40MAQ
High Wall Ductless System
Sizes 09 to 36

Carrier
turn to the experts

Service Manual

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

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

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

Read this manual thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety−alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, and **CAUTION**.

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

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

⚠ WARNING

EXPLOSION HAZARD

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

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

INTRODUCTION

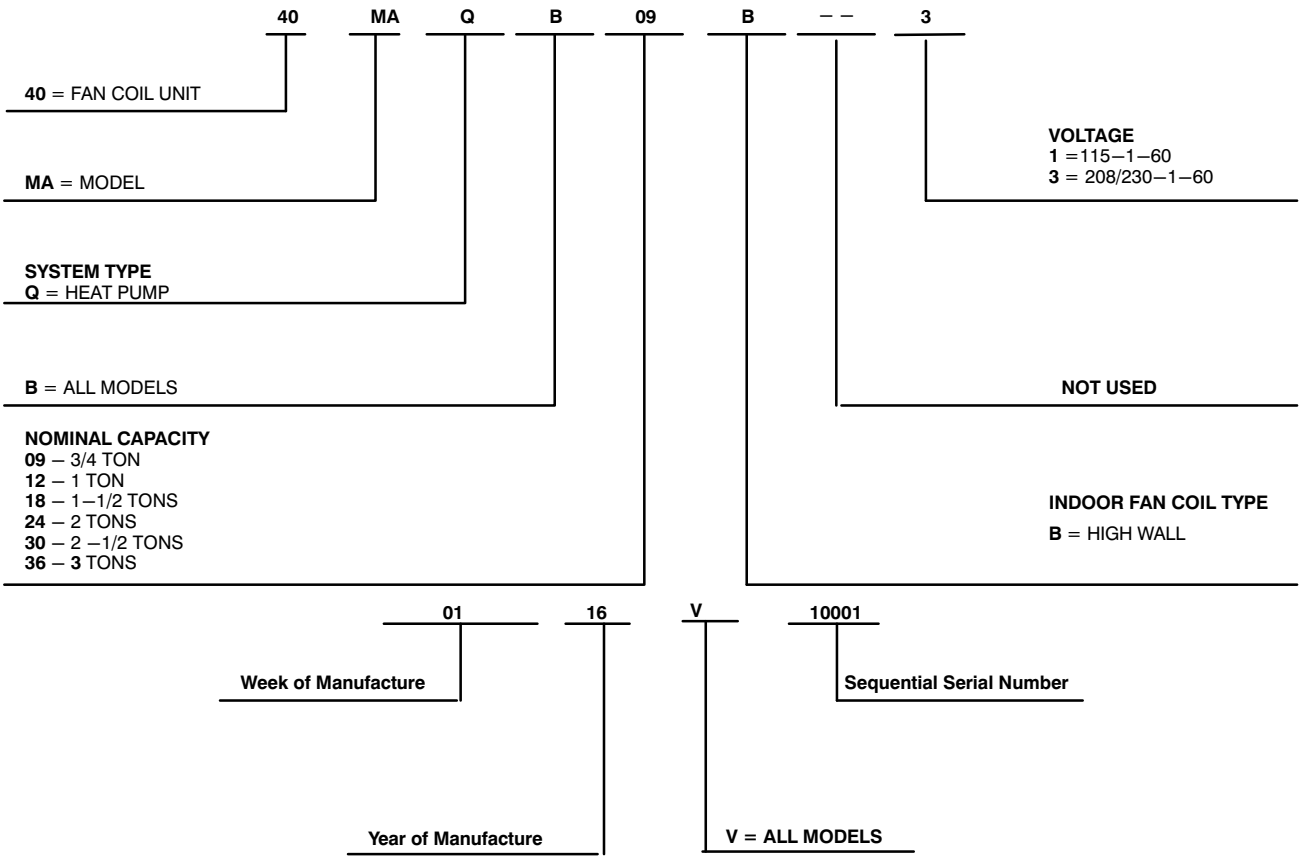
This Service Manual provides the necessary information to service, repair, and maintain the indoor units. Section 2 of this manual has an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

MODEL/SERIAL NUMBER NOMENCLATURES

Table 1—Unit Sizes

SYSTEM TONS	VOLTAGE/PH/HZ	INDOOR MODEL
9	115/1/60	40MAQB09B--1
12		40MAQB12B--1
9	208-230/1/60	40MAQB09B--3
12		40MAQB12B--3
18		40MAQB18B--3
24		40MAQB24B--3
30		40MAQB30B--3
36		40MAQB36B--3

INDOOR UNIT



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

SPECIFICATIONS

Table 2—Specifications

HEAT PUMP										
System	**SIZE**		**9**	**12**	**9**	**12**	**18**	**24**	**30**	**36**
	Indoor Model		40MAQB09B−−1	40MAQB12B−−1	40MAQB09B−−3	40MAQB12B−−3	40MAQB18B−−3	40MAQB24B−−3	40MAQB30B−−3	40MAQB36B−−3
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	115−1−60	115−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60	208/230−1−60
	Power Supply		Indoor unit powered from outdoor unit							
	MCA	A.	0.4	0.4	0.2	0.2	0.27	0.4	0.4	0.4
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Operating Range	Cooling Indoor DB Min −Max	°F(°C)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)	63~86 (17~30)
	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)	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)	1/4 (6.35)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)
	Pipe Connection Size − Suction	in (mm)	3/8 (9.52)	1/2 (12.7)	3/8 (9.52)	1/2 (12.7)	1/2 (12.7)	5/8 (16)	5/8 (16)	5/8 (16)
Indoor Coil	Face Area (sq. ft.)	Sq. Ft.	2.2	2.2	2.2	2.2	2.6	3.7	3.7	3.7
	No. Rows		2	2	2	2	2	3	3	3
	Fins per inch		20	20	20	20	20	18	18	18
	Circuits		3	3	3	3	4	7	7	7
Indoor	Unit Width	in (mm)	32.87 (835)	32.87 (835)	32.87 (835)	32.87 (835)	38.98 (990)	46.69 (1186)	46.69 (1186)	46.69 (1186)
	Unit Height	in (mm)	11.02 (280)	11.02 (280)	11.02 (280)	11.02 (280)	12.40 (315)	13.39 (343)	13.39 (343)	13.39 (343)
	Unit Depth	in (mm)	7.80 (198)	7.80 (198)	7.80 (198)	7.80 (198)	8.58 (218)	10.16 (258)	10.16 (258)	10.16 (258)
	Net Weight	lbs (kg)	19.18 (8.7)	19.18 (8.7)	19.18 (8.7)	19.18 (8.7)	26.46 (12.0)	40.12 (18.2)	40.12 (18.2)	40.12 (18.2)
	Fan Speeds		4	4	4	4	4	4	4	4
	Airflow (lowest to highest)	CFM	210/290/360/380	210/300/360/380	210/290/360/380	210/300/360/380	310/450/650/680	520/620/780/870	520/620/780/870	520/620/780/870
	Sound Pressure (lowest to highest)	dB(A)	27/34/42	27/34/42	27/34/42	27/34/42	33/40/46	39/45/50	39/45/50	39/45/50
	Air Throw Data	ft (m)	23 (7)	23 (7)	23 (7)	23 (7)	30 (9)	36 (11)	36 (11)	36 (11)

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

Legend
SEER - Seasonal Energy Efficiency Ratio
EER - Energy Efficiency Ratio
MCA - Minimum Circuit Amps
MOCP - Max. Over-Current Protection

COMPATIBILITY

Table 3—Compatibility

INDOOR UNIT	40MAQB09B−−1	40MAQB12B−−1	40MAQB09B−−3	40MAQB12B−−3	40MAQB18B−−3	40MAQB24B−−3	40MAQB30B−−3	40MAQB36B−−3
OUTDOOR UNIT SINGLE ZONE	38MAQB09−−−1	38MAQB12−−−1	38MAQB09−−−3	38MAQB12−−−3	38MAQB18−−−3	38MAQB24−−−3	38MAQB30−−−3	
	38MAQB09R−−1	38MAQB12R−−1	38MAQB09R−−3	38MAQB12R−−3	38MAQB18R−−3	38MAQB24R−−3	38MAQB30R−−3	38MAQB36R−−3
OUTDOOR UNIT MULTI−ZONE			38MGQC18−−−3					
			38MGQD27−−−3					
			38MGQF36−−−3					
			38MGQF48−−−3					
			38MGRQ18B−−3					
			38MGRQ24C−−3					
			38MGRQ30D−−3					
			38MGRQ36D−−3					
			38MGRQ48E−−3					

DIMENSIONS

Table 4—Dimensions

HIGH WALL UNIT SIZE		9K	12K	9K	12K	18K	24K	30K	36K
Voltage		(115V)	(115V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)	(208/230V)
Height	In (mm)	11.02 (280)	11.02 (280)	11.02 (280)	11.02 (280)	12.40 (315)	13.39 (343)	13.39 (343)	13.39 (343)
Width	In (mm)	32.87 (835)	32.87 (835)	32.87 (835)	32.87 (835)	38.98 (990)	46.69 (1186)	46.69 (1186)	46.69 (1186)
Depth	In (mm)	7.80 (198)	7.80 (198)	7.80 (198)	7.80 (198)	8.58 (218)	10.16 (258)	10.16 (258)	10.16 (258)
Weight–Net	Lbs (kg)	19.18 (8.7)	19.18 (8.7)	19.18 (8.7)	19.18 (8.7)	24.46 (12.0)	40.12 (18.2)	40.12 (18.2)	40.12 (18.2)

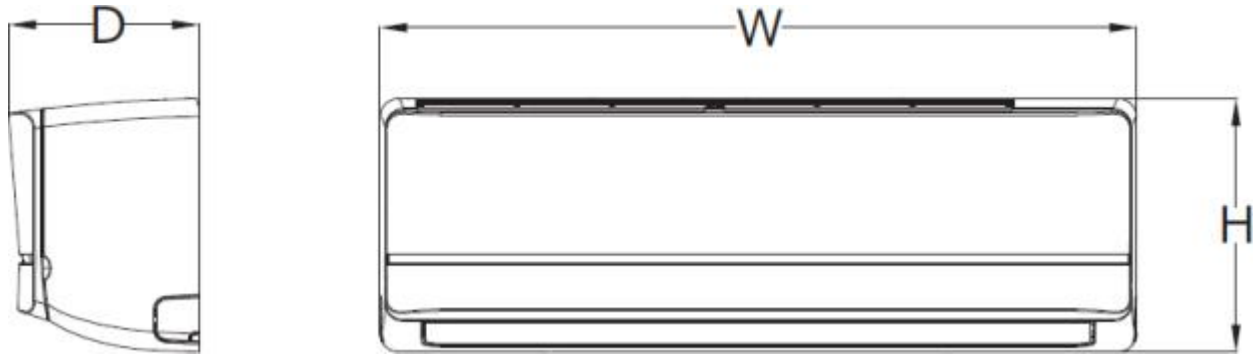


Fig. 1 – Indoor Units

CLEARANCES

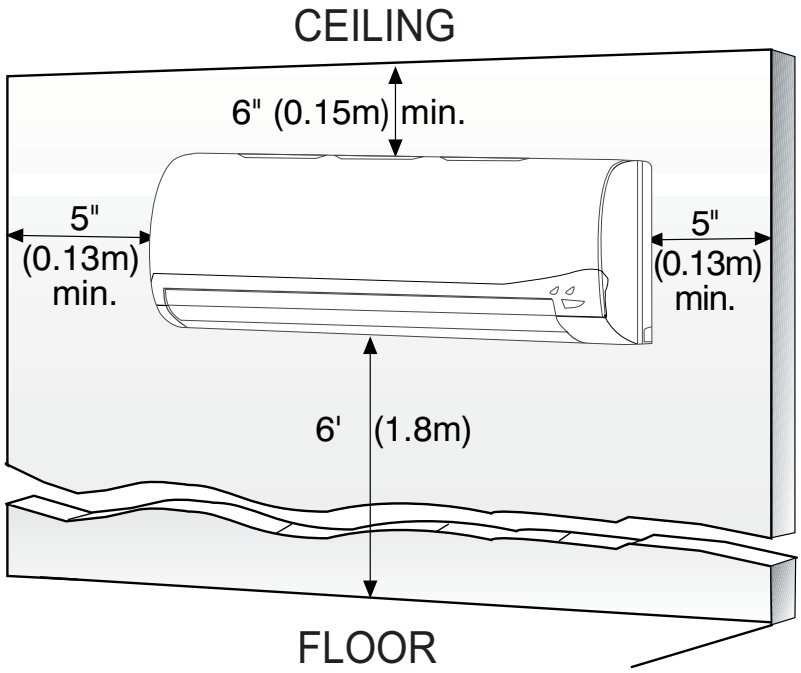


Fig. 2 – Indoor Unit Clearance

ELECTRICAL DATA

Table 5—Electrical Data Indoor High Wall

HIGH WALL UNIT SIZE	INDOOR FAN			MAX FUSE CB AMP
	V–Ph–Hz	FLA	HP	
9K	115–1–60	0.33	0.053	Refer to outdoor unit installation instructions – Indoor unit powered by the outdoor unit
12K		0.33	0.053	
9K	208/230–1–60	0.33	0.053	
12K		0.33	0.053	
18K		0.49	0.067	
24K		0.61	0.16	
30K		0.61	0.16	
36K		0.61	0.16	

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

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 the 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.

Per the caution note, only stranded copper conductors with a 600 volt rating and double insulated copper wire must be used. The use of BX cable is not recommended.

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.

Recommended Connection Method for Power and Communication Wiring (To minimize communication wiring interference)

Power 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.
- Use copper conductors only with a minimum 600 volt rating and double insulated copper wire.

⚠ 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. Therefore, ensure all wiring is tightly connected.
- No wire should be allowed to 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 a hole in the conduit panel.

