

SINGLE ZONE MINISPLIT

SERVICE MANUAL



For the following models:

9H47YIMI
12H47YIMI
12H47ZIMI
18H47ZIMI
24H46ZIMI
30H48ZIMI
36H46ZIMI

9H47YOMI
12H47YOMI
12H47ZOMI
18H47ZOMI
24H46ZOMI
30H48ZOMI
36H46ZOMI

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1. Precaution

- Installation MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA70/ANSI C1-1993 or current edition and Canadian Electrical Code Part1 CSA C.22.1.
- The information contained in the manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.
- Installation or repairs made by unqualified persons can result in hazards to you and others.
- Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury, and/or death.
- This service manual is only intended for the service engineer to use.

1.1 Safety Precaution

- To prevent injury or damage to the user, other people, or property, the following instructions must be followed.
- Incorrect operation due to ignoring instructions may cause harm or damage.
- Before servicing the unit, be sure to read this service manual first.

1.2 Warning

- Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.
- For electrical work, contact the dealer, seller, a qualified electrician, or an authorized service center.
- Always ground the product.
- Install the panel and the cover of the control box securely.
- Always install a dedicated circuit and breaker.
- Use a properly rated breaker and fuse.
- Do not let the air conditioner run for a long time when the humidity in the area is high or if a door or window is left open.
- Do not touch or operate the product with wet hands.
- Do not place a heater or other appliance near the power cable.
- Do not allow water to run into electrical parts.
- Do not store or use flammable gas or combustibles near the product.
- Do not use the product in a tightly closed space for a long time. (oxygen deficiency)
- When flammable gas leaks, turn off the gas and open a window for ventilation before turning the product back on.
- If strange sounds or smoke comes from the product, turn the breaker off or disconnect the power supply cable.
- Stop operation and close the window during storms or hurricanes.
- Do not open the inlet grill of the product during operation.
- When the product is soaked, contact an authorized service center.
- Be careful to prevent water from entering the product.

- Turn the main power off when cleaning or maintaining the product.
- When the product is not used for a long time, disconnect the power supply plug or turn off the breaker.
- Do not step on the outdoor unit.

1.3 Caution

- Always check for gas (refrigerant) leakage after installation or repair of product.
- Install the drain hose to ensure that water is drained away properly.
- Keep level even when installing the product.
- Do not install the product where the noise or hot air from the outdoor unit could cause damage to harm to neighbors or other property.
- Use two or more people to lift and transport the product.
- Do not install the product where it will be directly exposed to sea wind (salt spray). Commercial coatings may be used to protect outdoor unit, if necessary.

1.4 Operational

- Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision refrigeration system.
- Do not block the inlet or outlet of air flow.
- Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.
- Do not touch the metal parts of the product when removing the air filter. They are very sharp.
- Do not step on or put anything on the product (outdoor units).
- Always insert the filter securely. Clean the filter every two weeks or more often if necessary.
- Do not insert hands or other objects through air inlet or outlet while the product is operating.
- Do not drink the water drained from the product.
- Use a firm stool or ladder when cleaning or maintaining the product.
- Do not mix old and new batteries or different types of batteries.
- Do not recharge or disassemble the batteries. Do not dispose of batteries in a fire.
- If the liquid from the batteries gets onto your skin or clothes, wash it well with clean water. Do not use the remote if batteries have leaked inside.

2. Model/Part Names and Definitions

2.1 Model Names and Definition

AAHXXCDXX

Example: 1 2 H 4 7 Y I M I

AA – BTU capacity

H –heat pump

C – Rated Voltage

Y: 115V

Z: 230V

D – Type of unit

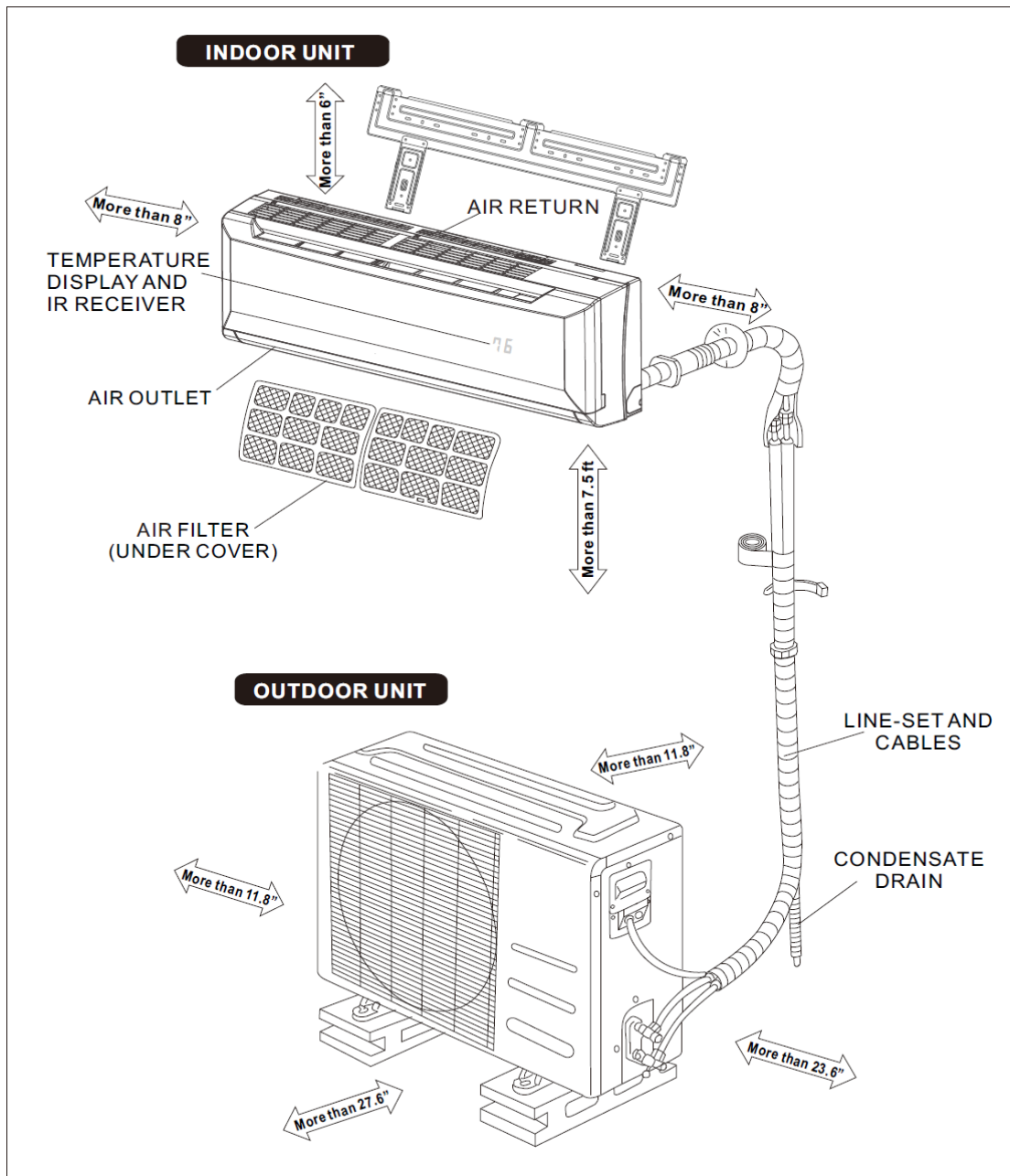
I: Indoor unit

O: Outdoor unit

X – Internal Code

Indoor	Outdoor	Voltage (V)	Capacity (BTU)	Heat Pump
9H47YIMI	9H47YOMI	115	9,000	X
12H47YIMI	12H47YOMI		12,000	X
12H47ZIMI	12H47ZOMI			X
18H47ZIMI	18H47ZOMI	230	18,000	X
24H46ZIMI	24H46ZOMI		24,000	X
30H48ZIMI	30H48ZOMI		30,000	X
36H46ZIMI	36H46ZOMI		36,000	X

2.2 Part Names



2.3 Function/Feature Names and Definition

Indoor Unit

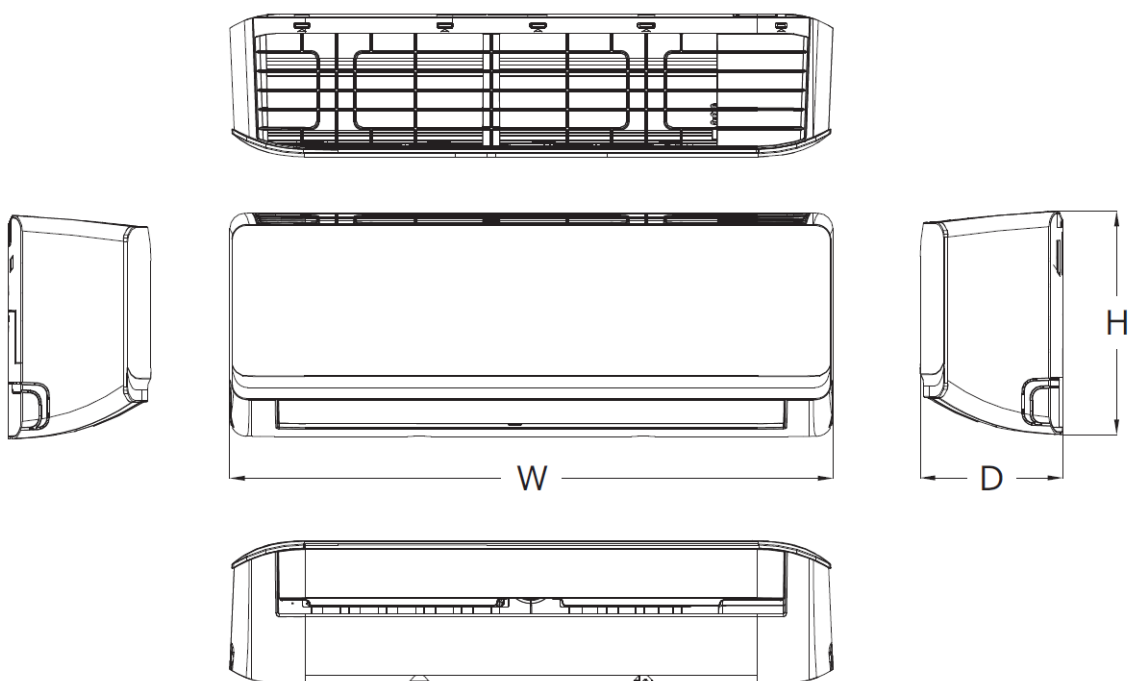
- **Air Freshening Filter** – Eliminate formaldehyde and other volatile organic compounds as well as harmful gases and odors.
- **Follow Me** – With this feature, a temperature sensor is built into the remote control. The unit will use that temperature sensor for the ambient temperature so the air conditioner is following the user.
- **Louver Position Memory Function** – When starting the unit again after shutting down, its louver will return to the angle that was previously set by the user.

Outdoor Unit

- Refrigerant leak detection – The refrigerant leak detection function can better prevent the compressor from being damaged by the leaked refrigerant or compressor overload.
- Self-diagnosis Function – The air conditioner's control board will shut off the unit if there is any abnormal operation or parts failure and display a corresponding error code for the potential cause of the problem.
- Compressor Crankcase Heater – Oil easily dissolves in refrigerant, especially in low temperature conditions. The crankcase heating belt can heat the bottom of the compressor to avoid pumping out too much oil with the refrigerant, which also protects the compressor.
- Freezing protection – In heating mode, the set temperature can be set to 46°F (8°C) to prevent pipes, etc. from freezing when the house is unoccupied for a long time severe cold weather.

3. Dimension

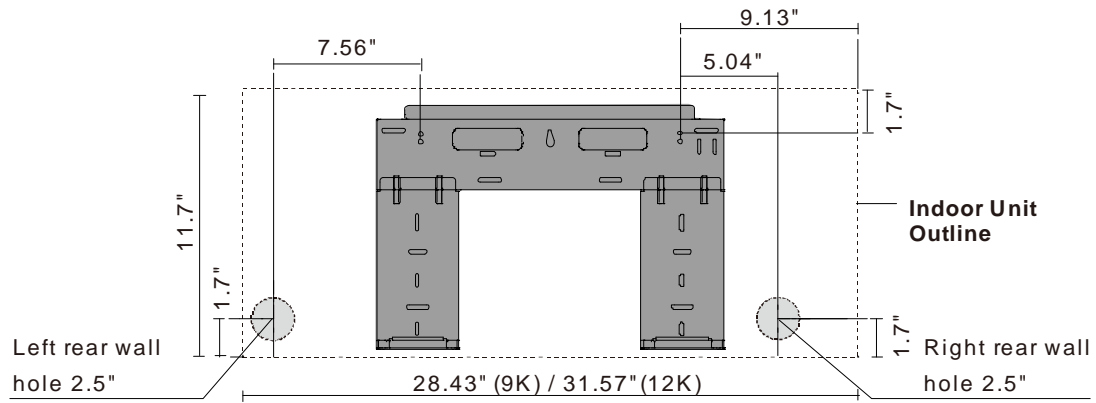
3.1 Indoor Unit



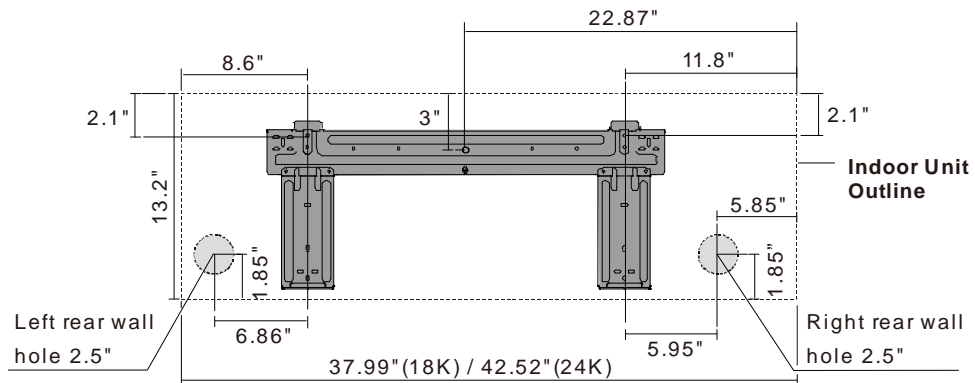
Model	W	D	H
9H47YIMI	28.43"	7.36"	11.42"
	(722 mm)	(187 mm)	(290 mm)
12H47YIMI	31.57"	7.44"	11.69"
	(802 mm)	(189 mm)	(297 mm)
12H47ZIMI	37.99"	8.46"	12.56"
	(965 mm)	(215 mm)	(319mm)
24H46ZIMI	42.52"	8.9"	13.19"

	(1080 mm)	(226 mm)	(335 mm)
30H48ZIMI	49.57"	11.1"	14.25"
36H46ZIMI	(1259 mm)	(282 mm)	(362 mm)

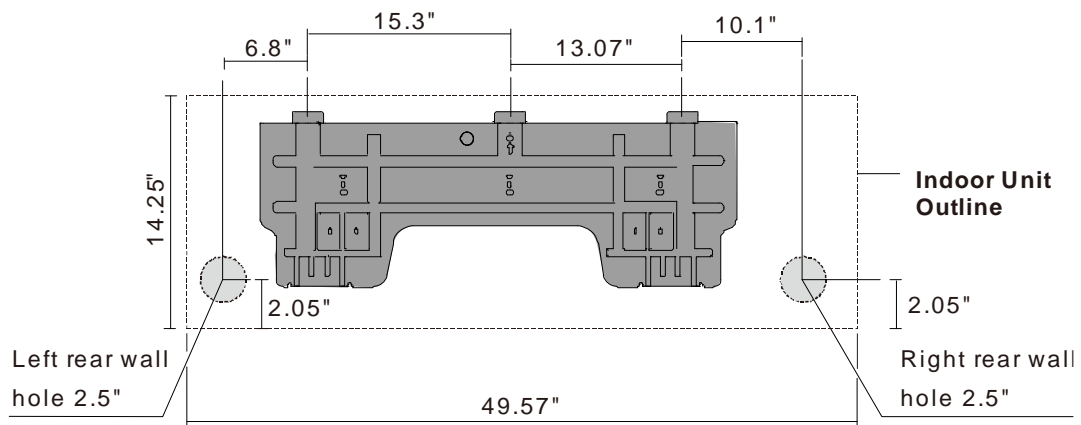
Mounting Plate for Models: 9H47YIMI, 12H47YIMI, 12H47ZIMI



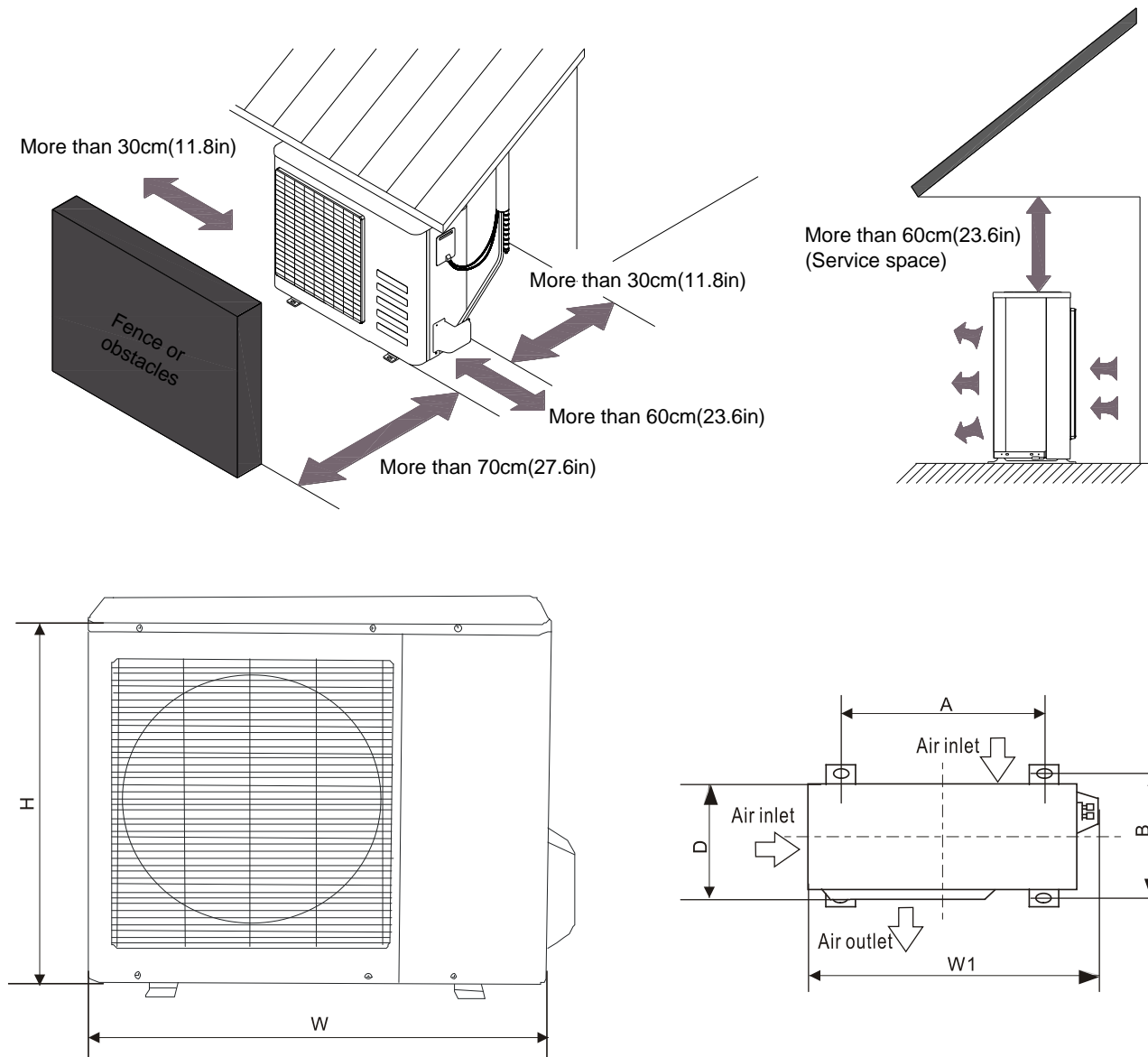
Mounting Plate for models: 18H47YIMI, 24H46ZIMI



Mounting Plate for models: 30H48ZIMI, 36H46ZIMI



3.2 Outdoor Unit



NOTE: The drawing above is for reference only. The appearance of actual units may be different.

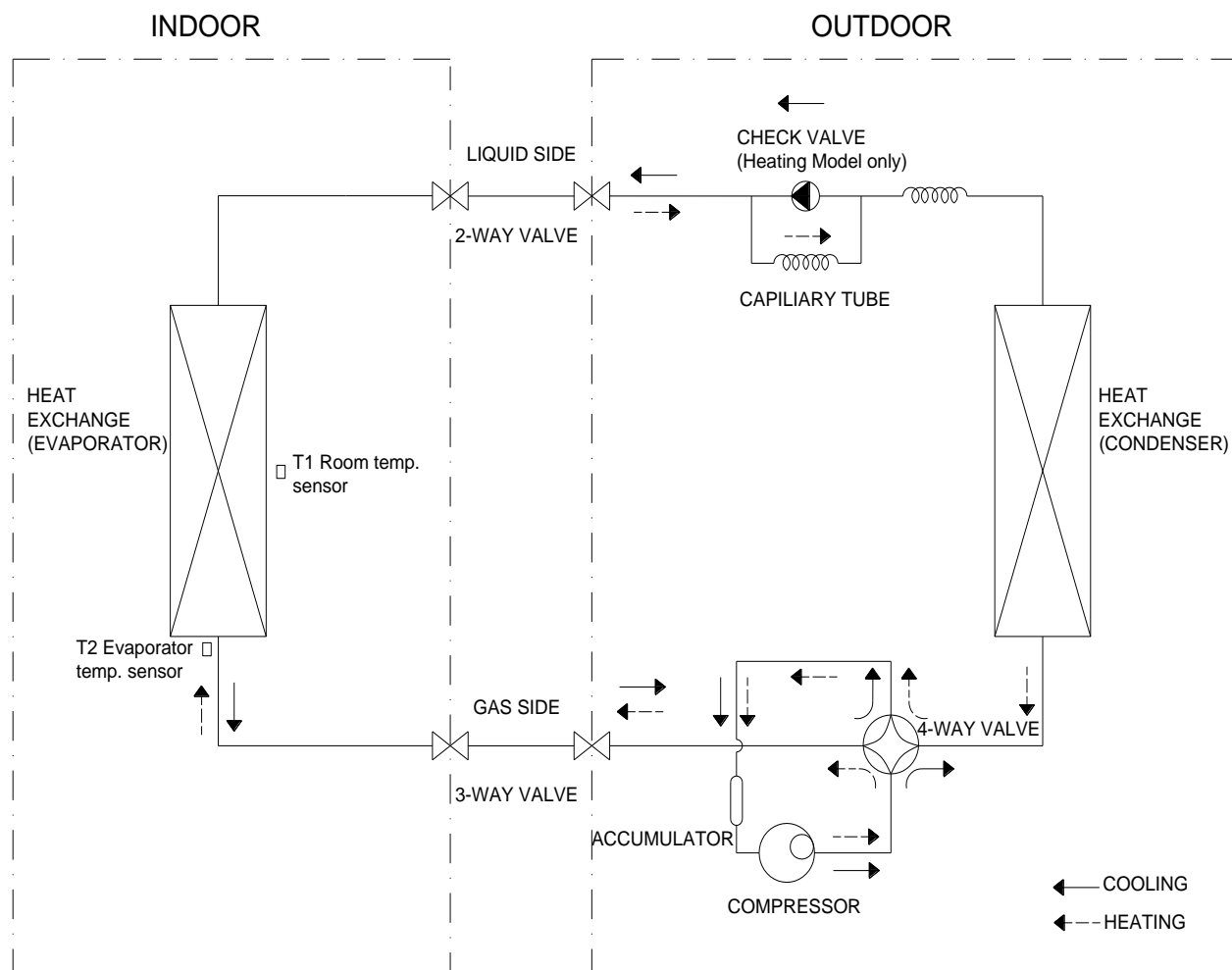
Model	W	D	H	W1	A	B
9H47YOMI	30.31"	11.81"	21.85"	32.40"	20.87"	11.42"
12H47YOMI	(770 mm)	(300 mm)	(555 mm)	(823 mm)	(530 mm)	(290 mm)
12H47ZOMI						
18H47ZOMI	31.50"	13.11"	21.81"	32.40"	20.87"	11.42"
	(800 mm)	(333 mm)	(554 mm)	(823 mm)	(530 mm)	(290 mm)
24H46ZOMI	33.27"	14.29"	27.64"	34.41"	21.61"	12.80"
	(845 mm)	(363 mm)	(702 mm)	(874 mm)	(549 mm)	(335 mm)

30H48ZOMI	37.24"	16.54"	31.89"	40.55"	26.50"	15.87"
36H46ZOMI	(946 mm)	(420 mm)	(810 mm)	(1030 mm)	(673 mm)	(403 mm)

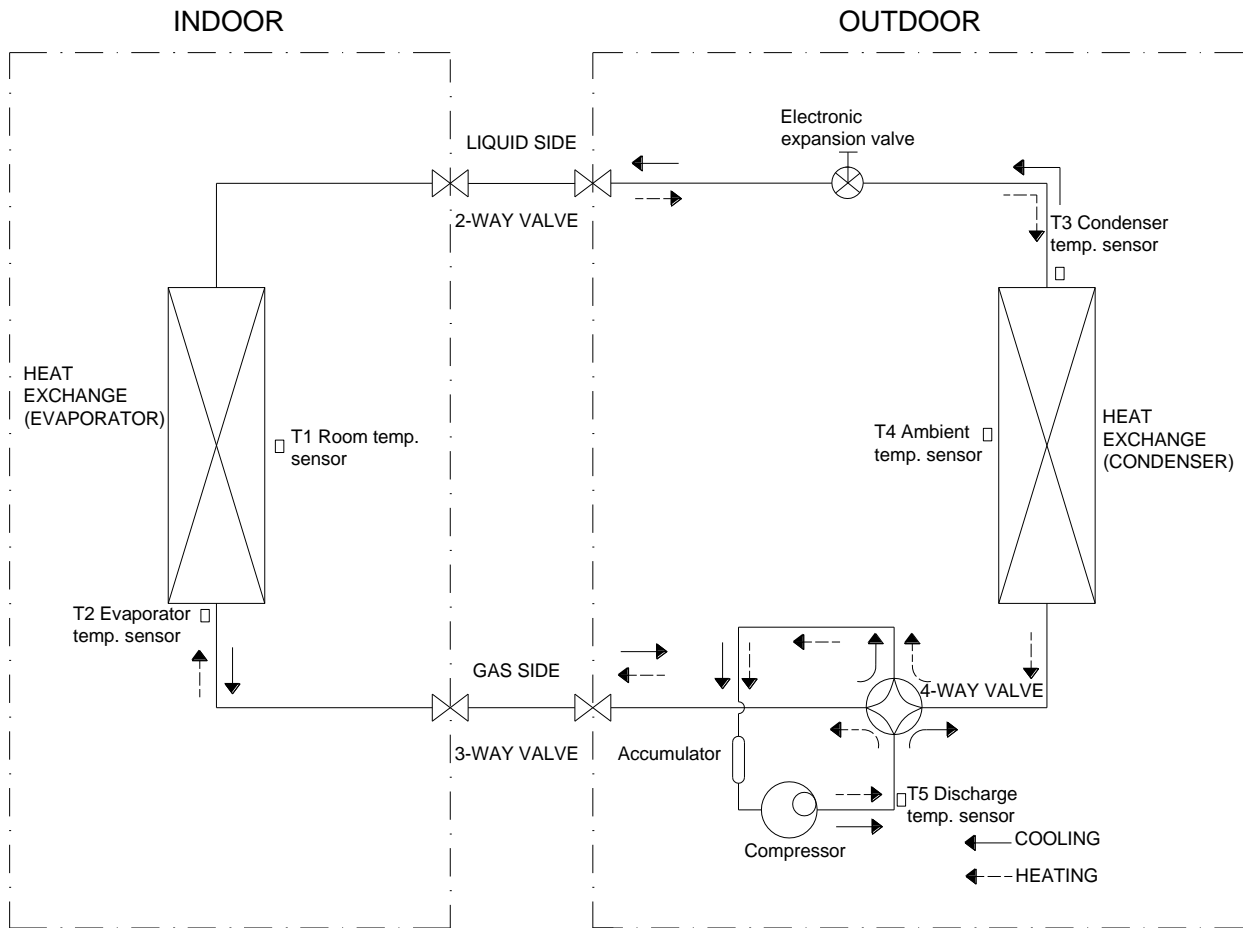
4. Refrigerant Cycle Diagram & Performance

