40MBDQ
Ducted Style Ductless System
Sizes 09 to 58

Service Manual

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, the 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

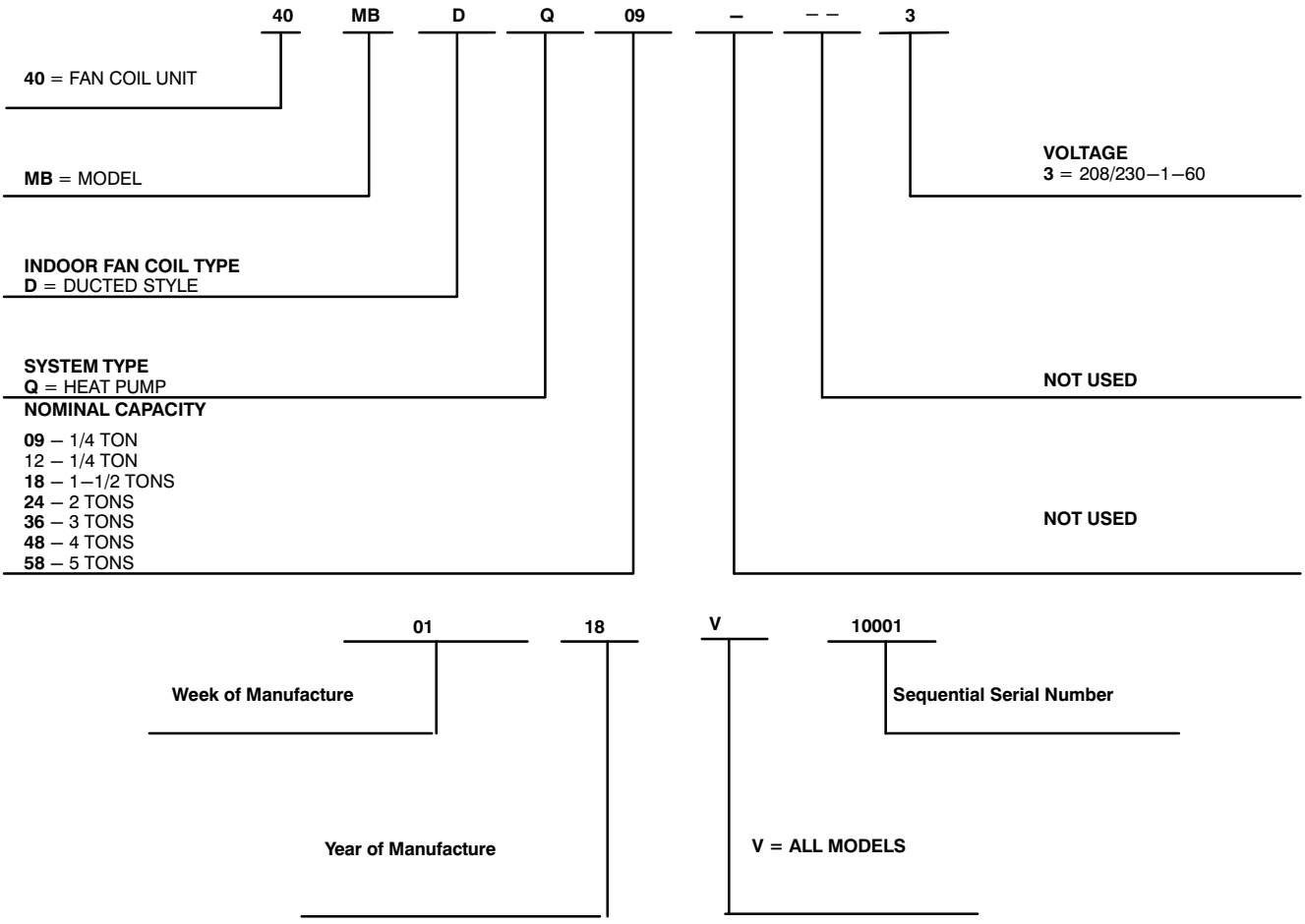
This service manual provides the necessary information to service, repair, and maintain the indoor units. Section 2 of this manual has an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

MODEL SERIAL NUMBER NOMENCLATURES

Table 1—Unit Sizes

kBTUh	V–Ph–Hz	ID Model No.
9	208/230–1–60	40MBDQ09–––3
12		40MBDQ12–––3
18		40MBDQ18–––3
24		40MBDQ24–––3
36		40MBDQ36–––3
48		40MBDQ48–––3
58		40MBDQ58–––3

INDOOR UNIT



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INTERTEK ETL CM LISTED C US

SPECIFICATIONS

Table 2—Specifications

Heat Pump									
System	**Size**		**09K**	**12K**	**18K**	**24K**	**36K**	**48K**	**58K**
	Indoor Model		40MBDQ09−−−3	40MBDQ12−−−3	40MBDQ18−−−3	40MBDQ24−−−3	40MBDQ36−−−3	40MBDQ48−−−3	40MBDQ58−−−3
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60
	Power Supply		Indoor unit powered from outdoor unit						
	MCA	A.	1.11	1.11	1.2	1.2	2.45	3.2	3.65
Controls	Wireless Remote Controller (° F/° C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (° F/° C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard	Standard
Operating Range	Cooling Indoor DB Min−Max	° F (° C)	63~90(17~32)	63~90(17~32)	63~90(17~32)	63~90(17~32)	63~90(17~32)	63~90(17~32)	63~90 (17~32)
	Heating Indoor DB Min−Max	° F (° C)	32~86 (0~30)	32~86 (0~30)	32~86(0~30)	32~86(0~30)	32~86(0~30)	32~86(0~30)	32~86 (0~30)
Piping	Pipe Connection Size−Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4(6.35)	3/8(9.52)	3/8(9.52)	3/8(9.52)	3/8 (9.52)
	Pipe Connection Size−Suction	in (mm)	3/8 (9.52)	1/2 (12.7)	1/2(12.7)	5/8(16)	5/8(16)	5/8(16)	3/4 (19)
Indoor Coil	Face Area	Sq. Ft.	1.2	1.2	1.9	2.9	3.7	4.2	5.9
	No. Rows		3	3	3	3	4	4	4
	Fins Per Inch		18	18	16	16	16	16	16
	Circuits		3	3	4	7	7	8	9
Indoor	Unit Width	in (mm)	27.559(700)	27.559(700)	34.65(880)	43.31(1100)	53.54(1360)	47.24(1200)	55.12 (1400)
	Unit Height	in (mm)	7.874(200)	7.874(200)	8.27(210)	9.8(249)	9.8(249)	11.81(300)	17.32 (440)
	Unit Depth	in (mm)	19.92(506)	19.92(506)	26.54(674)	30.47(774)	30.47(774)	34.41(874)	33.78 (858)
	Net Weight	lbs (kg)	43.56(19.8)	43.56(19.8)	54(24.5)	86.86(39.4)	106.48(48.3)	119.71(54.3)	163 (74)
	Fan Speeds		3	3	3	3	3	3	3
	Airflow (lowest to highest)	CFM	147/211/264	177/283/353	300/400/480	440/700/780	700/910/1080	720/1030/1230	1260/1710/2150
	Sound Pressure (lowest to highest)	dB(A)	30/34/38	35/37/38	35/37/39	35.5/40/44	38.5/42/45.5	46/49.5/50.5	51/54/57
	Max Static Pressure	In.WG.	0.2	0.2	0.40	0.64	0.64	0.64	0.80
	Field Drain Pipe Size O.D.	in (mm)	1(25.4)	1(25.4)	1(25.4)	1(25.4)	1(25.4)	1(25.4)	1 (25.4)

Performance may vary based on the outdoor unit matched to. See the compatible outdoor units product data for Performance Data.

DIMENSIONS

Table 3—Dimensions

		OUTLINE DIMENSIONS				AIR OUTLET OPENING SIZE				AIR RETURN OPENING SIZE			HANGER BRACKERS		REFRIGERANT PIPE LOCATIONS				OPERATING WEIGHT lb (kg)
Size	Unit	A	B	C	D	E	F	G	H	I	J	K	L	M	H1	H2	W1	W2	
9	In.	27.6	7.9	19.9	17.7	5.4	21.1	1.2	6	23.6	7.3	2	29.2	14.2	3.3	5.5	3.3	3.3	40
	mm	700	200	506	450	137	537	30	152	599	186	50	741	360	84	140	84	84	18.1
12	In.	27.6	7.9	19.9	17.7	5.4	21.1	1.2	6	23.6	7.3	2	29.2	14.2	3.3	5.5	3.3	3.3	40
	mm	700	200	506	450	137	537	30	152	599	186	50	741	360	84	140	84	84	18.1
18	In.	34.65	8.27	26.54	23.62	5.51	27.80	1.97	5.35	30.79	7.48	1.57	36.22	20	3.07	5.83	3.46	4.41	54
	mm	880	210	674	600	140	706	50	136	782	190	40	920	508	78	148	88	112	24.5
24	In.	43.31	9.8	30.47	27.56	5.51	36.46	1.97	6.89	39.41	8.98	0.2	44.88	23.54	3.15	5.91	5.12	6.1	87
	mm	1100	249	774	700	140	926	50	175	1001	228	5	1140	598	80	150	130	155	39.4
36	In.	53.54	9.8	30.47	27.56	5.51	46.69	1.97	6.89	49.65	8.98	0.2	55.12	23.54	3.15	5.91	5.12	6.1	106
	mm	1360	249	774	700	140	1186	50	175	1261	228	5	1400	598	80	150	130	155	48.3
48	In.	47.24	11.81	34.41	31.5	4.84	41.1	1.97	8.94	43.35	11.02	0.2	48.82	27.44	3.15	5.91	7.28	8.27	120
	mm	1200	300	874	800	123	1044	50	227	1101	280	5	1240	697	80	150	185	210	54.3
58	In.	55.12	17.32	33.78	30.31	4.17	46.81	1.1	15.16	46.54	11.02	1.57	56.57	27.56	8.15	10.75	5.67	5.67	163
	mm	1400	440	858	770	106	1189	28	385	1182	280	40	1437	700	207	273	144	144	74

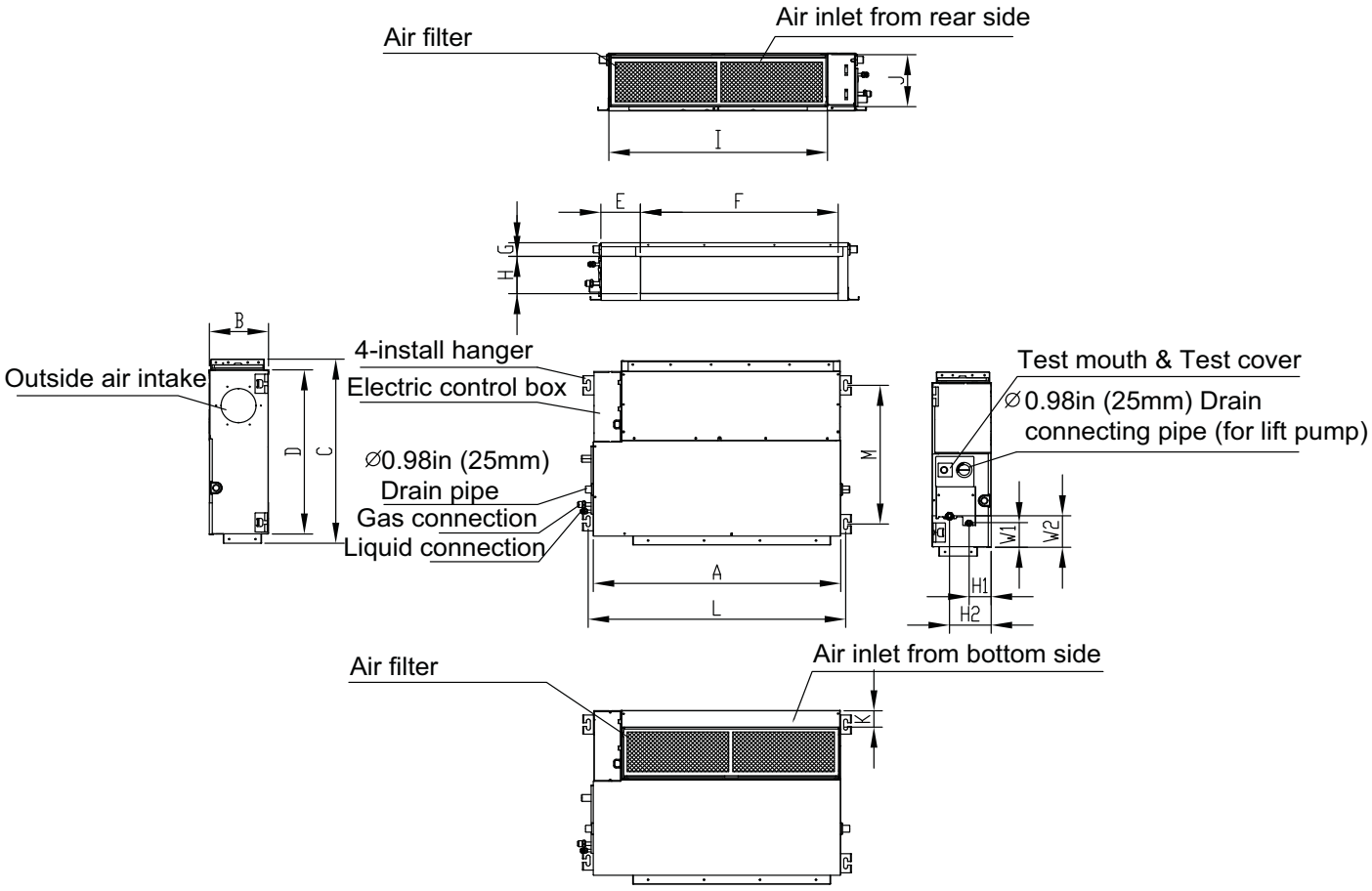


Fig. 1 – Indoor Unit Sizes 9K − 48K

DIMENSIONS − (CONT.)

