

# 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

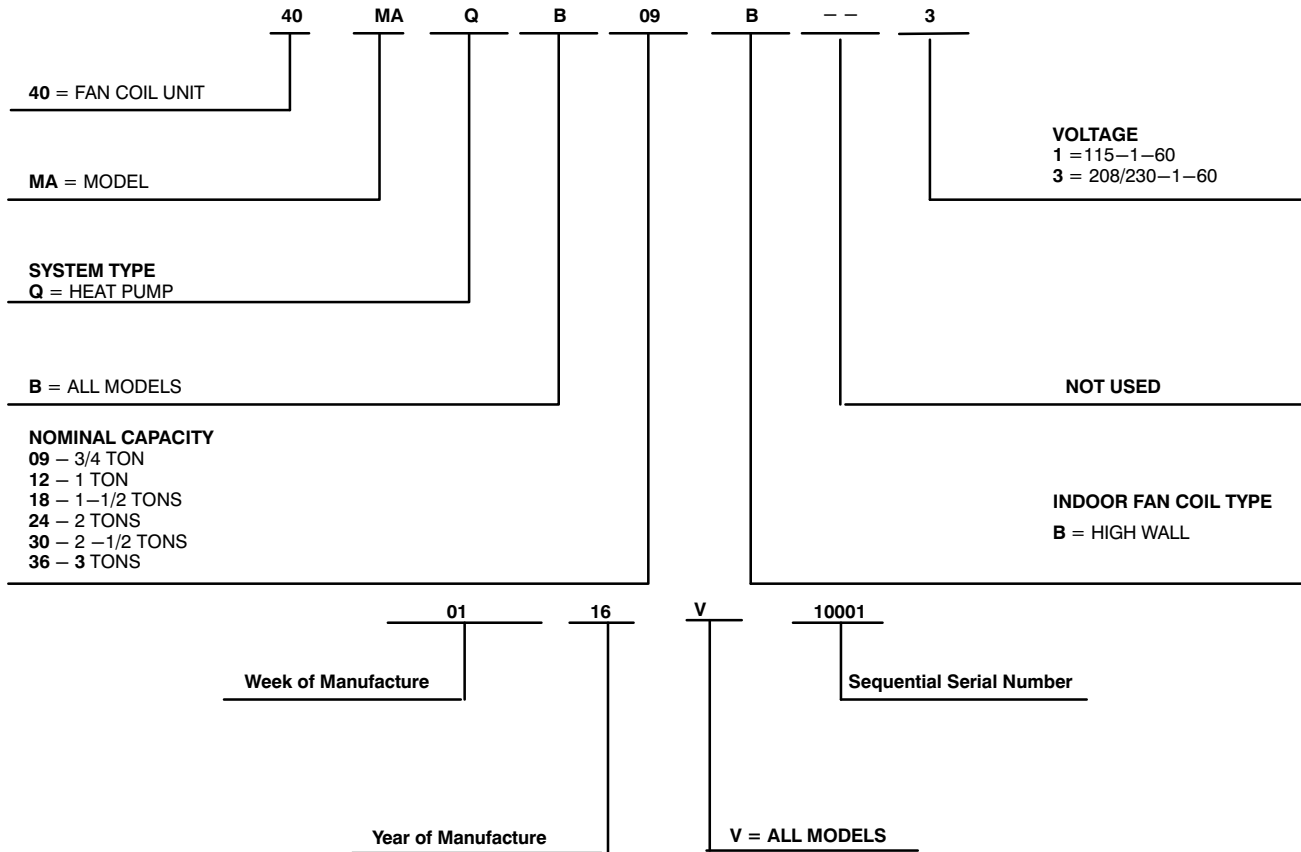
This Service Manual provides the necessary information to service, repair, and maintain the indoor units. Section 2 of this manual has an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

# 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](http://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  |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>OUTDOOR UNIT SINGLE ZONE</b> | 38MAQB09---1  | 38MAQB12---1  | 38MAQB09---3  | 38MAQB12---3  | 38MAQB18---3  | 38MAQB24---3  | 38MAQB30---3  | 38MAQB36R---3 |
| <b>OUTDOOR UNIT MULTI-ZONE</b>  | 38MAQB09R---1 | 38MAQB12R---1 | 38MAQB09R---3 | 38MAQB12R---3 | 38MAQB18R---3 | 38MAQB24R---3 | 38MAQB30R---3 | 38MAQB36R---3 |
|                                 |               |               | 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) |

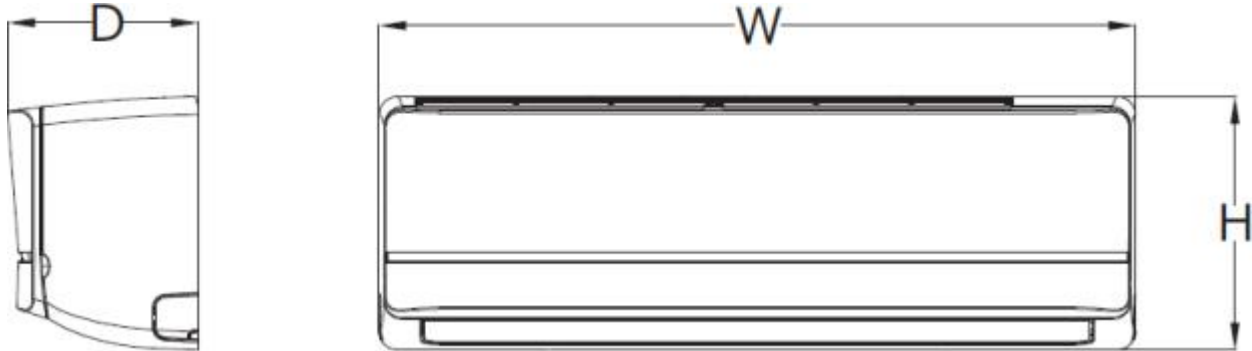


Fig. 1 – Indoor Units

# CLEARANCES

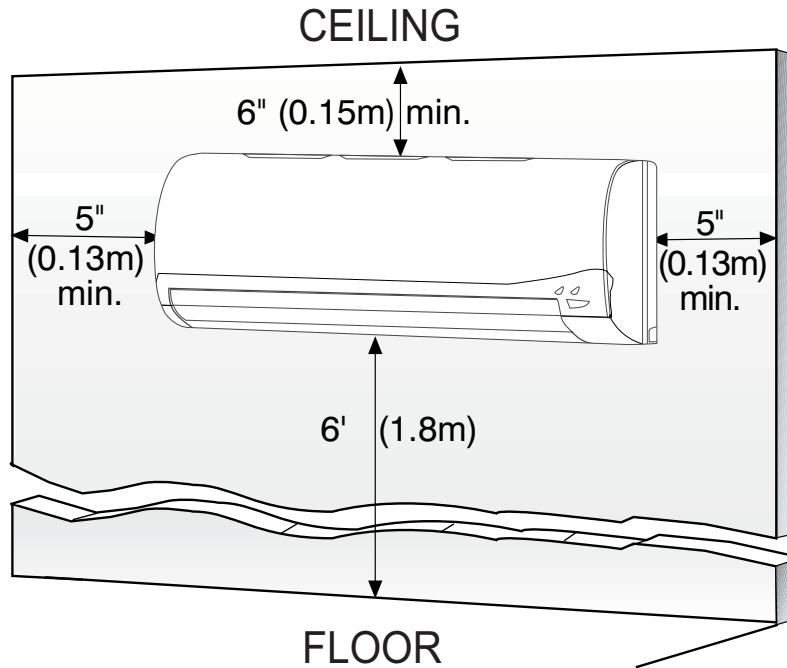


Fig. 2 – Indoor Unit Clearance

# 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 MOC (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

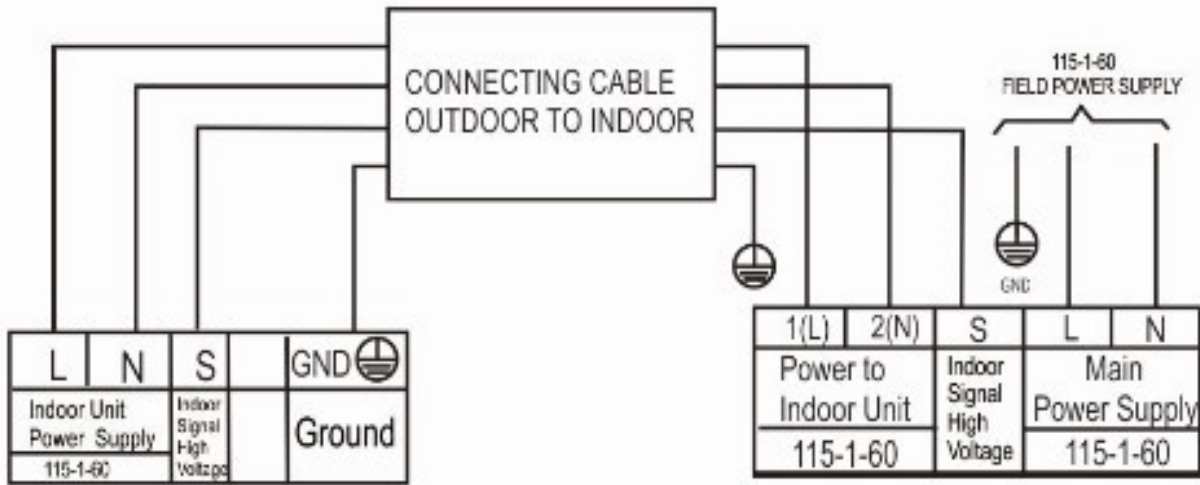


Fig. 3 – 115V

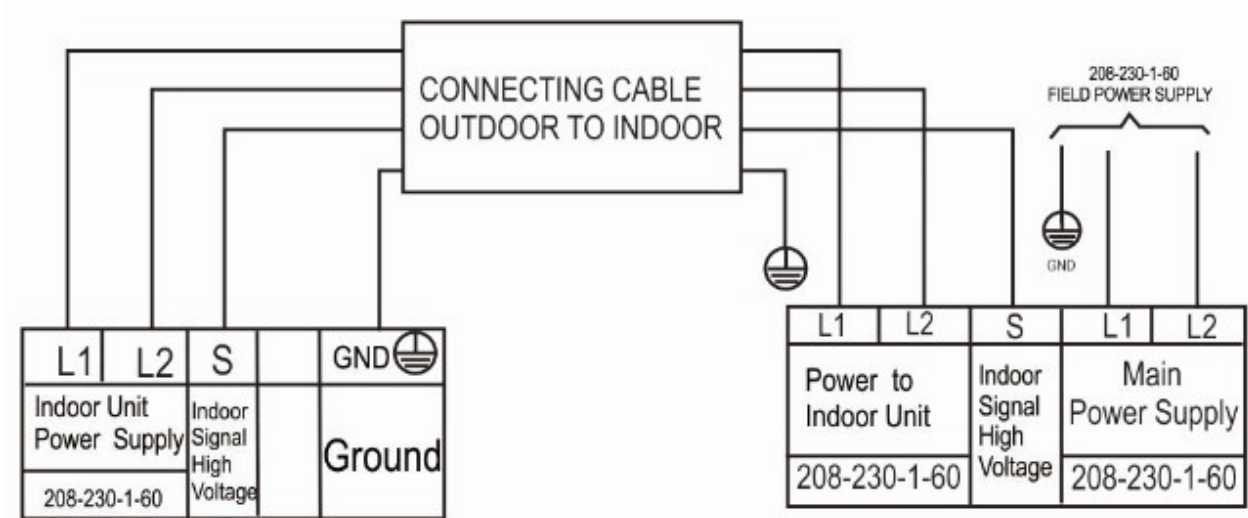
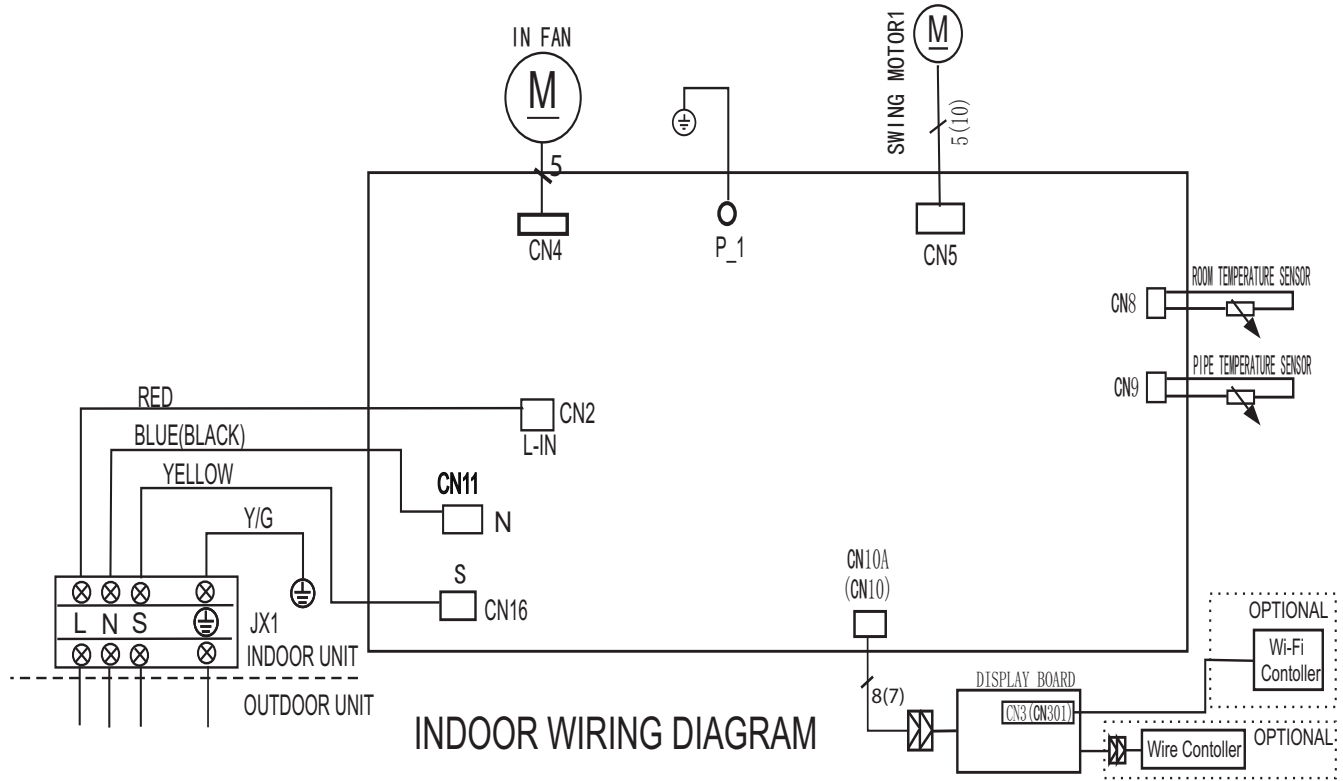


