HEAT CONTROLLER, INC.

SERVICE MANUAL

Inverter Flex Multi-Zone Ductless Mini Split

Outdoor Section

A-VMH18DC-1
A-VMH27TC-1
A-VMH36QC-1

Heat Controller, Inc. • 1900 Wellworth Ave. • Jackson, MI 49203 • (517)787-2100 • www.heatcontroller.com

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1. General information of Outdoor Units

Model name	Dimension mm(in)	Compressor
A-VMH18DC-1	845x320x700(33.3x12.6x27.6)	DA130S1C-20FZ
A-VMH27TC-1	845x320x700(33.3x12.6x27.6)	DA150S1C-20FZ
A-VMH36QC-1	990x345x965(39x13.6x38)	TNB306FPGMC-L

2. Features

Outdoor unit

Power relay control

Low noise air flow system

Hydrophilic aluminum fin

The hydrophilic fin is corrosion resistant and improves heating efficiency in heat mode by absorbing the water on its surface and by spreading the water instead of forming water droplets.

4 way valve control

Operates only in heating mode except during defrosting.

Anti-rust cabinet

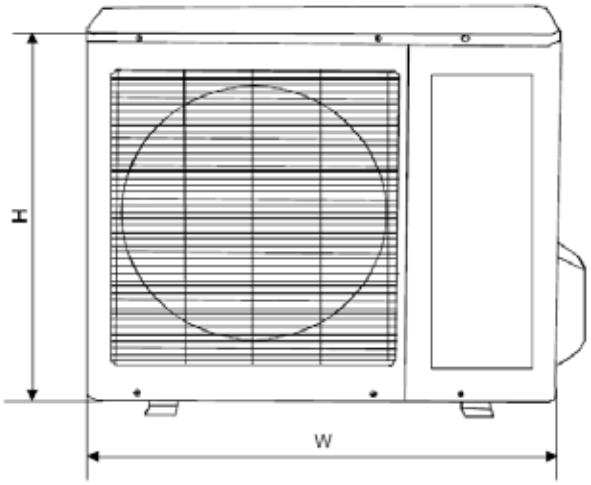
Valve protection cover

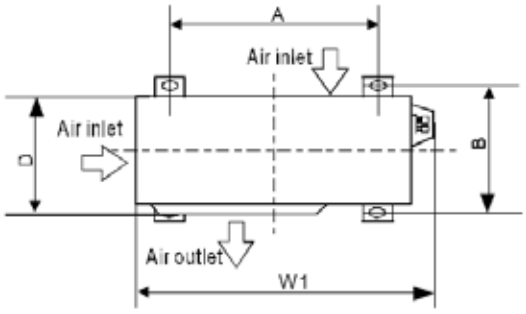
It protects the valves and prevents water from dripping in the cabinet.