CONNECTION DIAGRAMS

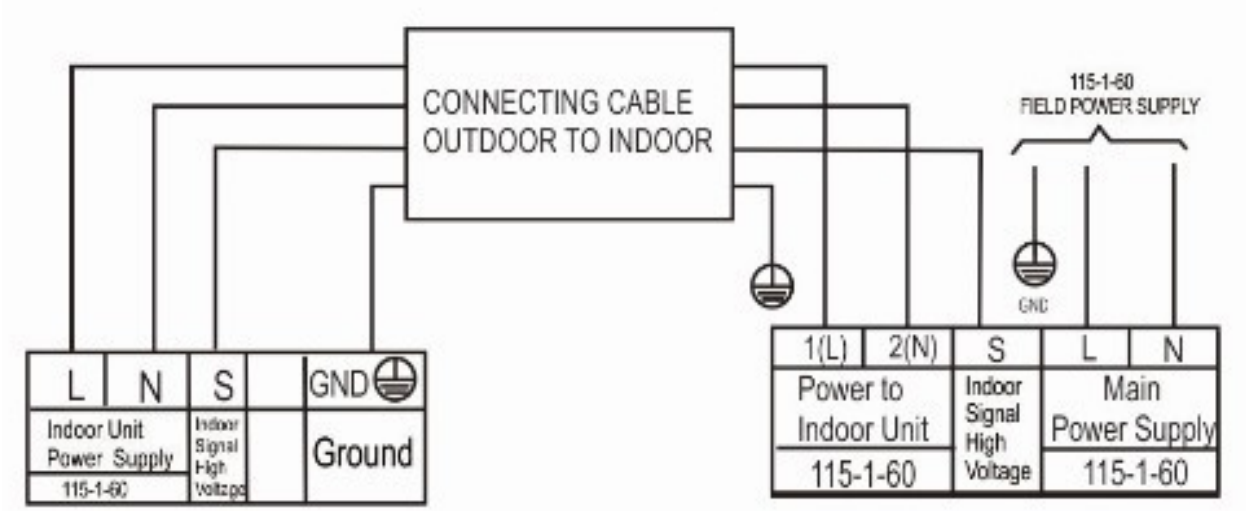


Fig. 3 – 115V

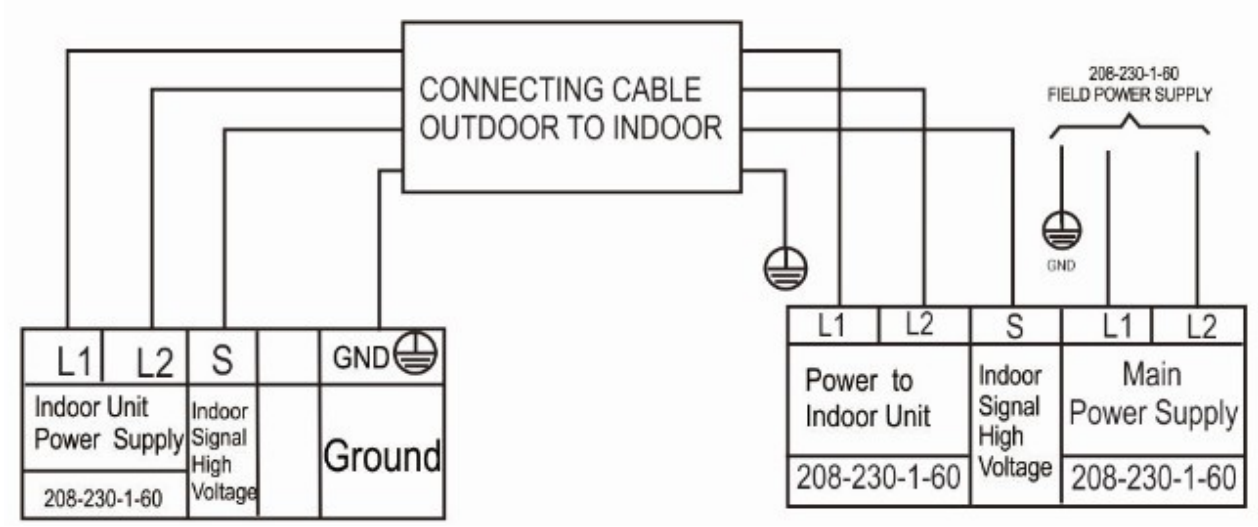


Fig. 4 – 208–230V

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

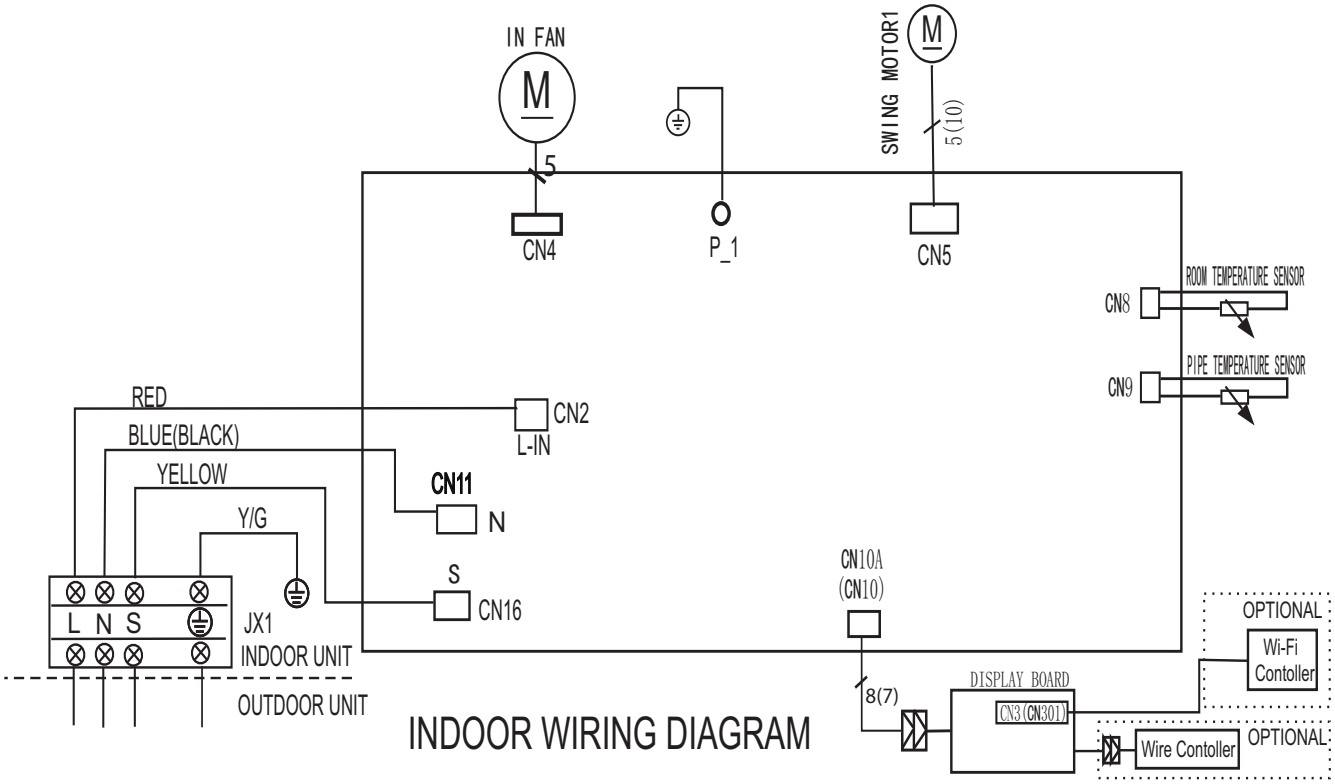


Fig. 5 – Wiring Diagram Sizes 09–12 (115V)

Table 6—INDOOR UNIT CONTROL BOARD

INPUT or OUTPUT VALUE	
L_IN	Power Voltage: AC115V
CN11	Power Voltage: AC115V
CN16	Relative to the N terminal voltage: DC 24V
CN15	Maximum voltage: DC5V
CN4	Indoor fan interface, maximum voltage: DC310V
CN5	Stepper motor interface, maximum voltage between the lines: DC12V
P_1	Ground
CN8	Room temperature sensor interface, maximum voltage: DC5V
CN9	Pipe temperature sensor interface, maximum voltage: DC5V
CN10A	Display interface,maximum voltage between the lines: DC5V

WIRING DIAGRAMS (CONT)

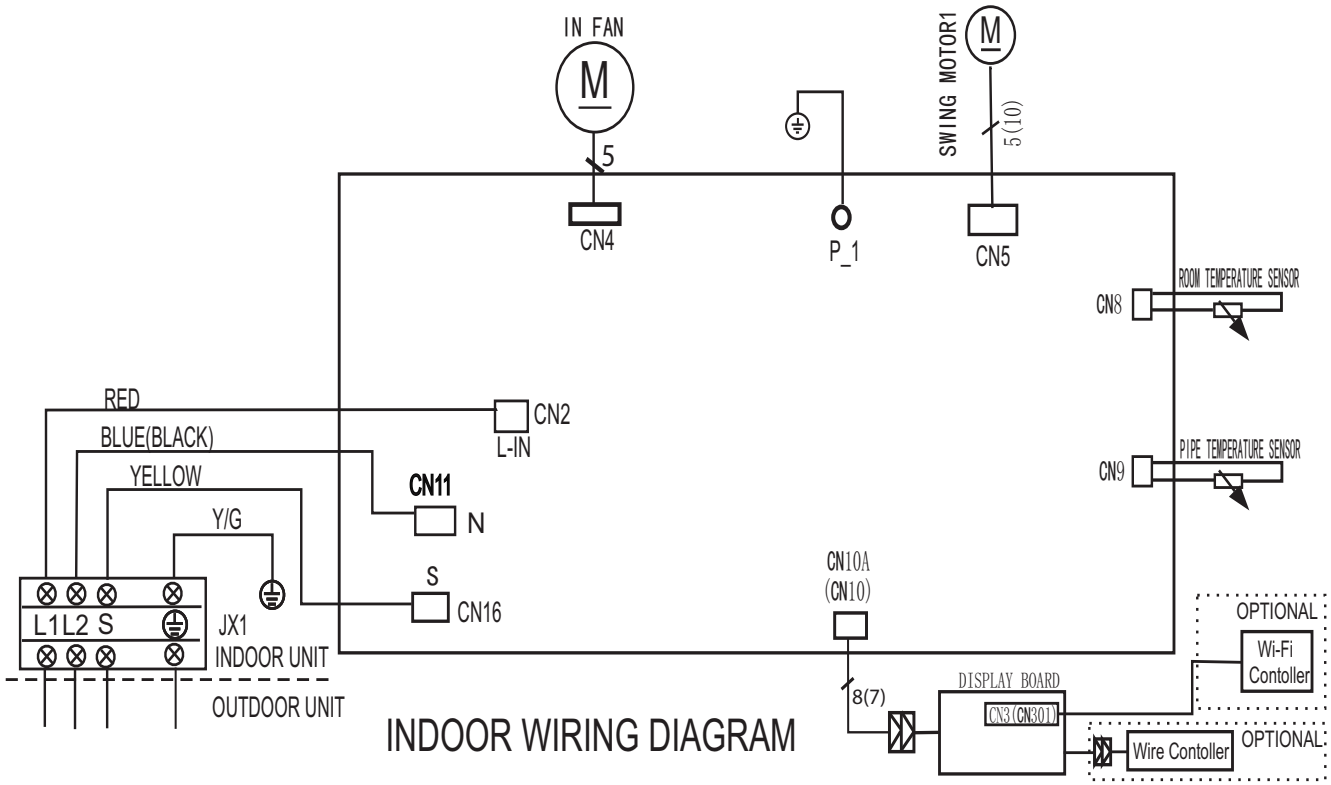


Fig. 6 – Wiring Diagram Sizes 09–36 (208–230V)

Table 7—INDOOR UNIT CONTROL BOARD

INPUT or OUTPUT VALUE	
L_IN	Power Voltage: AC230V
CN11	Power Voltage: AC230V
CN16	Relative to the N terminal voltage: DC24V
CN15	Maximum voltage: DC5V
CN4	Indoor fan interface, maximum voltage: DC310V
CN5	Stepper motor interface, maximum voltage between the lines: DC12V
P_1	Ground
CN8	Room temperature sensor interface, maximum voltage: DC5V
CN9	Pipe temperature sensor interface, maximum voltage: DC5V
CN10A	Display interface,maximum voltage between the lines: DC5V

REFRIGERATION CYCLE DIAGRAMS

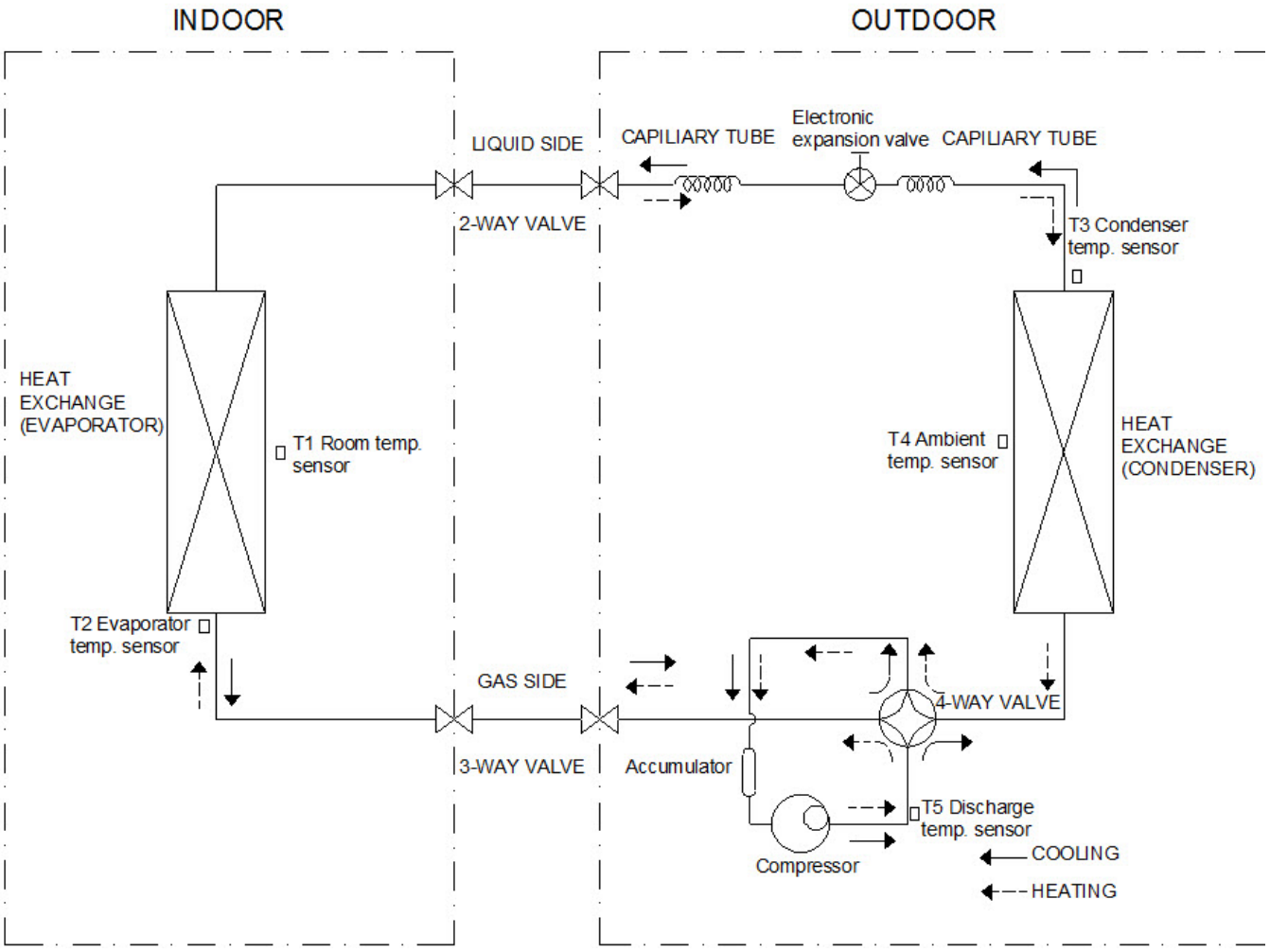


Fig. 7 – Heat Pumps

REFRIGERANT LINES

IMPORTANT: Both refrigerant lines must be insulated separately.

