DLFSHB
High Wall Ductless System
Sizes 09 to 24

Midea

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.). Only trained, qualified installers and service mechanics should install, start-up, and service this equipment. Untrained personnel can perform basic maintenance functions such as coil cleaning. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment. Follow all safety codes. Wear safety glasses and work gloves. Keep a quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

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

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

⚠ WARNING

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

Before installing, modifying, or servicing system, 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.

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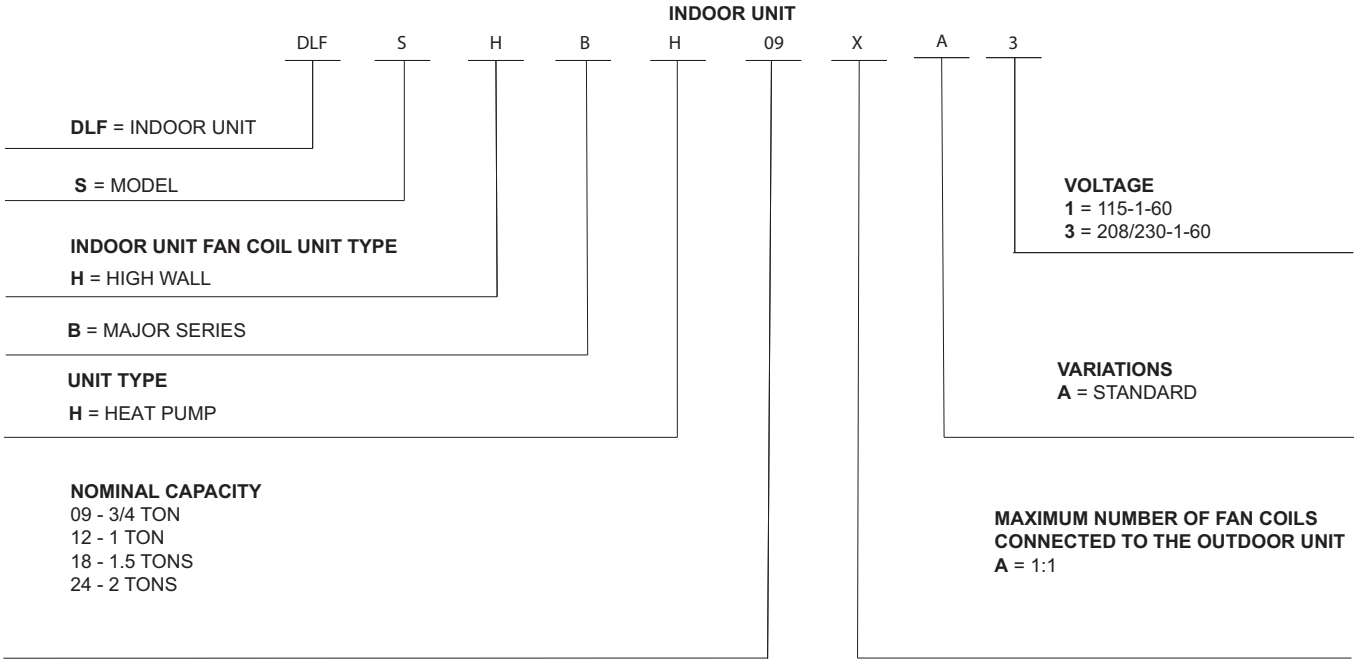
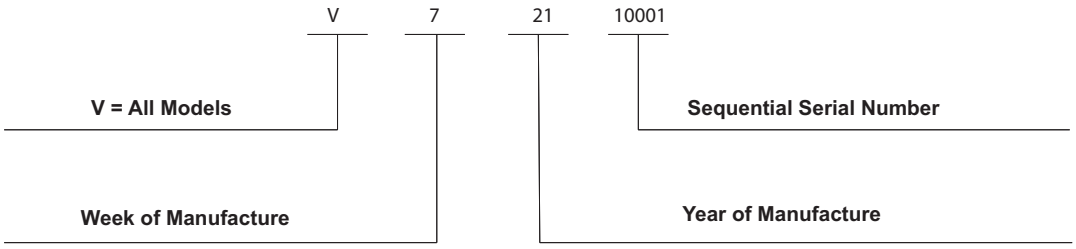
MODEL / SERIAL NUMBER NOMENCLATURES

Table 1 —Unit Sizes

SYSTEM TONS	VOLTAGE	INDOOR MODEL
12	115-1-60	DLFSHBH12XAJ
9	208-230/1/60	DLFSHBH09XAK
12		DLFSHBH12XAK
18		DLFSHBH18XAK
24		DLFSHBH24XAK





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.

Performance may vary based on the outdoor unit matched to. See Table 3 for compatible outdoor units.

Legend
MCA-Minimum Circuit Amps

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SPECIFICATIONS

Table 2 — Specifications

SYSTEM	SIZE		12K	9K	12K	18K	24K
	Indoor Model		DLFSHBH12XAJ	DLFSHBH09XAK	DLFSHBH12XAK	DLFSHBH18XAK	DLFSHBH24XAK
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	Power Supply						
	MCA	A.	0.31	0.19	0.19	0.5	0.5
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	Optional	Optional	Optional
Operating Range	Cooling Indoor DB Min - Max	°F(°C)	62~90 (17~32)	62~90 (17~32)	62~90 (17~32)	62~90 (17~32)	62~90 (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)
Piping	Pipe Connection Size - Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)
	Pipe Connection Size - Suction	in (mm)	1/2 (12.7)	3/8 (9.52)	1/2 (12.7)	1/2 (12.7)	5/8 (16)
Indoor Coil	Face Area	Sq. Ft.	2.05	2.05	2.05	2.67	2.67
	No. Rows		2	2	2	2	2
	Fins per inch		20	20	20	20	20
	Circuits		2	2	2	4	4
Indoor	Unit Width	in (mm)	31.57 (802)	31.57 (802)	31.57 (802)	42.60 (1082)	42.60 (1082)
	Unit Height	in (mm)	11.61 (295)	11.61 (295)	11.61 (295)	13.27 (337)	13.27 (337)
	Unit Depth	in (mm)	7.87 (200)	7.87 (200)	7.87 (200)	9.21 (234)	9.21 (234)
	Net Weight	lbs (kg)	18.96 (8.6)	18.96 (8.6)	18.96 (8.6)	29.54 (13.4)	29.98 (13.6)
	Fan Speeds		4	4	4	4	4
	Airflow (lowest to highest)	CFM	176/241/300/341	152/194/291/341	152/194/291/341	382/458/531/761	382/459/601/761
	Sound Pressure (lowest to highest)	dB(A)	29.8/32.3/38.6	32.3/35.5/41.2	32.9/35.6/41	37.9/40.9/46.3	41/45.1/49.8
	Air throw Data	ft (m)	23 (7)	19.7 (6)	22.3 (6.8)	31.8 (9.7)	34.4 (10.5)
	Moisture removal	Pint/h (L/h)	0.058 (0.028)	0.039 (0.014)	0.061 (0.029)	0.072 (0.034)	0.106 (0.051)
	Field Drain Pipe Size O.D.	in (mm)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)

Compatibility

Table 3 — Compatibility

Indoor Unit	DLFSHBH12XAJ	DLFSHBH09XAK	DLFSHBH12XAK	DLFSHBH18XAK	DLFSHBH24XAK
Outdoor Unit Single Zone	DLCSRBH12AAJ	DLCSRBH09AAK	DLCSRBH12AAK	DLCSRBH18AAK	DLCSRBH24AAK
Outdoor Unit Multi-zone		DLCMRAH18BAK			
		DLCMRAH27CAK			
		DLCMRAH36DAK			
		DLCMRAH48EAK			

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DIMENSIONS

Table 4 — Dimensions

HIGH WALL UNIT SIZE		12K	9K	12K	18K	24K
(Voltage)		(115V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)
Height (H)	In/ (mm)	11.61(295)	11.61(295)	11.61(295)	13.27(337)	13.27(337)
Width (W)	In/ (mm)	31.57(802)	31.57(802)	31.57(802)	42.60(1082)	42.60(1082)
Depth (D)	In/ (mm)	7.87(200)	7.87(200)	7.87(200)	9.21(234)	9.21(234)
Height	In/ (mm)	14.96(380)	14.96(380)	14.96(380)	12.40(315)	12.40(315)
Width	In/ (mm)	34.45(875)	34.45(875)	34.45(875)	45.47(1155)	45.47(1155)
Depth	In/ (mm)	11.22(285)	11.22(285)	11.22(285)	16.34(415)	16.34(415)
Thickness	In/ (mm)	0.295(7.5)	0.295(7.5)	0.295(7.5)	0.295(7.5)	0.295(7.5)
Drawing No.	-	860*270*360 (33.86*10.63*14.17)	860*270*360 (33.86*10.63*14.17)	860*270*360 (33.86*10.63*14.17)	1140*400*300 (44.88*15.75*11.81)	1140*400*300 (44.88*15.75*11.81)
Weight - Gross	lbs. (kg)	24.47(11.1)	24.25(11)	24.25(11)	37.48(17)	38.14(17.3)
Weight - Net	lbs. (kg)	18.96(8.6)	18.96(8.6)	18.96(8.6)	29.54(13.4)	29.98(13.6)

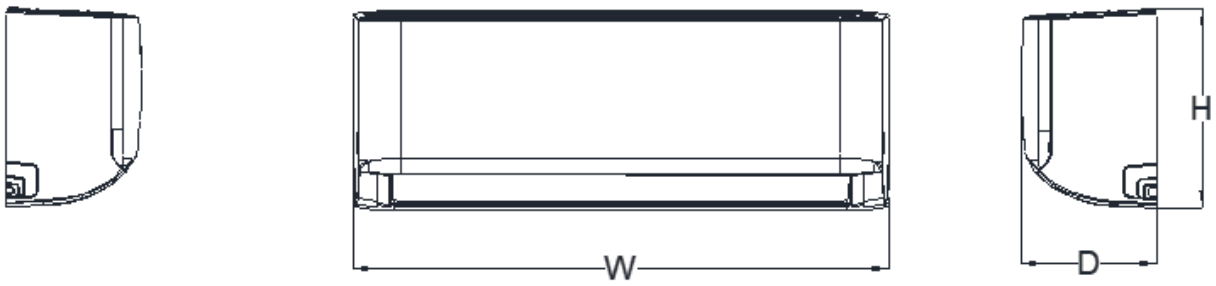

Fig. 1 — Indoor Unit

CLEARANCES

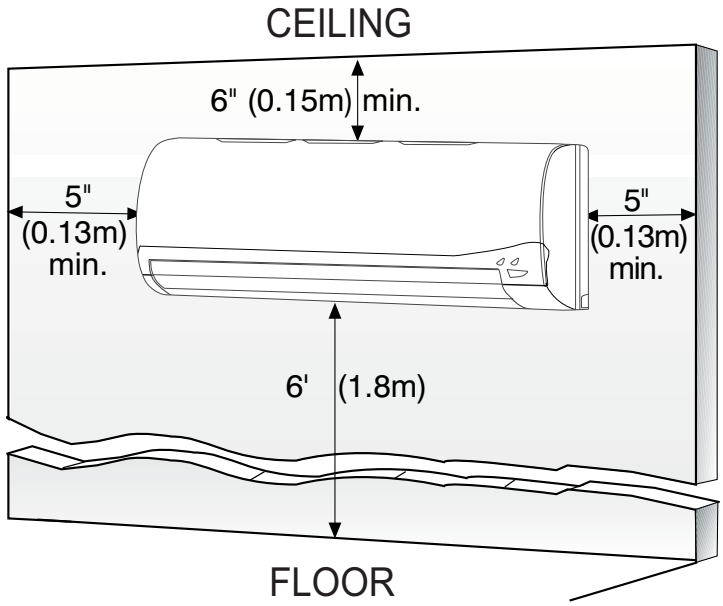

Fig. 2 — Clearances

NOTE: The top clearance recommended for proper return airflow is 5.9in (15cm). Reduction of this clearance may decrease unit performance. This may be reduced to 2.0 in (51 mm) as long as the right and left clearances are achieved.

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ELECTRICAL DATA

Table 5 — Electrical Data

HIGH WALL INDOOR UNITS HP		12K (115V)	9K (208/230V)	12K (208/230V)	18K (208/230V)	24K (208/230V)	MAX FUSE CB AMP
Running Current	(A)	0.467	0.34	0.34	0.21	0.21	Refer to outdoor unit installation instructions – Indoor unit powered by the outdoor unit
Power Consumption	(W)	20	13	13	58	58	
Power Factor	(%)	81	66.2	97.8	70	94.3	

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

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 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.

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Connection Diagrams

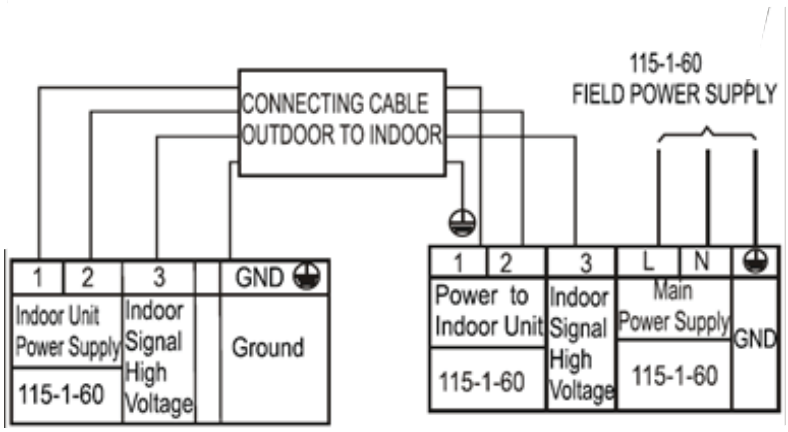

Fig. 3 — Connection Diagram - 12K (115V)

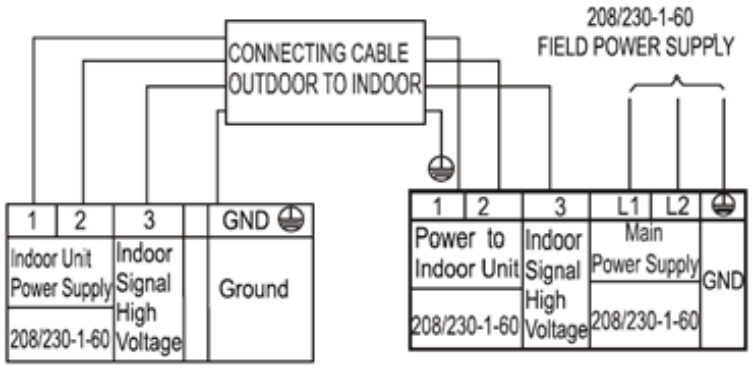

Fig. 4 — Connection Diagram - 9K - 18K (208/230-1-60)

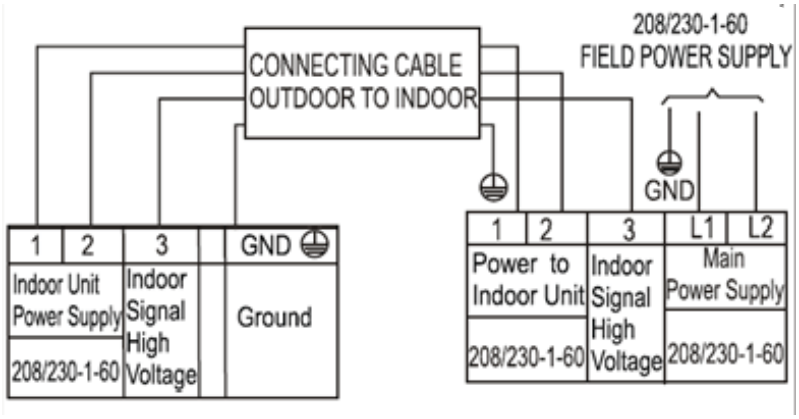

Fig. 5 — Connection Diagram - 24K (208/230-1-60)

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 (see figures 3 - 5). The connections are sensitive to polarity and will result in a fault code.