4.1 Refrigerant Cycle Diagram

For models: 9H47YOMI, 12H47YOMI, 12H47ZOMI, 18H47ZOMI, 24H46ZOMI



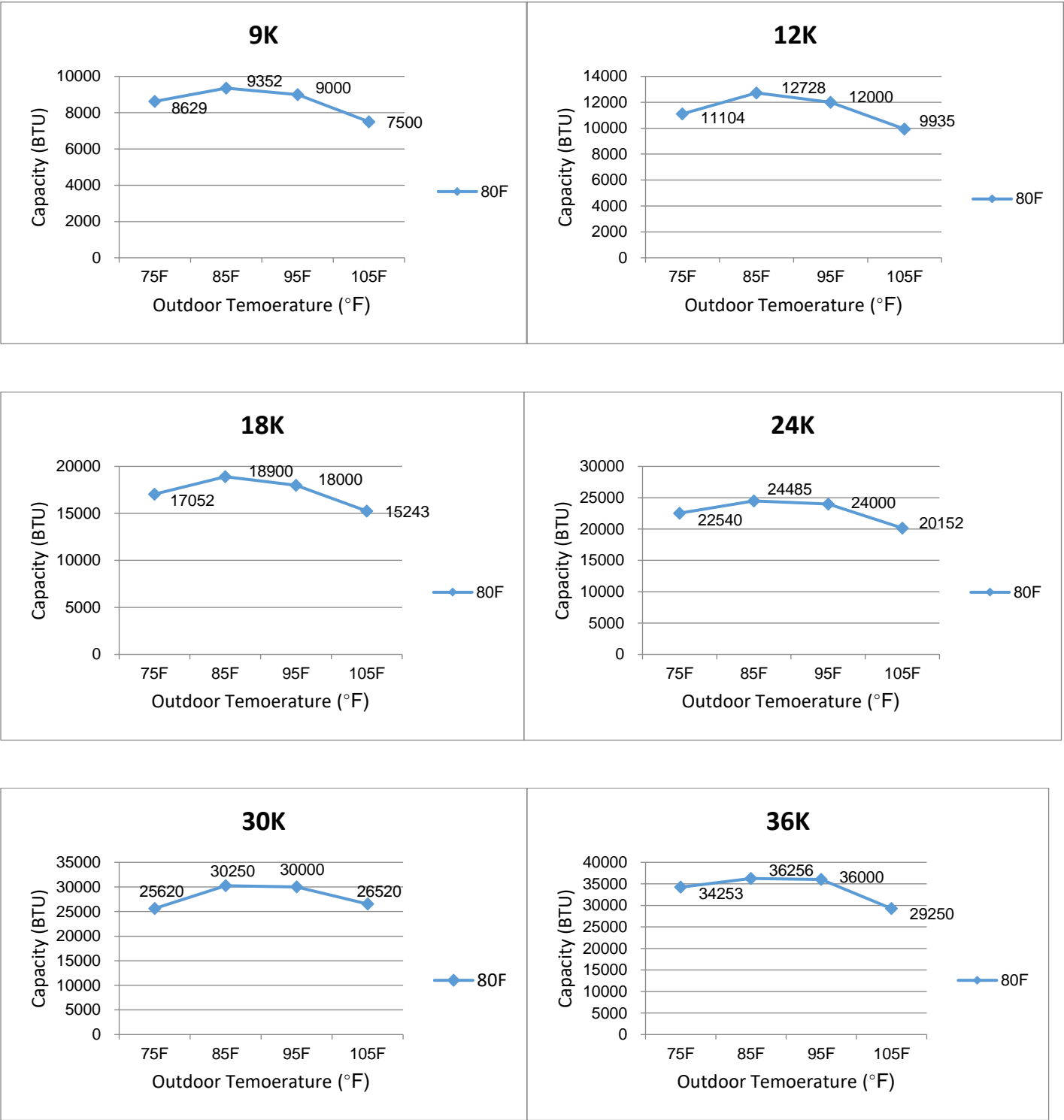
For models: 30H48ZOMI, 36H46ZOMI



4.2 Performance Data

4.2.1 Cooling

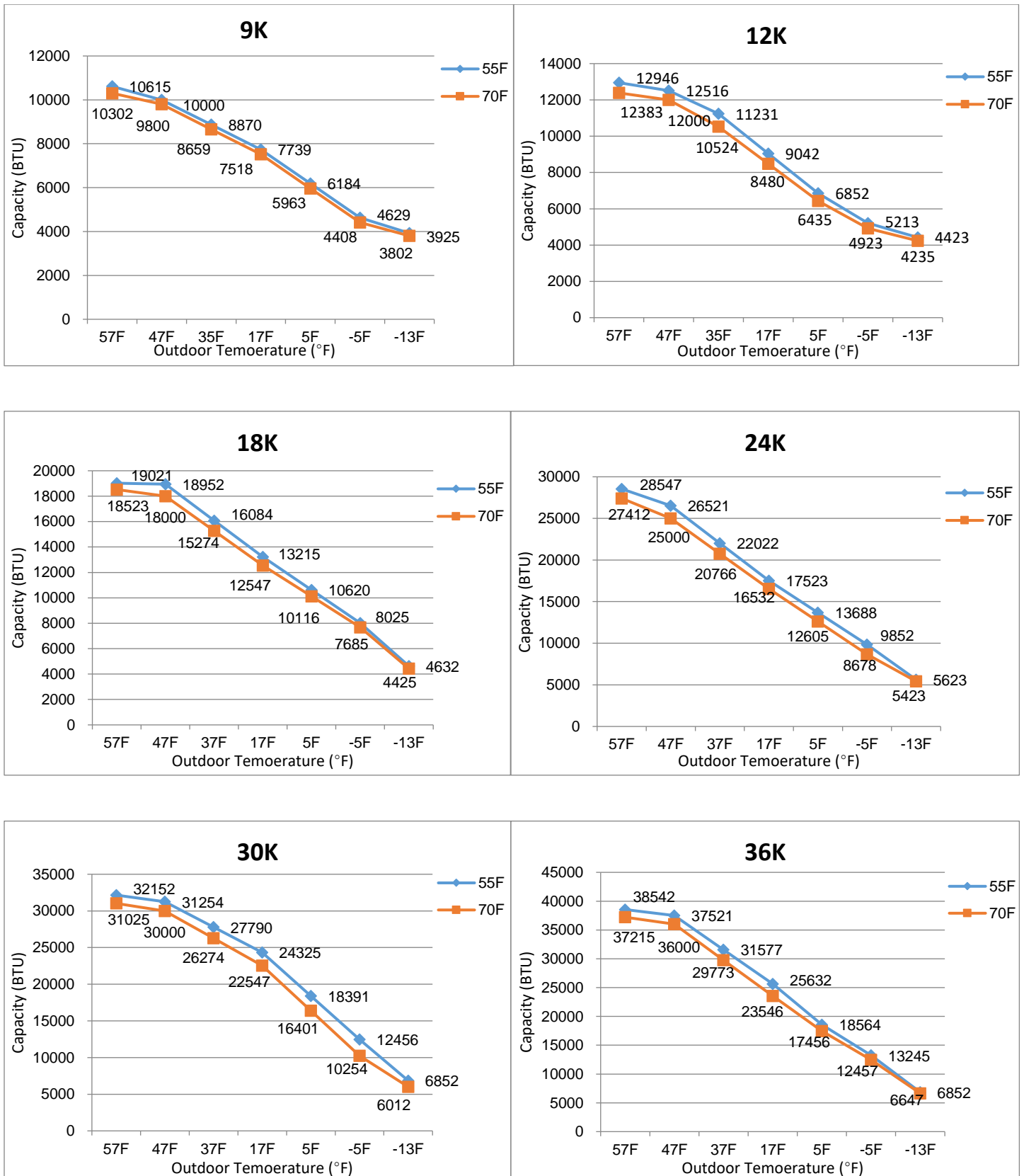
*NOTE: Based on an indoor temperature of 80°F.
Actual capacity may vary from test results shown below.*



4.2.2 Heating

NOTE: Based on the indoor temperature of 55°F / 70°F.

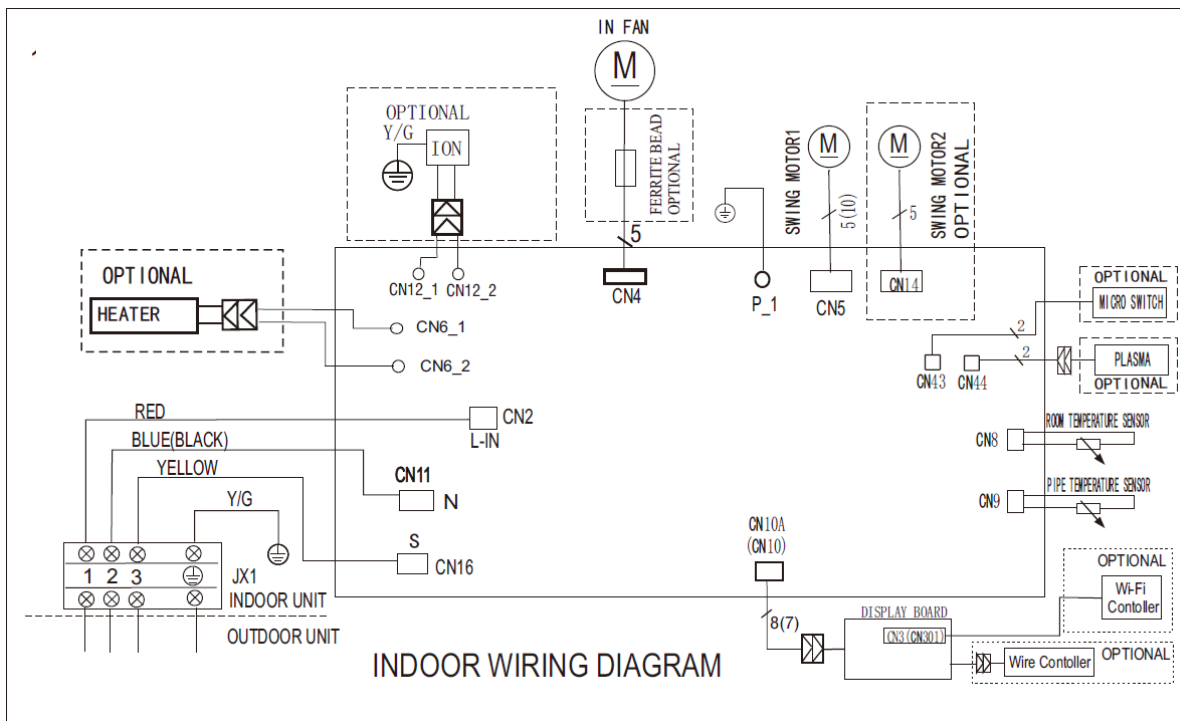
Actual capacity may vary from test results shown below.



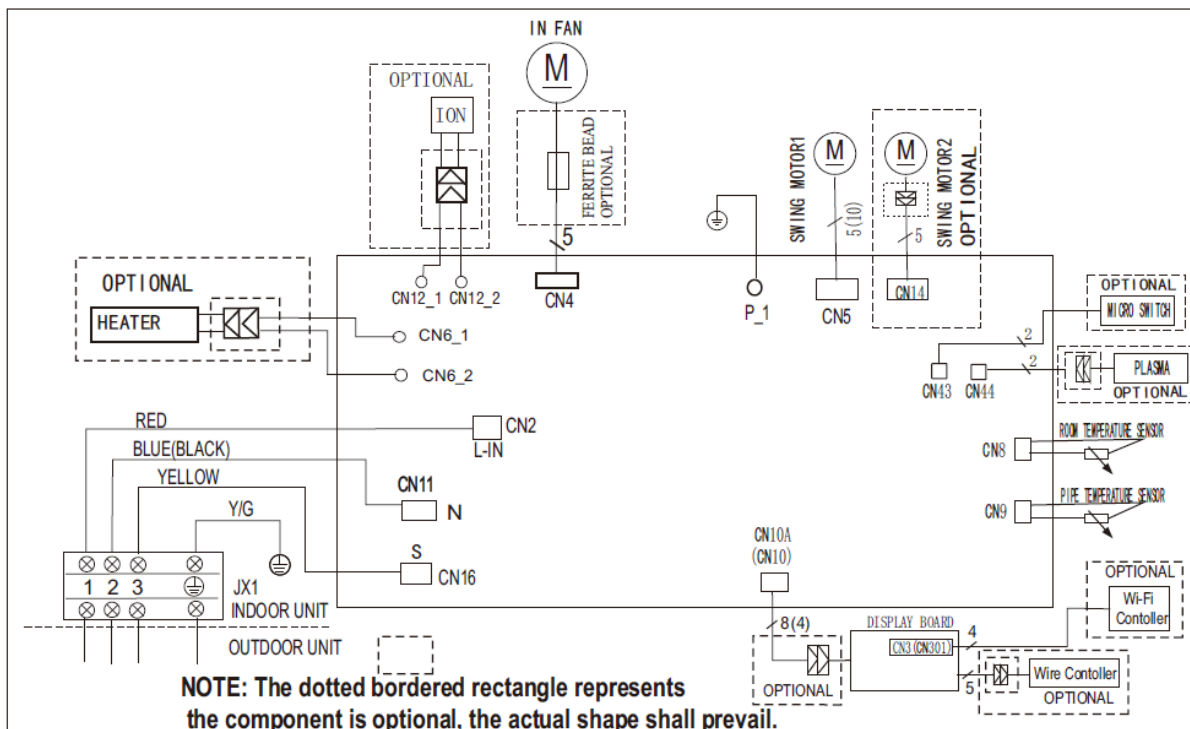
5. Wiring Diagram

5.1 Indoor Unit

For models: 9H47YIMI, 12H47YIMI, 12H47ZIMI, 18H47ZIMI, 24H46ZIMI

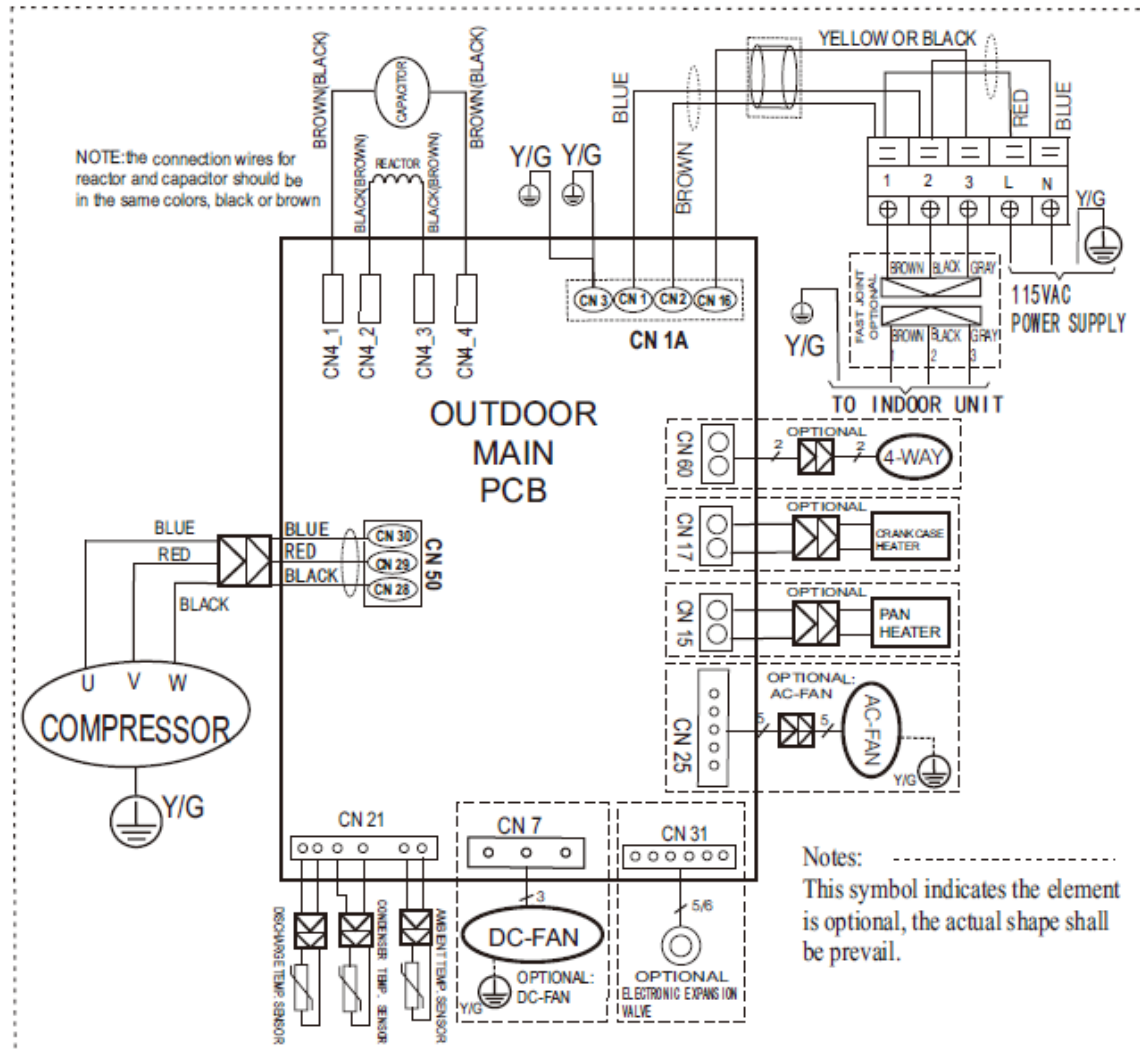


For models: 30H48ZIMI, 36H46ZIMI

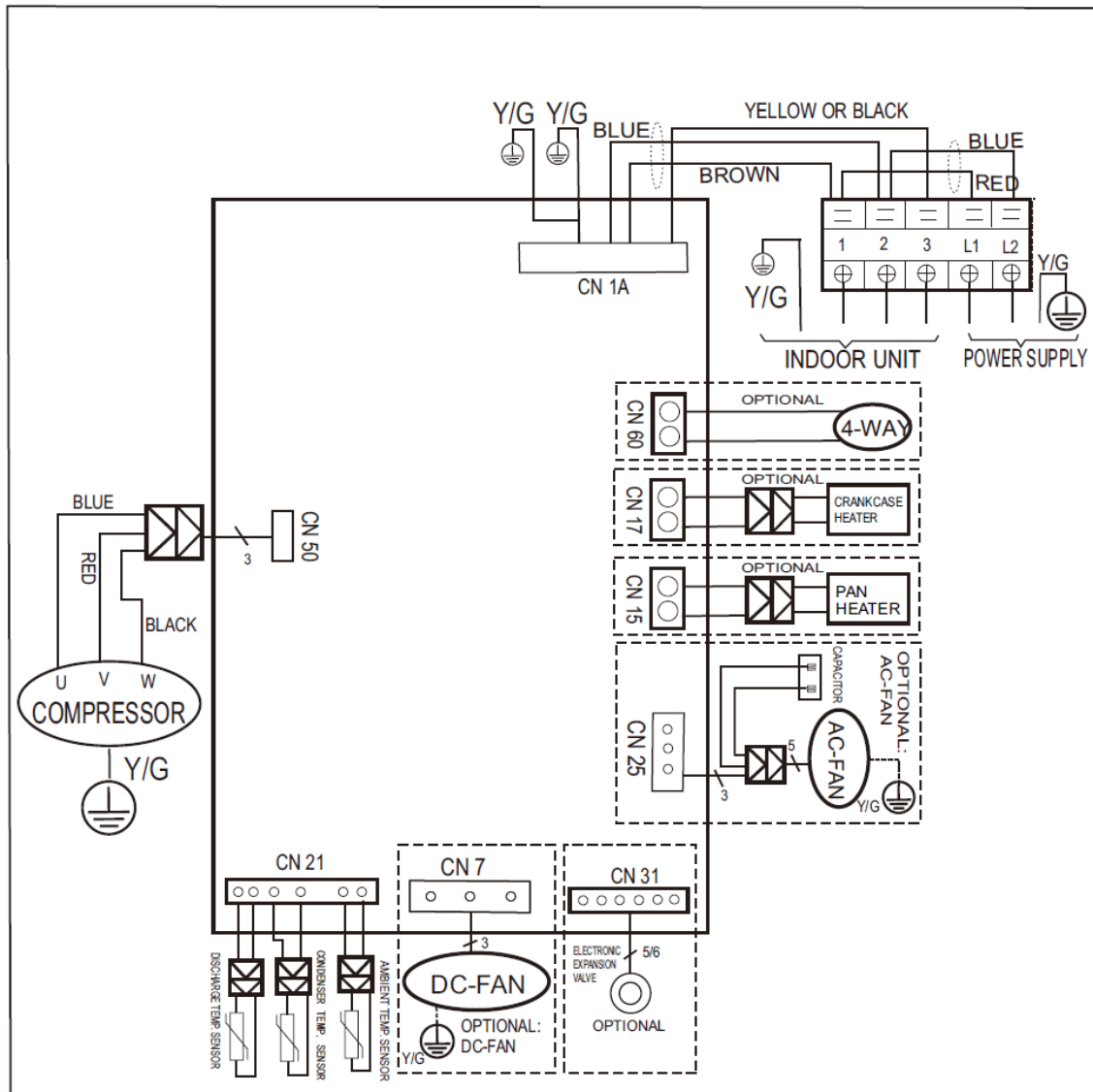


5.2 Outdoor Unit

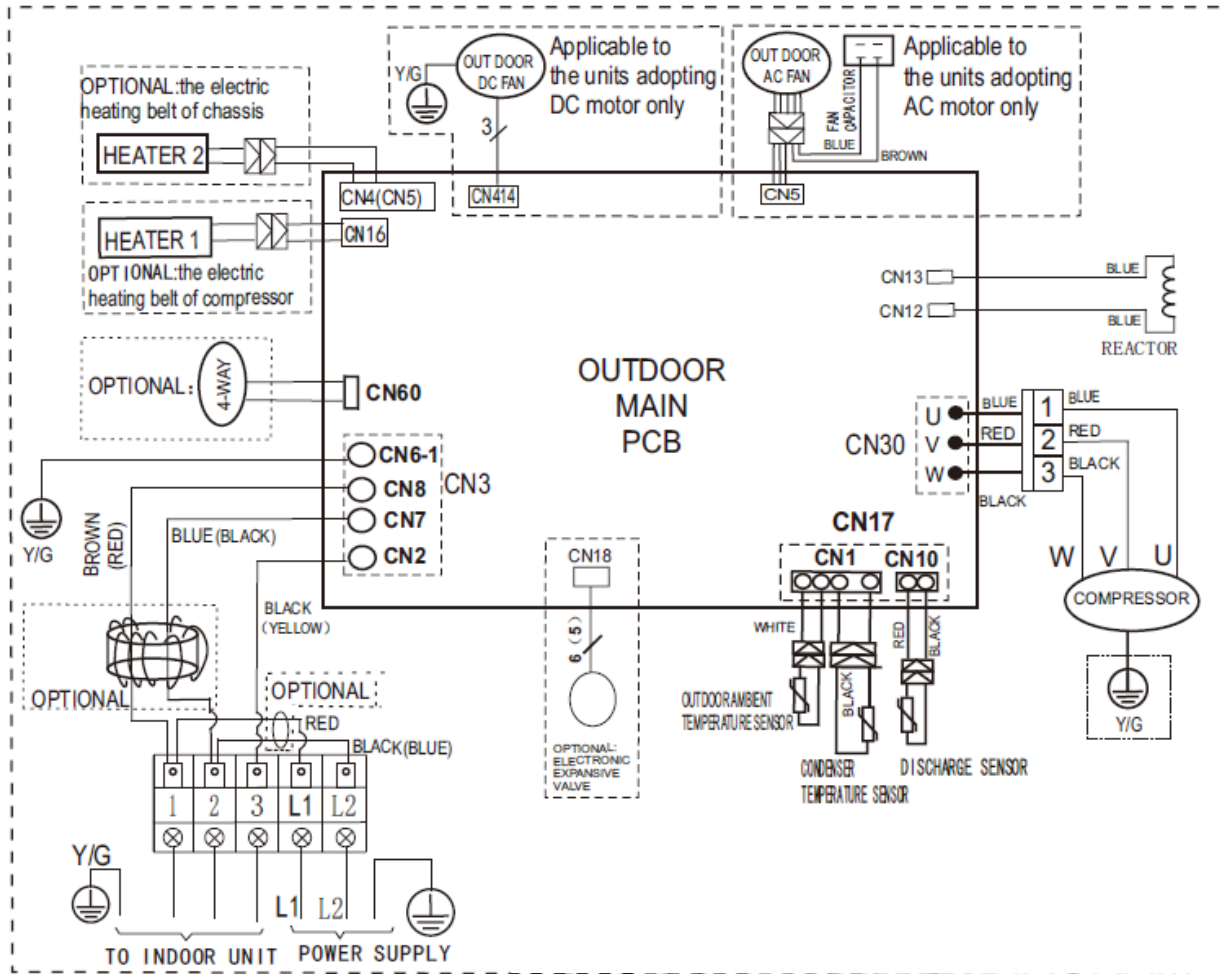
Model	Voltage (V)	Capacity (BTU)	Type
9H47YOMI	115	9,000	HEAT PUMP
12H47YOMI	115	12,000	HEAT PUMP



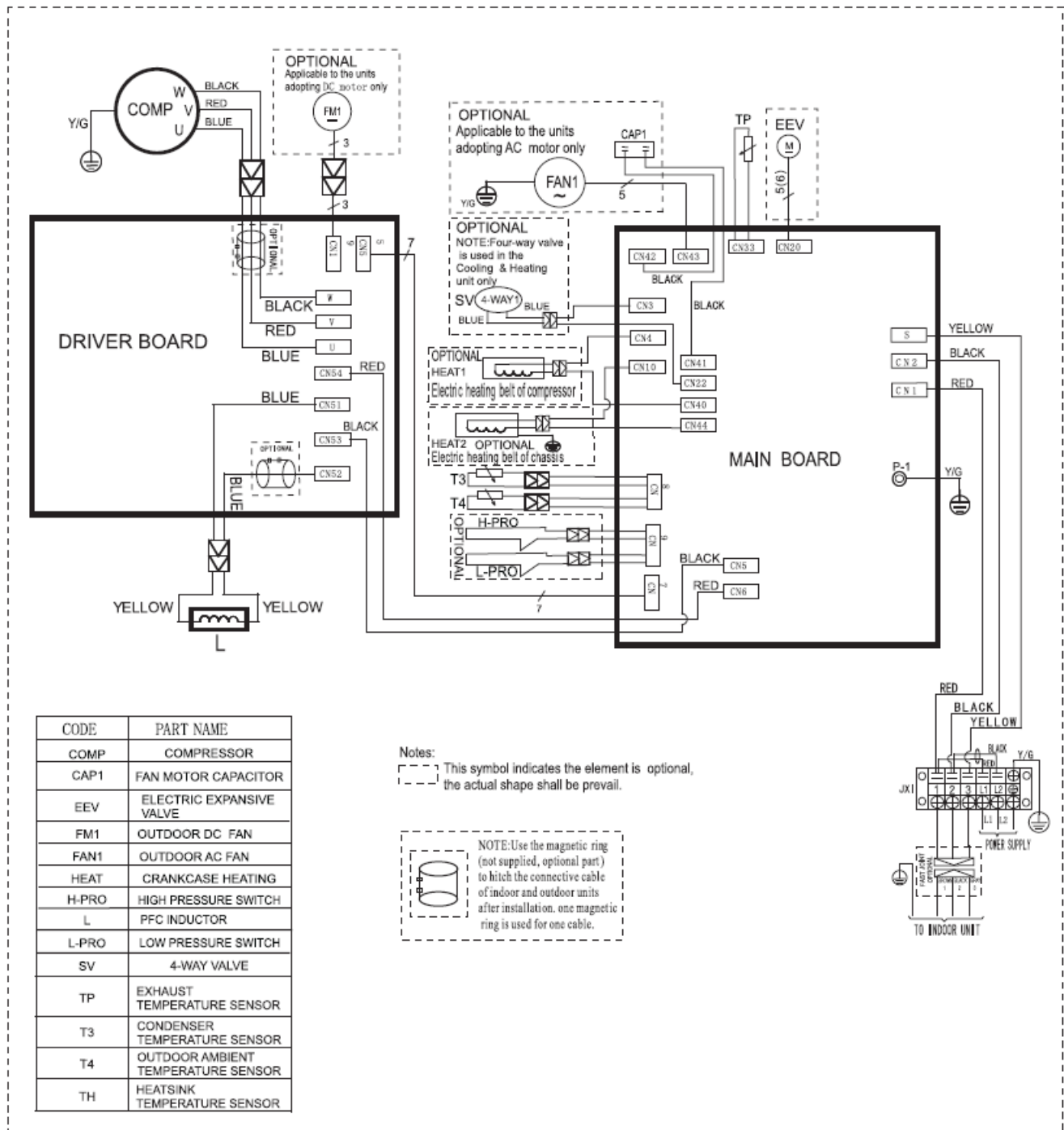
Model	Voltage (V)	Capacity (BTU)	Type
12H47ZOMI	230	12,000	HEAT PUMP



Model	Voltage (V)	Capacity (BTU)	Type
18H47ZOMI	230	18,000	HEAT PUMP
24H46ZOMI	230	24,000	HEAT PUMP



Model	Voltage (V)	Capacity (BTU)	Type
30H48ZIMI	230	30,000	HEAT PUMP
36H46ZIMI	230	36,000	HEAT PUMP



6. Installation Details

6.1 Wrench Torque Sheet

Outside Diameter		Recommended Torque	Max Torque
Φ6.35mm	1/4"	11.063 lb.ft (1500 N.cm)	11.801 lb.ft (1600 N.cm)
Φ9.52mm	3/8"	18.439 lb.ft (2500 N.cm)	19.177 lb.ft (2600 N.cm)
Φ12.7mm	1/2"	25.815 lb.ft (3500 N.cm)	26.552 lb.ft (3600 N.cm)
Φ15.9mm	5/8"	33.190 lb.ft (4500 N.cm)	34.665 lb.ft (4700 N.cm)

6.2 Cable Connection Sheet

The cable size and the current of the fuse or switch are determined by the maximum current indicated on the nameplate located on the side panel of the unit. Please refer to the nameplate before selecting the cable, fuse, and disconnect box. The supply power cable should be selected according to the specifications sheet shown below.