Fig. 4 – 208-230V

**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

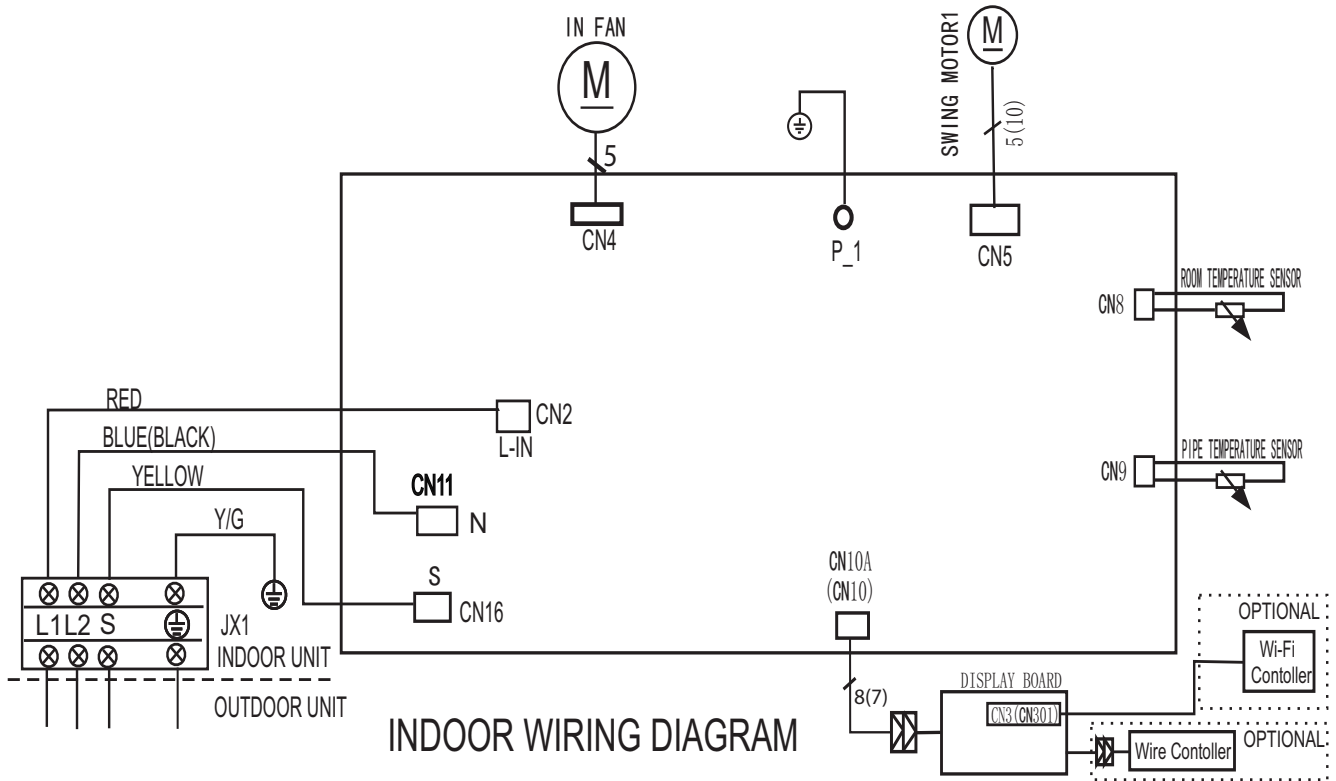


**Fig. 5 – Wiring Diagram Sizes 09–12 (115V)**

**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

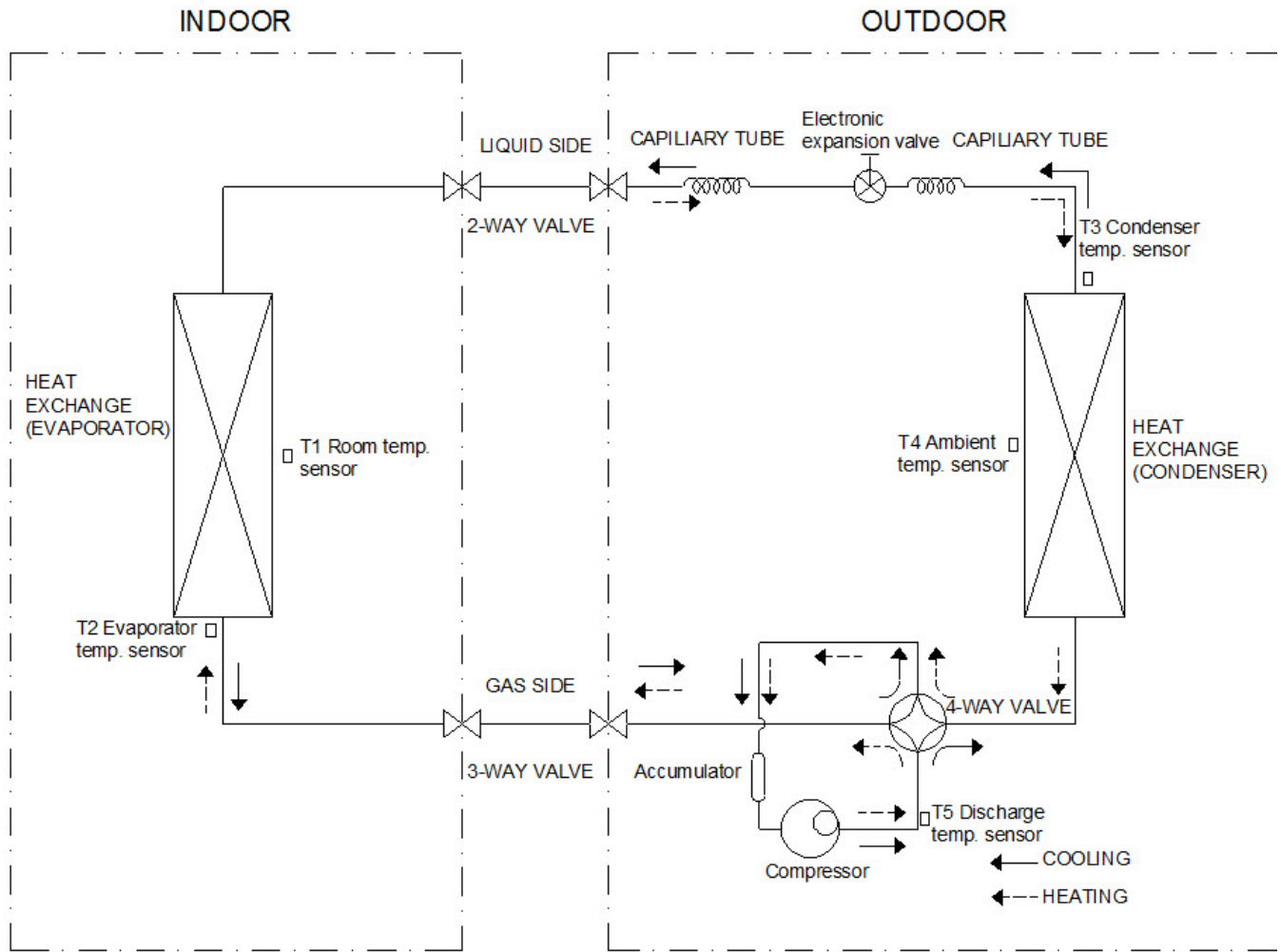


Fig. 7 – Heat Pumps

## 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.

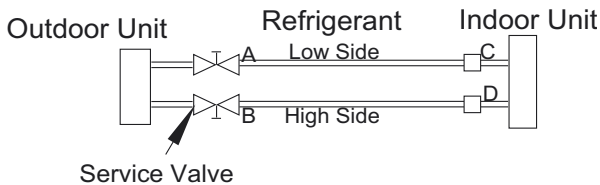
Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the following procedure is followed. Always break a vacuum with dry nitrogen.

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

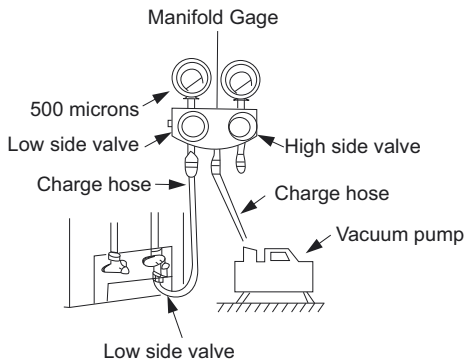
## System Vacuum and Charge

### 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.



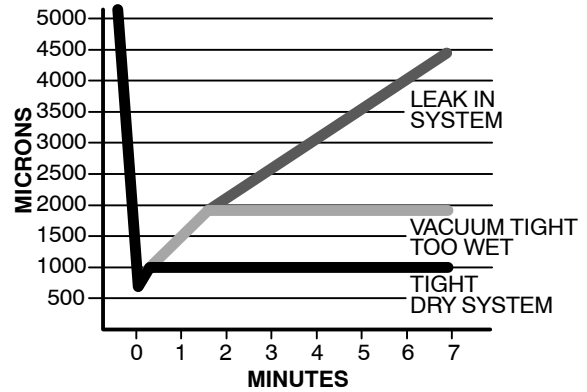
**Fig. 8 – Service Valve**



**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).

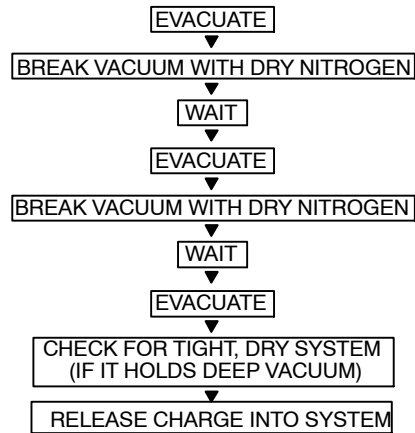


**Fig. 10 – Deep Vacuum Graph**

### 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.

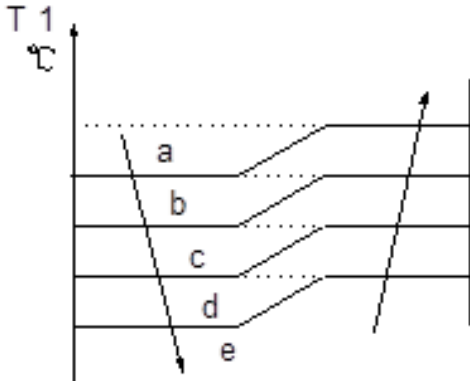
**Sensor Protection at Open Circuit and Breaking Disconnection**

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**

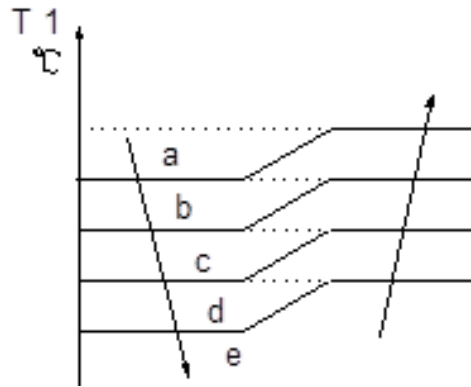
In the **COOLING** mode, the indoor fan runs all the time and the speed can be selected as high, medium, low and auto. When the setting temperature is reached, if the compressor stops running, the indoor fan motor runs at the minimum or setting speed.