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Wiring Diagrams

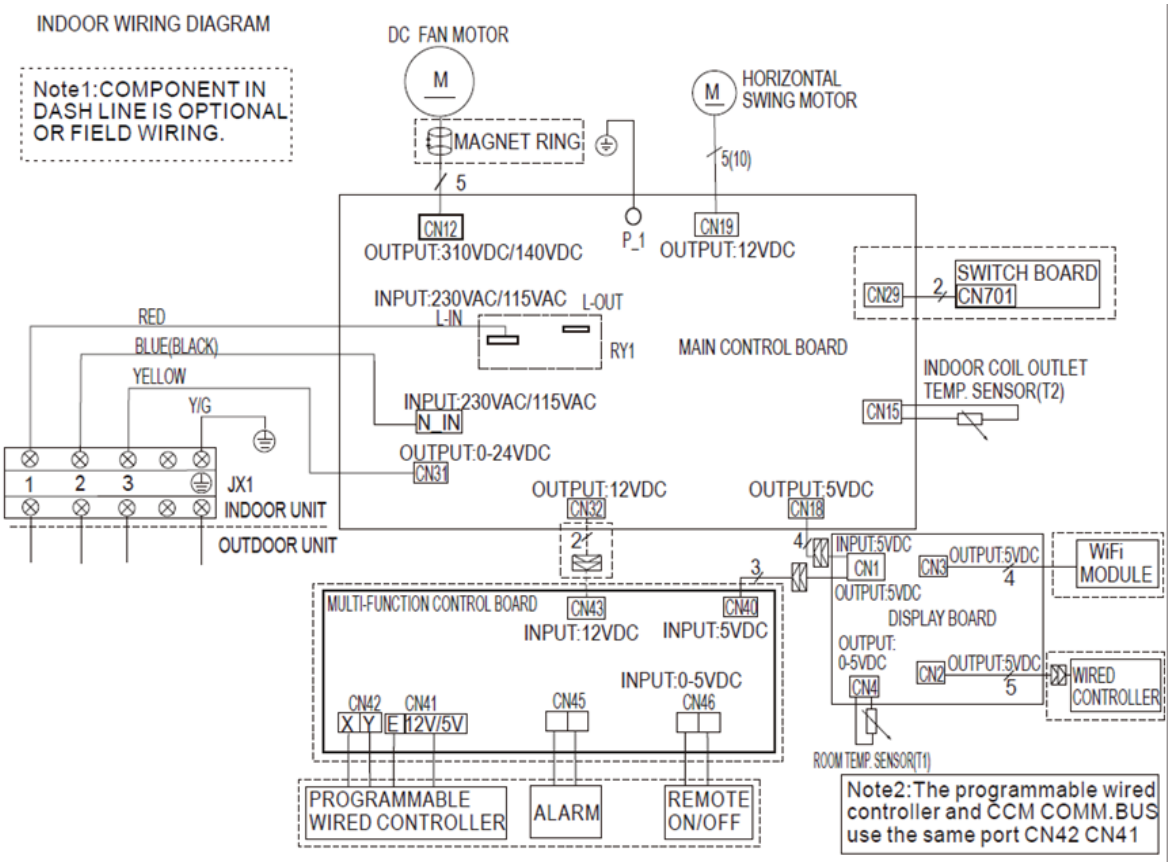

Fig. 6 — Wiring Diagram 9K - 12K (115V and 208/230)

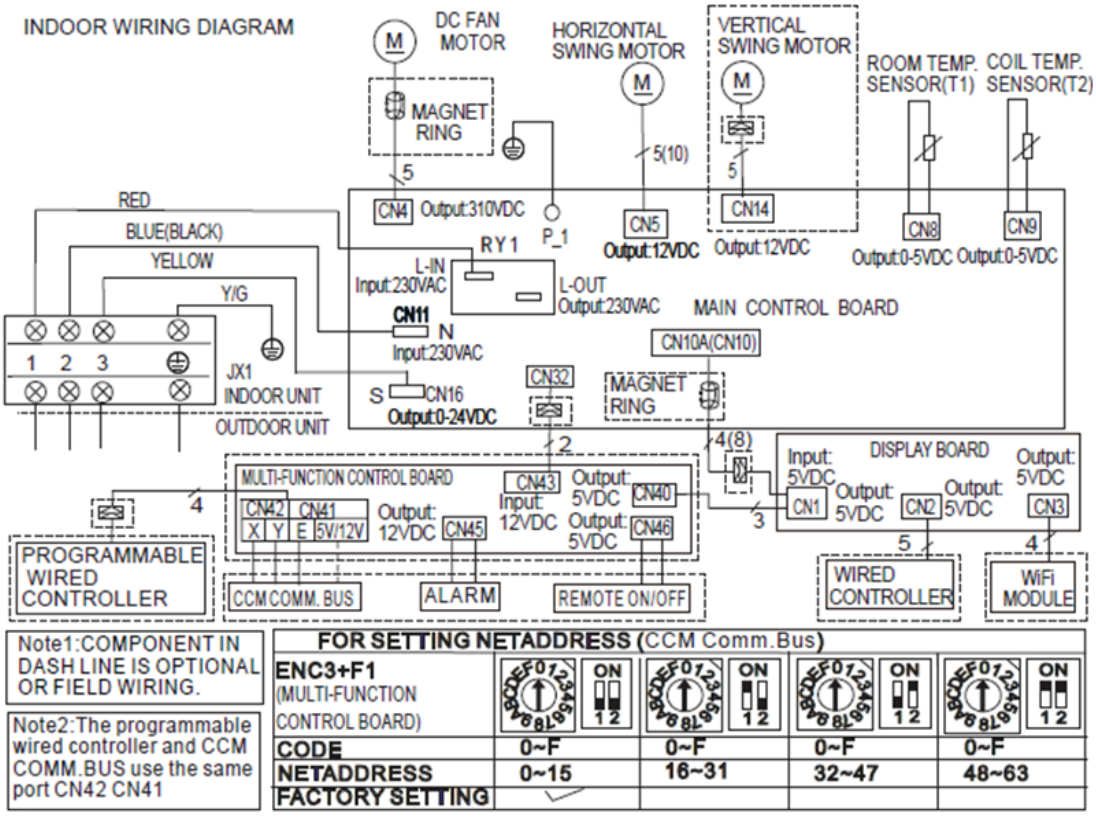

Fig. 7 — Wiring Diagram 18K - 24K (208/230)

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Fan and Motor Specifications

Table 6 — Fan and Motor Specifications

HIGH WALL UNIT SIZE			12K	9K	12K	18K	24K
			(115 V)	(208/230 V)	(208/230 V)	(208/230 V)	(208/230 V)
HIGH WALL FAN	Material		Acrylontrile Styrene +30%GF	Acrylontrile Styrene +30%GF	Acrylontrile Styrene +30%GF	Acrylontrile Styrene +30%GF	Acrylontrile Styrene +30%GF
	Type		GL-96*608-IN	GL-96*608-IN	GL-96*608-IN	GL-108*818	GL-108*818
	Diameter	In (mm)	3.78(96)	3.78(96)	3.78(96)	4.25(108)	4.25(108)
	Height	In (mm)	23.94(608)	23.94(608)	23.94(608)	32.2(818)	32.2(818)
HIGH WALL FAN MOTOR	Model		ZKFP-20-8-113	ZKFP-13-8-4	ZKFP-13-8-4	ZKFP-58-8-1-5	ZKFP-58-8-1-5
	Volts	V	140	310	310	310	310
	Phase		3	3	3	3	3
	FLA	A	0.25	0.15	0.15	0.4	0.4
	MCA	A	0.31	0.19	0.19	0.5	0.5
	Type		DC				
	Insulation class		E	E	E	E	E
	Safe class		IP20(Welling, Dayang)/ IPX0(Tongda)	IPX0 (Weling,Tongda)/ IP20(Zhipu)	IPX0 (Weling,Tongda)/ IP20(Zhipu)	IP20(Welling)/ IP40(Dayang)	IP20(Welling)/ IP40(Dayang)
	Input	W	35.8(WellingTongda)/ 31.8(Dayang)	19.4(Welling, Tongda)/ 17.9(zhipu)	19.4(Welling, Tongda)/ 17.9(zhipu)	64.1(Welling)/ 81(Dayang)	64.1(Welling)/ 81(Dayang)
	Output	W	20	13	13	58	58
	Range of current	Amps	0.467±10% (Weling,Tongda)/ 0.486±10% (Dayang)	0.58±10%	0.58±10%	0.206±10% (Welling)/0.26±10% (Dayang)	0.206±10% (Welling)/0.26±10% (Dayang)
	Rated current	Amps	0.467 (Weling,Tongda)/ 0.486(Dayang)	0.58	0.58	0.206(Welling)/ 0.26(Dayang)	0.206(Welling)/ 0.26(Dayang)
	Rated HP	HP	0.027	0.017	0.017	0.077	0.077
	Speed	rev/min	850/750/450	1150/990/750	1250/990/750	1120/952/868	1200/960/600
	Rated RPM	rev/min	850	1150	1250	1120	1200
	Max. input	W	65.8 (Weling,Tongda)/ 68(Dayang)	101.7(Welling ,Tongda)/104.6(zhipu)	101.7(Welling ,Tongda)/104.6(zhipu)	113.5(Welling)/ 125(Dayang)	113.5(Welling)/ 125(Dayang)

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REFRIGERATION CYCLE DIAGRAM

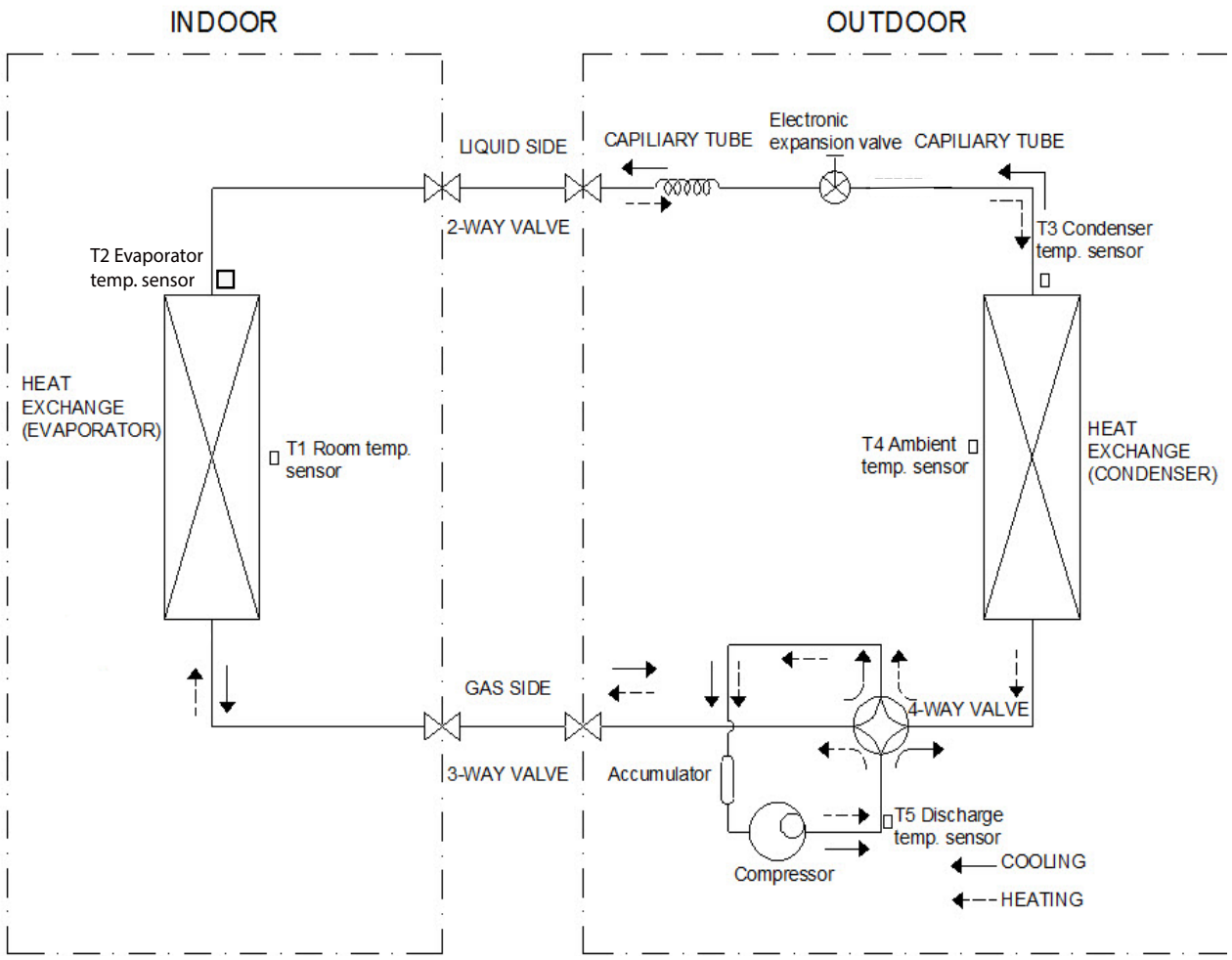

Fig. 8 — Refrigeration Cycle Diagram

Refrigerant Lines

IMPORTANT: Both refrigerant lines must be insulated separately.

Table 2 on page 3 lists the pipe sizes for the indoor unit. Refer to the outdoor unit installation instructions for other allowed piping lengths and refrigerant information.

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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 a Vacuum Pump

1. Completely tighten flare nuts on the line set at both the indoor and outdoor units. **DO NOT** open the service valves on the outdoor unit for the new installation or the replacement unit. Open the service valves on the outdoor unit if repairs have been made to the refrigerant sealed system. Connect the manifold gauge low pressure hose to the charge port of the gas side service valve (see Fig. 9).
2. Connect the charge hose to the vacuum pump.
3. Open (fully) the low pressure valve of manifold gage (see Fig. 10).
4. Start the vacuum pump.
5. Evacuate using either the deep vacuum or triple evacuation method.
6. After the evacuation is complete, close (fully) the pressure valve side of the manifold gage and stop the vacuum pump operation.
7. The factory charge contained in the outdoor unit is good for up
8. to 25ft. (8 m) of line length. If the vacuum process is complete, open the service valves to release the factory charge into the system.
9. Disconnect the charge hose from the charge connection of the gas side service valve.
10. Securely tighten the service valve caps.

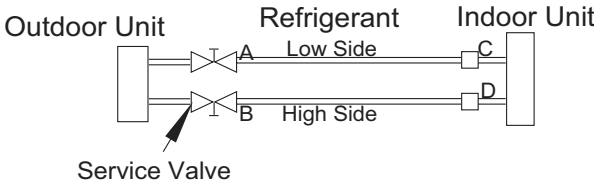

Fig. 9 —Service Valve

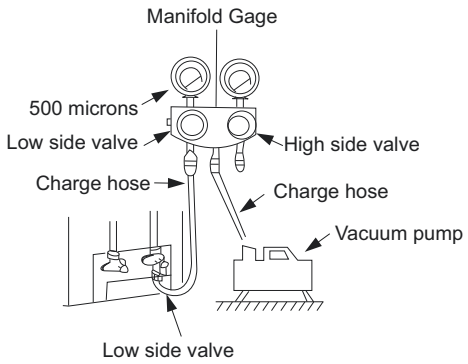

Fig. 10 —Manifold

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).

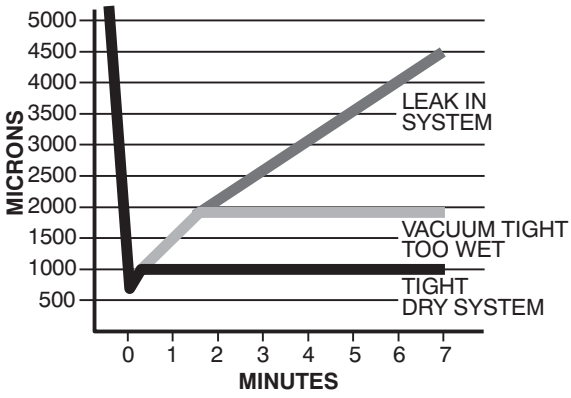

Fig. 11 —Deep Vacuum Graph

Triple Evacuation Method

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

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

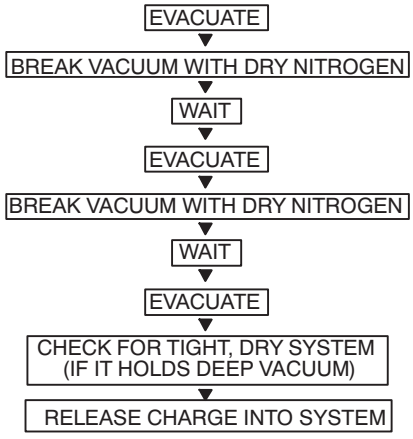

Fig. 12 —Triple Evacuation Method

Final Tubing Check

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

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Operation Modes and Functions

Abbreviation

Table 7 — Unit Element Abbreviation

ABBREVIATION	ELEMENT
T1	Indoor room temperature
T2	Evaporator Coil temperature
T3	Condenser Coil temperature
T4	Adjusted Setting temperature
Tp	Compressor discharge temperature

Safety Features

Compressor Three − Minute Delay at Restart

Compressor functions are delayed for up to ten seconds upon the first start−up of the unit, and are delayed for up to three minutes upon subsequent unit restarts.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds 226°F (108°C) for nine seconds, the compressor ceases operation.

Automatic shutoff based on fan speed

If the indoor fan speed registers below 200RPM or over 2100RPM for an extended period of time, the unit ceases operation and the corresponding error code appears on the indoor unit.

Inverter module protection

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code appears on the indoor unit and the unit ceases operation.

Indoor fan delayed operation

- When the unit starts, the louver is automatically activated and the indoor fan operates after a period of setting time or when the louver is in place.
- If the unit is in the **HEATING** mode, the indoor fan is regulated by the anti−cold wind function.

Compressor Preheating

Preheating is automatically activated when the T4 sensor is lower than setting temperature.

Sensor redundancy and automatic shutoff

- If one temperature sensor malfunctions, the air conditioner continues to operate and displays the corresponding error code, allowing for emergency use.
- When more than one temperature sensor malfunctions, the air conditioner ends the operation.

Display Function

Unit Display Function

Fig. 13 — Unit Display Function

DISPLAY A		DISPLAY B
Display		Function
fresh		Fresh (available on select units only)
defrost		Defrost
run		When the unit is on
timer		When the **TIMER** is on
		WiFi control (available on select units only)
	Temperature value	Temperature
	3S	Activation of **TIMER ON**, **Fresh**, **Swing**, **Turbo**, or **SILENT**
	3S	Cancellation of **TIMER OFF**, **Fresh**, **Swing**, **Turbo**, or **SILENT**
		Defrost
		Active Clean (For inverter split type) or self-cleaning (for fixed-speed type)
		Heating in room temperature under 8°C

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FAN Mode

When the **FAN** mode is activated:

- The outdoor fan and compressor stop.
- The temperature control is disabled and the indoor room temperature appears.
- The indoor fan speed can be set to 1%~100%, or **AUTO**.
- The louver operations are identical to those in **COOLING** mode.
- **AUTO FAN**: In the **FAN−ONLY** mode, the air conditioner operates the same as the **AUTO FAN** in the **COOLING** mode with the temperature set at 75°F 24°C (Tsc =75°F (24°C).