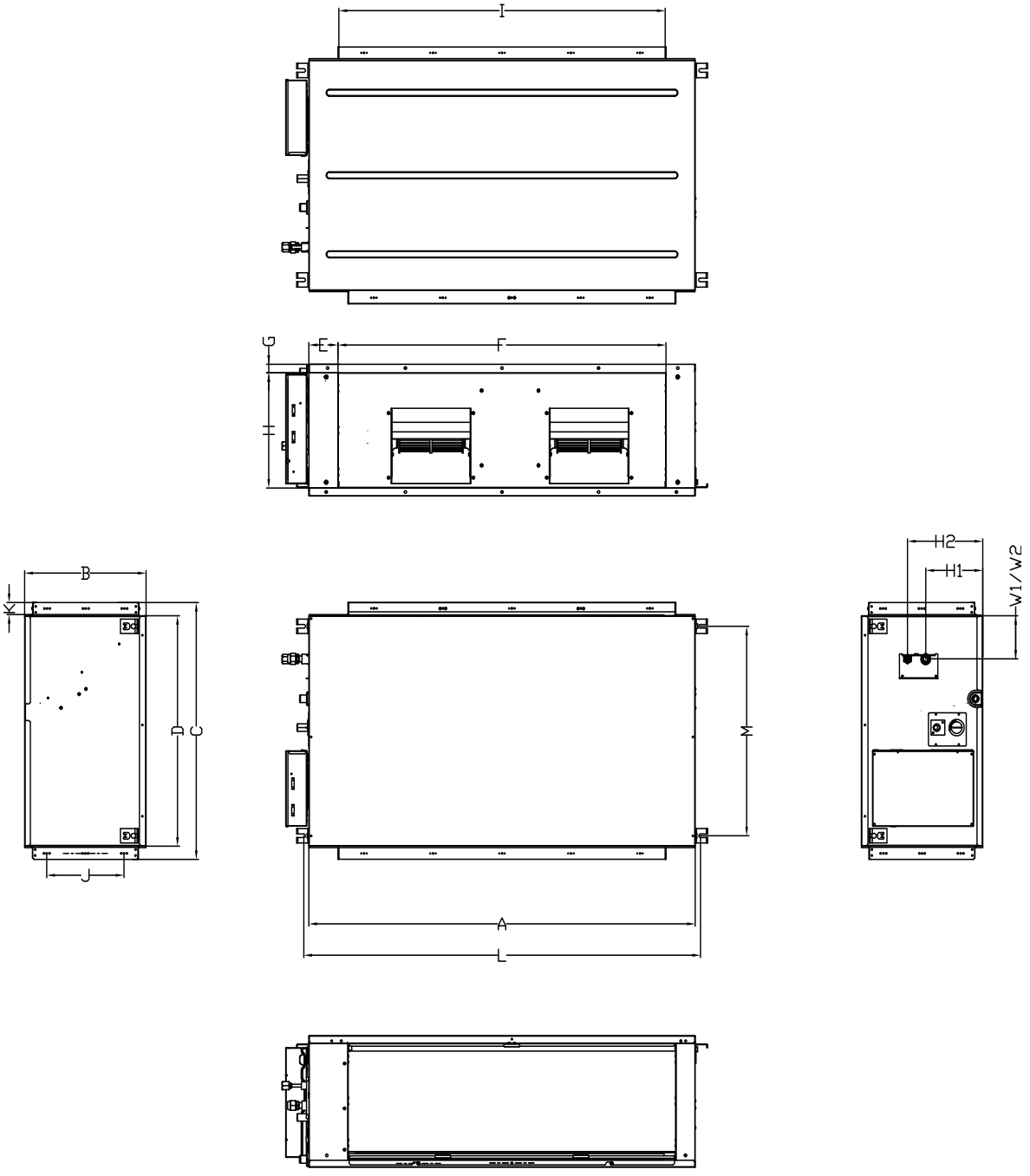


Fig. 2 – Indoor Unit Size 58K

INSTALLATION CLEARANCES

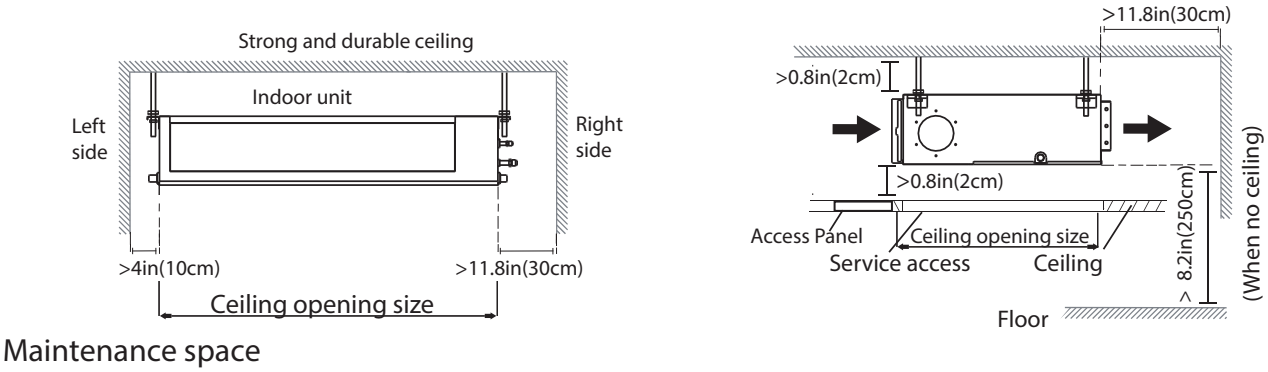


Fig. 3 – Installation Clearances

MAINTENANCE CLEARANCES

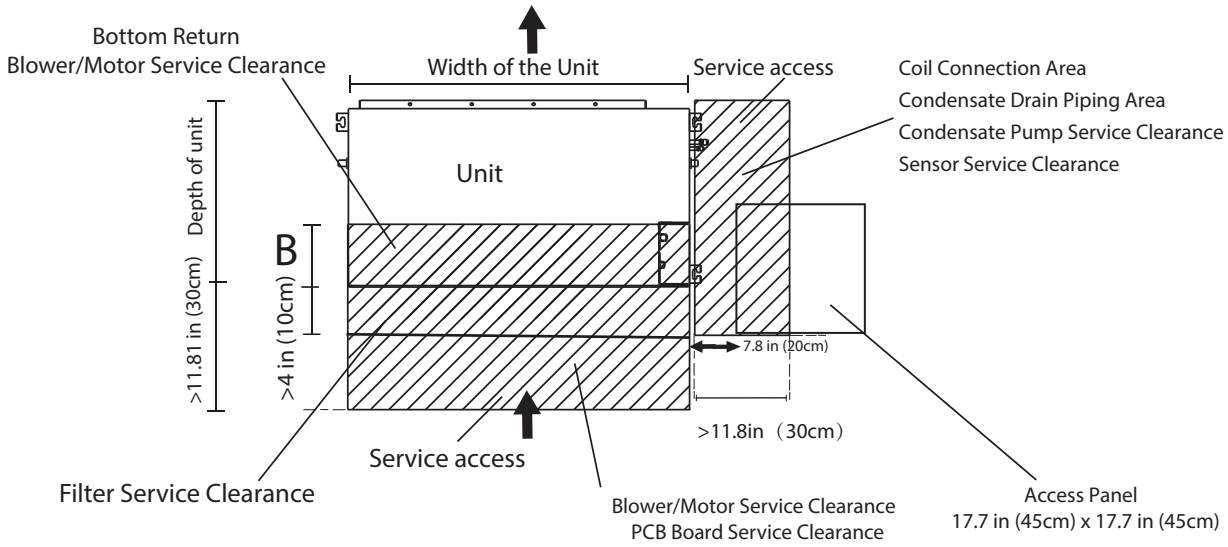


Fig. 4 – Maintenance Clearances

Table 4—Maintenance Clearances

Capacity (Kbtu)	B
9K	11.81in. (30cm)
12K	11.81in. (30cm)
18K	11.81in. (30cm)
24K	11.81in. (30cm)
36K	11.81in. (30cm)
48K	15.75in. (40cm)
58K	15.75in. (40cm)

NOTE: If installed above a hard lid ceiling, utilize a ceiling access panel the length and width of the unit, otherwise the blower components and/or entire unit cannot be removed.

If a single access panel is desired, the minimum dimensions should be:

- Width: The width of the unit plus 2−inches on both sides
- Length: The length of the unit plus 18−inches on the connection end and 2−inches on the opposite end

ELECTRICAL DATA

Table 5—Electrical Data

UNIT SIZE	INDOOR FAN				MAX FUSE CB AMP
	V–PH–HZ	FLA	HP	W	
09	208–230/1/60	1.11	0.18	130	Refer to outdoor unit installation instructions – Indoor unit powered by the outdoor unit
12		1.11	0.18	130	
18		1.2	0.27	200	
24		1.2	0.27	200	
36		2.45	0.56	420	
48		3.2	0.75	560	
58		3.65	0.952	1000	

LEGEND
FLA – Full Load Amps

WIRING

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

Sizes 09−24 Recommended Connection Method for Power and Communication Wiring

Power and Communication Wiring:

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

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

Sizes 36−58 Recommended Connection Method for Power and Communication Wiring

Power and Communication Wiring:

The main power is supplied to the outdoor unit. The field supplied power wiring from the outdoor unit to the indoor unit consists of three (3) wires and provides the power for the indoor unit. Two wires are high voltage AC power and one is a ground wire. To minimize voltage drop, the factory recommended wire size is 14/2 stranded with a ground.

Communication Wiring:

A separate shielded stranded copper conductor only, with a 600 volt rating and double insulated copper wire, must be used as the communication wire from the outdoor unit to the indoor unit. Please use a separate shielded 16GA stranded control wire.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.
Wires should be sized based on NEC and local codes.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

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

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

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

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

CONNECTION DIAGRAMS

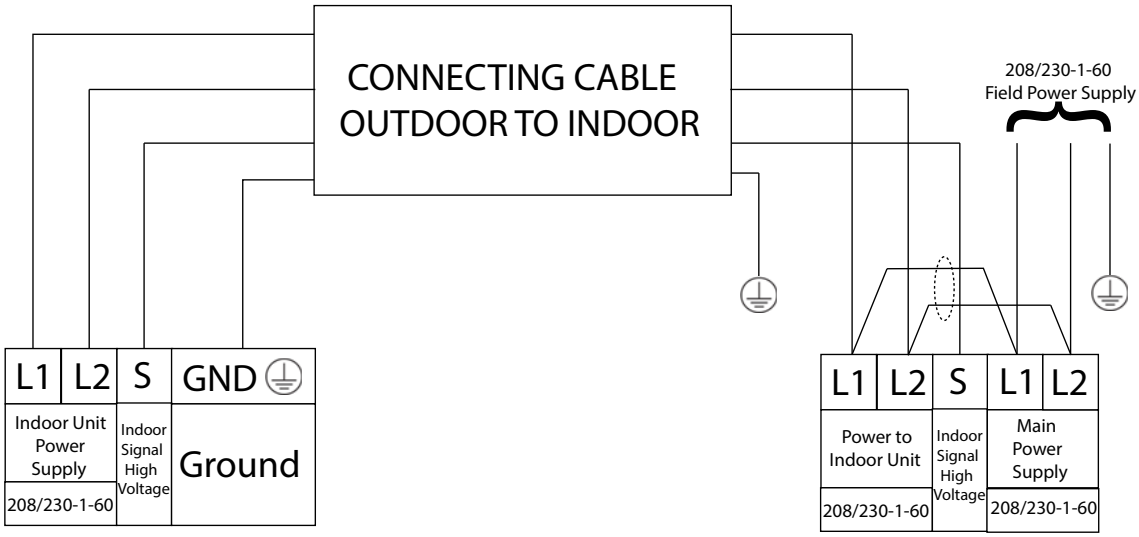


Fig. 5 – Connection Diagrams 9−24

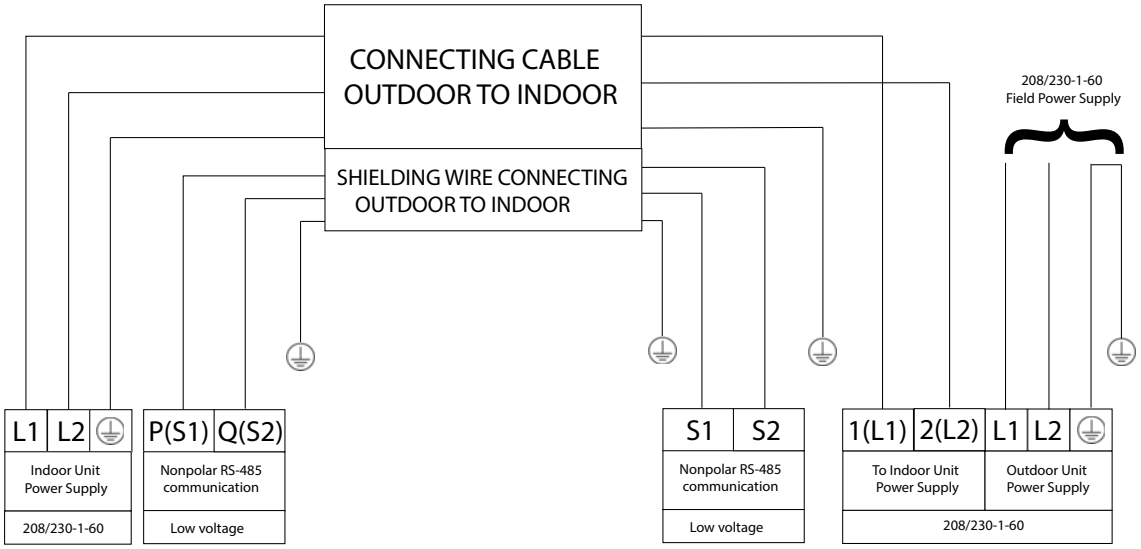


Fig. 6 – Connection Diagrams 36−58

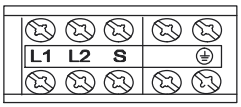


Fig. 7 – Control and Power Wiring on Indoor Unit (sizes 09 to 24)

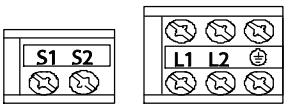


Fig. 8 – Control and Power Wiring on Indoor Unit (sizes 36 to 58)

Notes:
1. Do not use 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

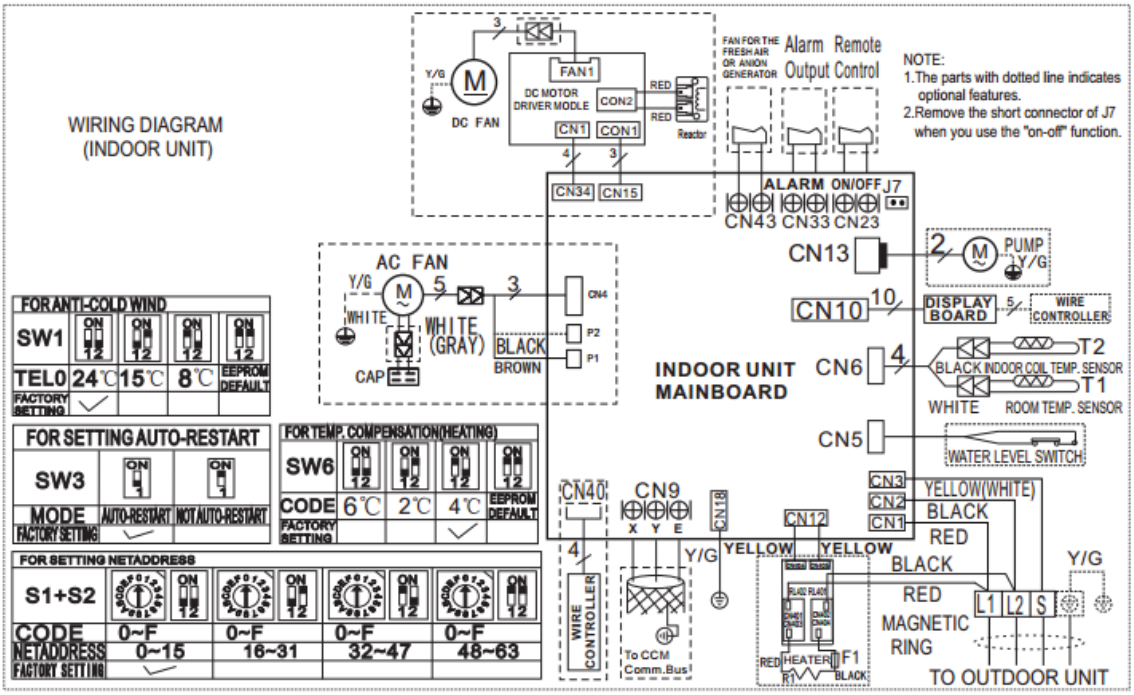


Fig. 9 – Wiring Diagram Sizes 9K − 24K

Table 6—Wiring Diagrams

Indoor Unit	
Code	**Part Name**
CN1	Input: 230VAC High Voltage Connection of the terminal
CN2	Input: 230VAC High Voltage Connection of the terminal
CN3/CN26	Output: 0V Connection of the earth
CN5	Output: 0—5VDC Connection of the water level switch
CN6	Output: 5VDC Connection of the room and pipe temperature
CN8/CN18	Output: 320VDC High Voltage Connection of the reactor
CN9	Output: 5VDC Connection of the CCM
CN10 (CN10A)	Output: 12VDC Connection of the display board
CN12	Output: 220VAC High Voltage Connection of the electrical heater
CN13	Output: 220VAC High Voltage Connection of the pump
CN15	Output: 320VDC High Voltage Connection of the fan board
CN23	Output 1 — 12VDC Connection of the remote switch
CN33	Output: 0V Connection of the alarm
CN40	Output: 12VDC Connection of the wire controller
CN43	Output: 220VAC High Voltage Connection of the fresh air suction fan

WIRING DIAGRAMS (CONT.)

