159	
Indoor Fan Speed/ Outdoor Fan Speed	0	OFF	
	1,2,3,4	Low speed, Medium speed, High speed, Turbo	For some big capacity motors.
	14−FF	Actual fan speed = Display value turns to decimal value and then multiply 10. The unit is RPM.	For some small capacity motors, the display value is from 14−FF (hexadecimal), the corresponding fan speed range is from 200−2550 RPM.
EXV Opening Angle	0−FF	Actual EXV opening value = Display value turns to decimal value and then multiply 2.	
Compressor Continuous Running Time	0−FF	0−255 minutes	If the actual value exceeds the range, it displays the maximum value or minimum value.
Compressor Stop Causes	0−99	For the detailed meaning, please consult with engineer	Decimal display

TROUBLESHOOTING

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

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

Required Tools:

The following tools are needed when diagnosing the units:

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

Recommended Steps

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

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

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

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

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

1. Always disconnect the main power.
2. When possible check the outdoor board first.
3. Start by removing the outdoor unit top cover.
4. Reconnect the main power
5. Probe the outdoor board inputs and outputs with a digital multi−meter referring to the wiring diagrams.
6. Connect the red probe to hot signal and the black probe to the ground or negative.
7. Note that some of the DC voltage signals are pulsating voltages for signal. this pulse should be rapidly moving at all times when there is a signal present.
8. If it is necessary to check the indoor unit board you must start by disconnecting the main power.
9. Next remove the front cover of the unit and then control box cover.
10. Carefully remove the indoor board from the control box, place it face up on a plastic surface (not metal).
11. Reconnect the main power and repeat steps 5, 6, and 7.
12. Disconnect main power before reinstalling board to avoid shock hazard and board damage.

DIAGNOSTIC GUIDES

Table 10—Diagnostic Guides Indoor Units

OPERATION LAMP	TIMER LAMP	DISPLAY	LED STATUS
☆ 1 time	X	E0	Indoor unit EEPROM parameter error
☆ 2 times	X	E1	Communication malfunction between indoor and outdoor units
☆ 4 times	X	E3	Indoor fan speed malfunction
☆ 5 times	X	E4	Indoor room temperature sensor (T1) malfunction
☆ 6 times	X	E5	Evaporator coil temperature sensor (T2) malfunction
☆ 7 times	X	EC	Refrigerant leakage detection
☆ 8 times	X	EE	Water—level alarm malfunction
☆ 1 time	O	F0	Current overload protection
☆ 2 times	O	F1	Outdoor ambient temperature sensor (T4) malfunction
☆ 3 times	O	F2	Condenser coil temperature sensor (T3) malfunction
☆ 4 times	O	F3	Compressor discharge temperature sensor (T5) malfunction
☆ 5 times	O	F4	Outdoor unit EEPROM parameter error
☆ 6 times	O	F5	Outdoor fan speed malfunction
☆ 7 times	O	F6	Indoor coil outlet pipe sensor(Located on outdoor unit low pressure valve)
☆ 8 times	O	F7	Communication malfunction between the cassette optional lift panel and the unit
☆ 9 times	O	F8	Cassette optional lift panel malfunction
☆ 10 times	O	F9	Cassette optional lift panel not closed
☆ 1 time	¿	P0	Inverter module (IPM) malfunction
☆ 2 times	¿	P1	Over—voltage or under—voltage protection
☆ 3 times	¿	P2	Compressor top high temperature protection (OLP)
☆ 4 times	¿	P3	Low ambient temperature cut off in heating
☆ 5 times	¿	P4	Compressor drive malfunction
☆ 6 times	¿	P5	Indoor units mode conflict
☆ 7 times	¿	P6	Low pressure protection
☆ 8 times	¿	P7	Outdoor IPM temperature sensor error

O（light）　X（off）　☆（flash）

Table 11—Diagnostic Guides Indoor Units

DISPLAY	LED STATUS
F0	Communication error between wired controller and indoor unit
F1	The cassette faceplate is abnormal
E7	Indoor unit EEPROM parameter error
E1	Communication malfunction between indoor and outdoor units
E8	Indoor fan speed malfunction
E2	Indoor room temperature sensor (T1) malfunction
E3	Evaporator coil temperature sensor (T2) malfunction
EF	Refrigerant leak detection
EE	Water—level alarm malfunction
E5	Outdoor ambient temperature sensor (T4) malfunction
E5	Condenser coil temperature sensor (T3) malfunction
E5	Compressor discharge temperature sensor (T5) malfunction
ED	Outdoor unit EEPROM parameter error
ED	Outdoor fan speed malfunction
EB	Inverter module (IPM) malfunction
EF	Other malfunction

DIAGNOSIS AND SOLUTION

Outdoor Unit Error Display

Table 12—Diagnostic Table Outdoor Units

NO.	PROBLEMS	ERROR CODE
1	Communication malfunction between indoor and outdoor units	E1
2	Current overload protection	F0
3	Outdoor ambient temperature sensor (T4) malfunction	F1
4	Condenser coil temperature sensor (T3) malfunction	F2
5	Compressor discharge temperature sensor (T5) malfunction	F3
6	Outdoor unit EEPROM parameter error	F4
7	Outdoor fan speed malfunction	F5
8	Inverter module (IPM) malfunction	P0
9	Over−voltage or under−voltage protection	P1
10	Compressor top high temperature protection (OLP)	P2
11	Low ambient temperature cut off in heating	P3
12	Compressor drive malfunction	P4
13	High temperature protection of indoor coil in heating	J0
14	Outdoor temperature protection of outdoor coil in cooling	J1
15	Temperature protection of compressor discharge	J2
16	PFC module protection	J3
17	Communication malfunction between control board and IPM board	J4
18	High pressure protection	J5
19	Low pressure protection	J6
20	Outdoor IPM module temperature sensor malfunction	P7
21	AC voltage protection	J8

DIAGNOSIS AND SOLUTION (CONT)

Table 13—Outdoor Check Function

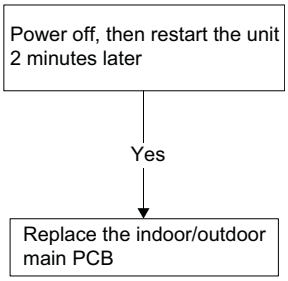
N	DISPLAY	REMARK
00	Normal display	Display running frequency, running state or malfunction code
01	Indoor unit capacity demand code	Actual data*HP*10 If the capacity demand code is higher than 99, the digital display tube will display a single digit and tens digit. (For example, the digital display tube displays “5.0”,it means the capacity demand is 15. The digital display tube show “60”,it means the capacity demand is 6.0)
02	Amendatory capacity demand code	
03	The frequency after the capacity requirement transfer	
04	The frequency after the frequency limit	
05	The frequency of sending to 341 chip	
06	Indoor unit evaporator outlet temp.(heating T2，cooling T2B)	If the temp. is lower than 0 degree, the digital display tube displays “0”. If the temp. is higher than 70 degree, the digital display tube displays “70”.
07	Condenser pipe temp.(T3)	If the temp. is lower than −9 degree, the digital display tube displays “−9”.If the temp. is higher than 70 degree, the digital display tube displays “70”. If the indoor unit is not connected, the digital display tube displays: “−−”
08	Outdoor ambient temp.(T4)	
09	Compressor discharge temp.(T5)	The display value is between 13～129 degree. If the temp. is lower than 13 degree, the digital display tube displays “13”. If the temp. is higher than 99 degree, the digital display tube displays a single digit and a tens digit. (For example, if the digital display tube displays “0.5”,it means the compressor discharge temp. is 105 degree. If the digital display tube displays “1.6”,it means the compressor discharge temp. is 116 degrees).
10	AD value of current	The display value is a hex number.
11	AD value of voltage	
12	Indoor unit running mode code	Off:0, Fan only 1,Cooling:2, Heating:3
13	Outdoor unit running mode code	Off:0, Fan only 1,Cooling:2, Heating:3, Forced cooling:4
14	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, if the digital display tube displays “2.0”,it means the EXV open angle is 120×4=480p.).
15	Frequency limit symbol	Bit7 Frequency limit caused by IGBT radiator Bit6 Frequency limit caused by PFC Bit5 Frequency limit caused by T4 Bit4 Frequency limit caused by T2 Bit3 Frequency limit caused by T3 Bit2 Frequency limit caused by T5 Bit1 Frequency limit caused by current Bit0 Frequency limit caused by voltage The display value is a hex number. For ex., the digital display tube displays 2A, then Bit5=1, Bit3=1, Bit1=1. It represents the frequency limit caused by T4, T3 and current.
16	DC fan motor speed	
17	IGBT radiator temp.	The display value is between 30～120 degrees. If the temp. is lower than 30 degrees, the digital display tube displays “30”.If the temp. is higher than 99 degrees, the digital display tube displays a single digit and a tens digit. (For example, if the digital display tube displays “0.5”,it means the IGBT radiator temp. is 105 degrees. If the digital display tube displays “1.6”, it means the IGBT radiator temp. is 116 degrees).
18	Indoor unit number	The indoor unit can communicate well with the outdoor unit. General:1, Twins:2
19	Evaporator pipe temp. T2 of 1# indoor unit	If the temp. is lower than 0 degree, the digital display tube displays “0”.If the temp. is higher than 70 degrees, the digital display tube displays “70”. If the indoor unit is not connected, the digital display tube displays: “−−”.
20	Evaporator pipe temp. T2 of 2# indoor unit	
21	Evaporator pipe temp. T2 of 3# indoor unit	
22	1# Indoor unit capacity demand code	Actual data*HP*10 If the 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”,it means the capacity demand is 15. If the digital display tube displays “60”,it means the capacity demand is 6.0). If the indoor unit is not connected, the digital display tube displays: “−−”.
23	2# Indoor unit capacity demand code	
24	3# Indoor unit capacity demand code	
25	Room temp. T1 of 1# indoor unit	If the temp. is lower than 0 degree, the digital display tube displays “0”.If the temp. is higher than 70 degrees, the digital display tube displays “70”. If the indoor unit is not connected, the digital display tube displays: “−−”.
26	Room temp. T1 of 2# indoor unit	
27	Average room temp. T1	
28	Reason of stop	
29	Evaporator pipe temp. T2B of 1# indoor unit	If the temp. is lower than 0 degree, the digital display tube displays “0”.If the temp. is higher than 70 degrees, the digital display tube displays “70”. If the indoor unit is not connected, the digital display tube displays: “−−”.
30	Evaporator pipe temp. T2B of 2# indoor unit	

DIAGNOSIS AND SOLUTION (CONT)

Table 14—EEPROM Parameter Error Diagnosis and Solution (E0/F4)

Error Code	E0/F4
Malfunction conditions	Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.
Possible causes	• Installation mistake • Faulty PCB

Troubleshooting



EEPROM: A read−only memory whose contents can be erased and reprogrammed using a pulsed voltage. For the location of EEPROM chip, refer to the following images.

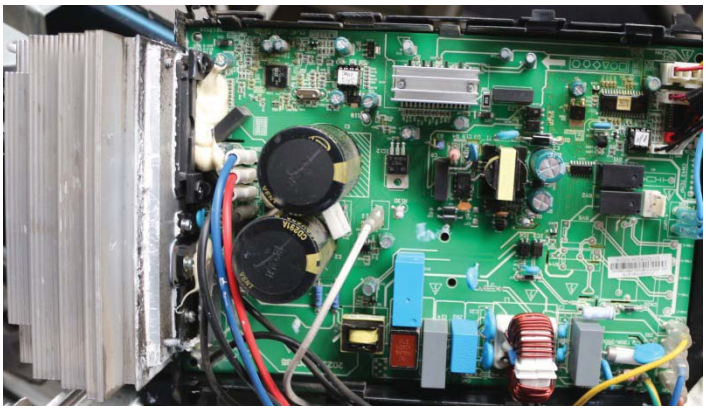


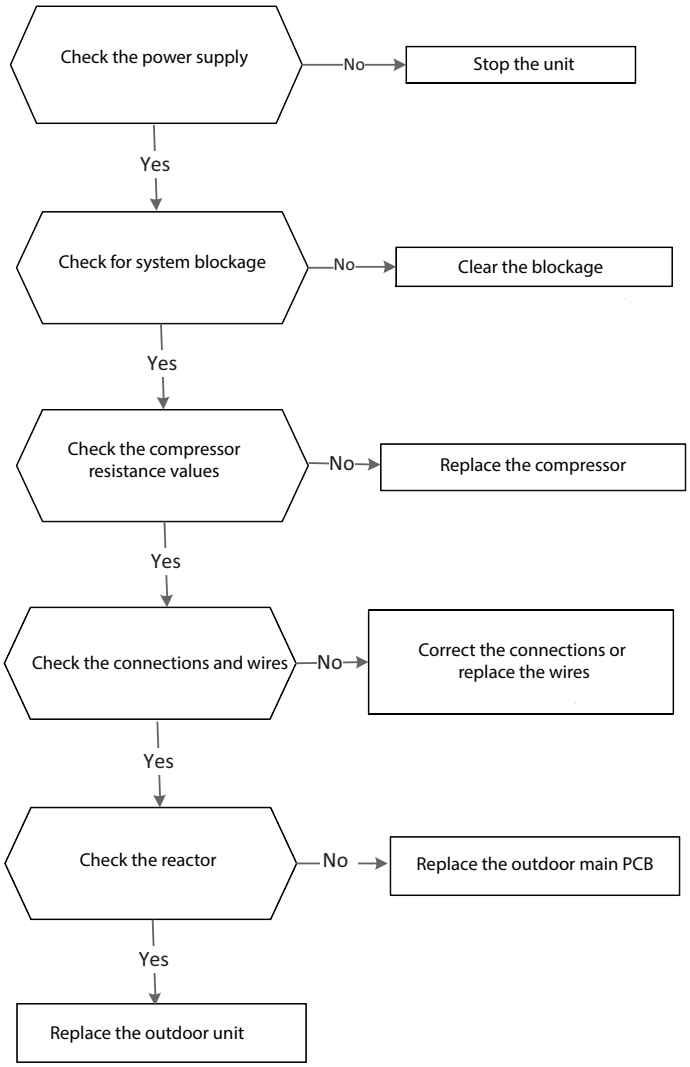
Fig. 17 — Outdoor PCB

NOTE: **Fig. 17 is for illustration purposes only and may differ from your actual unit.**

DIAGNOSIS AND SOLUTION (CONT)

Table 15—Overload Current Protection Diagnosis and Solution (F0)

Error Code	F0
Malfunction decision conditions	An abnormal current rise is detected by checking the specified current detection circuit.
Possible causes	• Power supply problems • System blockage • PCB faulty • Wiring mistake • Compressor malfunction