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

SYSTEM EVACUATION AND CHARGING

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Never use the system compressor as a vacuum pump.

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

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

System Vacuum and Charge

Using Vacuum Pump

1 Completely tighten the flare nuts (A, B, C, D, E). Fully open all circuits service valves. Connect the manifold gage charge hose to the charge port of the low side Master service valve to evacuate all circuits at the same time (see Fig. 8).

2 Connect the charge hose to the vacuum pump.

3 Fully open the low side of manifold gage (see Fig. 9).

4 Start the 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 25ft. (8 m) of line length.

8 Disconnect the charge hose from the charge connection of the low side service valve.

9 Securely tighten the service valves caps.

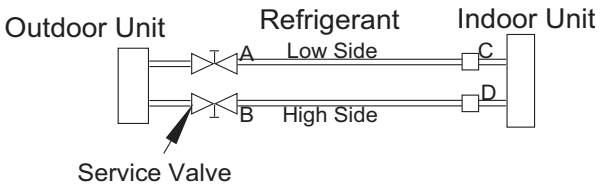


Fig. 8 – Service Valve

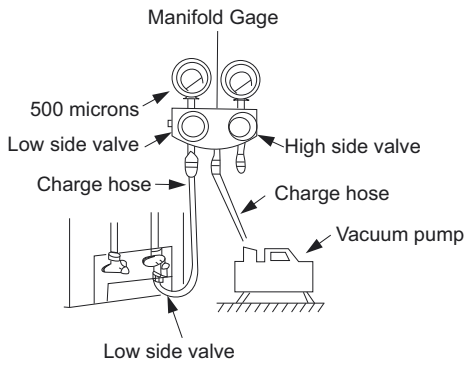


Fig. 9 – Manifold

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. 10).

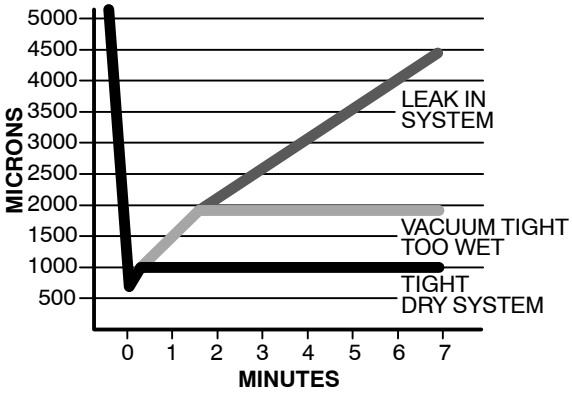


Fig. 10 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should be used. Refer to Fig. 11 and proceed as follows:

1 Pump system down to 500 MICRONS of mercury and allow the pump to continue operating for an additional 15 minutes. Unit must maintain 500 microns or less for 30 minutes or more to ensure a dry system.

2 Close the service valves and shut off the vacuum pump.

3 Connect a nitrogen cylinder and regulator to the system and open until the system pressure is 2 psig.

4 Close the service valve and allow the system to stand for 10 minutes. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.

5 Repeat this procedure as indicated in Fig. 11. The system will then be free of any contaminants and water vapor.

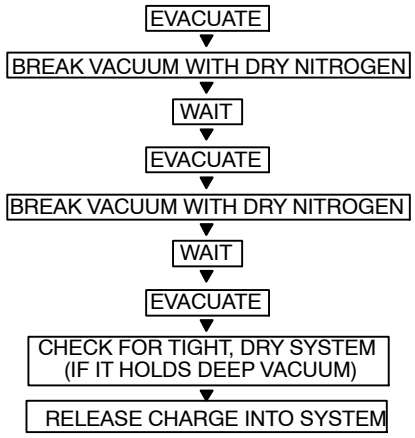


Fig. 11 – Triple Evacuation Method

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.

Main Protection

Fan Speed is Out of Control

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

Inverter Module Protection

The inverter module has a protection function for current, voltage and 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 10s later. If the unit runs in the **HEATING** mode, the indoor fan will be controlled by the anti−cold wind function.

Zero Crossing Detection Error Protection

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

Sensor Protection at Open Circuit and Breaking Disconnection

When there is only one malfunctioning temperature sensor, the air conditioner keeps working yet 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.

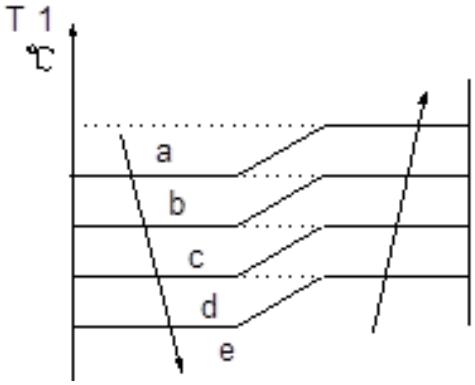


Fig. 12 – Auto Fan

COOLING Mode

Indoor Fan Running Rules

In the **COOLING** mode, the indoor fan runs all the time and the speed can be selected as high, medium, low and 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. 13.

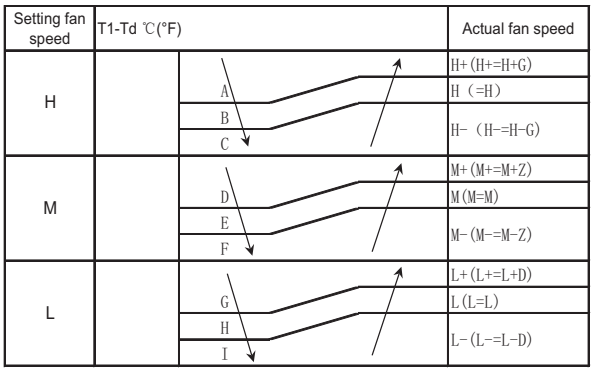


Fig. 13 – Indoor Fan Running Rules

The **AUTO** fan is controlled by the rules shown in Fig. 14.

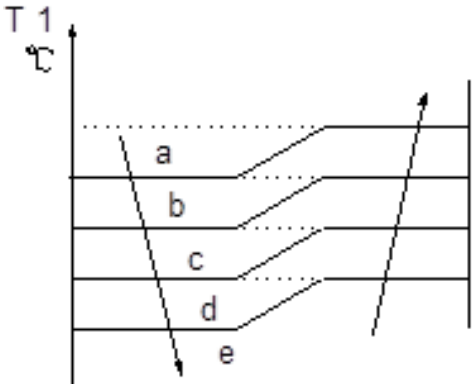


Fig. 14 – Indoor Fan Running Rules

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 can not be changed. When the temperature is lower than the setting value, the indoor fan motor stops.

When the indoor temp reaches the setting temperature, the compressor stops, the indoor fan motor runs at the minimum speed or setting speed. (The anti−cold air function is valid). The indoor fan is controlled as shown in Fig. 15.

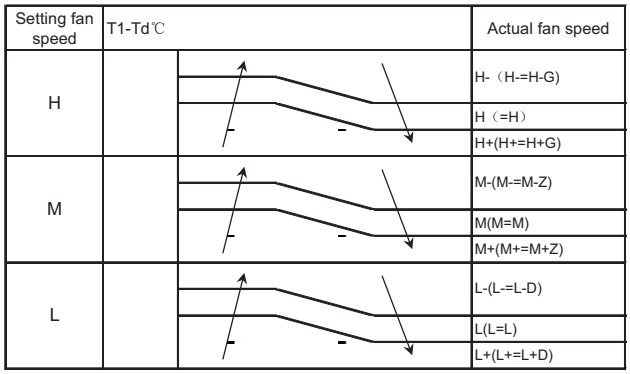


Fig. 15 – Indoor Fan Running Rules

Auto Fan Action in HEATING Mode

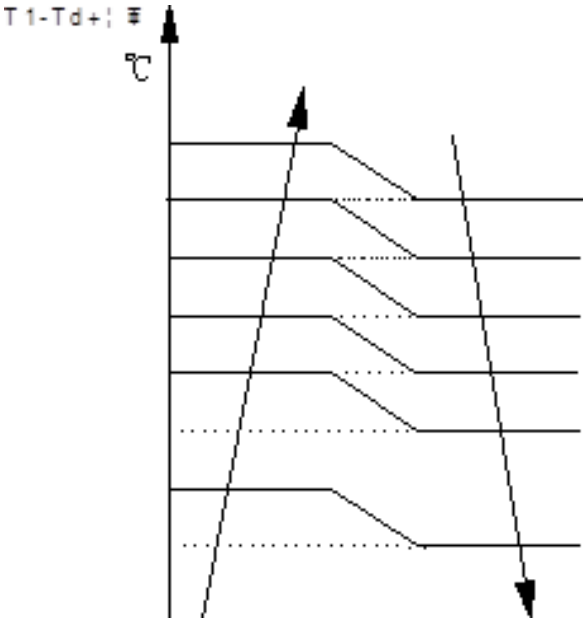


Fig. 16 – Auto Fan Action in HEATING Mode

DEFROSTING Mode

The air conditioner enters the **DEFROSTING** mode according to the T3 temperature value and the T3 temperature change value range plus the compressor running time.

During the **DEFROSTING** mode, the compressor continues to runs, the indoor and outdoor motors stop, and the indoor unit defrost lamp illuminates and dF appears.

Evaporator Coil Temperature Protection

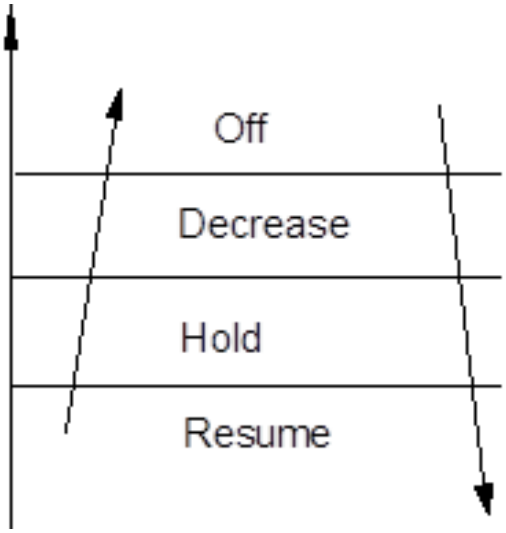


Fig. 17 – Evaporator Coil Temperature Protection

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).

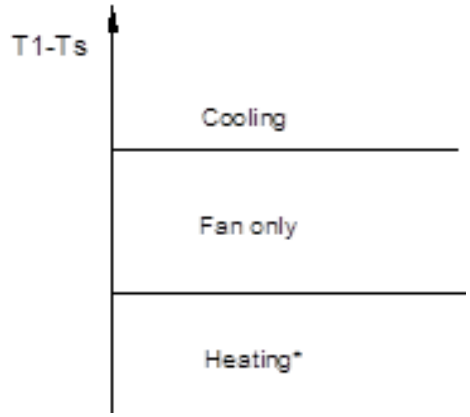


Fig. 18 – AUTO Mode

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 a certain time and then chooses the mode according to T1−Ts. If the setting temperature is modified, the machine chooses the running function again.

DRYING Mode

Indoor Fan Speed is Fixed

Indoor fan speed is fixed at breeze and can not 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.

Outdoor Fan

The outdoor fan operates the same as in the **COOLING** mode.

FORCED OPERATION Function

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

FORCED OPERATION Mode

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

Operation Rules

FORCED COOLING Mode:

The compressor runs at the F2 frequency and the indoor fan runs in the **BREEZE** mode. After running for 30 minutes. the machine enters **AUTO** mode at the 75.2°F(24°C) setting temperature.

FORCED AUTO mode:

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

AUTO−RESTART Function

The indoor unit is equipped with 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 **SWING** function) automatically three (3) 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 1 minute before powering on. In other instances, the compressor waits three (3) minutes before restarts.

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 no change or very little change.

Louver Position Memory Function

When starting the unit again after shutting down, the louver returns to the angle originally set by the user, however the precondition is that the angle must be within the allowable range, if it exceeds, it will memorize the maximum angle of the louver. During operation, if the power fails or the end user shuts down the unit in the turbo mode, the louver returns to the default angle.

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.

Point Check Function

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

Press the **LED DISPLAY** or **AIR DIRECTION** button to check the next or front item’s information.

When the air conditioner enters the information enquiry status, it displays the code name in 2 seconds (see Table 8).

Table 8—Information Enquiry

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
Compressor stop causes	ST	Compressor stop causes
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 air conditioner enters the information enquiry status, it displays the code value for 25 seconds (see Table 9).