COOLING Mode

Compressor Control

Reaches the configured temperature:

1. When the compressor runs continuously for less than 120 minutes.
   - If the following conditions are satisfied, the compressor ceases operation.
     a. While the calculated frequency (fb) is less than the minimum limit frequency (FminC).
     b. While the protective time is more than or equal to ten minutes.
     c. While T1 is lower than or equal toTsc−CDIFTEMP−0.9°F (0.5°C)

NOTE: CDIFTEMP is the EEPROM setting parameter. It is 4°F (2°C) usually.

2. When the compressor runs continuously for more than 120 minutes.
   - If the following conditions are satisfied, the compressor ceases operation.
     a. When the calculated frequency (fb) is less than minimum limit frequency (FminC).
     b. When the protective time is more than or equal to ten minutes.
     c. When T1 is lower than or equal to (Tsc−CDIFTEMP).

NOTE: CDIFTEMP is the EEPROM setting parameter. It is 4°F (2°C) usually.

3. If one of the following conditions is satisfied, regardless of time.
   - Compressor running frequency is more than the test frequency.
   - When the compressor running frequency is equal to the test frequency, T4 is greater than 59°F (15°C) or no T4 or T4 fault.
   - Change setting temperature
   - Turbo or sleep function on/off
   - Various frequency limit shutdown occurs

NOTE: CDIFTEMP is EEPROM setting parameter. It is 4°F (2°C) usually.

Indoor Fan Control

1. In the **COOLING** mode, the indoor fan operates continuously. The fan speed can be set to 1%−100%, or **AUTO**.
2. **AUTO** fan
   - **Descent Curve**
     - When T1−Tsc is lower than or equal to 6.3°F (3.5°C), fan speed reduces to 80%;
     - When T1−Tsc is lower than or equal to 1.8°F (1°C), fan speed reduces to 60%;
     - When T1−Tsc is lower than or equal to 0.9°F (0.5°C), fan speed reduces to 40%;
     - When T1−Tsc is lower than or equal to 0°F (0°C), fan speed reduces to 20%;
     - When T1−Tsc is lower than or equal to −0.9°F (0.5°C), fan speed reduces to 1%.
   - **Rise Curve**
     - When T1-Tsc is higher than 0°F (0°C), the fan speed increases to 20%;
     - When T1-Tsc is higher than 0.9°F (0.5°C), the fan speed increases to 40%;
     - When T1-Tsc is higher than 1.8°F (1°C), the fan speed increases to 60%;
     - When T1-Tsc is higher than 2.7°F (1.5°C), the fan speed increases to 80%;
     - When T1-Tsc is higher than 7.2°F (4°C), the fan speed increases to 100%.

Outdoor Fan Control

- The outdoor unit runs at a different fan speed according to T4 and the compressor running frequency.
- For different outdoor units, the fan speeds are different.

Condenser Temperature Protection

When the condenser temperature exceeds a configured value, the compressor ceases operations.

Evaporator Temperature Protection

When the evaporator temperature drops below a configured value, the compressor and outdoor fan ceases operations.

:

HEATING Mode

Compressor Control

1. Reach the configured temperature:
   - If the following conditions are satisfied, the compressor ceases operation.
     a. While the calculated frequency (fb) is less than the minimum limit frequency (FminC).
     b. When the protective time is more than or equal to ten minutes.
     c. When T1 is higher than or equal to Tsc+HDIFTEMP2.

NOTE: HDIFTEMP2 is the EEPROM setting parameter. It is 4°F (2°C) usually.

   - If the following conditions are satisfied, regardless of time.
     a. Compressor running frequency is more than test frequency.
     b. When the compressor running frequency is equal to the test frequency, T4 is more than 59°F (15°C) or no T4 or T4 fault.
     c. Change the setting temperature.
     d. Turbo or sleep function on or off.
2. When the current is higher than the predefined safe value, the surge protection is activated, causing the compressor to cease operations.

Indoor Fan Control

1. In the **HEATING** mode, the indoor fan operates continuously. The fan speed can be set to 1%−100%, or muted.
2. **AUTO** fan
   - **Rise curve**
     a. When T1−Tsc is higher than −2.7°F (-1.5°C), fan speed reduces to 80%;
     b. When T1−Tsc is higher than 0°F (0°C), fan speed reduces to 60%;
     c. When T1−Tsc is higher than 0.9°F (0.5°C), fan speed reduces to 40%;
     d. When T1−Tsc is higher than 1.8°F (1°C), fan speed reduces to 20%.
   - **Descent curve**
     a. When T1−Tsc is lower than or equal to 0.9°F (0.5°C), fan speed increases to 20%;
     b. When T1−Tsc is lower than or equal to 0°F (0°C), fan speed increases to 60%;
     c. When T1−Tsc is lower than or equal to −2.7°F (−1.5°C), fan speed increases to 80%;
     d. When T1−Tsc is lower than or equal to −5.4°F (−3°C), fan speed increases to 100%.

Outdoor Fan Control

- The outdoor unit runs at a different fan speed according to T4 and compressor running frequency.
- For different outdoor units, the fan speeds differ.

DEFROSTING Mode

- The unit enters the **DEFROSTING** mode according to changes in the temperature value of T3, T4 as well as the compressor running time.
- In the **DEFROSTING** mode the compressor continues to run and the indoor and outdoor motor stop operating, the indoor unit's defrost light illuminates, and the symbol appears.
- If any one of the following conditions is satisfied, defrosting ends and the unit switches to the normal **HEATING** mode:
  - T3 rises above TCDE1C.
  - T3 maintained above TCDE2C for 80 seconds.
  - Unit runs for 15 minutes consecutively in the

Evaporator Temperature Protection

- **Off:** Compressor stops.
- **Decrease:** Decrease the running frequency to the lower level per 20 seconds.
- **Hold:** Keep the current frequency.
- **Resume:** No limitation for frequency.

AUTO Mode

- This mode can be selected with the remote controller and the setting temperature can be changed between 61F~86F (16C~30C).
- In the **AUTO** mode, the unit selects the **COOLING**, **HEATING**, **AUTO−DRYING** or **FAN−ONY** mode on the basis of T1,Ts, T4 and relative humidity.
- If the setting temperature is modified, the machine selects a new running function.

DRY Mode

In the **DRY** mode, the air conditioner operates the same as the auto fan function in the **COOLING** mode.

1. Mute function is active.
   - All the protections are activated and operate the same as they do that in **COOLING** mode.
2. Low Room Temperature Protection
   - If the room temperature is lower than 50°F (10°C), the compressor ceases operations and does not resume until the room temperature exceeds 53.6°F (12°C).

Forced Operation Function

Forced **COOLING** Mode:

The compressor and outdoor fan continue to run and the indoor fan runs at rated speed. After running for 30 minutes, the air conditioner switches to **AUTO** mode with a preset temperature of 75.2°F (24°C).

Forced **AUTO** Mode:

The Forced **AUTO** mode operates the same as the normal **AUTO** mode with a preset temperature of 75.2°F (24°C)

- The unit exits the forced operation when it receives the following signals:
  - Switch on
  - Switch off
  - Timer on
  - Timer off
  - Changes in:
    - Mode
    - Fan Speed
    - Setting Temperature

:

Timer Function

The **Timing** range is 24 hours.

- **Timer on.** The unit turns on automatically when it reaches the setting time.
- **Timer off.** The unit turns off automatically when it reaches the setting time.
- **Timer on/off.** The unit turns on automatically when it reaches the setting on time, and then turns off automatically when reaching the setting off time.
- **Timer off/on.** The machine turns off automatically when it reaches the setting off time, and then turns on automatically when reaching the setting on time.
- The timer function will not change the AC current operation mode. For example, the unit is off now; it will **NOT** start up first after setting the **TIMER OFF** function. Upon reaching the setting time, the timer LED is off and the unit's running mode has not been changed.
- The setting time is relative time.
- The unit exits the **TIMER** function when it malfunctions.

SLEEP Function

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

- When cooling, the temperature rises 1.8°F (1°C) (no higher than 86°F (30°C) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at a low speed.
- When heating, the temperature decreases 1.8°F (1°C) (to not lower than 61°F (16°C)) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at a low speed. Anti−cold wind function takes priority.
- The operating time for the **SLEEP** mode is 8 hours, after which, the unit exits this mode and turns off.
- The timer setting is available in this mode.

Auto−Restart Function

The indoor unit has an auto−restart module which allows the unit to restart automatically. The module automatically stores the current settings and, in the case of a sudden power failure, restores those setting automatically within 3 minutes after the power returns.

If there is a power failure while the unit is running, the compressor starts 3 minutes after the unit restarts. If the unit was already powered down prior to the power failure, the unit remains in the **STANDBY** mode.

Active Clean Function

The **Active Clean Technology** washes away dust, mold, and grease that may cause odors when it adheres to the heat exchanger by automatically freezing and then rapidly thawing the frost. The internal wind wheel then keeps operating to blow-dry the evaporator, thus preventing the growth of mold and keeping the inside clean.

When this function is turned on, the indoor unit display window displays **"CL"**, after 20 to 45 minutes, the unit turns off automatically and cancel **Active Clean** function.

46°F (8°C) Heating

In the **HEATING** mode, the temperature can be set to as low as 46°F (8°C), preventing the indoor area from freezing if unoccupied during severe cold weather.

ECO Function

Used to enter the energy efficient mode.

- Under the **COOLING** mode, press **ECO**, the remote controller adjusts the temperature automatically to 75°F (24°C), **AUTO** fan speed to save energy (however only if the set temperature is less than 75°F (24°C). If the set temperature is more than 75°F (24°C) and 86°F (30°C), press **ECO**, the fan speed changes to **AUTO**, the set temperature remains unchanged.
- When the unit receives signals, such as **POWER OFF**, **TURBO**, **SILENCE**, **SELF CLEAN**, **FORCED COOLING**, **SLEEPING**, or adjusting the set temperature to less than 75°F (24°C), the unit exits the **ECO** mode.
- Operation time in **ECO** mode is 8 hours. After 8 hours, the air conditioner exits this mode.
- If there is a malfunctioning temperature sensor, the air conditioner exits the **ECO** mode.
- The indoor fan runs in the **AUTO** fan function when it enters the **ECO** mode. The setting temperature and setting fan speed can be changed with the remote controller.

Follow Me

Press **FOLLOW ME** on the remote controller, the indoor unit emits beeps. This indicates the **FOLLOW ME** function is active.

Once active, the remote controller sends a signal every 3 minutes, with no beeps. The unit automatically sets the temperature according to the measurements from the remote controller.

The unit only changes modes if the information from the remote controller makes it necessary, not from the unit's temperature setting.

If the unit does not receive a signal for 7 minutes or **FOLLOW ME** is pressed, the function turns off. The unit regulates temperature based on its own sensor and settings.

Silence

Press **SILENCE** on the remote controller to enable the **SILENCE** function. While this function is active, the indoor unit runs at faint breeze (1% fan speed), which reduces noise to the lowest possible level.

Electrical Energy Consumption Control Function

Press **GEAR** on the remote controller to enter the energy efficient mode (see Fig. 14).

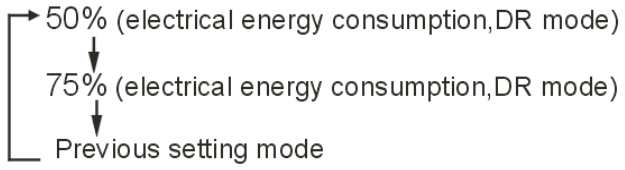

Fig. 14 — Electrical Energy Consumption Control Function

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Information Inquiry

To enter **INFORMATION INQUIRY STATUS**, hold both **ON/OFF** and **FAN** for 8 seconds to activate. To exit the inquiry mode, let the remote remain idle for 60 seconds.

Table 8 displays the information codes. The screen displays the code for two seconds, then the information for 25 seconds.

Table 8 — Information Codes

EXPLANATION	DISPLAYED CODE	ADDITIONAL NOTES
T1	T1	T1 temperature
T2	T2	T2 temperature
T3	T3	T3 temperature
T4	T4	T4 temperature
TP	TP	TP temperature
Targeted frequency	FT	Targeted Frequency
Actual frequency	Fr	Actual Frequency
Compressor current	dL	Actual amperage
Outdoor AC voltage	Uo	Actual voltage
Indoor capacity test	Sn	N/A
Reserve	--	N/A
Outdoor fan speed	Pr	Outdoor fan speed=value*8
EXV opening angle	Lr	EXV opening angle-value*8
Indoor fan speed	ir	Indoor fan speed=value*8
Indoor humidity	HU	N/A
Adjusted setting temperature	TT	Setpoint in Celsius
Reserve	--	N/A
Reserve	--	N/A
Reserve	--	N/A
GA algorithm frequency	oT	N/A
Reserve	LH	N/A

:

TROUBLESHOOTING

Safety

WARNING

UNIT DAMAGE HAZARD

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

Lock out and tag switch with a suitable warning label.

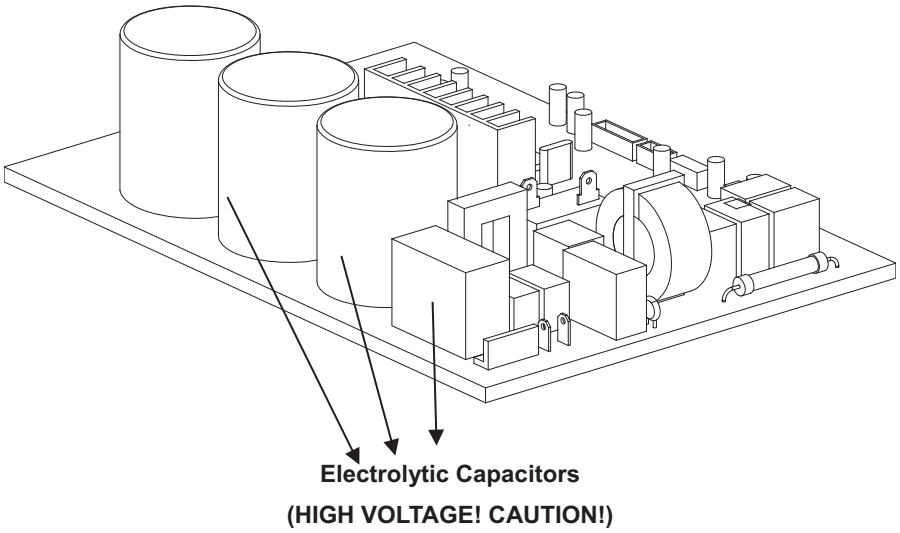

Fig. 15 —Electrolytic Capacitors

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

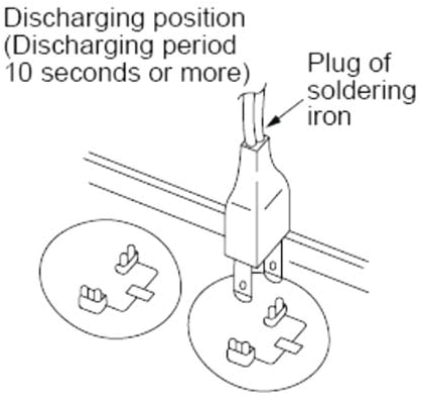

Fig. 16 —Discharge Position

NOTE: Fig. 16 is for reference only. The plug on your unit may differ.

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TROUBLESHOOTING (CONT)

Error Display (Indoor Unit)

When the indoor unit encounters a recognized error, the indicator light flashes in a corresponding series, the timer display may turn on or begin flashing, and the error code displays. See Table 9 for the error codes and meanings.

Table 9 — Error Codes

DISPLAY	ERROR INFORMATION
EH 00/EH 0A	Indoor unit EEPROM parameter error
EL 01	Indoor / outdoor unit communication error
EH 02	Zero-crossing signal detection error
EH 30	Over low voltage protection of indoor external fan
EH 31	Over voltage protection of indoor external fan
EH 03	The indoor fan speed is operating outside of the normal range
EC 51	Outdoor unit EEPROM parameter error
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited
EC 56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited
Eh 60	Indoor room temperature sensor T1 is in open circuit or has short circuited
Eh 61	Evaporator coil temperature sensor T2 is in open circuit or has short circuited
EC 07	The outdoor fan speed is operating outside of the normal range(
EH 0	Indoor PCB/Display board communication error
EL 0C	Refrigerant leak detected
PC 00	IPM malfunction or IGBT over-strong current protection
PC 10	Over low voltage protection
PC 11	Over voltage protection
PC 12	DC voltage protection
PC 02	Compressor top high temperature protection (OLP)
PC 03	Pressure protection
PC 40	Communication error between outdoor main chip and compressor driven chip
Pc 41	Current Input detection protection
PC 42	Compressor start error
PC 43	Lack of phase (3 phase) protection
PC 44	No speed protection
PC 45	341PWM error
PC 46	Compressor speed malfunction
PC 49	Compressor over current protection
--	Indoor units mode conflict (match with multi outdoor unit)
PC 0A	Condenser high temperature protection
PC 06	Compressor discharge temperature protection
PC 08	Outdoor current protection
PH 09	Anti-cold air in heating mode
PC 0F	PFC module malfunction
pc 01	Outdoor ambient temperature too low
PH 90	Evaporator coil temperature over high protection
PH 91	Evaporator coil temperature over low Protection
LC 05	Frequency limit caused by voltage
LC 03	Frequency limit caused by current
LC 02	Frequency limit caused by TP
LC 01	Frequency limit caused by T3
LH 00	Frequency limit caused by T2
LC 06	Frequency limit caused by PFC
LH 07	Frequency limit caused by remote controller
nA	no malfunction or protection

For other codes

The display board may show a garbled code or a code undefined by the service manual. Ensure that this code is not a temperature reading.