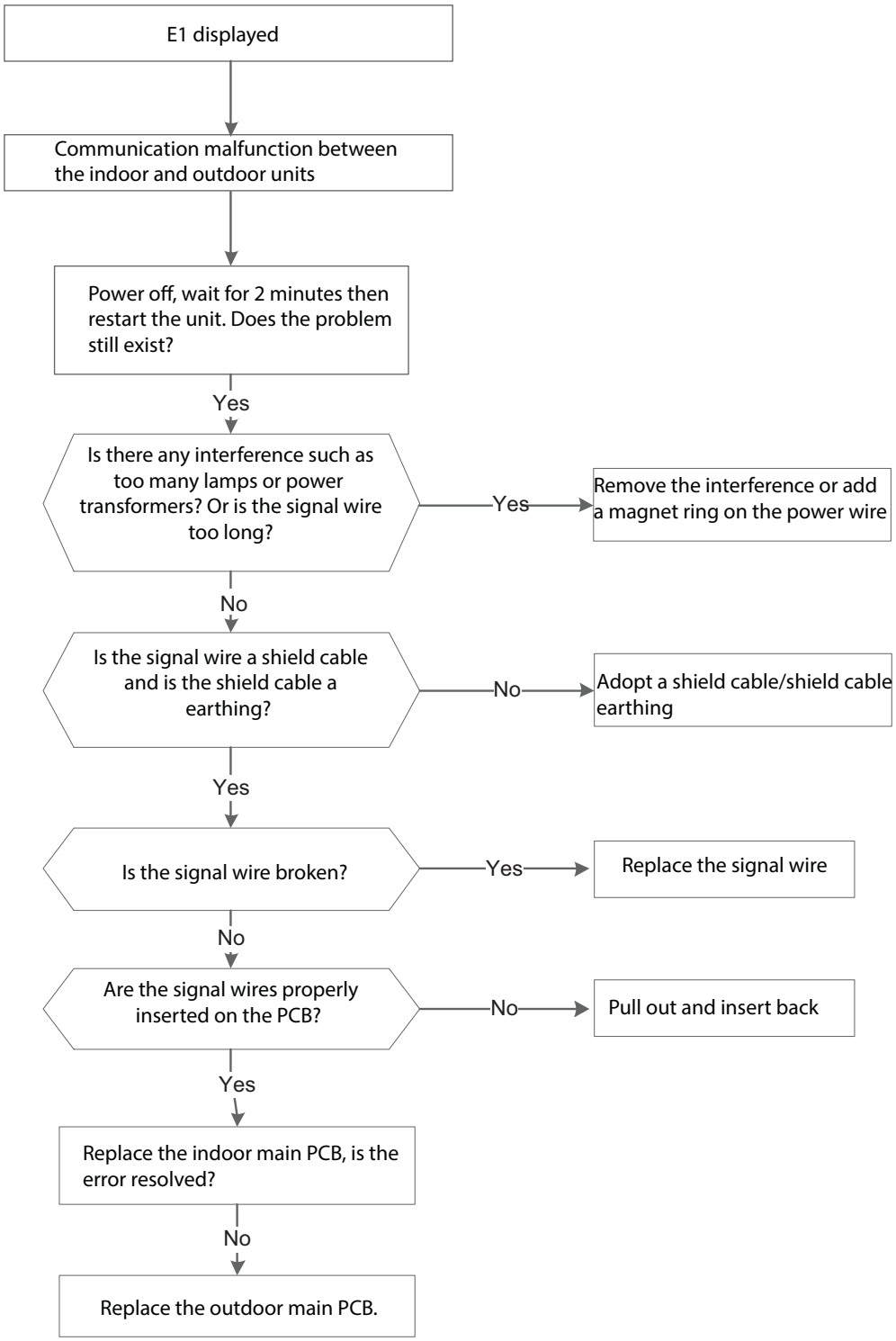


DIAGNOSIS AND SOLUTION (CONT)

Table 16—Indoor/Outdoor Unit Communication Error − Diagnosis and Solution (E1)

Error Code	E1
Malfunction decision conditions	Indoor unit does not receive feedback from outdoor unit for 60 seconds, or the outdoor unit does not receive feedback from indoor unit for 120 seconds.
Possible causes	• Wiring mistakes • Faulty indoor or outdoor PCB

Troubleshooting:



DIAGNOSIS AND SOLUTION (CONT)

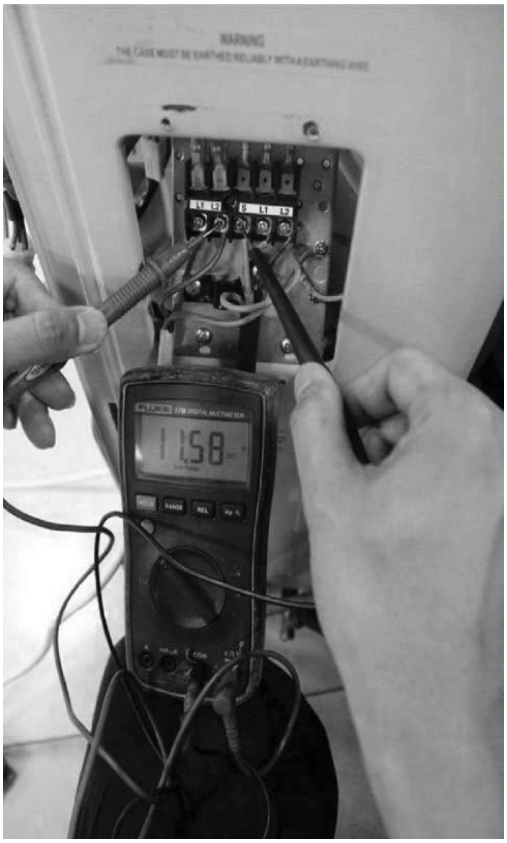


Fig. 18 – DC Voltage Test

Remark

Use a multimeter to test the DC voltage between the outdoor unit's L2 port and S ports (Fig. 16). The red pin of the multimeter connects with the L2 port while the black pin is for the S port. When the AC is running normally, the voltage moves alternatively between −50V to 50V.

If the outdoor unit has a malfunction, the voltage moves alternatively with a positive value. If the indoor unit has a malfunction, the voltage has a certain value. Example: 10−13VDC small fluctuating amounts indicates indoor unit malfunction.

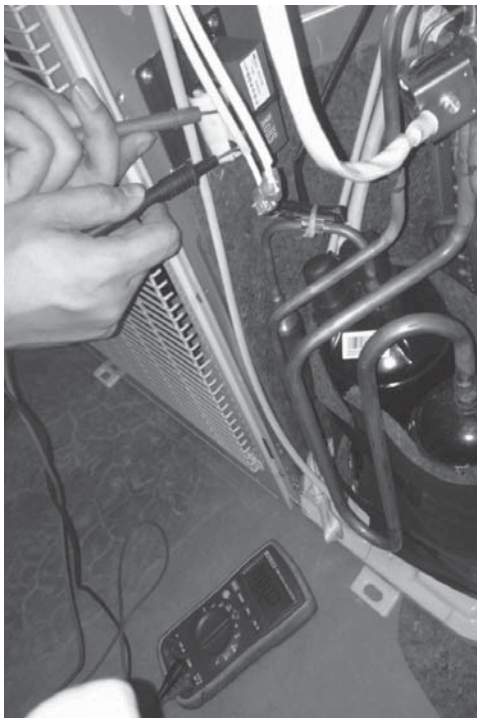


Fig. 19 – Reactor Resistance Test

Remark

Use a multimeter to test the reactor resistance that does not connect with the capacitor (Fig. 19). The normal values should be around zero ohm. Otherwise, the reactor has malfunctioned and needs to be replaced.

DIAGNOSIS AND SOLUTION (CONT)

Index 1

Indoor or Outdoor DC Fan Motor (control chip is in the fan motor). Power on and when the unit is in standby, measure the voltage of pin−1 − pin3, pin4 −pin3 in the fan motor connector. If the value of the voltage is not in the range showing in the table below, the PCB has an issue and needs to be replaced.

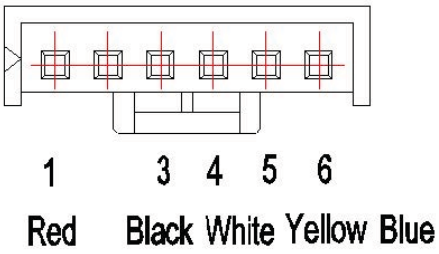


Fig. 20 — Control Chip

Table 17—DC motor voltage input and output

No.	COLOR	SIGNAL	VOLTAGE
1	Red	Vs/Vm	200~380V
2	–––	–––	–––
3	Black	GND	OV
4	White	Vcc	13.5~16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5~16.5V

DIAGNOSIS AND SOLUTION (CONT)

Table 18—Open Circuit or Short Circuit of Temperature Sensor Diagnosis and Solution (E4/E5/F1/F2/F3)

Error Code	E4/E5/F1/F2/F3
Malfunction decision conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure.
Possible causes	• Wiring mistake • Sensor Faulty

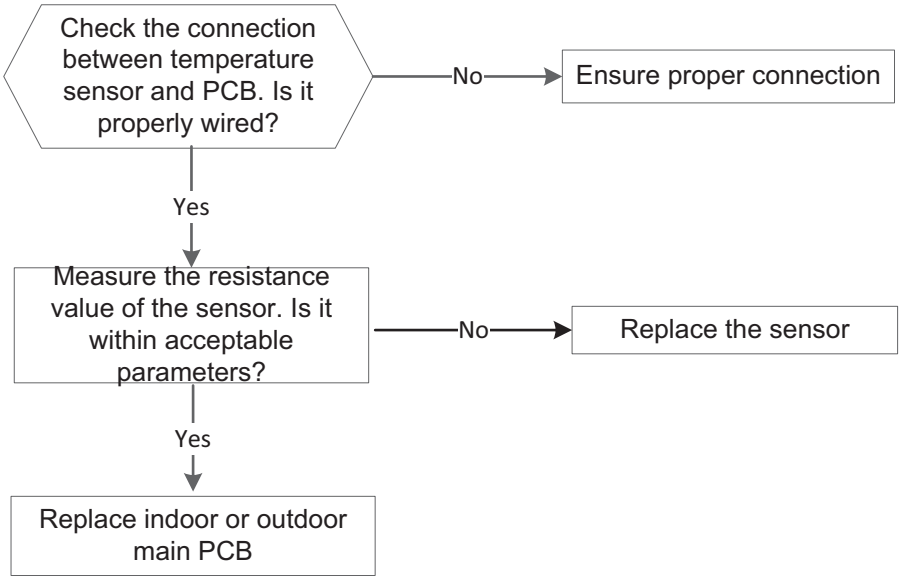


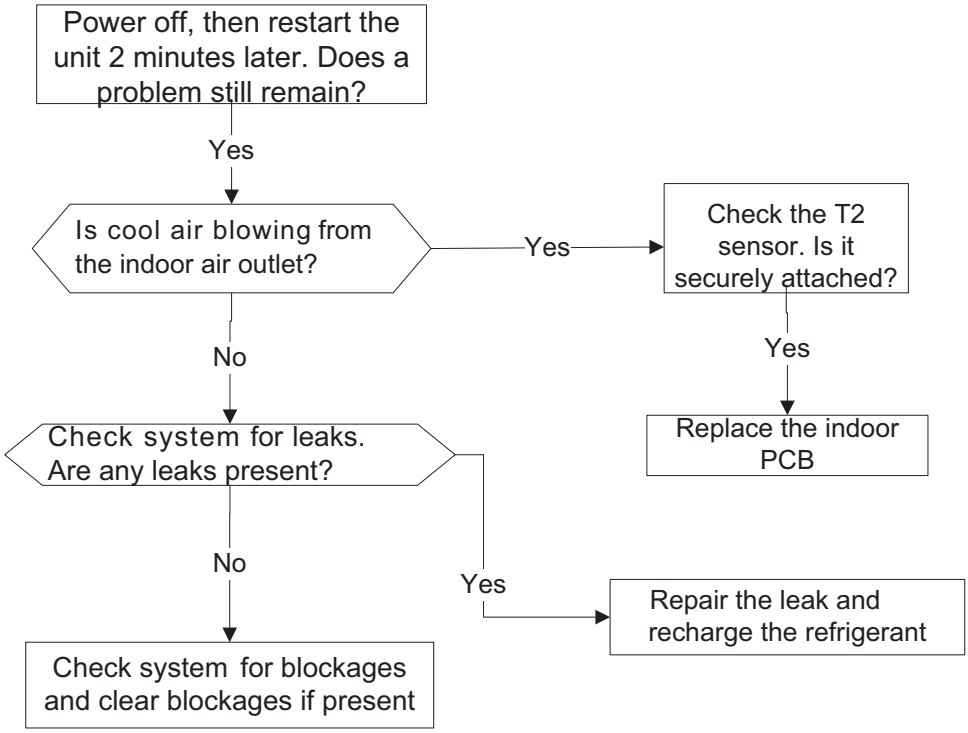
Fig. 21 — Test

DIAGNOSIS AND SOLUTION (CONT)

Table 19—Refrigerant Leakage Detection Diagnosis and Solution (EC)

Error Code	EC
Malfunction decision conditions	Define the evaporator coil temp.T2 of the compressor just starts running as Tcool. In the beginning 5 minutes after the compressor starts up, if T2 <Tcool−35.6°F(Tcool−2°C) does not keep continuous 4 seconds and this situation happens 3 times, the display area shows “EC” and AC turns off.
Possible causes	• T2 sensor faulty • Indoor PCB faulty • System problems, such as leakage or blocking

Troubleshooting:

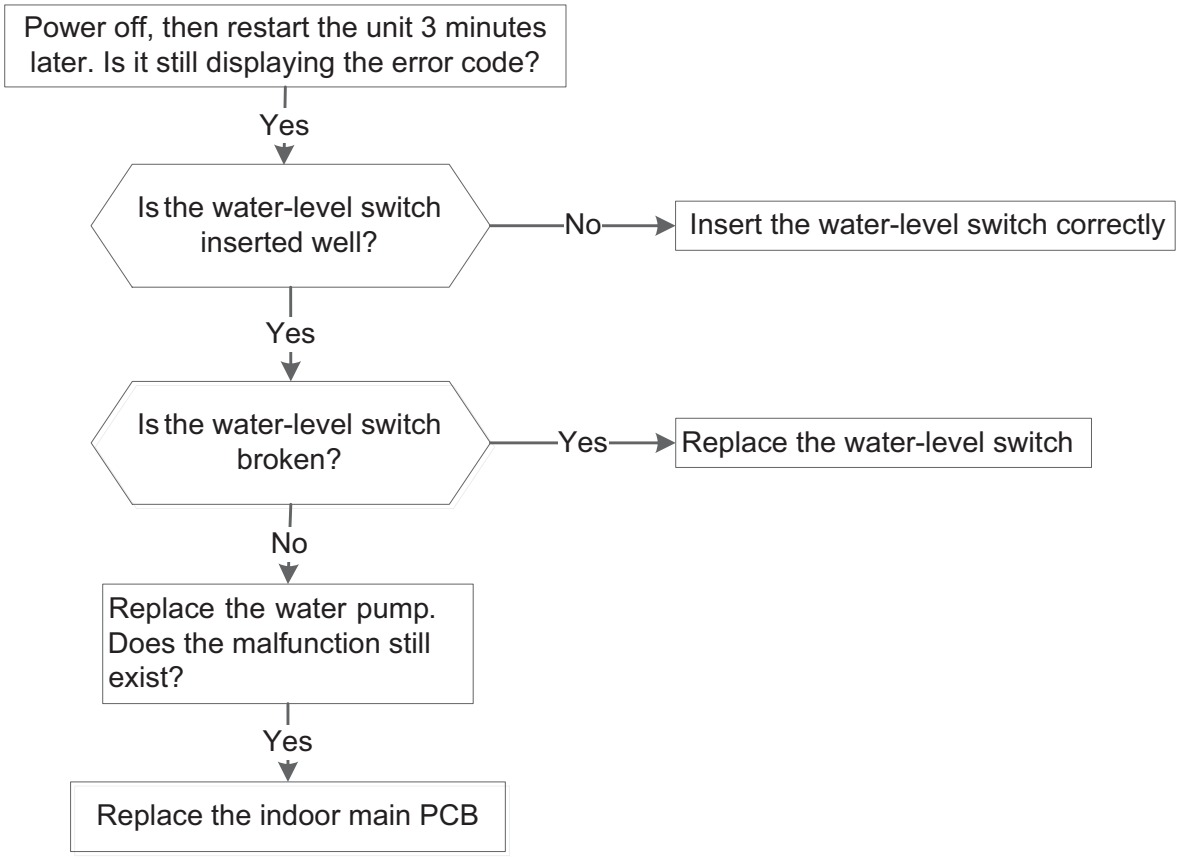


DIAGNOSIS AND SOLUTION (CONT)

Table 20—Water−Level Alarm Malfunction Diagnosis and Solution (EE)

Error Code	EE
Malfunction conditions	If the sampling voltage is not 5V, the LED will display the failure code.
Possible causes	• Wiring problem • Faulty water-level switch • Faulty water pump • Faulty indoor PCB

Troubleshooting:

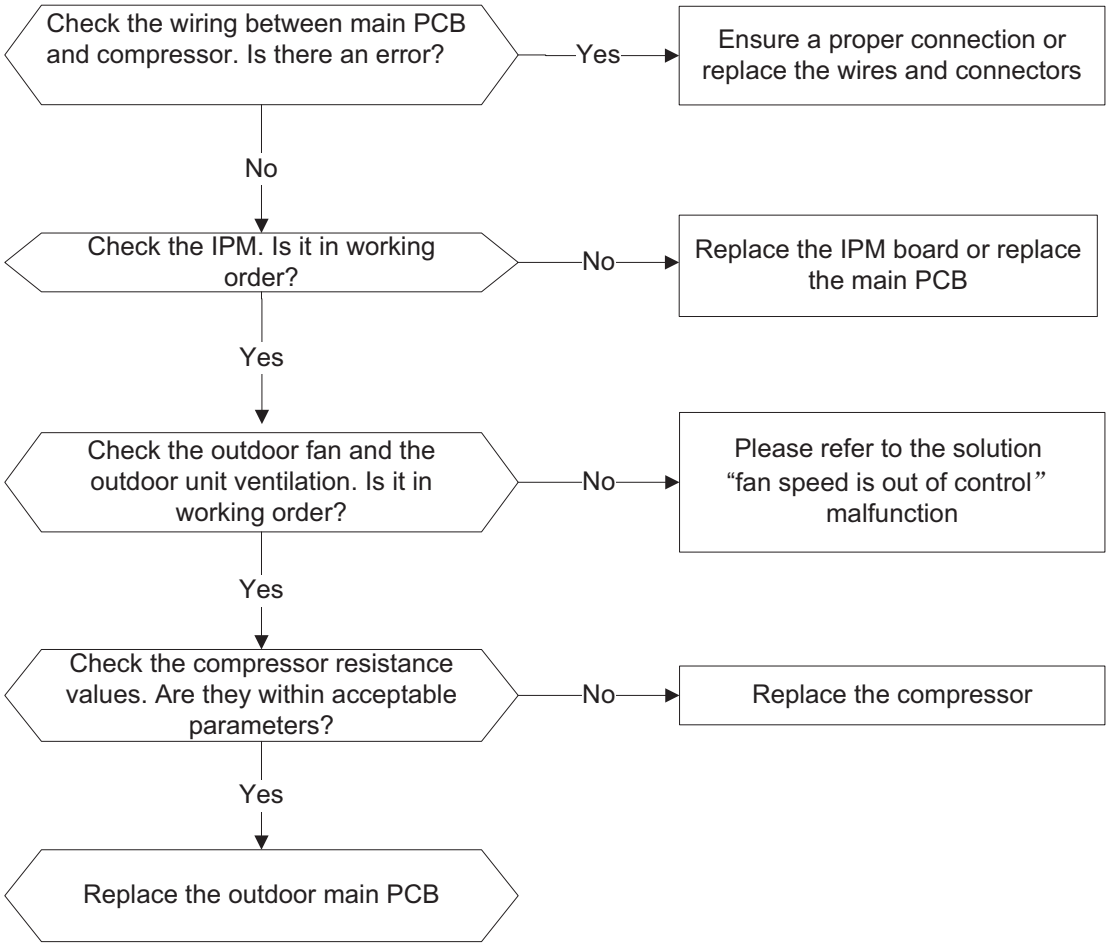


DIAGNOSIS AND SOLUTION (CONT)

Table 21—IPM Malfunction or IGBT Over−strong Current Protection Diagnosis and Solution (PO)

Error Code	PO
Malfunction decision conditions	When the voltage signal that IPM sends to the compressor drive chip is abnormal, the LED displays “PO” and the AC turns off.
Possible causes	• Wiring mistake • IPM malfunction • Outdoor fan assembly faulty • Compressor malfunction • Outdoor PCB faulty

Troubleshooting



NOTE: In figures 22−25 the following is observed:

- U,V,W references the compressor connection point
- P references input voltage
- N references output voltage

DIAGNOSIS AND SOLUTION (CONT)

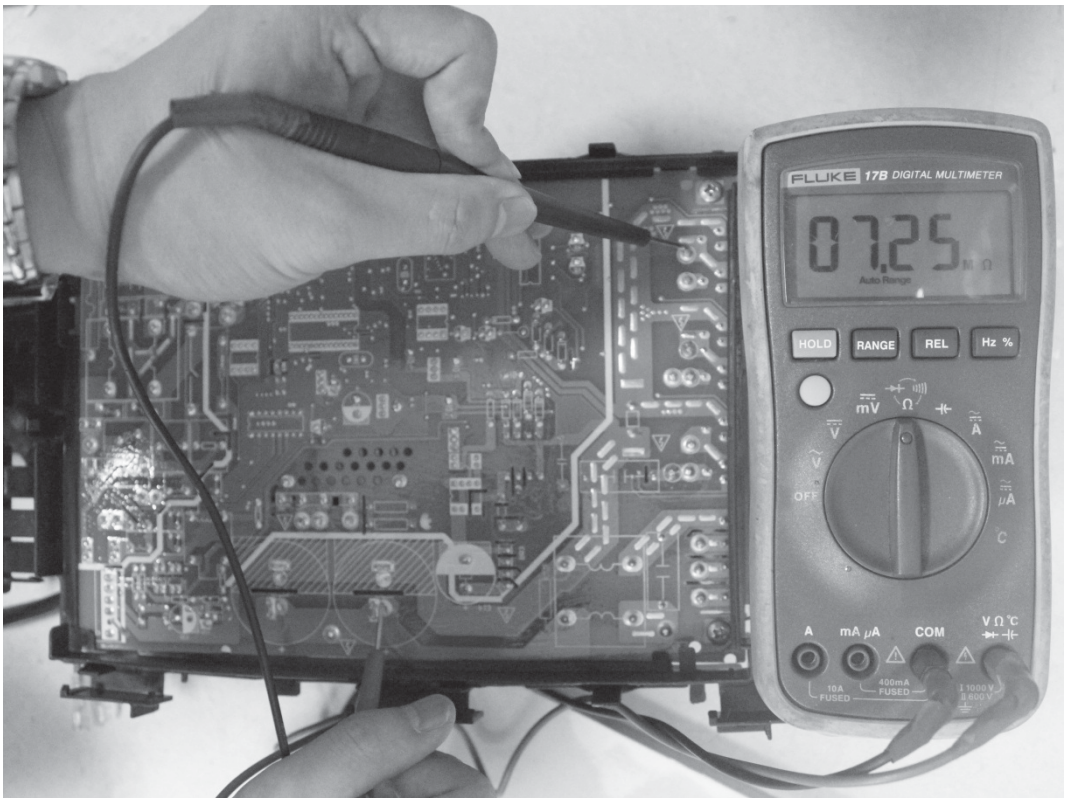


Fig. 22 – P–U

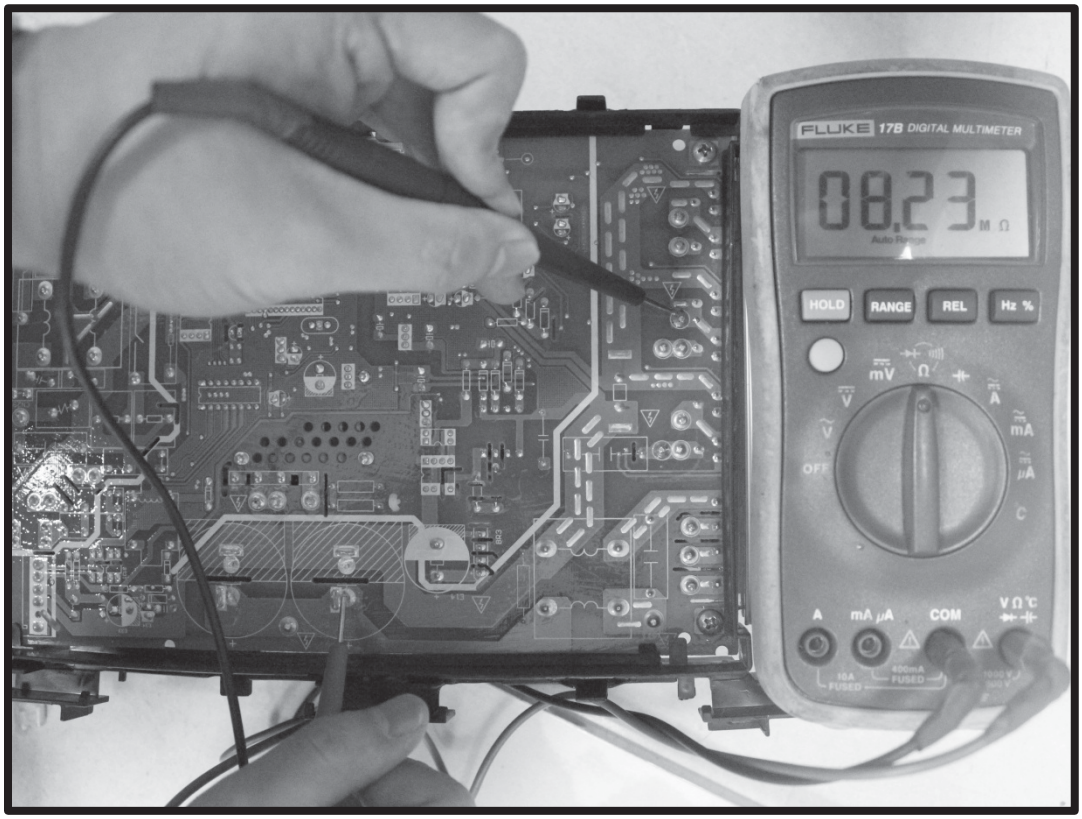


Fig. 23 – P–V

DIAGNOSIS AND SOLUTION (CONT)