Table 9—Information Enquiry

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 displaying temperature is the actual value. 2. The temperature is °C no matter what kind of remote controller is used. 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 10. The unit is RPM.	For some small capacity motors, the display value is from 14−FF (hexadecimal), the corresponding fan speed range is from 200−2550 RPM.
EXV opening angle	0−FF	Actual EXV opening value = Display value turns to decimal value and then multiply 2.	
Compressor continuous running time	0−FF	0−255 minutes	If the actual value exceeds the range, it displays the maximum value or minimum value.
Compressor stop causes	0−99	For the detailed meaning, please consult with engineer	Decimal display
Reserve	0−FF		

TROUBLESHOOTING

Safety

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

NOTE: Remember to discharge the electricity power in capacitor.

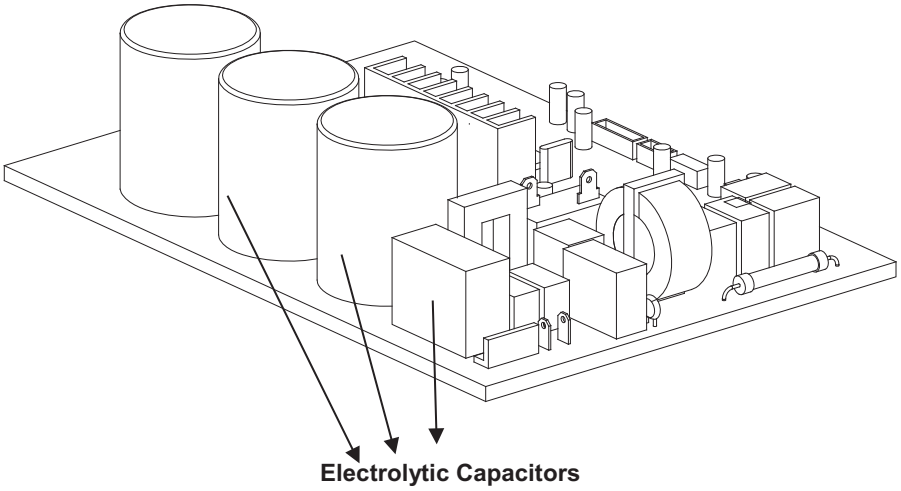


Fig. 19 – Electrolytic Capacitors

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.

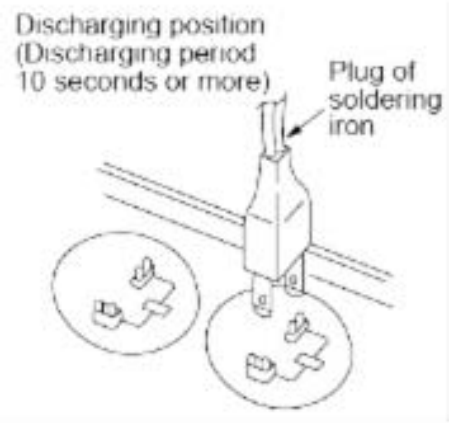


Fig. 20 – Discharge Position

NOTE: Fig. 20 is for reference only. The plug on your unit may differ.

INDOOR UNIT DIAGNOSTIC GUIDE

Table 10—Indoor Unit Error Display

OPERATION LAMP	TIMER LAMP	DISPLAY	LED STATUS
★ 1 time	X	E0	Indoor unit EEPROM parameter error
★ 2 times	X	E1	Indoor / outdoor units communication error
★ 3 times	X	E2	Zero−crossing signal detection error
★ 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
★ 1 time	O	F0	Overload current protection
★ 2 times	O	F1	Outdoor ambient temperature sensor T4 open circuit or short circuit
★ 3 times	O	F2	Condenser coil temperature sensor T3 open circuit or short circuit
★ 4 times	O	F3	Compressor discharge temperature sensor T5 open circuit or short circuit
★ 5 times	O	F4	Outdoor unit EEPROM parameter error
★ 6 times	O	F5	Outdoor fan speed has been out of control
★ 1 time	★	P0	IPM malfunction or IGBT over−strong current protection
★ 2 times	★	P1	Over voltage or over low voltage protection
★ 3 times	★	P2	High temperature protection of compressor top diagnosis and solution (only for 9k,12k models)
★ 5 times	★	P4	Inverter compressor drive error

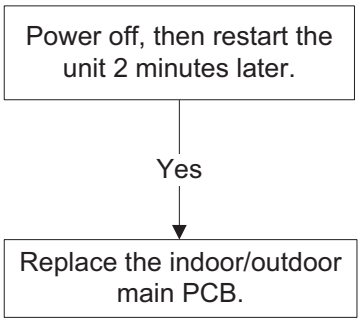
O(light) X(off) ★(flash)

DIAGNOSIS AND SOLUTION

EEPROM Parameter Error Diagnosis and Solution (E0/F4)

Error Code	E0/F4
Malfunction decision conditions	Indoor or outdoor PCB main chip does not receive feedback from the EEPROM chip.
Supposed causes	·Installation mistake ·PCB faulty

Troubleshooting



EEPROM: A read−only memory whose contents can be erased and reprogrammed using a pulsed voltage. For the EEPROM chip location, please refer to Fig 21 and Fig. 22.

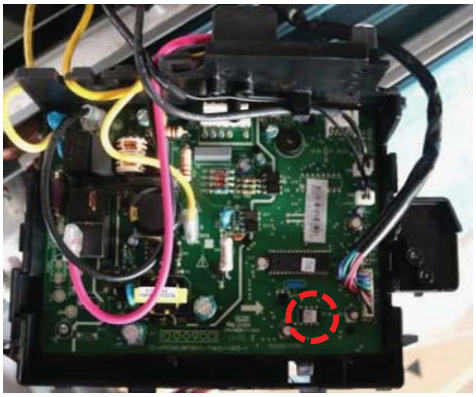


Fig. 21 – Indoor PCB

Fig. 22 – Outdoor PCB (18K Model)

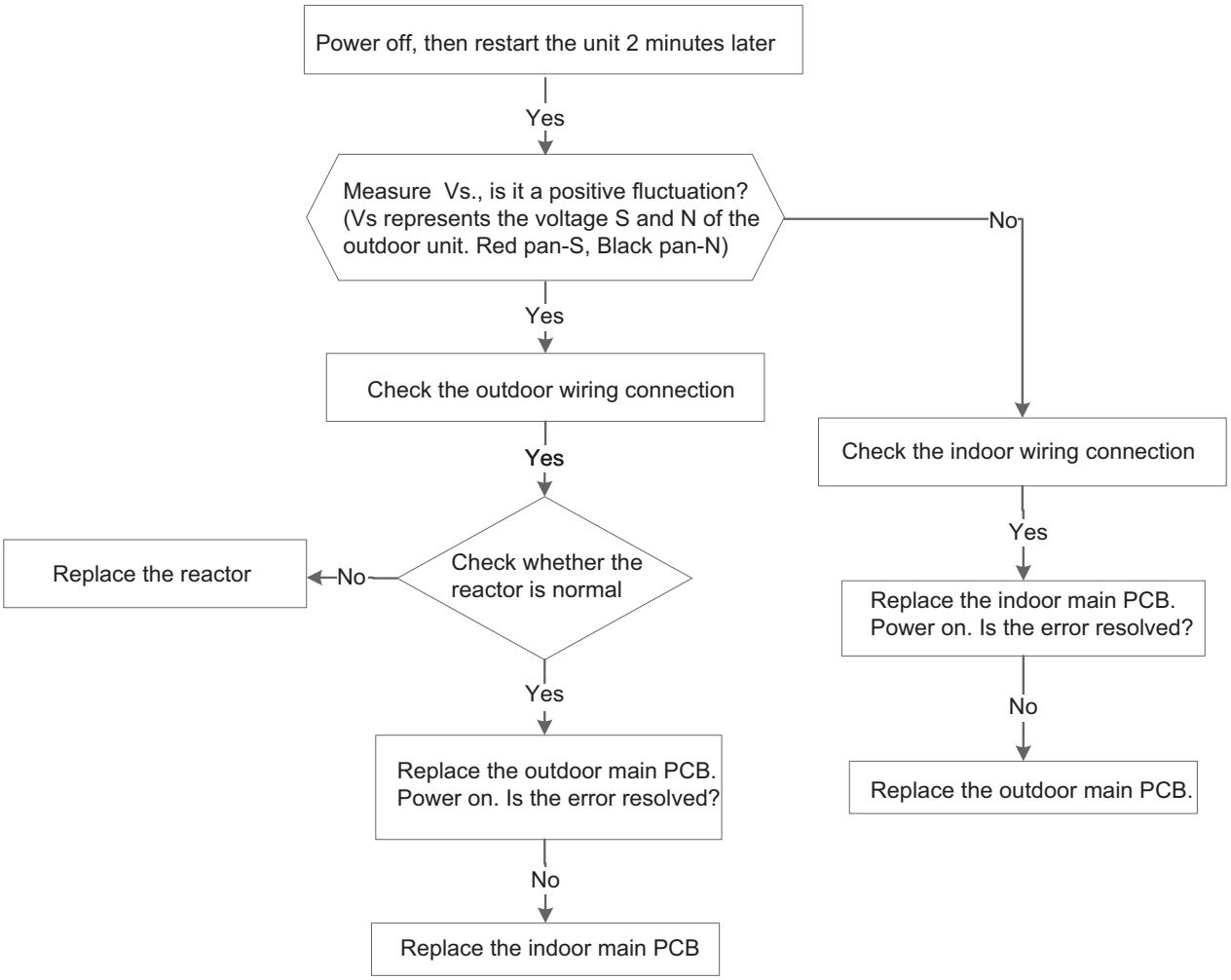
NOTE: The two photos above are for reference only and they may differ from the actual unit.

DIAGNOSIS AND SOLUTION (CONT)

Indoor / outdoor unit's communication diagnosis and solution (E1)

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.
Supposed Causes	·Wiring mistake ·Indoor or outdoor PCB faulty

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

Fig. 23 – Test the DC Voltage

Use a multimeter to test the DC voltage between L2 port and S port of the outdoor unit. The red pin of the multimeter connects with the L2 port while the black pin is for the S port. When air conditioner is running normal, the voltage moves alternately between –50V to 50V. If the outdoor unit has a malfunction, the voltage will move alternately with positive value. If the indoor unit has malfunction, the voltage will have a certain value.

Fig. 24 – Test the Reactor Resistance

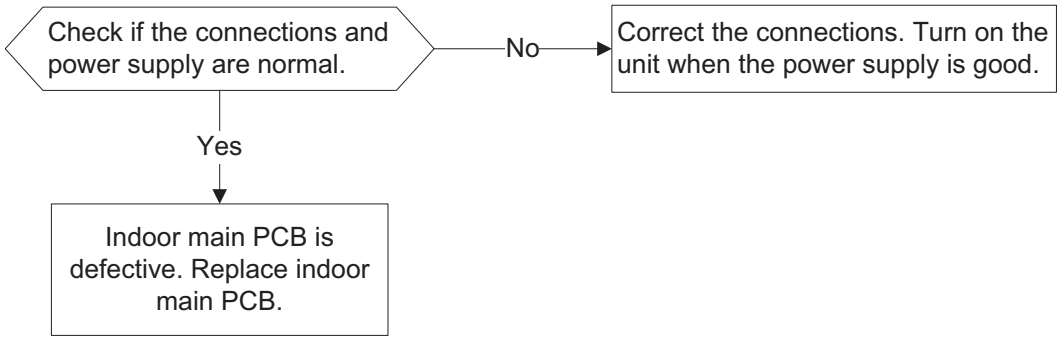
Use a multimeter to test the resistance of the reactor which does not connect with the capacitor. The normal value should be around zero (0) ohm. Otherwise, the reactor has a malfunction and needs to be replaced.

DIAGNOSIS AND SOLUTION (CONT)

Zero crossing detection error diagnosis and solution (E2)

Error Code	E2
Malfunction decision conditions	When the PCB does not receive a zero crossing signal feedback for 4 minutes or the zero crossing signal time interval is abnormal.
Supposed causes	·Connection mistake ·PCB faulty

Troubleshooting

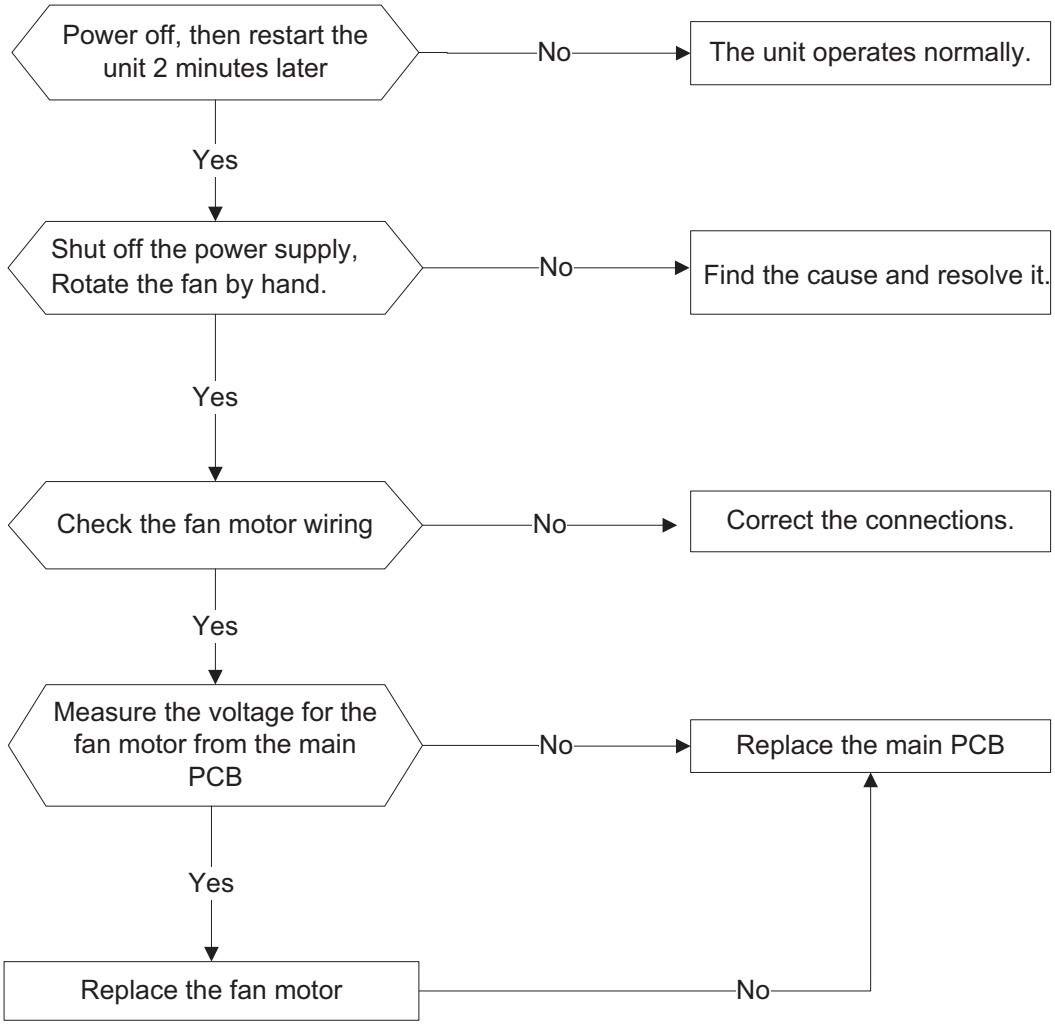


DIAGNOSIS AND SOLUTION (CONT)

Fan speed has been out of control diagnosis and solution (E3/F5)

Error Code	E3/F5
Malfunction decision conditions	When indoor fan speed remains too low (300RPM) for certain time, the unit stops and the LED displays the failure.
Supposed causes	·Wiring mistake ·Fan ass'y faulty ·Fan motor faulty ·PCB faulty

Troubleshooting



DIAGNOSIS AND SOLUTION (CONT)

Index 1

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 fan motor connector. If the voltage value is not in the range shown in Table 11 or Table 12, the PCB has an issue and needs to be replaced.