Appliance Amps	AWG Wire Size
10	18
13	16
18	14
25	12
30	10

6.3 Pipe Size, Length, and Elevation

Model		Pipe Size		Standard Length	Max Length	Max Elevation	Additional Refrigerant
Indoor	Outdoor	Gas	Liquid				
9H47YIMI	9H47YOMI	3/8"					
		(Φ9.52 mm)	1/4"		82.0'	32.8'	0.161 oz/ft
12H47YIMI	12H47YOMI		(Φ6.35 mm)		(25 m)	(10 m)	(15 g/m)
12H47ZIMI	12H47ZOMI	1/2"					
		(Φ12.7 mm)					
18H47ZIMI	18H47ZOMI			25'	98'	66'	
24H46ZIMI	24H46ZOMI			(7.5 m)	(30 m)	(20 m)	
					164.0'	82.0'	
30H48ZIMI	30H48ZOMI	5/8"	3/8"		(50 m)	(25 m)	0.322 oz/ft
		(Φ15.9 mm)	(Φ9.52 mm)				(30 g/m)
36H46ZIMI	36H46ZOMI				213.0'	98.0'	
					(65 m)	(30 m)	

6.4 First Time Installation

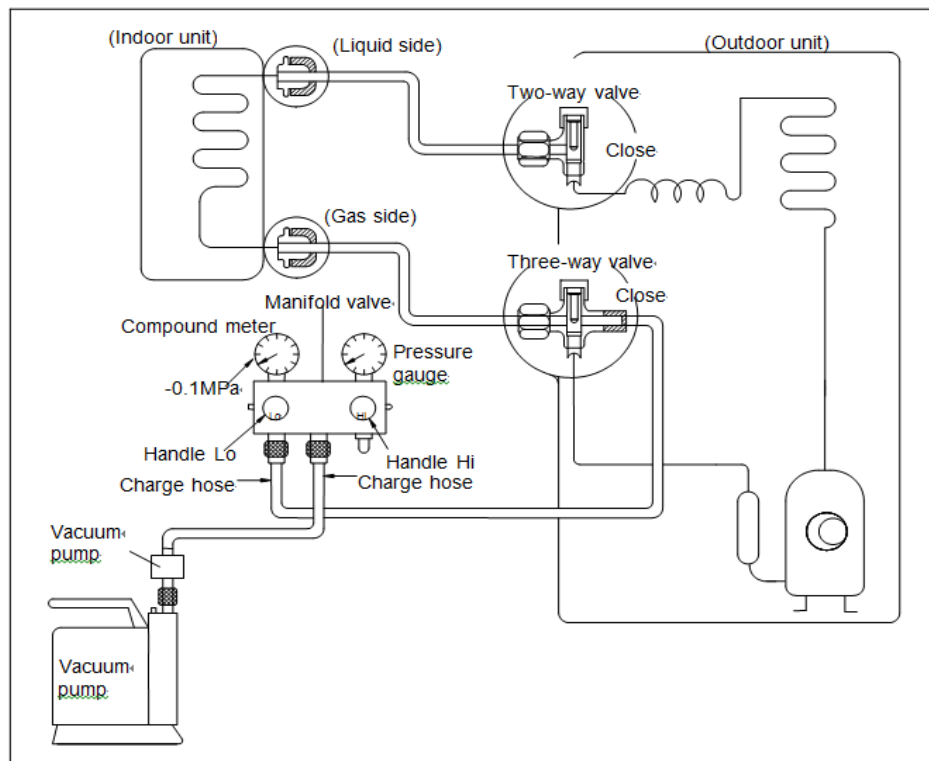
The indoor units and the pipes between indoor and outdoor units must be leak tested and evacuated in order to remove gas and moisture from the system. If not, the air and moisture in the refrigerant system can cause undesirable effects such as the ones shown below.

- Pressure in the system rises.
- Operating current rises.
- Cooling or heating efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigerant system.

6.4.1 Gas Leak Check (Soap Water Method)

Apply soap water or a neutral liquid detergent to the indoor unit, line set connections, and service ports with a soft brush. If bubbles start forming, there is a leak at the connection where the bubbles form.

6.4.2 Air Purging with a Vacuum Pump

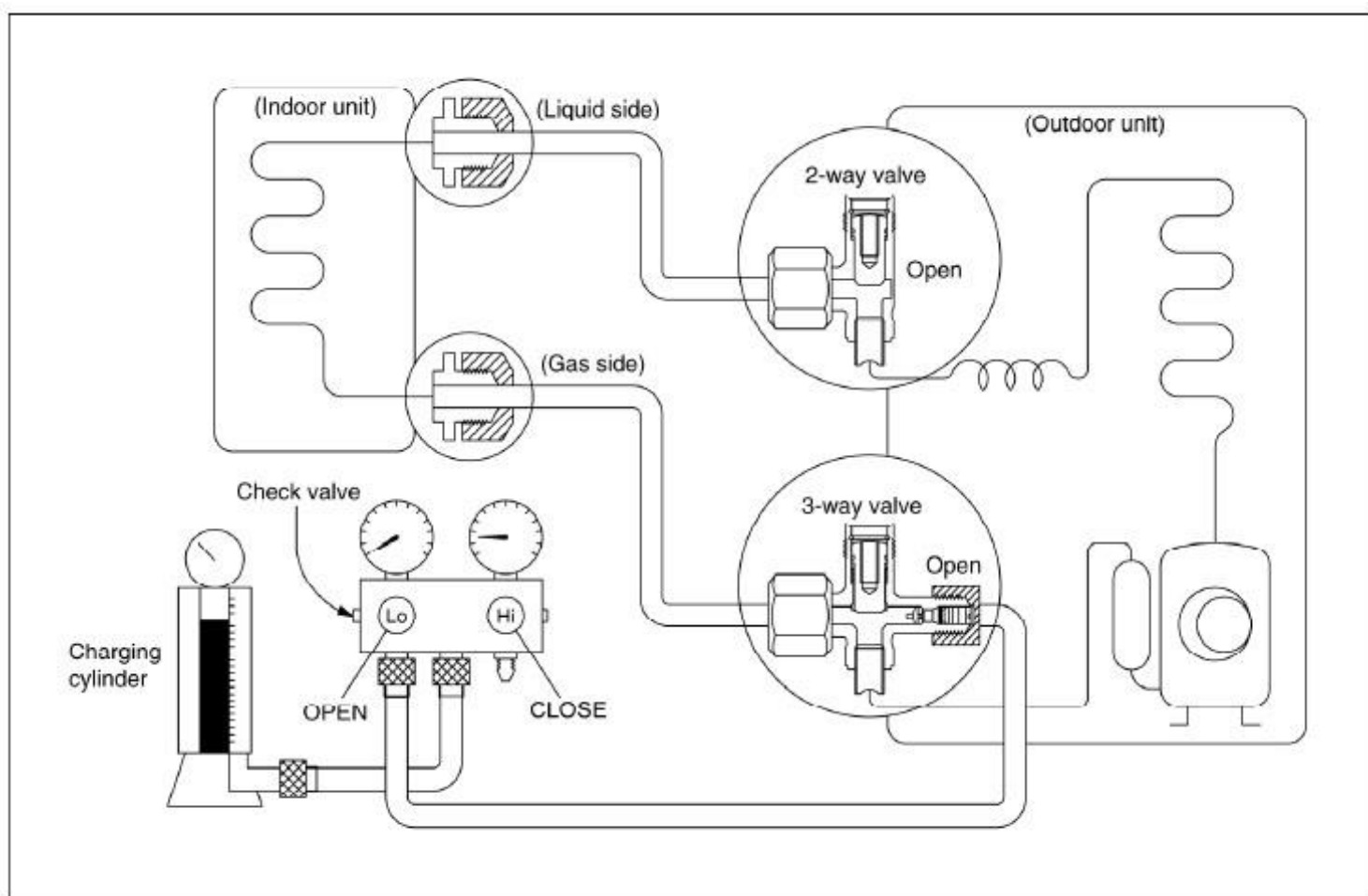


Procedure:

1. Tighten the flare nuts of the indoor and outdoor units. Confirm that both the 2-way and 3-way valves are set to the closed position.
2. Connect the charge hose with the push pin of Handle Lo (low pressure side) to the 3-way valve's gas side service port.
3. Connect the charge hose of Handle Hi (high pressure side) connection to the vacuum pump.
4. Fully open the Handle Lo of the manifold valve.
5. Operate the vacuum pump to evacuate.

6. Hold a vacuum for 120 minutes while the compound meter reads 500 microns (μmHg). If the meter does not indicate 500 microns after pumping for 30 minutes, continue checking the pressure for 20 minutes more. If the pressure can't achieve 500 microns after pumping 50 minutes, check to see if there are some leakage points. Fully close the Handle Lo valve of the manifold valve and stop the operation of the vacuum pump. Confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).
7. Turn the flare nut of the 3-way valves about 45° counterclockwise for 6 or 7 seconds after the gas comes out, then retighten the flare nut. Make sure the pressure display in the pressure indicator is 10 psi higher than the atmosphere pressure. Then remove the charge hose from the 3-way valve.
8. Fully open the 2-way valve and 3-way valve and securely tighten the cap of the 3-way valve.

6.5 Adding Refrigerant for a Used System



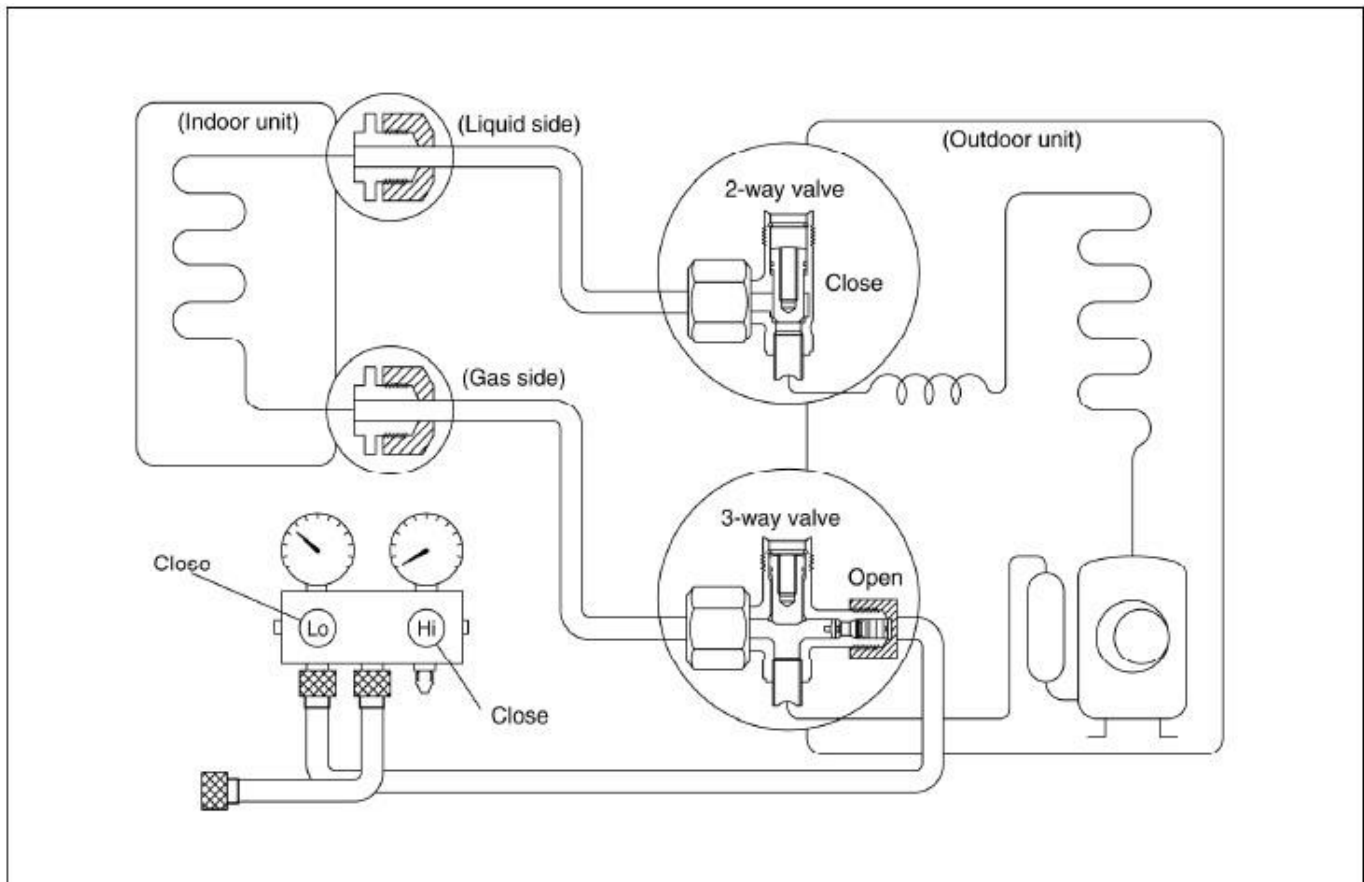
Procedure:

1. Connect the charge hose to the 3-way service port, open the 2-way valve and the 3-way valve. Connect the charge hose to the valve at the bottom of the cylinder. If the refrigerant is R410a, make sure the cylinder is upside-down to ensure liquid charge.
2. Purge the air from the charge hose. Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).
3. Put the charging cylinder onto the electronic scale and record the weight.

4. Operate the air conditioner at the cooling mode.
5. Open the valves (low side) on the charge set and charge the system with liquid refrigerant.
6. When the electronic scale displays the proper weight (refer to the gauge and the pressure of the low side), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.
7. Mount the valve stem caps and the service port. Use torque wrench to tighten the service port cap to a torque of 13.3ft·lb (18N·m). Be sure to check for gas leakage.

6.6 Re-installation of the Indoor Unit

6.6.1. Collecting the Refrigerant into the Outdoor Unit

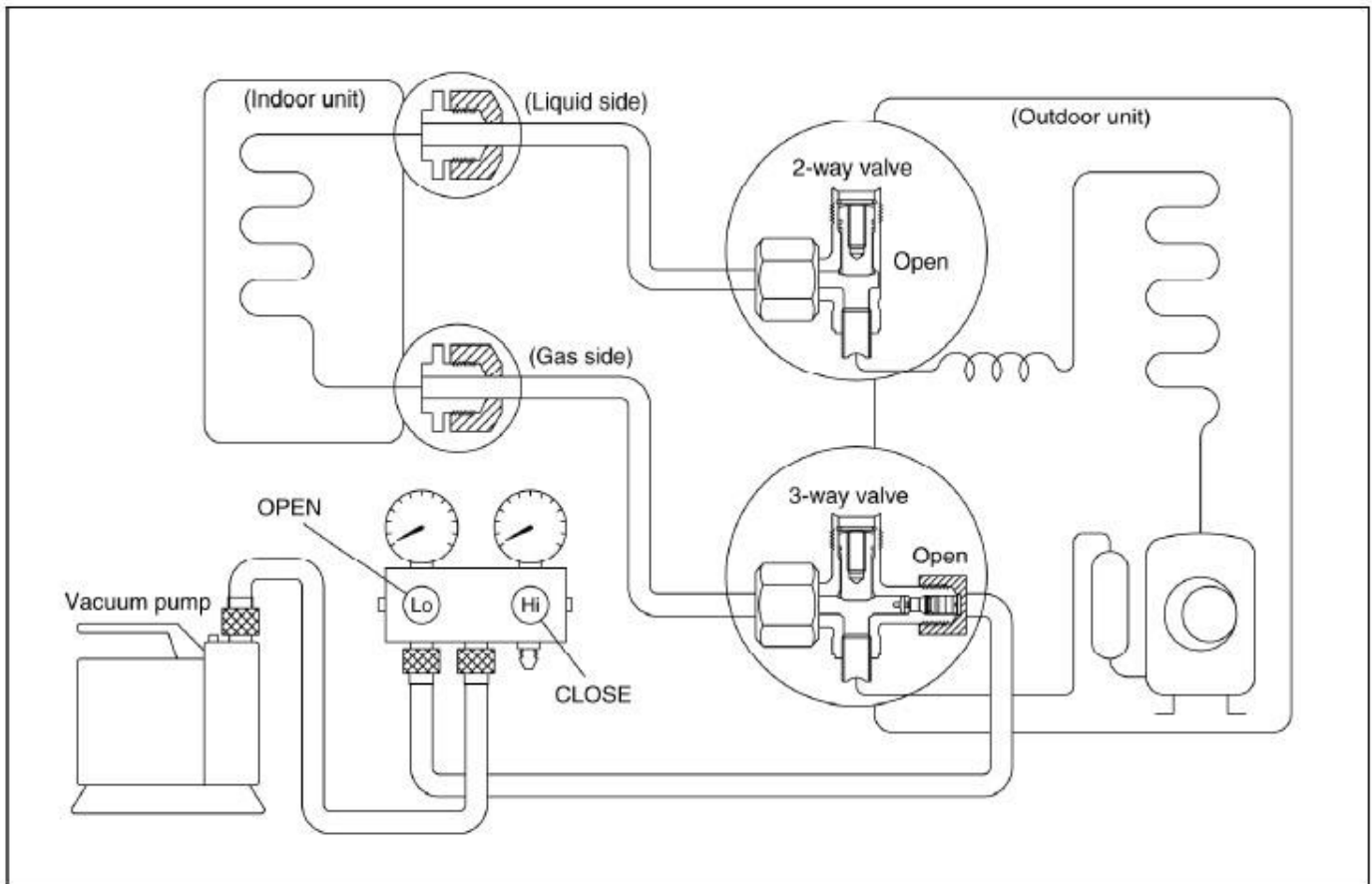


Procedure:

1. Confirm that both the 2-way and 3-way valves are set to the opened position. Remove the valve stem caps and confirm that the valve stems are in the opened position. Be sure to use a hexagonal wrench to operate the valve stems.
2. Connect the charge hose with the push pin of Handle Lo to the 3-way valves gas service port.
3. Air purging of the charge hose. Open the Handle Lo valve of the manifold valve slightly to purge air from the charge hose for 5 seconds and then close it quickly.
4. Set the 2-way valve to the close position.
5. Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 14.5 psi (0.1 MPa).
6. Set the 3-way valve to the closed position immediately. Do this quickly so that the gauge ends up indicating 43.5 psi (0.3 MPa) to 72.5 psi (0.5 MPa). Disconnect the charge set, and tighten the 2-way and 3-way valve's stem nuts. Use a torque wrench to tighten the 3-way valves service port cap to a torque of 13.3ft·lb (18N·m). Be sure to check for gas leakage.

6.7 Re-installation of the Outdoor Unit

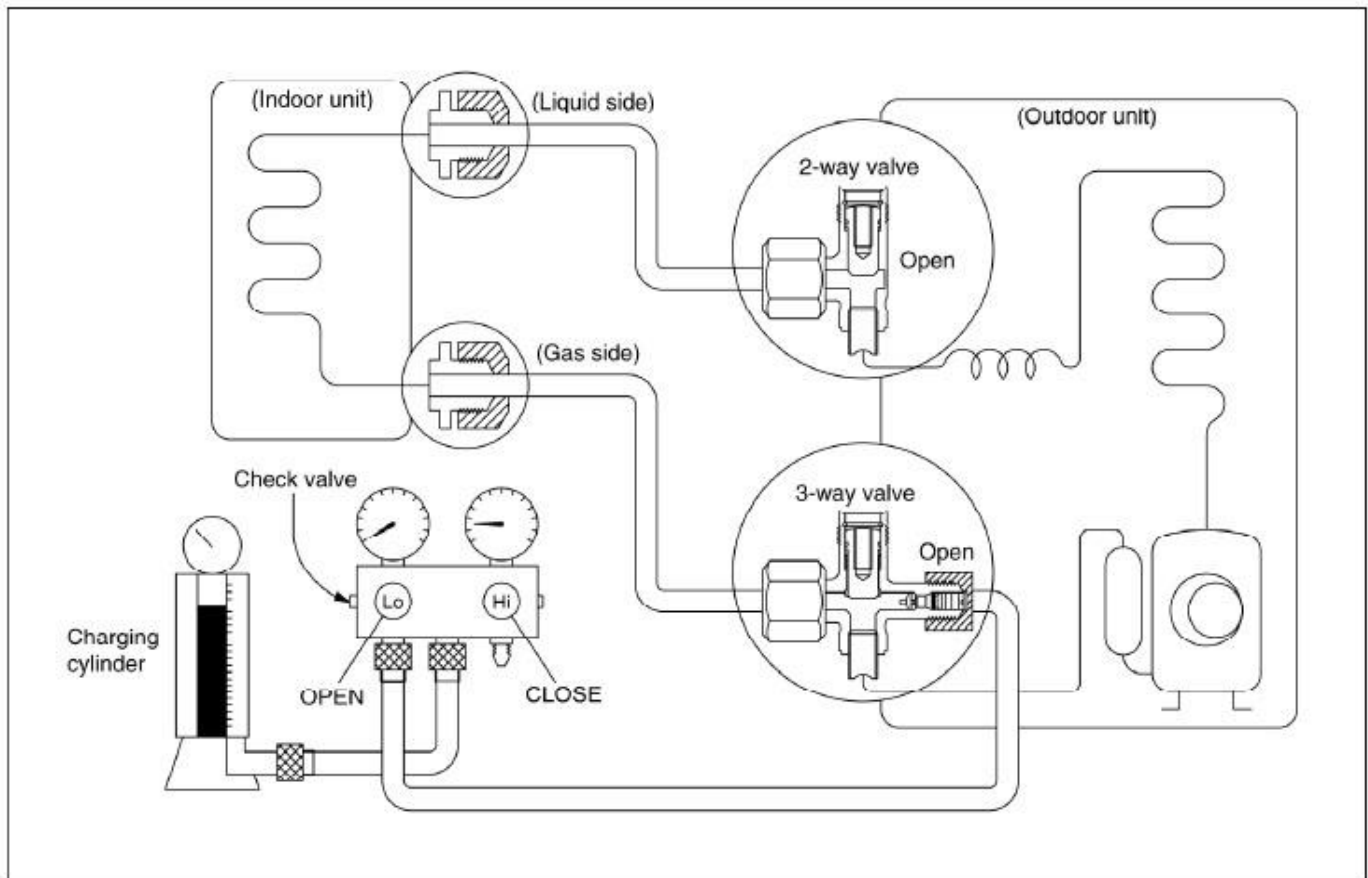
6.7.1 Evacuation for the Whole System



Procedure:

1. Confirm that both the 2-way and 3-way valves are set to the opened position.
2. Connect the vacuum pump to 3-way valve's service port.
3. Evacuation for approximately two hours. Confirm that the compound meter indicates 500 microns (μmHg).
4. Close the valve (low side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).
5. Disconnect the charge hose from the vacuum pump.

6.7.2 Refrigerant Charging



Procedure:

1. Connect the charge hose to the charging cylinder, open the 2-way valve and the 3-way valve. Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder. If the refrigerant is R410a, make the cylinder bottom up to ensure liquid charge.
2. Purge the air from the charge hose. Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).
3. Put the charging cylinder onto the electronic scale and record the weight.
4. Open the valves (low side) on the charge set and charge the system with liquid refrigerant. If the system cannot be charged with the specified amount of refrigerant, or can be charged with a little at a time (approximately 5oz or 150g each time), operating the air conditioner in the cooling cycle; however, one time is not sufficient, wait approximately 1 minute and then repeat the procedure.
5. When the electronic scale displays the proper weight, disconnect the charge hose from the 3-way valve's service port immediately. If the system has been charged with liquid refrigerant while operating the air conditioner, turn off the air conditioner before disconnecting the hose.
6. Mounted the valve stem caps and the service port. Use torque wrench to tighten the service port cap to a torque of 13.3ft·lb (18N·m). Be sure to check for gas leakage.