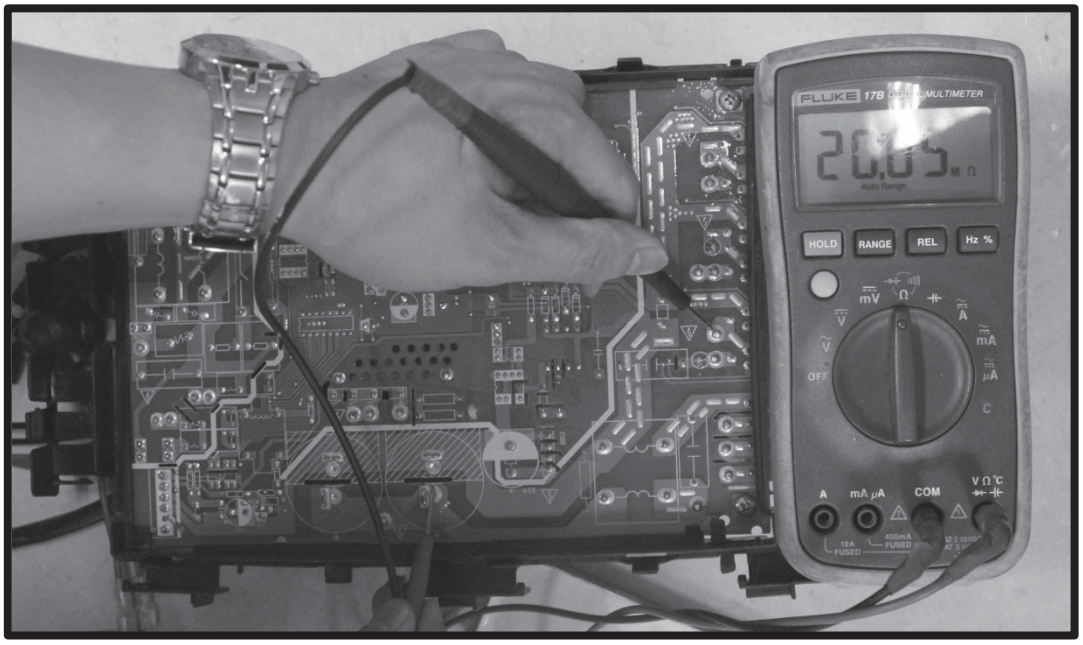


Fig. 24 — P–W

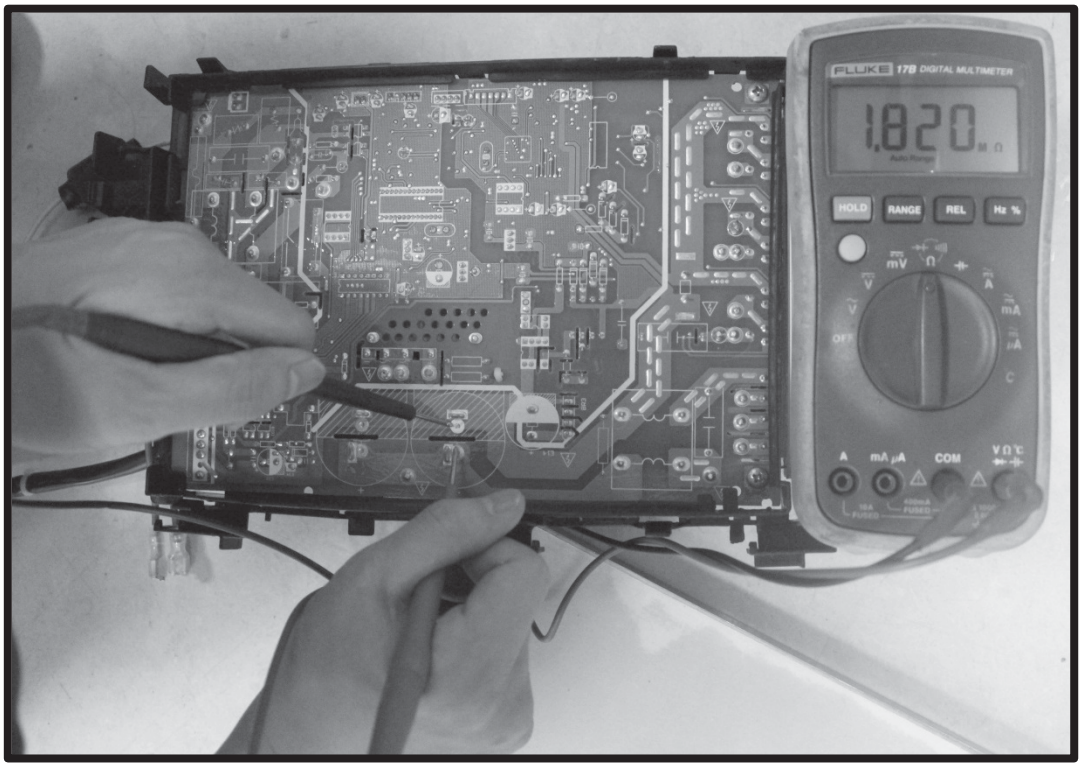


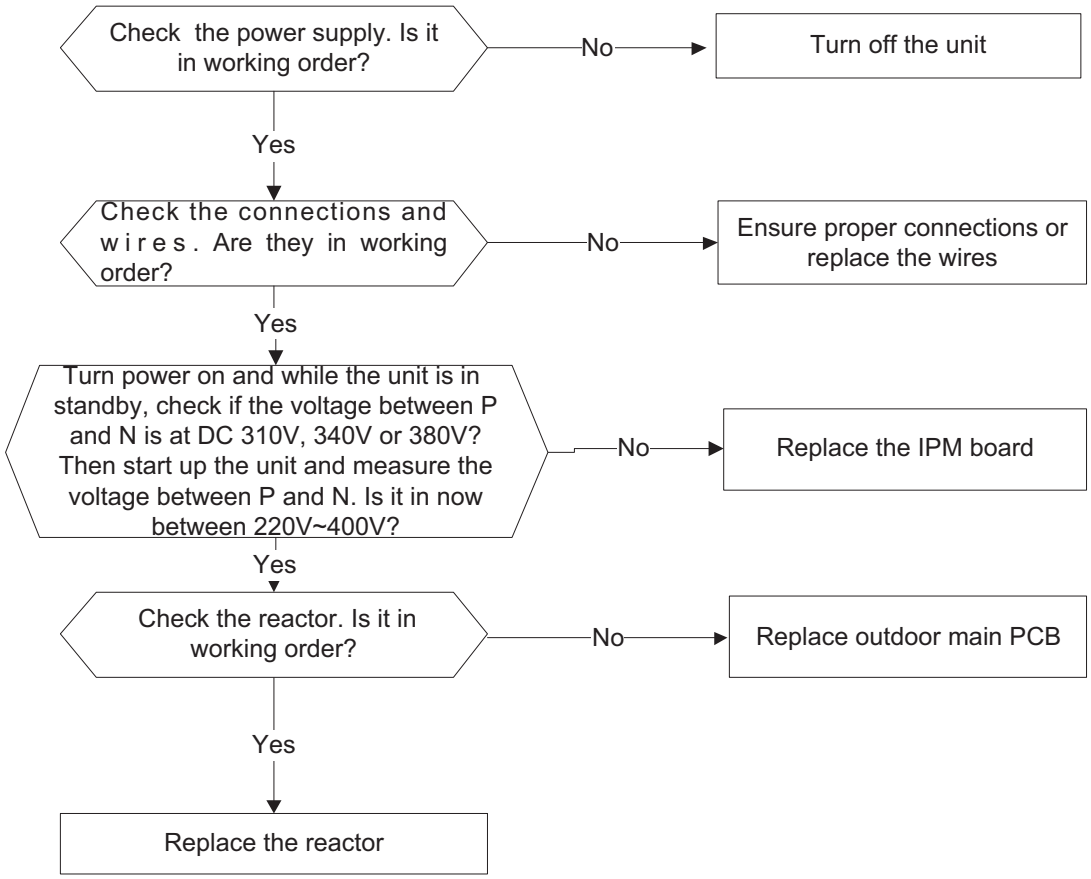
Fig. 25 — P–N

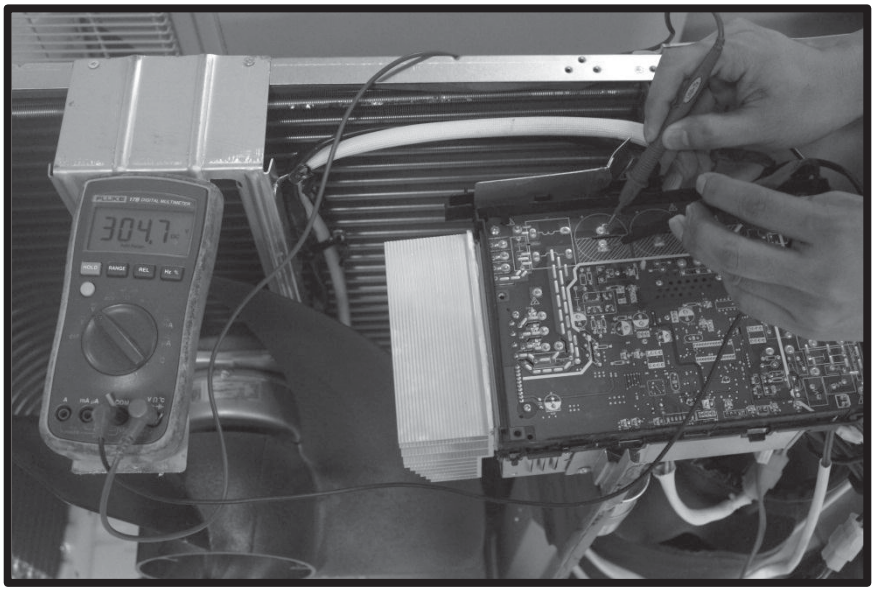
DIAGNOSIS AND SOLUTION (CONT)

Table 22—Over Voltage or Too Low Voltage Protection Diagnosis and Solution (P1)

Error Code	P1
Malfunction decision conditions	An abnormal current rise is detected by checking the specified current detection circuit.
Supposed causes	• Power supply problems • System leakage or blockage • PCB faulty

Troubleshooting



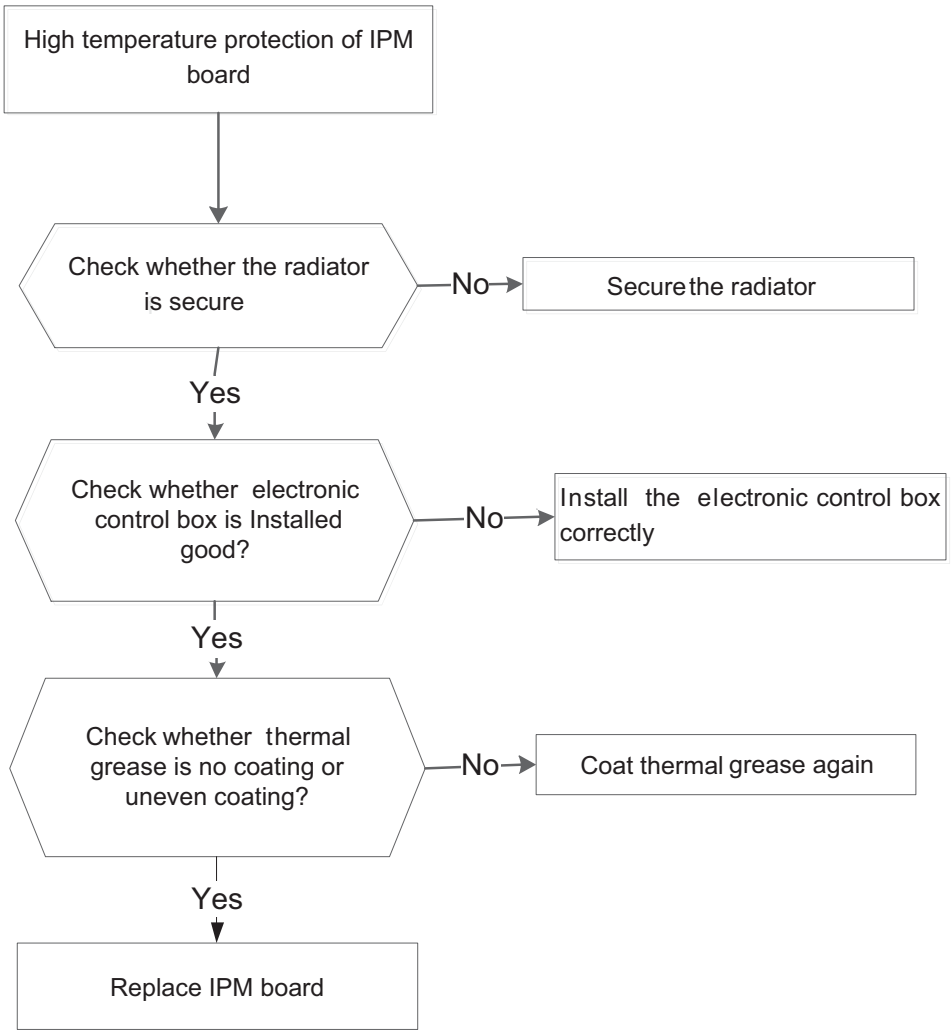


DIAGNOSIS AND SOLUTION (CONT)

Table 23—High Temperature Protection of Compressor Top Diagnosis and Solution (P2)

Error Code	P2
Malfunction decision conditions	If the sampling voltage is not 5V, the LED displays the failure.
Possible causes	• Power supply problems • System leakage or block • PCB faulty

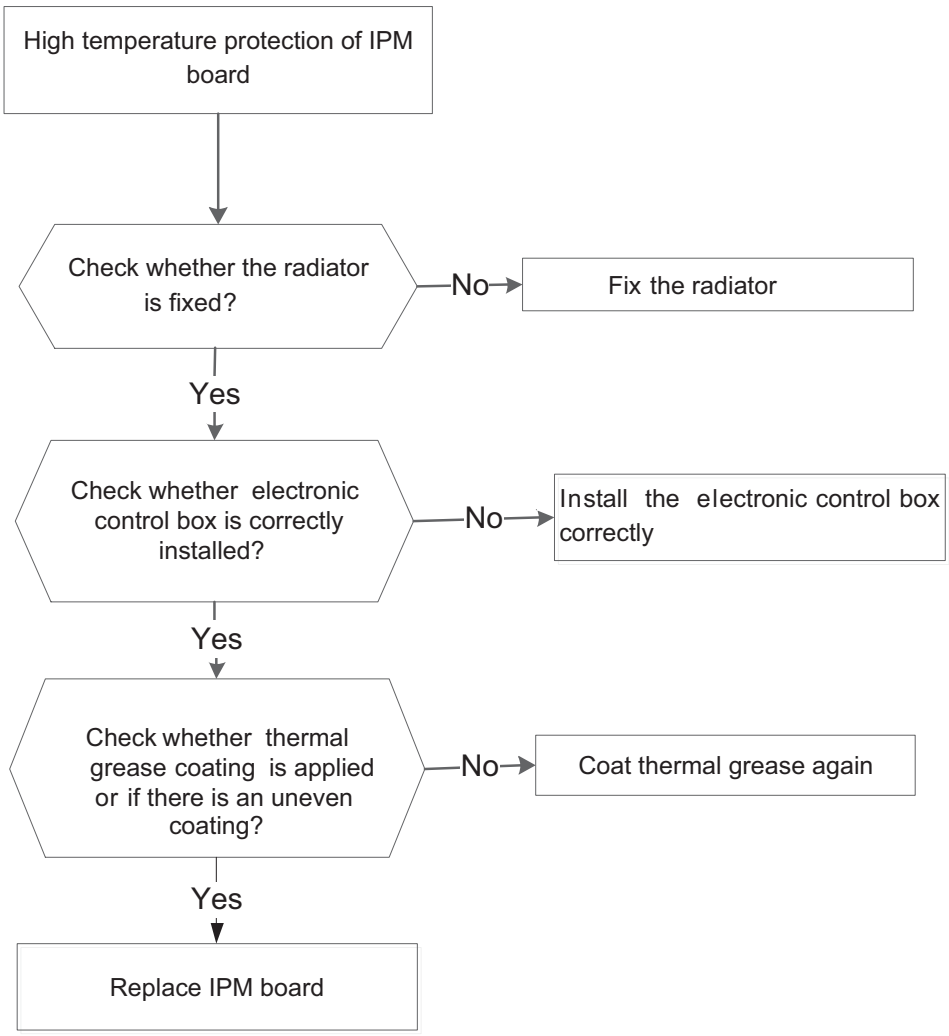
Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

HIGH TEMPERATURE PROTECTION OF IPM BOARD DIAGNOSIS AND SOLUTION (P2)

Troubleshooting

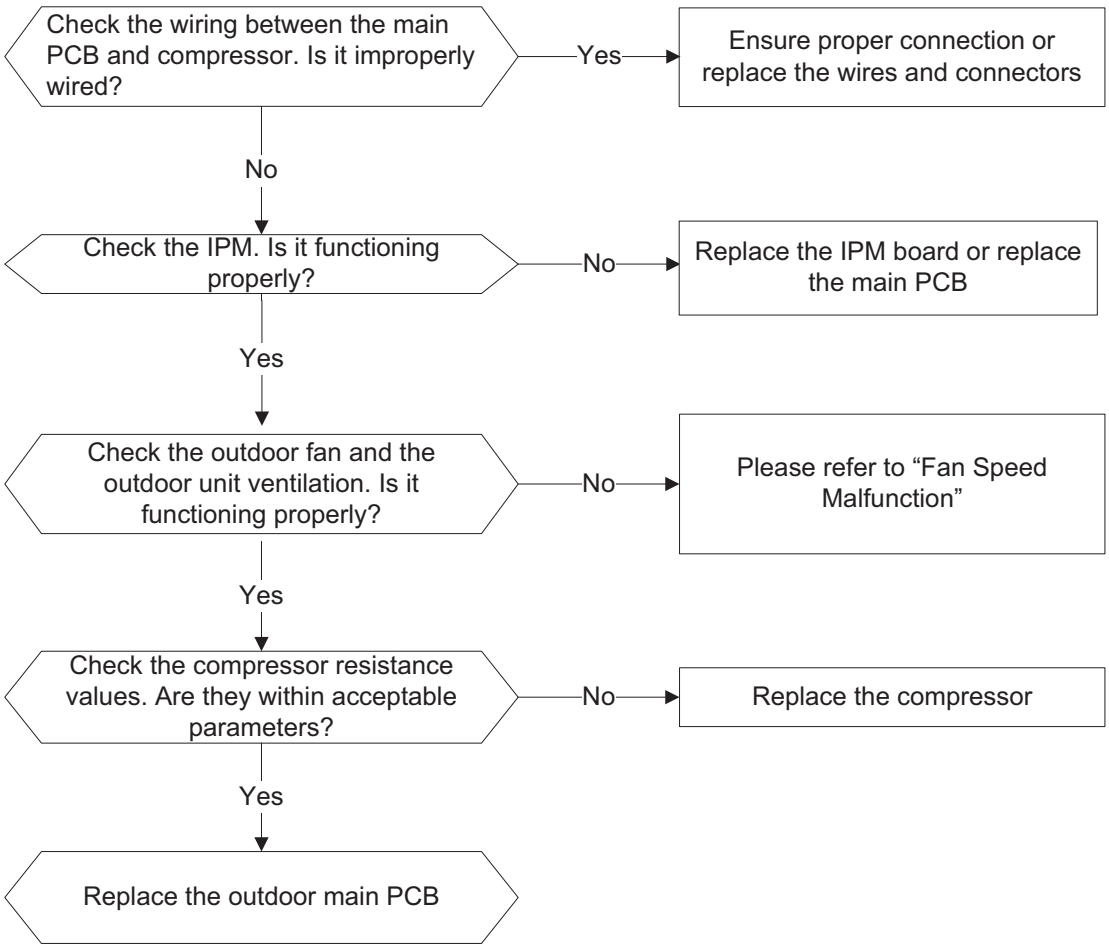


DIAGNOSIS AND SOLUTION (CONT)

Table 24—Inverter Compressor Drive Error Diagnosis and Solution (P4)

Error Code	P4
Malfunction conditions	An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection and so on.
probable causes	• Wiring mistake • IPM malfunction • Outdoor fan assembly fault • Compressor malfunction • Outdoor PCB faulty

Troubleshooting

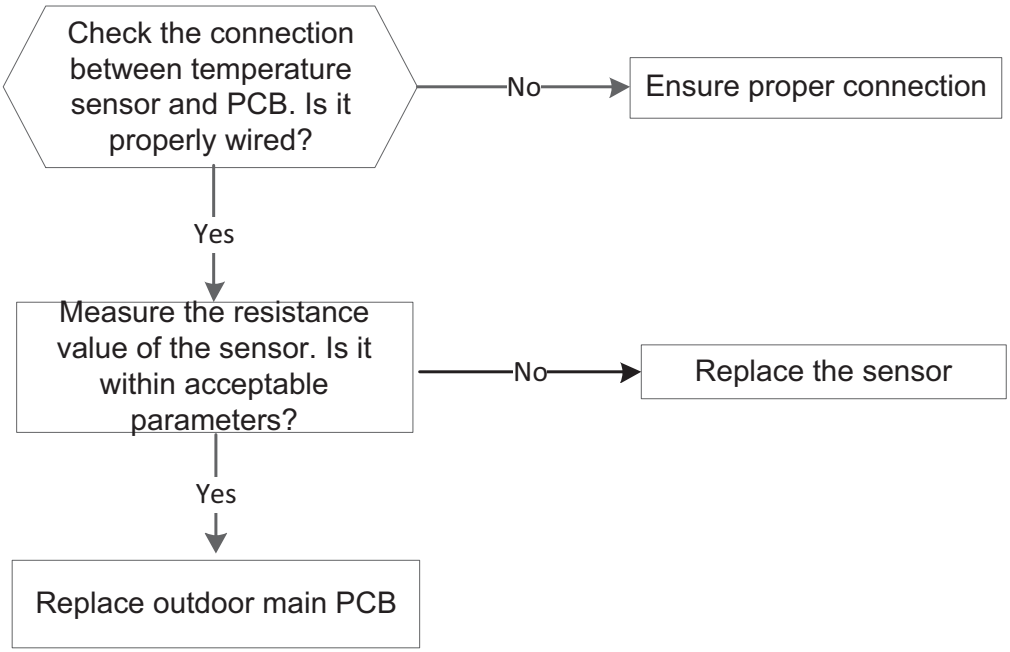


DIAGNOSIS AND SOLUTION (CONT)