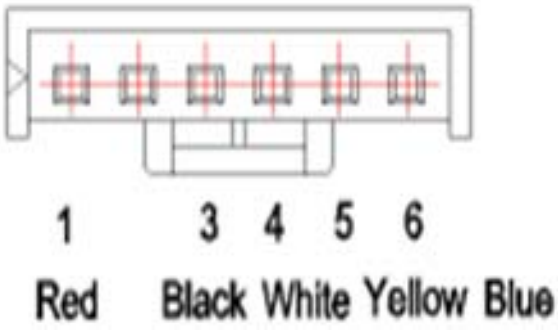


Fig. 25 – Motor Connector

Table 11—DC motor voltage input and output (voltage: 220−240V~)

NO.	COLOR	SIGNAL	VOLTAGE
1	Red	Vs/Vm	280V~380V
2	−−−	−−−	−−−
3	Black	GND	0V
4	White	Vcc	14−17.5V
5	Yellow	Vsp	0~5.6V
6	Blue	FG	14−17.5V

Table 12—DC motor voltage input and output (voltage : 115V~)

NO.	COLOR	SIGNAL	VOLTAGE
1	Red	Vs/Vm	140V~190V
2	−−−	−−−	−−−
3	Black	GND	0V
4	White	Vcc	14−17.5V
5	Yellow	Vsp	0~5.6V
6	Blue	FG	14−17.5V

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

- Power on the unit and check if the fan runs normally. If the fan runs normally, the PCB has an issue and needs to be replaced. If the fan does not run normally, measure the resistance of each two pins. If the resistance is not equal to each other, the fan motor has an issue and needs to be replaced, otherwise the PCB has an issue and needs to be replaced.

3 Indoor AC Fan Motor

- Power on the unit and set the unit in **FAN** mode at the high fan speed. Run for 15 seconds then measure the voltage of pin1 and pin2. If the voltage value is less than 100V(208~240V power supply) or 50V(115V power supply), the PCB has an issue and needs to be replaced.

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.
Supposed causes	·Wiring mistake ·Sensor faulty ·PCB faulty

Troubleshooting

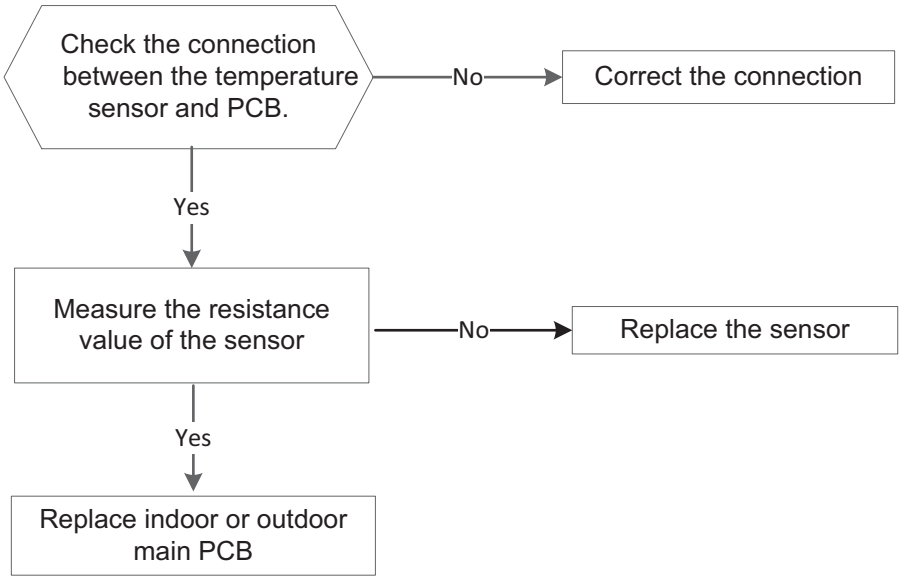


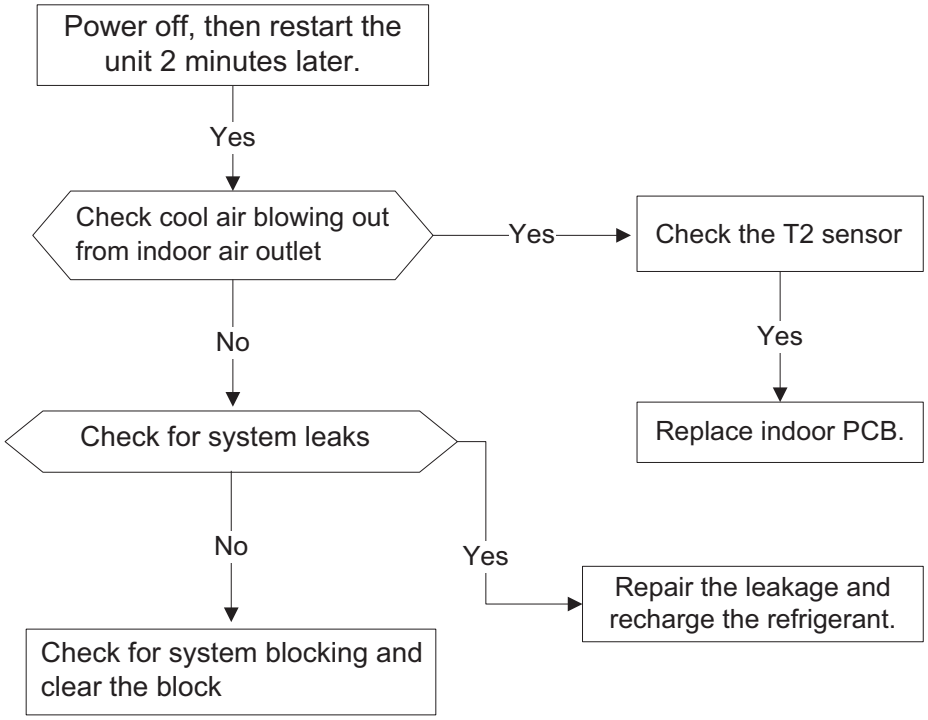
Fig. 26 – Check the connection

DIAGNOSIS AND SOLUTION (CONT)

Refrigerant Leakage Detection diagnosis and solution (EC)

Error Code	EC
Malfunction decision conditions	Define the evaporator coil temp.T2 of the compressor. It starts running in Tcool. At first, 5 minutes after the compressor starts up, if T2 ＜Tcool－35.6°F (Tcool－2 °C) does not run for 4 seconds and this situation occurs 3 times, the display area displays “EC” and the air conditioner will turn off.
Supposed causes	·T2 sensor faulty ·Indoor PCB faulty ·System problems, such as leakage or blocking.

Troubleshooting

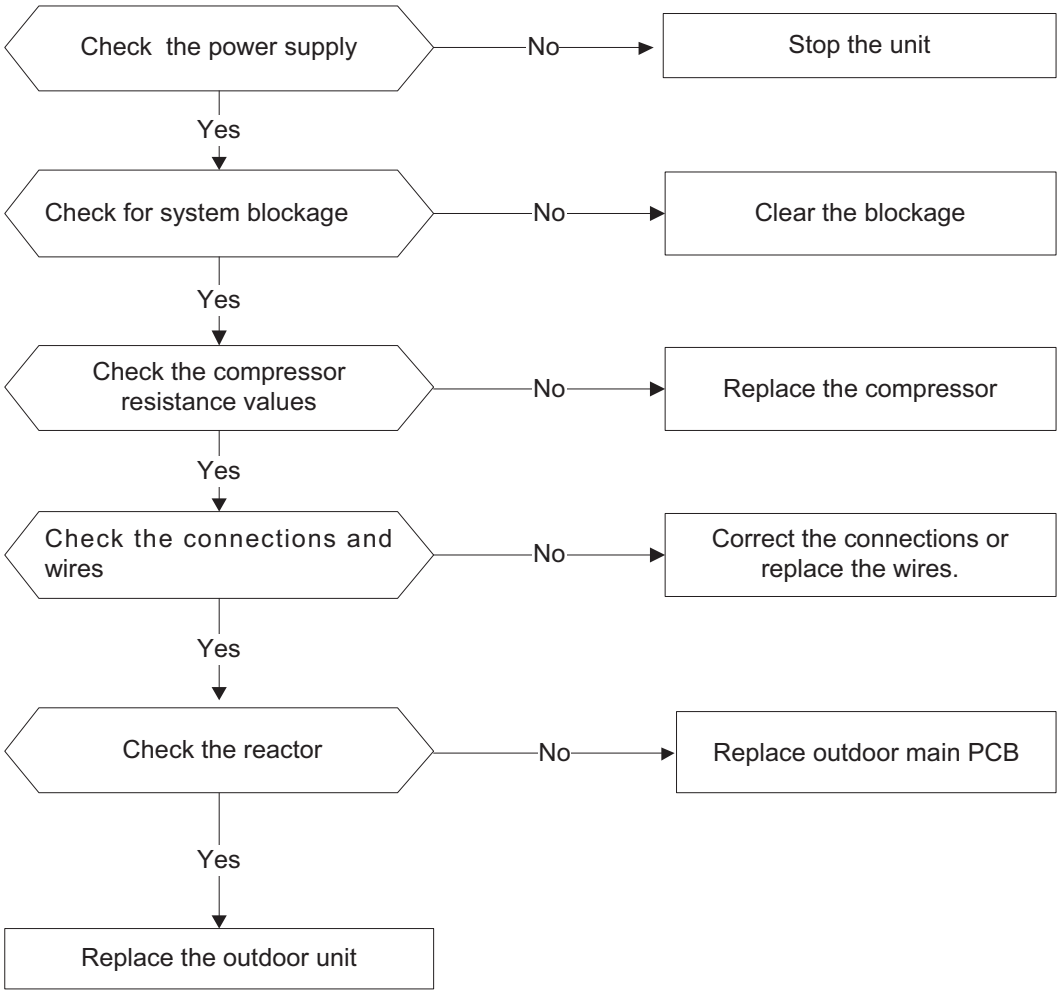


DIAGNOSIS AND SOLUTION (CONT)

Overload current protection diagnosis and solution (F0)

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

Troubleshooting

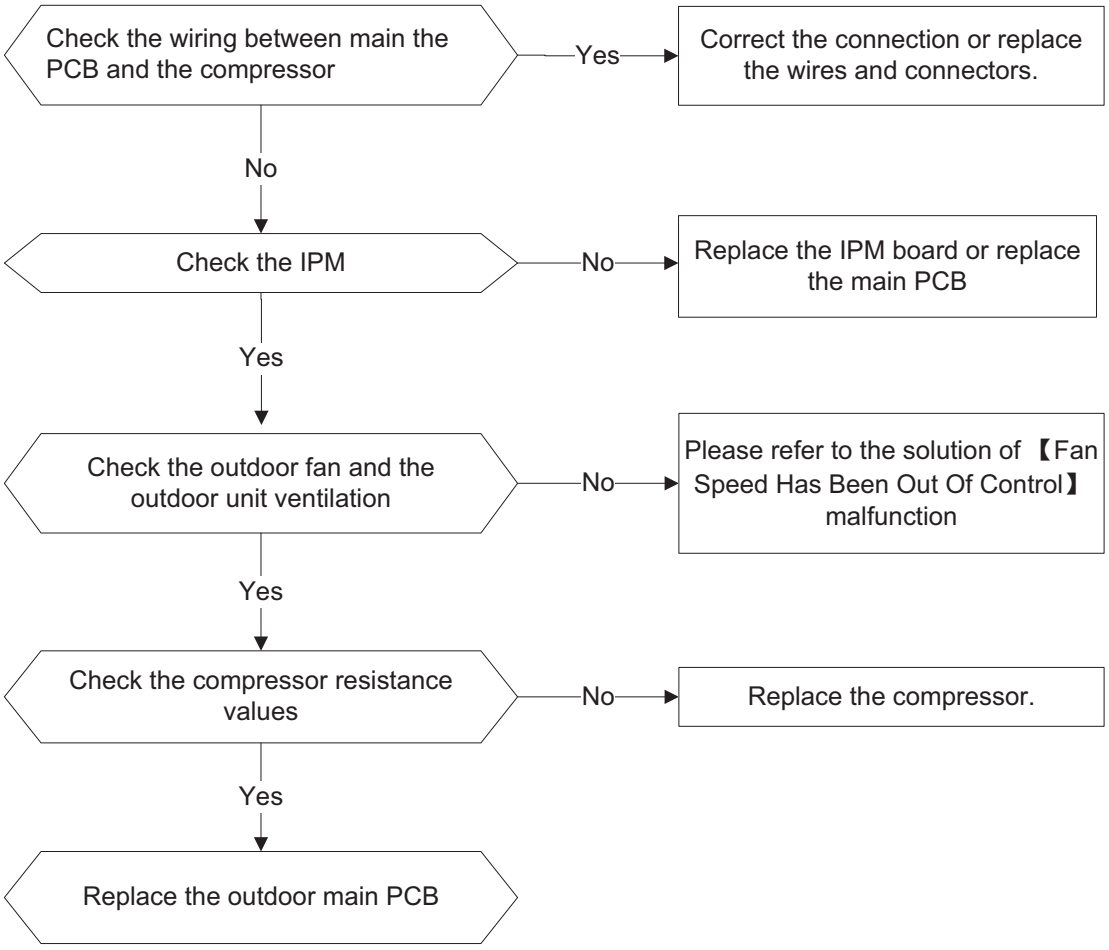


DIAGNOSIS AND SOLUTION (CONT)