The indoor fan is controlled by the rules shown in Fig. 13.

| Setting fan speed | T1-Td °C (°F) | Actual fan speed |
|-------------------|---------------|------------------|
| H                 | A             | H+ (H+=H+G)      |
|                   | B             | H (=H)           |
|                   | C             | H- (H-=H-G)      |
| M                 | D             | M+ (M+=M+Z)      |
|                   | E             | M (M=M)          |
|                   | F             | M- (M-=M-Z)      |
| L                 | G             | L+ (L+=L+D)      |
|                   | H             | L (L=L)          |
|                   | I             | L- (L-=L-D)      |

**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**

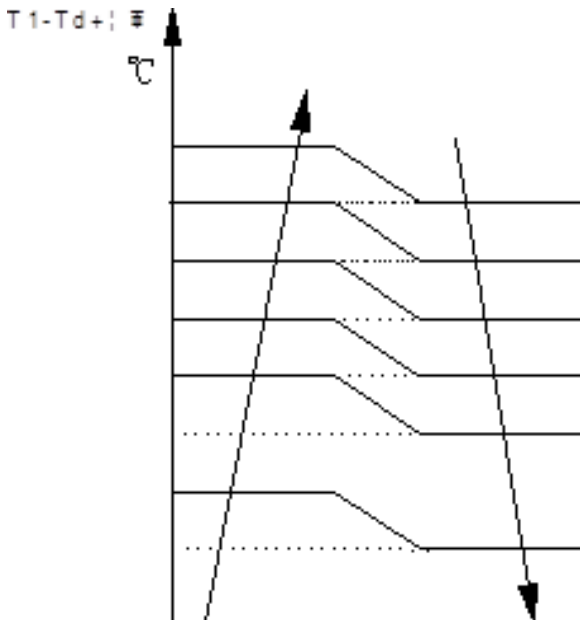
When the compressor is on, the indoor fan can be set to high/med/low/auto/mute. When the indoor unit coil temperature is low, the anti-cold air function starts and the indoor fan motor runs at a low speed and the speed can not be changed. When the temperature is lower than the setting value, the indoor 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.

| Setting fan speed | T1-Td°C | Actual fan speed |
|-------------------|---------|------------------|
| H                 |         | H- (H-=H-G)      |
|                   |         | H (=H)           |
|                   |         | H+(H+=H+G)       |
| M                 |         | M-(M-=M-Z)       |
|                   |         | M(M=M)           |
|                   |         | M+(M+=M+Z)       |
| L                 |         | L-(L-=L-D)       |
|                   |         | L(L=L)           |
|                   |         | L+(L+=L+D)       |

**Fig. 15 – Indoor Fan Running Rules**

**Auto Fan Action in HEATING Mode**



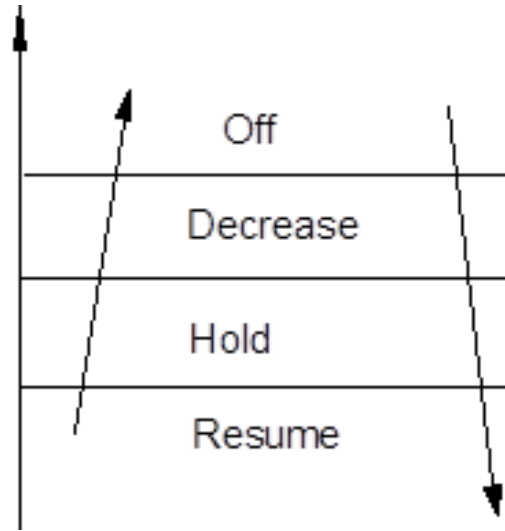
**Fig. 16 – Auto Fan Action in HEATING Mode**

**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 run, the indoor and outdoor motors stop, and the indoor unit defrost lamp illuminates and **df** appears.

**Evaporator Coil Temperature Protection**



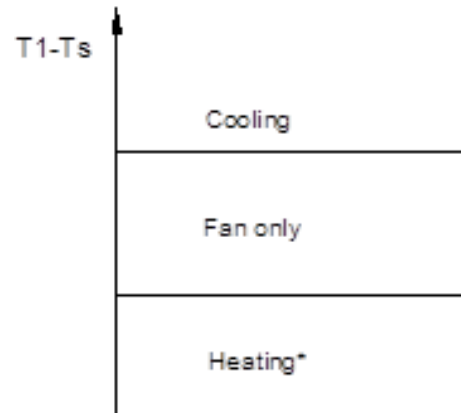
**Fig. 17 – Evaporator Coil Temperature Protection**

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**

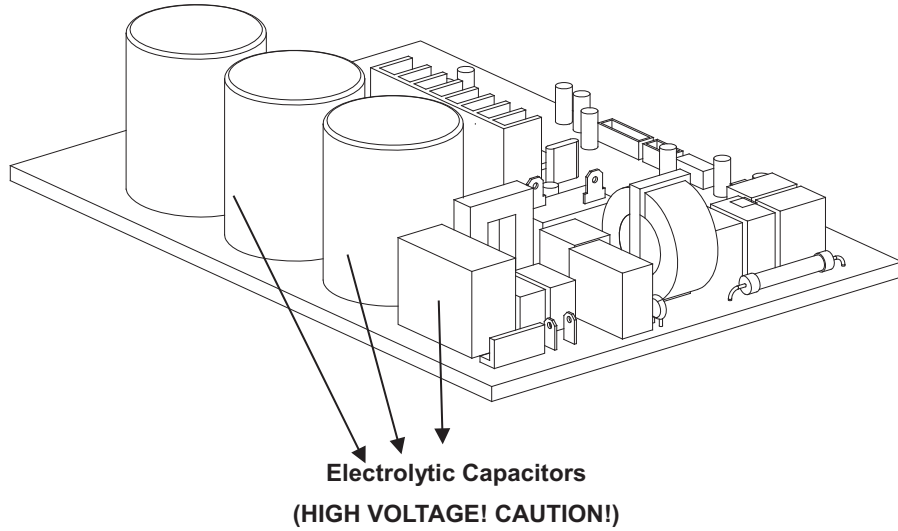
| ENQUIRY INFORMATION   | DISPLAY VALUE               | MEANING   | REMARK  |
|---|-----------------------------|---|---|
| T1,T2,T3,T4,<br>T2B,TP,TH,<br>Targeted<br>Frequency,<br>Actual<br>Frequency | -1F,-1E,-1d,-1c,<br>-1b,-1A | -25,-24,-23,-22,-21,-20   | 1. The displaying temperature is the actual value.<br>2. The temperature is °C no matter what kind of remote controller is used.<br>3. T1,T2,T3,T4,T2B display range: -25~70, TP display range: -20~130.<br>4. Frequency display range: 0~159HZ.<br>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<br>/Outdoor fan<br>speed                                   | 0                           | OFF   | For some big capacity motors.   |
|   | 1,2,3,4                     | Low speed, Medium speed,<br>High speed, Turbo   |   |
|   | 14-FF                       | Actual fan speed = Display<br>value turns to decimal value<br>and then multiply 10. The<br>unit is RPM. |   |
| EXV opening<br>angle  | 0-FF                        | Actual EXV opening value =<br>Display value turns to<br>decimal value and then<br>multiply 2.           |   |
| Compressor<br>continuous<br>running time                                    | 0-FF                        | 0-255 minutes   | If the actual value exceeds the range, it displays the maximum value or minimum value.  |
| Compressor stop<br>causes   | 0-99                        | For the detailed meaning,<br>please consult with engineer   | Decimal display   |
| Reserve   | 0-FF                        |   |   |

# TROUBLESHOOTING

## Safety

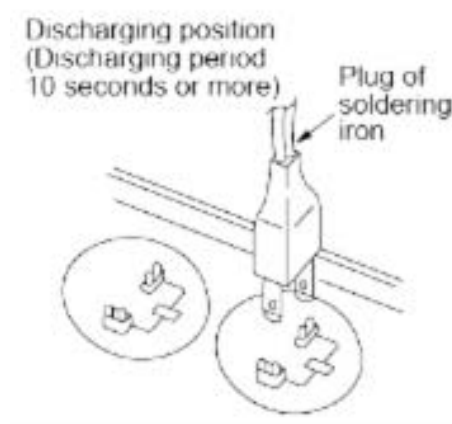
Electricity power is kept in capacitors even if the power supply is shut off.

**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)

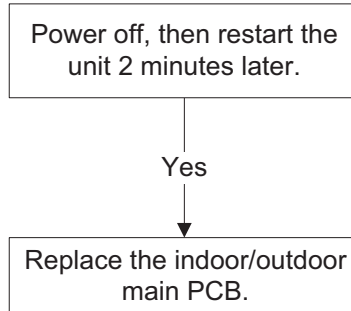


# DIAGNOSIS AND SOLUTION

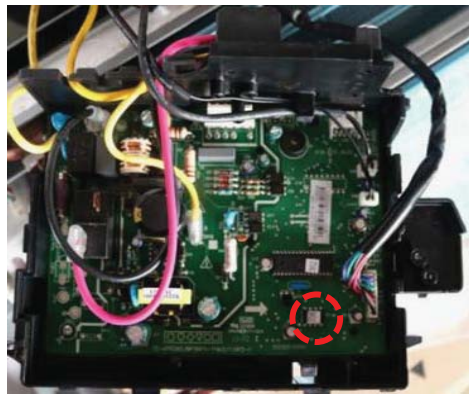
## EEPROM Parameter Error Diagnosis and Solution (E0/F4)

| 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<br>·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)**