Table 25—Outdoor IPM module temperature sensor malfunction diagnosis and solution (P7)

Error Code	P7
Malfunction Conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays a failure
Possible Causes	• Faulty wiring • Faulty sensor

Troubleshooting

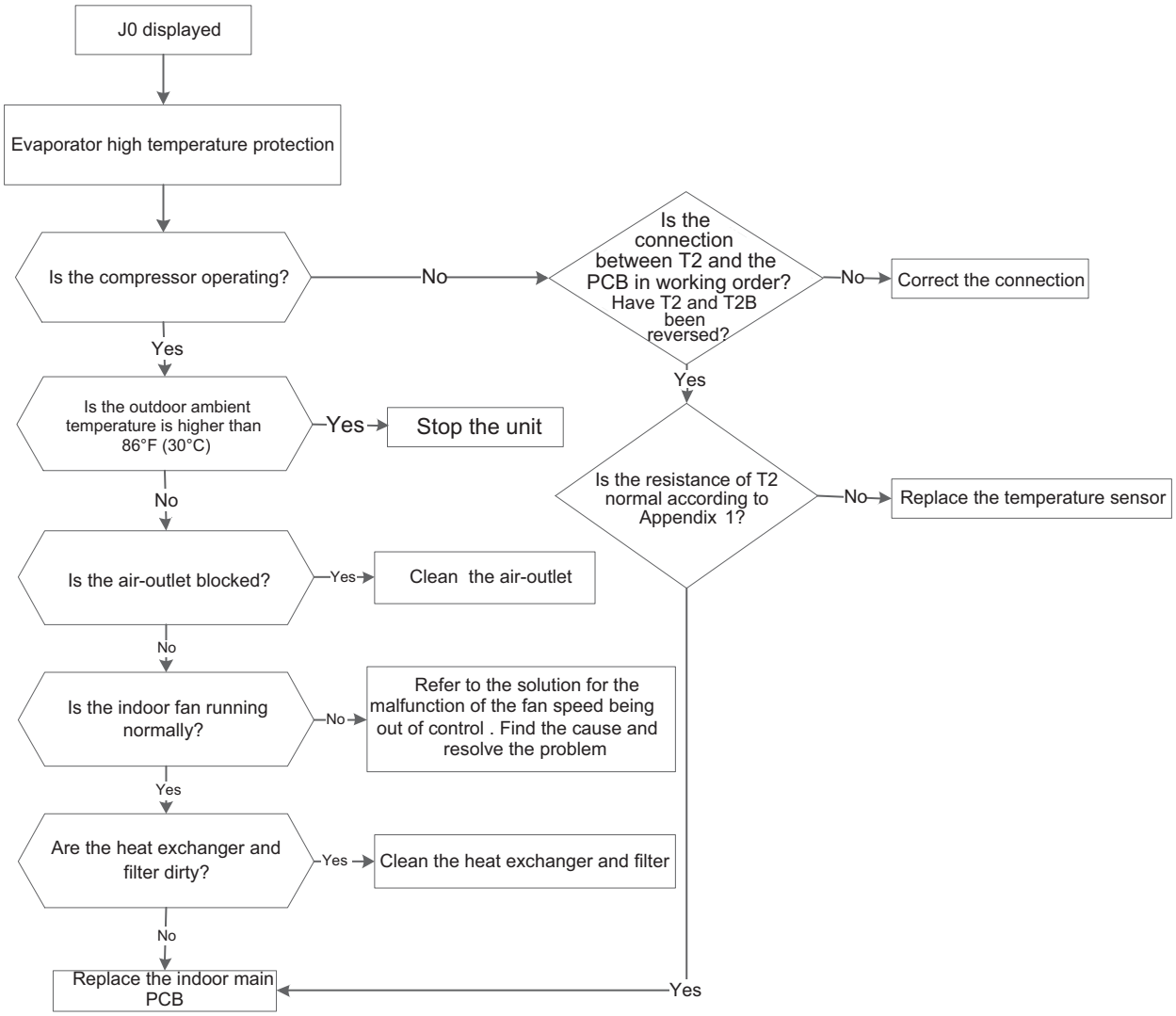


DIAGNOSIS AND SOLUTION (CONT)

Table 26—J0 Malfunction

Malfunction Conditions	When the evaporator coil is more than 140°F(60°C), the unit stops. It starts up again only when the evaporator coil is less than 129°F(54°C).
Possible Causes	• Faulty evaporator coil temperature sensor • Dirty heat exchanger • Faulty fan • Faulty PCB

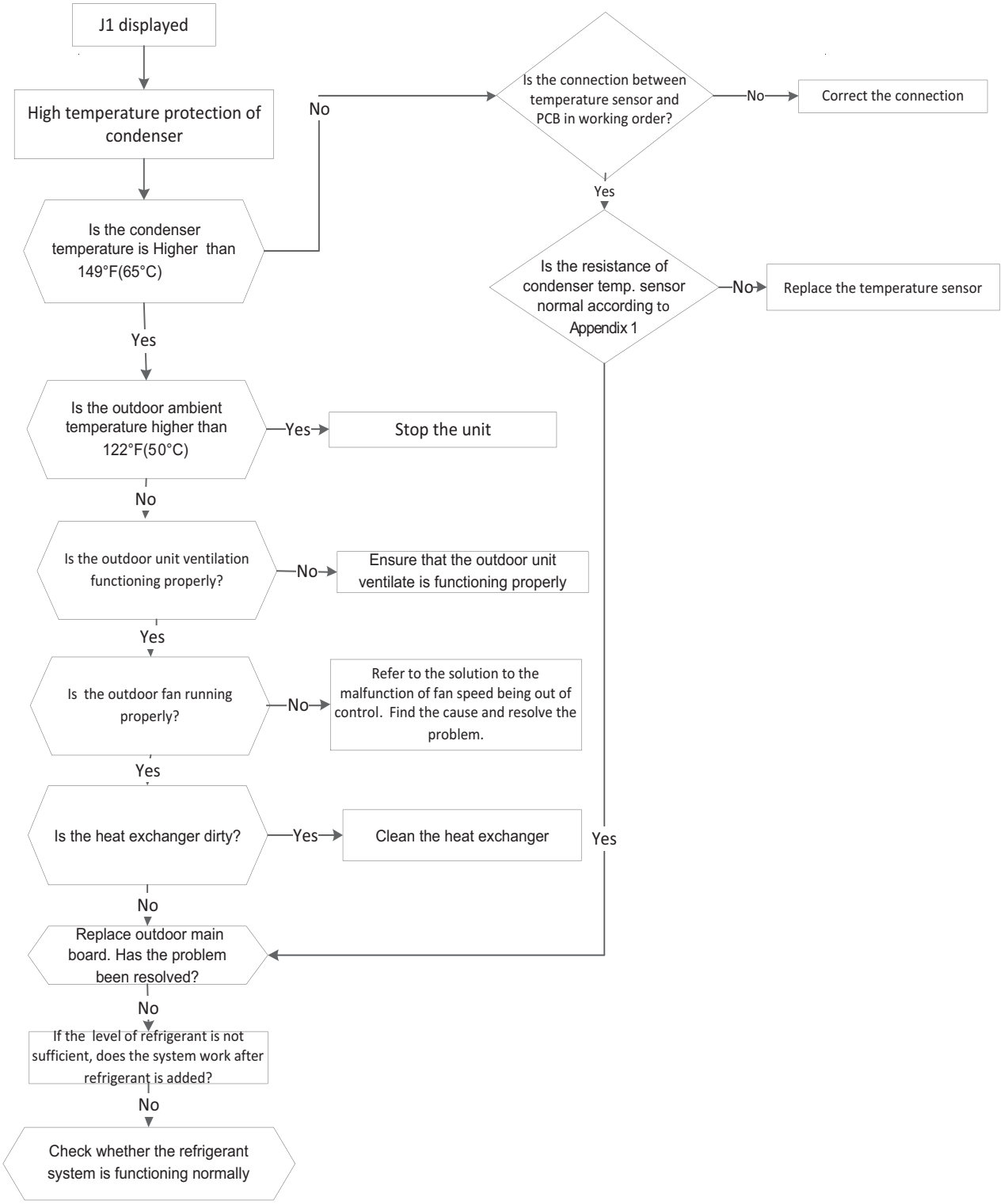
Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

Table 27—J1 Malfunction

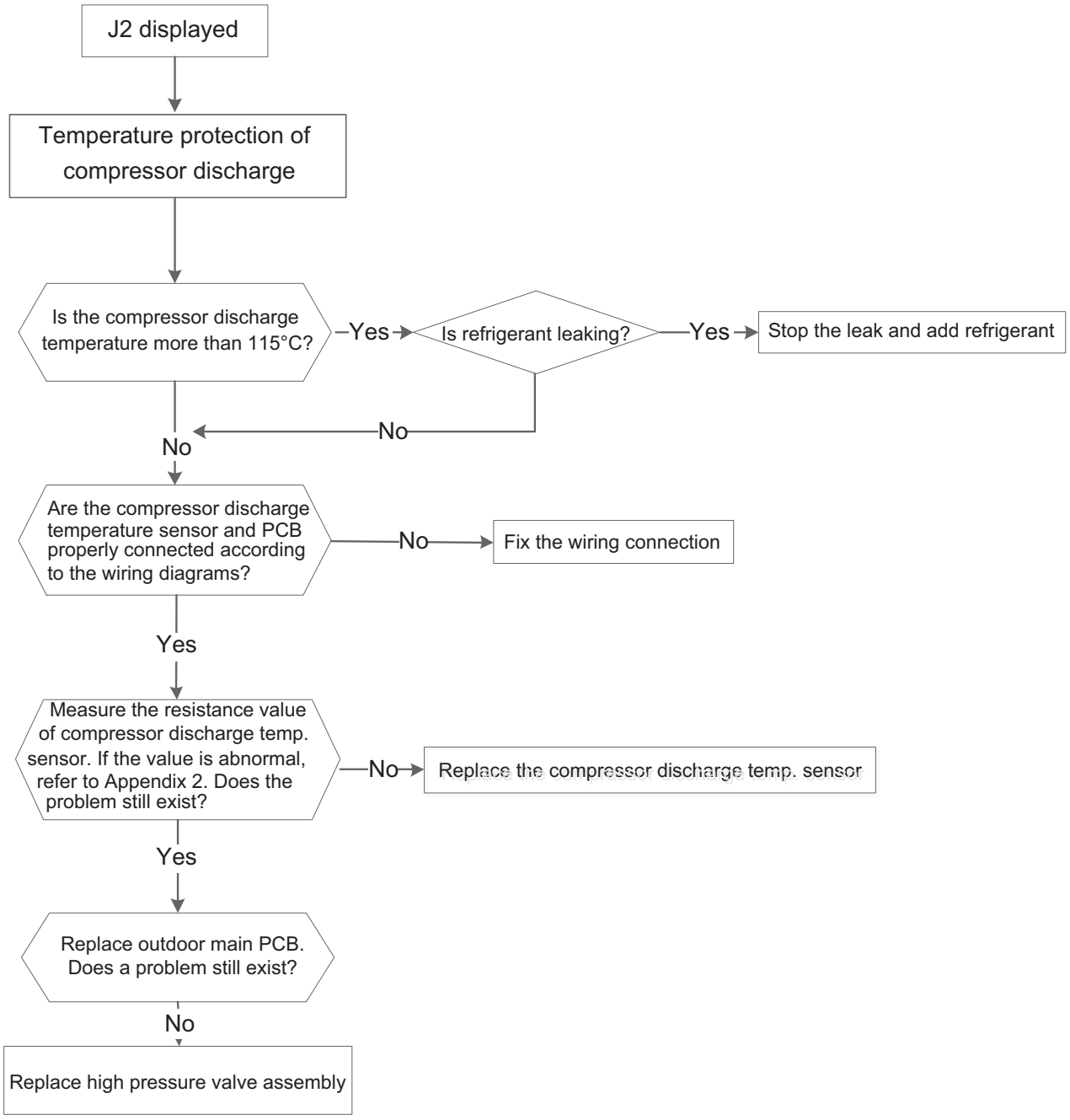
Malfunction Conditions	When the outdoor pipe temperature is more than 149°F(65°C), the unit stops. It starts up again only when the outdoor pipe temperature is less than 126°F(52°C).
Possible Causes	• Faulty condenser temperature sensor • Dirty heat exchanger • System leakage or blockage



DIAGNOSIS AND SOLUTION (CONT)

Table 28—J2 Malfunction

Malfunction Conditions	When the compressor discharge temperature (T5) is more than 115°C for 10 seconds, the compressor will stop and not restart until T5 is less than 90°C.
Possible Causes	• Refrigerant leakage • Faulty wiring • Faulty discharge temperature sensor • Faulty outdoor PCB

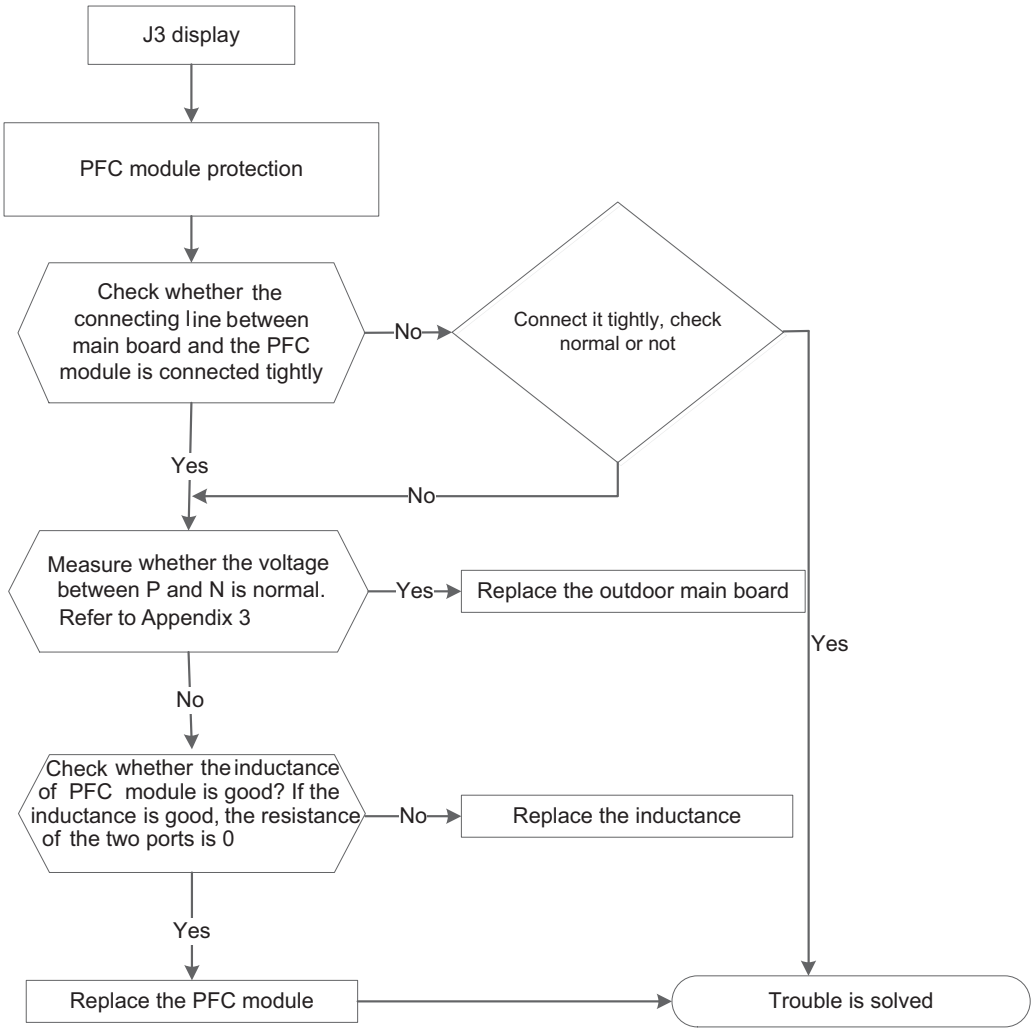


DIAGNOSIS AND SOLUTION (CONT)