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

Error Code	P0
Malfunction decision conditions	When the voltage signal, that the IPM sends to the compressor drive chip is abnormal, the display LED displays P0” and the air conditioner turns off.
Supposed causes	·Wiring mistake ·IPM malfunction ·Outdoor fan ass’y faulty ·Compressor malfunction ·Outdoor PCB faulty

Troubleshooting



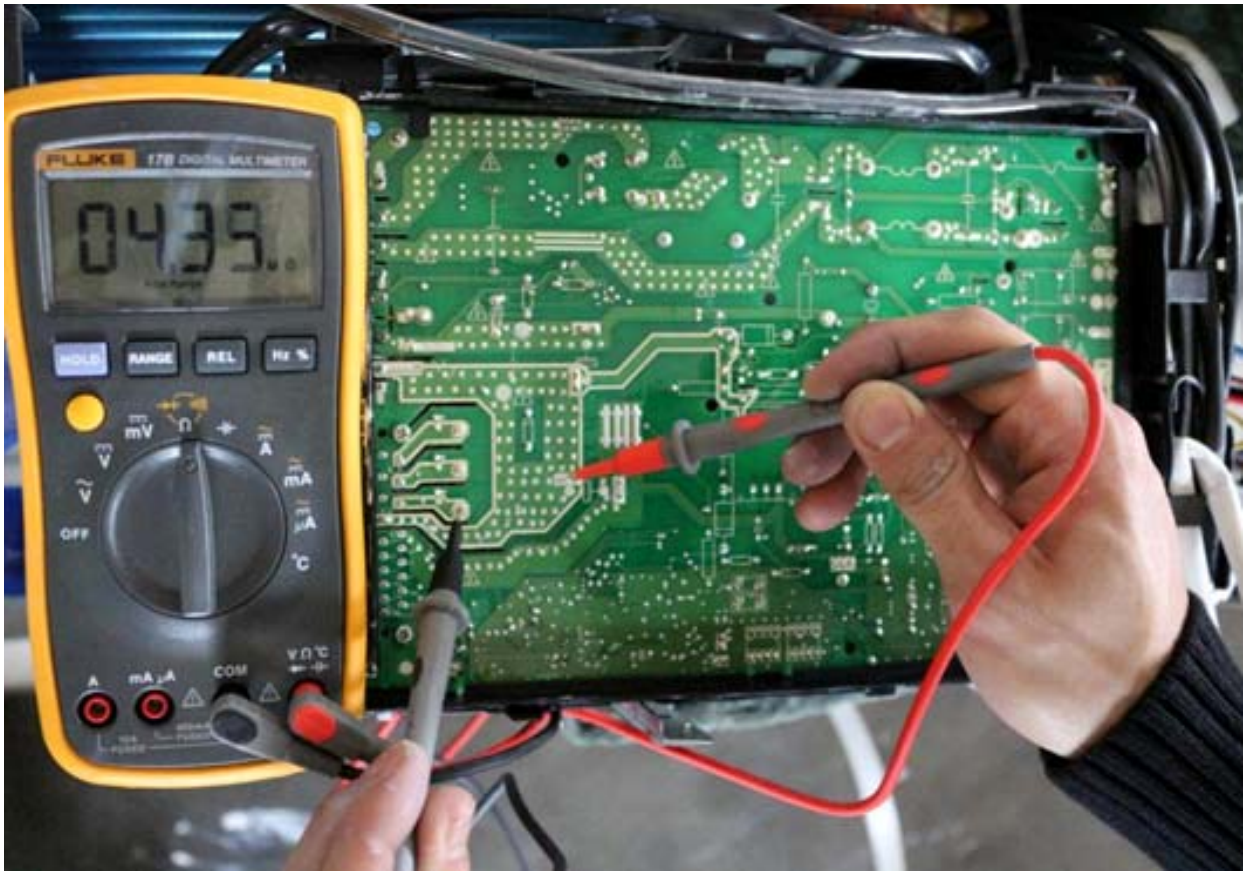


Fig. 27 – P–U

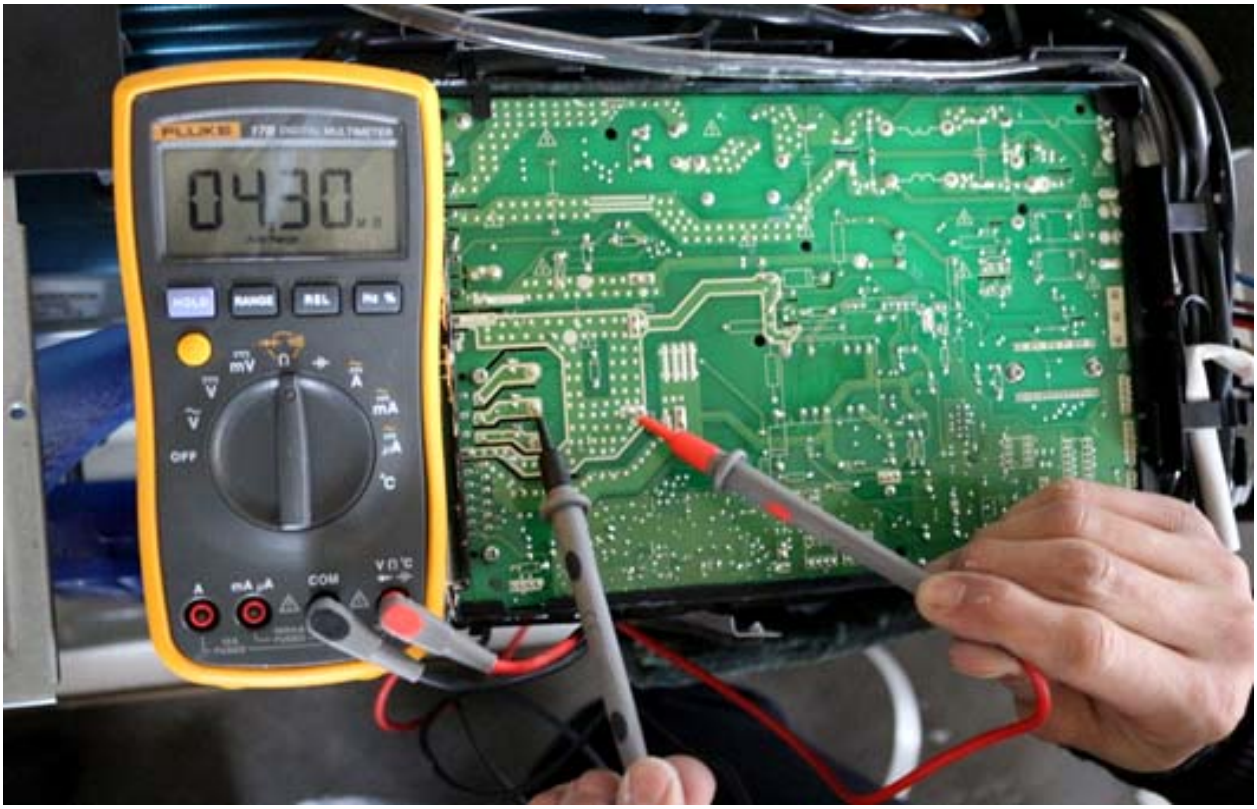


Fig. 28 – P–V

DIAGNOSIS AND SOLUTION (CONT)

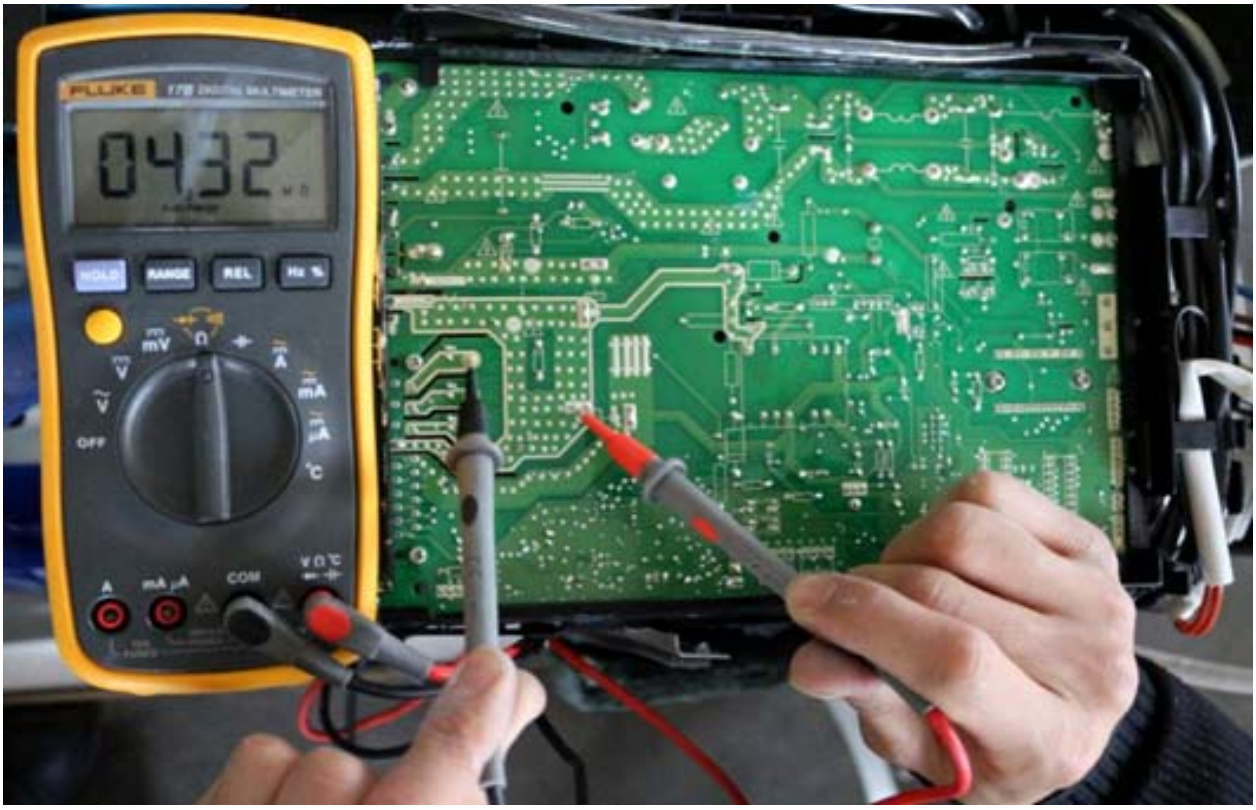


Fig. 29 – P–W

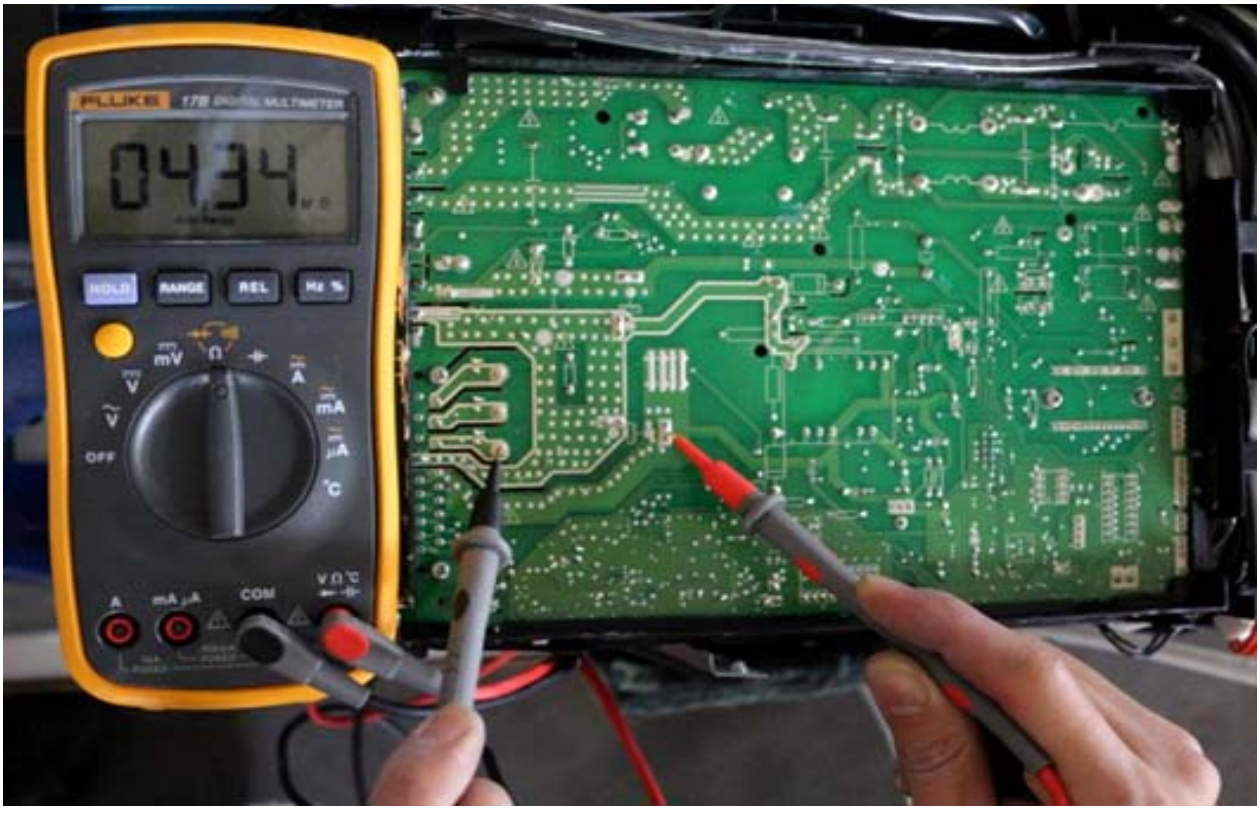


Fig. 30 – N–U

DIAGNOSIS AND SOLUTION (CONT)