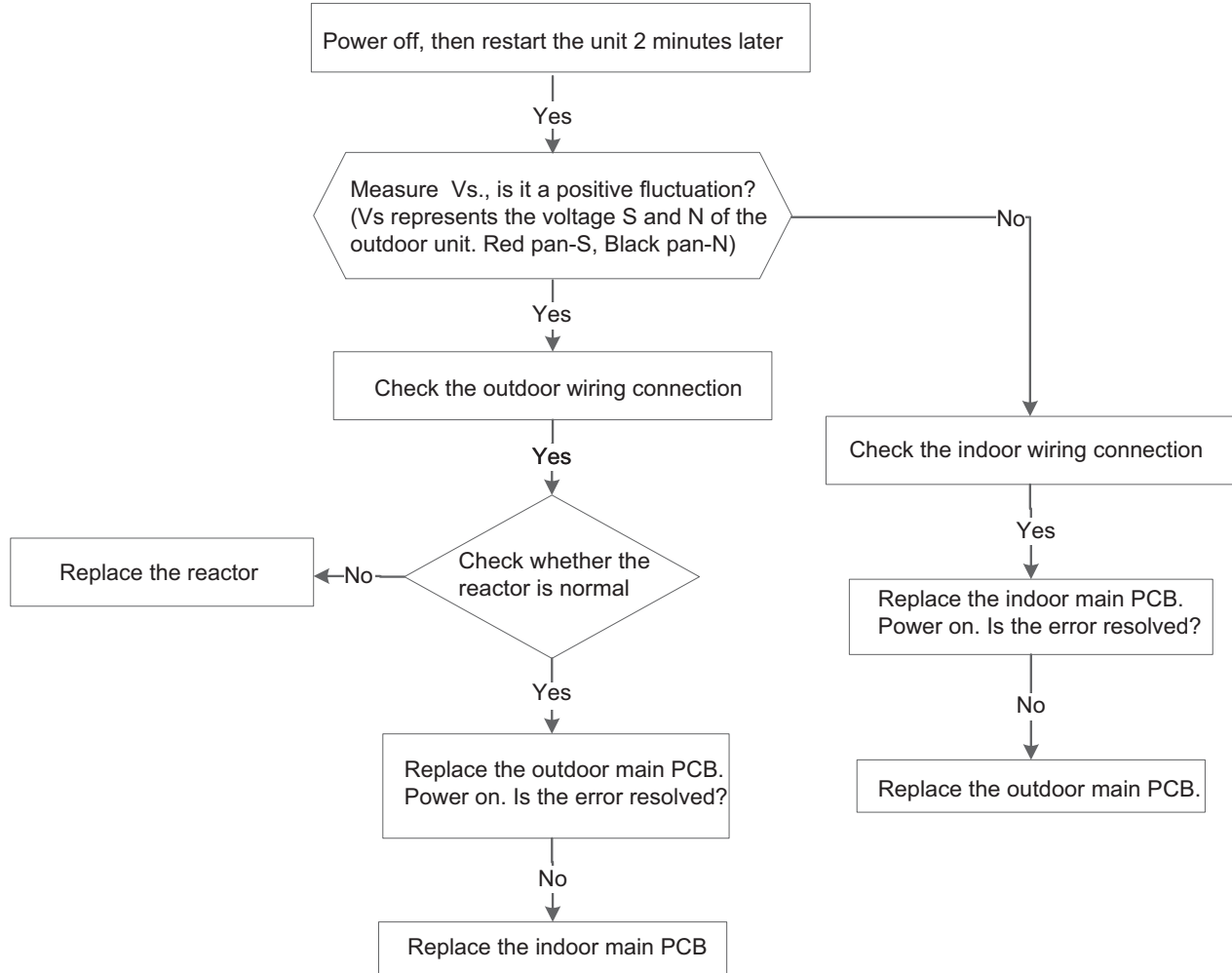
**NOTE:** The two photos above are for reference only and they may differ from the actual unit.

# DIAGNOSIS AND SOLUTION (CONT)

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

|                                 |  |
|---------------------------------|--|
| <b>Error Code</b>               | <b>E1</b>  |
| 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<br>·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  $-50\text{V}$  to  $50\text{V}$ . 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**

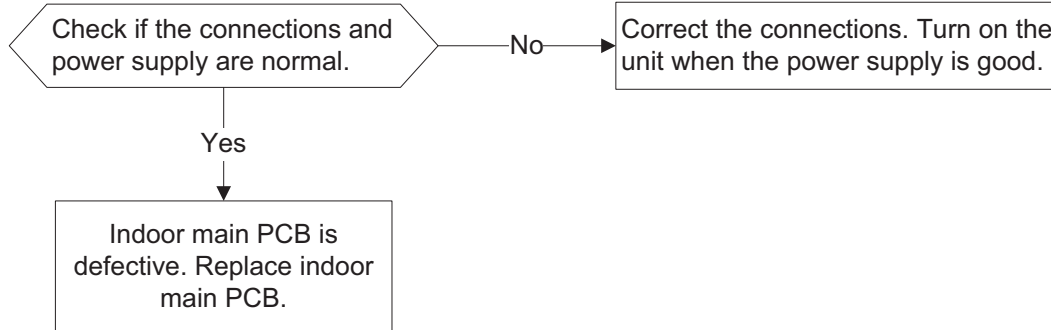
Use a multimeter to test the resistance of the reactor which does not connect with the capacitor. The normal value should be around zero (0) ohm. Otherwise, the reactor has a malfunction and needs to be replaced.

# 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<br>·PCB faulty   |

### Troubleshooting

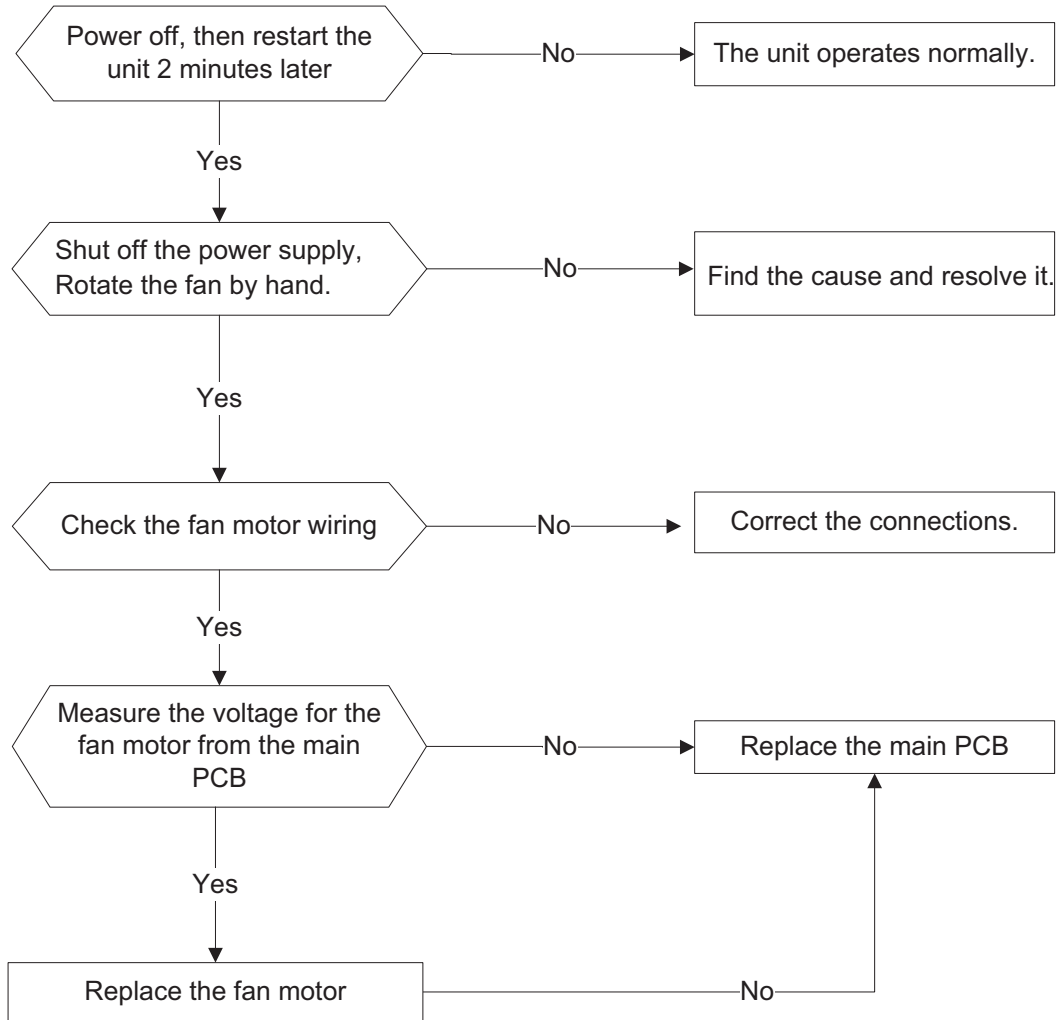


# DIAGNOSIS AND SOLUTION (CONT)

## 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                 | <ul style="list-style-type: none"> <li>·Wiring mistake</li> <li>·Fan ass'y faulty</li> <li>·Fan motor faulty</li> <li>·PCB faulty</li> </ul> |

### 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.

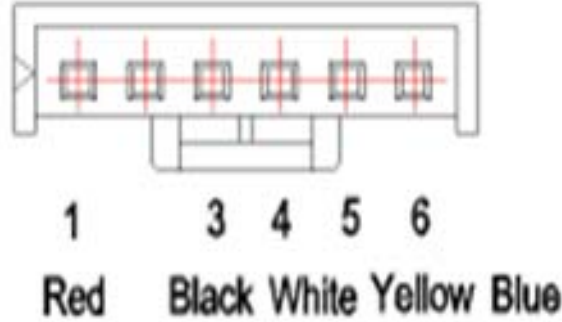


Fig. 25 – Motor Connector

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<br>·Sensor faulty<br>·PCB faulty  |

### Troubleshooting

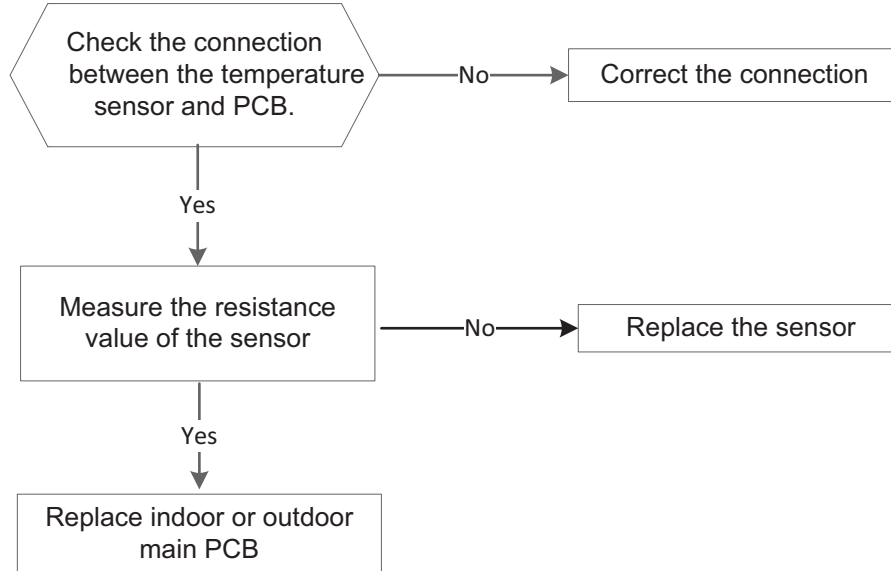


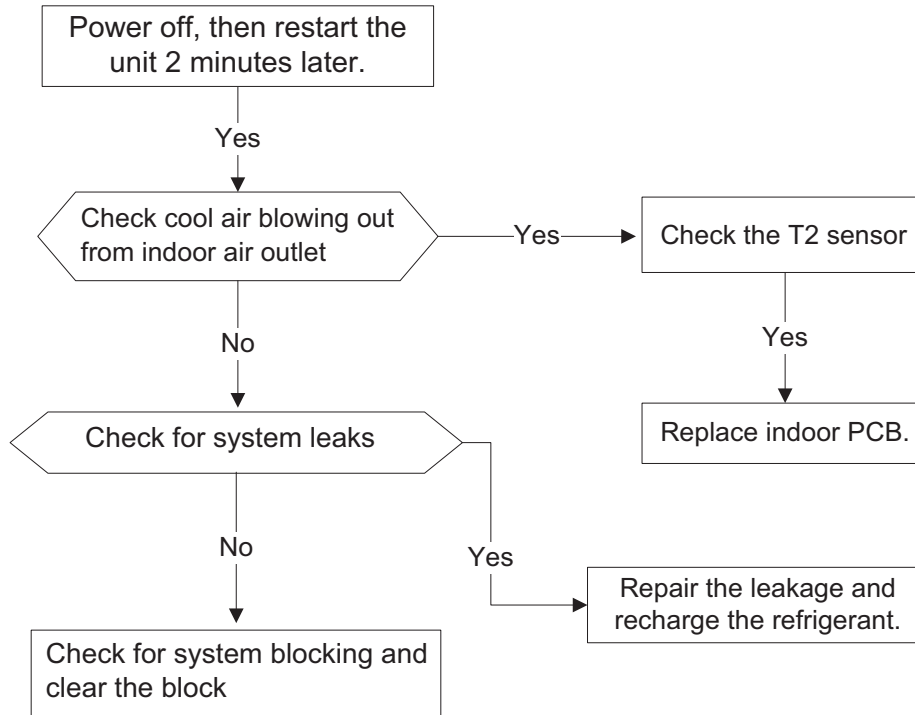
Fig. 26 – Check the connection

# 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 $T2 < T_{cool} - 35.6^{\circ}\text{F}$ ( $T_{cool} - 2^{\circ}\text{C}$ ) 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                 | <ul style="list-style-type: none"> <li>·T2 sensor faulty</li> <li>·Indoor PCB faulty</li> <li>·System problems, such as leakage or blocking.</li> </ul>  |