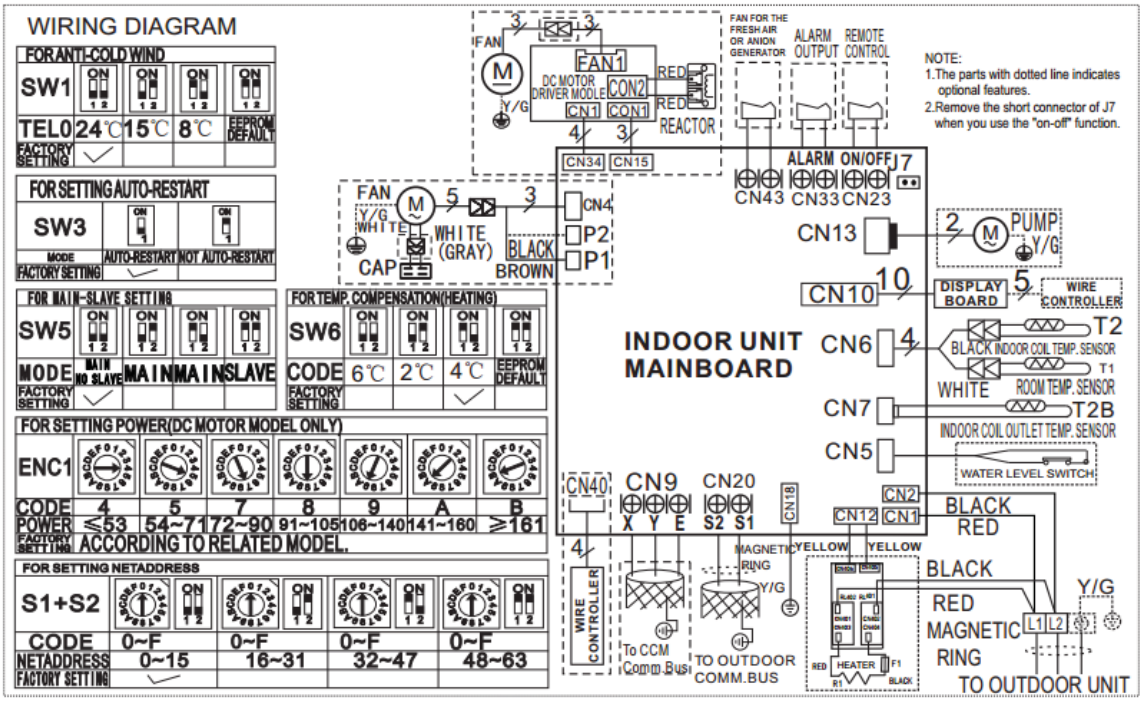


Fig. 10 – Wiring Diagram Sizes 36−48

Indoor Unit	
Code	**Part Name**
CN1	Input: 230VAC High Voltage Connection of the terminal
CN2	Input: 230VAC High Voltage Connection of the terminal
CN5	Output: 0−5VDC Connection of the water level switch
CN6	Output: 5VDC Connection of the room and pipe temperature
CN8/CN18	Output: 320VDC High Voltage Connection of the reactor
CN9	Output: 5VDC Connection of the CCM
CN10 (CN10A)	Output: 12VDC Connection of the display board
CN13	Output: 220VAC High Voltage Connection of the pump
CN15	Output: 320VDC High Voltage Connection of the fan board
CN23	Output 1 – 12VDC Connection of the remote switch
CN33	Output: 0V Connection of the alarm
CN40	Output: 12VDC Connection of the wire controller
CN43	Output: 220VAC High Voltage Connection of the fresh air suction fan

WIRING DIAGRAMS (CONT.)

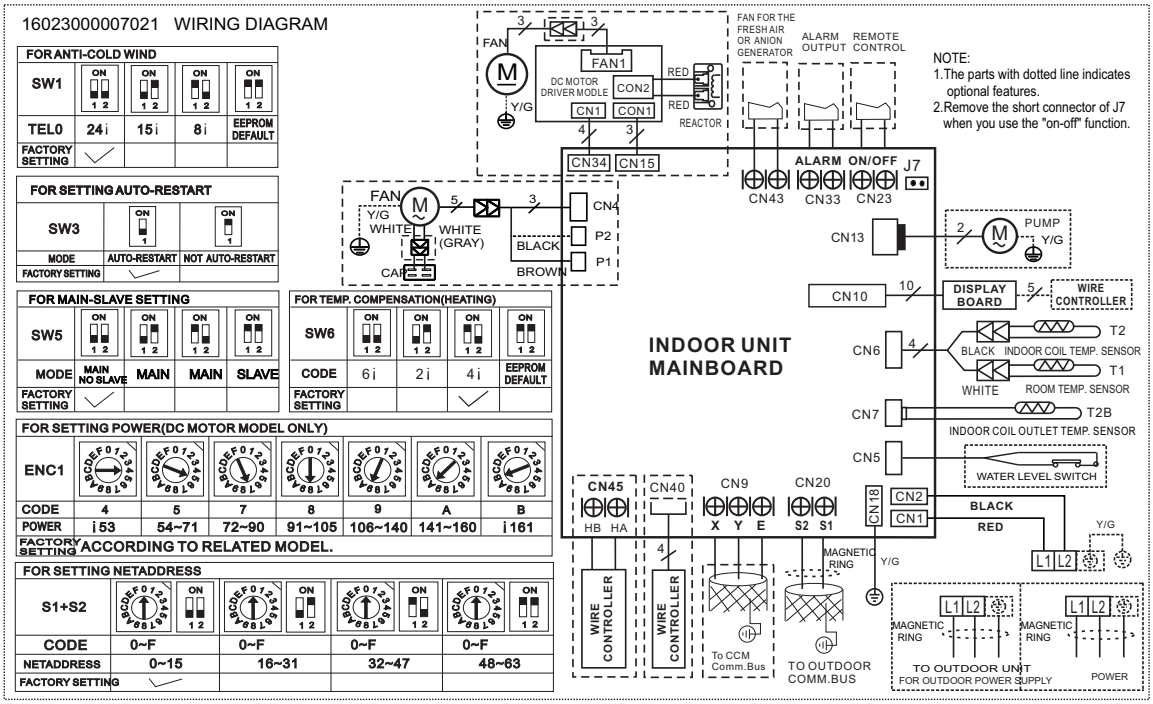


Fig. 11 – Wiring Diagram Size 58

Table 7—Wiring Dimensions

Indoor Unit	
Code	**Part Name**
CN1	Input: 230VAC High Voltage Connection of the terminal
CN2	Input: 230VAC High Voltage Connection of the terminal
CN3/CN26	Output: 0V Connection of the earth
CN5	Output: 0—5VDC Connection of the water level switch
CN6	Output: 5VDC Connection of the room and pipe temperature
CN7	Output: 5VDC Connection of the indoor coil outlet temperature sensor T2B
CN8/CN18	Output: 320VDC High Voltage Connection of the reactor
CN9	Output: 5VDC Connection of the CCM
CN10 (CN10A)	Output: 12VDC Connection of the display board
CN13	Output: 220VAC High Voltage Connection of the pump
CN15	Output: 320VDC High Voltage Connection of the fan board
CN23	Output 1 — 12VDC Connection of the remote switch
CN33	Output: 0V Connection of the alarm
CN20	Output: 24VDC between CN2 Connection of the S signal
CN41	Output: 24VDC between CN2 Connection of the S signal
CN43	Output: 220VAC High Voltage Connection of the fresh air suction fan

REFRIGERATION CYCLE DIAGRAM

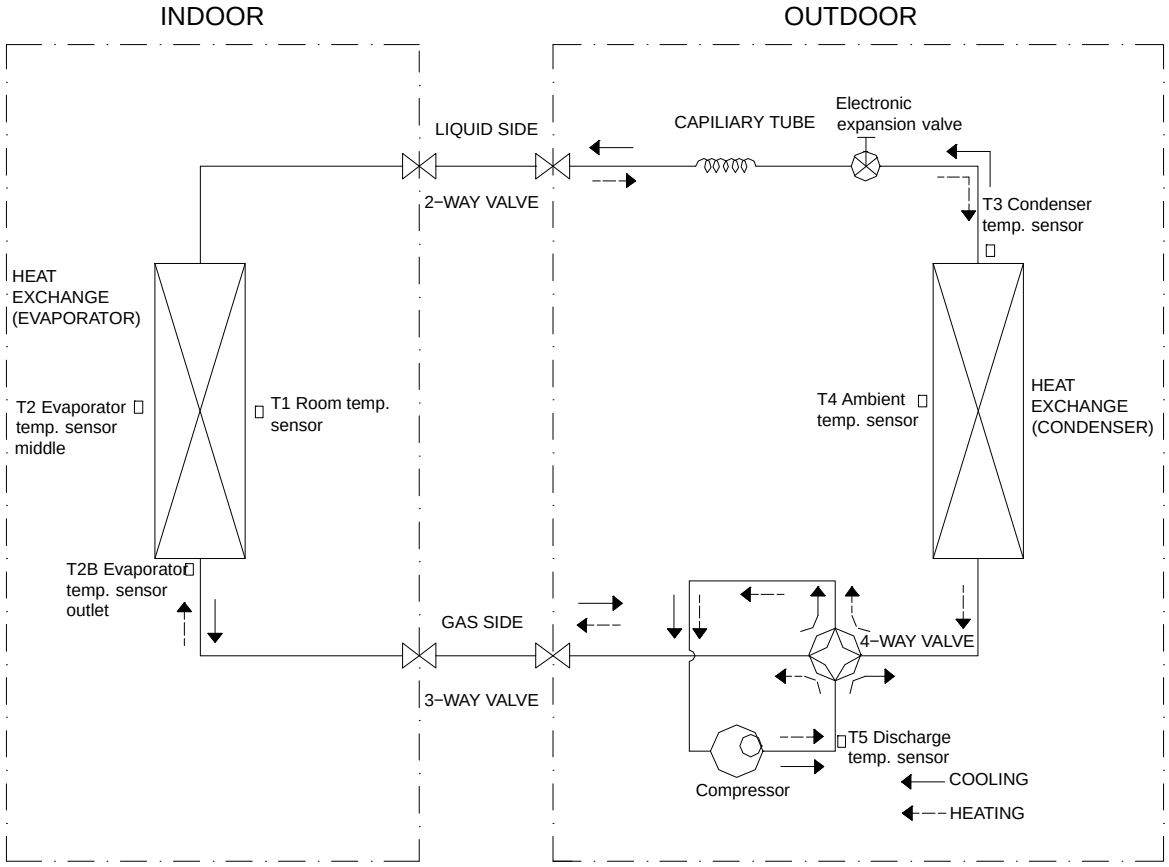


Fig. 12 – Refrigerant Cycle Diagram

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). For runs over 25 ft. (7.6 m), consult the product data.
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 ½ 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.
6. For piping runs greater than 25 ft. (7.6 m), add refrigerant up to the allowable length as specified in the product data.

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.

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. 13).
2. Connect charge hose to vacuum pump.
3. Fully open the low side of manifold gage (see Fig. 14).
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 the vacuum pump operation.
7. The factory charge contained in the outdoor unit is good for up to 25 ft. (8m) of line length.
8. Disconnect charge hose from charge connection of the low side service valve.
9. Fully open service valves B and A.
10. Securely tighten caps of service valves.

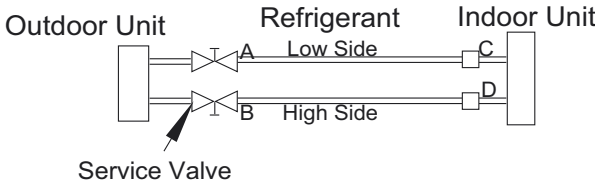


Fig. 13 – Service Valve

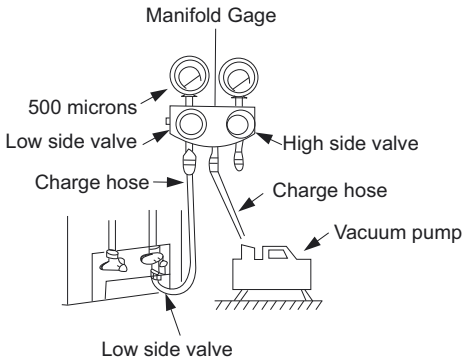


Fig. 14 – Manifold

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 this vacuum depth. The deep vacuum method is the most positive way of ensuring a system is free of air and liquid water (see Fig. 15).

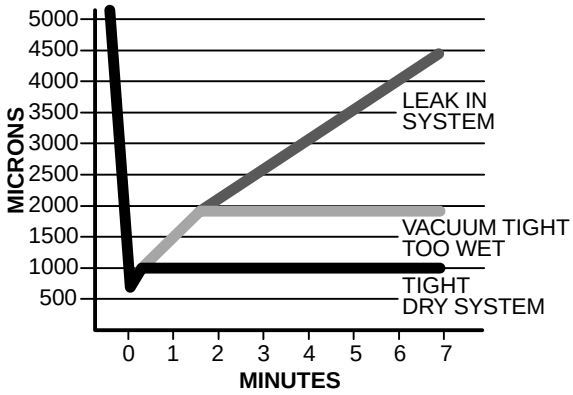


Fig. 15 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should be used. Refer to Fig. 16 and proceed as follows:

1. Pump the system down to 1500 microns 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 dry nitrogen cylinder and regulator to the system and break vacuum until the system reaches 2 psig.
4. Close the service valve and allow the system to stand for one hour. During this time, the dry nitrogen can diffuse throughout the system absorbing moisture.
5. Pump the system down to 1000 microns.
6. Break the vacuum with dry nitrogen (2 psig).
7. Pump the system down to 500 microns.
8. Perform the hold test for 30 minutes.

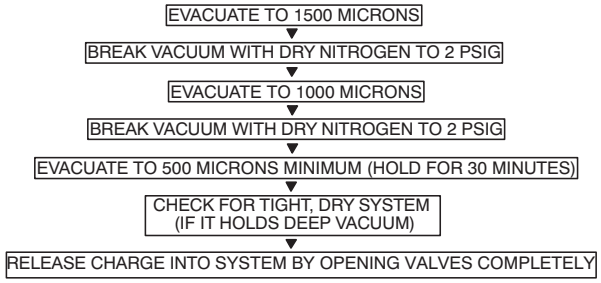


Fig. 16 – Triple Evacuation Method

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 FUNCTION

Main Protection

Fan Speed is Out of Control

When the indoor fan speed remains too low (lower than 300RPM) for 50 seconds, the indoor fan will shut off and restarts 30 seconds later, if protection occurred three times when the fan motor restarts continuously, the unit stops and the LED displays the failure. When the outdoor fan speed remains too low (lower than 100 RPM) or too high (higher than 1500 RPM) for 60 seconds, the unit stops and the LED displays the failure. The malfunction is cleared 30 seconds later.

If a fault occurs on the air volume regulator or the regulator enters protection mode, it sends the error message CF and an instruction to reduce fan speed to the master. The message and the instruction can be inquired with the remote controller or the wired controller. (Fault and protection information are displayed for one minute).

After a fault occurs, the master unit shows the error code E3 and the fault count for one minute. If the fault occurs three times, the fan is unable to resolve the problem independently. External shutdown by a remote controller, wired controller, or central controller must be used to clear the fan fault and fault count.

The fan runs normally for five minutes while clearing fault count.

Table 8—Point Check

0	No malfunction
1	P0 Overcurrent
2	Overpressure
3	Overload
4	Overspeed
5	Start−up malfunction
6	Lack of phase
7	DC voltage too low
8	Communication fault
9	Parameter fault
10	L3 Current limited
11	L5 Voltage limited
12	Target speed cannot be met during the static pressure calculation process

Inverter Module Protection

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

Indoor Fan Delayed Open Function

When the unit starts up, the louver becomes active immediately and the indoor fan opens seven seconds later. If the unit runs in the **HEATING** mode, the indoor fan will be controlled by the anti−cold wind function.

Evaporator low temperature T2 protection

−−−T2 < 32°F (0°C), the compressor stops and restarts when T2 ≥ 5°C (41°F).

−−−32°F (0°C) ≤ T2 < 39.2°F (4°C), the compressor frequency is limited and decreased to the lower level

−−−39.2°F (4°C) ≤ T2 ≤ 44.6°F (7°C), the compressor keeps the current frequency.

−−−T2 > 44.6°F (7°C), the compressor frequency will not be limited.