Troubleshooting

Test the indoor unit using the remote controller. If the unit display is working however will not respond to the remote, the indoor PCB needs replacing. If there is no display after pressing **LED** and the unit responds, the display board needs replacing.

:

Error Diagnosis and Troubleshooting without Error Codes

WARNING

UNIT DAMAGE HAZARD

Be sure to turn off unit before any maintenance to prevent damage or injury.

Table 10 — Error Diagnosis and Troubleshooting without Error Codes

REMOTE MAINTENANCE	ELECTRICAL CIRCUIT							REFRIGERANT CIRCUIT						
Possible causes of trouble	Power failure	The main power tripped	Loose connections	Faulty transformer	The voltage is too high or too low	The remote control is powered off	Broken remote control	Dirty air filter	Dirty condenser fins	The setting temperature is higher/lower than the room's (cooling/heating)	The ambient temperature is too high/low when the mode is cooling/heating	Fan mode	SILENCE function is activated (optional function)	Frosting and defrosting frequently
Unit will not start	✪	✪	✪	✪										
The power switch is on but fans will not start			✪	✪	✪									
The temperature on the display board cannot be set						✪	✪							
Unit is on but the wind is not cold (hot)										✪	✪	✪		
Unit runs, but shortly stops					✪					✪	✪			
The unit starts up and stops frequently					✪						✪			✪
Unit runs continuously but insufficient cooling (heating)								✪	✪	✪	✪		✪	
Cool can not change to heat														
Unit is noisy														
Test Method / Remedy	Test voltage	Close the power switch	Inspect connections - tighten	Change the transformer	Test the voltage	Replace the battery in the remote controller	Replace the remote controller	Clean or replace	Clean	Adjust the setting temperature	Turn on the AC later	Adjust to COOL mode	Turn off the SILENCE function	Turn on the AC later

:

Table 11 — Error Diagnosis and Troubleshooting without Error Codes

REMOTE MAINTENANCE	OTHERS					
Possible causes of trouble	Heavy load condition	Loosen hold down bolts and / or screws	Not air tight	The air inlet or outlet of either unit is blocked	Interference from cell phone towers and remote boosters	Shipping plates remain attached
Unit will not start						
The power switch is on but fans will not start					✪	
The temperature on the display board cannot be set						
Unit is on but the wind is not cold (hot)						
Unit runs, but shortly stops						
The unit starts up and stops frequently				✪		
Unit runs continuously but insufficient cooling (heating)	✪		✪	✪		
Cool can not change to heat						
Unit is noisy		✪				✪
Test Method / Remedy	Check heat load	Tighten bolts or screws	Close all the windows and doors	Remove the obstacles	Reconnect the power or press ON/OFF button on remote control to restart operation	Remove them

:

Table 12 — Error Diagnosis and Troubleshooting without Error Codes

FIELD MAINTENANCE	REFRIGERANT CIRCUIT							OTHERS																
Possible causes of trouble	Compressor stuck	Shortage of refrigerant	Restricted liquid line	Dirty air filter	Dirty evaporator coil	Insufficient air through evaporator coil	Overcharge of refrigerant	Dirty or partially blocked condenser	Air or incompressible gas in refrigerant cycle	Short cycling of condensing air	High temperature condensing medium	Insufficient condensing medium	Broken compressor internal parts	Inefficient compressor	Expansion valve obstructed	Expansion valve or capillary tube closed completely	Leaking power element on expansion valve	Poor installation of feeler bulb	Heavy load condition	Loosen hold down bolts and / or	Shipping plates remain attached	Poor choices of capacity	Contact of piping with other piping or external plate
Unit will not start																							
Compressor will not start but fans run	✪																						
Compressor and condenser (outdoor) fan will not start																							
Evaporator (indoor) fan will not start																							
Condenser (Outdoor) fan will not start																							
Unit runs, but soon stops		✪	✪				✪	✪								✪	✪						
Compressor short-cycles due to overload		✪					✪	✪															
High discharge pressure							✪	✪	✪	✪	✪	✪											
Low discharge pressure		✪												✪									
High suction pressure							✪							✪				✪	✪				
Low suction pressure		✪	✪	✪	✪	✪									✪	✪	✪						
Unit runs continuously but insufficient cooling		✪	✪	✪	✪	✪		✪	✪	✪				✪					✪			✪	
Too cool																							
Compressor is noisy							✪						✪							✪			✪
Horizontal louver can not revolve																							
Test Method / Remedy	Replace the compressor	Leak test	Replace restricted part	Clean or replace	Clean coil	Check fan	Change charged refrigerant volume	Clean condenser or remove obstacle	Purge, evacuate and recharge	Remove obstruction to air flow	Remove obstruction in air or water flow	Remove obstruction in air or water flow	Replace compressor	Test compressor efficiency	Replace valve	Replace valve	Replace valve	Fix feeler bulb	Check heat load	Tighten bolts or screws	Remove them	Choose AC of lager capacity or add the number of AC	Rectify piping so as not to contact each other or with external plate

:

Table 13 — Error Diagnosis and Troubleshooting without Error Codes

FIELD MAINTENANCE	ELECTRICAL CIRCUIT														
Possible causes of trouble	Power failure	Blown fuse or varistor	Loose connections	Shorted or broken wires	Safety device opens	Faulty thermostat / room temperature sensor	Wrong setting place of temperature sensor	Faulty transformer	Shorted or open capacitor	Faulty magnetic contactor for compressor	Faulty magnetic contactor for fan	Low voltage	Faulty stepping motor	Shorted or grounded compressor	Shorted or grounded fan motor
Unit will not start	✪	✪	✪	✪	✪			✪							
Compressor will not start but fans run				✪		✪			✪	✪				✪	
Compressor and condenser (outdoor) fan will not start				✪		✪				✪					
Evaporator (indoor) fan will not start				✪					✪		✪				✪
Condenser (Outdoor) fan will not start				✪		✪			✪		✪				✪
Unit runs, but soon stops										✪		✪			
Compressor short-cycles due to overload										✪		✪			
High discharge pressure															
Low discharge pressure															
High suction pressure															
Low suction pressure															
Unit runs continuously but insufficient cooling															
Too cool						✪	✪								
Compressor is noisy															
Horizontal louver can not revolve			✪	✪									✪		
Test Method / Remedy	Test voltage	Inspect fuse type & size	Inspect connections - tighten	Test circuits with tester	Test continuity of safety device	Test continuity of thermostat / sensor & wiring	Place the temperature sensor at the central of the air inlet grille	Check control circuit with tester	Check capacitor with tester	Test continuity of coil & contacts	Test continuity of coil & contacts	Test voltage	Replace the stepping motor	Check resistance with multimeter	Check resistance with multimeter

:

Table 14 — Quick Maintenance by Error Code

	ERROR CODE									
PART REQUIRING REPLACEMENT	EH 00/ EH 0A	EL 01	EH 02	EH 03	EH 60	EH 61	EH 06	EL 0C	EC 56	PC 08
INDOOR PCB	√	√	√	√	√	√	√	√	x	x
OUTDOOR PCB	x	√	x	x	x	x	x	x	√	√
DISPLAY BOARD	x	x	x	x	x	x	√	x	x	x
INDOOR FAN MOTOR	x	x	x	√	x	x	x	x	x	x
T1 SENSOR	x	x	x	x	√	x	x	x	x	x
T2 SENSOR	x	x	x	x	x	√	x	√	x	x
T2B SENSOR	x	x	x	x	x	x	x	x	√	x
REACTOR	x	√	x	x	x	x	x	x	x	x
COMPRESSOR	x	x	x	x	x	x	x	x	x	√
ADDITIONAL REFRIGERANT	x	x	x	x	x	x	x	√	x	x
PART REQUIRING REPLACEMENT	EC 53	EC 52	EC 54	EC 51	EC 07	PC 00	PC 01	PC 02	PC 03	PC 04
Outdoor PCB	√	√	√	√	√	√	√	√	√	√
Indoor fan motor	x	x	x	x	x	x	x	x	x	x
Outdoor fan motor	x	x	x	x	√	√	x	√	x	√
T3 Sensor	x	√	x	x	x	x	x	x	x	x
T4 Sensor	√	x	x	x	x	x	x	x	x	x
TP Sensor	x	x	√	x	x	x	x	x	x	x
Reactor	x	x	x	x	x	x	√	x	x	x
Compressor	x	x	x	x	x	√	x	x	x	√
IPM module board	x	x	x	x	x	√	√	√	x	√
High pressure protector	x	x	x	x	x	x	x	√	x	x
Low pressure protector	x	x	x	x	x	x	x	x	√	x
Additional refrigerant	x	x	x	x	x	x	x	x	√	x

:

Troubleshooting by Error Code

Common Check Procedures

Temperature Sensor Check

Disconnect the temperature sensor from PCB, measure the resistance value with a 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.(Tp) sensor.
Measure the resistance value of each winding by using the multi−meter.

Compressor Checking

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

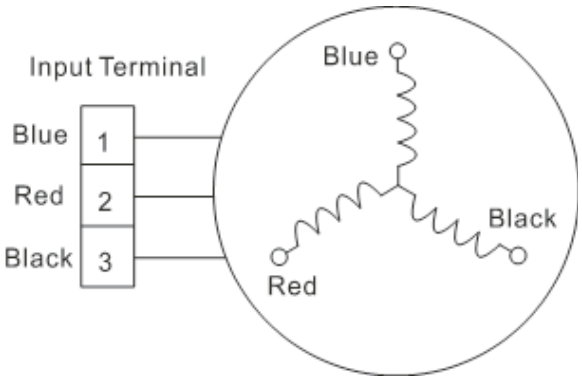


Fig. 17 — Compressor Checking

Table 15 — Compressor Checking

POSITION	RESISTANCE VALUE		
	ASN98D22UFZ	ATM115D43UFZ2	ATF235D22UMT
Blue - Red	1.57Ω(20°C/68°F)	1.87Ω(20°C/68°F)	0.75Ω(20°C/68°F)
Blue - Black			
Red - Blue			

Fig. 18 — Compressor Checking

:

IPM Continuity Check

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

Table 16 — 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		

:

DIAGNOSIS AND SOLUTION

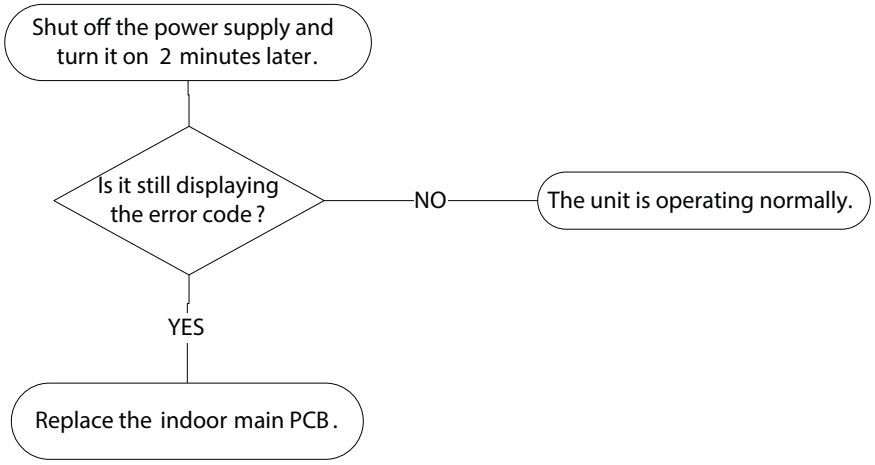
EEPROM Parameter Error (EH00/EH0A)

Description: The indoor or outdoor PCB main chip does not receive feedback from the EEPROM chip

Recommended parts to prepare:

- Indoor PCB

Troubleshooting and Repair



Review Figure 19 for the location of the EEPROM chip on the indoor and outdoor PCB.

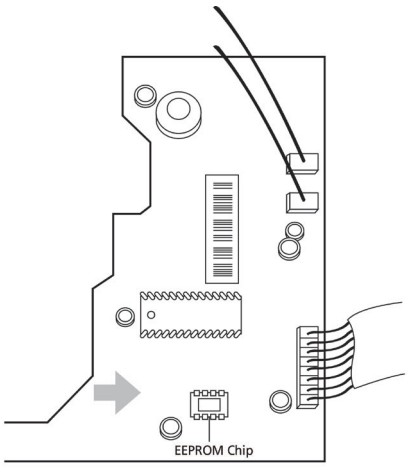


Fig. 19 — EEPROM Chip (Indoor Unit)

NOTE: The images within this manual are for reference only.

:

DIAGNOSIS AND SOLUTION (CONT)

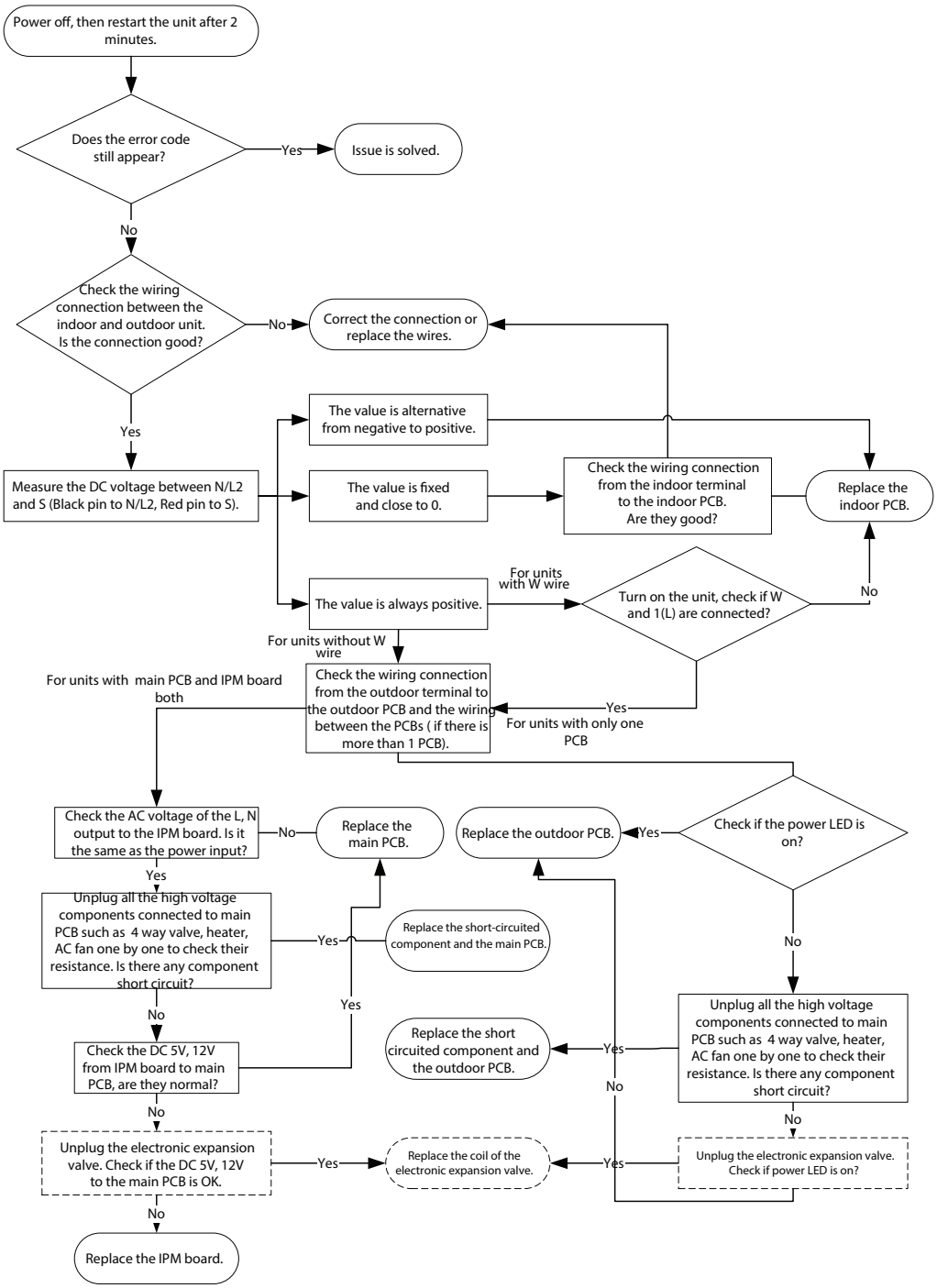
Indoor and outdoor unit communication error (EL01)

Description: The indoor unit has not received feedback from the outdoor unit for 150 seconds, four consecutive times.

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB
- Short-circuited component

Troubleshooting and repair



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DIAGNOSIS AND SOLUTION (CONT)

Indoor and outdoor unit communication error (EL01)

Remarks:

- Use a multimeter to test the DC voltage between the outdoor unit's 2 port and 3 port. The red pin of multimeter connects with the 2 port while the black pin is for 3 port.
- When the air conditioner is normal running, the voltage is moving alternately as positive values and negative values.
- If the outdoor unit has a malfunction, the voltage has always been the positive value.
- If the indoor unit has malfunction, the voltage is a fixed value.