### Troubleshooting



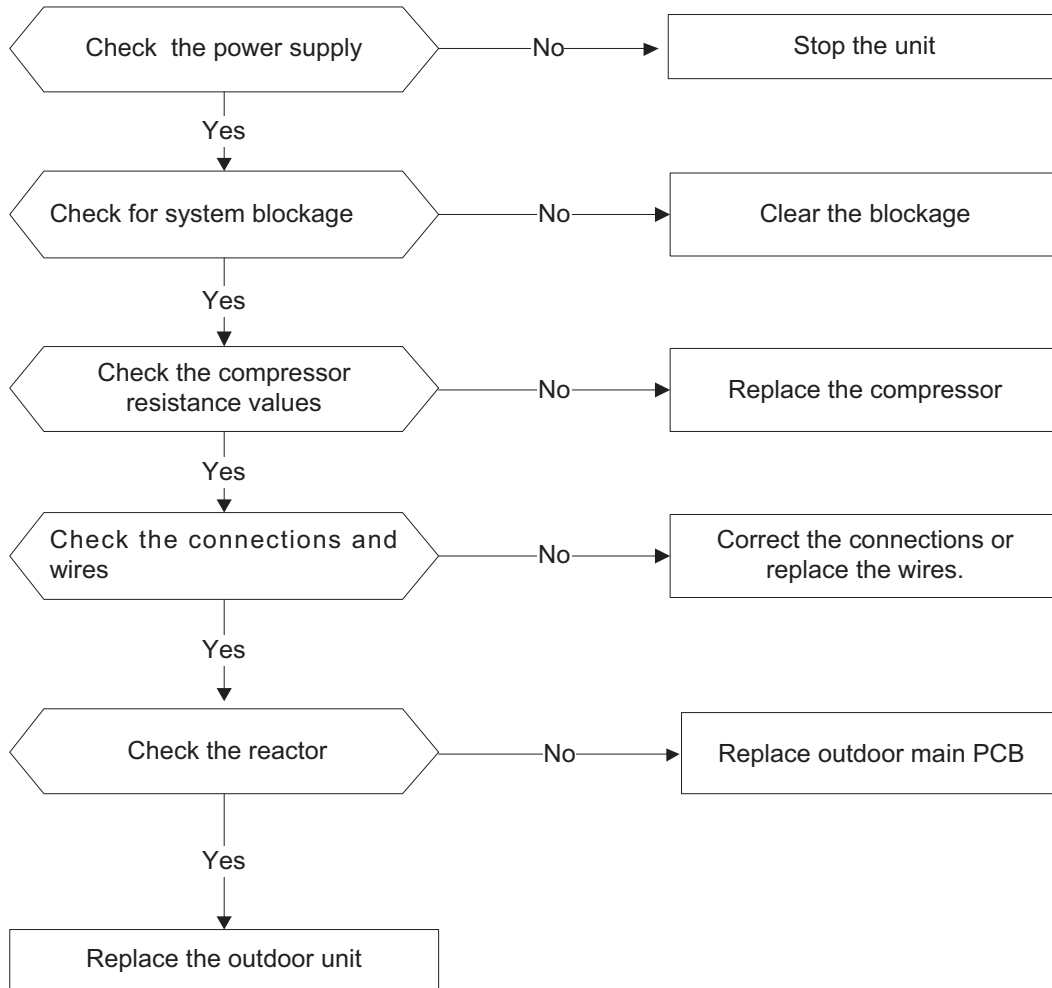


# DIAGNOSIS AND SOLUTION (CONT)

## 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                 | <ul style="list-style-type: none"> <li>·Power supply problems</li> <li>·System blockage</li> <li>·PCB faulty</li> <li>·Wiring mistake</li> <li>·Compressor malfunction</li> </ul> |

### Troubleshooting

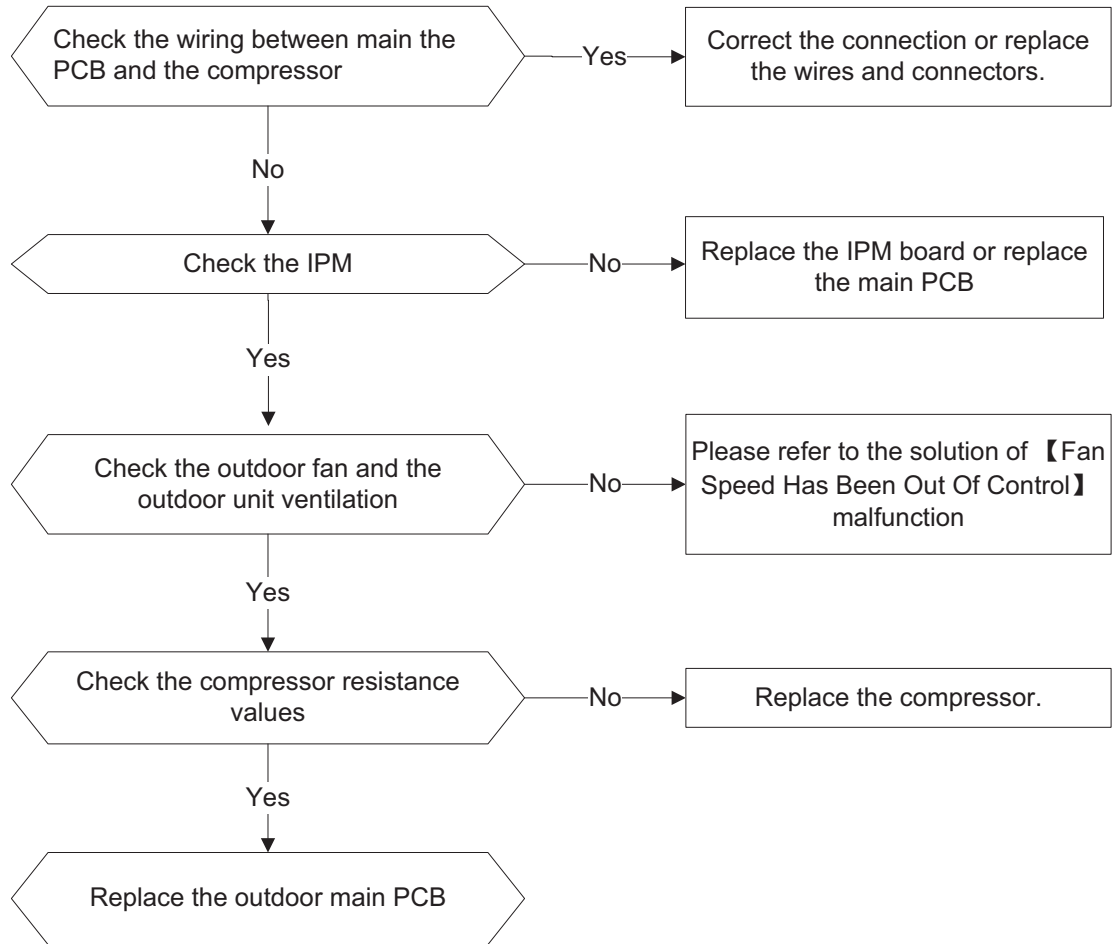


# DIAGNOSIS AND SOLUTION (CONT)

## 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                 | <ul style="list-style-type: none"> <li>·Wiring mistake</li> <li>·IPM malfunction</li> <li>·Outdoor fan ass’y faulty</li> <li>·Compressor malfunction</li> <li>·Outdoor PCB faulty</li> </ul> |