Zero Crossing Detection Error Protection

If the AC detects that the time interval is not correct for a continuous period of 240 seconds, 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

When there is only one malfunctioning temperature sensor, the air conditioner keeps working, but displays the error code in case of any emergency use. When there is more than one malfunctioning temperature sensor, the air conditioner stops working.

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 in the **COOLING** mode.

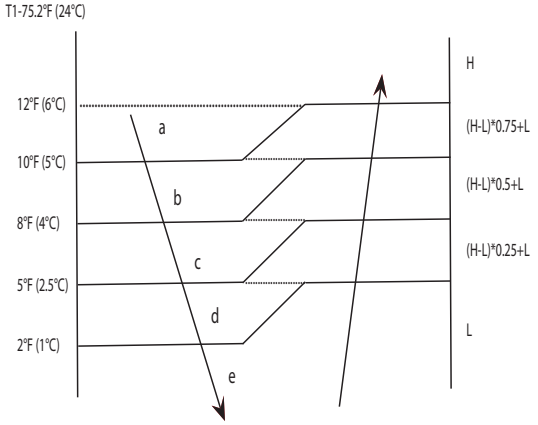


Fig. 17 – Auto Fan

COOLING Mode

Indoor Fan Running Rules

In the **COOLING** mode, the indoor fan runs constantly and the speed can be selected as high, medium, low, or auto. When the setting temperature is reached, if the compressor stops running, the indoor fan motor runs at the minimum or setting speed.

The indoor fan is controlled by the rules shown in Fig. 18.

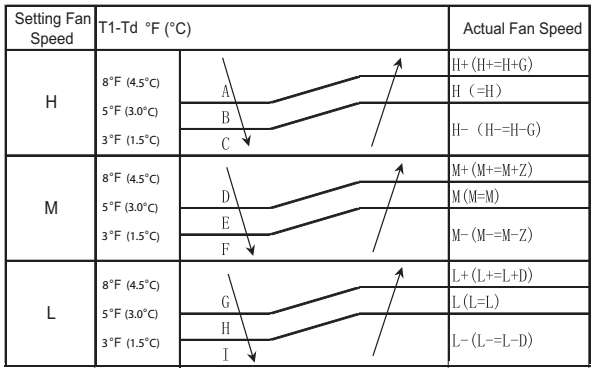


Fig. 18 – Indoor Fan Running Rules

The **AUTO** fan is controlled by the rules shown in Fig. 19.

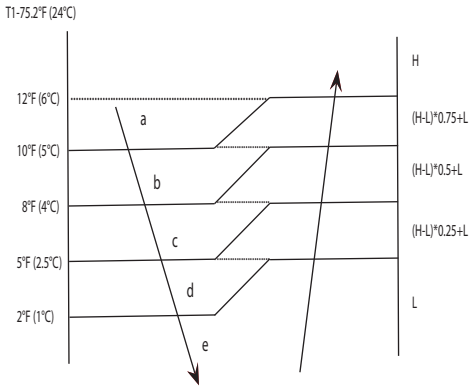


Fig. 19 – Indoor Fan Running Rules

Evaporator Temperature Protection

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

HEATING Mode

Indoor Fan Running Rules

When the compressor is on, the indoor fan can be set to 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 a low speed and the speed cannot 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. 20.

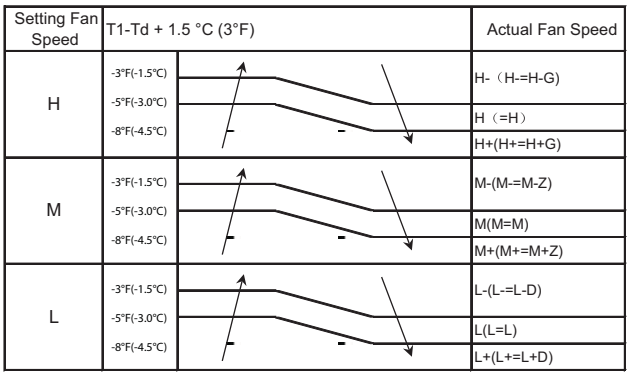


Fig. 20 – Indoor Fan Running Rules

Auto Fan Action in HEATING Mode

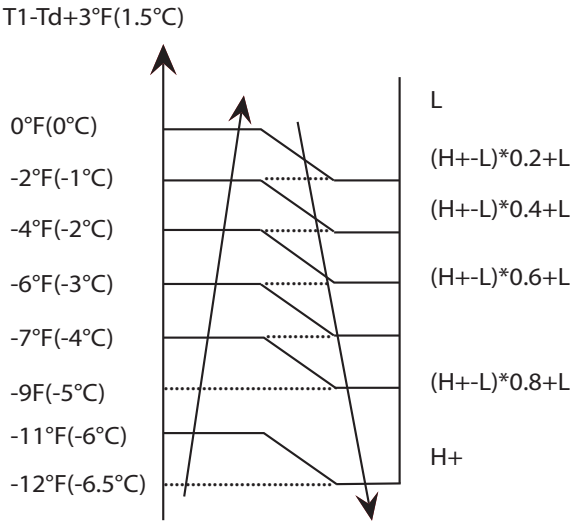


Fig. 21 – Auto Fan Action in HEATING Mode

DEFROSTING Mode

If any one of the following items is satisfied, the unit will enter the **DEFROSTING** mode. After the compressor starts and runs for a while, mark the minimum value of T3 from the 10th minute to the 15th minute as T30.

1. If the compressor runs for 29 minutes and T3 < TCDI1, T3 ＋ T30SUBT3ONE ≤ T30.
2. If the compressor runs for 35 minutes and T3 < TCDI2, T3 ＋ T30SUBT3TWO ≤ T30.
3. If the compressor runs for 29 minutes and T3 < TCDI3 for three minutes.
4. If the compressor runs for 120 minutes and T3 < 5°F (−15°C).

Condition of ending defrosting

If any one of the following items is satisfied, the **DEFROSTING** mode ends and the machine reverts to the normal **HEATING** mode.

- T3 increases to a point higher than TCDE1
- T3 maintains a point higher than TCDE2 for 80 seconds.
- Unit runs for ten minutes in **DEFROSTING** mode.

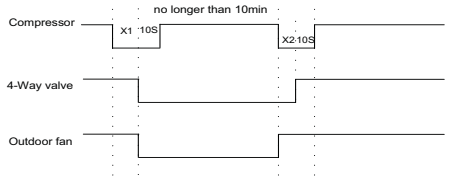


Fig. 22 – Defrosting Action

Evaporator Coil Temperature Protection

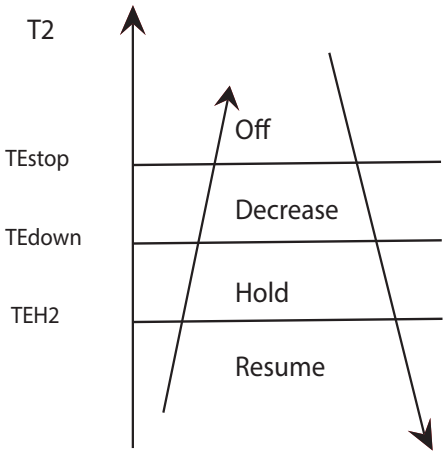


Fig. 23 – Evaporator Coil Temperature Protection

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

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

Auto−Mode

This mode can be chosen with the remote controller and the setting temperature can be changed between 62.6°F (17°C)~86°F (30°C).

In the **AUTO** mode, the machine chooses the **COOLING**, **HEATING** or **FAN−ONLY** mode according to ΔT (ΔT = T1−Ts).

Table 9—Auto Mode

ΔT=T1-Ts	Running mode
ΔT＞2℃	Cooling
-2≤ΔT≤2℃	Fan−only
ΔT<-2℃	Heating

The indoor fan runs under auto fan in the relevant mode. The louver operates same as in relevant mode. If the machine switches mode between **HEATING** and **COOLING**, the compressor stops for fifteen minutes and then chooses the mode according to T1−Ts. If the setting temperature is modified, the machine chooses the running function again.

DRY Mode

Indoor Fan Speed is Fixed

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

Low Indoor Room Temperature Protection

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

Evaporator Anti−Freezing Protection

The evaporator anti−freezing protection condenser high temperature protection and outdoor unit frequency limit are active and the same as that in the **COOLING** mode.

Timer Function

Timing range is 24 hours.

- **Timer on:** The machine turns on automatically when reaching the setting time.
- **Timer off:** The machine turns off automatically when reaching the setting time.
- **Timer on/off:** The machine turns on automatically when reaching the setting “on” time, and then turn off automatically when reaching the setting “off” time.
- **Timer off/on:** The machine turns off automatically when reaching the setting “off” time, and then turn on automatically when reaching the setting “on” time.

The timer function will not change the unit’s current operation mode. For example, if the unit is off now, it will not start up initially after setting the **Timer off** function. Additionally, when reaching the setting time, the timer LED will turn off and the unit’s running mode has not been changed.

NOTE: **The setting time is relative time.**

Sleep Function

The sleep function is available in the **COOLING**, **HEATING** or **AUTO** mode. The operation process in the **SLEEP** mode is as follows:

- When cooling, the setting temperature rises 2°F (1°C) (maximum 86°F (30°C)) every one hour. Two hours later, the setting temperature stops rising and the indoor fan is set at low speed.
- When heating, the setting temperature decreases 2°F (1°C) (minimum 62.6°F (17°C)) every one hour. Two hours later, the setting temperature stops rising and the indoor fan is set at low speed. The anti−cold wind function has the priority.

Operation time in sleep mode is seven hours. After seven hours, the unit exits this mode and turns off. The Timer setting is available.

AUTO−RESTART Function

The indoor unit is equipped with the **AUTO−RESTART** function, which is carried out through an auto−restart module. In the event of a sudden power failure, the module memorizes the setting conditions prior to the power failure. The unit resumes the previous operation setting (not including the **SLEEP** function) automatically three minutes after the power returns.

If the memorization condition is the **FORCED COOLING** mode, the unit will run in the **COOLING** mode for 30 minutes and turn to the **AUTO** mode at the 75.2°F (24°C) setting temperature.

If the air conditioner is off before the power turns off and the air conditioner is required to start up, the compressor delays start up for one minute before powering on. In other instances, the compressor waits three minutes before restarts.

FOLLOW ME

If the indoor PCB receives the signal, which results from pressing **FOLLOW ME** on the remote controller, the buzzer emits a sound indicating the **FOLLOW ME** function is initiated. However, when the indoor PCB receives a signal from the remote controller every three minutes, the buzzer will not respond.

When the unit is running with the **FOLLOW ME** function, the PCB controls the unit according to the temperature from the **FOLLOW ME** signal, and the temperature collection function of the room temperature sensor is shielded; however, the error detective function of room temperature sensor remains valid.

When the **FOLLOW ME** function is available, the PCB controls the unit according to the room temperature from the remote controller and the setting temperature.

The PCB will take action to the mode change information from remote controller signal, however it will not be affected by the setting temperature.

When the unit is in the **FOLLOW ME** mode, if the PCB does not receive a signal from the remote controller for seven minutes or pressing the **FOLLOW ME** button again, the **FOLLOW ME** function turns off automatically, and the temperature controls the unit according to the room temperature detected from its own room temperature sensor and setting temperature.

Refrigerant Leakage Detection

With this new technology, the display area displays “EC” when the outdoor unit detects a refrigerant leak. This function is only active in cooling mode. It can better prevent the compressor being damaged by refrigerant leakage or compressor overload.

Open Condition: When the compressor is active, the value of the Coil temperature of evaporator T2 has little or no change.

46°F (8°C) Heating

When the compressor is running, the indoor fan motor runs without the **ANTI−COLD** air function. When the compressor is off, the indoor fan motor is off.

Silence Operation

Press the **SILENCE** button on the remote controller to initiate the **SILENCE** function. When the **SILENCE** function is activated, the compressor running frequency remains lower than F2 and the indoor unit emits a faint breeze, which reduces the noise to the lowest level and create a quiet and comfortable room for the user.

Drain Pump Control

Use the water−level switch to control the action of drain pump.

NOTE: Main action under different condition: every five seconds the system will check the water level one time.

1. When the unit operates under **COOLING** mode (including auto cooling), dehumidifying, and forced cooling mode, the pump will start running immediately and continuously until cooling stops.
2. Once the water level increases to the control point, the LED alarm sounds, the drain pump opens and continues checking the water level. If the water level drops and the LED no longer alarms (drain pump delays for one minute) the system will operate under the last mode set. Otherwise, the entire system stops operating (including the pump) and the LED continues to alarm after three minutes.

Point Check Function

Press **LED DISPLAY** or **LED** or **MUTE** on the remote controller three times, and then press **AIR DIRECTION** or **SWING** three times in ten seconds (the buzzer rings for two seconds). The air conditioner enters the information enquiry mode. You can press **LED DISPLAY** or **AIR DIRECTION** to check the next item's information.

When the AC enters the "information enquiry" mode, it displays the code name in two seconds (see Table 10 for details).

Table 10—Point Check

Enquiry Information	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
Causes of compressor stop	ST	Causes of compressor stop
Reserve	A0	
Reserve	A1	
Reserve	.b0	
Reserve	.b1	
Reserve	.b2	
Reserve	.b3	
Reserve	.b4	
Reserve	.b5	
Reserve	.b6	
Reserve	.dL	
Reserve	Ac	
Reserve	Uo	
Reserve	Td	

When the unit enters the information enquiry mode, it displays the code value for 25 seconds (see Table 11 for details).

Table 11—Point Check

Enquiry Information	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 display temperature is the actual value. 2. Temperatures are listed as °C no matter the remote controller type. 3. T1, T2, T3, T4, T2B display range:−25~70, TP display range:−20~130. 4. Frequency 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,…A9	100, 101,…109	
	b0, b1,…b9	110 ,111,…119	
	c0, c1,…c9	120 ,121,…129	
	d0, d1,…d9	130 ,131,…139	
	E0, E1,…E9	140 ,141,…149	
	F0, F1,…F9	150 ,151,…159	
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 by 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 by 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.
Causes of compressor stop	0−99	For the detailed meaning, please consult with engineer	Decimal display
Reserve	0−FF		

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 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. Remove the front cover of the unit and then the control box cover.
10. Carefully remove the indoor board from the control box, and 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.

Safety

Electricity is stored in capacitors after the power supply is shut off. Be sure to discharge the electricity in capacitors.

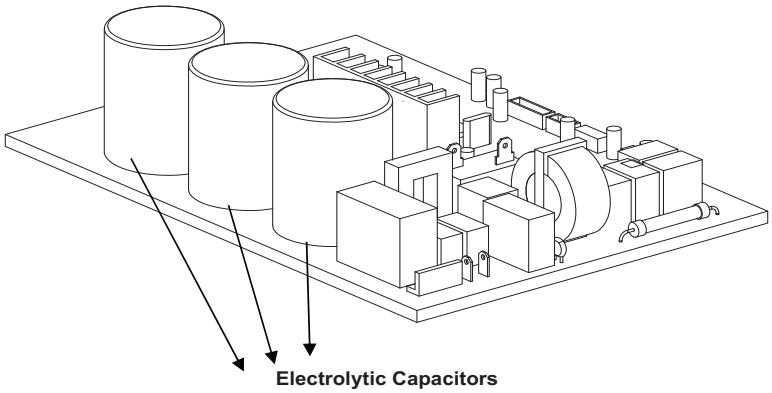


Fig. 24 – Capacitors

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

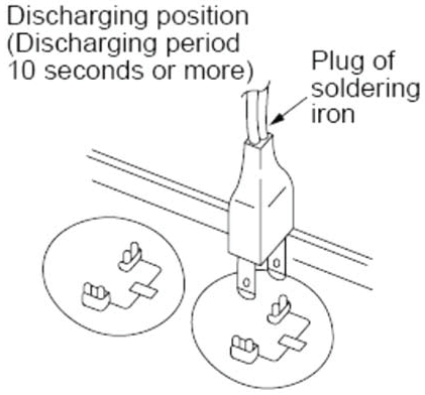


Fig. 25 – Discharging Position

NOTE: Fig. 25 is for reference only.