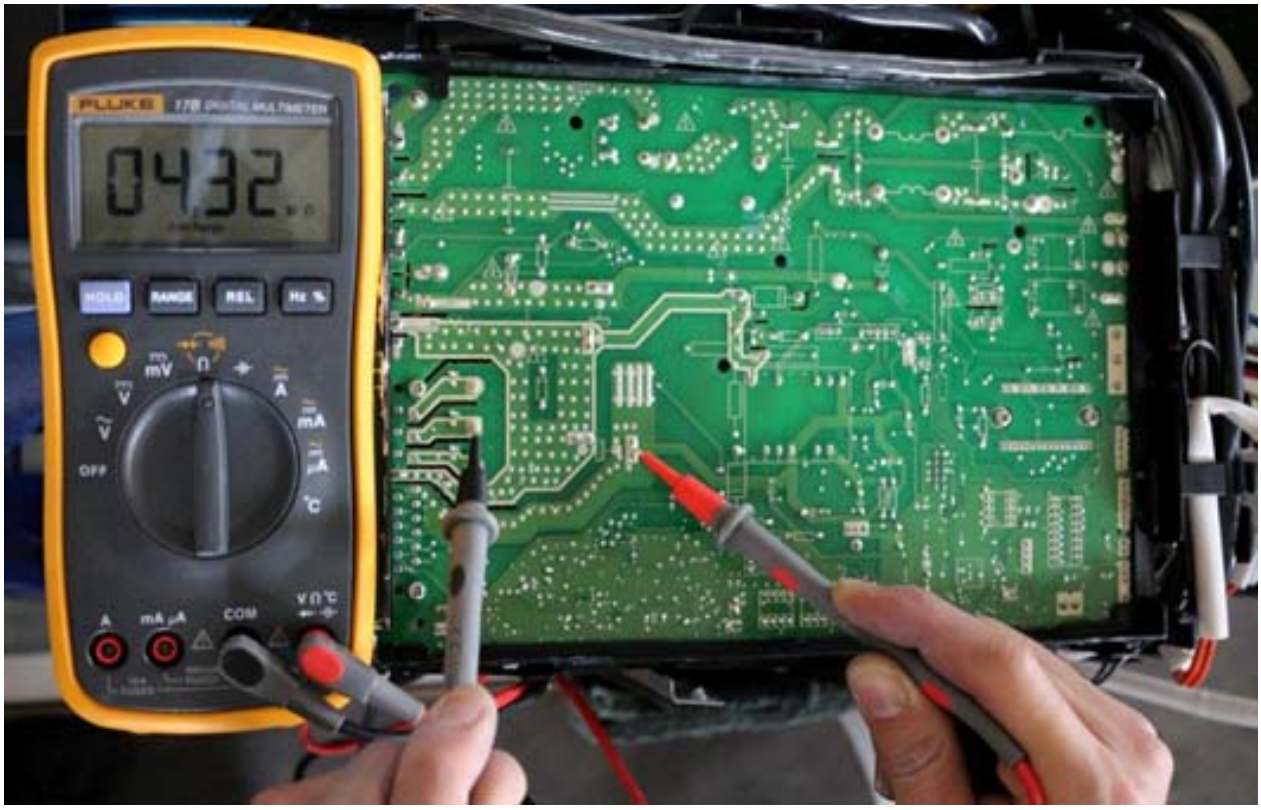


Fig. 31 – N–V

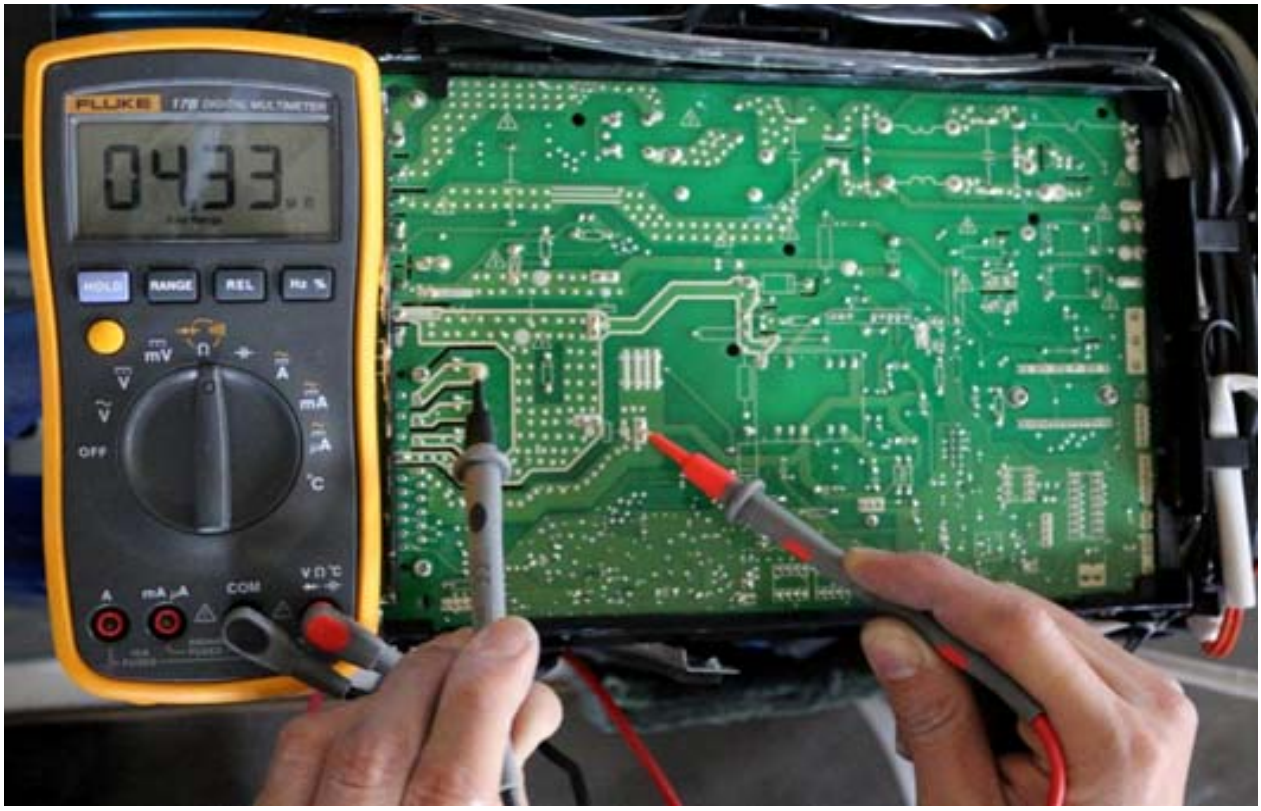


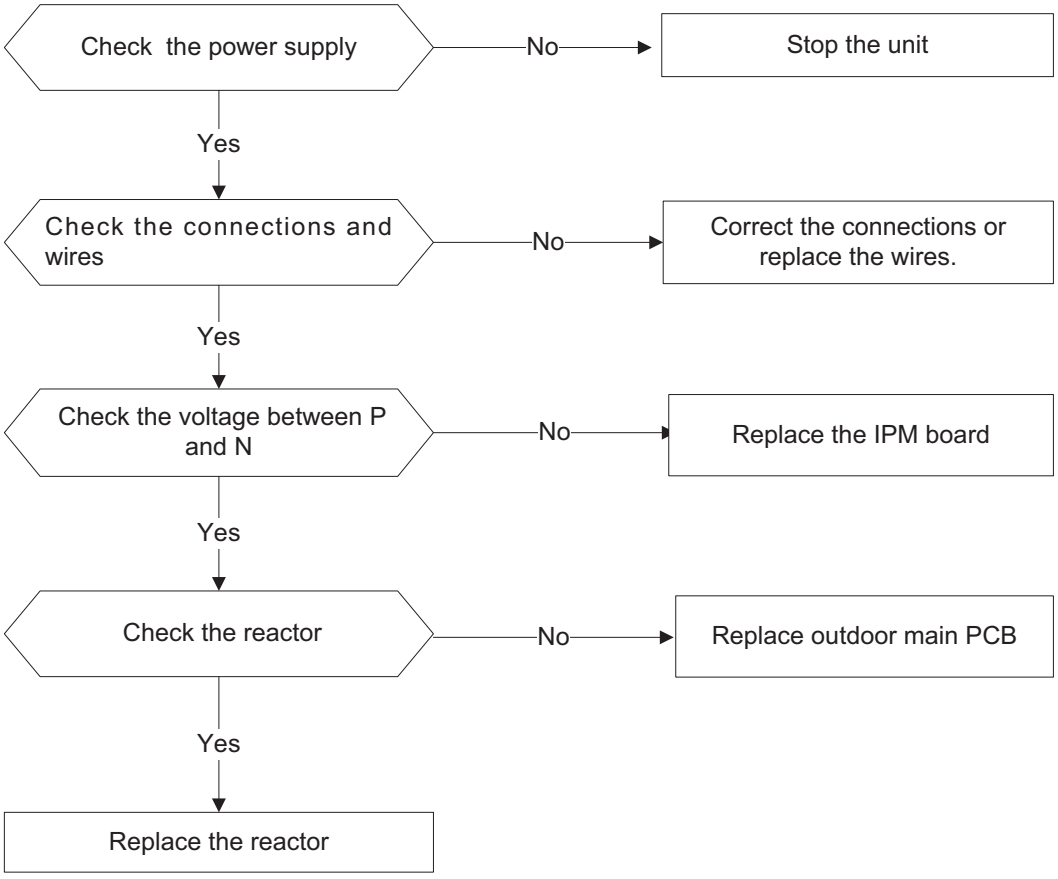
Fig. 32 – N–W

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.
Supposed causes	·Power supply problems ·System leakage or block ·PCB faulty

Troubleshooting



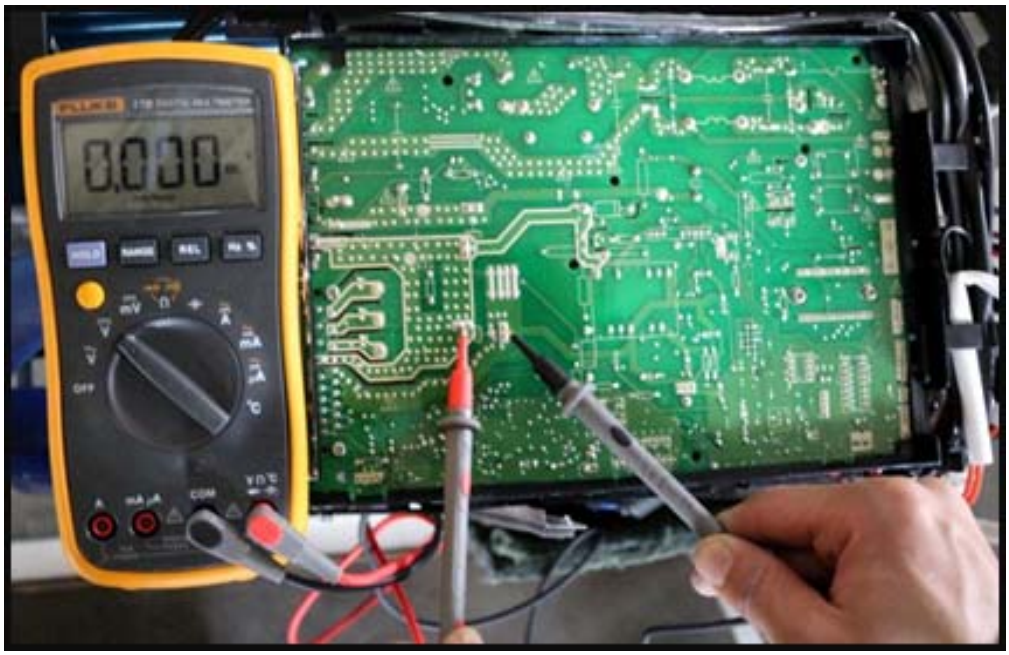


Fig. 33 – Test

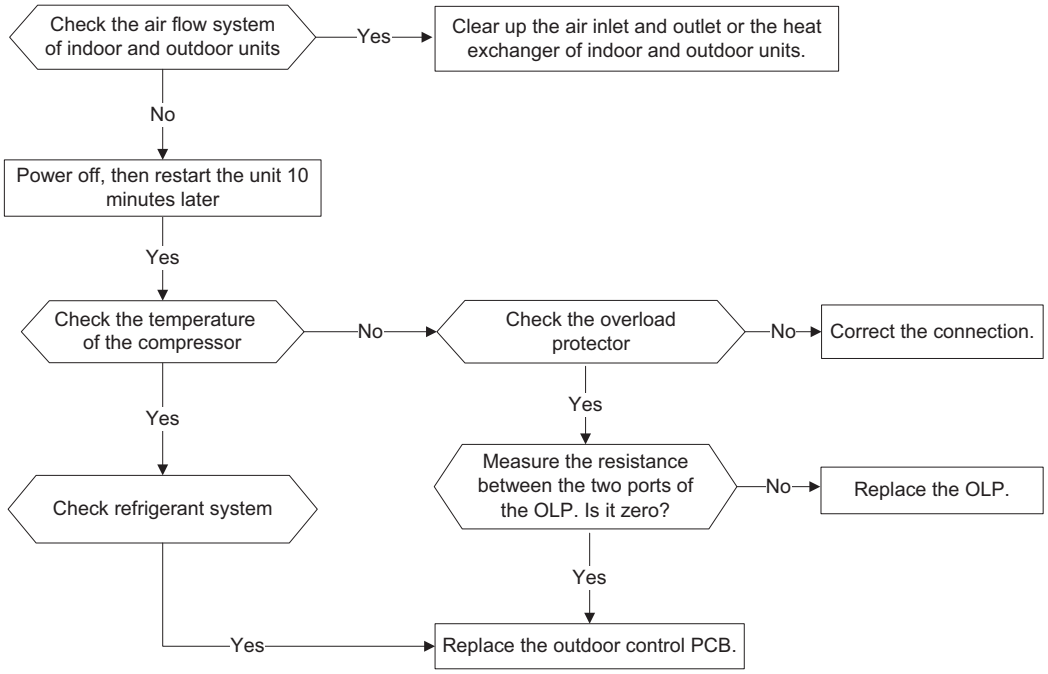
NOTE: Measure the DC voltage between the P and N port. The normal value should be around 310V.