### Troubleshooting



## DIAGNOSIS AND SOLUTION (CONT)

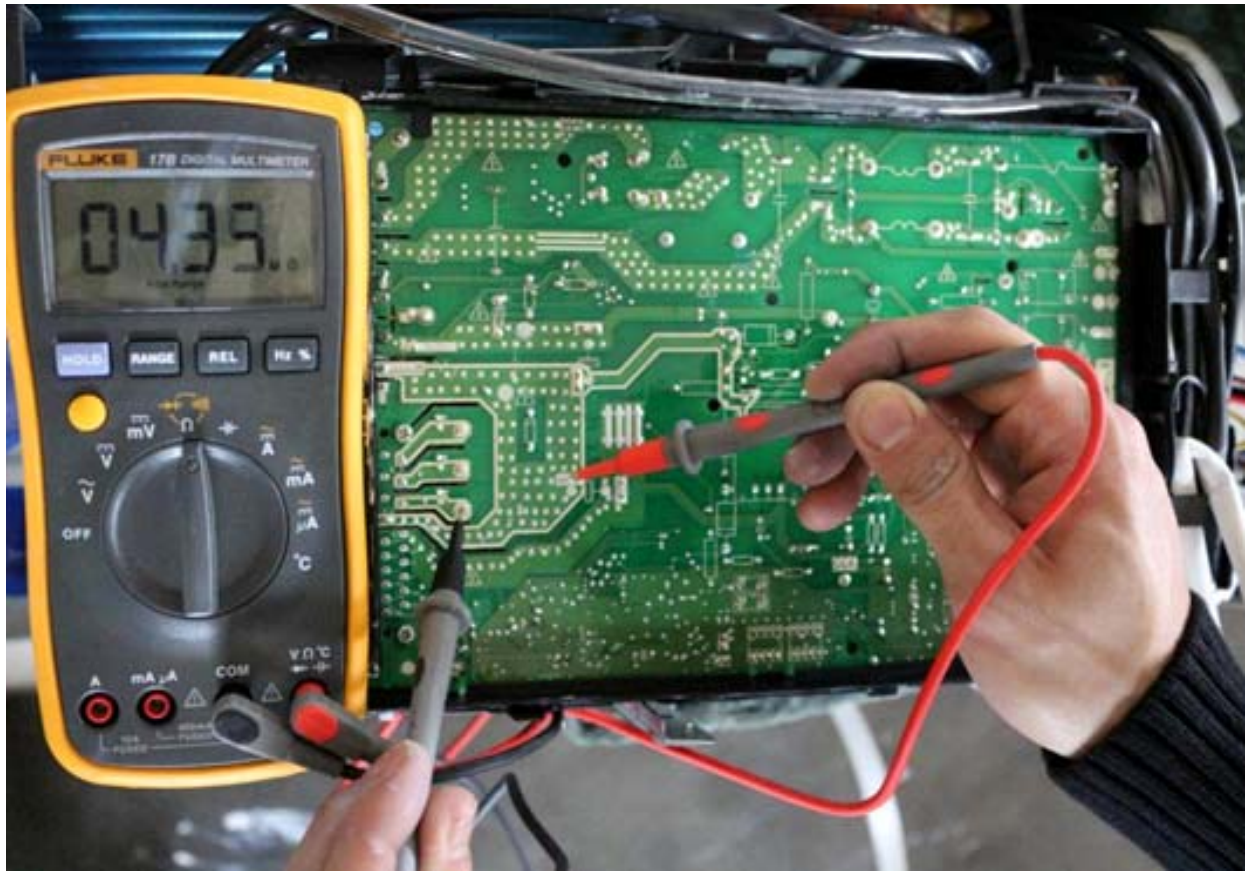


Fig. 27 – P-U

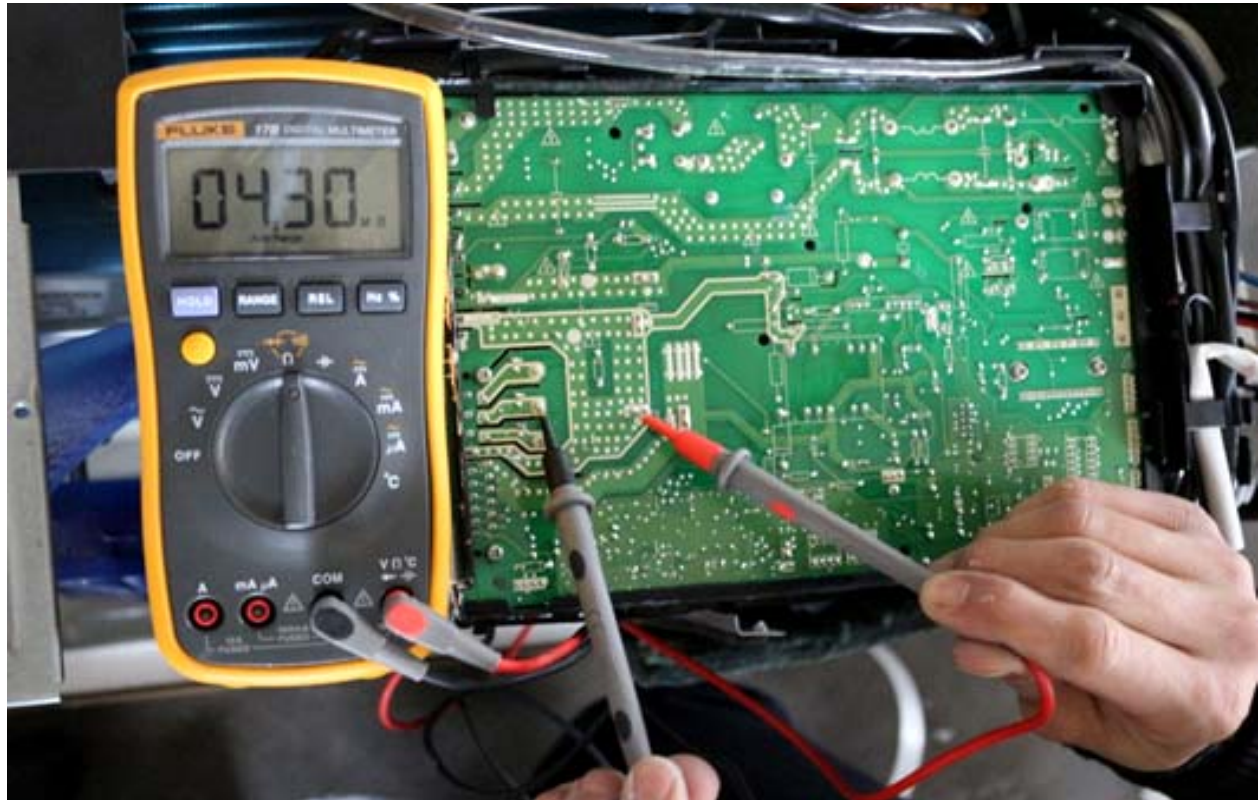


Fig. 28 – P-V

## DIAGNOSIS AND SOLUTION (CONT)

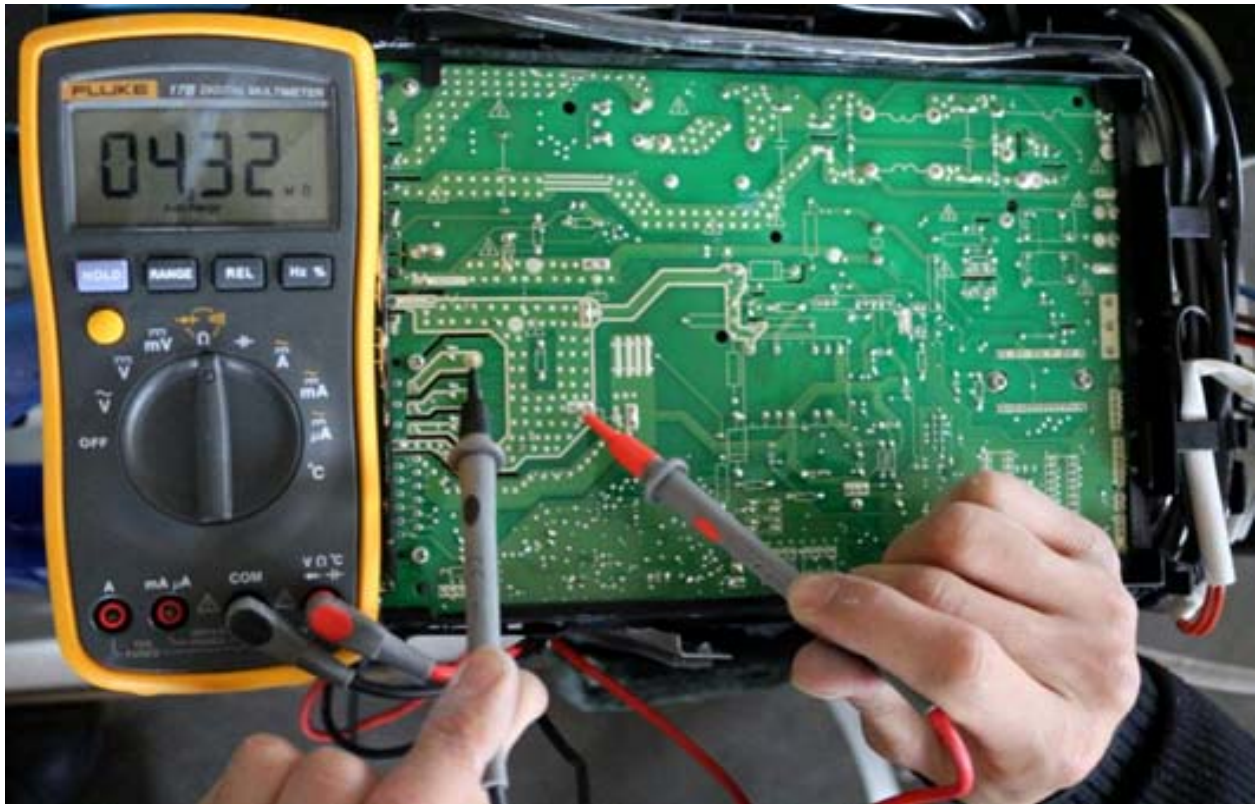


Fig. 29 – P-W

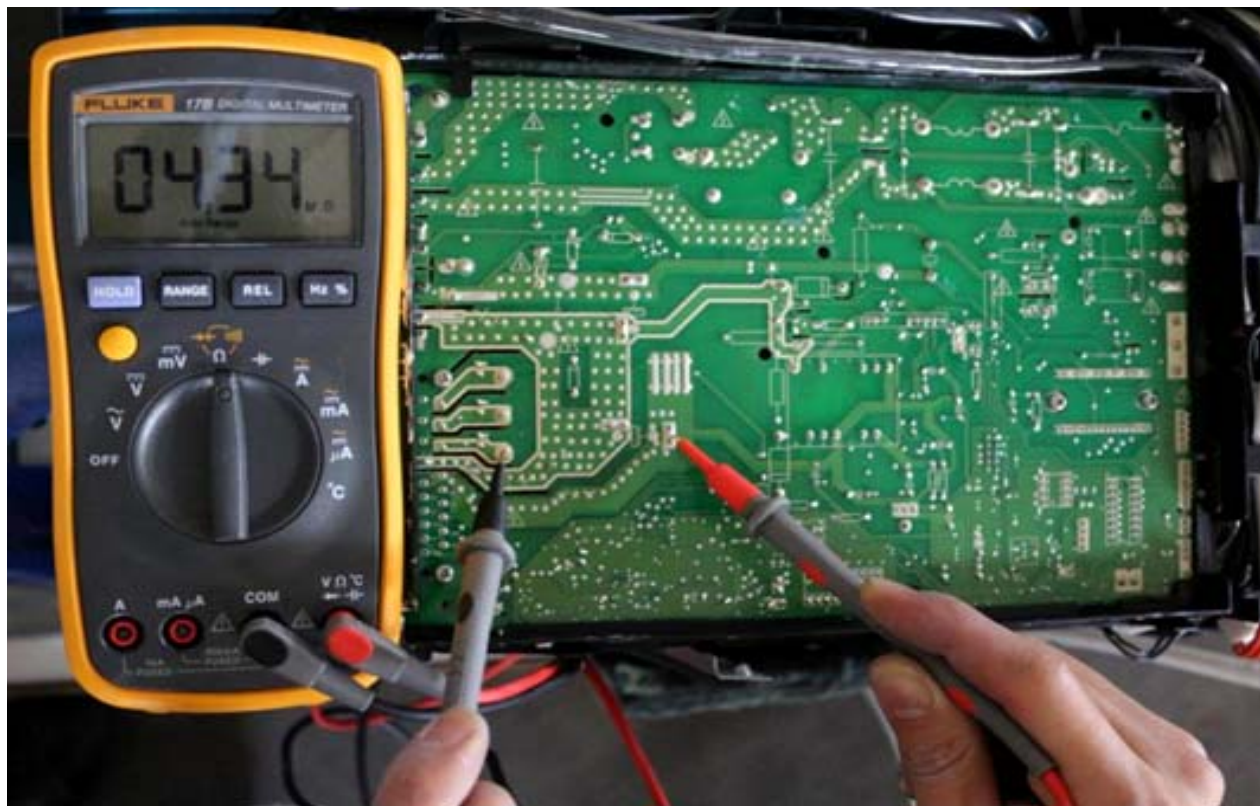


Fig. 30 – N-U

## DIAGNOSIS AND SOLUTION (CONT)

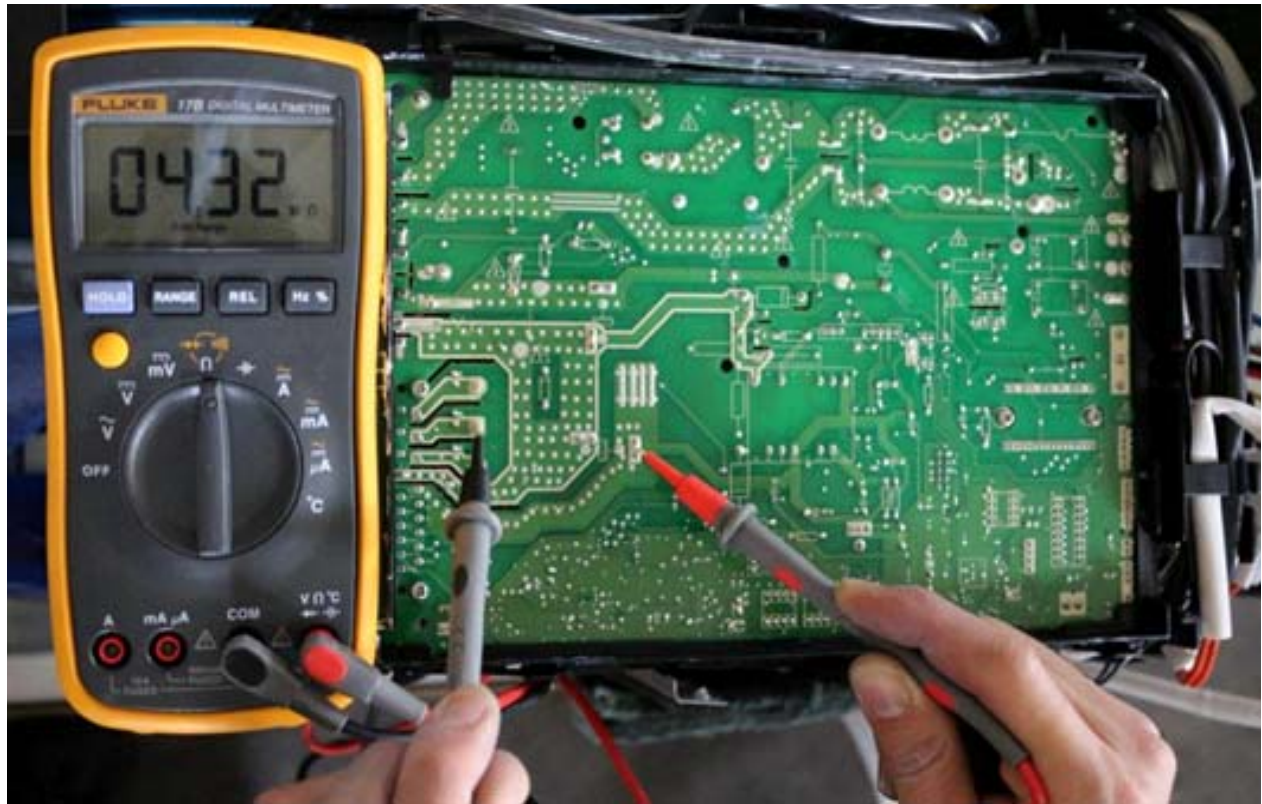


Fig. 31 – N-V

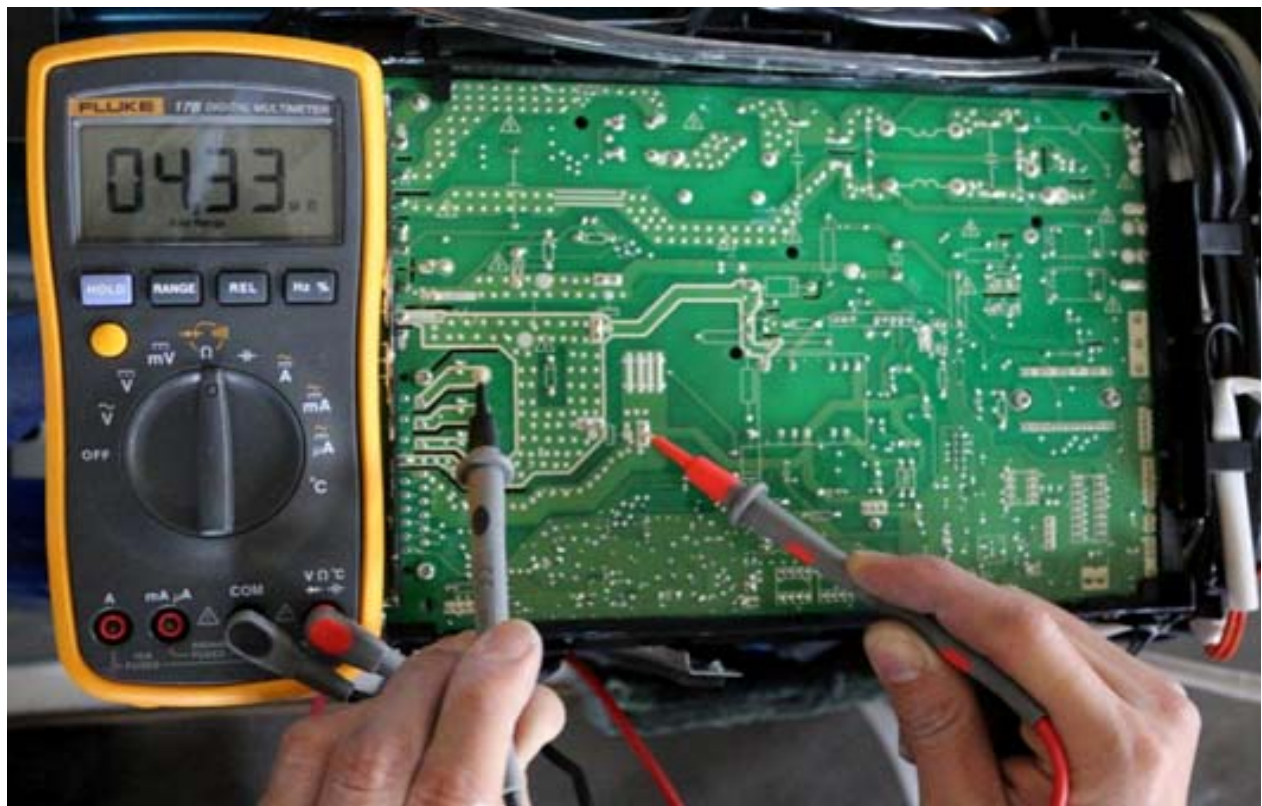


Fig. 32 – N-W

# 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                 | <ul style="list-style-type: none"> <li>·Power supply problems</li> <li>·System leakage or block</li> <li>·PCB faulty</li> </ul> |

### Troubleshooting

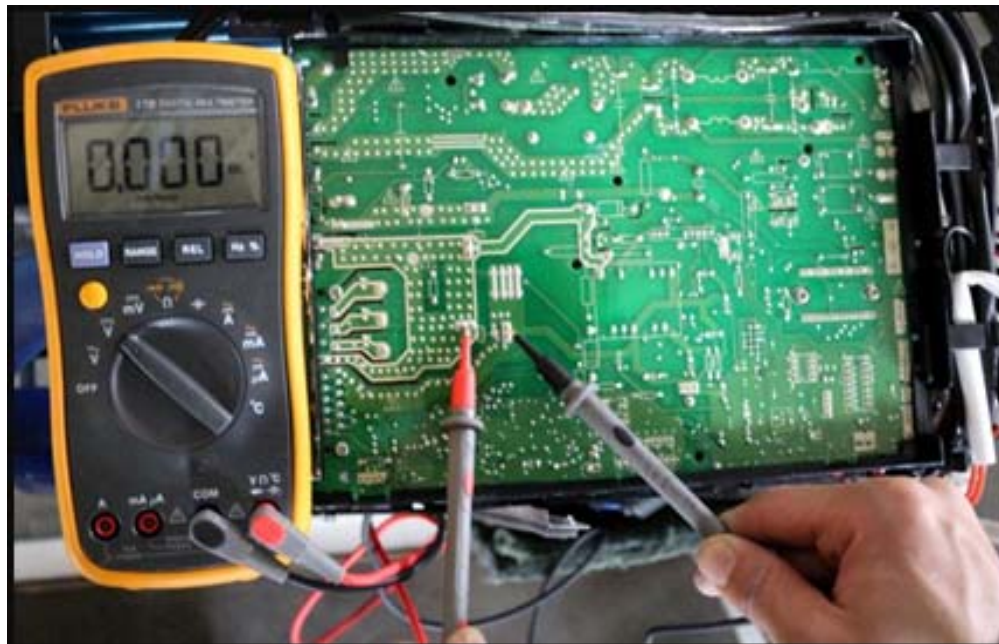