7. Operation Characteristics

Mode Temperature	COOL	HEAT	DRY
Indoor Temperature	≥62°F (17°C)	≤86°F (30°C)	≥62°F (17°C)
Outdoor Temperature	5°F ~ 122°F* (-15°C ~ 50°C)	5°F ~ 86°F (-15°C ~ 30°C)	32°F ~ 122°F (0°C ~ 50°C)

* All models have this low ambient control characteristic

CAUTION:

1. If the air conditioner is used beyond the above conditions, certain safety protection features may come into operation and cause the unit to operate abnormally.
2. The room relative humidity should be less than 80%. If the air conditioner operates beyond this figure, the surface of the air conditioner may attract condensation. Please set the vertical air flow louver to its maximum angle (vertically to the floor), and set HIGH fan mode.
3. The optimum performance will be achieved during this operating temperature zone.

8. Electronic Functions

NOTE: The "x" variable for all graphs shown in this section is time.

8.1 Abbreviation

- T1: Indoor room temperature
- T2: Evaporator coil temperature
- T3: Condenser coil temperature
- T4: Outdoor ambient temperature
- T5: Compressor discharge temperature

8.2 Display Function

Operating Symbols Displayed in Panel



It displays the temperature settings when the air conditioner is operating.

It displays the room temperature in FAN mode.

Other function display:

- ON**: This code illuminates for 3 seconds when the Timer ON, Swing, Turbo or Silence function is activated.
- OF**: This code illuminates for 3 seconds when the Swing, Turbo or Silence function is cancelled or Timer OFF is activated.
- dF**: This code illuminates when unit is defrosting.
- cF**: This code illuminates when anti-cold air function is turned on.
- SC**: This code illuminates when unit is in self-cleaning process.
- FP**: This code illuminates when freeze protection is turned on.

8.3 Protection Features

- 1. Three minutes delay at restart for compressor.**
1 minute delay for the 1st time starting up and 3 minutes delay for other startup times.
- 2. Compressor overload protection**
If the compressor overload protection is triggered, the unit will stop and then later restart.
- 3. Temperature protection of compressor discharge**
 - T5 Compressor discharge temperature.
 - T5 > 239°F Compressor stops running after 5 seconds.
- 4. Fan speed is out of control**
When indoor fan speed operates too low (300 rpm) for a certain period of time, the unit will stop and the **E3** error code will display on the panel.

5. Inverter module protection

The inverter module has a protection feature for current, voltage, and temperature. If any of these do not operate properly, the unit will shut off and display the corresponding error code.

6. Indoor fan delayed open function

When the unit starts up, the louver will begin moving immediately but the indoor fan will open ten (10) seconds afterwards.

7. Compressor preheating function

When it is cold, the oil in the compressor will not properly lubricate the compressor. A compressor heating belt can preheat the compressor (and oil) to prevent damage.

- If $T_4 < 37.4^{\circ}\text{F}$ and the system was recently connected to the power supply or has been off for over three (3) hours, the compressor heating cable will turn on during startup.
- When $T_4 > 41^{\circ}\text{F}$, the compressor will start running and the compressor heating belt will turn off.

8. Zero crossing detection error protection

If the AC time interval is not correct for a continuous 240 seconds, the unit will stop operating and the **E2** error code will display on the panel. The correct zero crossing signal time interval should be between 6-13ms.

9. Condenser temperature protection

The condenser has a temperature protection system to prevent it from getting too cold. This is important because the refrigerant system was designed to operate at a specific safety pressure. If the pressure gets too high, the compressor may get overload and an explosion may even occur in extreme circumstances.

- $T_3 > 140^{\circ}\text{F}$ (for 5 sec) Compressor will stop until $T_3 < 125.6^{\circ}\text{F}$.
- $131^{\circ}\text{F} < T_3 < 140^{\circ}\text{F}$ Compressor slowly decrease speed every three (3) minutes.
- $125.6^{\circ}\text{F} < T_3 < 131^{\circ}\text{F}$ Compressor operates at the current speed.
- $T_3 < 125.6^{\circ}\text{F}$ Compressor maintains or increases the speed.

10. Evaporator temperature protection

The evaporator has a temperature protection system to prevent it from getting too cold. This is important because if the evaporator coils are too cold, too much condensate will be created which may get blown out by the fan or even freeze on the coils. The compressor operation will be as follows.

- $T_2 > 44.6^{\circ}\text{F}$ Compressor maintains or increases the speed.
- $39.2^{\circ}\text{F} < T_2 < 44.6^{\circ}\text{F}$ Compressor operates at the current speed.
- $32^{\circ}\text{F} < T_2 < 39.2^{\circ}\text{F}$ Compressor decreases speed every three (3) minutes.
- $T_2 < 32^{\circ}\text{F}$ Compressor will stop and restart when $T_2 \geq 41^{\circ}\text{F}$.

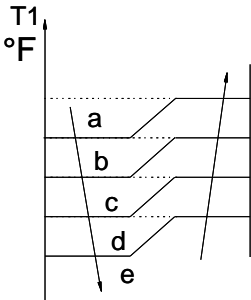
11. Low voltage protection

Voltage that is too low can cause overheating in the unit. To prevent this, all units come equipped with a low voltage protection system. When the voltage drops too low, the unit will reduce the frequency going to the compressor. If the voltage is still low after three (3) minutes, the unit will keep running at the lower frequency with the error code **P1** display on the panel until the unit is restarted.

8.4 Operation Modes and Logic

8.4.1 Fan Mode

- Outdoor fan and compressor stop running.
- Temperature setting is disabled and not shown.
- Indoor fan can be set to high/med/low/auto.
- Louver operates in the same way as cooling mode.
- Auto fan logic



8.4.2 Cooling Mode

8.4.2.1 Compressor Operation Logic

When $T1-Ts < \Delta T - 3.6\text{ }^{\circ}\text{F}$, the compressor will stop,

When $T1-Ts > \Delta T - 1^{\circ}\text{F}$, the compressor will be activated.

ΔT is the programmed parameter of temperature compensation.

When Silence feature is activated, the compressor will run with low frequency.

When the current is more than setting value, the current protection function will be activated, and the compressor will stop.

8.4.2.2 Outdoor Fan Logic

The outdoor unit will be run at different fan speed according to $T4$.

For different outdoor units, the fan speeds are different.

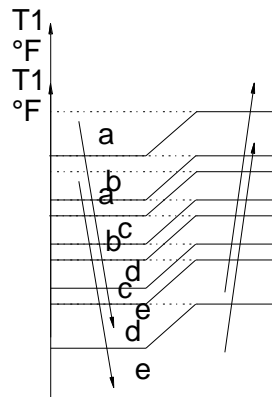
8.4.2.3 Indoor Fan Logic

When the compressor is on, the indoor fan can be set to high/med/low/auto. And the anti-cold wind function has the priority.

The indoor fan is controlled as below:

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)

The auto fan acts as beside:

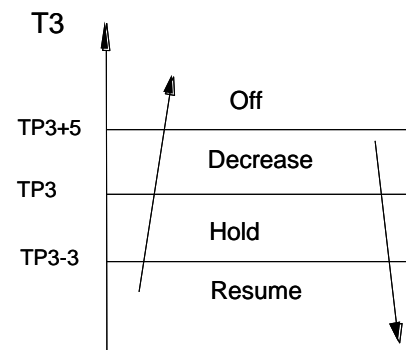


8.4.2.4 Condenser temperature protection

$TP3 < T3 < TP3+5$, the compressor frequency will decrease to the lower level until to F1 and then runs at F1. If $TP3-3 < T3 < TP3$, the compressor will keep running at the current frequency.

--- $T3 < TP3-3$, the compressor will not limit the frequency and resume to the former frequency.

--- $T3 > TP3+5$ for 5 seconds, the compressor will stop until $T3 < TP3-3$.



8.4.2.5 Evaporator temperature protection

The compressor will stop when the evaporator temperature below the setting value.

8.4.3 Heating Mode

8.4.3.1 Compressor Operation Logic

When $T1 - Ts > \Delta T$, the compressor will stop,

when $T1 - Ts < \Delta T - 1.5$, the compressor will be on.

ΔT is the programmed parameter of temperature compensation.

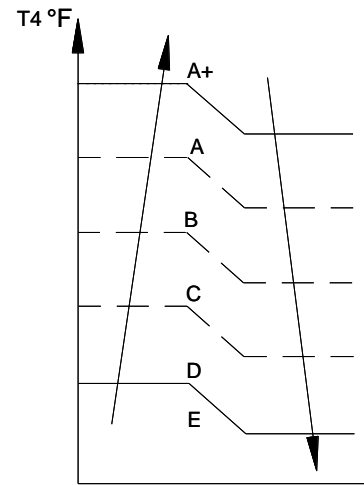
When the AC runs in Silence mode, the compressor will run with low frequency.

When the current is more than setting value, the current protection function will be activated and the compressor will stop.

8.4.3.2 Outdoor Fan Logic

The outdoor unit will be run at different fan speed according to T4.

For different outdoor units, the fan speeds are different.



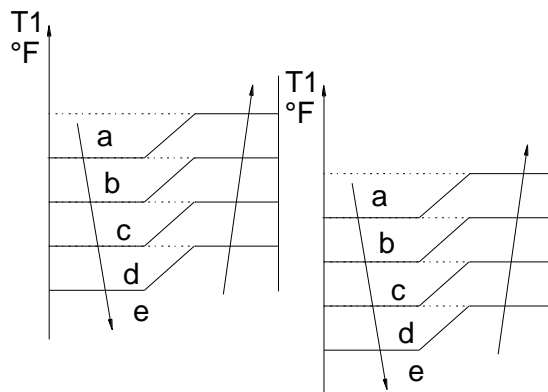
8.4.3.3 Indoor Fan Logic

When the compressor is on, the indoor fan can be set to high/med/low/auto. And the anti-cold wind function has the priority.

The indoor fan is controlled as below:

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)

Auto fan action in heating mode:



8.4.3.4 Defrost Mode

After extended use, frost may build up on the coils on the outdoor unit. The development of frost can slow the rate of heat transfer which can cause many various problems such as overloading the system. To prevent this, the system has an automatic defrost mode according to the temperature T3, and also the compressor running time.

During the defrosting mode, the compressor keep running, indoor and outdoor motor will stop, the operating symbol “**df**” will be displayed on the indoor panel.

If any one of the following items is satisfied, the defrosting will finish and the machine will back to normal heating mode.

----T3 rises to be higher than TCDE 1.8°F.

----T3 keeps on being higher than TCDE 3.6°F for 80 seconds.

----The machine has run for 15 minutes in defrosting mode.

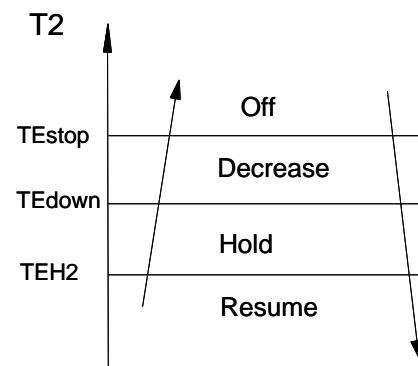
8.4.3.5 Evaporator temperature protection

Off: Compressor stops.

Decrease: Decrease the running frequency to the lower level.

Hold: Keep the current frequency.

Resume: No limitation for frequency.



8.4.4 AUTO Mode

This mode can be chosen with remote controller and the setting temperature can be changed between 62°F~86°C

In Auto mode, the unit will automatically choose between cooling, heating, or fan-only mode according to the temperature difference ΔT ($\Delta T = T_1 - T_s$) on the auto-fan speed. If the temperature changes enough to switch between heating and cooling mode, the compressor will stop for 15 minutes first and then determine what mode to switch into according to ΔT .

	Range	Mode	
	$\Delta T > 3.6^\circ\text{F}$	COOL	
	$-3.6^\circ\text{F} < \Delta T \leq 3.6^\circ\text{F}$	FAN	
Indoor fan will run	$\Delta T \leq -3.6^\circ\text{F}$	HEAT	at auto fan of the relevant mode.
The louver mode.			operates same as in relevant mode.

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

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

8.4.5 Drying Mode

The unit can also be used to dehumidify the air. During the drying mode, indoor fan speed is fixed at breeze and can't be changed. The louver angle is the same as in cooling mode.

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

8.4.6 Emergency Operation Function

To enter this operation: When the unit is off, press the button beside the removable cover of the power supply terminal to go into forced auto mode. If the button is pressed again within 5 seconds, the machine will go into forced cooling mode.

During forced operation: All general protections and remote control capabilities are available.

Forced cooling mode: The compressor and outdoor fan keep running and the indoor fan runs at low speed. After running for 30 minutes, AC will turn to auto mode with 75°F setting temperature.

Forced auto mode: The action of forced auto mode is the same as normal auto mode with 75°F setting temperature.

When AC receives signals from the remote control, such as switch on, switch off, timer on, timer off, mode setting, fan speed setting, sleeping mode setting, follow me setting, it will quit the forced operation. Or press that button again when the unit is on and operating in any forced operation to exit the emergency operation

8.4.7 Timer Function

The timer function can be used to automatically turn on and off the unit. When the Timer On function is activated, the unit will automatically turn on when the set time is reach. When the Timer Off function is activated, the unit will automatically turn off when the set time is reached. The timing range is 24 hours and both the Timer On and Timer Off function can be activated simultaneously.

The timer function will not change the AC current operation mode.

The AC will quit the timer function when it has malfunction.

8.4.8 Sleep Function

The sleep function can be used to reduce energy usage for the air conditioner during sleeping hours. It is available in cooling, heating or auto mode. To activate this feature, press the sleep button. When activated, the unit will do the following:

1. The set temperature will be raised/lowered 2°F for cooling/heating respectively every hour for two hours (4°F change total).

2. After the second hour, the indoor fan is fixed at low speed. (Anti-cold wind function has the priority in heating mode.)
3. After seven (7) hours of being activated, the air conditioner exit sleep mode and resume the mode and temperature that it was originally in.
4. Timer setting is available.

8.4.9 Auto-Restart Function

The indoor unit is equipped with an auto-restart function. In the case of a sudden power loss, the unit has a built in module that memorizes the mode and temperature settings. When the power resumes, the unit will automatically restart with the same settings as before the power outage.

If AC was off before the power outage, and AC is required to start up now, the compressor will have 1 minute delay when power resumes. Other conditions, the compressor will have 3 minutes delay when restarts.

8.4.10 Refrigerant Leakage Detection

With this new technology, the display area will show “**EC**” when the outdoor unit detects refrigerant leakage. This function is only available in cooling mode.

8.4.11 Louver Position Memory Function

When starting the unit again after shutting down, its louver will restore to the angle originally set by the user, but 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 will restore to the default angle.

8.4.12 Freezing Protection

In heating mode, the set temperature can be set to 46°F (8°C) to prevent things from freezing when the house is unoccupied for a long time in severe cold weather. “**FP**” shows on the display window of panel while this feature is activated.

8.4.13 Self Clean Function

For heat pump models, after running in cooling or drying mode, if the user press “Self Clean” button on remote control, firstly, indoor unit runs in fan only mode for a while, then low heat operation and finally runs in fan only again. This function will automatically clean and dry the Evaporator and keep the inside of indoor unit dry and prevent breeding of mold for the next operation. “**SC**” shows on the display window of panel while this feature is activated.

The Self Clean function will last approximately 16 minutes.

8.4.14 Follow Me

This allows the room temperature sensing to be transferred from the wall unit (evaporator) to the remote control.

- a. The buzzer will emit a sound while the FOLLOW ME button is pressed to active this function. The error detective function of room temperature sensor will be still valid.
- b. When the follow me function is activated, the remote control display will indicate actual room temperature and the wall unit will display set point temperature.
- c. The PCB will take action to the mode change information from remote control signal, but it will not affected by the setting temperature.
- d. The remote control will communicate with the indoor unit every 3 minutes interval until press the Follow Me button again to disable the function. The air conditioner will also cancel the Follow Me feature automatically if it does not receive the signal during any 7 minutes interval.

8.4.15 Silence Operation

Press the "SILENCE" button on remote control to active Silence function. When the Silence function is activated, the compressor running frequency will keep in low and the indoor unit will bring faint breeze, which will reduce the noise to the lowest level and create a quiet and comfortable room for you.

Due to low frequency operation of compressor, it may result in insufficient cooling and heating capacity.

8.4.16 Temperature Differential Selection

In heating mode, the warm air is lighter than cold air. So the higher the height is, the higher temperature of air is. The air conditioner will use temperature differential which is up to 10.8°F, equals to 6°C controlled by software.

Temperature Compensation (for Heat Pump only)

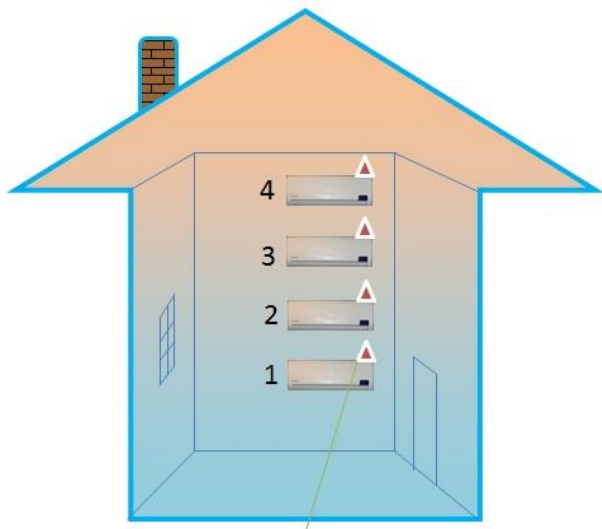
The installation height is for reference only.

Installer should consider:

1. Avoid cool or heat source near by the indoor unit.
2. Avoid the obstacle to the air flow.

Temperature Compensation in Cooling

Factory Setting	Installation Height ft.	Temperature Compensation °F	Position
	Lower than 5.8	1.8	1
	Between 5.9 – 6.5	0	2
	Between 6.6 – 7.8	-1.8	3
x	Between 7.9 – 8.5	-3.6	4
Note: See Setup Manual on page 38 for changing			



Room temperature sensor

Temperature Compensation in Heating

Factory Setting	Installation Height ft.	Temperature Compensation °F	Position
	Lower than 5.8	0	1
x	Between 5.9 – 6.5	3.6	2
	Between 6.6 – 7.8	7.2	3
	Between 7.9 – 8.5	10.8	4
Note: See Setup Manual on page 37 for changing			

8.4.16 Point Check Function

When indoor and outdoor unit were connected and started running, press the "LED" button on the remote control three times, and then press the DIRECTION/SWING button three times in ten seconds, the buzzer will keep ring for two seconds. The air conditioner will enter into the information enquiry status. You can press the LED or SWING button to check the previous or next item for operation data / failure record.

After entering the "information enquiry" status, the panel will display the code name in 2 seconds, the details are as follows:

Enquiry information	Displaying code	Meaning
T1	T1	T1 - Room temperature.
T2	T2	T2 - Indoor coil temperature.
T3	T3	T3 - Outdoor coil temperature.
T4	T4	T4 - outdoor ambient temperature.
T2B	Tb	T2B – N/A (for multi zone units only).
TP	TP	TP – discharge temperature
TH	TH	TH – N/A.
Targeted Frequency	FT	Targeted Frequency
Actual Frequency	Fr	Actual Frequency
Indoor fan speed	IF	Indoor fan speed
Enquiry information	Displaying code	Meaning
Outdoor fan speed	OF	Outdoor fan speed
EXV opening angle	LR	EXV opening angle
Compressor continuous running time	CT	Compressor continuous running time
Causes of compressor stop.	ST	Causes of compressor stop.
Reserve	RD	
Reserve	RI	
Reserve	b0	
Reserve	b1	
Reserve	b2	
Reserve	b3	
Reserve	b4	
Reserve	b5	
Reserve	b6	
Reserve	dL	
Reserve	Ac	
Reserve	Uo	
Reserve	Td	

When the AC enters the information enquiry status, it will display one code value in the next 25s, and then quit the enquiry status. The details of each item are as follows.

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. All the displaying temperature is actual value. 2. All 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 will display 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, display value is from 14-FF(hexadecimal), the corresponding fan speed range is from 200-2550RPM.
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 will display the maximum value or minimum value.
Causes of compressor stop.	0-99	For the detailed meaning, please consult with engineer	Decimal display
Reserve	0-FF		

8.5 Set-Up Changing Function

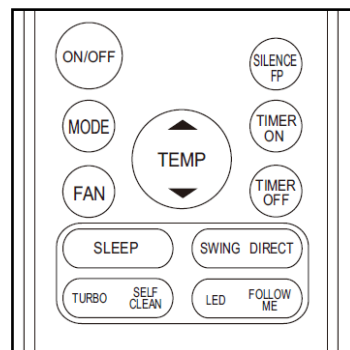
Some functions or settings, such as, temperature differential, filter reminder, louver position memory, auto-restart, anti-code air can be changed or disabled with the remote control according to different requests.

Important: The function can only be accessed in 30 seconds when the batteries were installed in the remote control, and the indoor unit must be turned off.

8.5.1 Set-up Steps

Follow the steps below to enter the set-up changing manual.

- Press and hold the three buttons "MODE", "FAN" and "TIMER ON" simultaneously for 5 seconds within 30 seconds after the batteries were installed in the remote control.
- Press "TEMP UP/DOWN" button to select the setup code.
- Press "MODE" button to enter the setup range.
- Press "FAN" or "TIMER OFF" to select the setup range.
- Press "TIMER ON" to confirm and exit.



8.5.1 Set-up Manual

Note: All temperature here is in Celsius.

Setup Manual					
Setup Code	Setup Name	Setup Range	Display (on remote /indoor unit panel)	Default Setting	Remark
F1	Auto Restart	ON	ON	ON	
		OFF	OFF		
F2	Temperature compensation in heating	-6°C ~ +6°C	-6 ~ 6	4°C	
F3	Indoor coil temperature setting (disable/active anti-cold air function in heating)	1 - Intelligent anti cold wind function	1	17°C	
		2 - temperature setting range: 0~21	2		
F4	Indoor fan speed setting while room temperature is satisfied	1 - Stop fan	1		
		2 - keeps run at low speed	2		
		3 - keeps run at set speed	3	3	
		4 (Thermal) - indoor fan will run 1 more minute at the lowest speed after the indoor fan stopped 4 minutes later while room temperature was satisfied.	4		Anti-cold wind function will be disabled while "4" (Thermal) selected
F5	Louver position memory	1 - NO	1		
		2 - Set-off memory for power off & power failure	2	2	
		3 - Set-off memory for power off only	3		

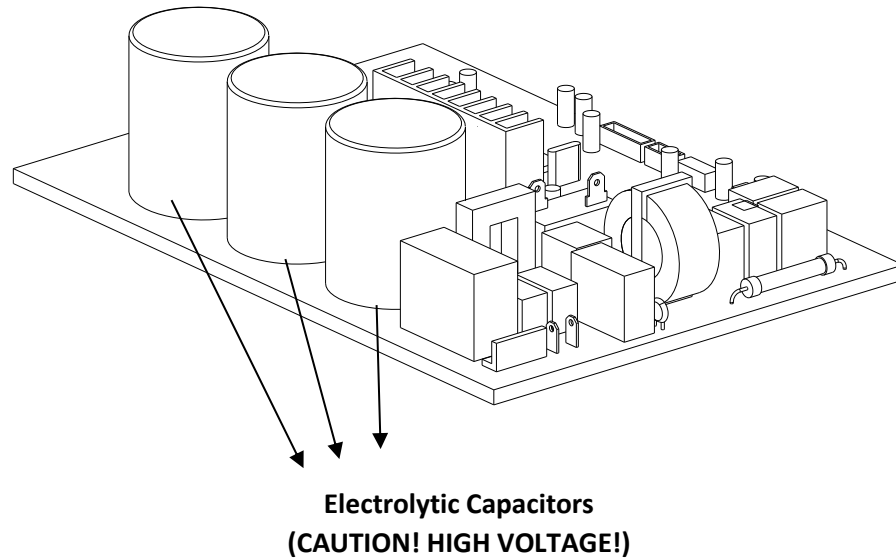
Setup Code	Setup Name	Setup Range	Display (on remote /indoor unit panel)	Default Setting	Remark
F6	unit operation	CH - Heat Pump	CH	CH	
		HH - Heating Only	HH		
F7	temperature compensation in cooling	-2°C ~ +2°C	-2 ~ 2	-2	
F8	refrigerant detection	ON	ON	ON	"EC" will display on the indoor panel while the refrigerant is not enough.
		OFF	OFF		
F9	air filter clean reminder	ON	ON		After 240 hours of use, "CL" will flash on the indoor panel for 15 seconds each time when the unit restarts.
		OFF	OFF	OFF	
E1	air freshening filter change reminder	ON	ON		After 2,880 hours of use, "nF" will flash on the indoor panel for 15 seconds each time when the unit restarts.
		OFF	OFF	OFF	
E2	lowest setting temperature	17°C ~ 24°C (62°F ~ 76°F)	17°C - 24°C (62°F - 76°F)	17	
E3	highest setting temperature	25°C ~ 30°C (78°F ~ 88°F)	25°C ~ 30°C (78°F ~ 88°F)	30	
E5	operation priority for multi zone	H - heating	H	H	Not available for the single zone mini splits.
		C - cooling	C		
E6	network address	0 ~ 63	0 ~ 63	N/A	Cannot check, only show when the address changed by special command. No set-off memory while address changed.
E7	capacity selection	0 ~ 11	0 ~ 11	N/A	Cannot be changed.
E8	twins selection	0 ~ 2	0, 1, 2	N/A	Cannot be changed.
E9	static pressure selection	0 ~ 4	0 ~ 4	N/A	Cannot be changed.

9. Troubleshooting

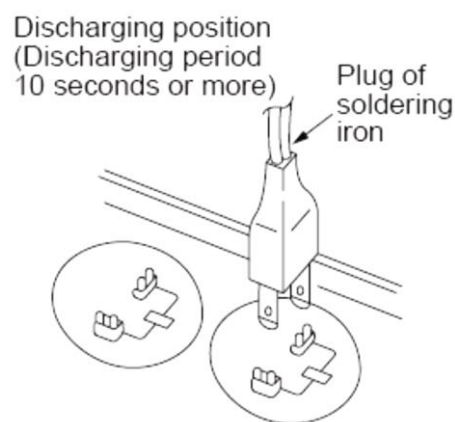
NOTE: All pictures used in this section are for reference only. Actual products may be different.

WARNING!

Electricity is still kept in the capacitors even when the power supply is shut off or disconnected. Do not forget to discharge the electricity in the capacitors before troubleshooting.



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



NOTE: The picture above is for reference only. The actual plugs and capacitors may be different.

9.1 Indoor Unit Error Codes

Display	LED STATUS
E0	Indoor unit EEPROM parameter error
E1	Indoor / outdoor units communication error
E2	Zero-crossing signal detection error
E3	Indoor fan speed has been out of control
E4	Indoor room temperature sensor T1 open circuit or short circuit
E5	Evaporator coil temperature sensor T2 open circuit or short circuit
EC	Refrigerant leakage detection
F0	Overload current protection
F1	Outdoor ambient temperature sensor T4 open circuit or short circuit
F2	Condenser coil temperature sensor T3 open circuit or short circuit
F3	Compressor discharge temperature sensor T5 open circuit or short circuit
F4	Outdoor unit EEPROM parameter error
F5	Outdoor fan speed has been out of control
P0	IPM malfunction or IGBT over-strong current protection
P1	Over voltage or over low voltage protection
P2	High temperature protection of compressor top diagnosis and solution(only for 9k,12k models)
P3*	Outdoor ambient temperature too low.
P4	Inverter compressor drive error
P5	Indoor units mode conflict (multi-zone ONLY)

*P3

- 1) In heating mode, when the outdoor temperature is lower than -13°F for 1 hour, the indoor unit display error code P3.
- 2) If the OUTDOOR temperature is higher than -8°F for 10 minutes and compressor stop for 1 hour OR outdoor temperature is higher than -23°F for 10 minutes, then the unit will return to work.