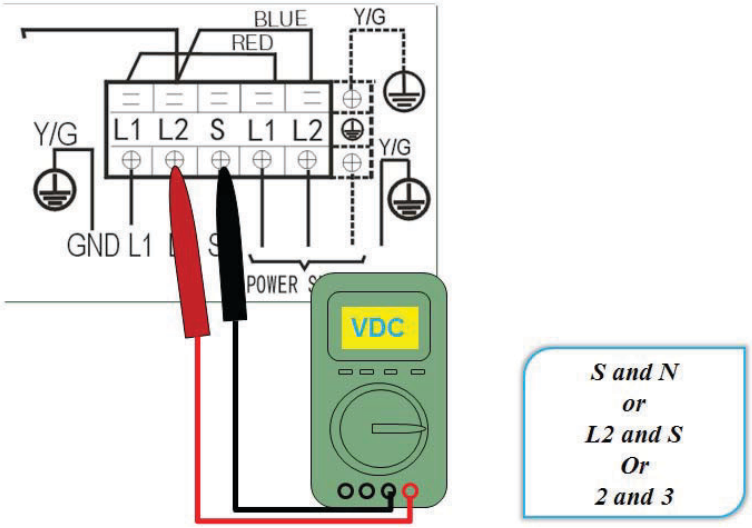


Fig. 20 — Multimeter

- Use a multimeter to test the resistance of the reactor that does not connect with the capacitor.
- The normal value should be around zero ohm, otherwise the reactor has malfunctioned.

Fig. 21 — Multimeter

:

DIAGNOSIS AND SOLUTION (CONT)

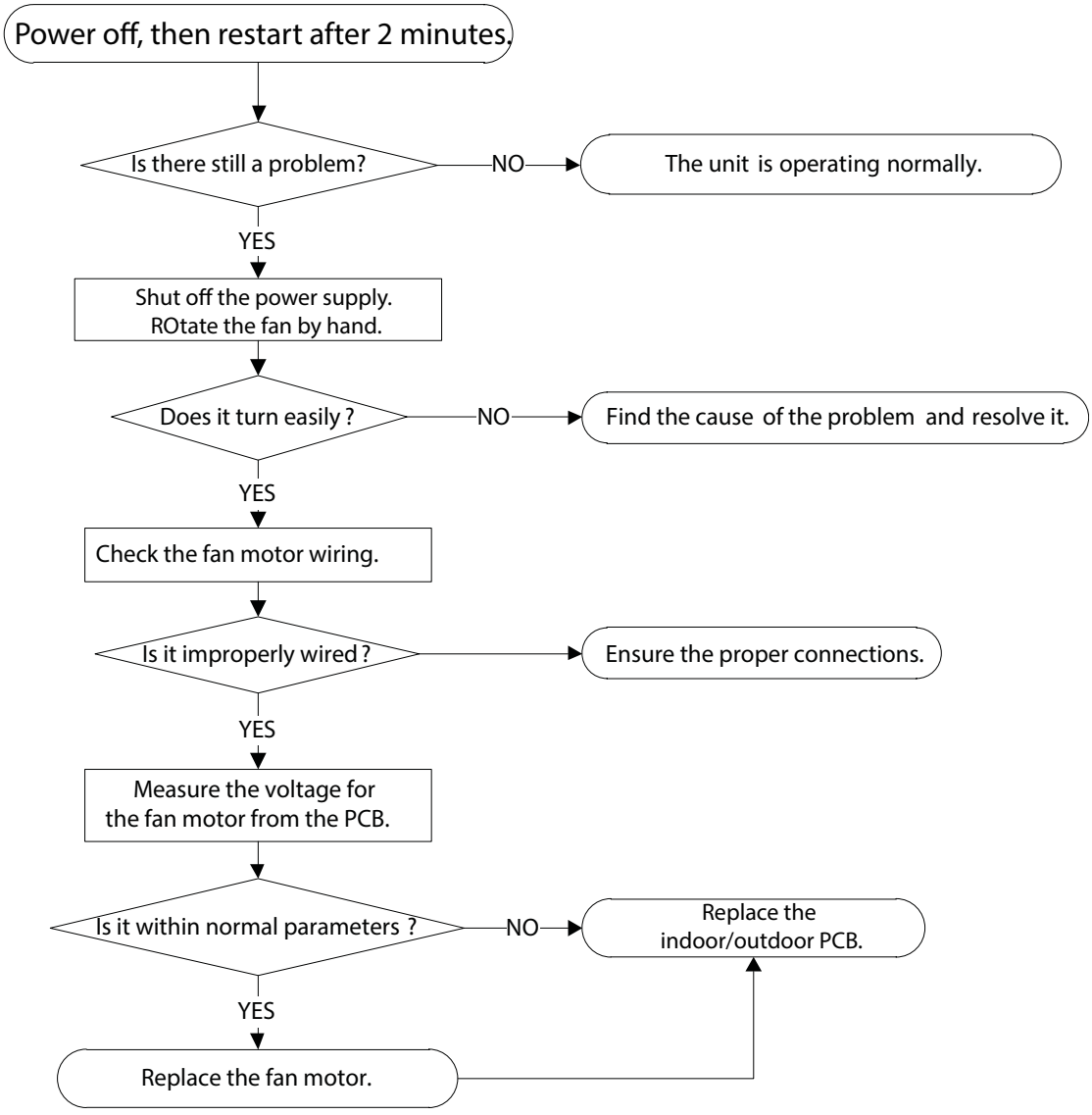
Fan speed is Operating Outside of the Normal Range (EH03)

Description: When the indoor fan speed maintains a low speed (ex. 300RPM) or a speed that is too high (ex.1500RPM) for a certain time, the unit stops and the LED displays the failure or when the outdoor fan speed registers below 200RPM or over 1500RPM for an extended period of time, the unit stops and the LED displays the failure (EHO3).

Recommended parts to prepare:

- Wiring
- Faulty fan assembly
- Faulty fan motor
- Faulty PCB

Troubleshooting and Repair:



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1. Indoor or Outdoor DC Fan Motor (control chip is in fan motor)
   Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 in the fan motor connector. If the voltage value is not in the range shown in Table 17 and 18, the PCB is faulty and needs to be replaced.

   • DC motor voltage input and output (voltage: 220-240V~):

Table 17 — Voltage

No.	Color	Signal	Voltage
1	Red	Vs/Vm	192V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5V-16.5V

   •DC motor voltage input and output (voltage: 115V~):

Table 18 — Voltage

No.	Color	Signal	Voltage
1	Red	Vs/Vm	140V~190V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5V-16.5V

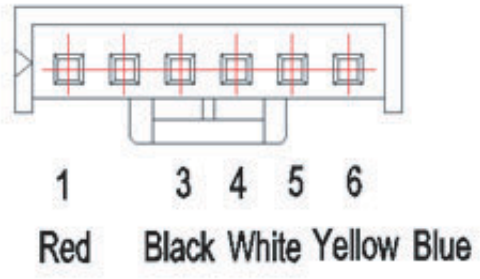


Table 19 — Indoor DC Fan Motor

:

DIAGNOSIS AND SOLUTION (CONT)

Open circuit or short circuit of the temperature sensor (EH60)

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

Recommended parts to prepare:

- Wiring mistake
- Fan sensor
- Faulty PCB

Troubleshooting and Repair:

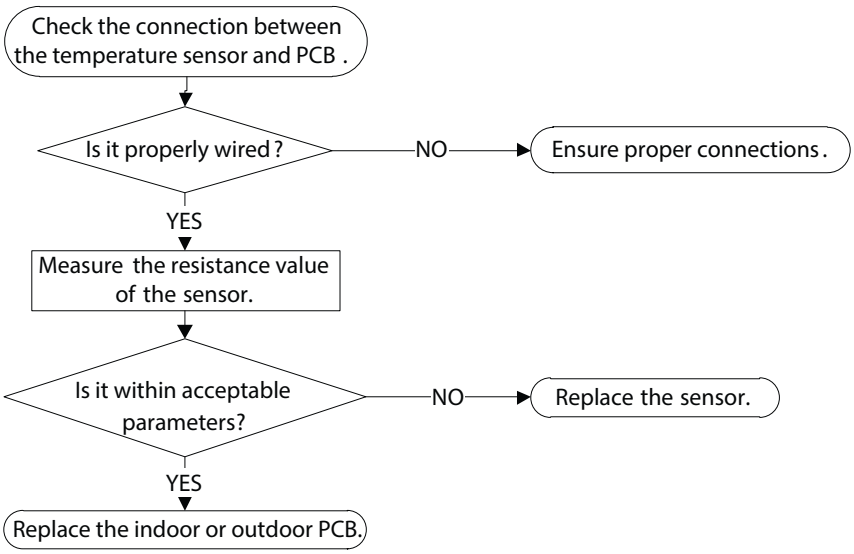


Fig. 22 — Multimeter

:

DIAGNOSIS AND SOLUTION (CONT)

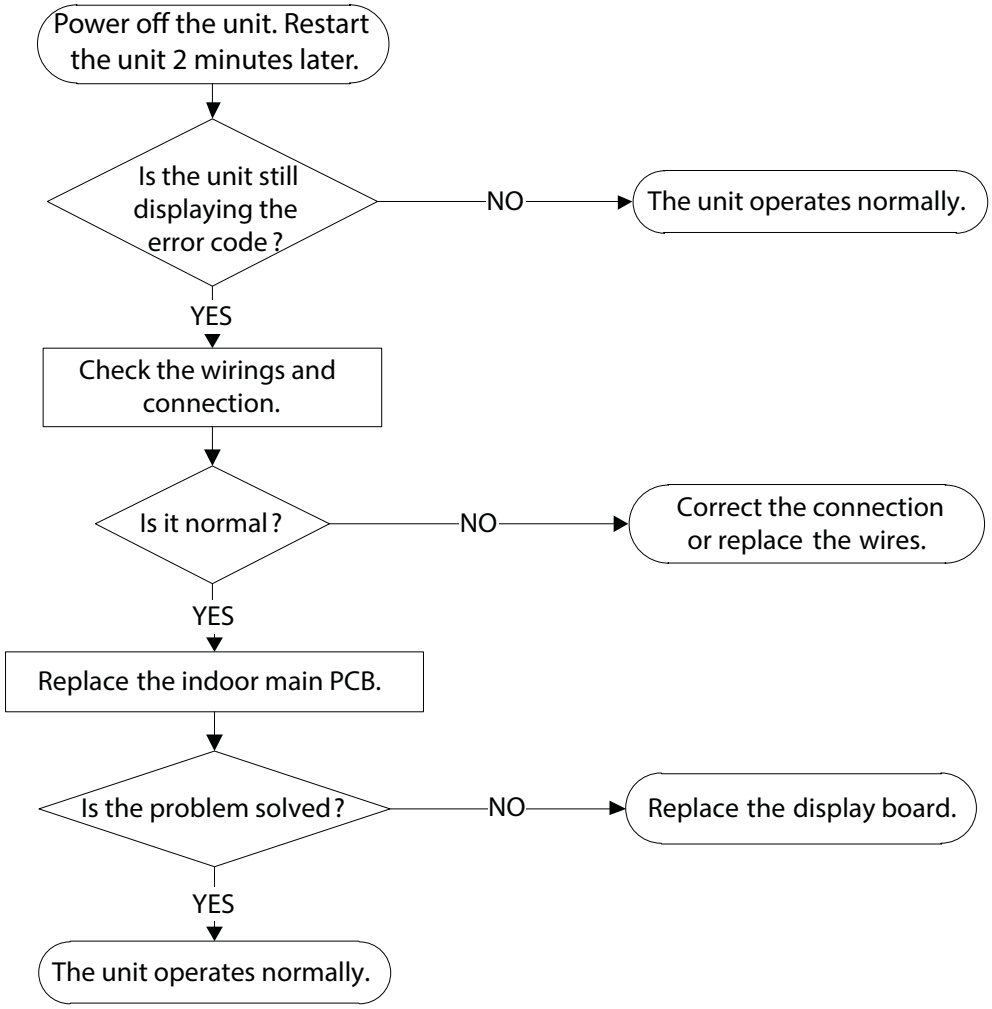
Communication error between the Indoor PCB and Display Board (EH0b)

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

Recommended parts to prepare:

- Wiring mistake
- PCB faulty
- Display board malfunction

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

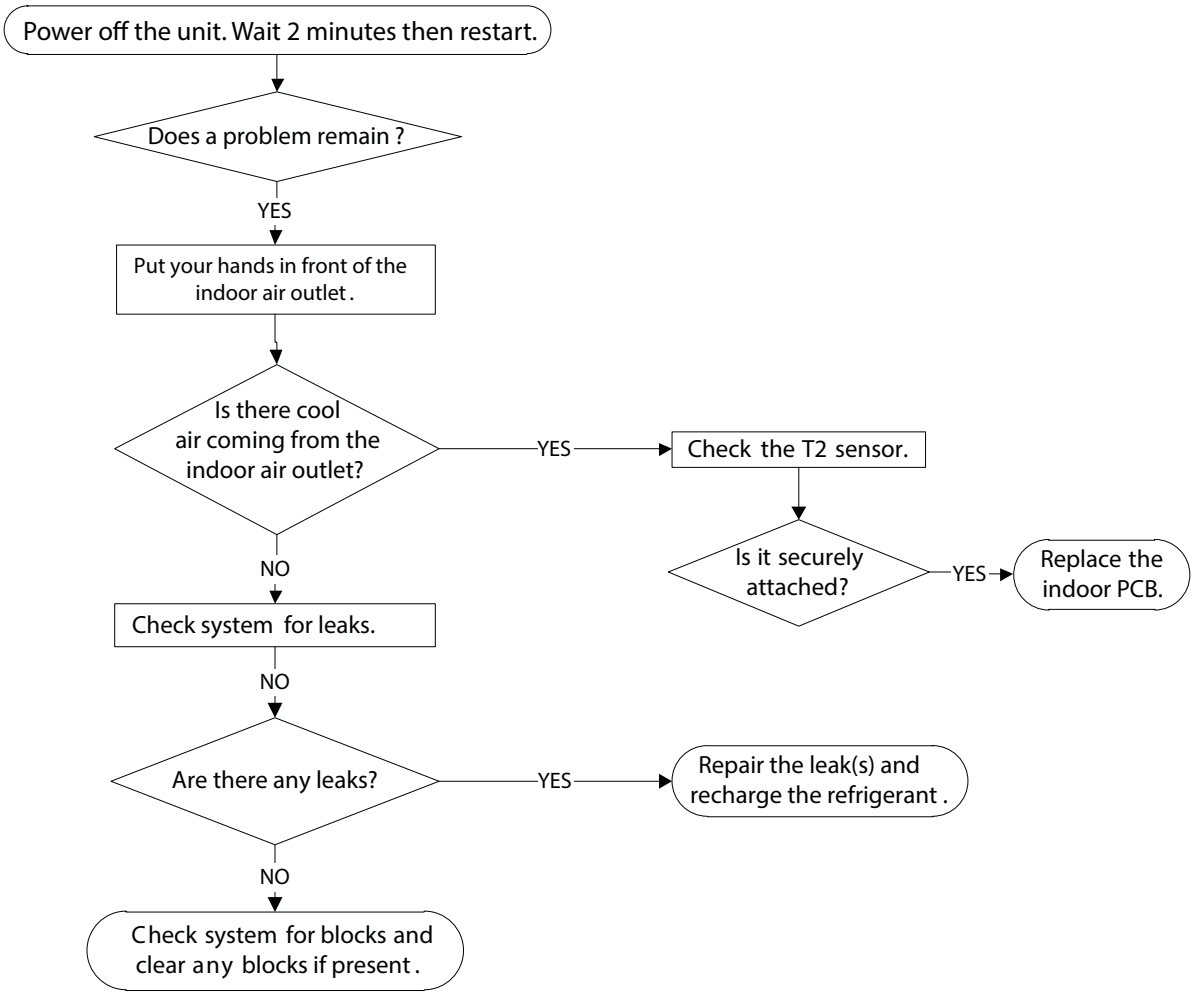
Refrigerant Leakage Detection (EL0C)

Description: Define the evaporator coil temperature T2 of the compressor as it starts running as Tcool. Five minutes after the compressor starts, if T2<Tcool-2C does not maintain continuous 4 seconds, and this issue occurs 3 times, the display area illuminates “EC” and the AC turns off.