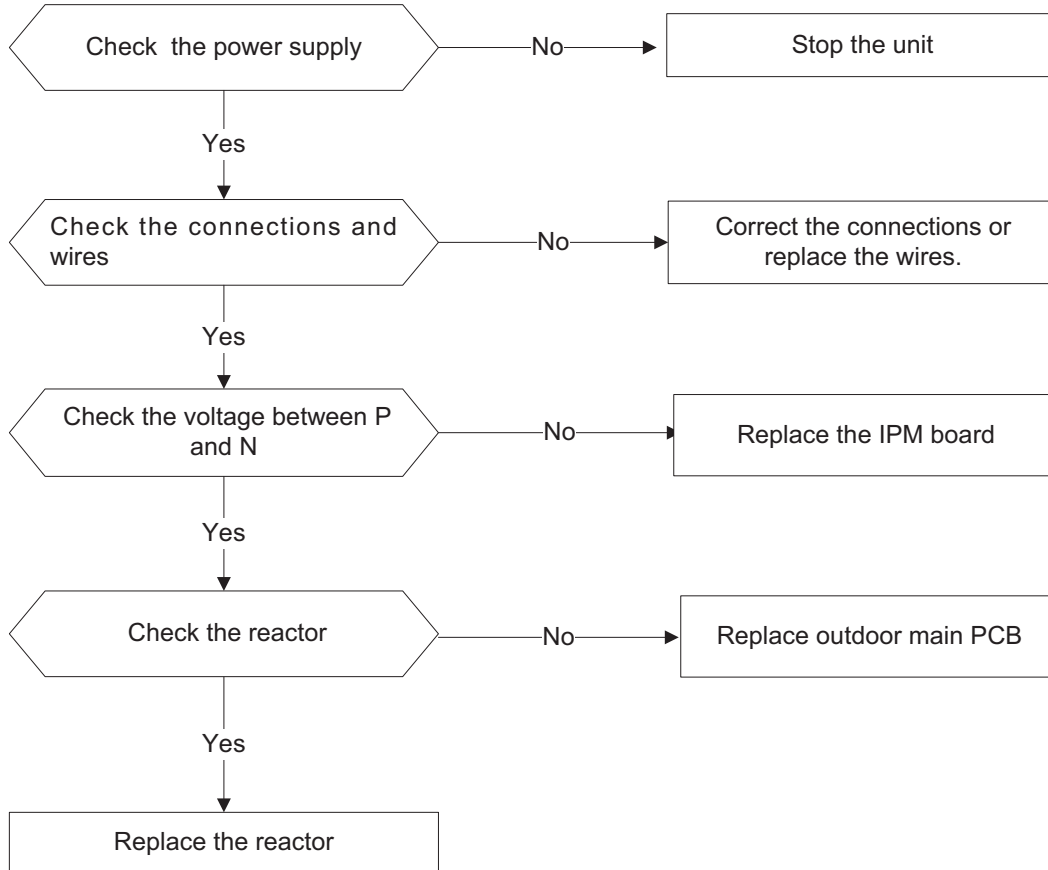


Fig. 33 – Test

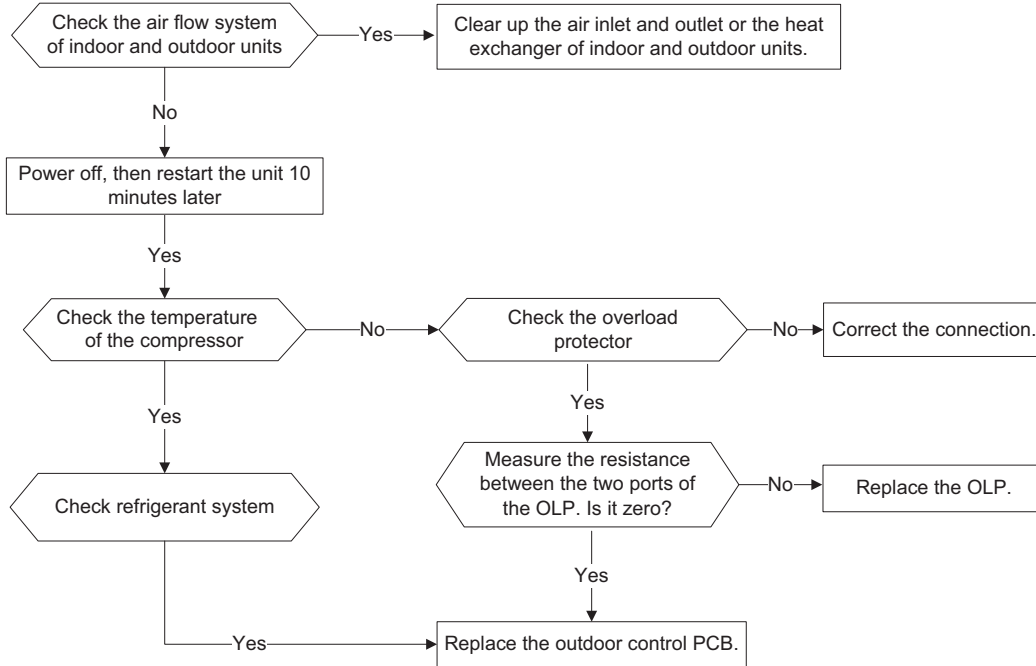
**NOTE:** Measure the DC voltage between the P and N port. The normal value should be around 310V.

# 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                 | <ul style="list-style-type: none"> <li>·Power supply problems</li> <li>·System leakage or block</li> <li>·PCB faulty</li> </ul> |

### Troubleshooting

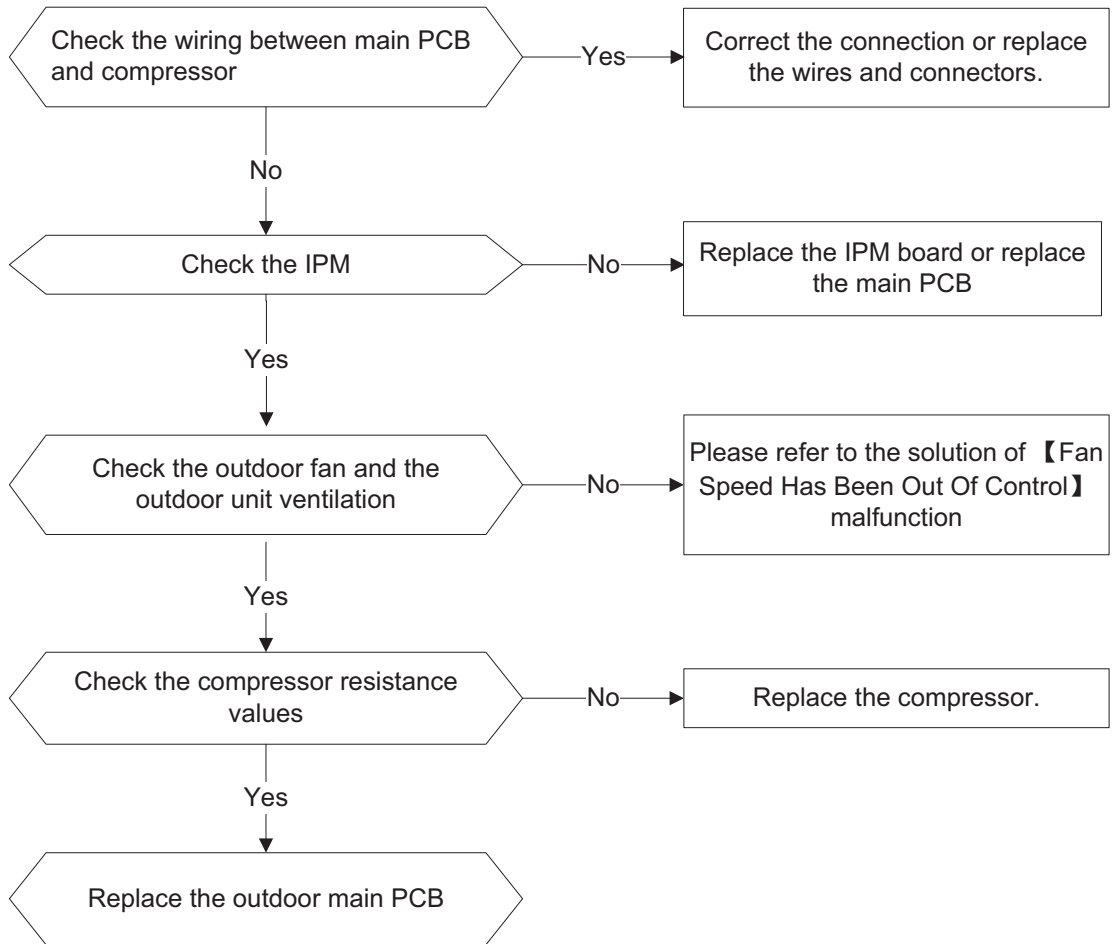


# DIAGNOSIS AND SOLUTION (CONT)

## 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                 | <ul style="list-style-type: none"> <li>·Wiring mistake</li> <li>·IPM malfunction</li> <li>·Outdoor fan ass'y faulty</li> <li>·Compressor malfunction</li> <li>·Outdoor PCB faulty</li> </ul>     |