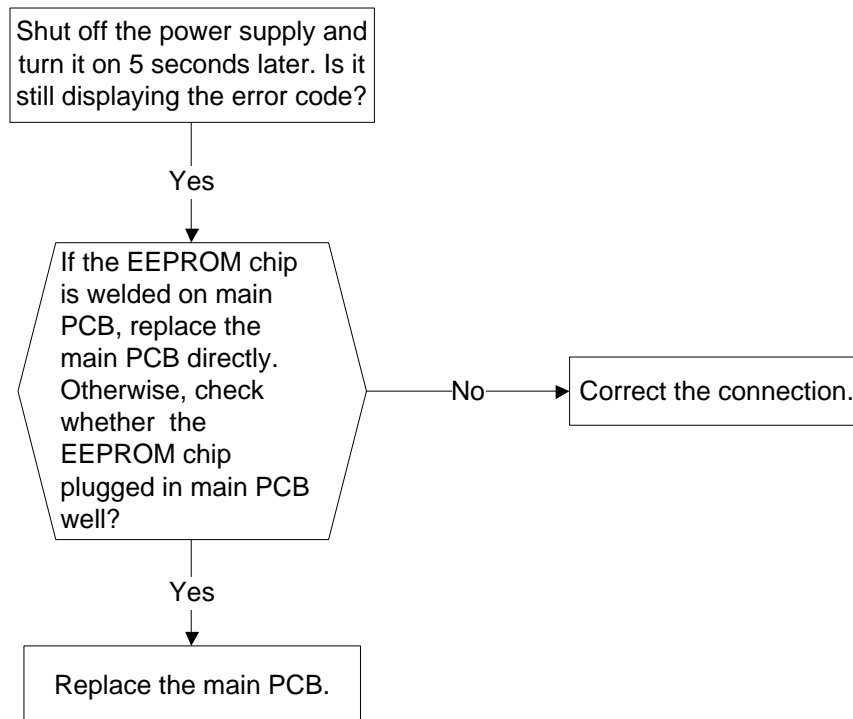
9.2 Diagnosis and Solution

9.2.1 E0/F4: EEPROM Parameter Error

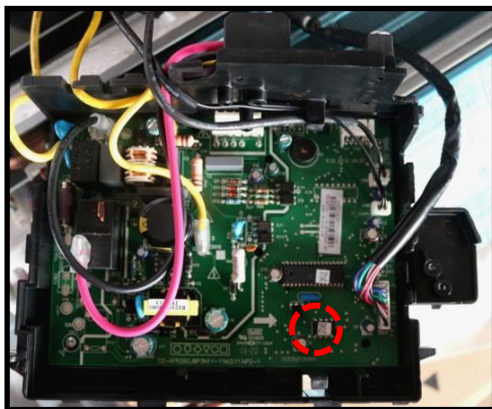
Condition: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.

Possible Causes:

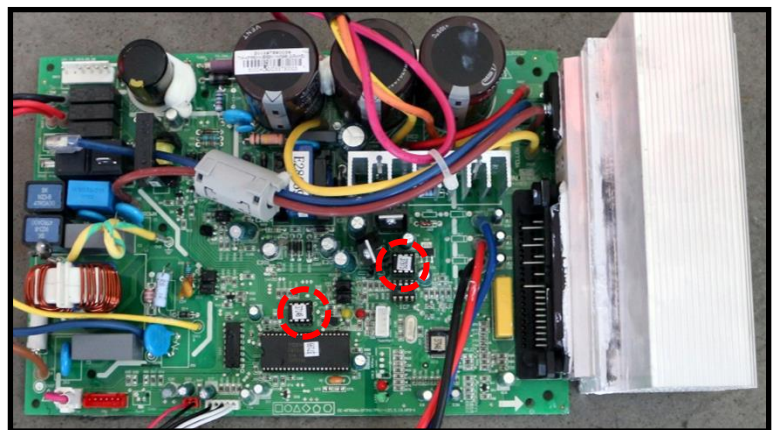
- Installation mistake
- PCB faulty



EEPROM: A read-only memory whose contents can only be erased and reprogrammed by using a pulsed voltage. For the location of the EEPROM chip, please refer to the pictures below.



Indoor PCB



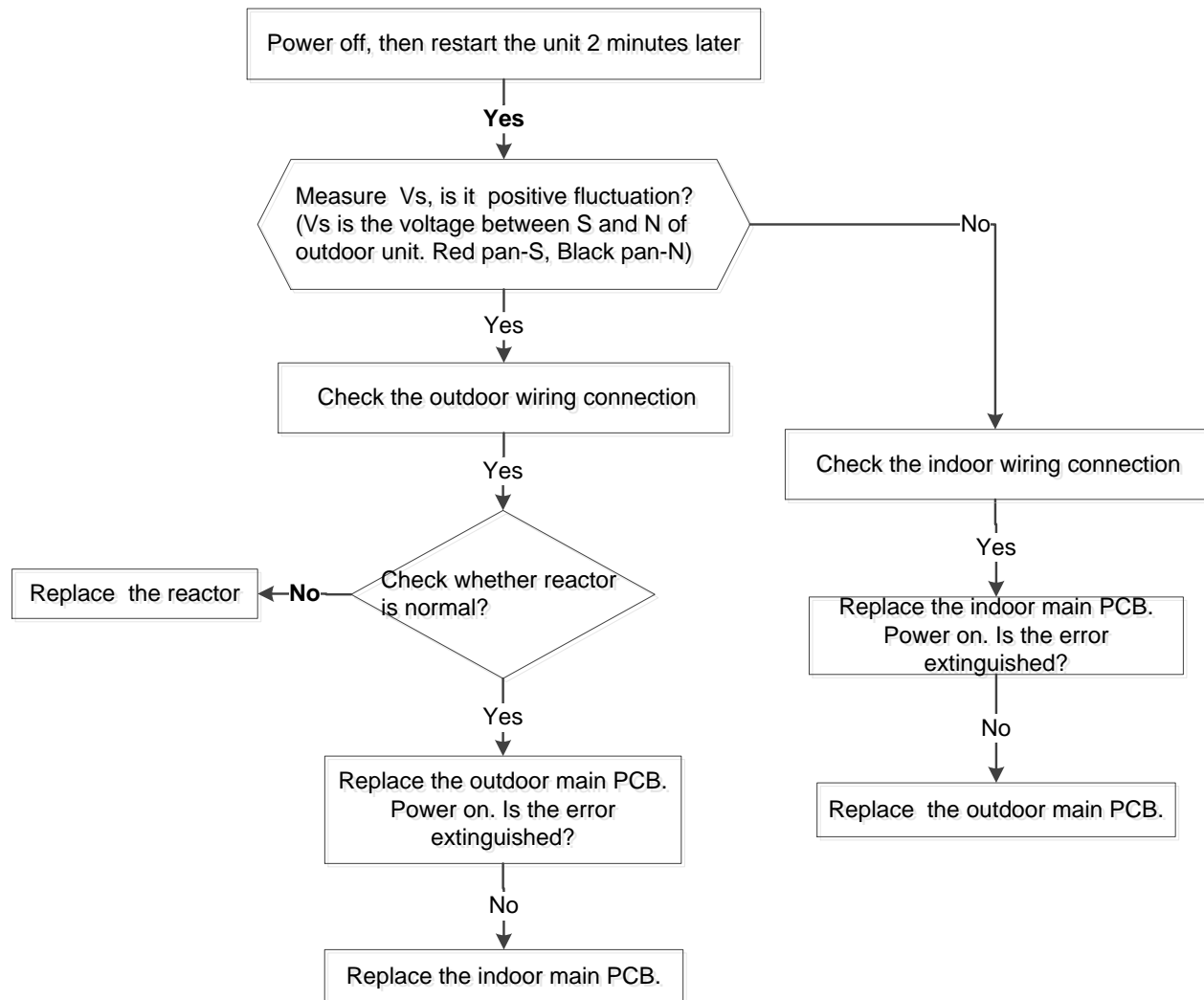
Outdoor PCB

9.2.2 E1: Indoor/Outdoor Communication Error

Condition: Indoor unit does not receive feedback from outdoor unit for 110 seconds, and this repeats four times continuously.

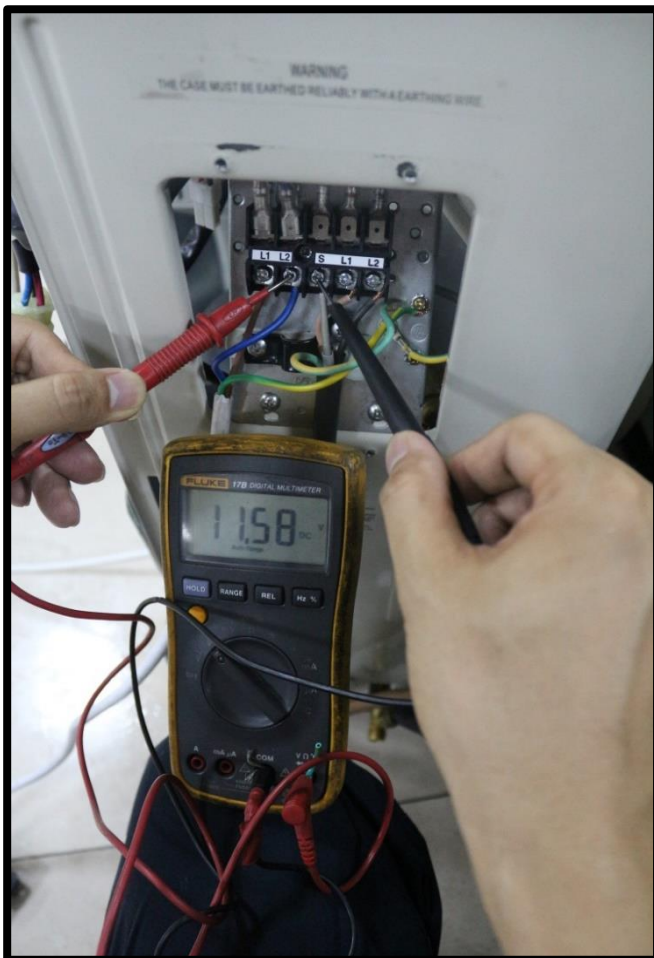
Possible Causes:

- Wiring mistake
- Indoor or outdoor PCB faulty



* V_s is the voltage between 2 and 3.

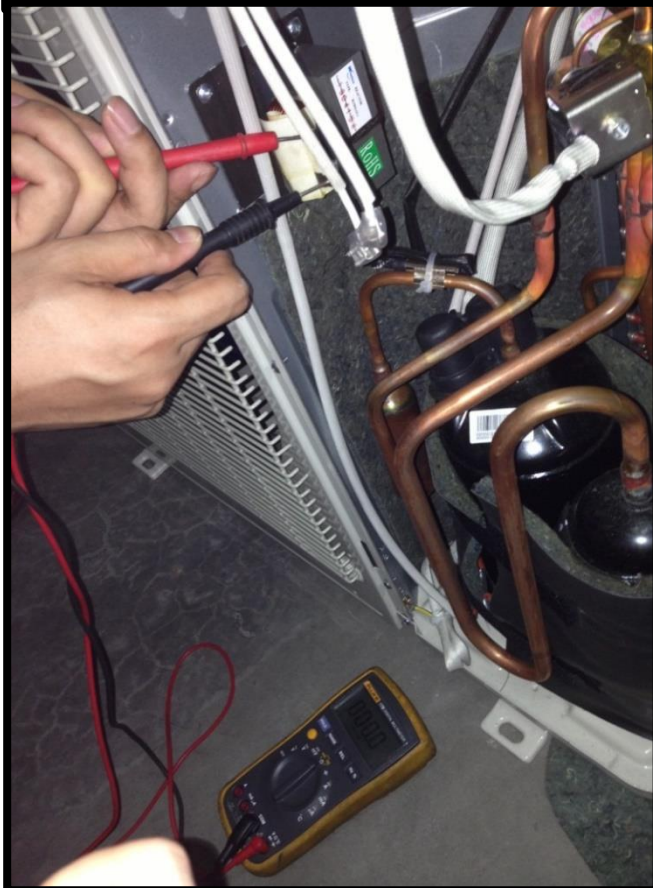
See next page for "Testing the Voltage" and "Testing the Reactor".



Testing the Voltage

Use a multimeter and switch to DC voltage to test the 2 port and 3 port of the outdoor unit. The red pin of multimeter connects with 2 port while the black pin is for the 3 port.

- When the unit is running normal, the voltage will move alternately between -25V to 25V.
- If the outdoor unit is faulty, the voltage will move alternately with positive value.
- If the indoor unit is faulty, the voltage will be a specific value.



Testing the Reactor

Use a multimeter to test the resistance of the reactor.

NOTE: The reactors are not attached to the capacitors.

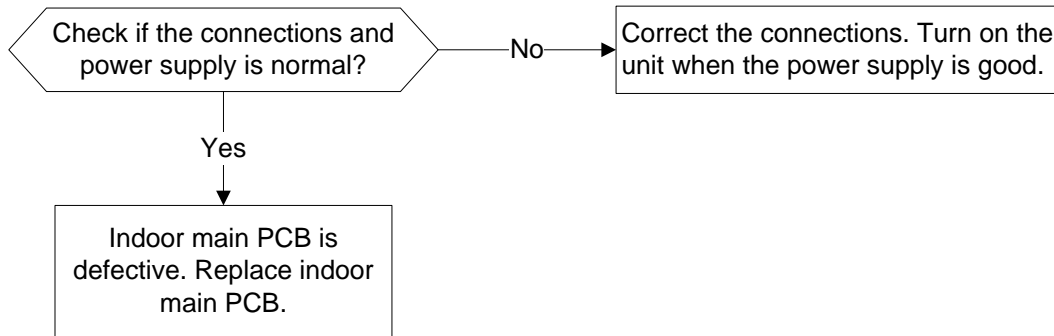
- The normal value should be around zero ohms ($0\ \Omega$). If otherwise, the reactor is faulty and must be replaced.

9.2.3 E2: Zero-Crossing Detection Error

Condition: When PCB does not receive the zero crossing signal feedback for four (4) minutes or the zero crossing signal time interval is abnormal.

Possible Causes:

- Wiring mistake
- PCB faulty

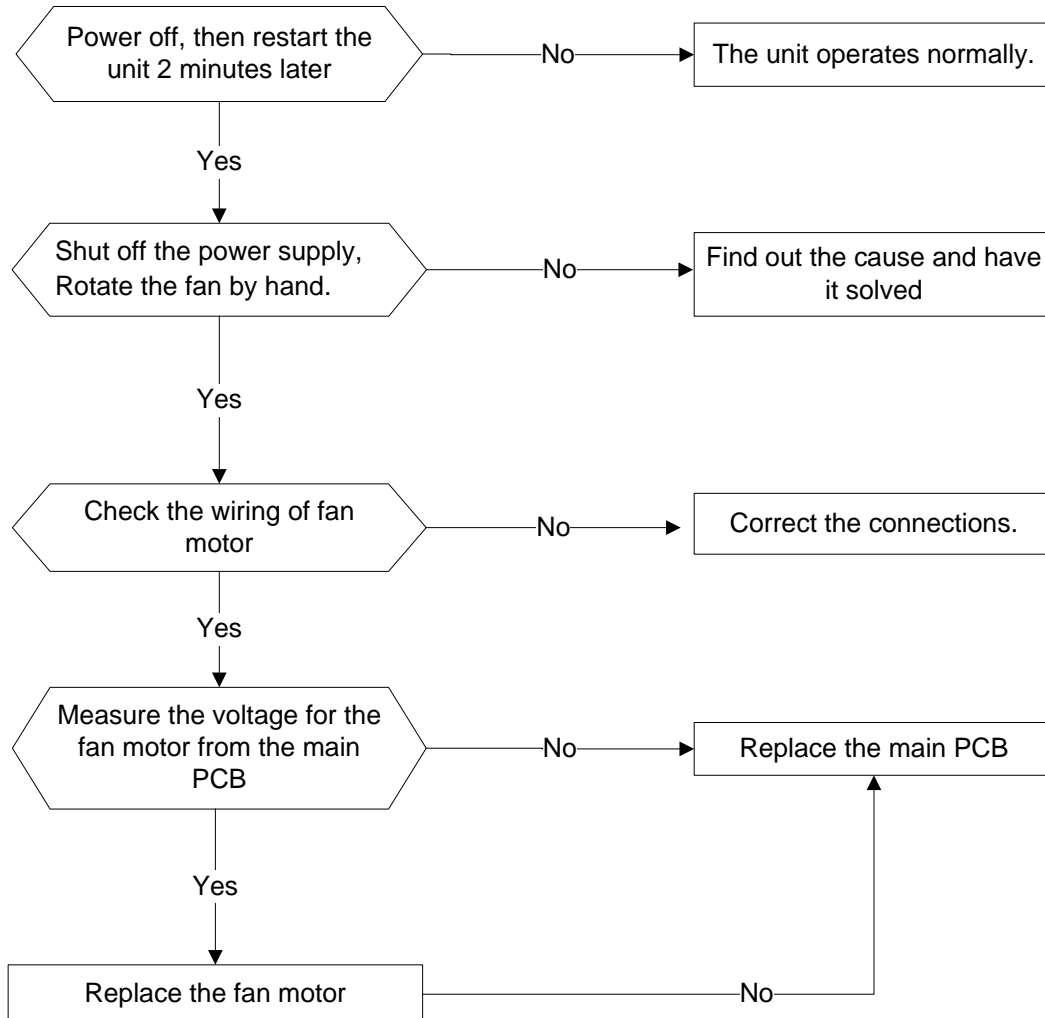


9.2.4 E3/F5: Fan Speed Out of Control Error

Condition: Indoor fan speed stays too low (300 RPM) for a certain time.

Possible Causes:

- Wiring mistake
- Fan assembly faulty
- Fan motor faulty
- PCB faulty

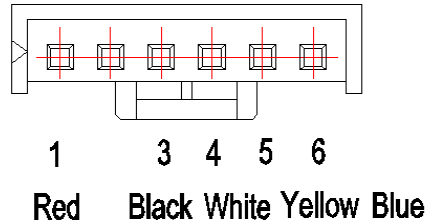


See next page for index 1

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 value of the voltage is not in the range showing in below table, there must be something wrong with the PCB and need to be replaced.



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

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 outdoor PCB)

Power on ,and check if the fan can run normally, if the fan can run normally, the PCB must has problems and need to be replaced, If the fan can't run normally, measure the resistance of each two pins. If the resistance is not equal to each other, the fan motor must have problems and need to be replaced, otherwise the PCB must has problems and need to be replaced.

3. Indoor AC Fan Motor

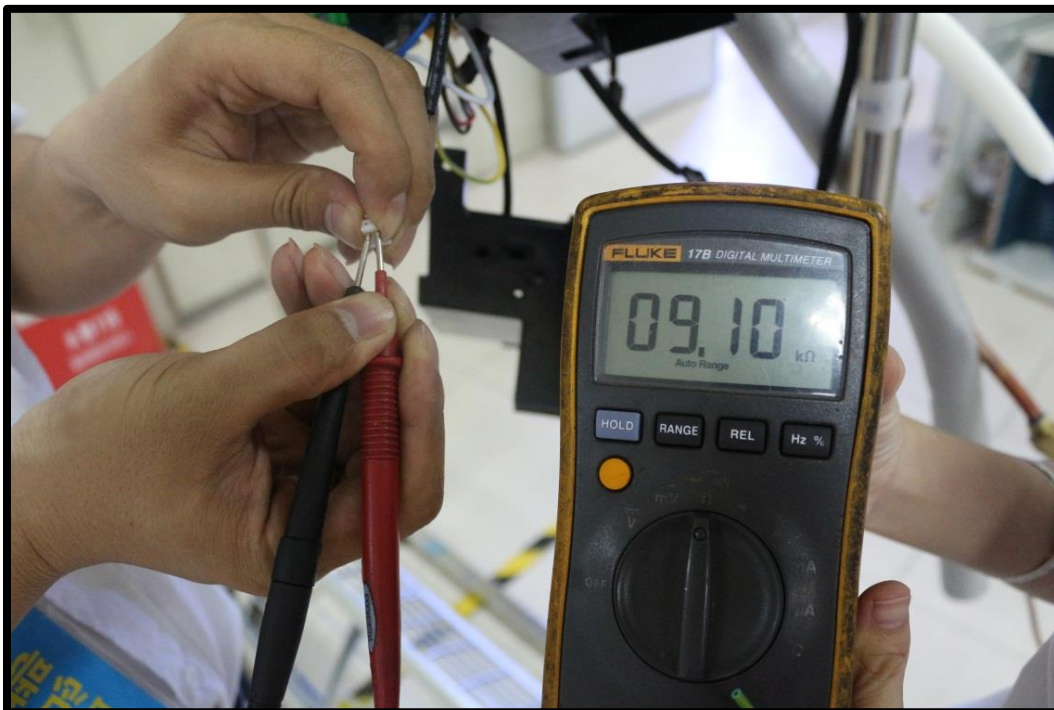
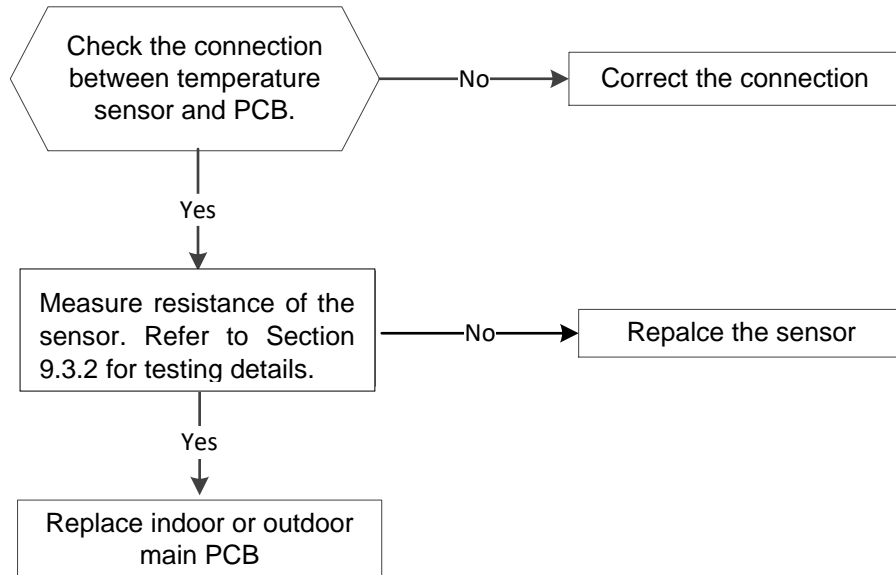
Power on and set the unit running in fan mode at high fan speed. After running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V (208~240V power supply)or 50V(115V power supply), the PCB must has problems and need to be replaced.

9.2.5 E4/E5/F1/F2/F3: Temperature Sensor Open or Short Circuit Error

Condition: Sampling voltage is lower than 0.06V or higher than 4.94V.

Possible Causes:

- Wiring mistake
- Sensor faulty



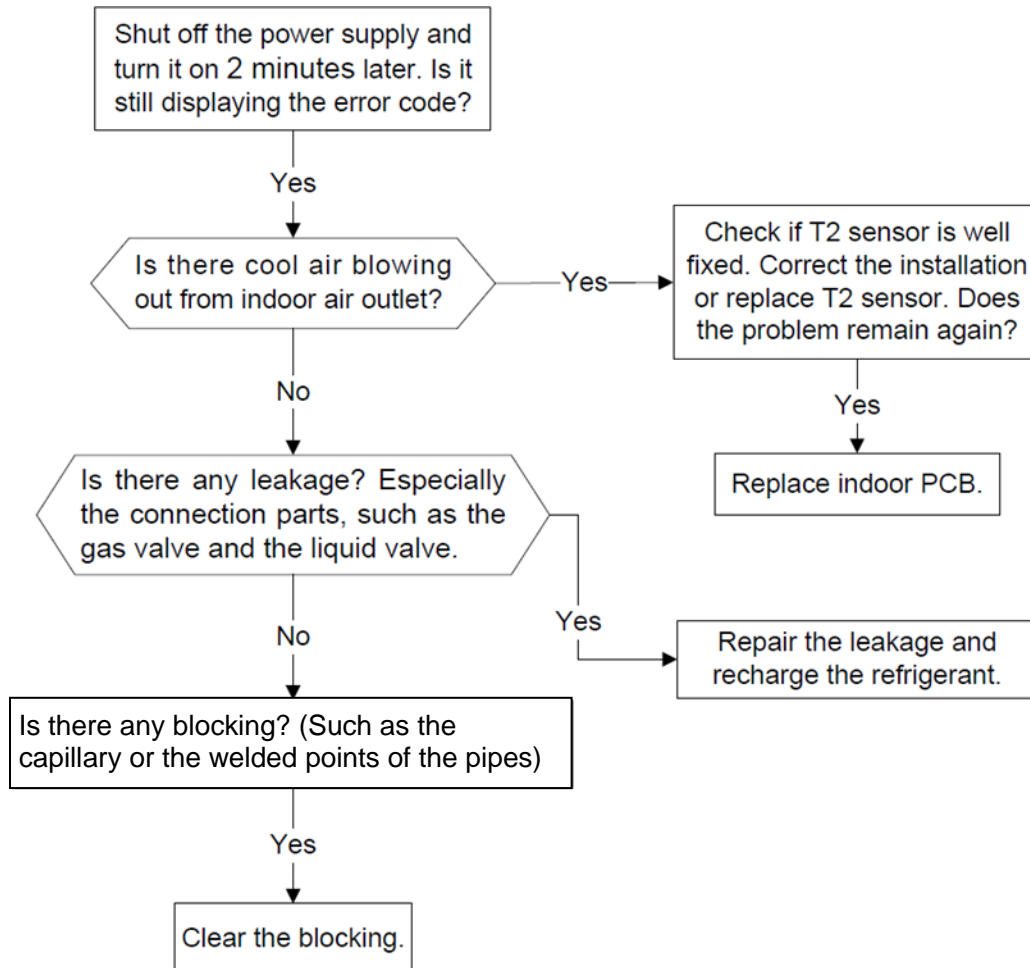
9.2.6 EC: Refrigerant Leak Detection

Condition: T_c : Temperature of the evaporator coil at the moment of startup

During the first five (5) minutes of starting up, if $T_2 < T_c - 3.8^\circ\text{F}$ (2°C) does not hold for four (4) continuous seconds three (3) times.