Table 29—J3 Malfunction

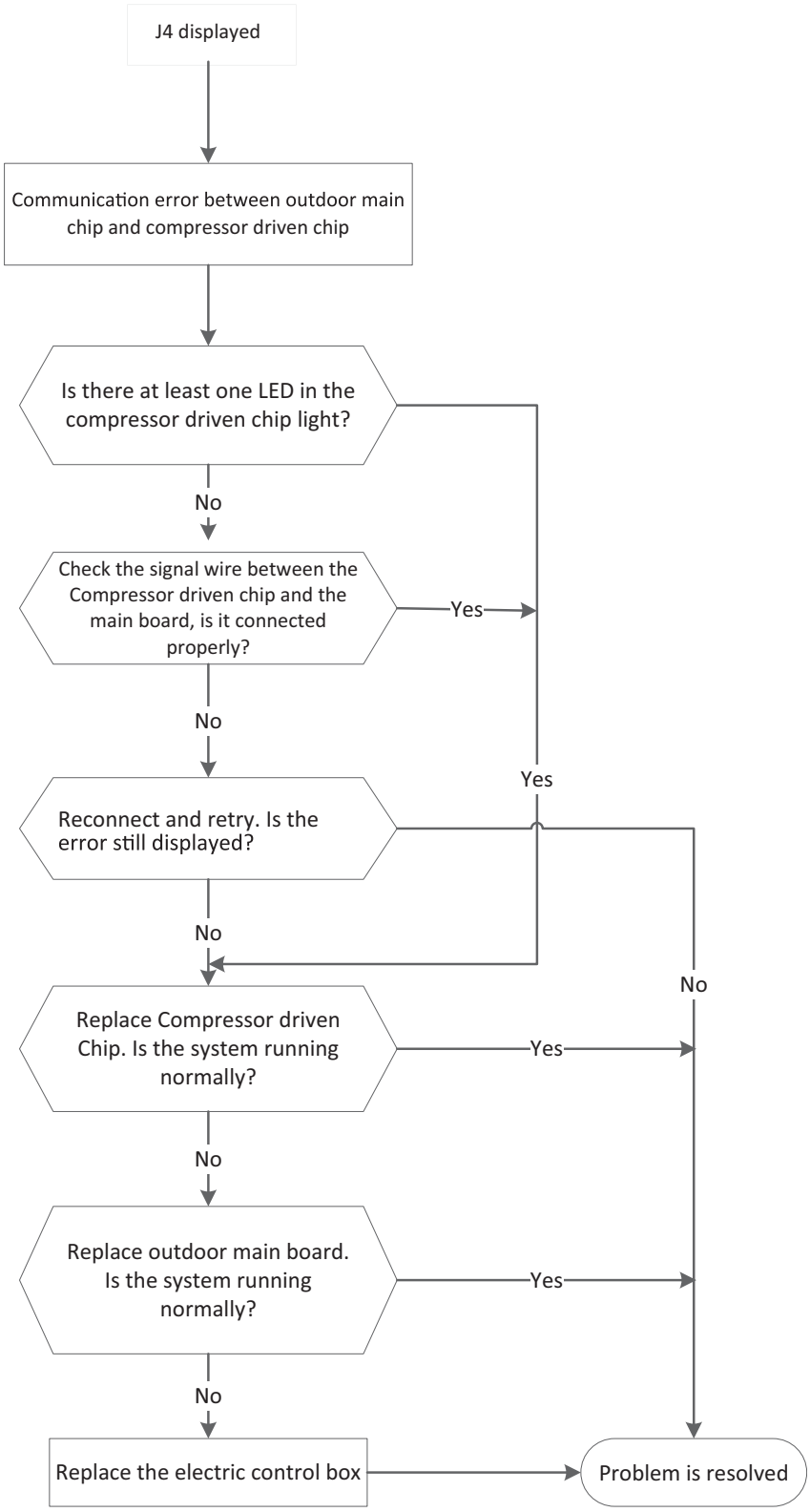
Malfunction Conditions	When the voltage signal that the IPM sends to the compressor is abnormal, the display LED will show “J3” and the unit will turn off.
Possible Causes	• Faulty wiring • Faulty IPM board • Faulty outdoor fan assembly • Compressor malfunction • Faulty outdoor PCB

At first, test the resistance between every two ports of U, V, W of IPM and P, N. If any ot the results is 0 or close to 0, the IPM is defective. Otherwise, follow the procedure below:



DIAGNOSIS AND SOLUTION (CONT)

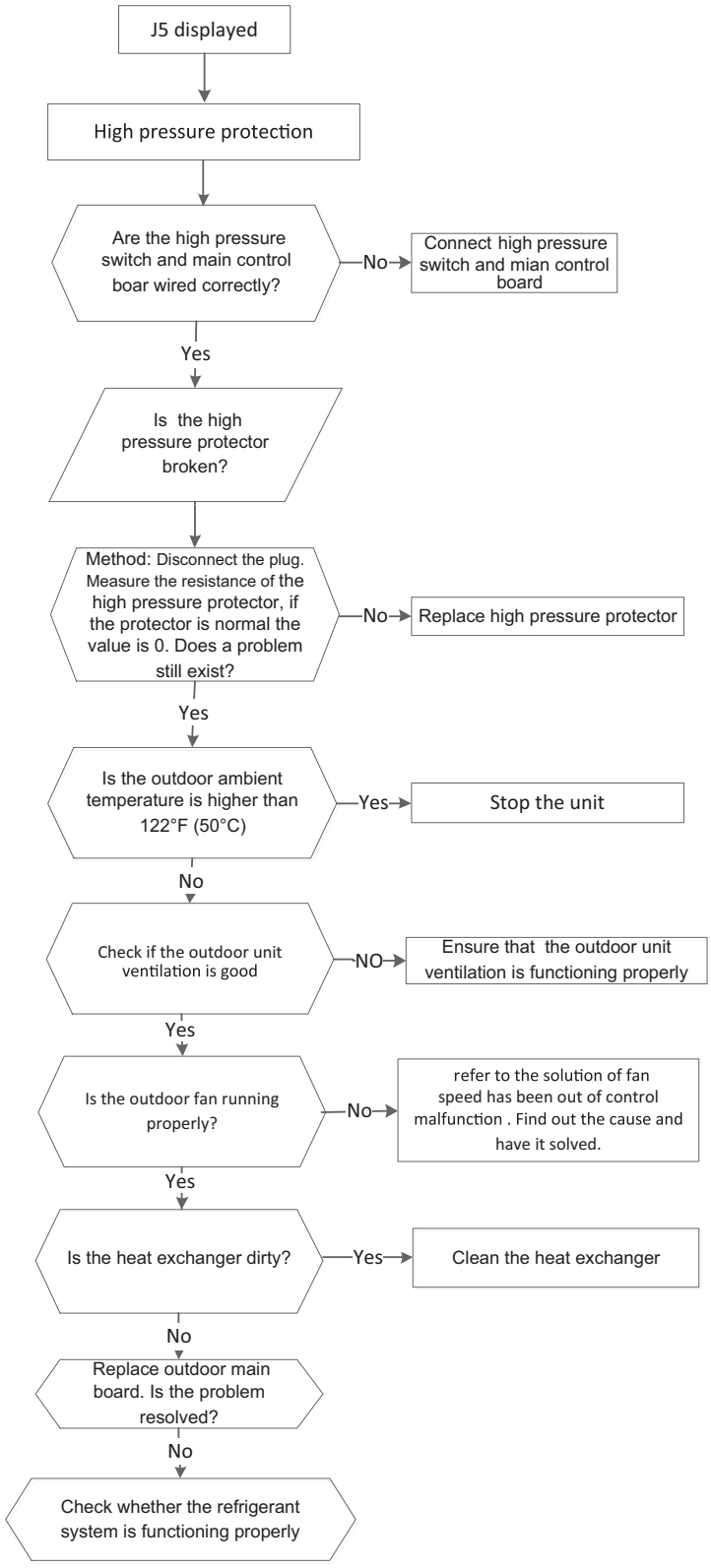
J4 MALFUNCTION



DIAGNOSIS AND SOLUTION (CONT)

Table 30—J5 Malfunction

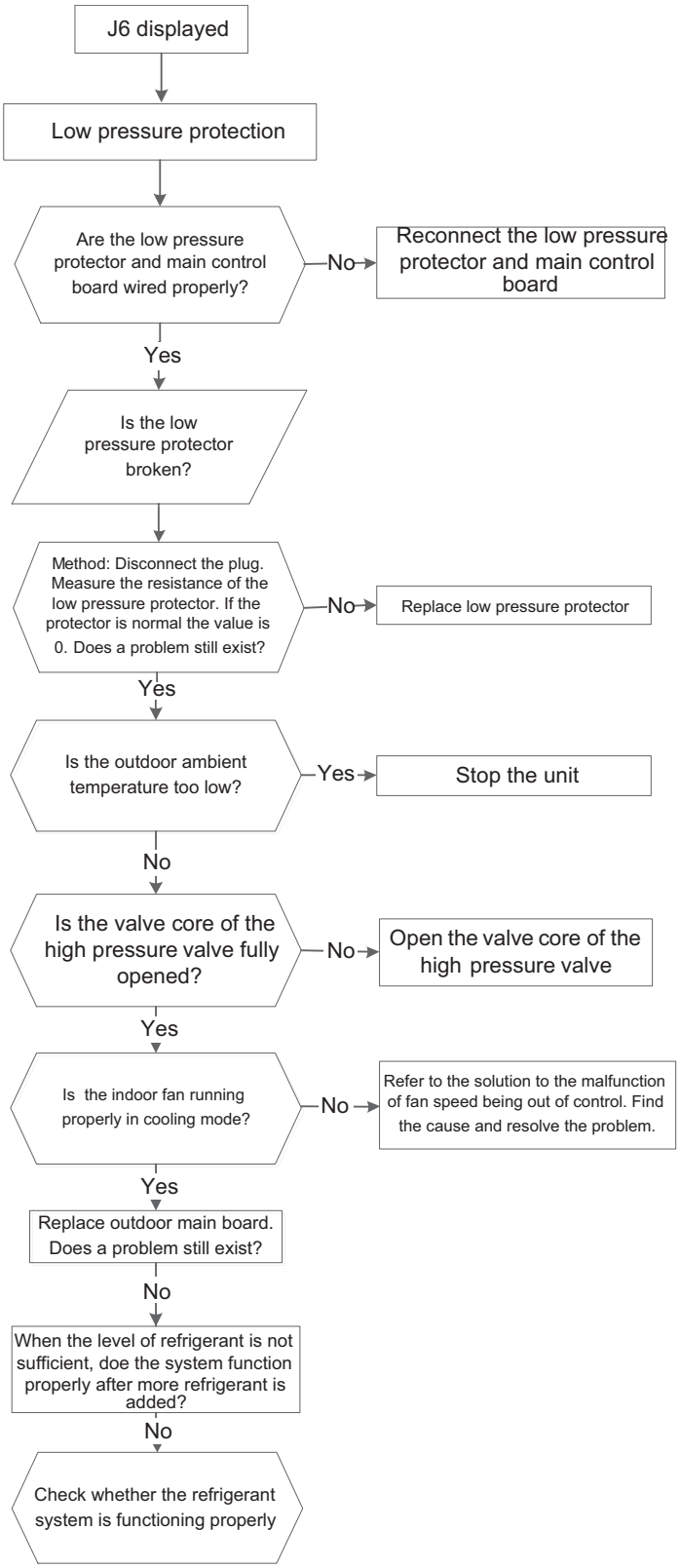
Malfunction Conditions	The sampling voltage is not 5V, the LED displays a failure code.
Possible Causes	• Faulty wiring • Faulty overload protector • System blockage • Faulty outdoor PCB



DIAGNOSIS AND SOLUTION (CONT)

Table 31—J6/P6 Malfunction

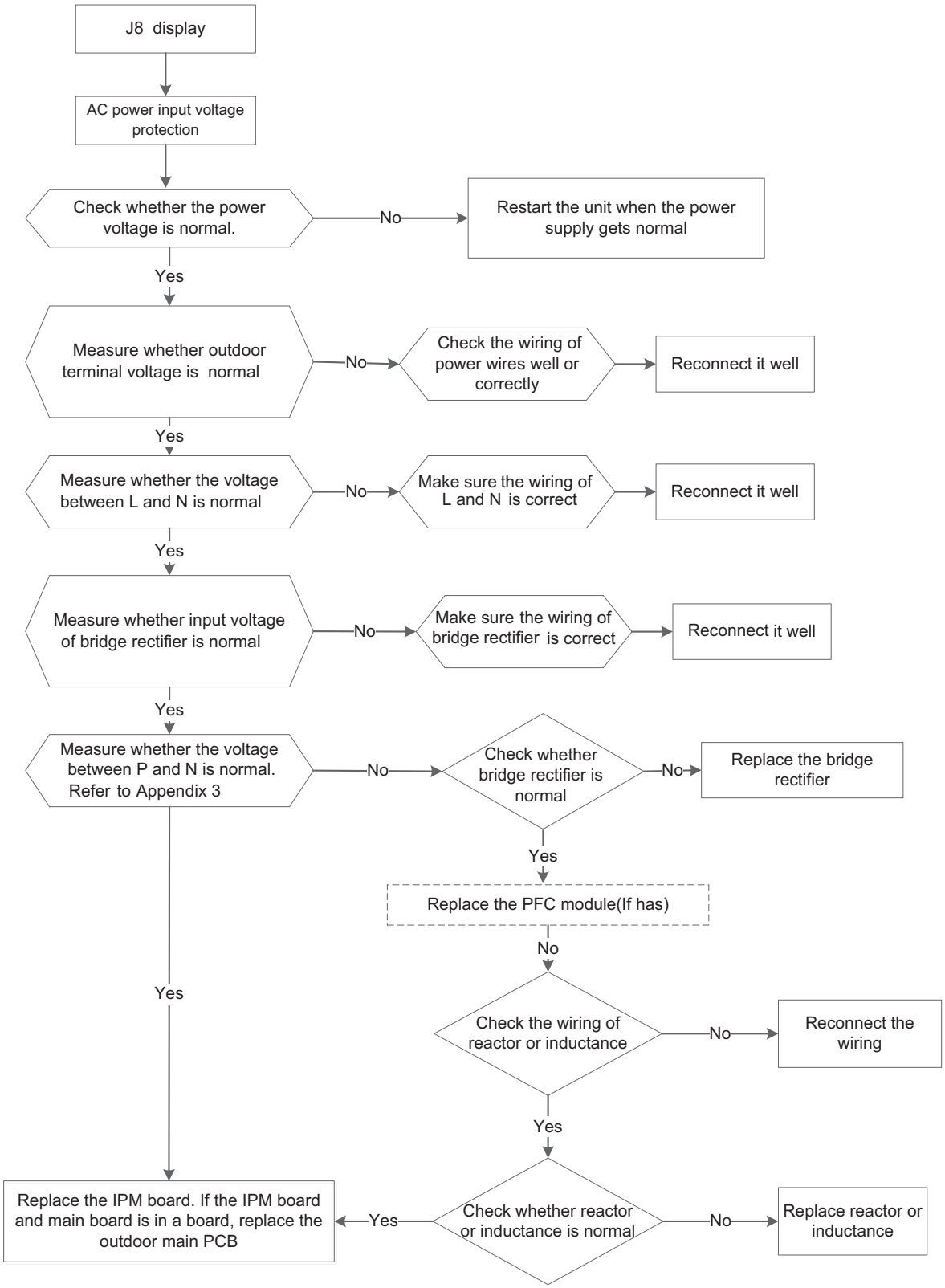
Malfunction Conditions	If the sampling voltage is not 5V, the LED displays a failure code.
Possible Causes	• Faulty wiring • Faulty overload protector • System blockage • Faulty outdoor PCB



DIAGNOSIS AND SOLUTION (CONT)

Table 32—J8 Malfunction

Malfunction Conditions	An abnormal voltage rise or drop is detected by checking the specified voltage detection circuit.
Possible Causes	• Faulty or wrong power supply • Faulty wiring • Faulty bridge rectifier • Faulty IPM board



DIAGNOSIS AND SOLUTION (CONT)

Main Parts Check

1. Temperature sensor checking
   Disconnect the temperature sensor from PCB, measure the resistance value with a tester.