Indoor Unit Diagnostic Guide

Table 12—Indoor Unit Error Display

Operation Lamp	Timer Lamp	Display	LED Status
☆1 time	X	E0	Indoor unit EEPROM error
☆ 2 times	X	E1	Communication malfunction between indoor and outdoor units
☆4 times	X	E3	Indoor fan speed has been out of control
☆5 times	X	E4	Indoor room temperature sensor T1 open circuit or short circuit
☆6 times	X	E5	Evaporator coil temperature sensor T2 open circuit or short circuit
☆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	Open circuit or short circuit of outdoor ambient temperature sensor T4
☆3 times	O	F2	Open circuit or short circuit of condenser coil temperature sensor T3
☆4 times	O	F3	Open circuit or short circuit of Compressor discharge temperature sensor T5
☆5 times	O	F4	Outdoor unit EEPROM error
☆6 times	O	F5	Outdoor fan speed has been out of control
☆7 times	O	F6	T2B sensor error
☆8 times	O	F7	Lifting−panel communication error
☆9 times	O	F8	Lifting−panel malfunction
☆10 times	O	F9	Lifting−panel is not closed
☆1 time	☆	P0	IPM malfunction
☆2 times	☆	P1	Over voltage or over low voltage protection
☆3 times	☆	P2	High temperature protection of compressor top
☆4 times	☆	P3	Outdoor low temperature protection
☆5 times	☆	P4	Inverter compressor drive error
☆6 times	☆	P5	Mode conflict
☆7 times	☆	P6	Compressor low−pressure protection
☆8 times	☆	P7	Outdoor IGBT temperature sensor error

O (light) X (off) ☆ (flash)

Table 13—Error Display on Two Way Communication Wired Controller

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 leakage 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

EEPROM error diagnosis and solution (E0/F4)

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

Troubleshooting:

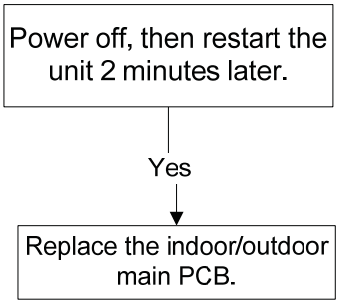


Fig. 26 – Troubleshooting

Fig. 27 – Indoor PCB

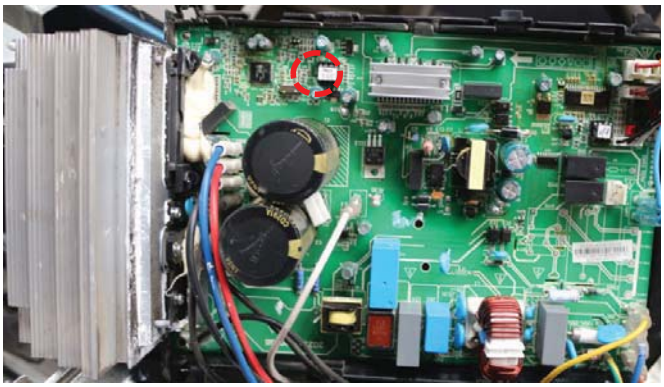


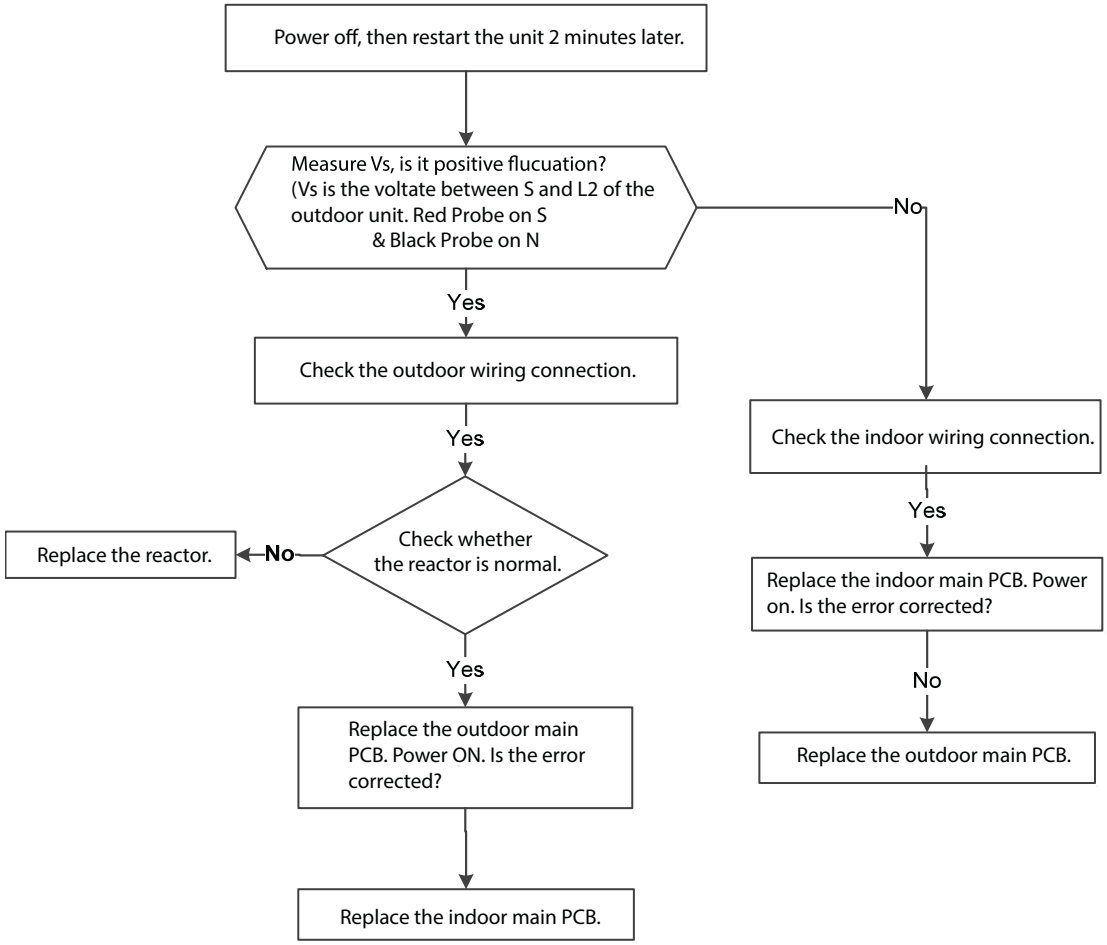
Fig. 28 – Outdoor PCB

NOTE: Fig. 27 and Fig. 28 are for reference only and may differ from the items on your unit.

DIAGNOSIS AND SOLUTION (CONT.)

Communication malfunction between indoor and outdoor units diagnosis and solution (E1) Sizes 18−24

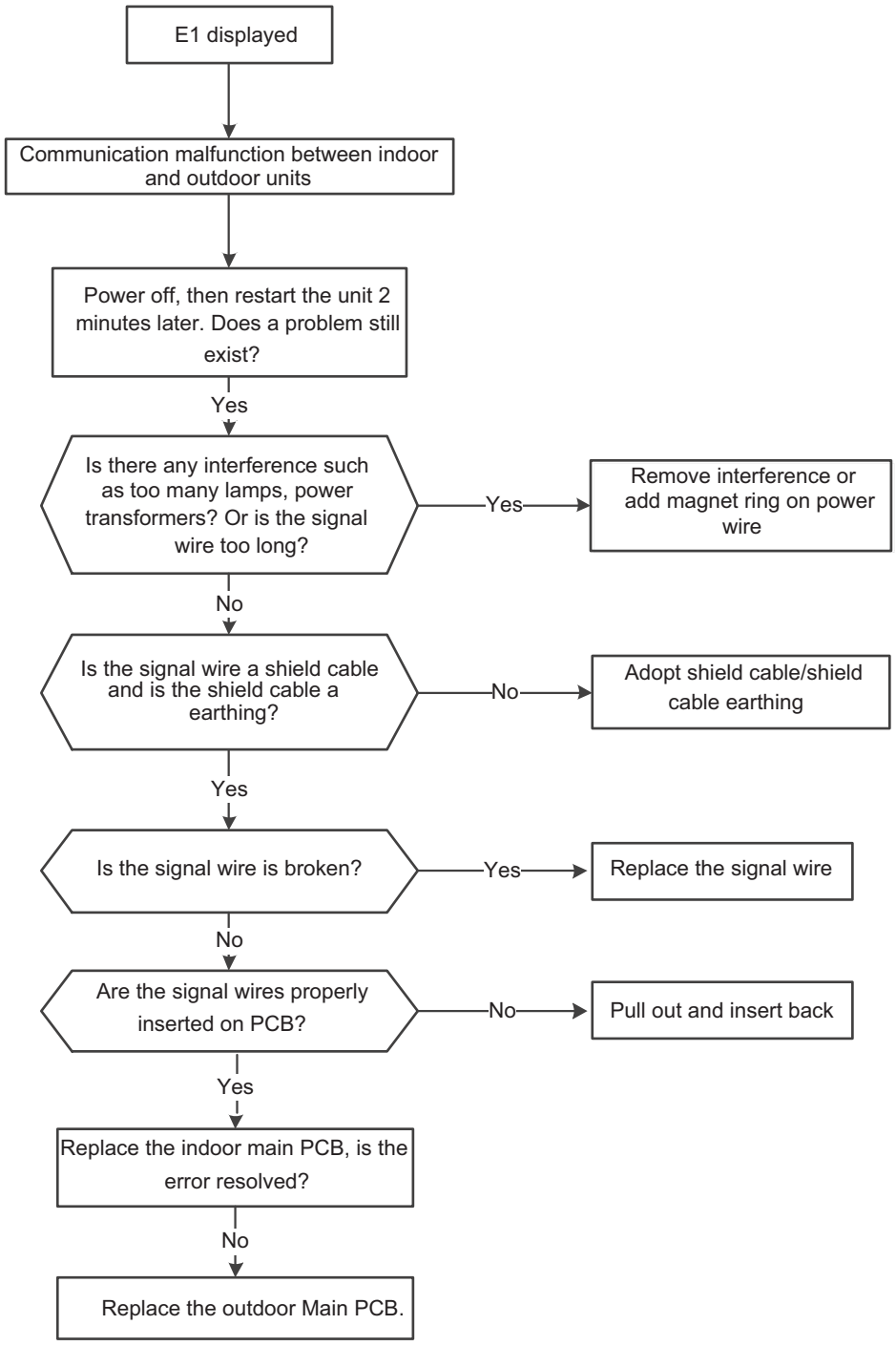
Error Code	E1
Malfunction decision conditions	Indoor unit does not receive the feedback from outdoor unit during 110 seconds and this condition happens four times continuously.
Possible causes	• Wiring problem • Faulty indoor or outdoor PCB



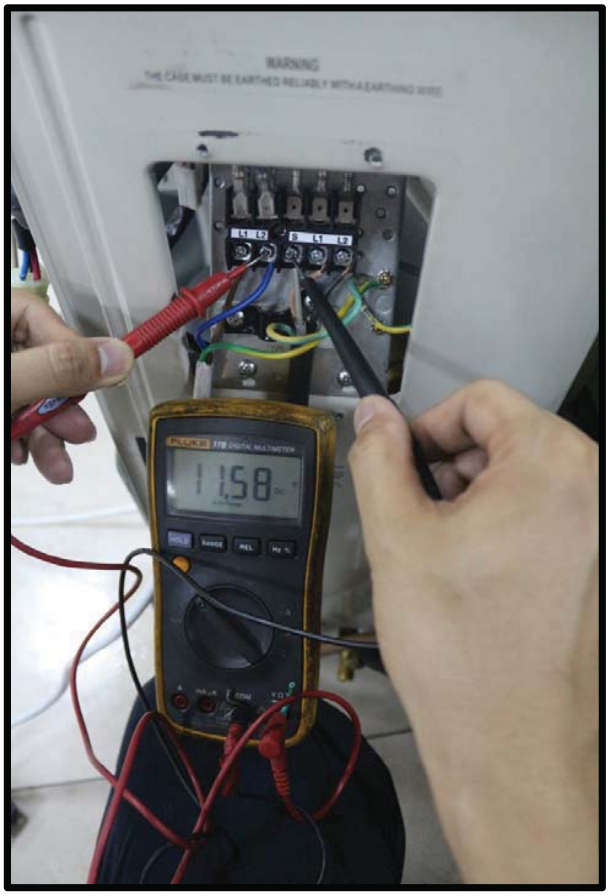
DIAGNOSIS AND SOLUTION (CONT.)

For 36K − 58K

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



DIAGNOSIS AND SOLUTION (CONT.)



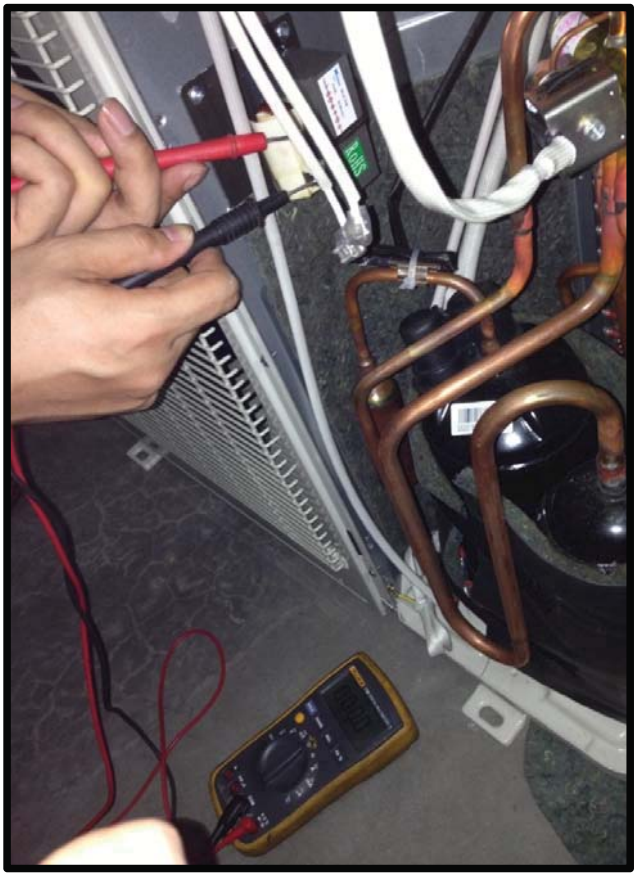
Remark:
Use a multimeter to test the DC voltage between L2 port and S port of outdoor unit. The red probe of the multimeter connects with L2 port while the black pin is for S port.

When the system is running normal, the voltage will move alternately between -50V to 50V.

If the outdoor unit has a malfunction, the voltage will move alternately with positive value.

While if the indoor unit has a malfunction, the voltage will be a certain value.