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.
Supposed causes	·Power supply problems ·System leakage or block ·PCB faulty

Troubleshooting

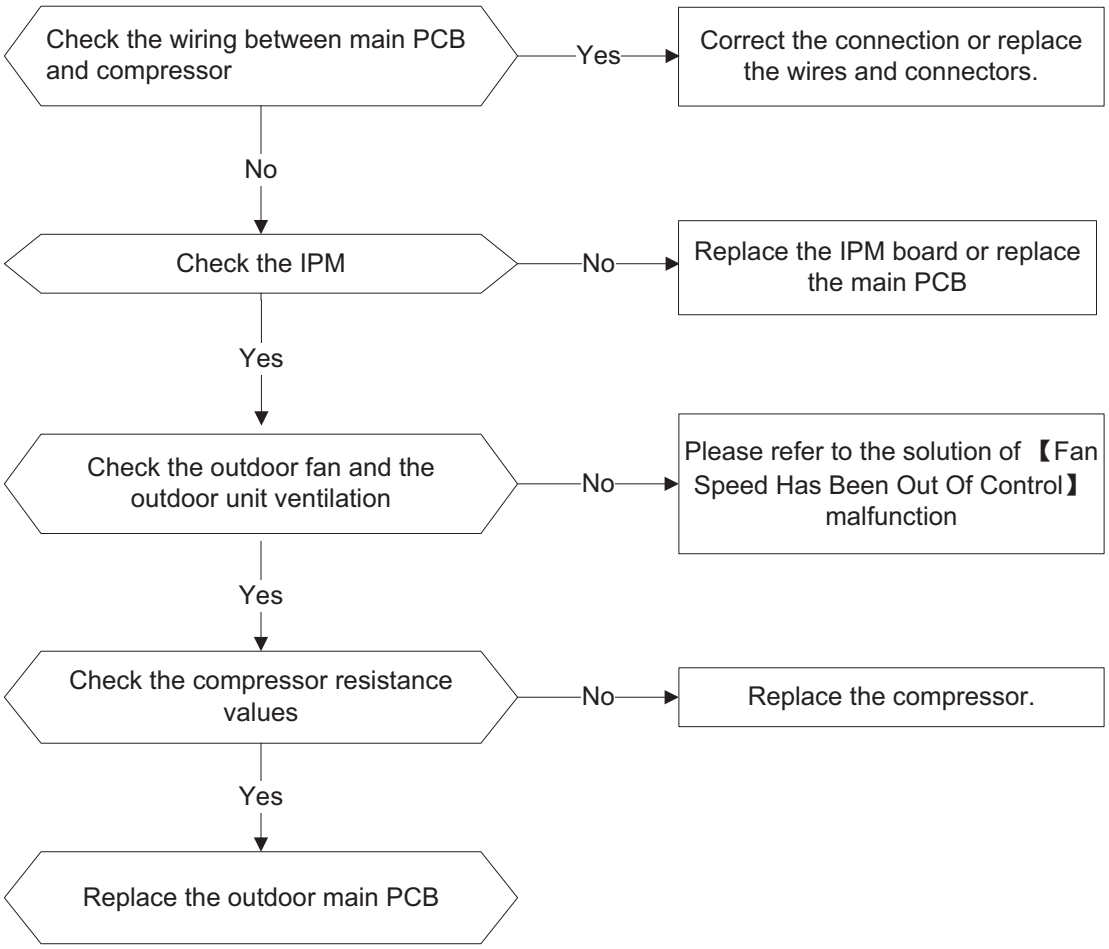


DIAGNOSIS AND SOLUTION (CONT)

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, etc..
Supposed causes	·Wiring mistake ·IPM malfunction ·Outdoor fan ass'y faulty ·Compressor malfunction ·Outdoor PCB faulty

Troubleshooting



Main Parts Check

Temperature Sensor Checking

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

Fig. 34 – 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

Table 13—Temperature Sensor Resistance Value Table for T1, T2, T3, T4 (°C--K)

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

APPENDIX (CONT)

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

APPENDIX (CONT)

Table 15—ΔT(° F)=9ΔT(° C)/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

IPM Continuity Check

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

Table 16—Digital Tester

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

Indoor AC Fan Motor

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

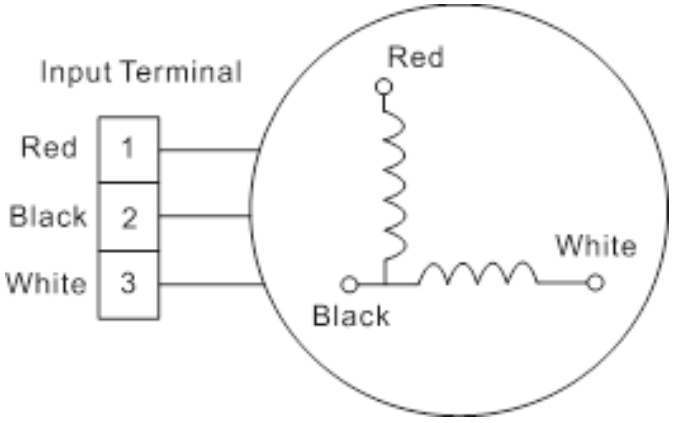
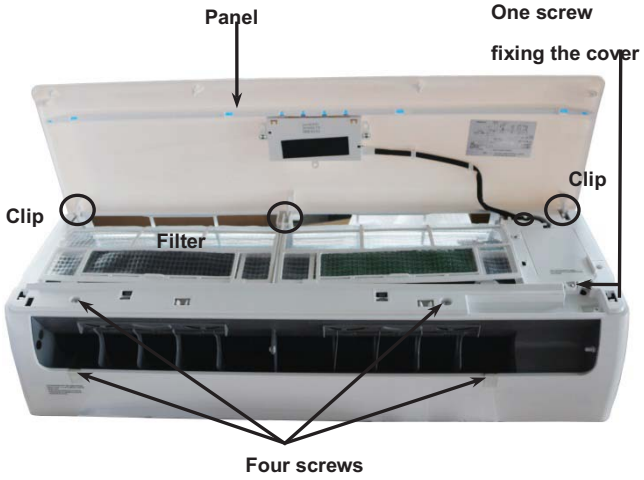


Table 17—Resistance Value

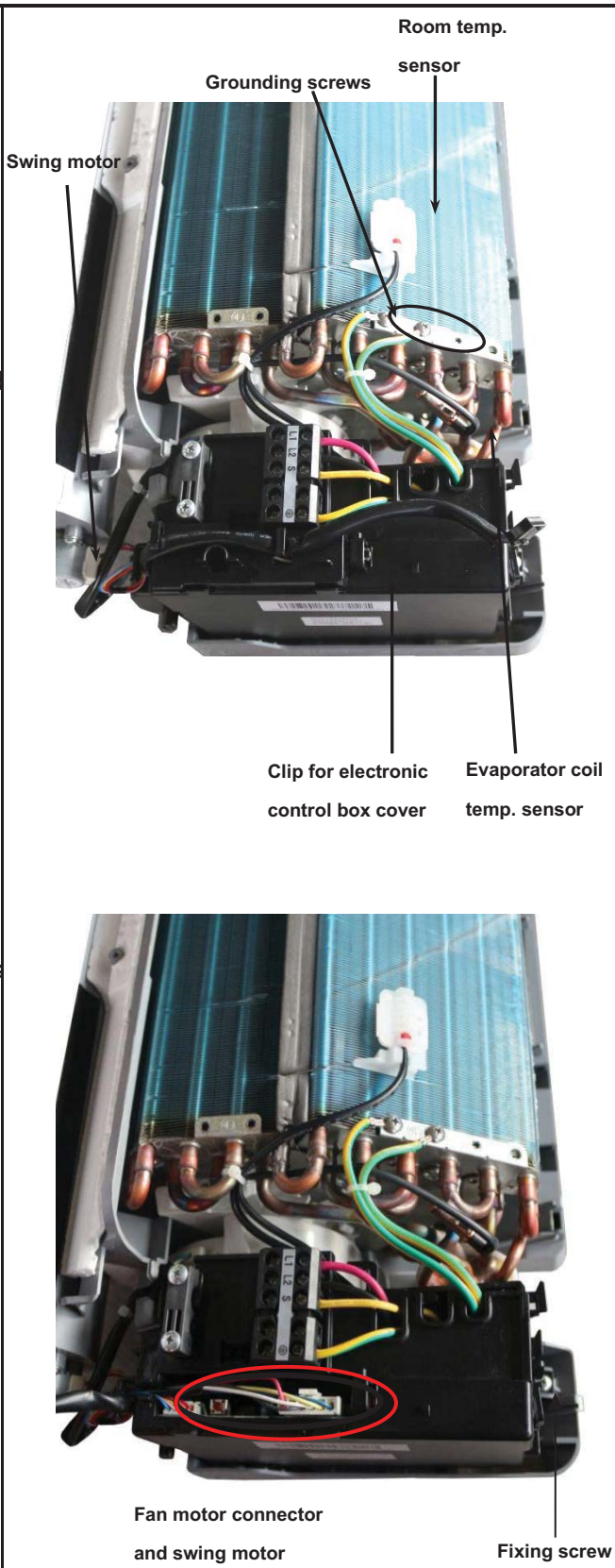
POSITION	RESISTANCE VALUE			
	RPG13B		RPG50B (YKFG−50−4−1)	
Black − Red	100.5Ω ±8% (20° C /68° F) (Brand: Weiling)	100Ω ±8% (20° C /68° F) (Brand: Dayang)	82.2Ω ±8% (20° C /68° F) (Brand: Weiling)	85Ω ±8% (20° C /68° F) (Brand: Dayang)
White − Black	64.5Ω ±8% (20° C /68° F) (Brand: Weiling)	68.5Ω ±8% (20° C /68° F) (Brand: Dayang)	72.3Ω ±8% (20° C /68° F) (Brand: Weiling)	57.8Ω ±8% (20° C /68° F) (Brand: Dayang)

DISASSEMBLY INSTRUCTIONS

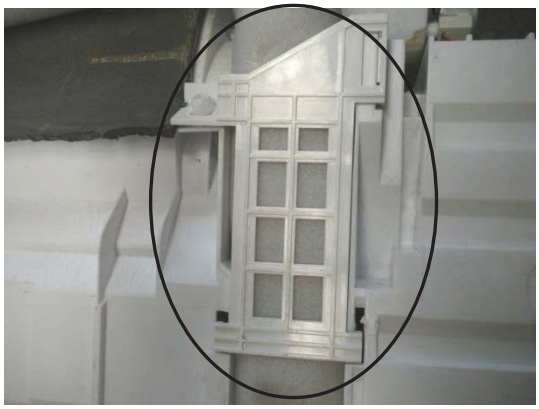
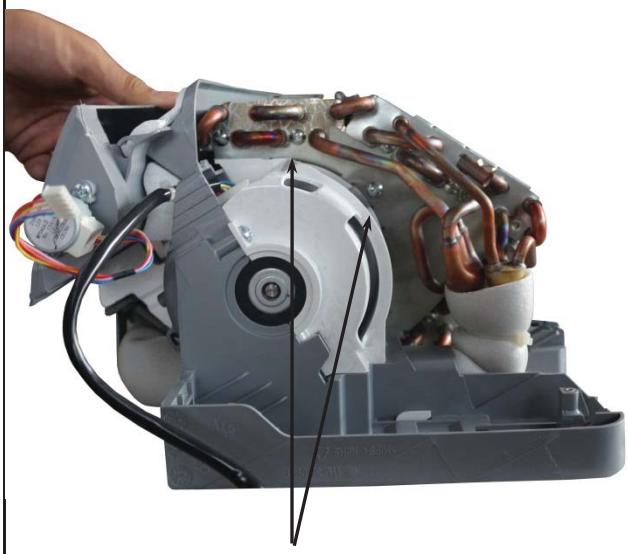
NOTE: This part is for reference, the photos may have slight difference with your unit.

No.	Parts name	Procedures	Remarks
1	Front panel	How to remove the front panel. 1) Pull the bottom side of the panel and release the clips. Then remove the front panel. 2) Remove the filter and horizontal louver. 3) Remove the four screws. 4) Remove the cover (one screw). 5) Lift the panel frame and release the connector of display assembly. Then remove the panel frame assembly.	**Overview:** 

DISASSEMBLY INSTRUCTIONS (CONT)

2	Electrical parts	How to remove the electrical parts. 1) After removing the front panel (see section 1), pull out the room temperature sensor and evaporator coil sensor. Remove the grounding screws. 2) Pull out the clip toward the left side and open the cover. 3) Remove the securing screw and open the box cover. 4) Pull out the connectors of the swing motor and the fan motor. 5) Remove the securing screw and remove the electronic control box and air outlet assembly.	

DISASSEMBLY INSTRUCTIONS (CONT)

3	Evaporator	How to remove the evaporator. 1) After removing the front panel assembly and electrical parts (sections 1 and 2), remove the pipe holder at the rear side of the unit. 2) Remove the two screws on the evaporator at the base bearing side. 3) Remove the two screws on the evaporator at the fixed plates and then lift the evaporator ass'y.	  **Two screws at the base bearing side** **Two screws at the fixed plates**

DISASSEMBLY INSTRUCTIONS (CONT)

4	Fan and motor	How to remove the fan and motor. 1) After removing the evaporator assembly (see sections 1 - 3), remove the three (3) screws securing the cover. 2) Remove the screw securing the motor and then pull out the motor.	 Three screws One screw

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Replaces: NEW

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