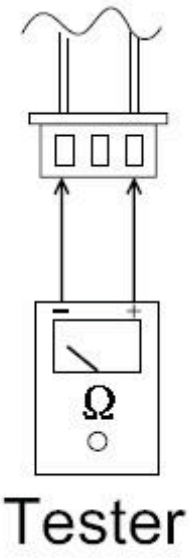


Fig. 26 – Tester

Temperature Sensors:

- Room temp. (T1) sensor,
- Indoor coil temp. (T2) sensor,
- Outdoor coil temp. (T3) sensor,
- Outdoor ambient temp. (T4) sensor,
- Compressor discharge temp. (T5) sensor.
- Measure the resistance value of each winding by using the multi−meter.

Compressor Checking

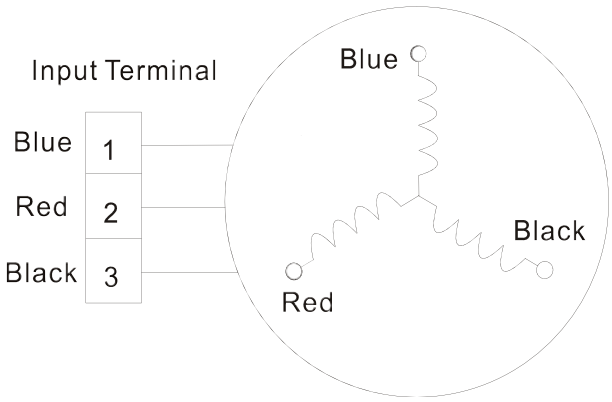


Fig. 27 – Tester

POSITION	RESISTANCE VALUE						
	ASN98D22UFZ	ASM135D23UFZ	ATF235D22UMT	ATF250D22UMT	ATF310D43UMT	ATQ420D1UMU	ATM115D43UFZ2
Blue - Red	1.57Ω	1.75 Ω	0.75 Ω	0.75 Ω	0.65 Ω	0.38Ω	1.87Ω
Blue - Black							
Red - Blue							

Fig. 28 – Compressor Checking

IPM Continuity Check

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

Table 33—IPM Continuity Check

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

Pressure on Service Port

Table 34—Cooling Chart (Cooling Mode)

F°(C°)	Indoor Temp	Outdoor Temp.				
		75(23.89)	85(29.44)	95(35)	105(40.56)	115(46.11)
BAR	70	8.2	7.8	8.1	8.6	10.1
BAR	75	8.6	8.3	8.7	9.1	10.7
BAR	80	9.3	8.9	9.1	9.6	11.2
PSI	70	119	113	117	125	147
PSI	75	124	120	126	132	155
PSI	80	135	129	132	140	162
MPA	70	0.82	0.78	0.81	0.86	1.01
MPA	75	0.86	0.83	0.87	0.91	1.07
MPA	80	0.93	0.89	0.91	0.96	1.12

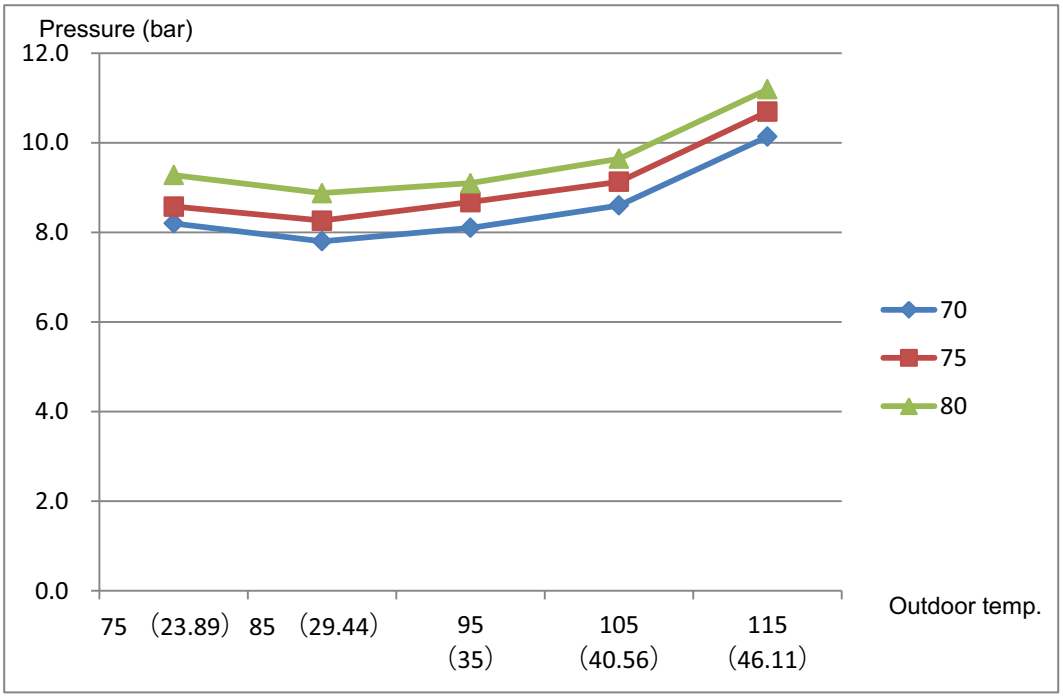
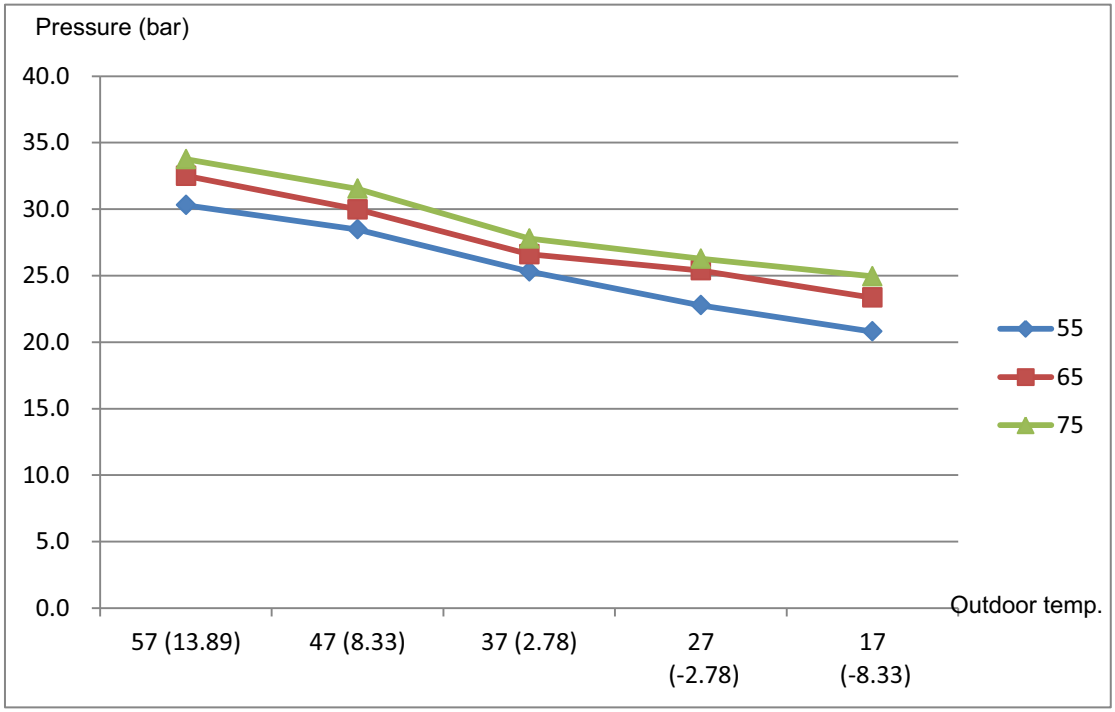
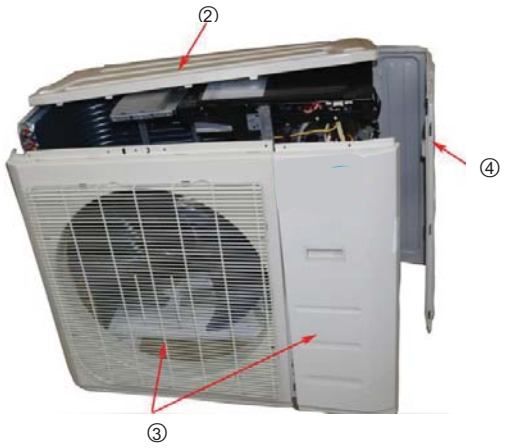


Table 35—Heating Chart (Heating Mode)

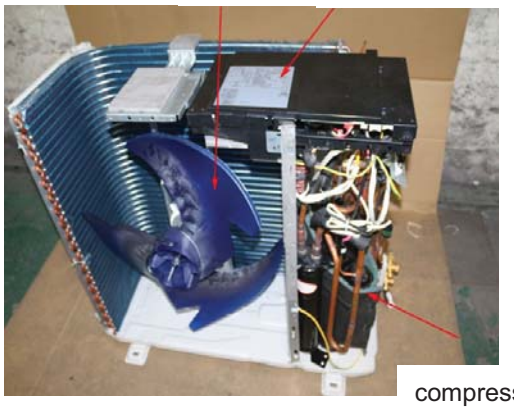
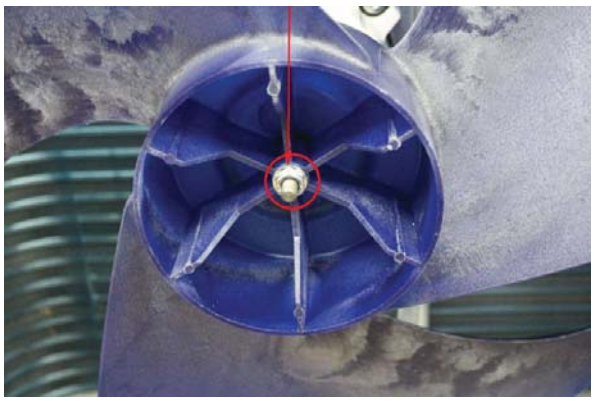
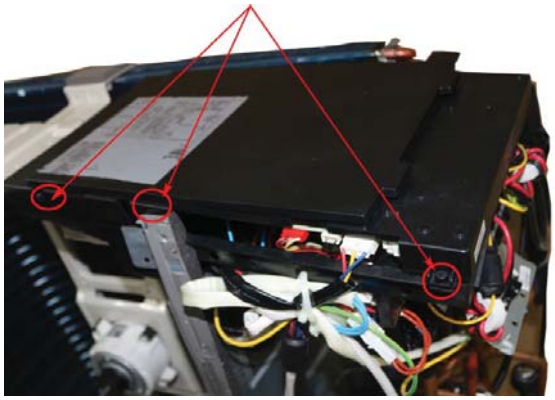
F°(C°)	Indoor Temp	Outdoor Temp.				
		57(13.89)	47(8.33)	37(2.78)	27(–2.78)	17(–8.33)
BAR	55	30.3	28.5	25.3	22.8	20.8
BAR	65	32.5	30.0	26.6	25.4	23.3
BAR	75	33.8	31.5	27.8	26.3	24.9
PSI	55	439	413	367	330	302
PSI	65	471	435	386	368	339
PSI	75	489	457	403	381	362
MPA	55	3.03	2.85	2.53	2.28	2.08
MPA	65	3.25	3.00	2.66	2.54	2.33
MPA	75	3.38	3.15	2.78	2.63	2.49



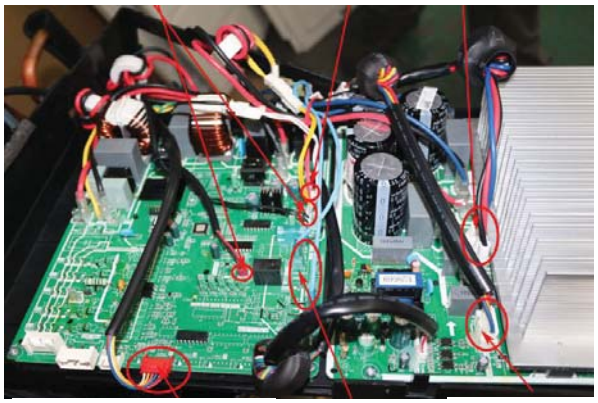
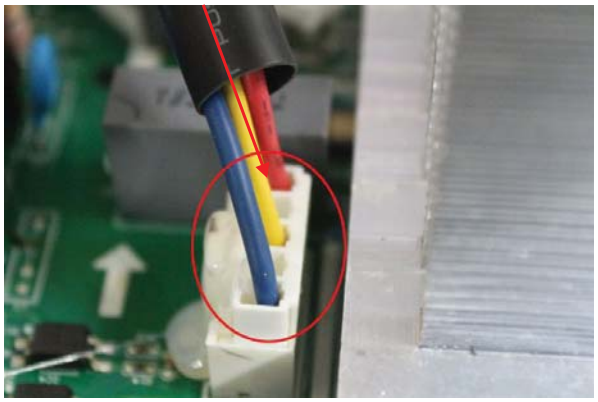
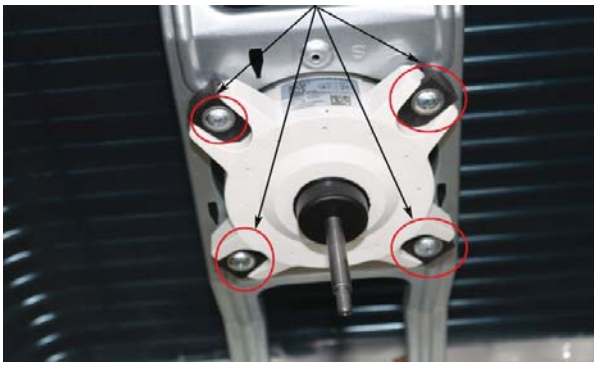
DISASSEMBLY INSTRUCTIONS SIZE 36

No.	Part name	Procedures	Remarks
1	Panel plate	How to remove the panel plate. 1) Stop the air conditioner and turn off the power breaker. 2) Remove the big handle first, then remove the top cover (7 screws). 3) Remove the front panel screws (11 screws). (4) Remove the right side panel screws (13).	4 screws of big handle Screws of top panel(3screws,1screws is under the big handle)  Screws of front panel (11 screws) 