Fig. 29 – Test the DC voltage



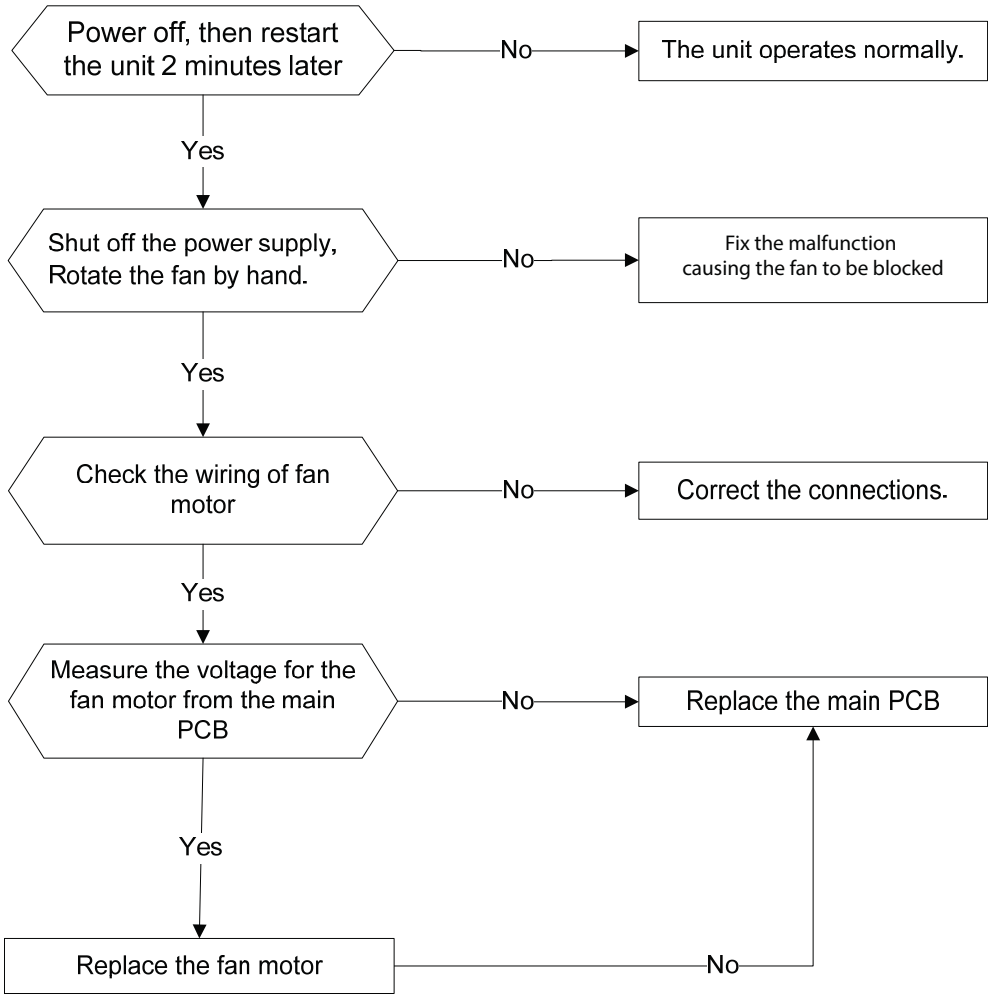
Remark:
Use a multimeter to test the resistance of the reactor which does not connect with capacitor.
The normal value should be around zero ohm. Otherwise, the reactor must have malfunction and need to be replaced.

Fig. 30 – Test the resistance

DIAGNOSIS AND SOLUTION (CONT.)

Fan speed is out of control diagnosis and solution (E3)

Error Code	E3
Malfunction decision conditions	When the indoor fan speed is too low (300RPM) for a certain time, the unit stops and the LED displays the failure.
Possible causes	• Wiring problem • Faulty fan assembly • Faulty fan motor • Faulty PCB



DIAGNOSIS AND SOLUTION (CONT.)

Index 1:

1. Indoor DC fan motor (control chip is inside fan motor)
   Power on and when the unit is in standby, measure the voltage of pin1−pin3, pin4−pin3 in fan motor connector. If the value of the voltage is not in the range showing in table below, replace the PCB.

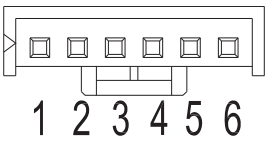


Fig. 31 – Indoor DC fan motor

DC motor voltage input and output

Table 14—Signals

No.	Color	Signal	Voltage
1	Red	Vs/Vm	200~380V
2	−−−	−−−	−−−
3	Black	GND	0V
4	White	Vcc	13.5~16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5~16.5V

DIAGNOSIS AND SOLUTION (CONT.)

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 problem • Faulty sensor

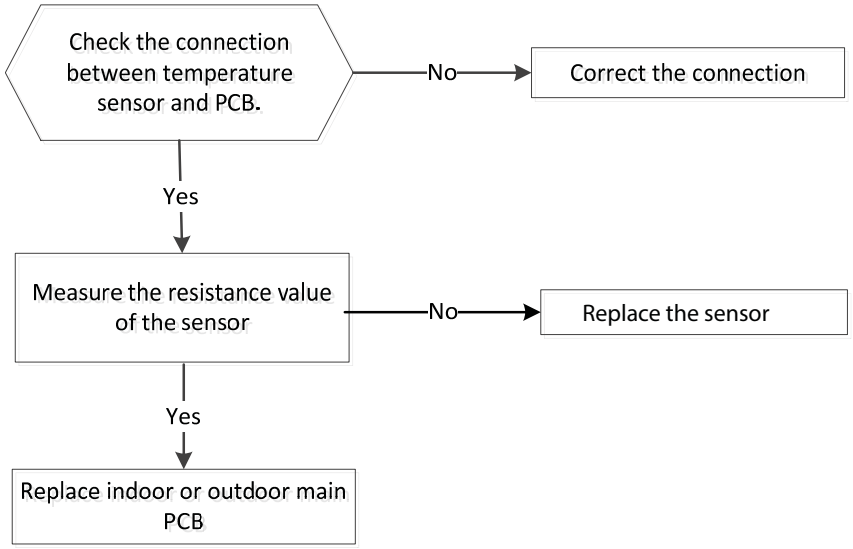


Fig. 32 – Troubleshooting

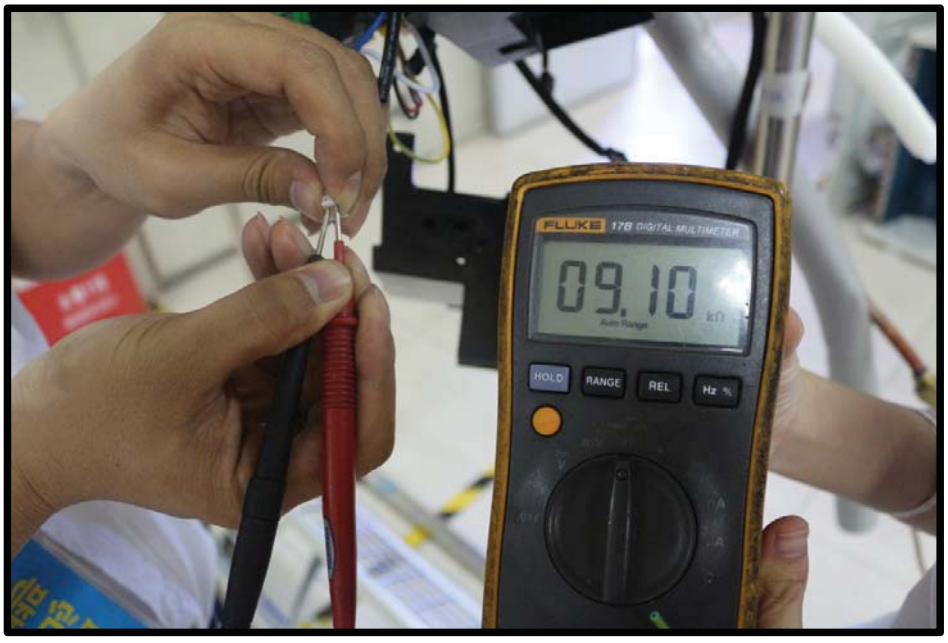
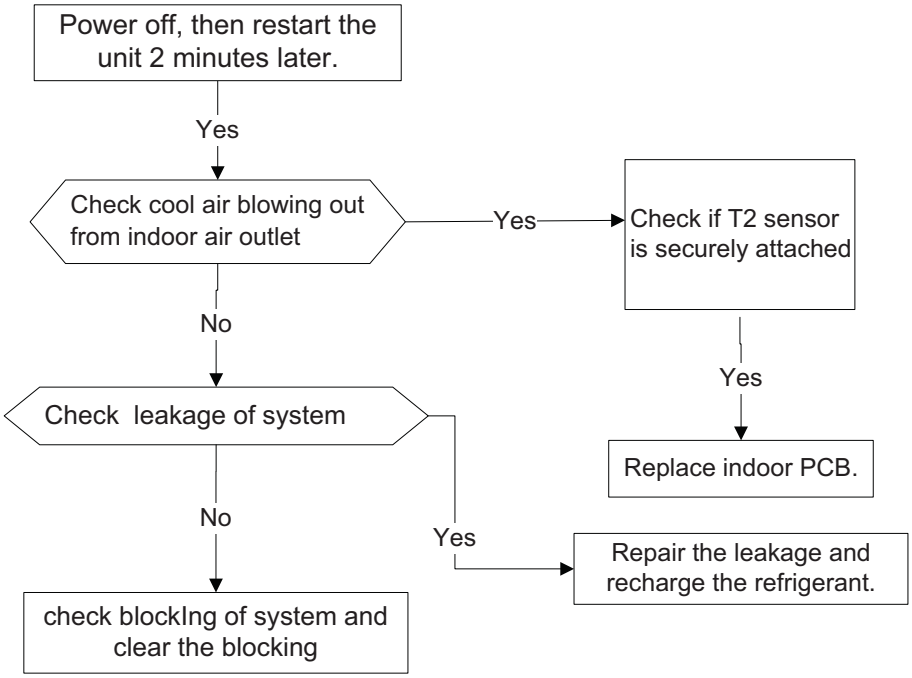


Fig. 33 – Temperature sensor diagnosis

DIAGNOSIS AND SOLUTION (CONT.)

Refrigerant Leakage Detection diagnosis and solution (EC)

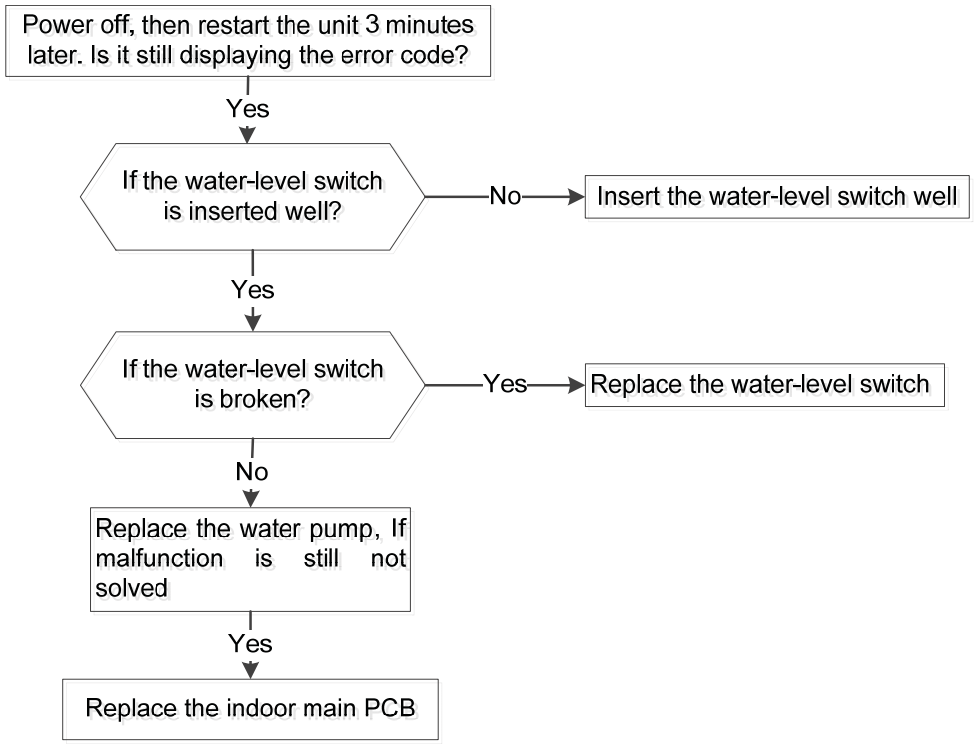
Error Code	EC
Malfunction decision conditions	The controls capture the value of T2 when the compressor starts in cool mode and assigns that value to Tcool. After a delay of five minutes with the compressor still running, T2 is compared to Tcool for four seconds. T2 < Tcool minus 4degF (2degC) = OK. Otherwise, the temperatures are sampled three times and EC is displayed if T2 temperature is not low enough to indicate sufficient refrigerant flow. Unit will be shut down.
Possible causes	• Faulty T2 Sensor • Faulty indoor FCB • System problems, such as leakage or blocking



DIAGNOSIS AND SOLUTION (CONT.)

Water−level alarm malfunction diagnosis and solution

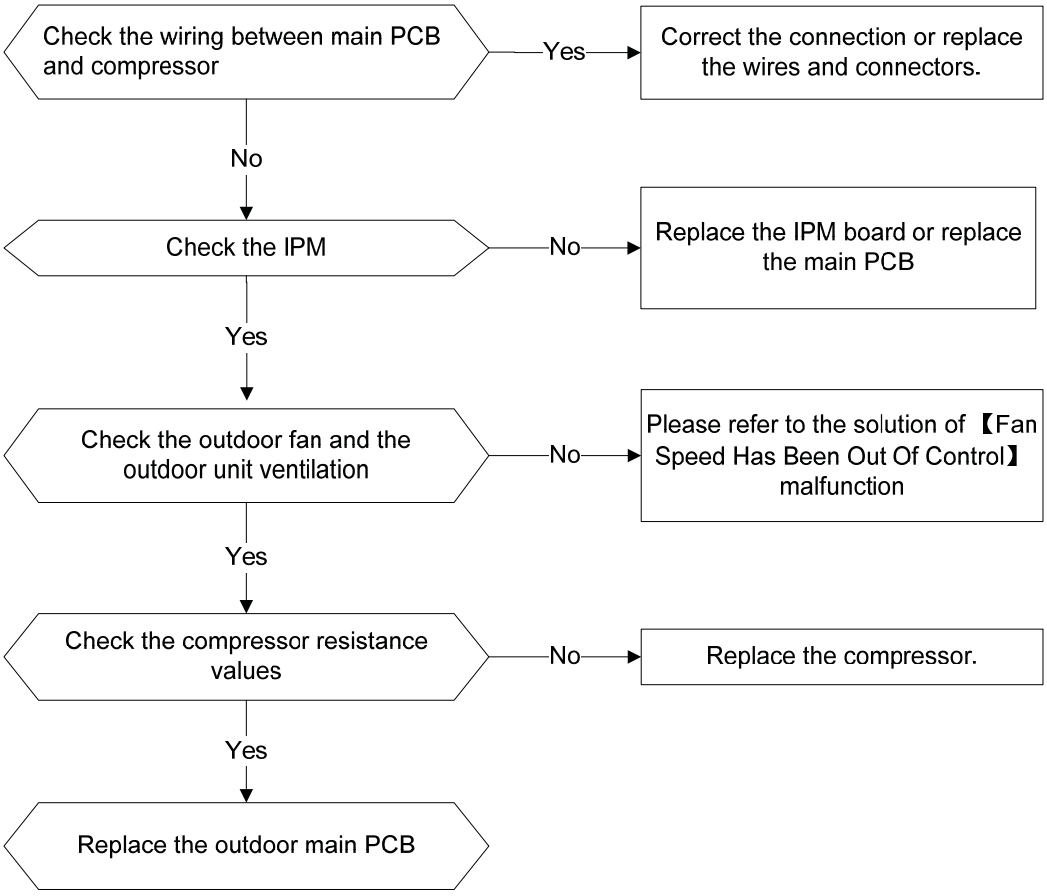
Error Code	EE
Malfunction decision conditions	If the sampling voltage is not 5V, the LED displays the failure.
Possible causes	• Wiring problem • Faulty water−level switch • Faulty water pump • Faulty indoor PCB



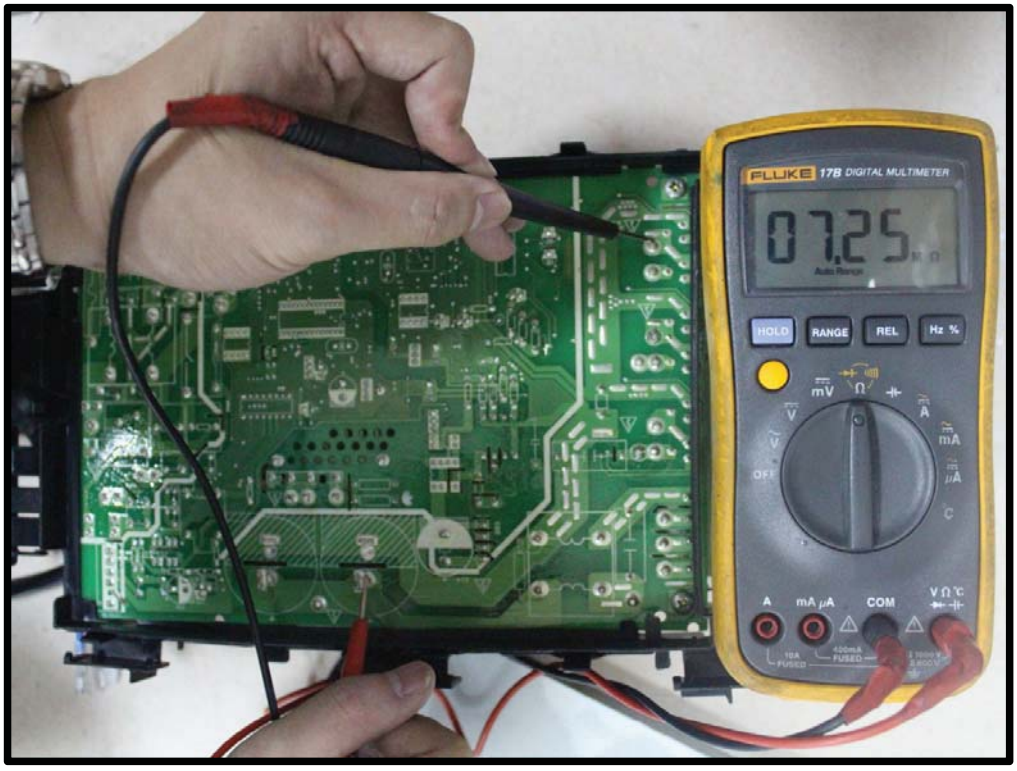
DIAGNOSIS AND SOLUTION (CONT.)