Recommended parts to prepare:

- Faulty T2 sensor
- Faulty indoor PCB
- System problems, such as leakage or blockages

Troubleshooting and Repair:



:

DIAGNOSIS AND SOLUTION (CONT)

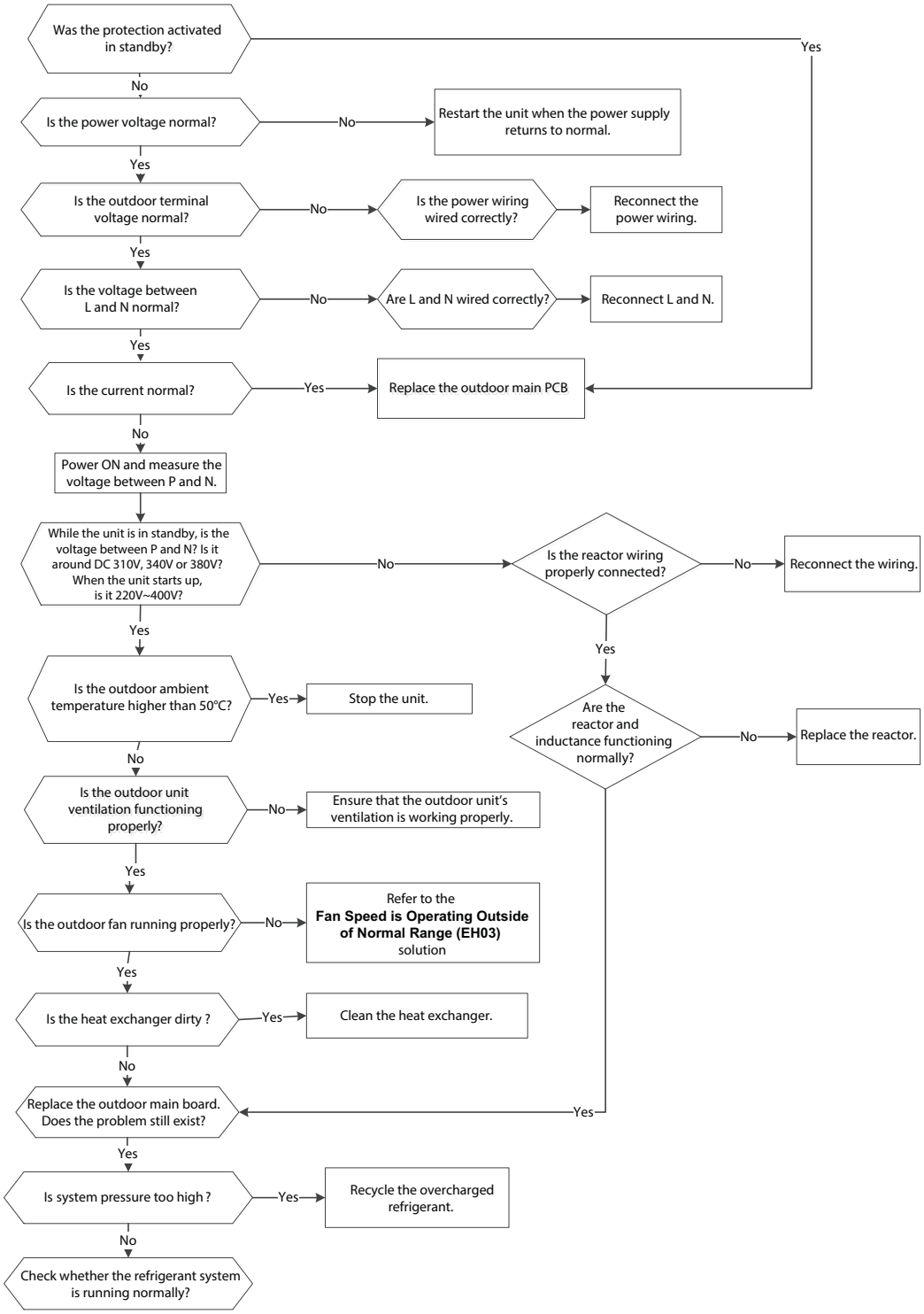
Overload current protection (PC08)

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

Recommended parts to prepare:

- Connection wires
- Reactor
- Outdoor fan
- Outdoor PCB

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

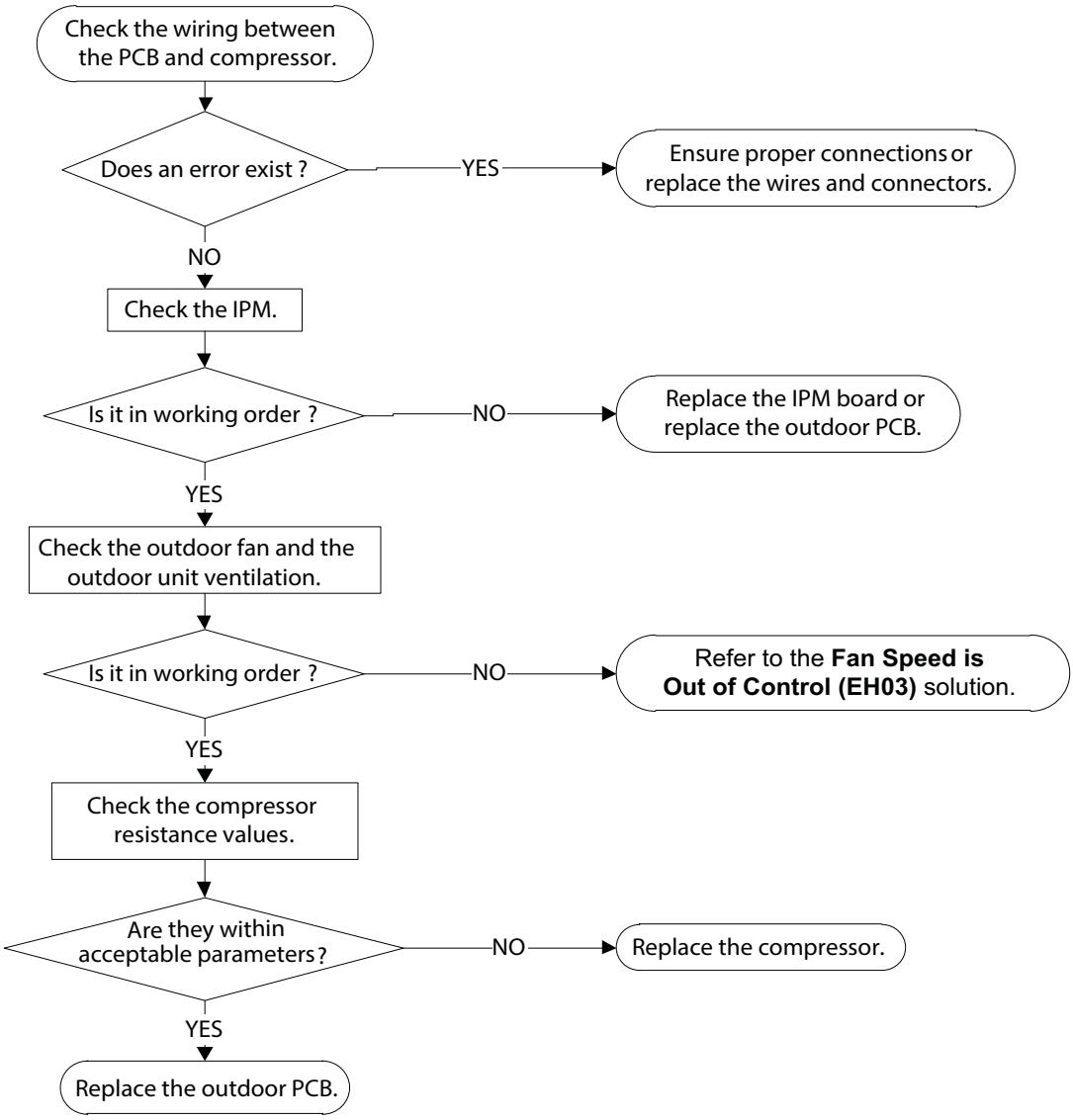
IPM malfunction or IGBT over-strong current protection (PC00)

Description: When the IPM sends a voltage signal to the compressor drive chip is abnormal, “PO” appears on the LED and the air conditioner turns off.

Recommended parts to prepare:

- Wiring mistake
- IPM malfunction
- Faulty outdoor fan assembly
- Compressor malfunction
- Faulty outdoor PCB

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

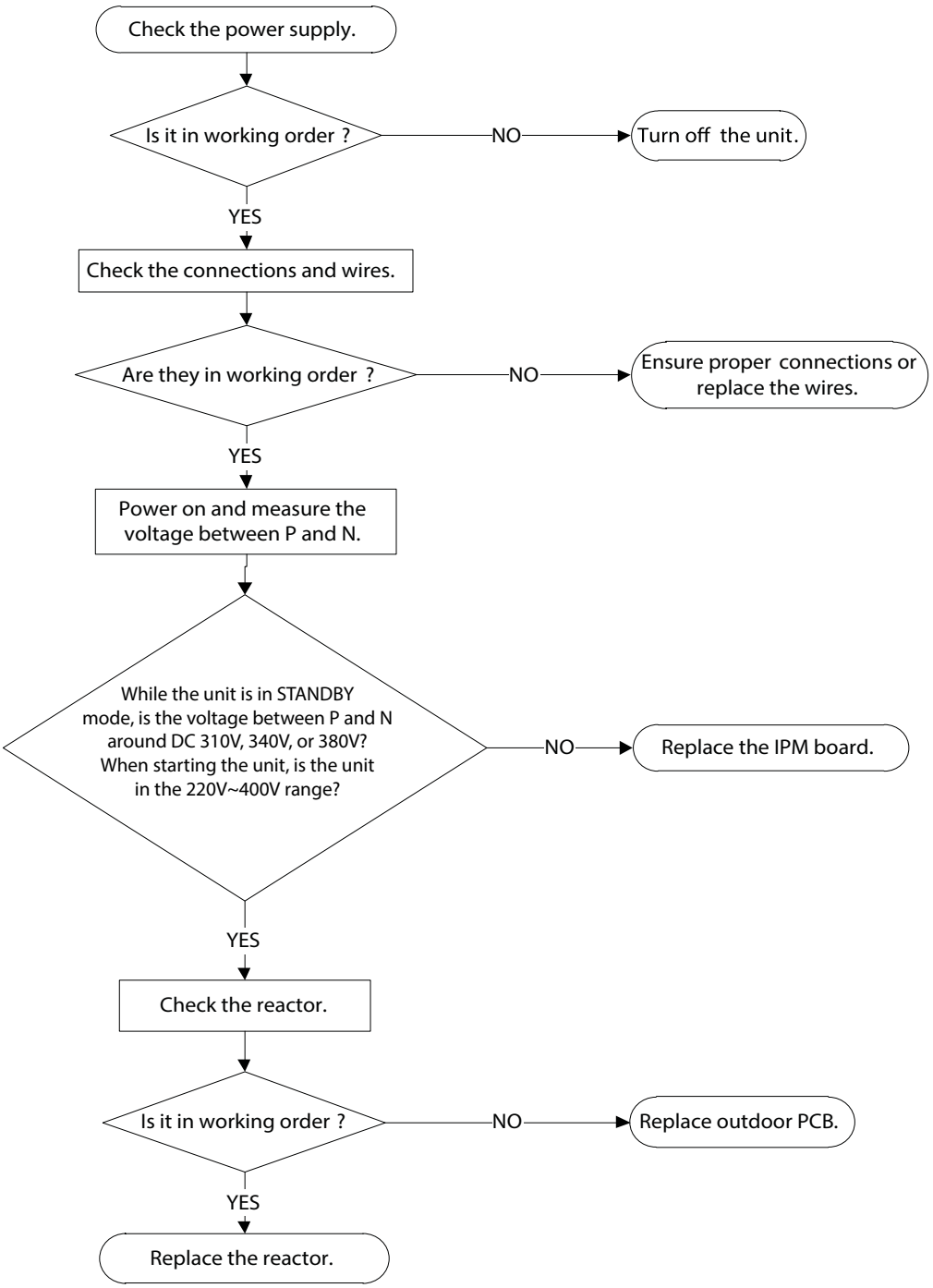
Over voltage or too low voltage protection (PC01)

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

Recommended parts to prepare:

- Power supply issues
- System leakage or blockage
- Faulty PCB
- Reactor

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

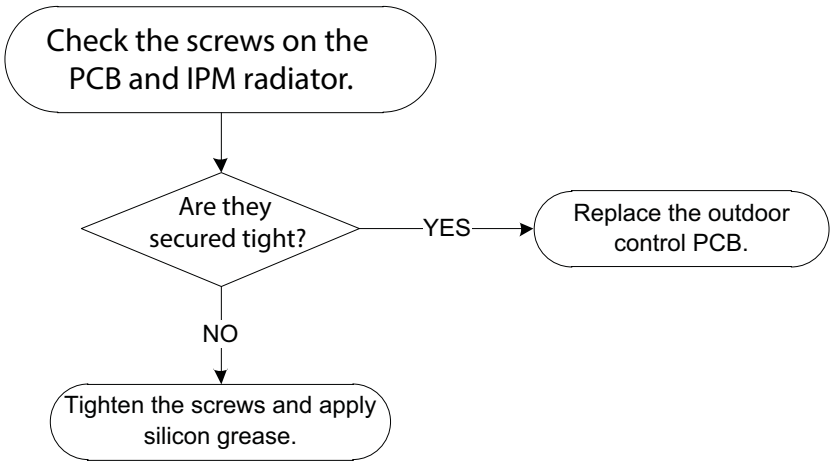
High temperature protection of IPM module (PC02)

Description: If the IPM module temperature is higher than the limited value, the LED displays an failure code.

Recommended parts to prepare:

- Faulty PCB
- Connection problems

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

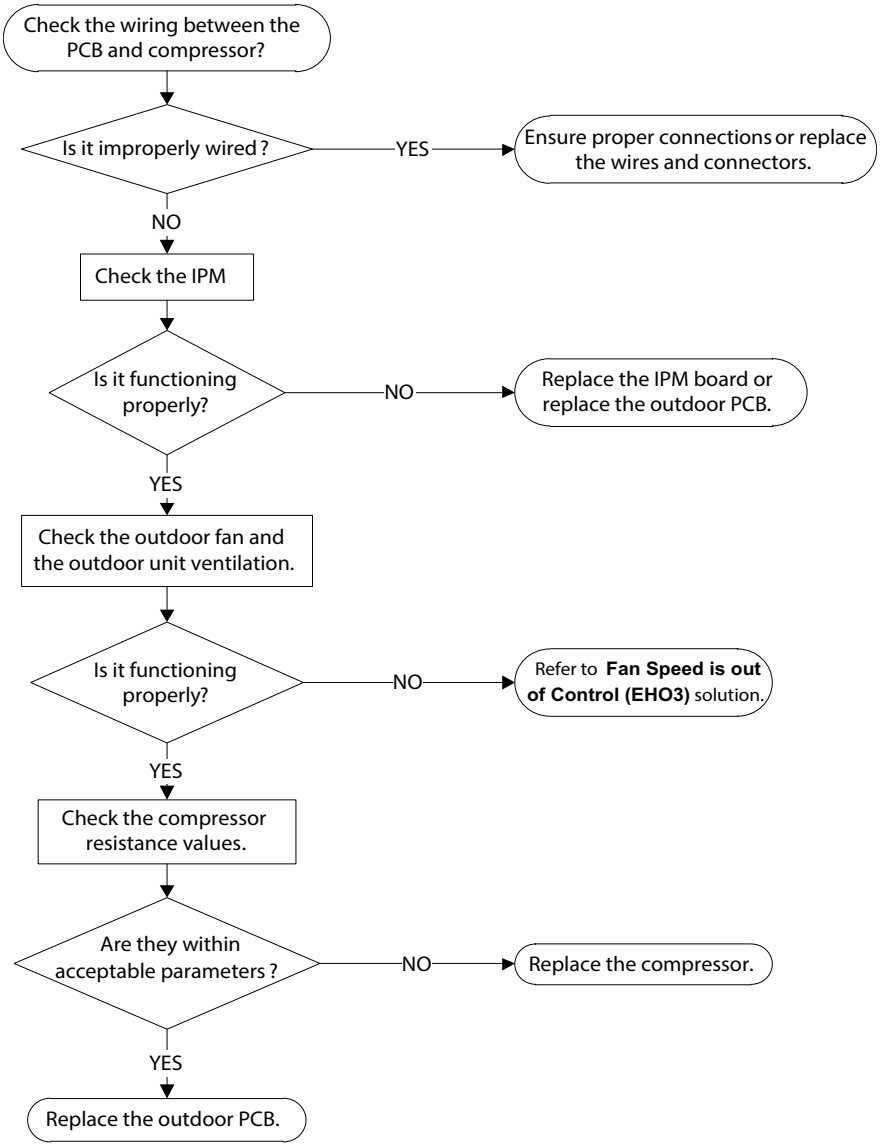
Inverter compressor drive error (PC04)

Description: If the IPM module temperature is higher than the limited value, the LED displays the failure code.