Possible Causes:

- T2 sensor faulty
- Indoor PCB faulty
- Refrigerant system faulty (i.e. leakage/blockage)

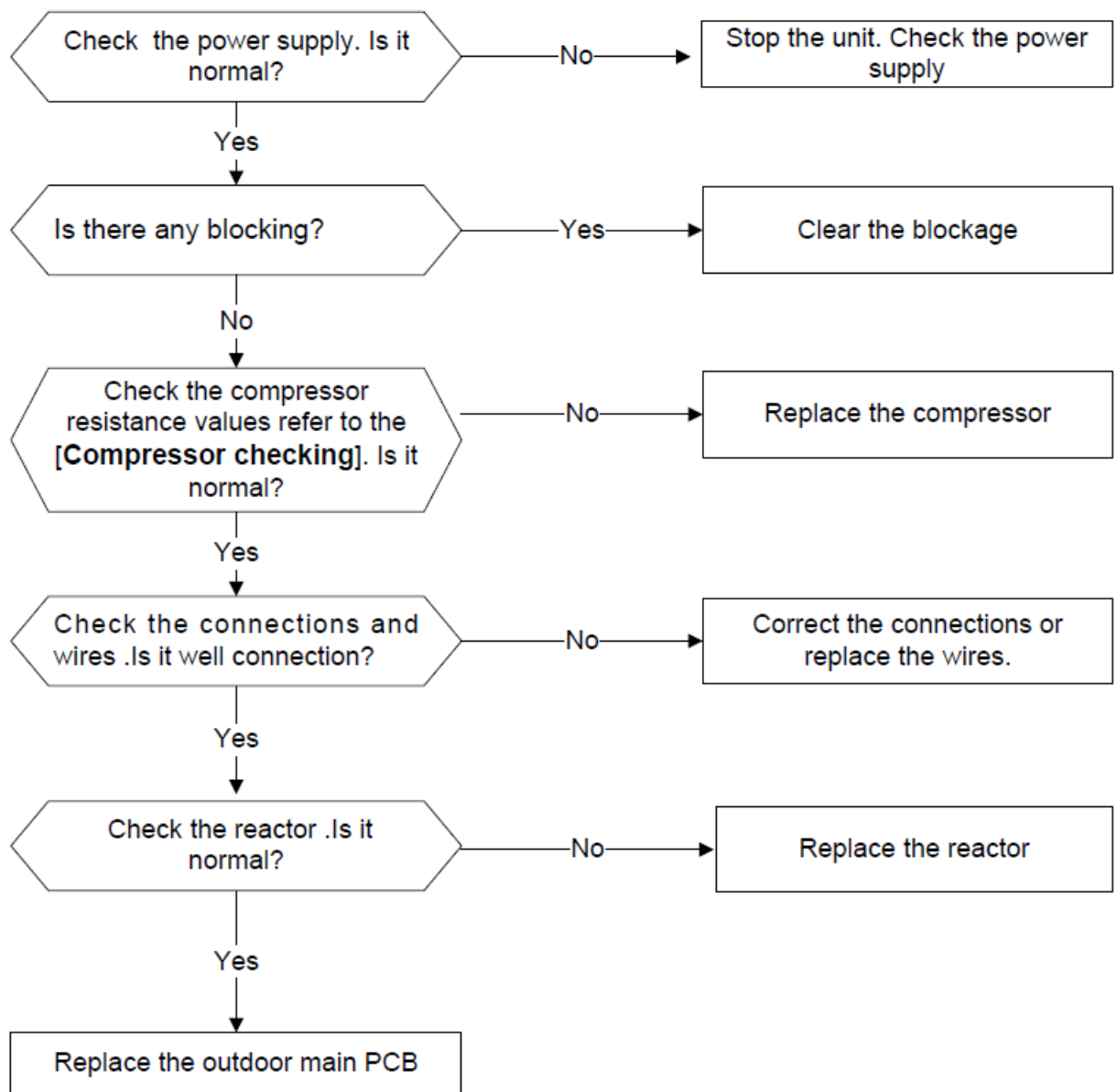


9.2.7 F0: Overload-current Protection

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

Possible Causes:

- Wiring mistake
- Power supply problems
- System blockage
- Compressor malfunction
- Outdoor PCB faulty



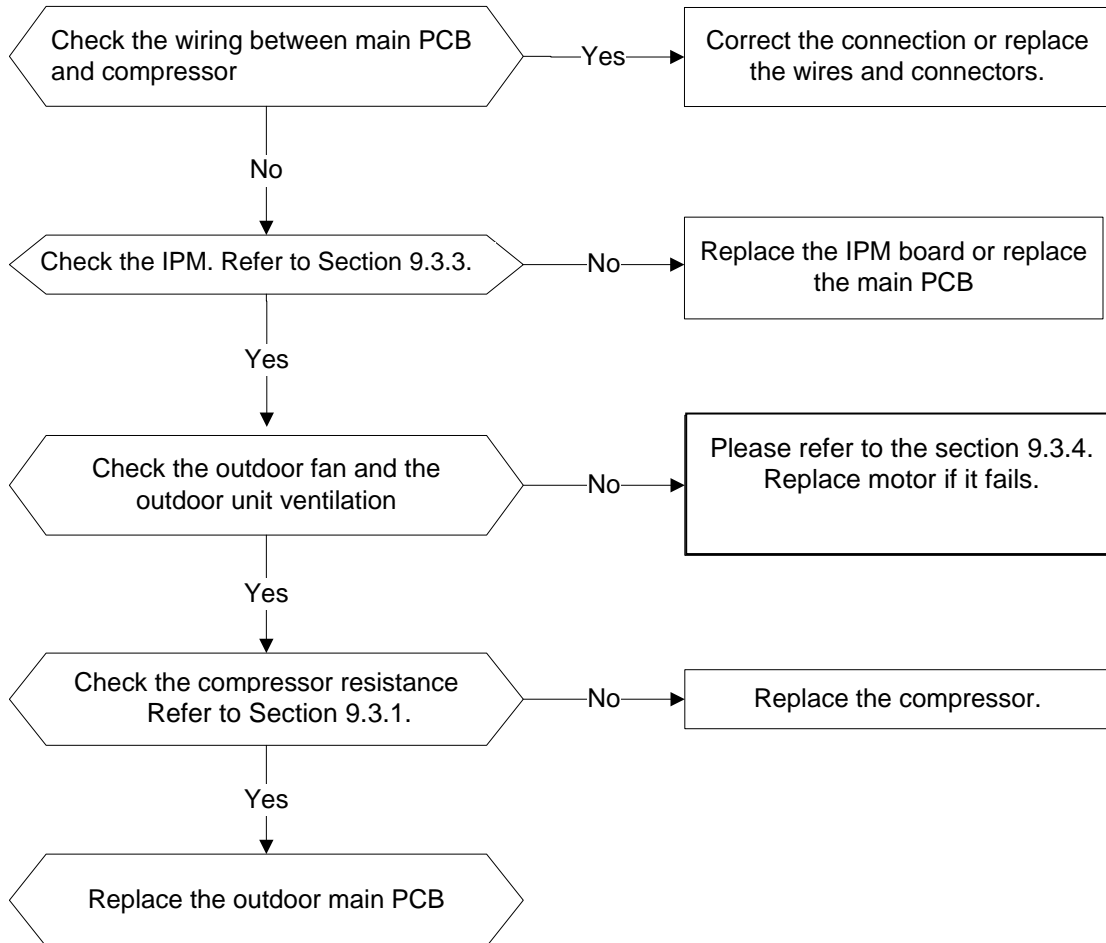
9.2.8 P0: IPM Malfunction or IGBT Over-current Protection

Condition: The voltage signal that the IPM sends to the compressor drive chip is abnormal.

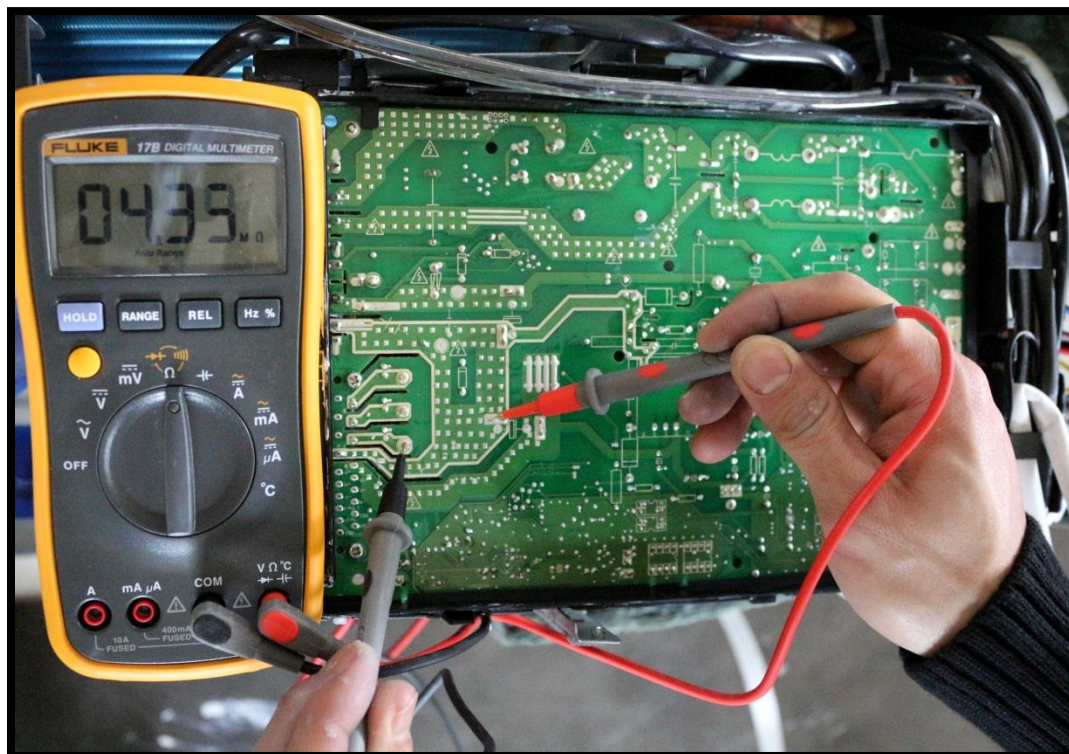
Possible Causes:

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

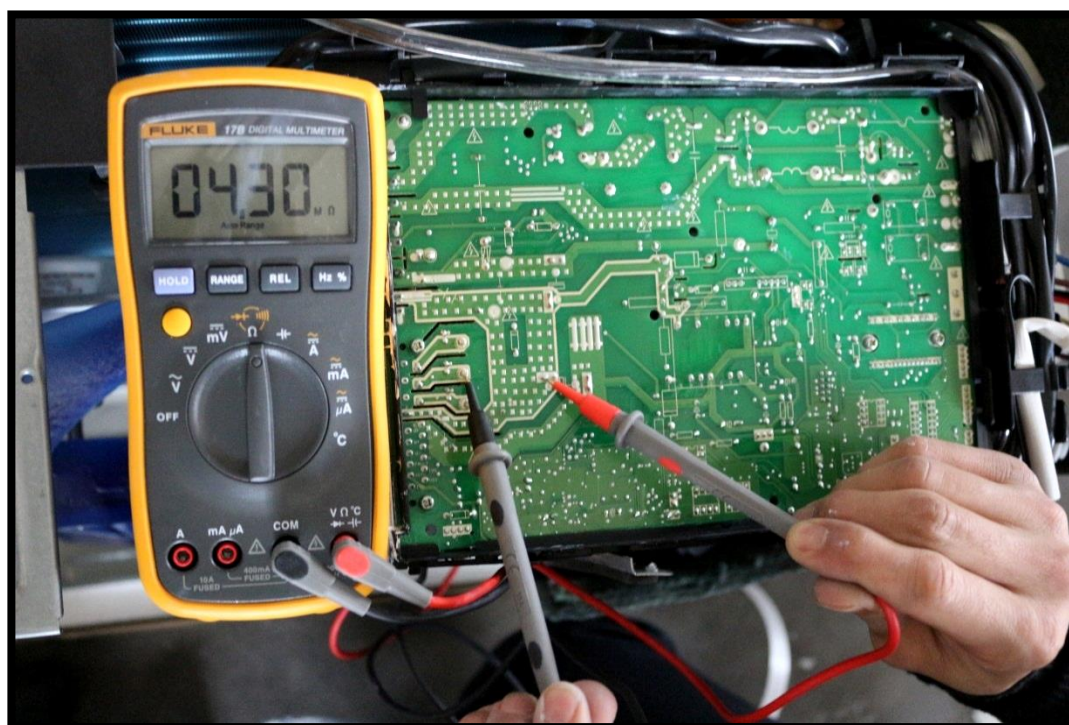
For 9K to 24K units



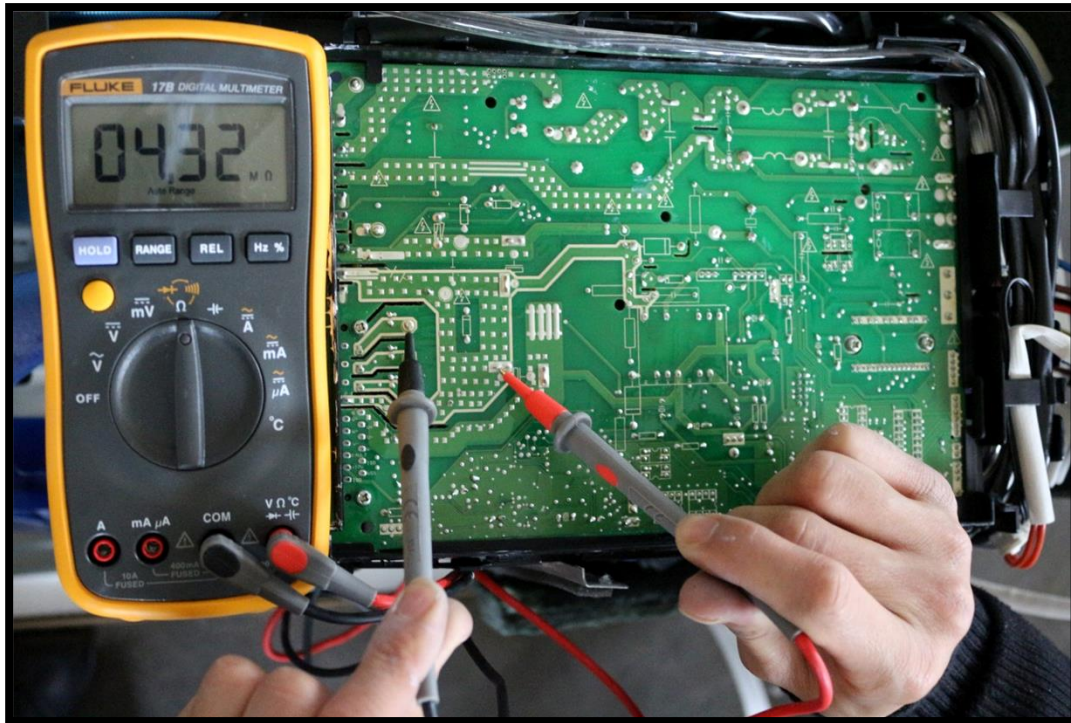
Note: The pictures below are only for reference, they may be not same as the ones on your unit.



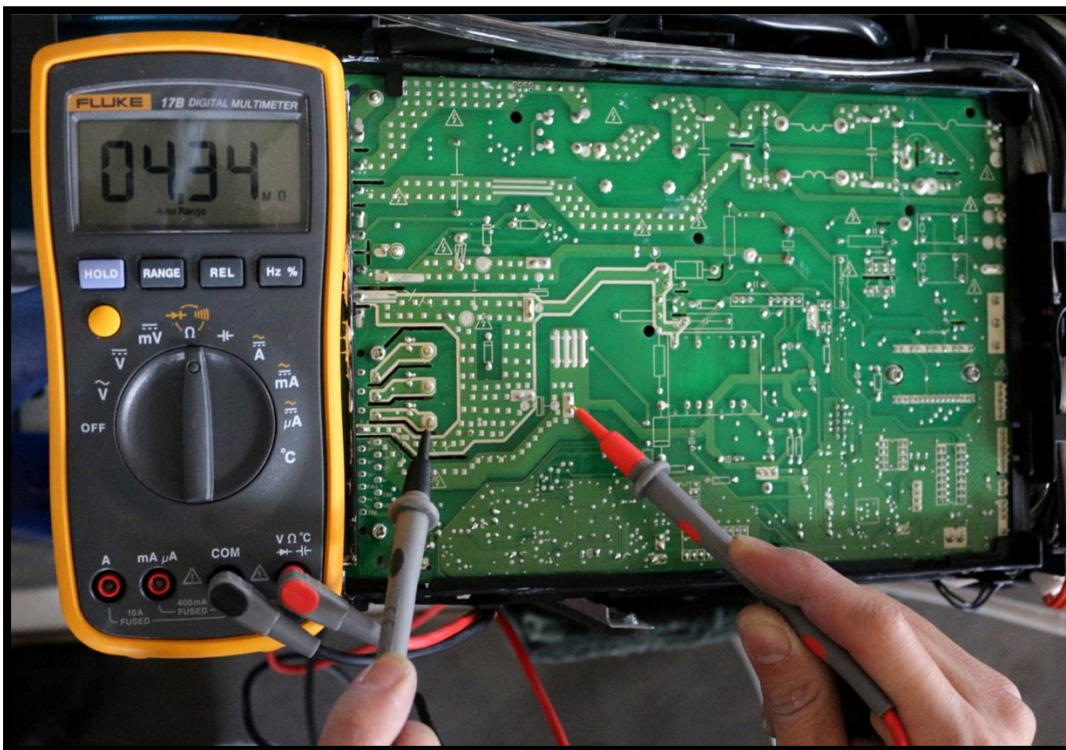
P-U



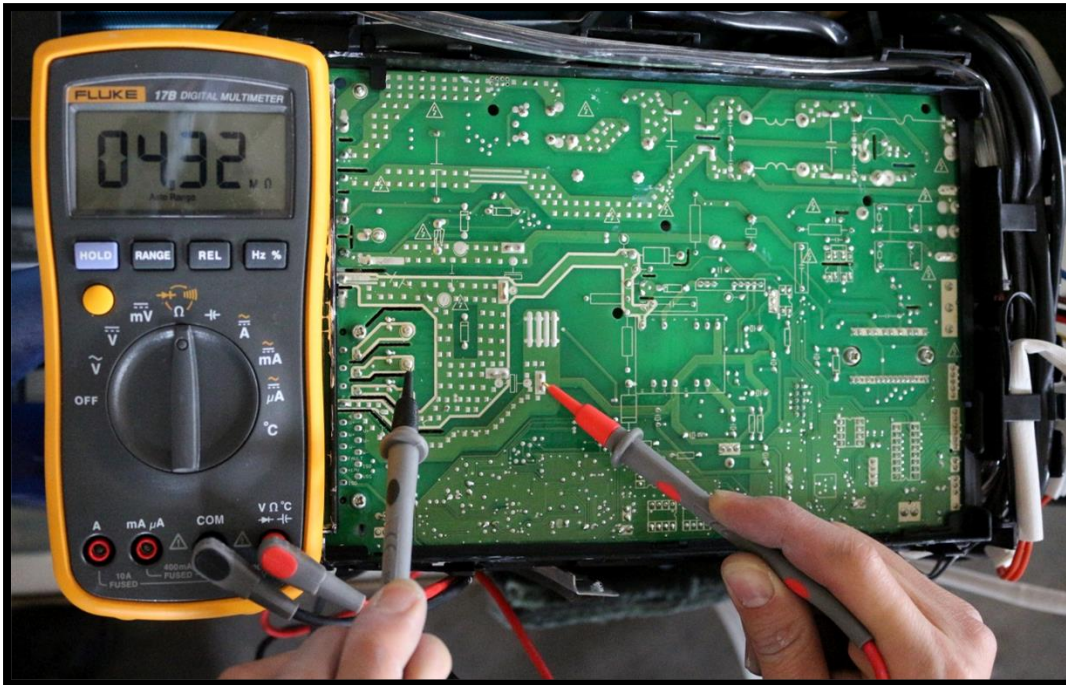
P-V



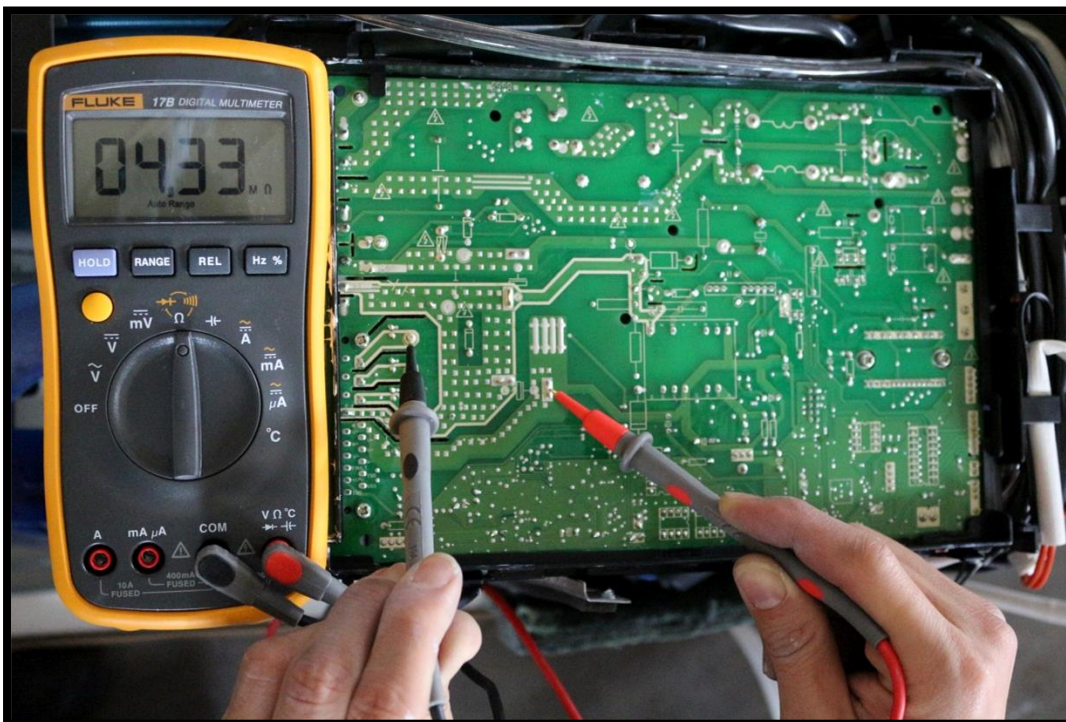
P-W



N-U



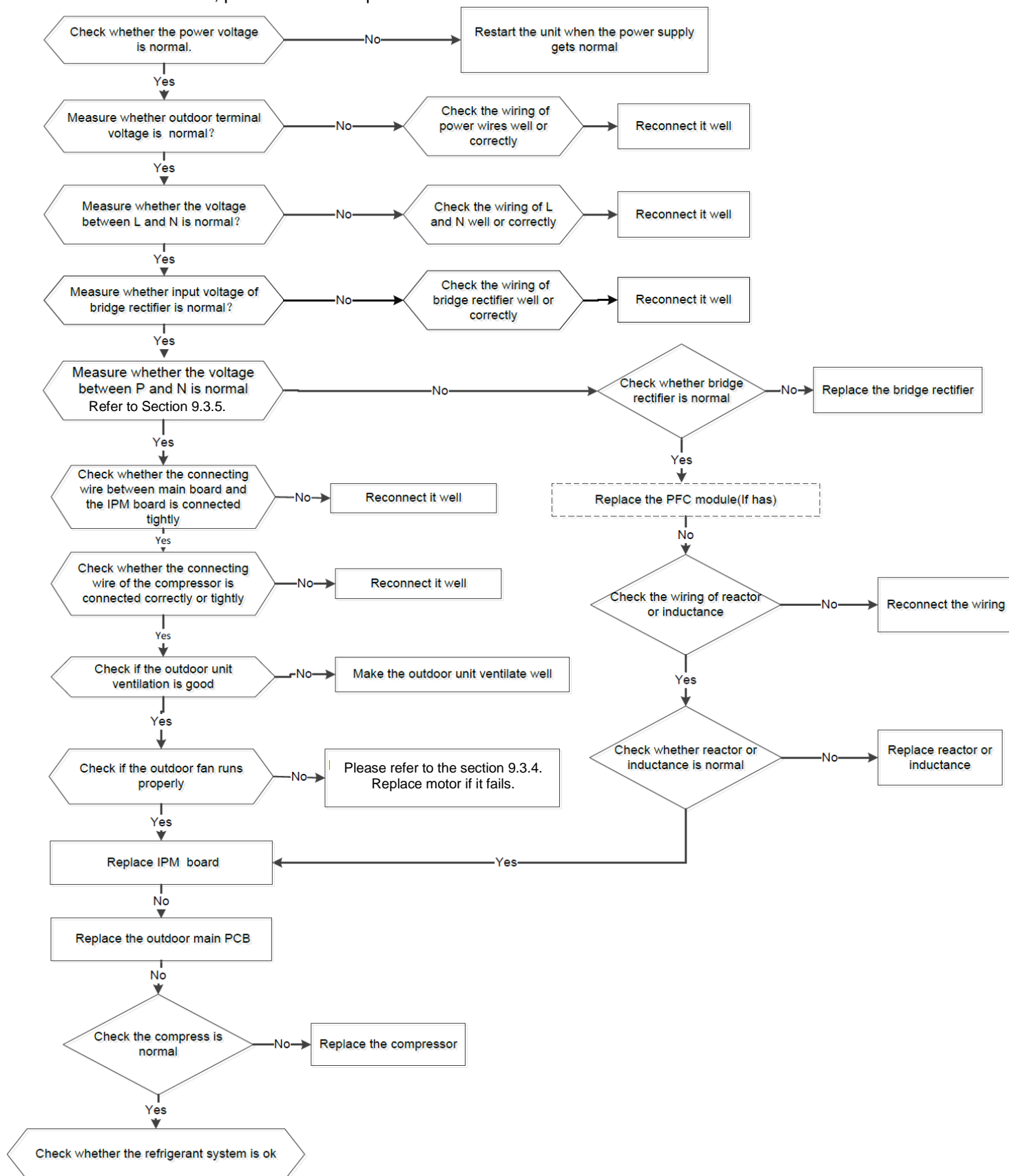
N-V



N-W

For 30K and 36K units

Following the test procedure above by checking the resistance between every two ports of U, V, W of IPM and P, N. If any result of them is 0 or close to 0, the IPM is defective and has to be replaced. Otherwise, please follow the procedure below:

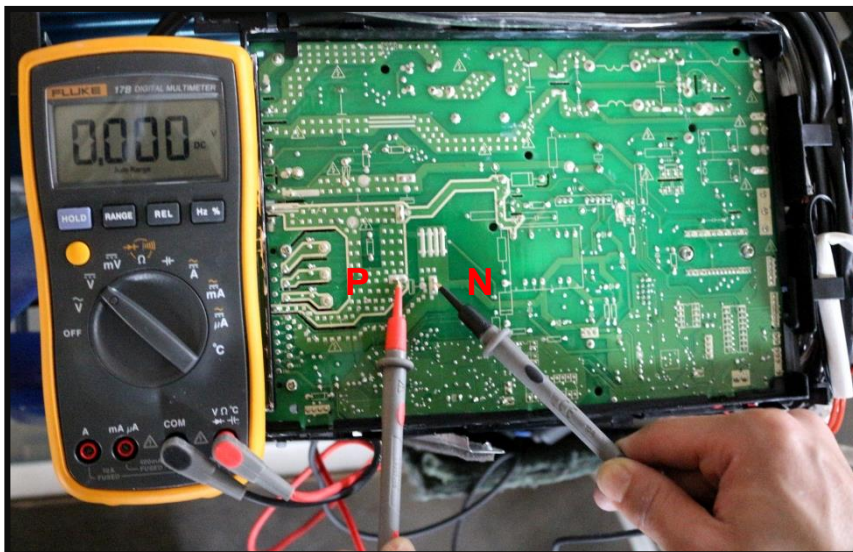
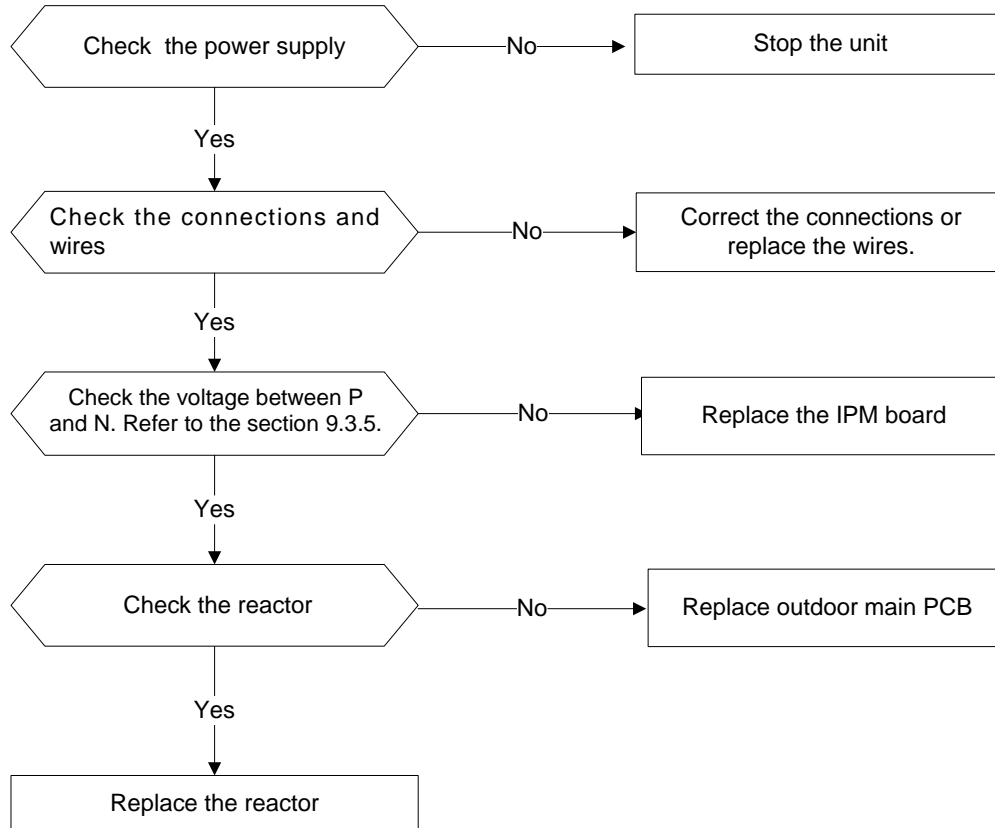


9.2.8 P1: High or Low Voltage Protection

Condition: An abnormal voltage rise or drop was detected by the specified voltage detection circuit.