IPM malfunction or IGBT over−strong current protection diagnosis and solution (P0)

Error Code	P0
Malfunction decision conditions	When the voltage signal that IPM send to compressor drive chip is abnormal, the display LED shows “P0” and AC turns off.
Possible causes	• Wiring problem • IPM malfunction • Faulty outdoor fan assembly • Compressor malfunction • Faulty outdoor PCB

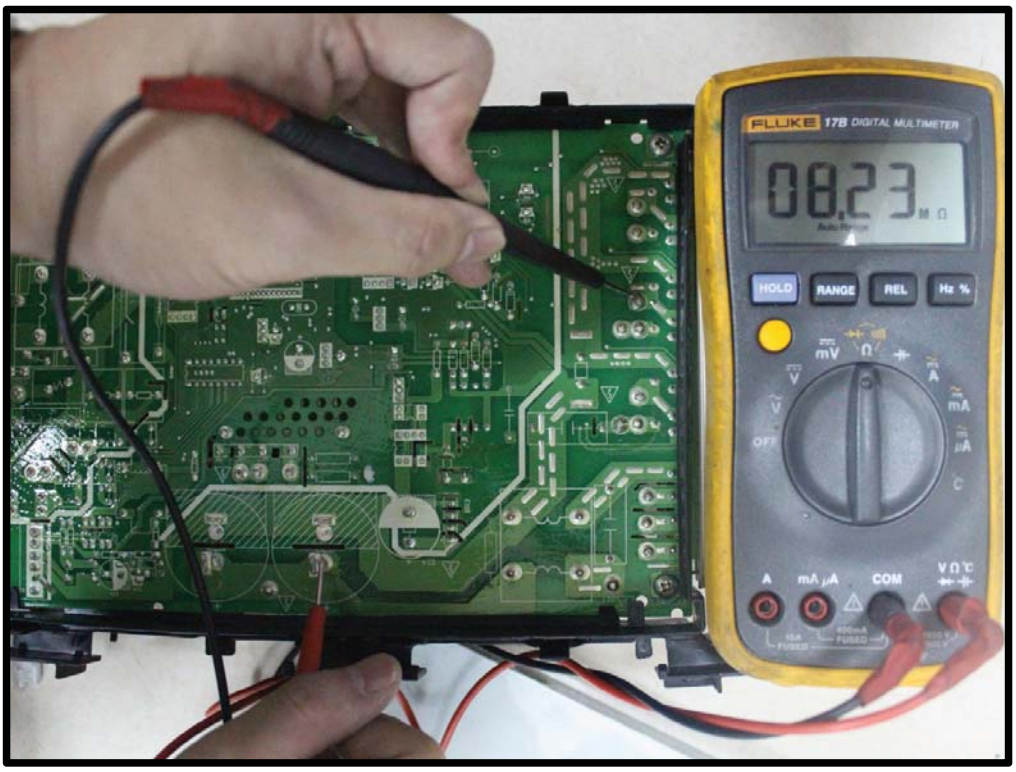


DIAGNOSIS AND SOLUTION (CONT.)



P-U

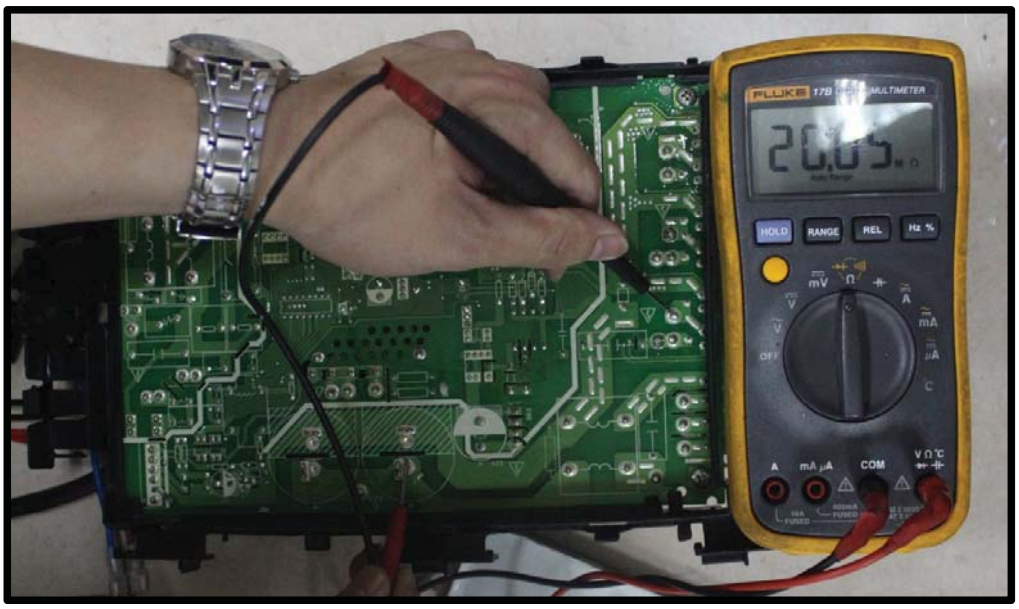
Fig. 34 – P−U



P-V

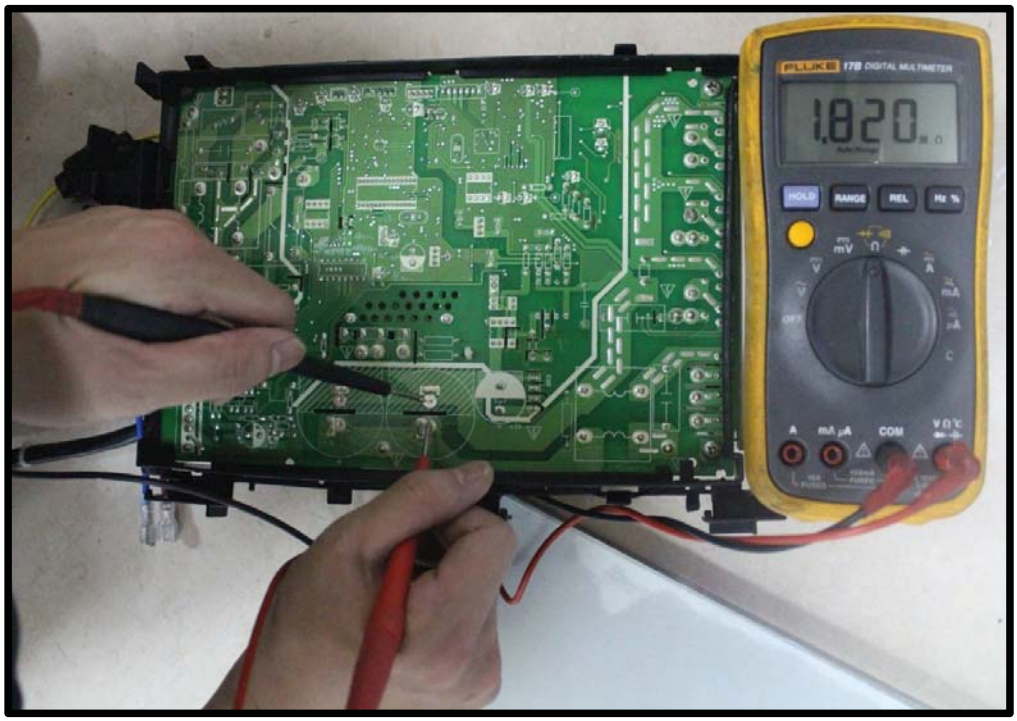
Fig. 35 – P−V

DIAGNOSIS AND SOLUTION (CONT.)



P-W

Fig. 36 – P−W



P-N

Fig. 37 – P−N

DIAGNOSIS AND SOLUTION (CONT.)

Over voltage or too low voltage protection diagnosis and solution (P1)

Error Code	P1
Malfunction decision conditions	An abnormal voltage rise or drop is detected by checking the specified voltage detection circuit.
Possible causes	• Power supply problems • System leakage or block • Faulty PCB

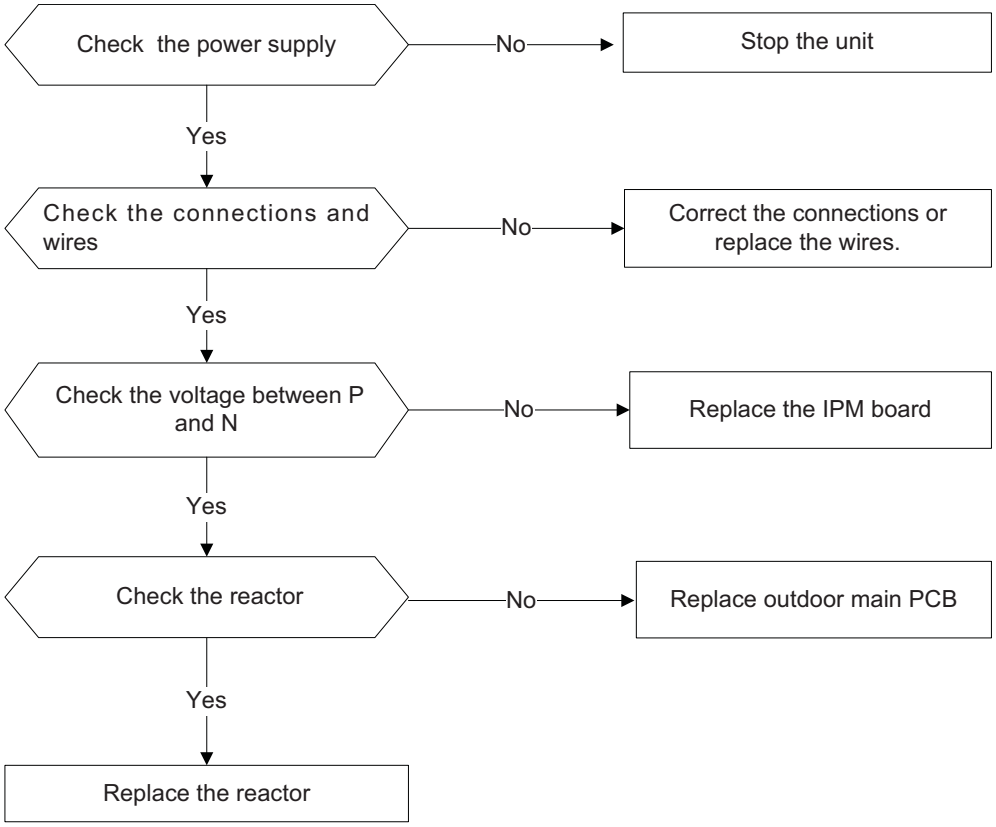


Fig. 38 – Troubleshooting

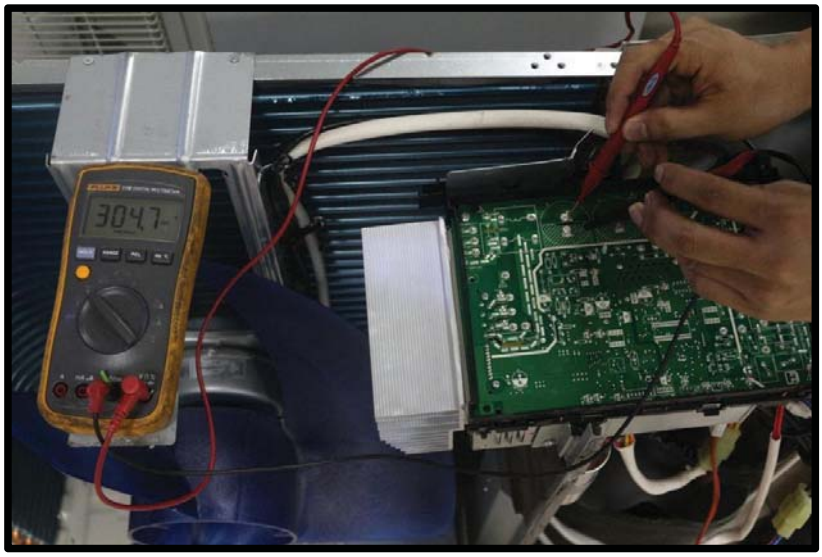


Fig. 39 – Measure the DC voltage

Remark:
Measure the DC voltage between P and N port. The normal value should be around 310V.

DIAGNOSIS AND SOLUTION (CONT.)

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 • Faulty PCB

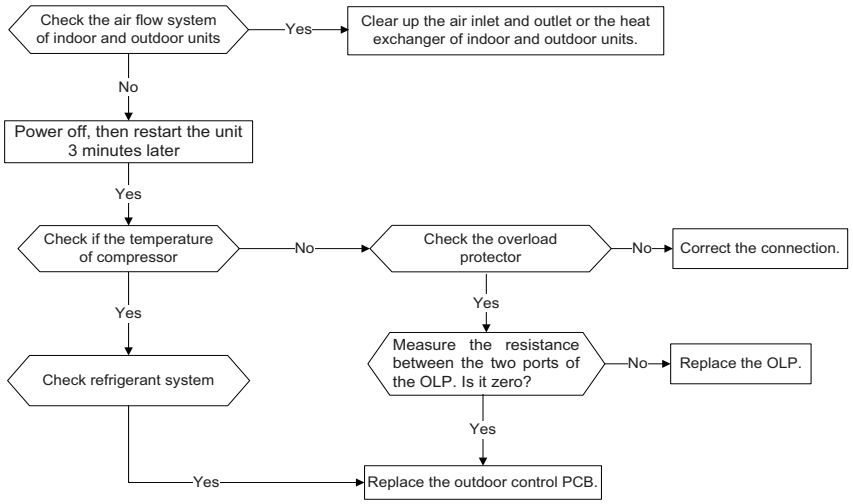


Fig. 40 – Troubleshooting − High temperature protection of compressor top diagnosis and solution (P2)