### Troubleshooting

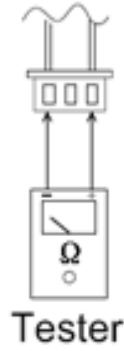




## Main Parts Check

### 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— $\Delta T(^{\circ}F)=9\Delta T(^{\circ}C)/5$**

| $^{\circ}C$ | $^{\circ}F$ | $^{\circ}C$ | $^{\circ}F$ | $^{\circ}C$ | $^{\circ}F$ | $^{\circ}C$ | $^{\circ}F$ | $^{\circ}C$ | $^{\circ}F$ |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| -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

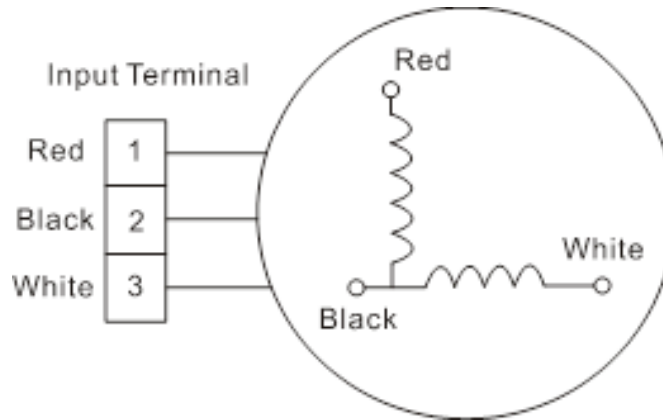
Turn off the power, let the large capacity electrolytic capacitors discharge completely, and dismount the IPM. Use a digital tester to measure the resistance between P and UVWN; UVW and N.

**Table 16—Digital Tester**

| DIGITAL TESTER |          | NORMAL RESISTANCE VALUE           | DIGITAL TESTER |          | NORMAL RESISTANCE VALUE           |
|----------------|----------|-----------------------------------|----------------|----------|-----------------------------------|
| (+)Red         | (-)Black |                                   | (+)Red         | (-)Black |                                   |
| P              | N        | $\infty$<br>(Several M $\Omega$ ) | U              | N        | $\infty$<br>(Several M $\Omega$ ) |
|                | U        |                                   | V              |          |                                   |
|                | V        |                                   | W              |          |                                   |
|                | W        |                                   | (+)Red         |          |                                   |

## Indoor AC Fan Motor

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


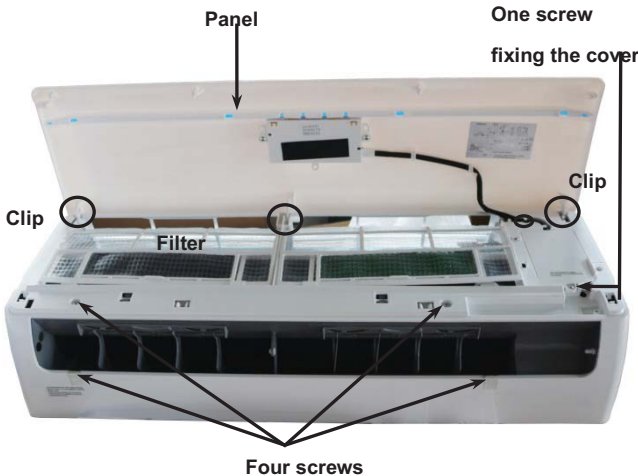



**Table 17—Resistance Value**

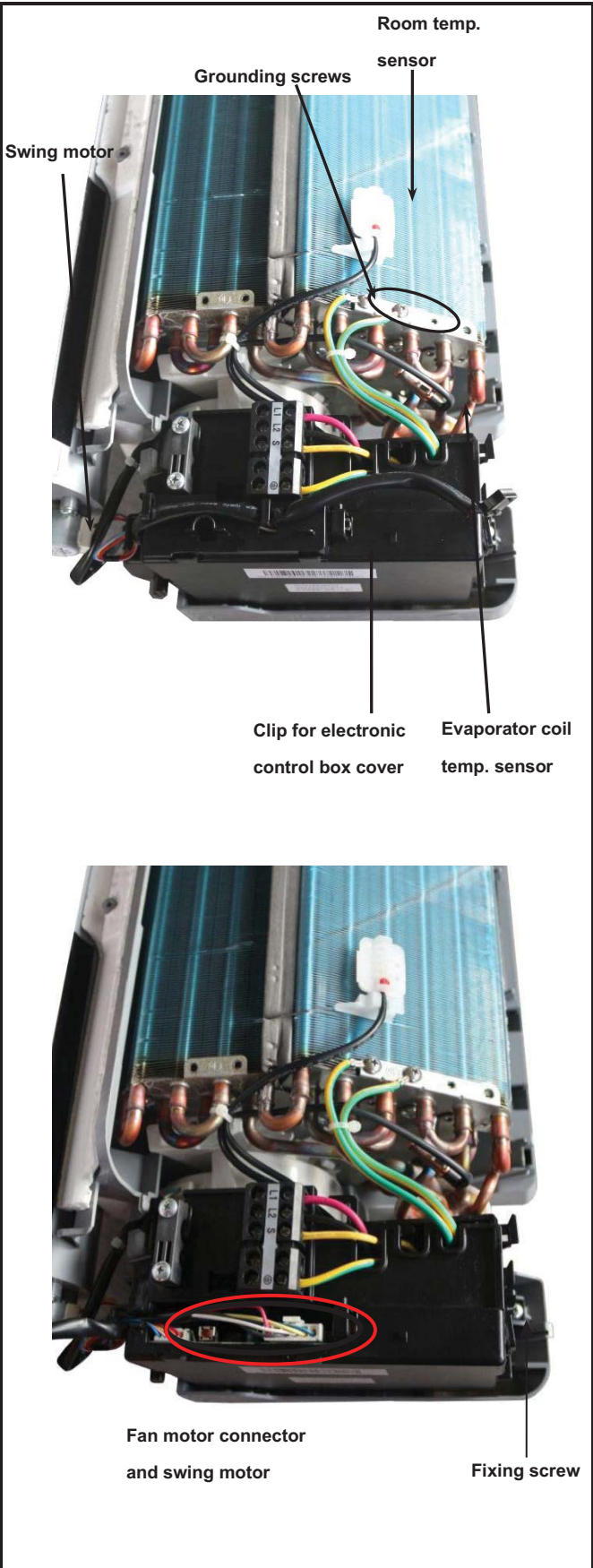
| POSITION      | RESISTANCE VALUE  |   |  |   |
|---------------|---|---|--|---|
|               | RPG13B  |   | RPG50B (YKFG-50-4-1)   |   |
| Black – Red   | 100.5 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Weiling) | 100 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Dayang)  | 82.2 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Weiling) | 85 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Dayang)   |
| White – Black | 64.5 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Weiling)  | 68.5 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Dayang) | 72.3 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Weiling) | 57.8 $\Omega$ $\pm$ 8%<br>(20° C /68° F)<br>(Brand: Dayang) |

# DISASSEMBLY INSTRUCTIONS


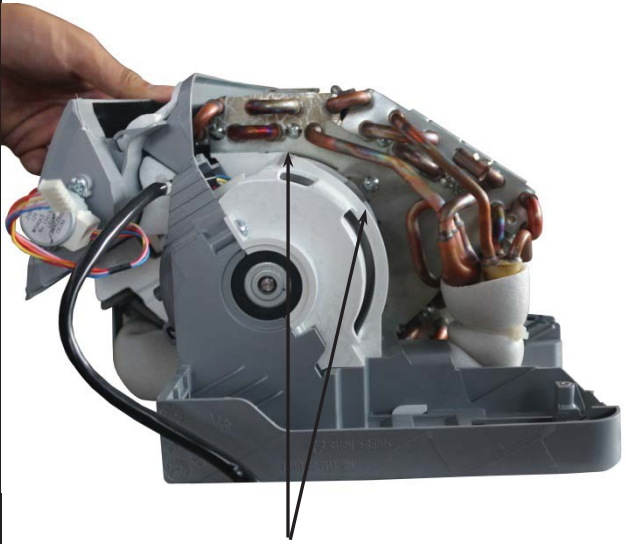

**NOTE:** This part is for reference, the photos may have slight difference with your unit.

| No. | Parts name  | Procedures  | Remarks   |
|-----|-------------|---|---|
| 1   | Front panel | <p>How to remove the front panel.</p> <ol style="list-style-type: none"> <li>1) Pull the bottom side of the panel and release the clips. Then remove the front panel.</li> <li>2) Remove the filter and horizontal louver.</li> <li>3) Remove the four screws.</li> <li>4) Remove the cover (one screw).</li> <li>5) Lift the panel frame and release the connector of display assembly. Then remove the panel frame assembly.</li> </ol> | <p><b>Overview:</b></p>  <p>The overview image shows a white air conditioner front panel with a digital display showing '12' and four indicator lights below it.</p>  <p>This diagram shows the front panel with the cover removed. Labels include: 'Panel' pointing to the top surface, 'One screw fixing the cover' pointing to a screw on the right side, 'Clip' pointing to clips on the left and right sides, 'Filter' pointing to the filter area, and 'Four screws' pointing to four screws along the bottom edge.</p>  <p>This diagram shows the front panel with the panel frame assembly removed. A label 'Connector for display ass'y' points to a connector on the right side.</p> |

## DISASSEMBLY INSTRUCTIONS (CONT)



|          |                         |   |   |
|----------|-------------------------|---|---|
| <p>2</p> | <p>Electrical parts</p> | <p>How to remove the electrical parts.</p> <ol style="list-style-type: none"> <li>1) After removing the front panel (see section 1), pull out the room temperature sensor and evaporator coil sensor. Remove the grounding screws.</li> <li>2) Pull out the clip toward the left side and open the cover.</li> <li>3) Remove the securing screw and open the box cover.</li> <li>4) Pull out the connectors of the swing motor and the fan motor.</li> <li>5) Remove the securing screw and remove the electronic control box and air outlet assembly.</li> </ol> |  <p>Room temp. sensor</p> <p>Grounding screws</p> <p>Swing motor</p> <p>Clip for electronic control box cover</p> <p>Evaporator coil temp. sensor</p> <p>Fan motor connector and swing motor</p> <p>Fixing screw</p> |
|----------|-------------------------|---|---|

## DISASSEMBLY INSTRUCTIONS (CONT)

|   |            |   |  |
|---|------------|---|--|
| 3 | Evaporator | <p>How to remove the evaporator.</p> <ol style="list-style-type: none"><li>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.</li><li>2) Remove the two screws on the evaporator at the base bearing side.</li><li>3) Remove the two screws on the evaporator at the fixed plates and then lift the evaporator ass'y.</li></ol> |   <p>Two screws at the base bearing side</p>  <p>Two screws at the fixed plates</p> |
|---|------------|---|--|



## DISASSEMBLY INSTRUCTIONS (CONT)

|   |               |   |   |
|---|---------------|---|---|
| 4 | Fan and motor | <p>How to remove the fan and motor.</p> <ol style="list-style-type: none"><li>1) After removing the evaporator assembly (see sections 1 - 3), remove the three (3) screws securing the cover.</li><li>2) Remove the screw securing the motor and then pull out the motor.</li></ol> |  <p>Three screws</p>  <p>One screw</p> |
|---|---------------|---|---|