Possible Causes:

- Power supply faulty
- Refrigerant system faulty (i.e. leakage/blockage)
- PCB faulty



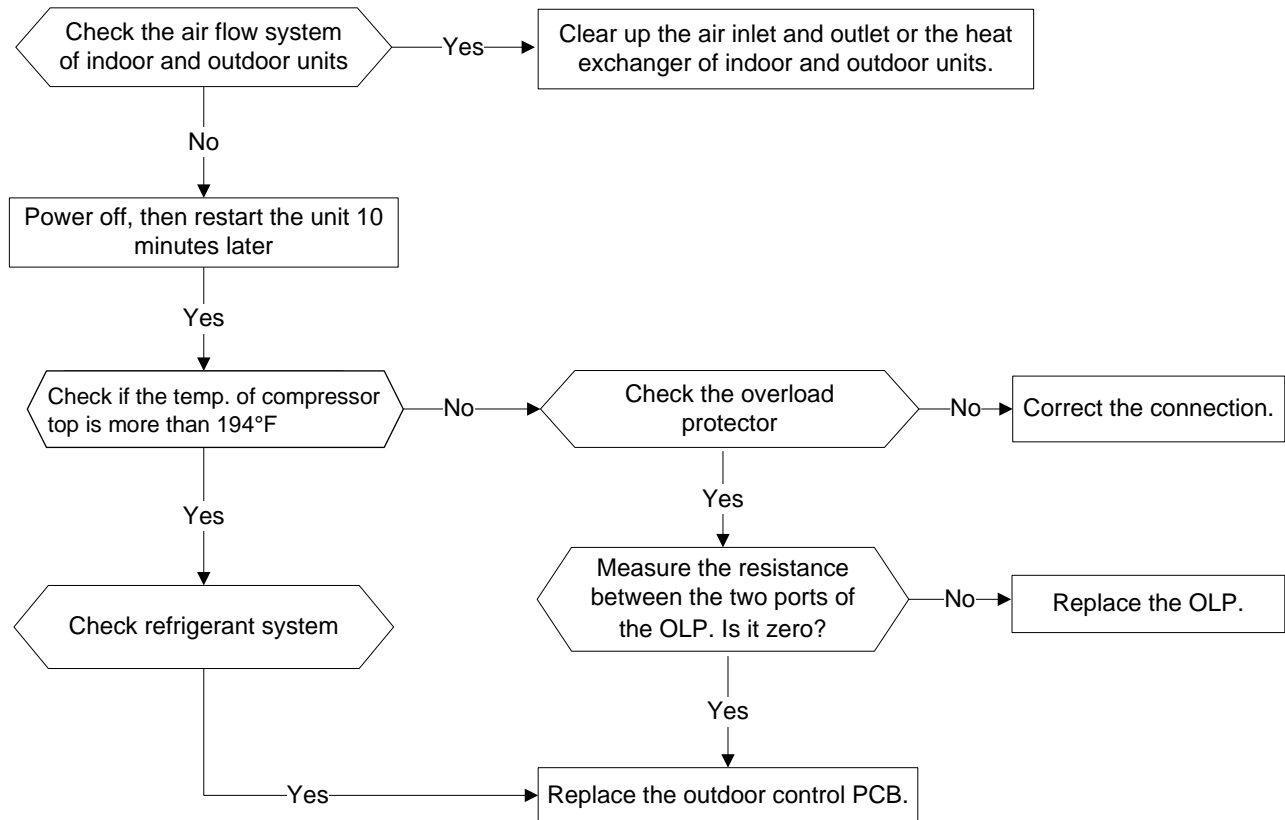
Measuring the DC Voltage between P and N Port
The normal voltage value should be around 310V.

9.2.9 P2: High Temperature Protection of Compressor Top

Condition: The sampling voltage is not 5V.

Possible Causes:

- Power supply faulty
- Refrigerant system faulty (i.e. leakage/blockage)
- PCB faulty



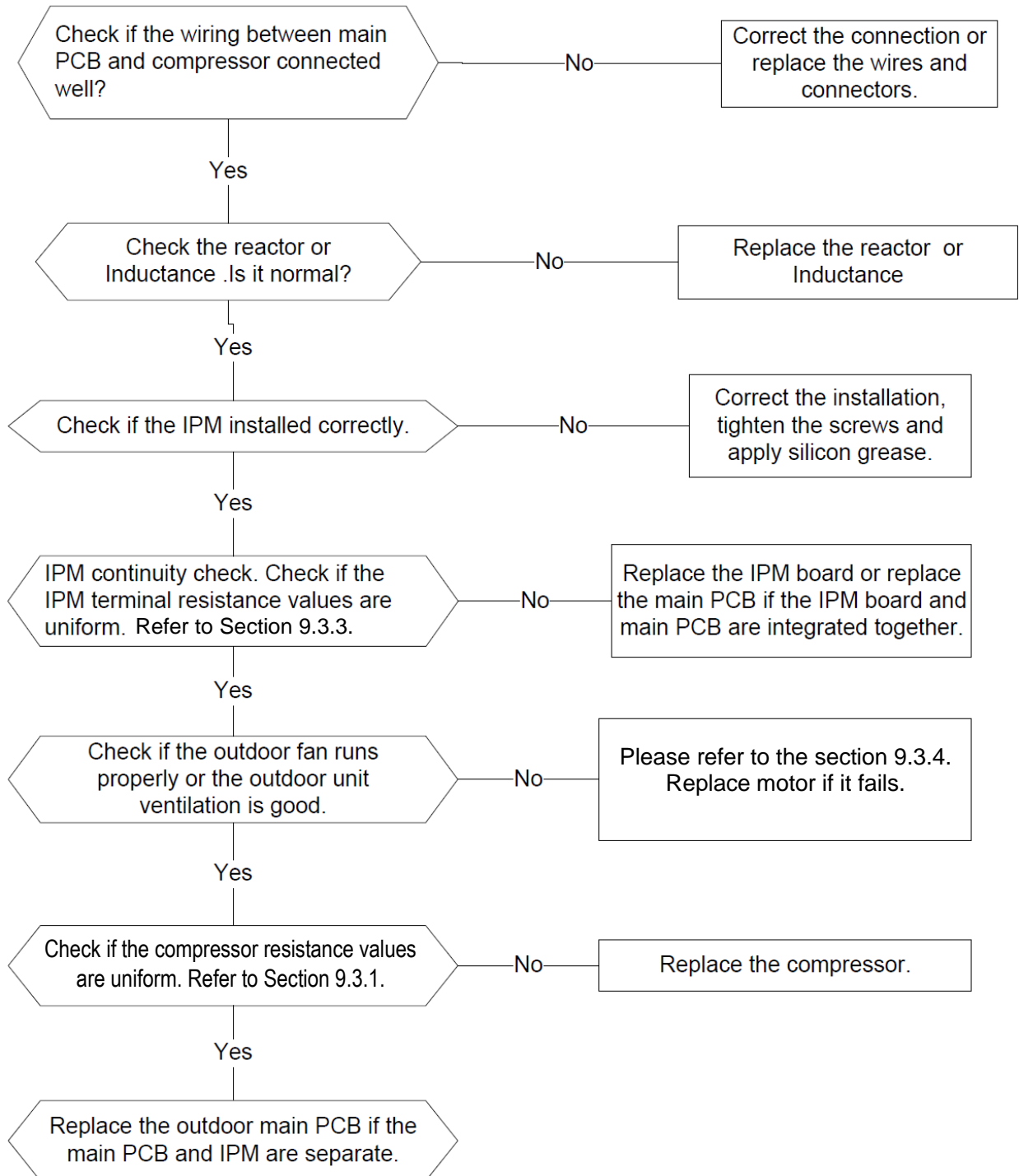
9.2.10 P4: Inverter Compressor Drive Error

Condition: An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection, etc.

Possible Causes:

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

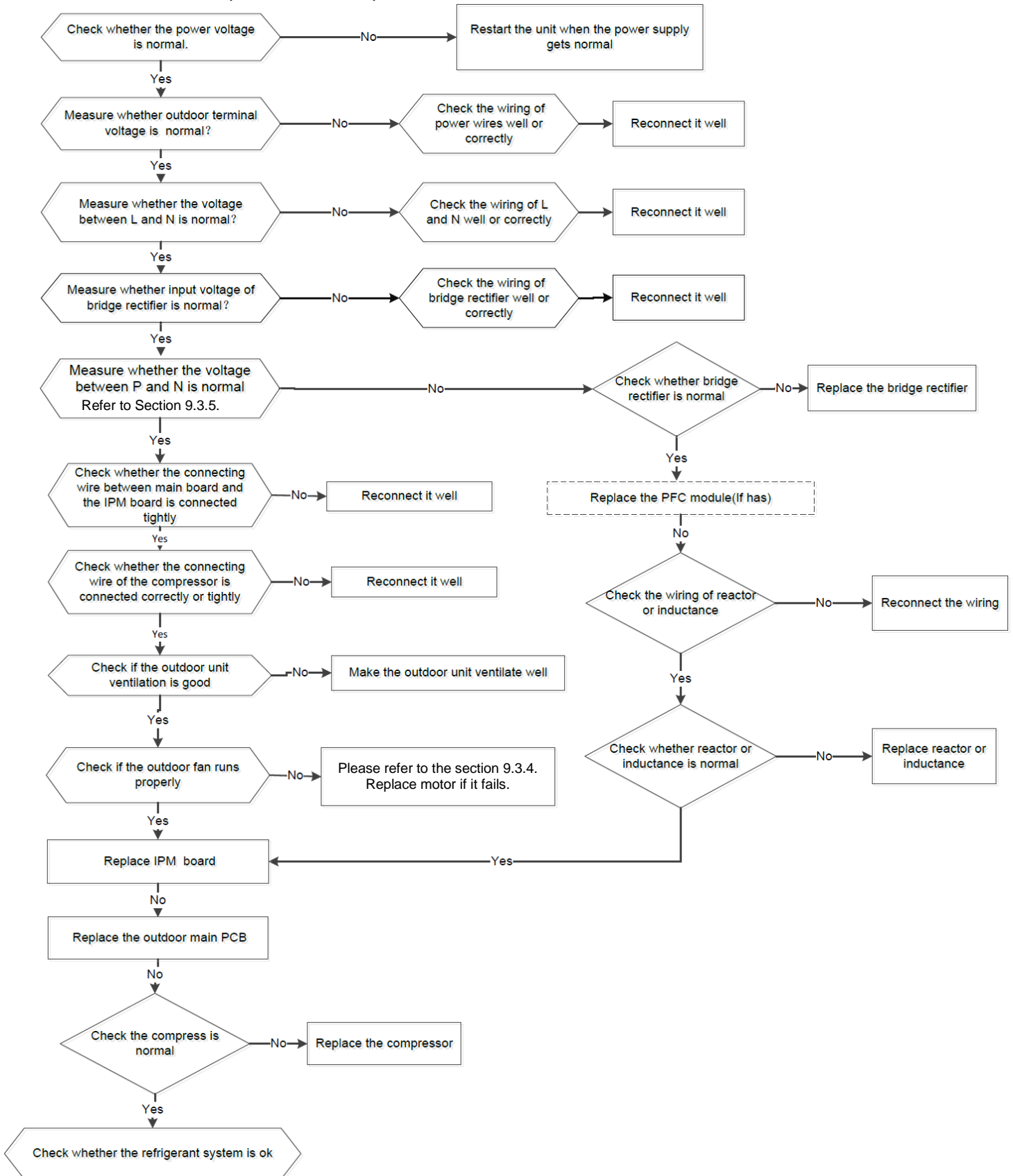
For 9K to 24K units



For 30K and 36K units

Check the resistance between every two ports of U, V, W of IPM and P, N first. If any result of them is 0 or close to 0, the IPM is defective and has to be replaced.

Otherwise, please follow the procedure below:



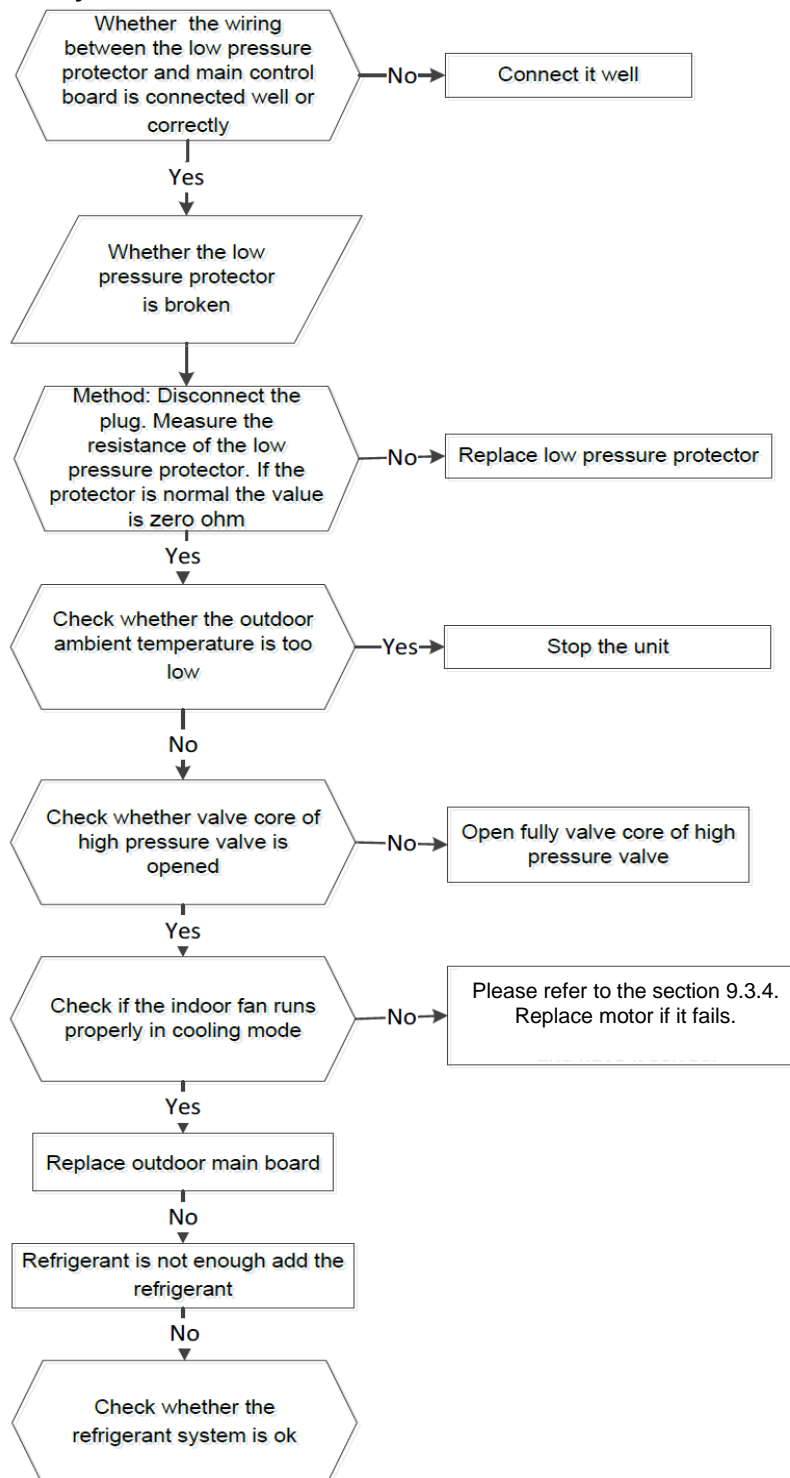
9.2.10 P6: Low Pressure Protection Diagnosis and Solution

Condition: When the pressure of system reach a certain value, the pressure protector will switch off. After the pressure resume to normal, the protection code will extinguish.

Possible Causes:

- Wiring mistake
- Pressure protector faulty
- Outdoor fan assembly faulty
- System problems
- Outdoor PCB faulty

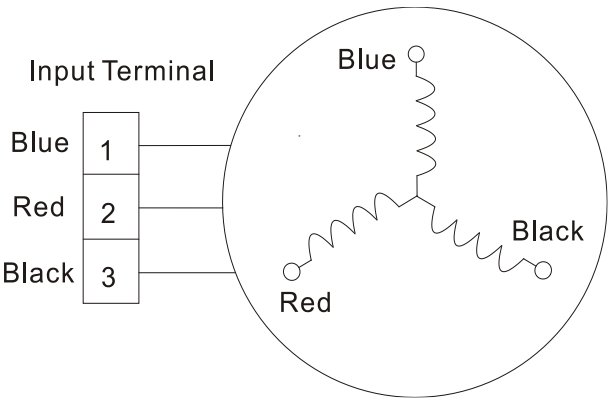
For 36K unit only



9.3 General Testing and Measurements

9.3.1 Compressor Check

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



Resistance @ 68°F (20°C)

Position	9H47YOMI	12H47YOMI	12H47ZOMI	18H47ZOMI	24H46ZOMI	30H48ZOMI	36H46ZOMI
	ASN98D22UFZ	ASN98D22UFZ	ASN98D22UFZ	ASM135D23UFZ	ATF235D22UMT	ATF250D22UMT	ATF250D22UMT
Blue – Red							
Blue – Black		1.57 Ω		1.75 Ω	0.75 Ω		0.75 Ω
Red – Blue							



9.3.2 Temperature Sensor Check

Disconnect the temperature sensor from the PCB and measure the resistance using a multimeter. The variables for the different temperature sensors are shown below.

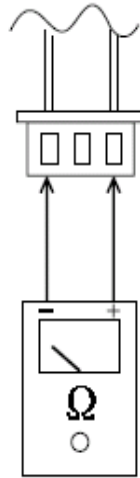
T1: Room temperature sensor

T2: Indoor coil temperature sensor

T3: Outdoor coil temperature sensor

T4: Outdoor ambient temperature sensor

T5(TP): Compressor discharge temperature sensor



Multimeter

Temperature Sensor Resistance Value Table for T1, T2, T3, T4

°C	°F	kΩ	°C	°F	kΩ	°C	°F	kΩ	°C	°F	kΩ
-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

Temperature Sensor Resistance Value Table for T5(TP)

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

9.3.3 IPM Continuity Check

First turn off the power to the unit and wait approximately 20 seconds to allow the electrolytic capacitors to fully discharge. Next remove the IPM from the PCB. Use a multimeter to measure the resistance between P & UVWN; UVW & N. See the table below for proper resistance values.

Position		Resistance
(+) Red	(-) Black	
	N	
	U	
P	V	∞
	W	
U		(Several M Ω)
V		
	N	
W		
(+) Red		

9.3.4 Outdoor AC Fan Motor Check

To check if the outdoor fan motor is working properly, measure the resistance value of each winding with a multimeter.

Resistance @ 68°F (20°C)					
Position	9H47YOMI	12H47YOMI	12H47ZOMI	18H47ZOMI	24H46ZOMI
	YKT-32-6-202L	YKT-32-6-202L	YKT-32-6-3L	YKT-48-6-206	YKT-63-6-200L
Black – Red					
Main	86 Ω		213 Ω	152 Ω	88.5 Ω
White – Black					
Aux	64 Ω		156 Ω	142 Ω	138 Ω

9.3.5 Voltages on P and N

Normal Voltage on P and N			
208-240VAC (1-phase, 3-phase)			380-420VAC (3-phase)
Standby			
Around 310 VDC			Around 530 VDC
Operating			
With passive PFC module	With partial active PFC module	With fully active PFC module	/
>200 VDC	>310 VDC	>370 VDC	>450 VDC

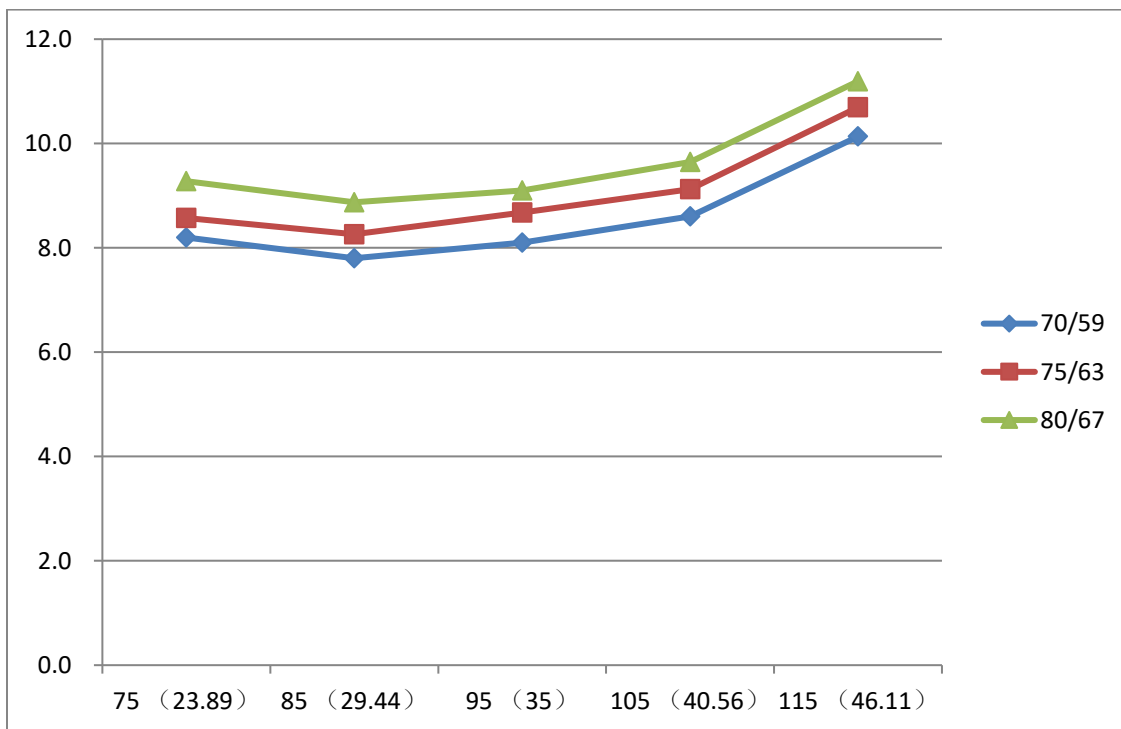
9.3.6 Pressure on Service Port

Cooling

°F(°C)	ODT IDT	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)
BAR	70/59	8.2	7.8	8.1	8.6	10.1
BAR	75/63	8.6	8.3	8.7	9.1	10.7
BAR	80/67	9.3	8.9	9.1	9.6	11.2

°F(°C)	ODT IDT	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)
PSI	70/59	119	113	117	125	147
PSI	75/63	124	120	126	132	155
PSI	80/67	135	129	132	140	162

°F(°C)	ODT IDT	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)
MPA	70/59	0.82	0.78	0.81	0.86	1.01
MPA	75/63	0.86	0.83	0.87	0.91	1.07
MPA	80/67	0.93	0.89	0.91	0.96	1.12

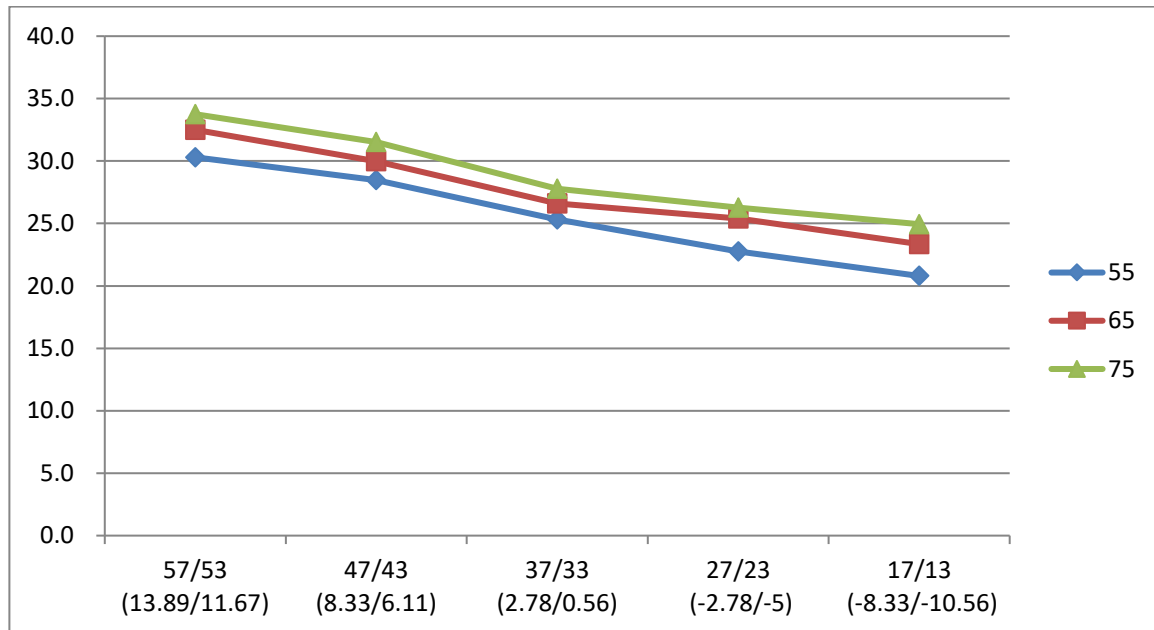


Heating

3°F (°C)	ODT IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)
BAR	55	30.3	28.5	25.3	22.8	20.8
BAR	65	32.5	30.0	26.6	25.4	23.3
BAR	75	33.8	31.5	27.8	26.3	24.9

°F (°C)	ODT IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)
PSI	55	439	413	367	330	302
PSI	65	471	435	386	368	339
PSI	75	489	457	403	381	362

°F (°C)	ODT IDT	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)
MPA	55	3.03	2.85	2.53	2.28	2.08
MPA	65	3.25	3.00	2.66	2.54	2.33
MPA	75	3.38	3.15	2.78	2.63	2.49



10. Unit Disassembly

Refer to the section below to see how to get to various parts of the indoor and outdoor units. The model used for the demonstration down below is the 24H45YZIMI/24H45ZOMI.