Recommended parts to prepare:

- Wiring mistake
- IPM malfunction
- Outdoor fan assembly faulty
- Compressor malfunction
- Outdoor PCB faulty

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

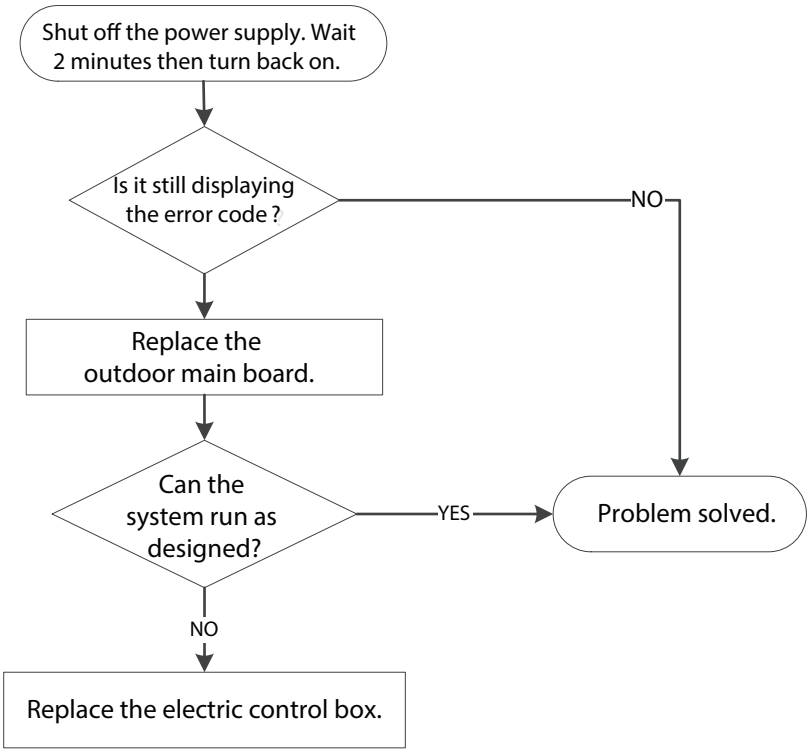
Compressor Driven Chip EEPROM Parameter Error (PC40)

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

Recommended parts to prepare:

- Outdoor main PCB
- Electric control box

Troubleshooting and Repair:



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DIAGNOSIS AND SOLUTION (CONT)

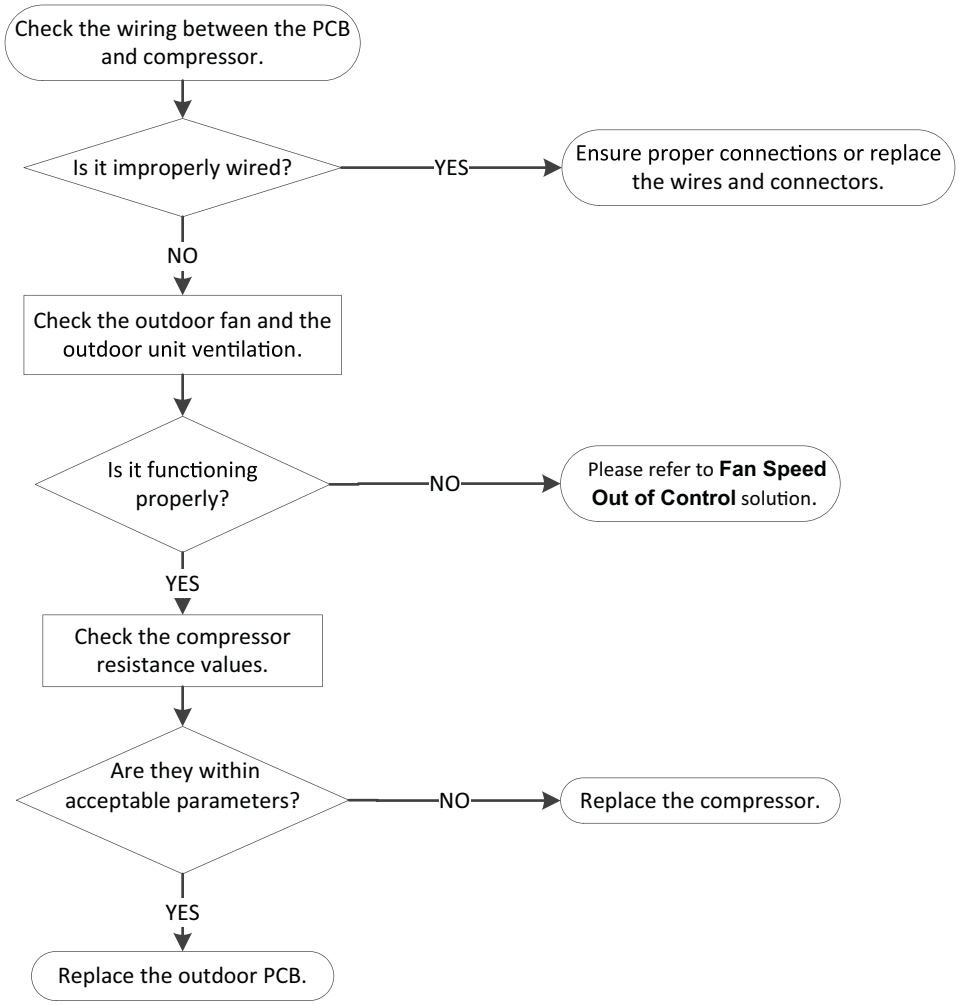
Zero Speed Protection for Compressor/Outdoor Fan or Lack of Compressor Phase or Outdoor Fan/ Compressor Speed Malfunction

Description: None

Recommended parts to prepare:

- Wiring mistake
- Faulty fan assembly faulty
- Faulty fan motor
- Faulty PCB
- Faulty compressor

Troubleshooting and Repair:



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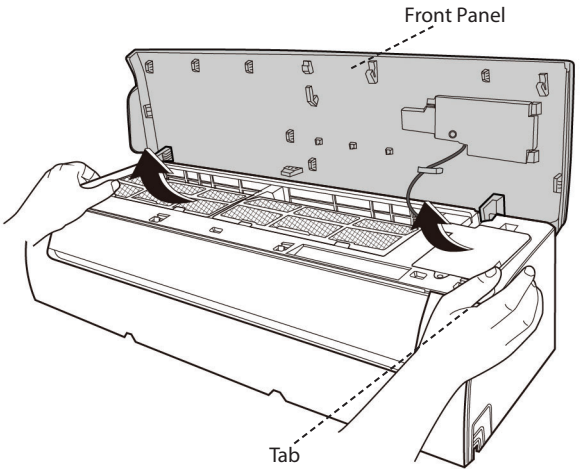
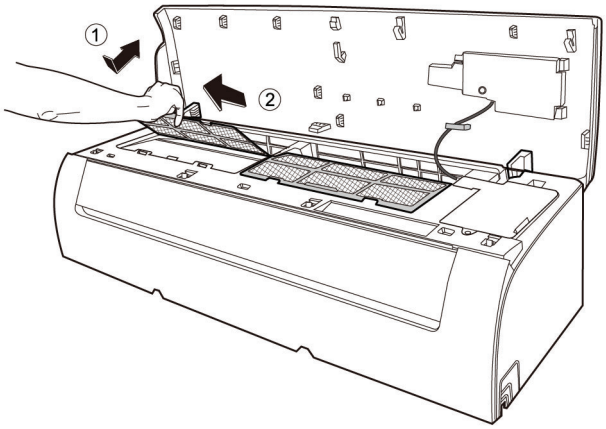
DISASSEMBLY INSTRUCTIONS

Front Panel

NOTE: This section is for reference only and the photos shown may differ from the actual unit.

Procedure	Illustration
1) Hold the front panel by the tabs on tboth sides and lift it.	
2) Push up the bottom of the air filter, and then pull it out downwards.	

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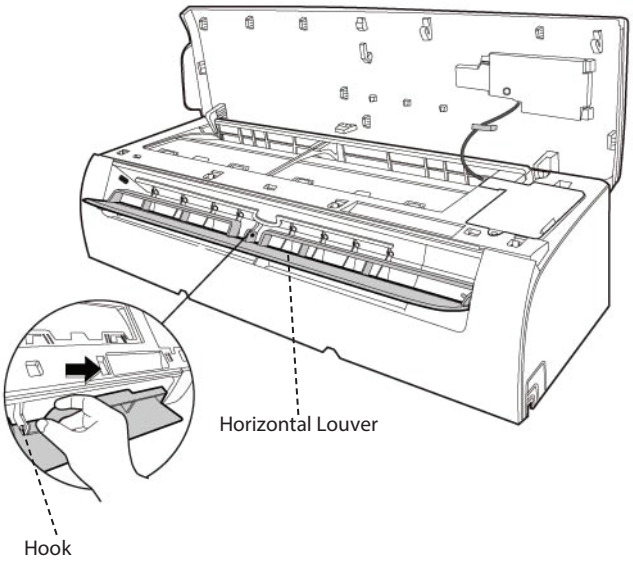
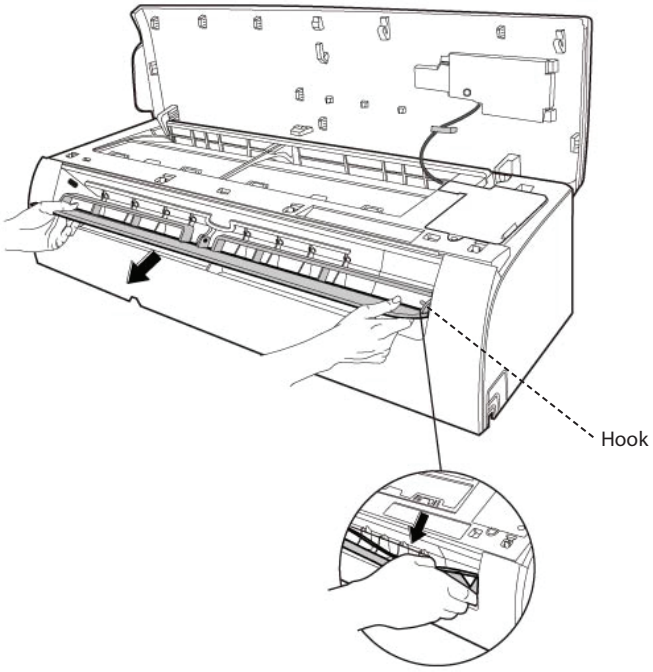
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
3) Open the horizontal louver and push the hook towards the left to open it.	
4) Bend the horizontal louver lightly with both hands to loosen the hooks, then remove the horizontal louver.	

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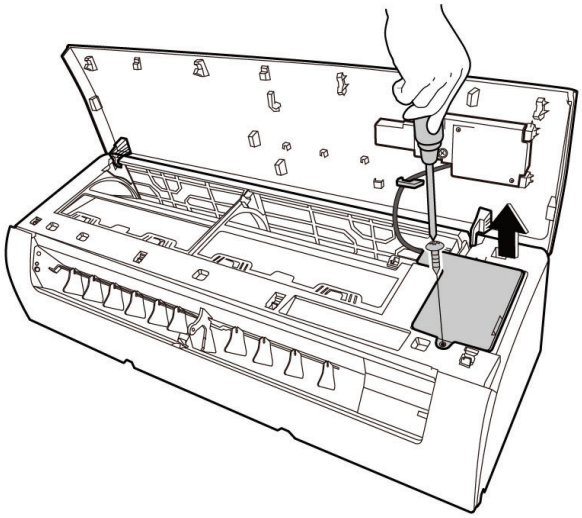
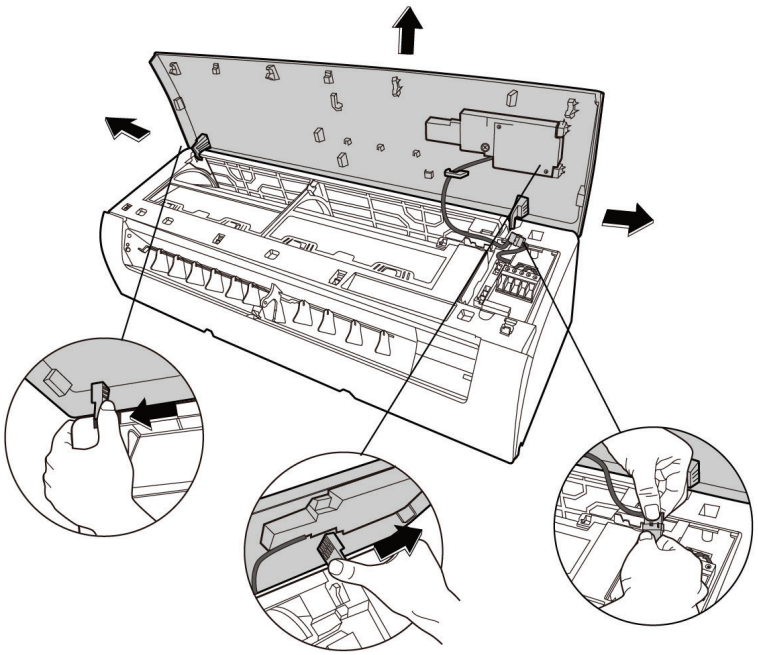
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
5) Pry the electrical cover with a flat screw driver, and rotate it towards left, then remove it.	
6) Disconnect the display board connector. 7) Slide the front panel side to side to release each axis.	

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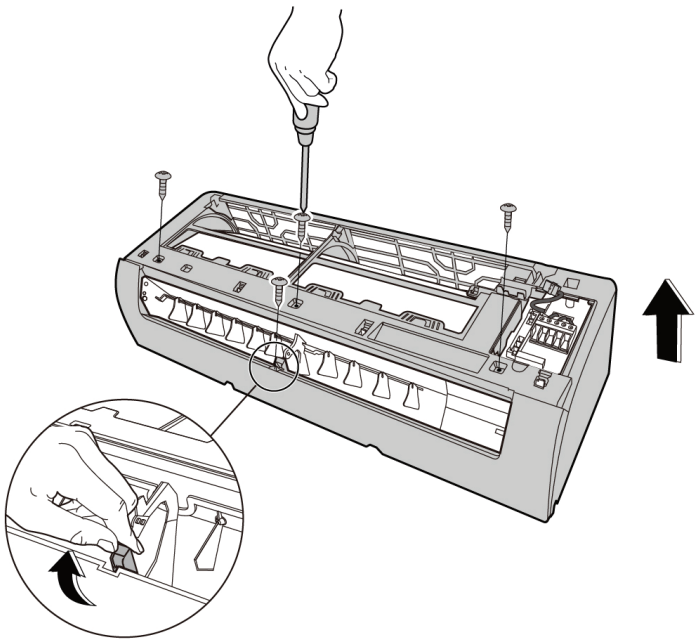
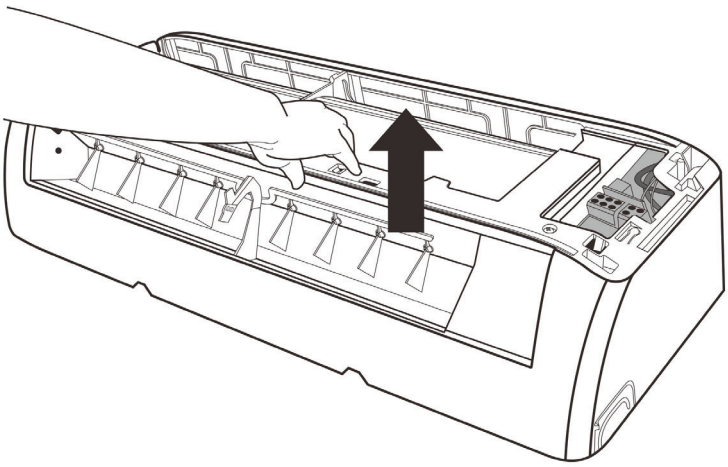
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
8) Open the screw cap and then remove the 3 screws.	
9) Release the hooks by hand.	

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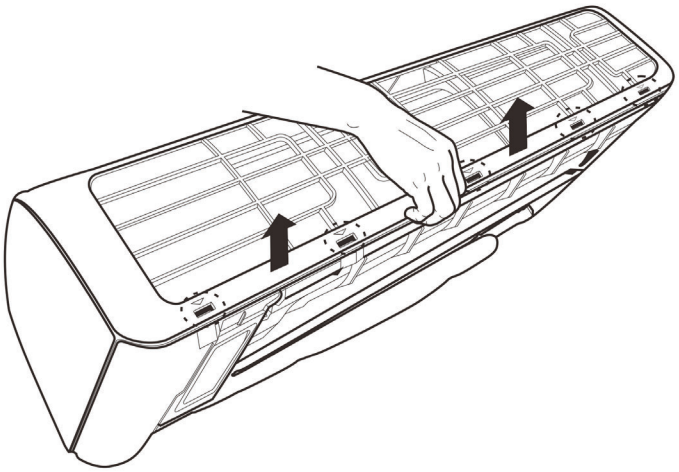
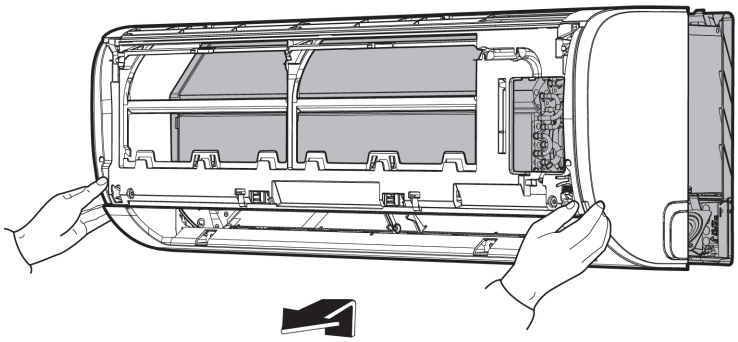
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
10) Release the 5 hooks in the back.	
11) Pull out the panel frame while pushing the hook through the clearance between the panel frame and the heat exchanger.	

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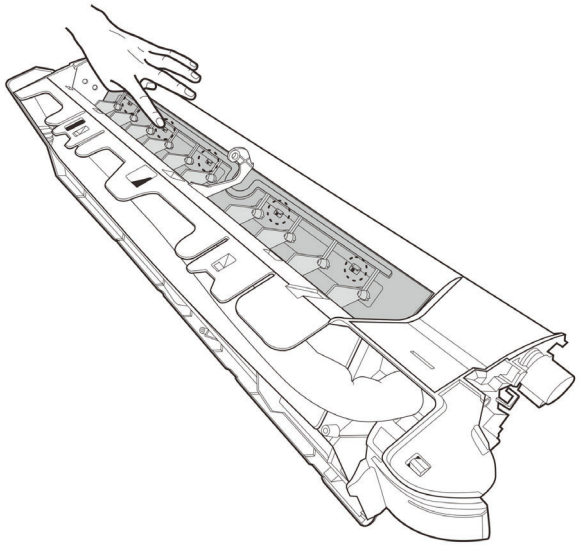
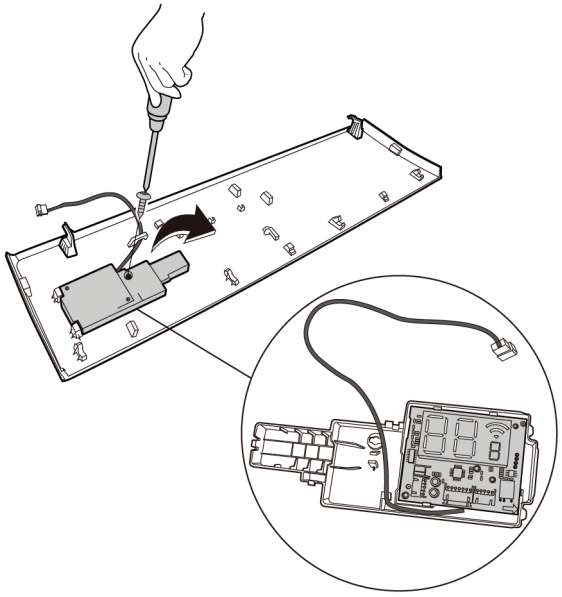
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
12) Release the 5 hooks of the vertical blades, then pull the vertical blades to the right and remove them.	
13) Remove 1 screw from the display board. 14) Rotate the display board in the direction shown in the right picture.	