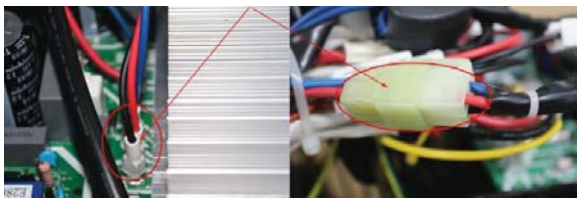
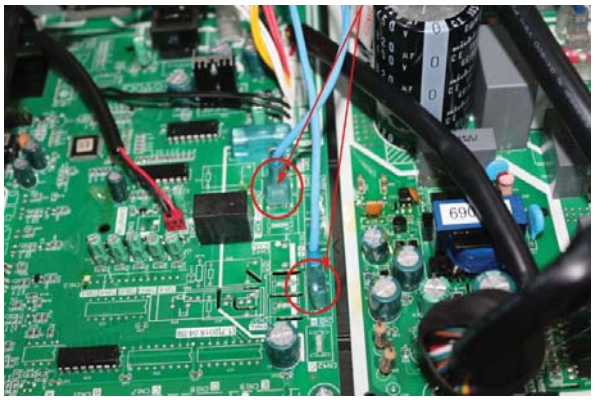
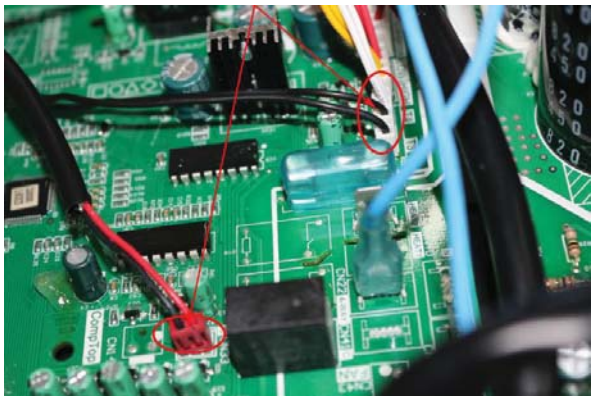
DISASSEMBLY INSTRUCTIONS SIZE 36 (CONT)

2	Fan ass'y	How to remove the fan ass'y	
		1) Use procedure 1 to remove the panel plate.	fan Electronic control box  compressor
		2) Remove the nut securing the fan, then remove the fan.	② 
		3) Unfix the hooks and remove the screws. Next, open the electronic control box cover.	③ 

DISASSEMBLY INSTRUCTIONS SIZE 36 (CONT)

		4) Disconnect the fan motor connector from the electronic control board. 5) Remove the fan motor's four screws (4) then remove the motor.	T3,T4,T5,sensor Pressure switch Compressor wire  Electronic expansion 4 way valve Motor wire ④  ⑤ 

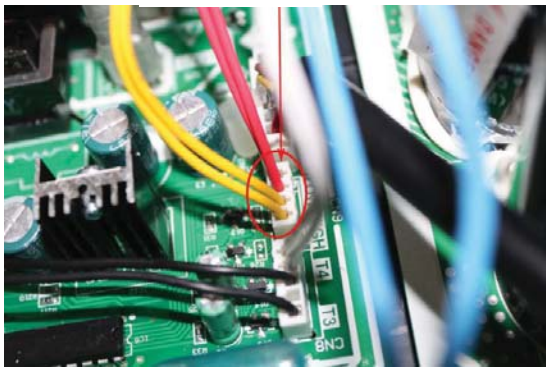
DISASSEMBLY INSTRUCTIONS SIZE 36 (CONT)

3	Electrical parts	How to remove the electrical parts. 1) After completing steps in sections 1 and 2, remove the compressor connector. 2) Pull out the two blue wires connected with the four-way valve. 3) Pull out the condenser coil temp. sensor (T3) connectors, outdoor ambient temp. sensor (T4), and the discharge temp. sensor (T5).	①  ②  ③ 

DISASSEMBLY INSTRUCTIONS SIZE 36 (CONT)

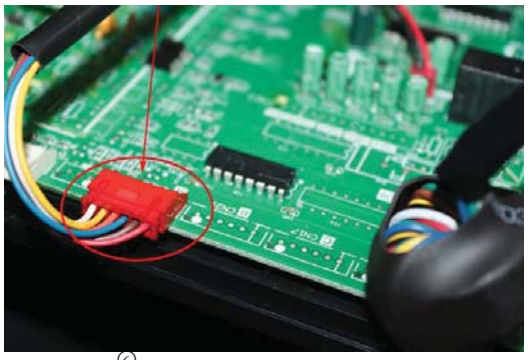
4) Disconnect the pressure switch connector.

④



5) Disconnect the electronic expansion valve wire from the control board.

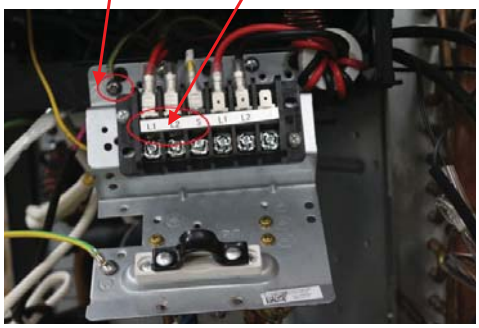
⑤



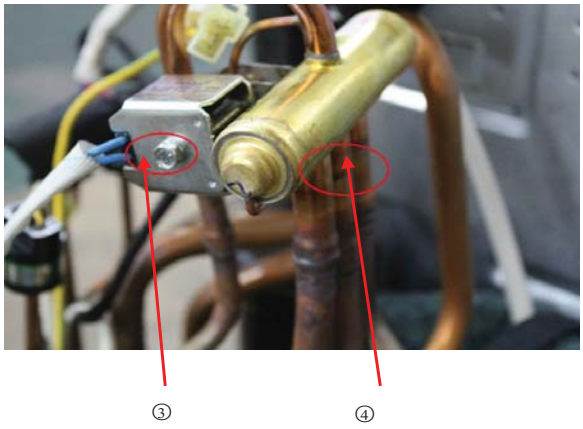
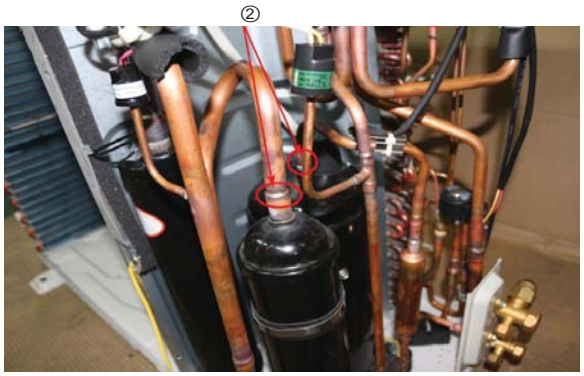
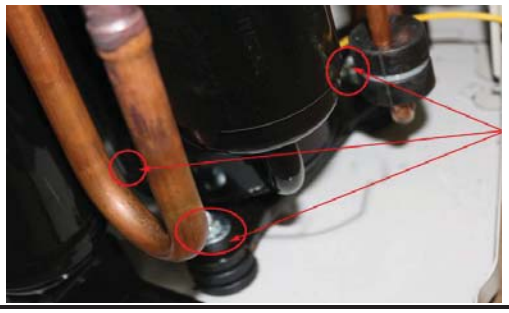
6) Remove the ground wires.

7) Remove the wires (1,2,3 or L1,L2, S). Next, remove the electronic control box.

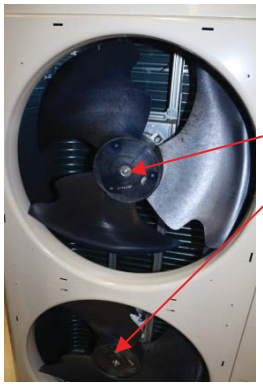
⑥ ⑦



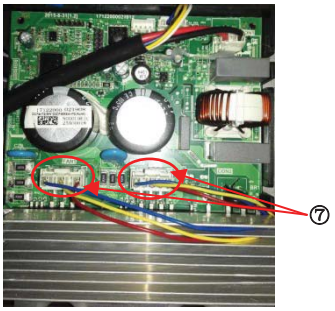
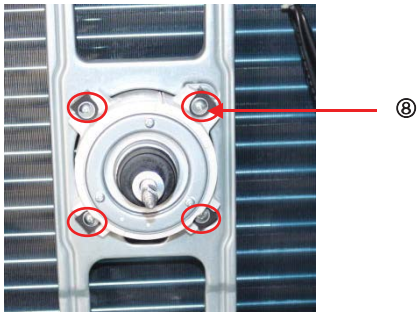
DISASSEMBLY INSTRUCTIONS SIZE 36 (CONT)

4	Four-way valve	How to remove the four-way valve. 1) Complete the steps in sections 1 and 3. 2) Recover refrigerant from the refrigerant circuit. 3) Remove the coil screw and then remove the coil. 4) Detach the welded parts of the four-way valve and pipe. 5) Remove the four-way valve ass'y.	The picture of the four-way valve may differ from your actual valve. 
5	Compressor	How to remove the compressor 1) After completing the steps in sections 1 and 3, recover the refrigerant from the refrigerant circuit. 2) Remove the discharge pipe and the suction pipe with a burner. 3) Remove the hex nuts and washers securing the compressor on the bottom plate. 4) Lift the compressor from the base pan assembly.	 

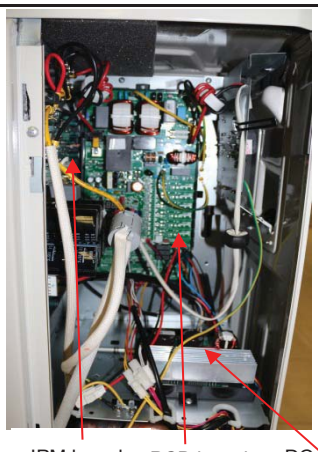
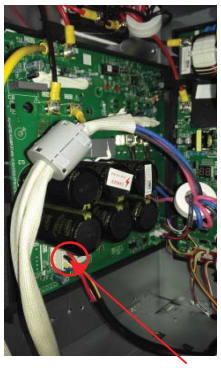
DISASSEMBLY INSTRUCTIONS SIZE 48 − 58

No.	Part name	Procedures	Remarks
1	Fan ass'y	How to remove the fan ass'y. 1) Stop the air conditioner and turn off the power breaker. 2) Remove the air outlet grille screws (8). 3) Remove the hex nut securing the fan. 4) Remove the fan. 5) Remove the top cover screws (4) then remove the top cover.	   Screws of top cover 

DISASSEMBLY INSTRUCTIONS SIZE 48 − 58 (CONT)

		6) Remove the right front side screws and the right front side panel (1 screw). 7) Disconnect the fan motor connectors FAN (3p, white) and FAN2 (3p, white) from the DC motor driver board. 8) Remove the fan motor after unfastening the securing screws.	  
2	Panel plate	How to remove the panel plate. 1) Remove the big handle (2 screws) and the water collector (2 screws). 2) Remove the terminal board screws (2) and the right-rear panel screws (7) and remove the right-rear panel.	

DISASSEMBLY INSTRUCTIONS SIZE 48 − 58 (CONT)

			
3	Electrical parts	How to remove the electrical parts. 1) Complete steps 5 - 6 in section 1 and section 2. 2) Disconnect the fan motor connector (5p, white) from the IPM board. 3) Disconnect the following eight (8) connection wires and connectors between the IPM and the other parts.	 

DISASSEMBLY INSTRUCTIONS SIZE 48 − 58 (CONT)

CN2(yellow)

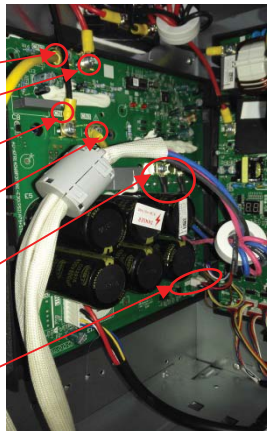
CN1(red)

CN6(black)

CN3(yellow)

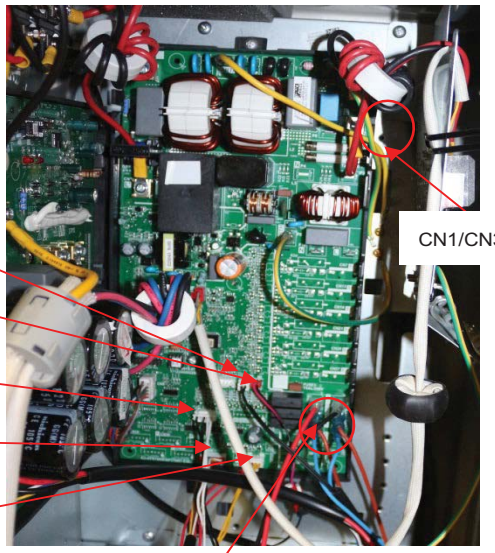
U、V、W(black)

CN9(10p,white)



4) Remove the screws securing the IPM board and remove the IBM board.

5) Disconnect the connectors and wires connected from the PCB and other parts.



Connectors:

CN8: Discharge temperature sensor (2p,white)

CN12：Heatsink temperature sensor(2p,red)

CN9:T3/T4 temperature sensor (2p/2p,white)

CN15: Electronic expansive valve (6p,red)

CN10: High and low pressure switch (2p/2p, white)

CN17/CN18

CN19/CN20

CN24/CN25

Wires:

CN17/CN18: 4-way valve (blue-blue)

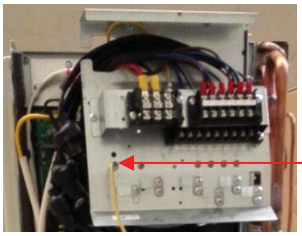
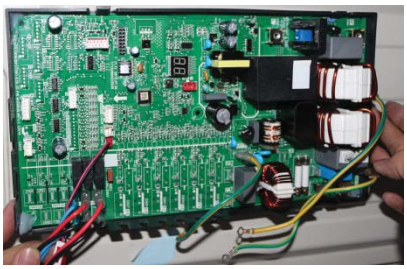
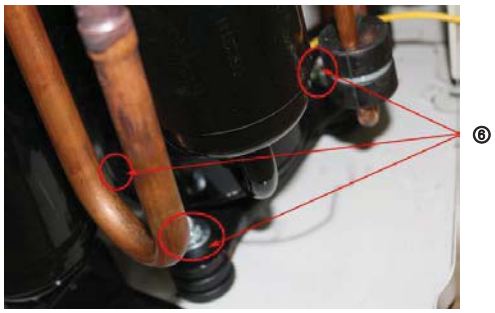
CN19/CN20: connected to crankcase heating cable. (black-red)

CN24/CN25: Electric heater of chassis (orange-orange)

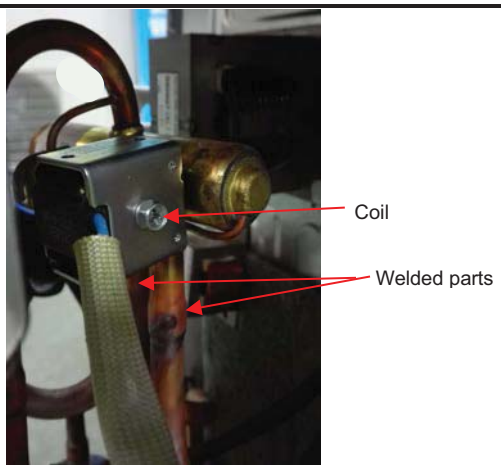
CN1:L-IN (red or white)

CN3:N-IN (black)

DISASSEMBLY INSTRUCTIONS SIZE 48 − 58 (CONT)

		6) Disconnect the grounding wire (yellow-green) after removal of the big handle. 7) Remove the PCB board.	 
4	Compressor	How to remove the compressor. 1) Complete steps 5 - 6 in section and section 2. 2) Extract the refrigerant gas. 3) Remove the sound insultation material and crankcase heating cable. 4) Remove the compressor terminal cover and disconnect the crankcase electric heater wires and compressor from the terminal. 5) Remove the discharge pipe and suction pipe with a burner. 6) Remove the hex nuts and washers securing the compressor to the bottom plate. 7) Lift the compressor.	 

DISASSEMBLY INSTRUCTIONS SIZE 48 − 58 (CONT)

5	The 4-way valve	How to remove the 4-way valve 1) Complete steps 5 - 6 of section 1 and section 2. 2) Extract the refrigerant gas. 3) Remove the electrical parts in section 3. 4) Remove the coil screw and remove the coil. 5) Detach the welded parts of the 4-way valve and pipe.	
6	The expansion valve	How to remove the expansion valve. 1) Complete the steps in sections 1 - 2. 2) Remove the electrical parts described in section 3. 3) Remove the coil. 4) Detach the expansion valves welded parts and pipes.