10.1 Indoor Unit

10.1.1 Accessing the Terminal Block

Follow the following steps to gain access to the terminal block.



1. Open the front cover of the mini-split unit.



2. Snap off cover (some models may have a screw).
3. Remove the cover

10.1.2 Removing the Front Cover Housing

Follow the following steps to remove the front cover housing from the indoor unit.



1. Remove the screw(s) on the bottom of the unit under the front cover. Number of screws will depend on model.



2. Remove the screws located under the front (flip up) cover. Additional screws maybe hidden under the horizontal louver covered by tabs.



3. To remove the case, first remove filters then unhook the clips from the housing on the top of the unit. Then the housing should easily come off.



4. When removing the front cover housing, be aware there is a wire connecting the cover housing and the indoor PCB. Be sure to disconnect this connector.



5. When the front cover housing is removed, the unit can be properly serviced.

10.1.3 Removing the Indoor PCB

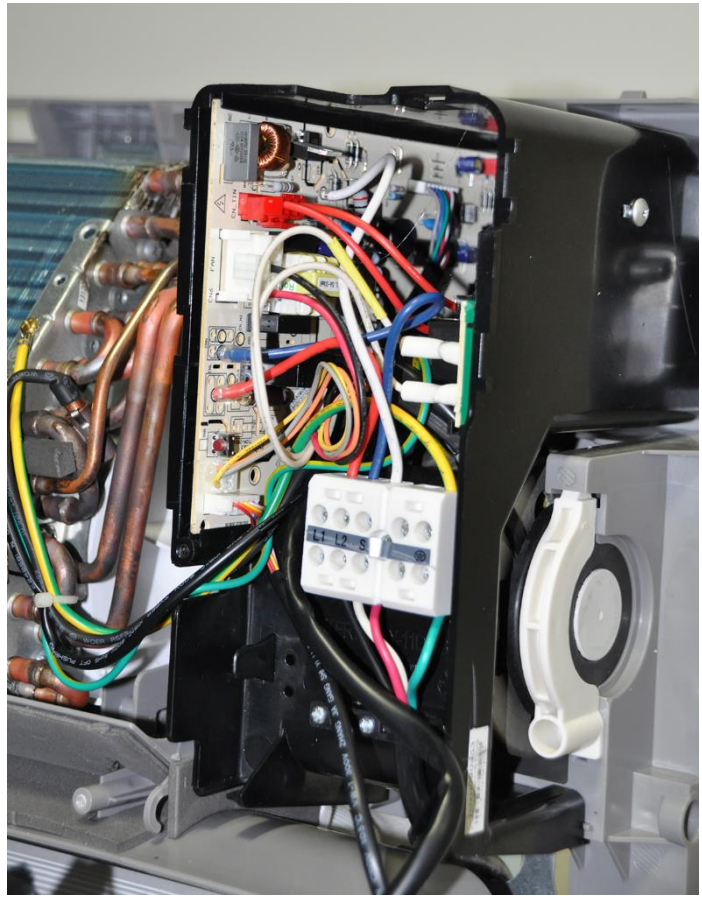
First follow the steps to remove the front cover housing from the previous section, then follow the steps below to remove the indoor PCB.



1. First, remove the screw holding the cover on the electronics box.

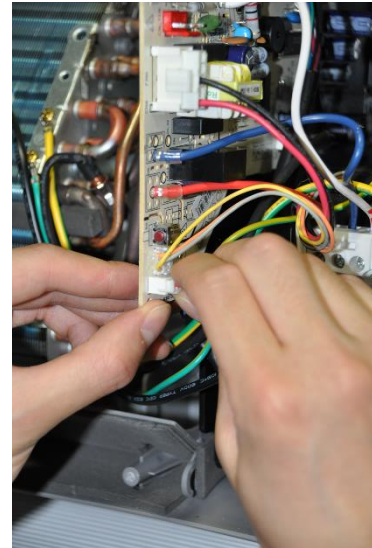
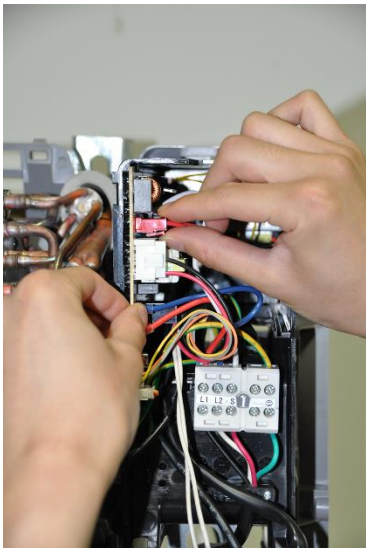


2. Pay attention to the clip on the top of the box holding the cover in. Unhook the clip.

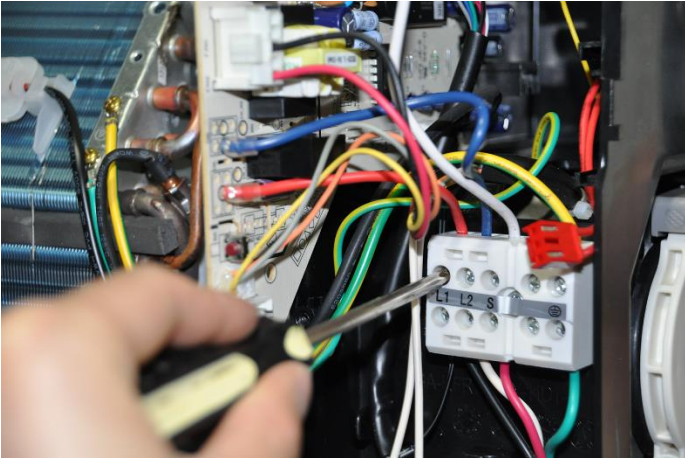


3. Lift the cover up from the bottom and pull out to remove cover. The picture on the right shows what the electronics box looks like with the cover removed.

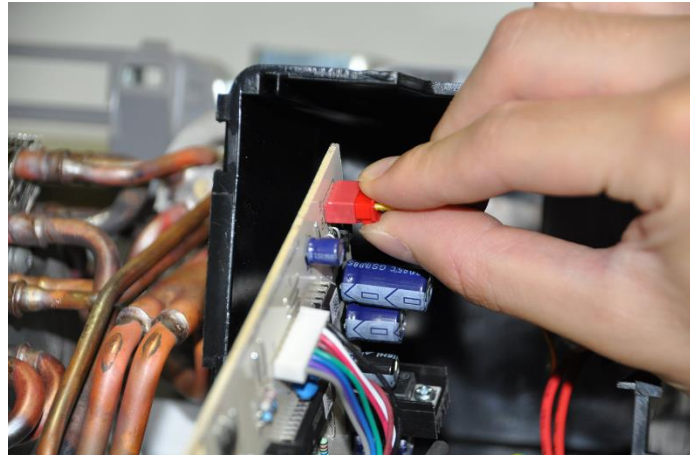
NOTE: The connections shown below can be removed in any order. The following steps are for demonstration purposes.



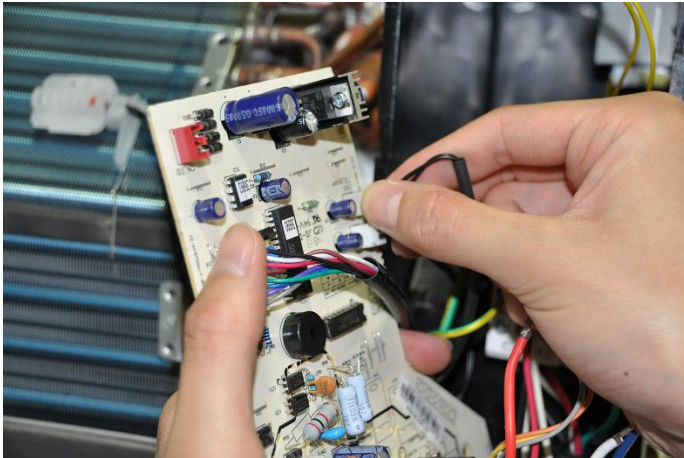
4. Disconnect the transformer secondary connector from the PCB board.



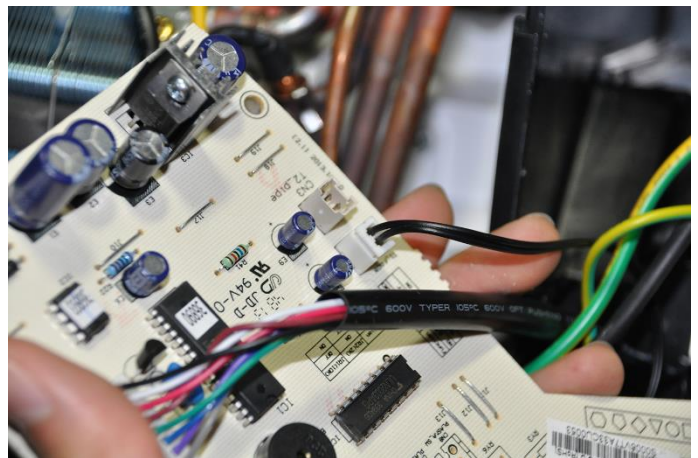
5. Disconnect the (white) horizontal louver connector.



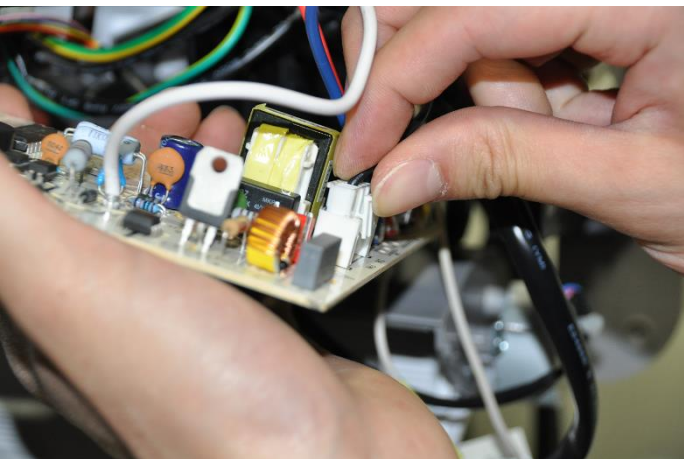
6. Disconnect the power, signal, and ground wires going to the top of the terminal block.



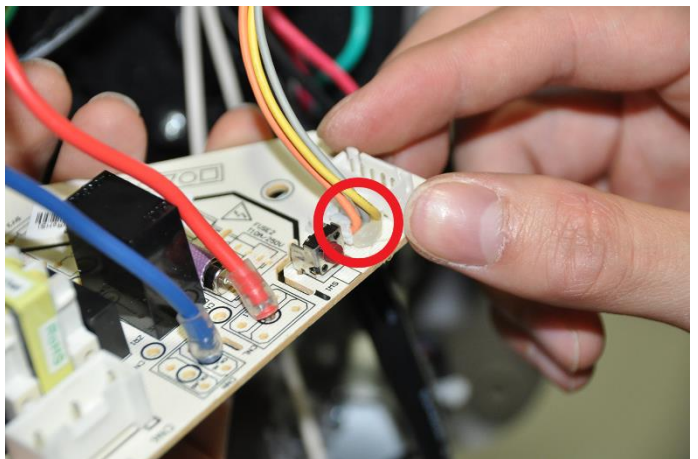
7. Disconnect the transformer primary connector.



8. Disconnect the (CN3) evaporator coil sensor.



9. Disconnect the (CN1) ambient temperature sensor.



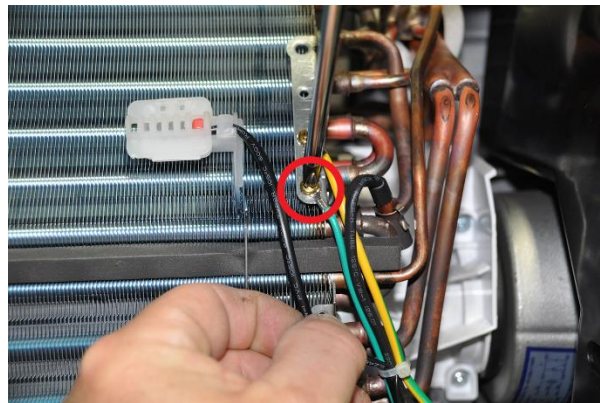
10. Disconnect the indoor fan motor connector.

11. Disconnect the indoor fan signal connector.

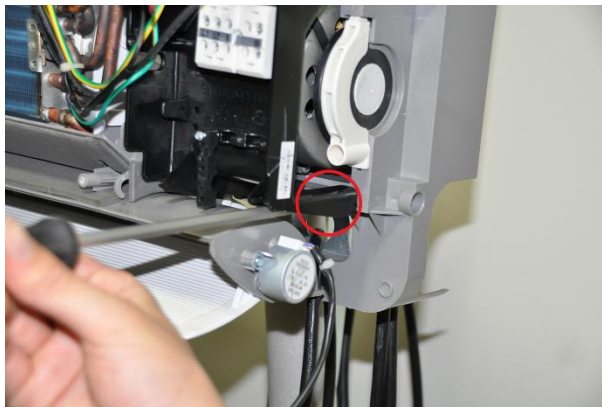
After all connectors are disconnected, PCB can be removed. To install new PCB, reconnect all the connectors to new PCB.

10.1.4 Removing the Electronics Box

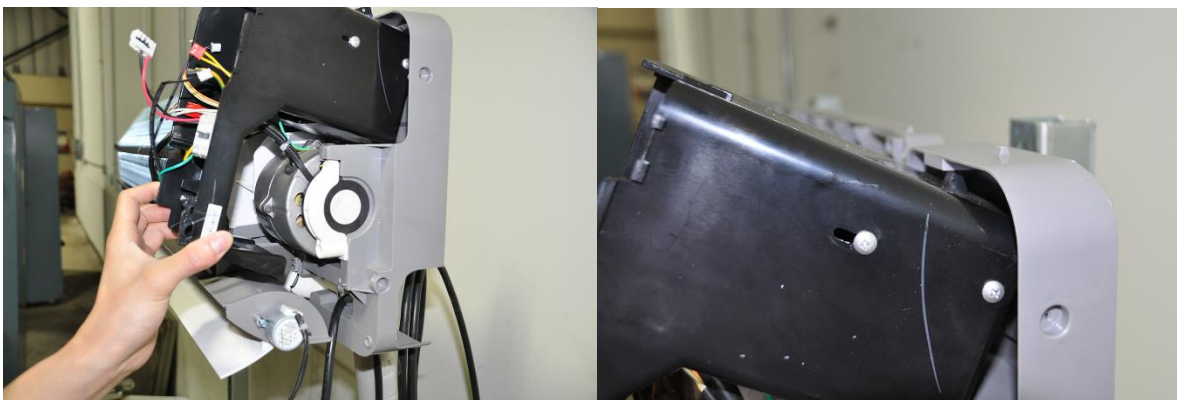
Follow the steps shown in the “Removing the Indoor PCB” in the previous section. The transformer and circuit board power wires do not need to be disconnected to remove the electronics box, however, they may need to be disconnected to gain access to other connectors that need to be disconnected.



1. Remove the screw for the ground wire in the location shown above.



2. Remove the screw on the bottom of the electronics box. See picture for location.



3. Lift and pull from the bottom of the electronics box. Make sure that the clip on the top of the box clears the plastic hook.

After removing the electronics box, the indoor fan motor can be seen behind it. To replace, just reverse the steps above.

10.2 Outdoor Unit

10.2.1 Removing the Outdoor PCB



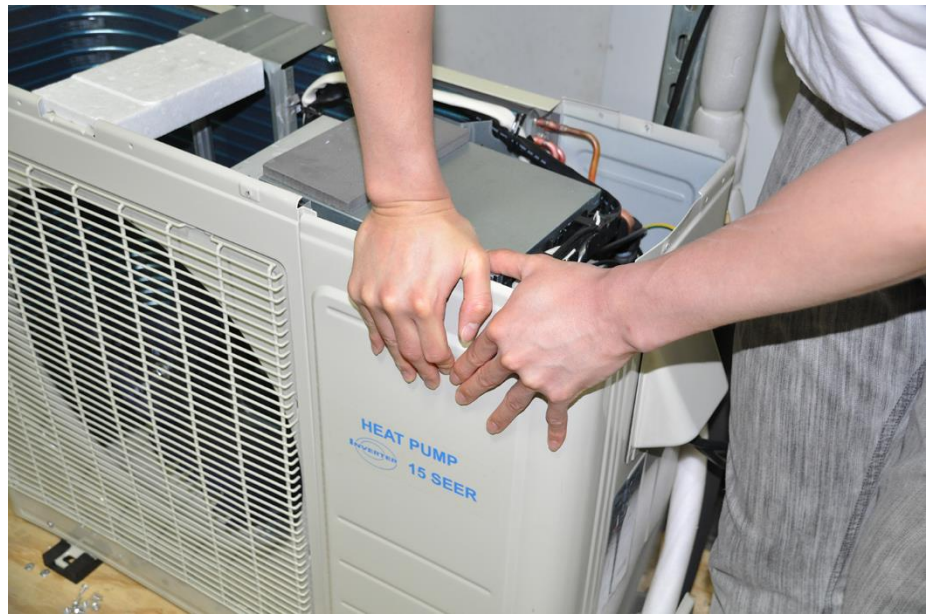
1. Remove the nine (9) screws on the top lid of the condenser unit.



2. Lift and remove the lid from the top of the unit.



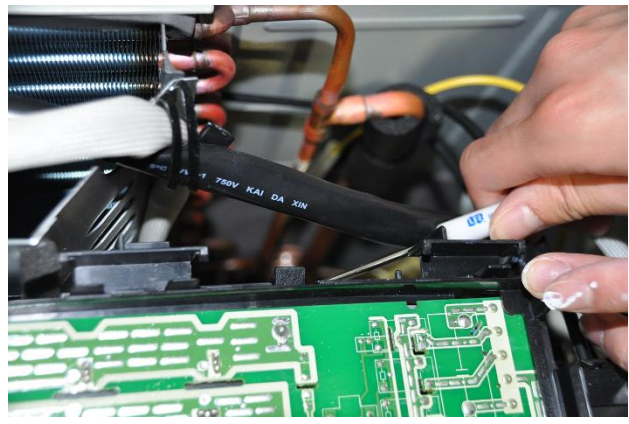
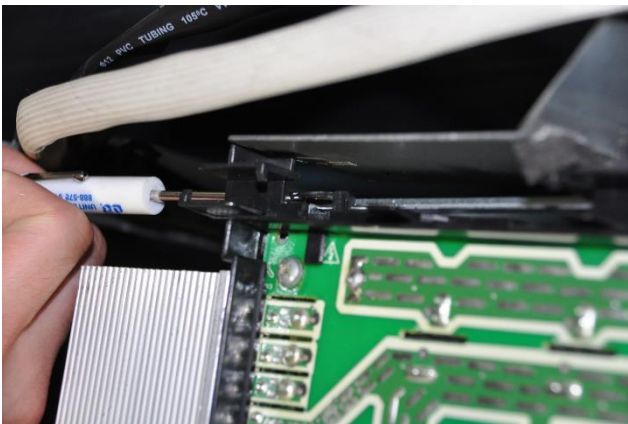
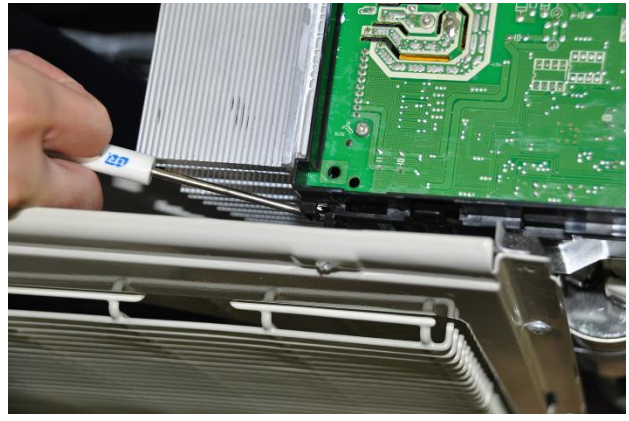
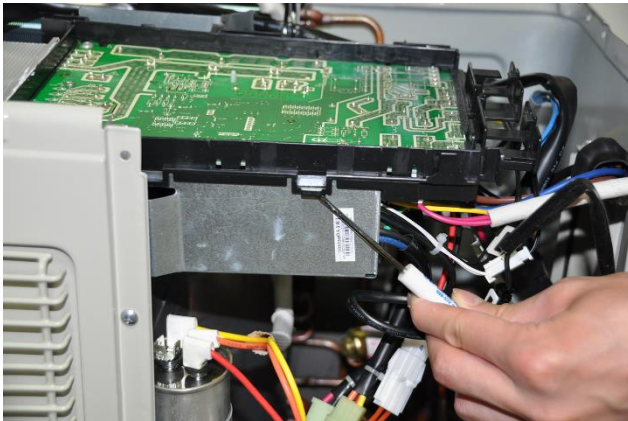
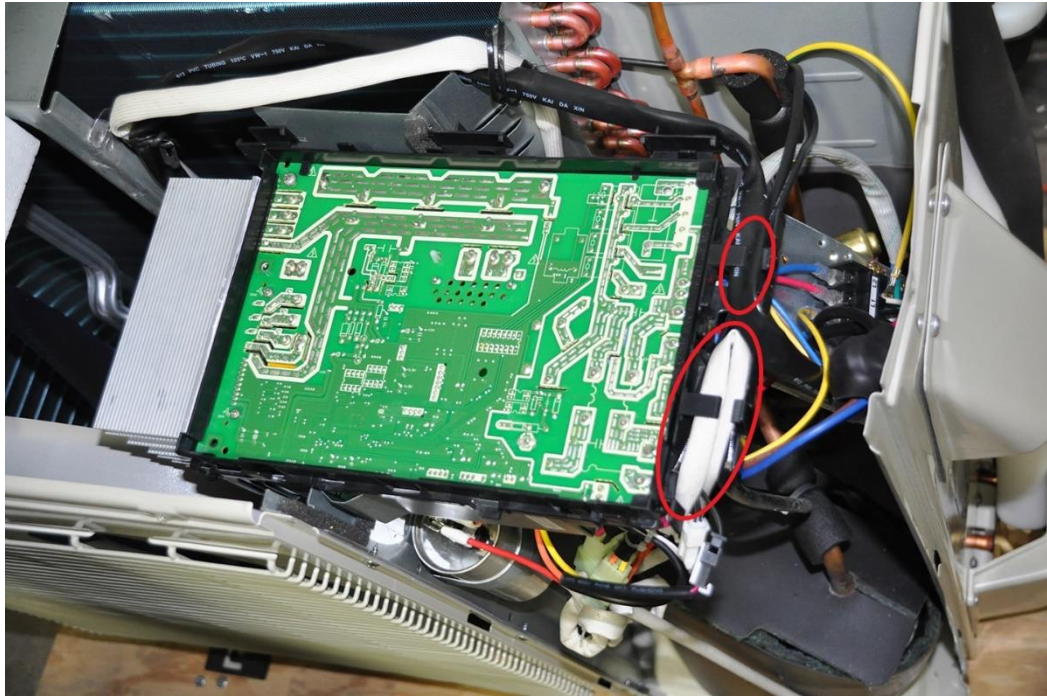
3. Remove the two screws on the side panel of the outdoor unit.



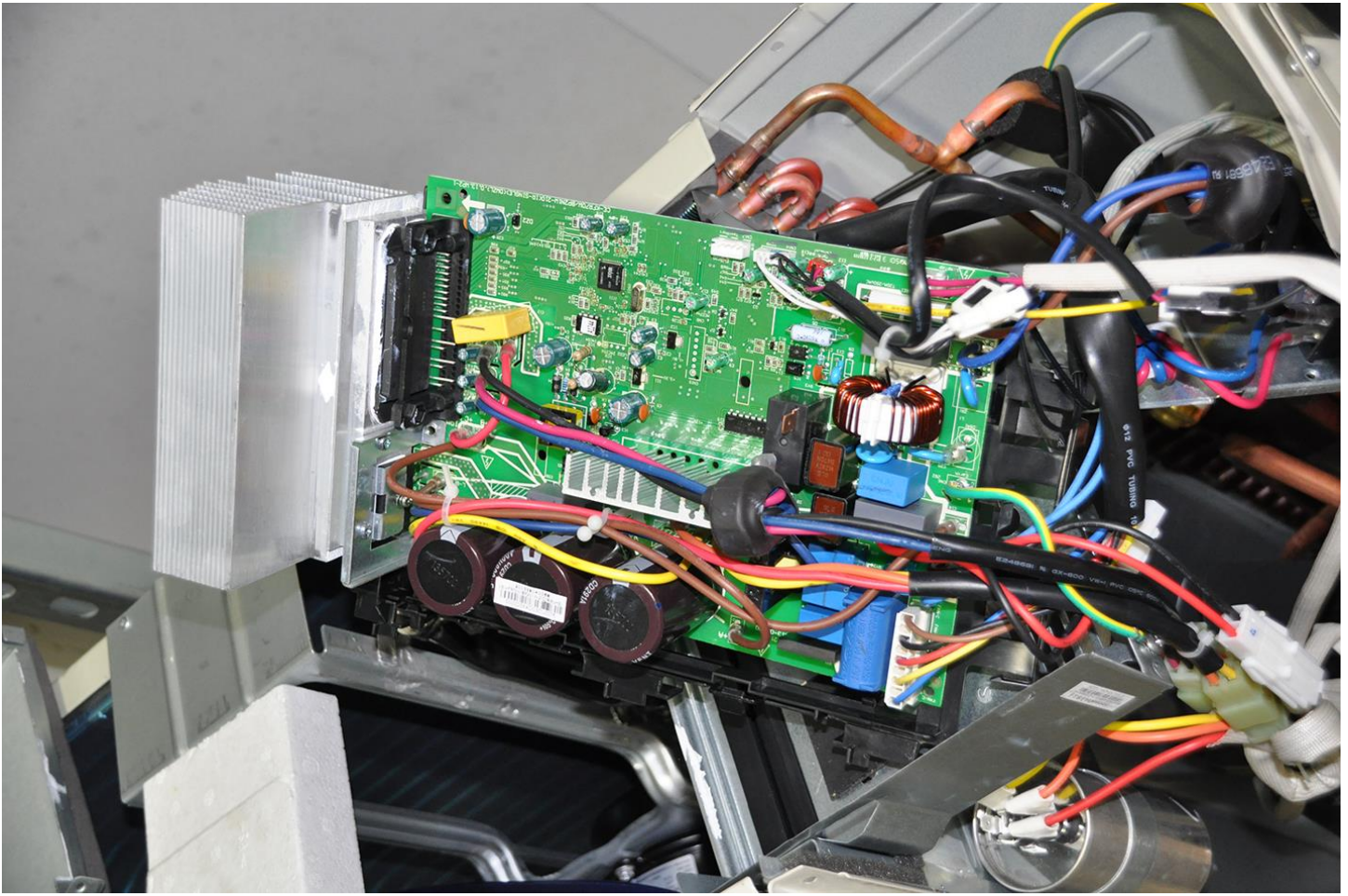
4. There are hooks on the side edges of the side panel. First push down on the panel to “unhook” it and then pull it forward to remove.



Picture of outdoor unit with side panel removed



6. There are four tabs that hold the plastic of the PCB in place. Use a flathead screwdriver or some kind of wedging tool, if necessary, to unhook the tabs.



7. Then lift the PCB assembly off the unit.
NOTE: All wires are still connected.