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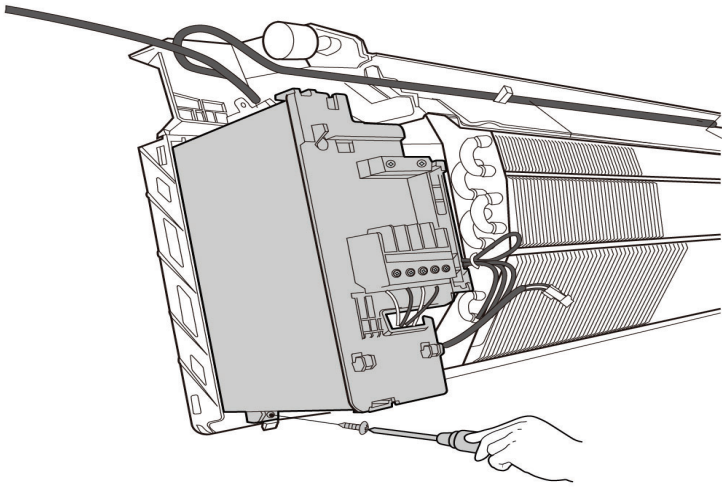
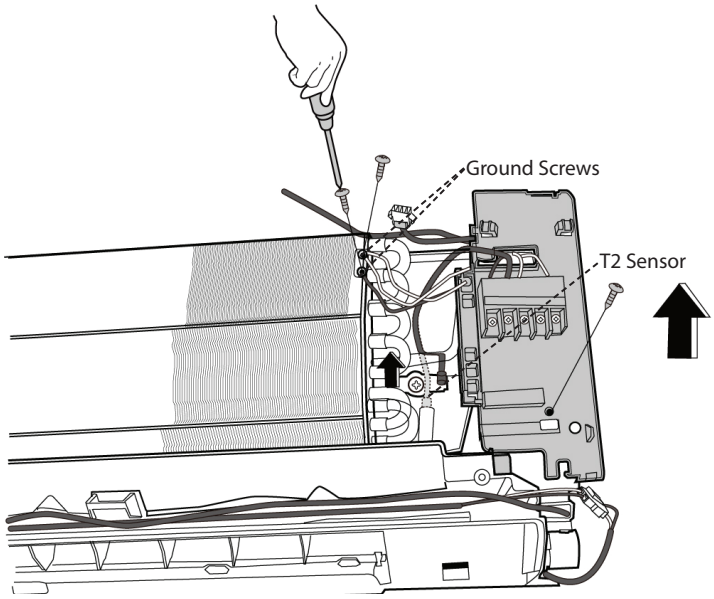
DISASSEMBLY INSTRUCTIONS (CONT)

Electrical Parts

Procedure	Illustration
1) Remove one screw from the electrical control box subassembly. If you want to repair the electrical control box components, perform step #1. If you want to repair the main control board assembly, perform steps #2 to #5 below.	
2) Cut the ribbon by a shear, then pull out the coil temperature sensor (T2). 3) Remove one screw from the electronic control box and two screws used for the ground connection.	

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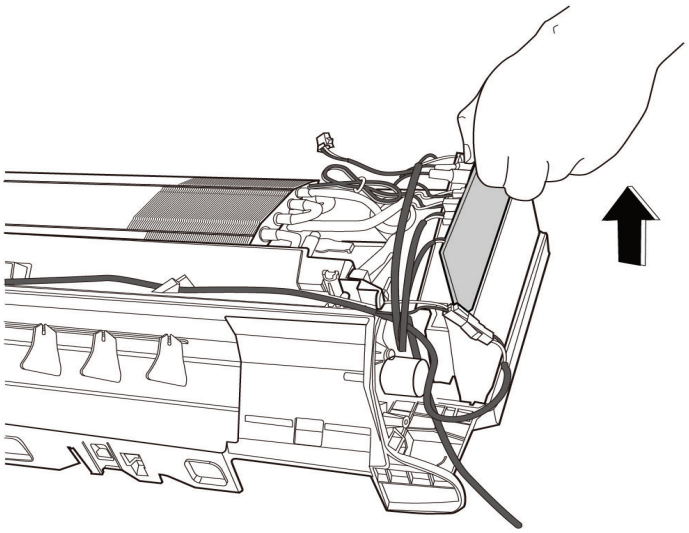
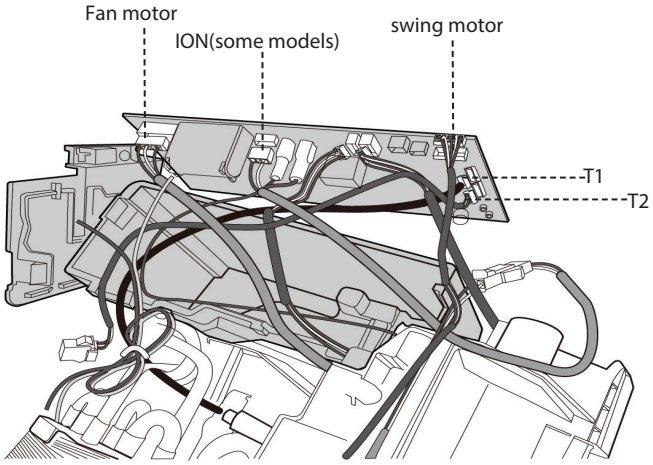
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
4) Pull out the electrical main board along the direction indicated in the image to the right.	
5) Disconnect the connectors and remove the main control board.	

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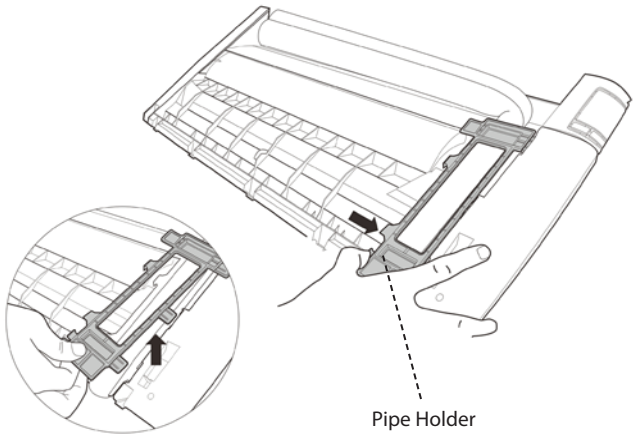
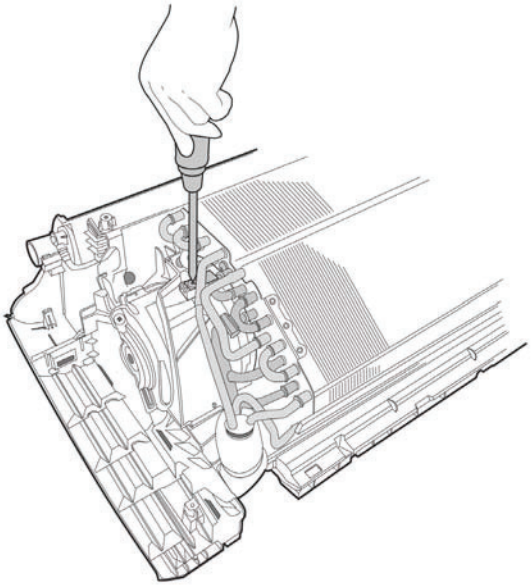
DISASSEMBLY INSTRUCTIONS (CONT)

Evaporator

Procedure	Illustration
1) Disassemble the pipe holder, located at the rear of the unit.	
2) Remove the screw (1) on the evaporator located at the fixed plate.	

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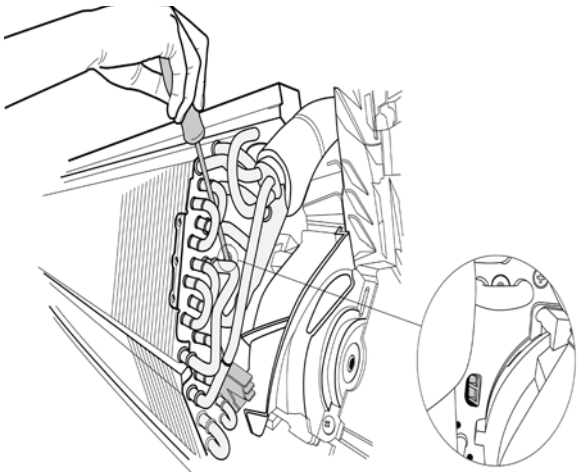
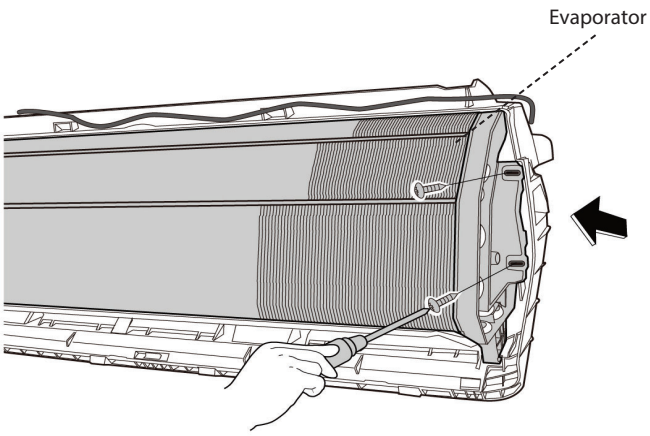
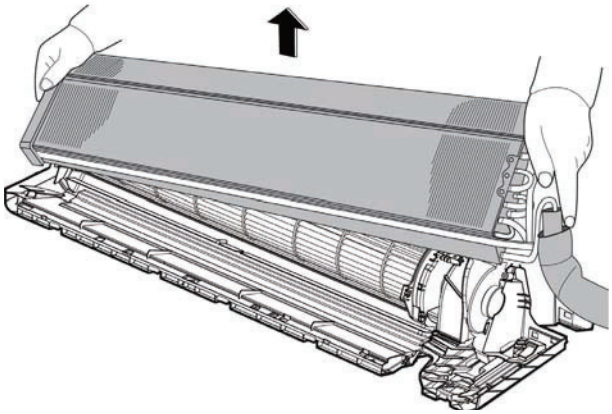
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
3) Release the hook on the evaporator.	
4) Remove the screws (2) on the evaporator located at the fixed plate.	
5) Pull out the evaporator.	

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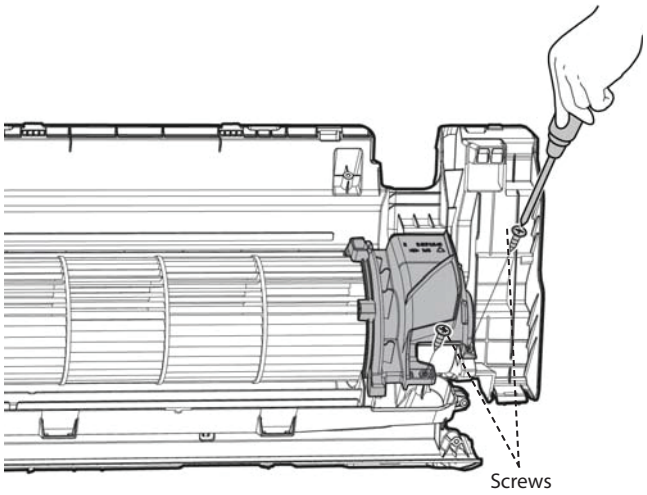
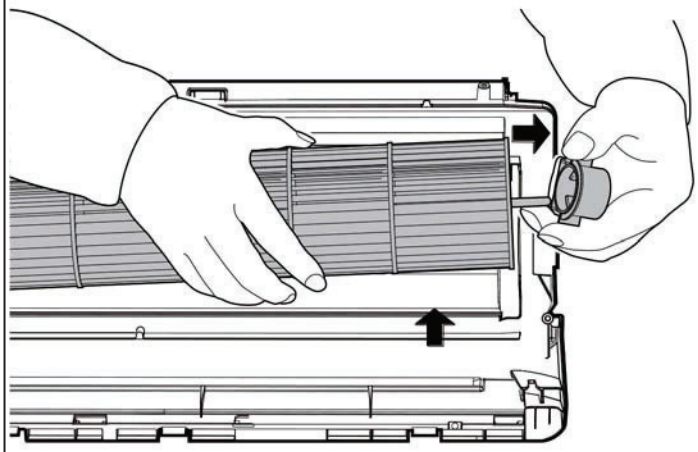
DISASSEMBLY INSTRUCTIONS (CONT)
Fan Motor and Fan

Procedure	Illustration
1) Remove the screws (2) and remove the fixing board of the fan motor.	
2) Remove the bearing sleeve.	

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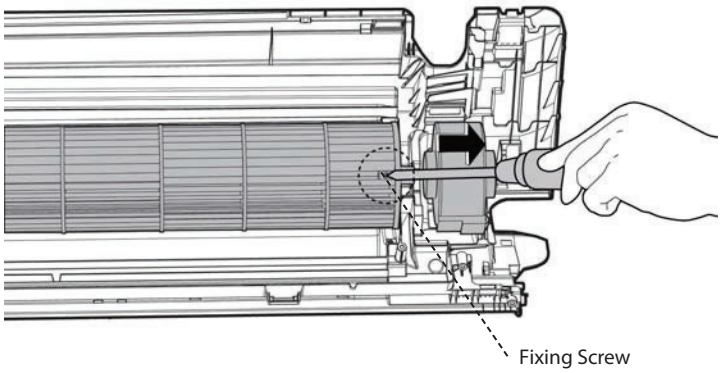
DISASSEMBLY INSTRUCTIONS (CONT)

Procedure	Illustration
3) Remove the fixing screw. 4) Pull out the fan motor and fan assembly from the side.	

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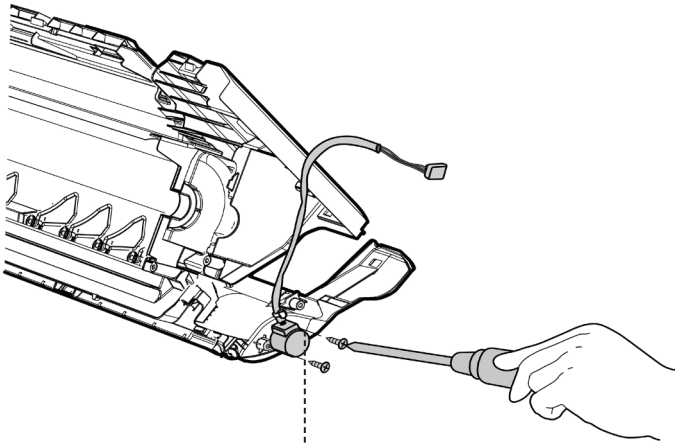
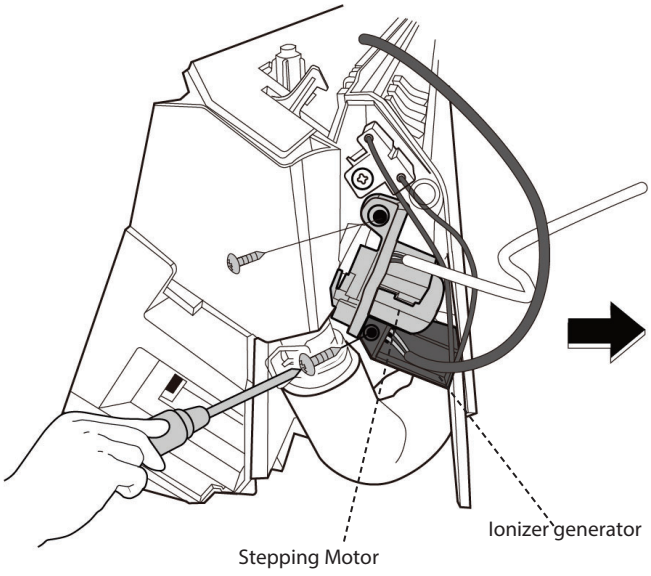
DISASSEMBLY INSTRUCTIONS (CONT)

Step Motor

NOTE: Remove the front panel and electrical parts before disassembling the step motor.

Procedure	Illustration
1) Remove the screws (2), then remove the horizontal swing motor.	
2) Remove the screw (1), then remove the svertical wing motor. 3) Remove the screw (1), then remove the ionizer generator.	

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APPENDIX

Appendix 1

Table 20 — Temperature Sensor Resistance Value Table for T1, T2, T3, T4 (C--K)

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

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Appendix 2

Table 21 — Temperature Sensor Resistance Value Table for T5 (TP) (C--K)

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

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Appendix 3

Table 22 — ΔT(°XF)=9XT(°XC)/5

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

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