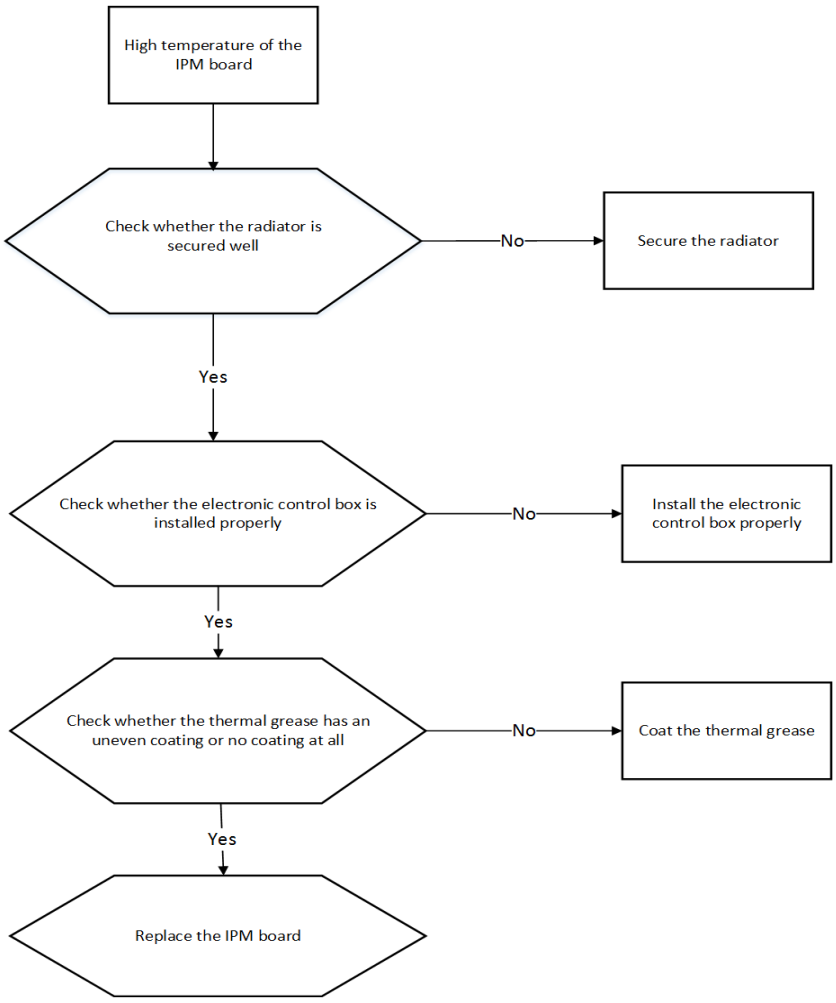
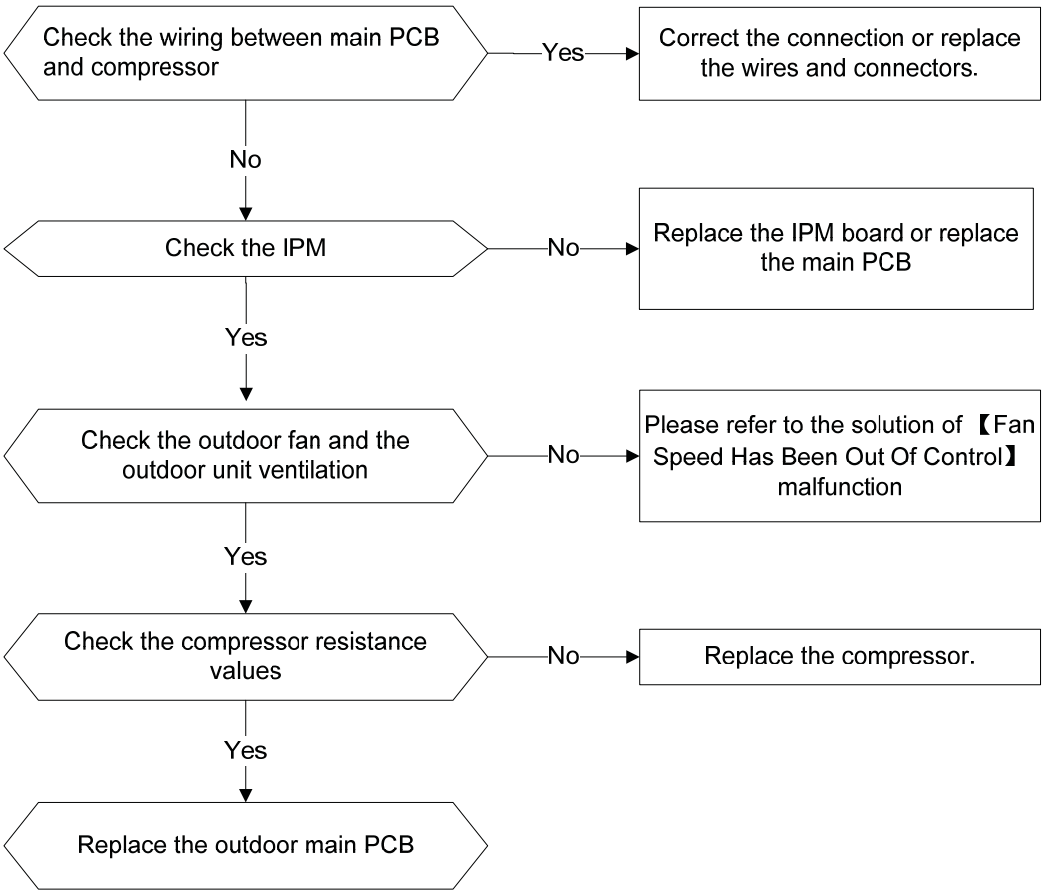


Fig. 41 – Troubleshooting − High temperature protection of IPM board diagnosis and solution (P2)

DIAGNOSIS AND SOLUTION (CONT.)

Inverter compressor drive error diagnosis and solution (P4)

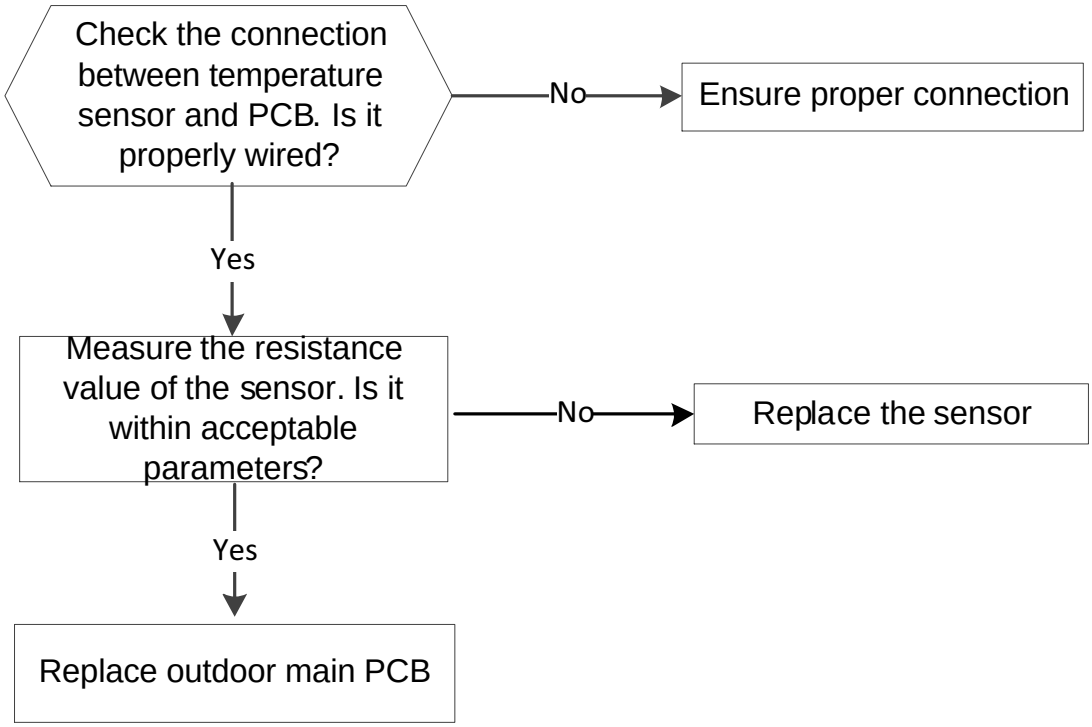
Error Code	P4
Malfunction decision conditions	An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection.
Possible causes	• Wiring problem • IPM malfunction • Faulty outdoor fan assembly • Compressor malfunction • Faulty outdoor PCB



DIAGNOSIS AND SOLUTION (CONT.)

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

Error Code	P7
Malfunction decision conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays a failure.
Possible causes	• Wiring problem • Faulty sensor



Main Parts Check

Temperature sensor checking

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

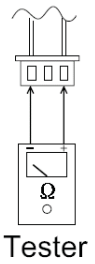


Fig. 42 – Tester

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.

APPENDIX 1

Table 15— Temperature Sensor Resistance Value Table for T1,T2,T3,T4 (t−−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 (t−−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			

IPM Continuity Check

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

Table 17— IPM Continuity Check

Digital Tester		Normal Resistance value	Digital Tester		Normal Resistance Value
(+) Red	(–) Black		(+) Red	(–) Black	
P	N	∞ (Several M W)	U	N	∞ (Several M W)
	U		V		
	V		W		
	W		(+) Red		

Pressure on Service Port

Table 18—Cooling Chart

°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

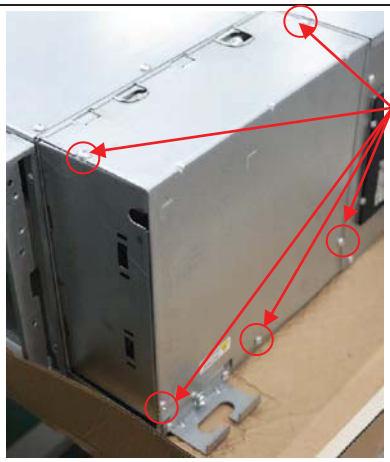
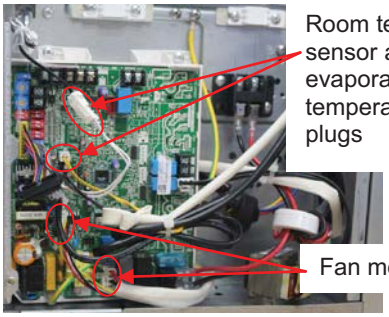
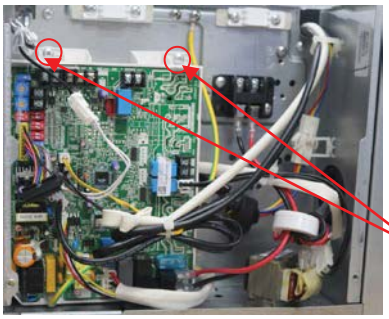
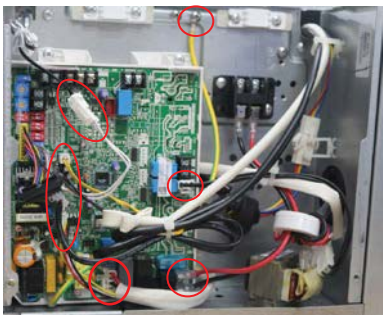
Heating Chart

Table 19—Heating Chart

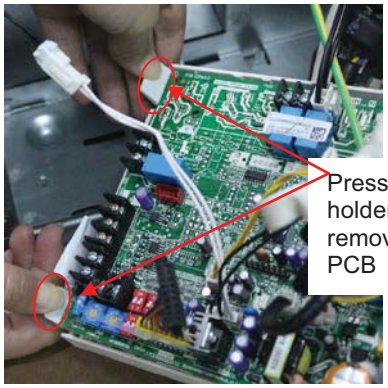
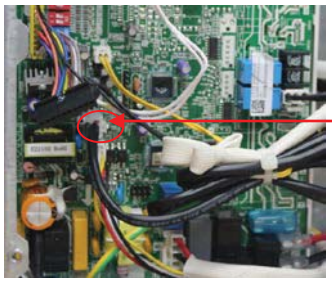
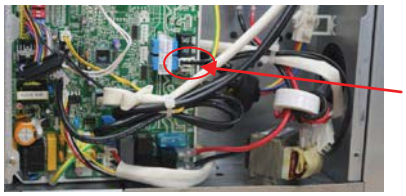
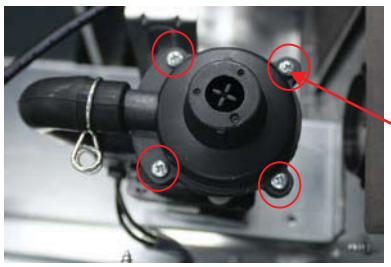
°F/°C	Indoor temp.	Outdoor Temperature				
		57 (13.89)	47 (8.33)	37 (2.78)	27 (–2.78)	17 (–8.33)
BAR	55	30.3	28.5	25.3	22.8	20.8
BAR	65	32.5	30.0	26.6	25.4	23.3
BAR	75	33.8	31.5	27.8	26.3	24.9
PSI	55	439	413	367	330	302
PSI	65	471	435	386	368	339
PSI	75	489	457	403	381	362
MPA	55	3.03	2.85	2.53	2.28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

NOTE: This section is for reference only. The images may differ slightly from your actual unit.

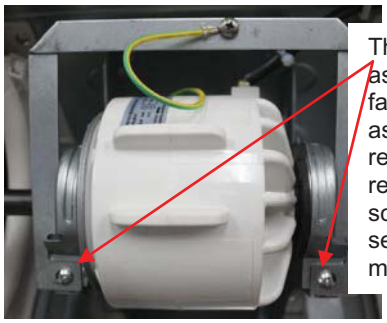
No.	Parts name	Procedures	Remarks
1	Remove the electronic control box	1) Remove the screws to remove the electronic control box cover.	
		2) Disconnect the fan motor wire, room temperature sensor wire and evaporator temperature sensor wire.	
		3) Remove the screws to remove electronic control box.	
2	Remove the PCB	1) Remove the electronic control box cover.	Repeat step1 of section 1
		2) Remove all plugs or connectors connected to the PCB and remove the ground wire after removing the screw.	

DISASSEMBLY INSTRUCTIONS (CONT.)

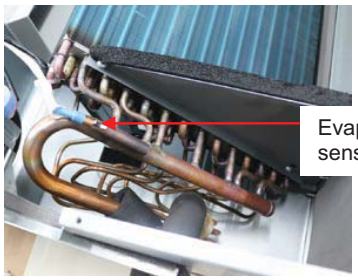
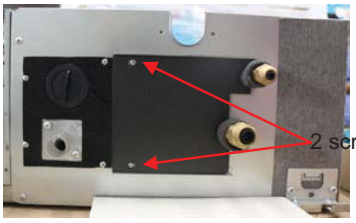
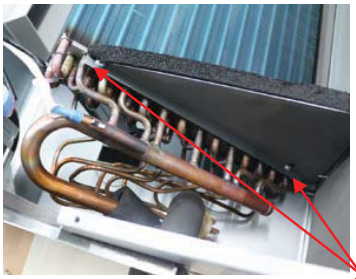
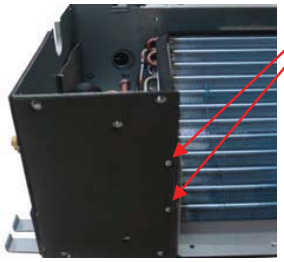
		3) Remove the PCB from the electronic control box.	
3	**Remove the reactance**	**1) Remove the electronic control box cover.**	Repeat step1 of section 1
		2) Disconnect the reactance wire.	
		3) Remove the screw.	
4	**Remove the drain pump**	**1) Remove the electronic control box cover.**	Repeat step1 of section 1
		2) Disconnect the drain pump wire.	
		3) Remove the screw.	

DISASSEMBLY INSTRUCTIONS (CONT.)

<table>
<tr><td rowspan="6">5</td><td rowspan="6">Remove the fan motor</td><td>1) Remove the screws to remove the rear cover board.</td><td> 
</td></tr>
<tr><td>2) Remove the volute shell.</td><td> 

Press the clips to remove the volute shell</td></tr>
<tr><td>3) Remove the fan motor wire from the electronic control box.</td><td>Refer step2 of section 1</td></tr>
<tr><td>4) Disassemble the fan motor clamps to remove the fan motor assembly and fan wheel assembly.</td><td> 
The fan motor assembly and fan wheel assembly can be removed after removing the 2 screws that secure the fan motor holder.</td></tr>
<tr><td>5) Disassemble the fan wheels, remove the fan motor.</td><td> 
Remove the screw to remove the fan wheel</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Remove the water collector assembly</td><td>1) Remove the rear cover board.</td><td>Repeat step1 of section 5</td></tr>
<tr><td>2) Remove the screws (7) to remove the top cover, then remove the water collector assembly.</td><td> 
</td></tr>
</table>

DISASSEMBLY INSTRUCTIONS (CONT.)

			
7	**Remove the evaporator**	**1) Remove the water collector.**	Repeat the steps in section 6
		2) Remove the evaporator sensor.	
		3) Remove the pipe clamp board.	
		4) Remove the evaporator support board.	 
		5) Remove the screws to remove the evaporator.	

 . Edition Date: 09/18

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