Discharge pipe temperature protection

Compressor crankcase heater

3. Dimensions



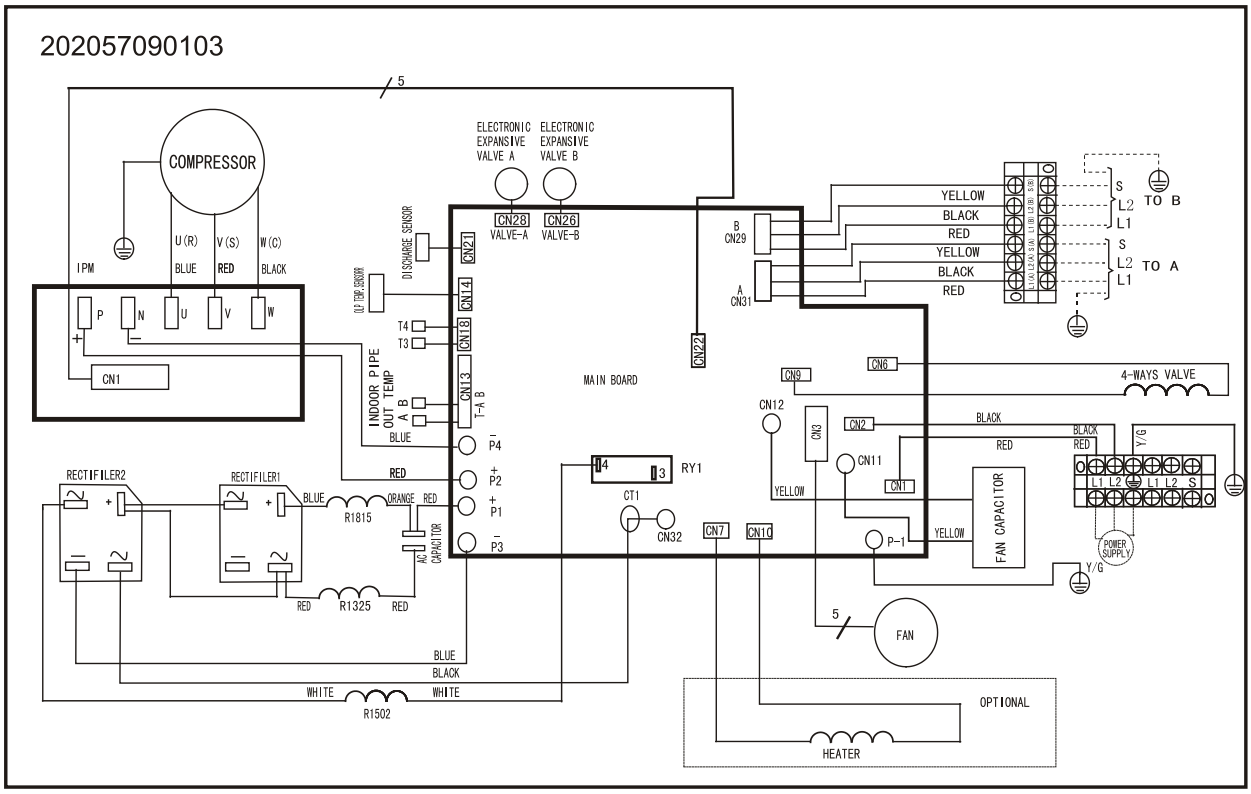


mm(in)

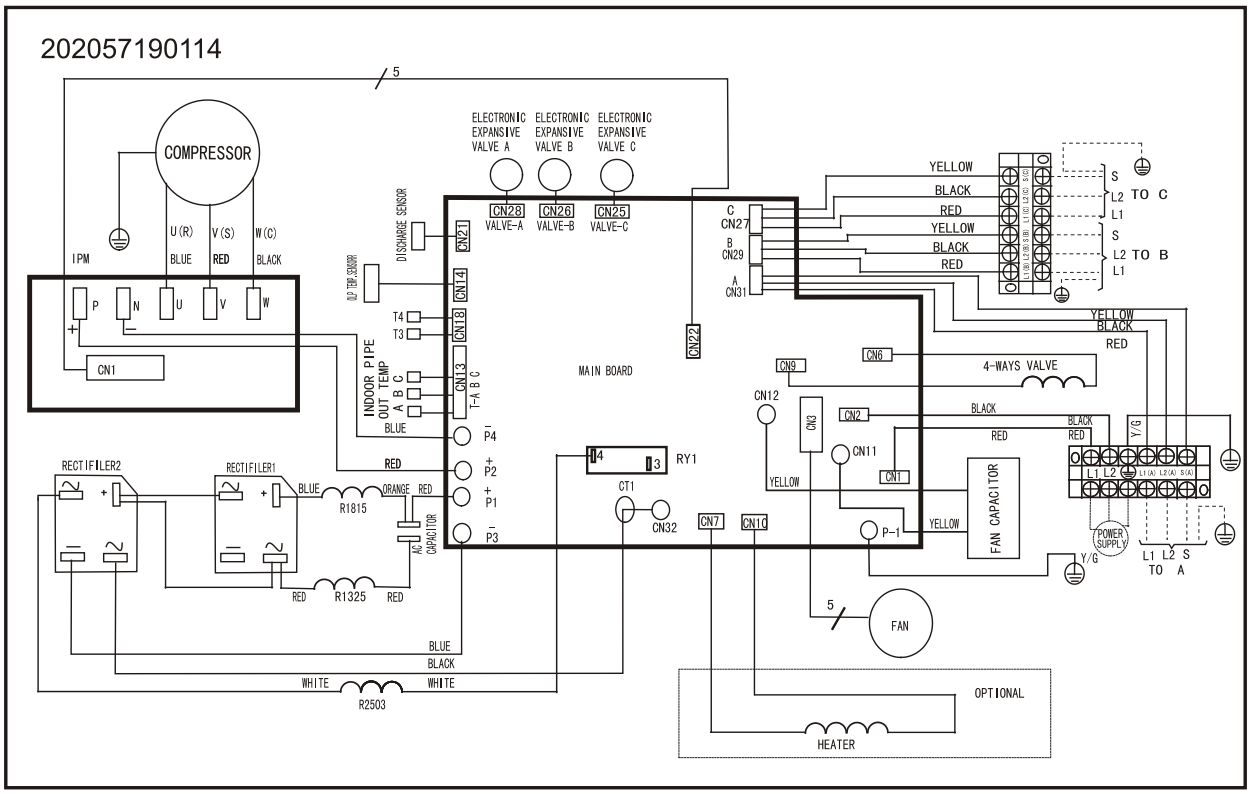
Model	W	D	H	W1	A	B
A-VMH18DC-1	845((33.3)	320(12.6)	700(27.6)	908(35.7)	560(22)	335(13.2)
A-VMH24TC-1						
A-VMH36QC-1	990(39)	345(13.6)	965(38)	1075(42.3)	624(24.6)	366(14.4)

4. Wiring Diagram

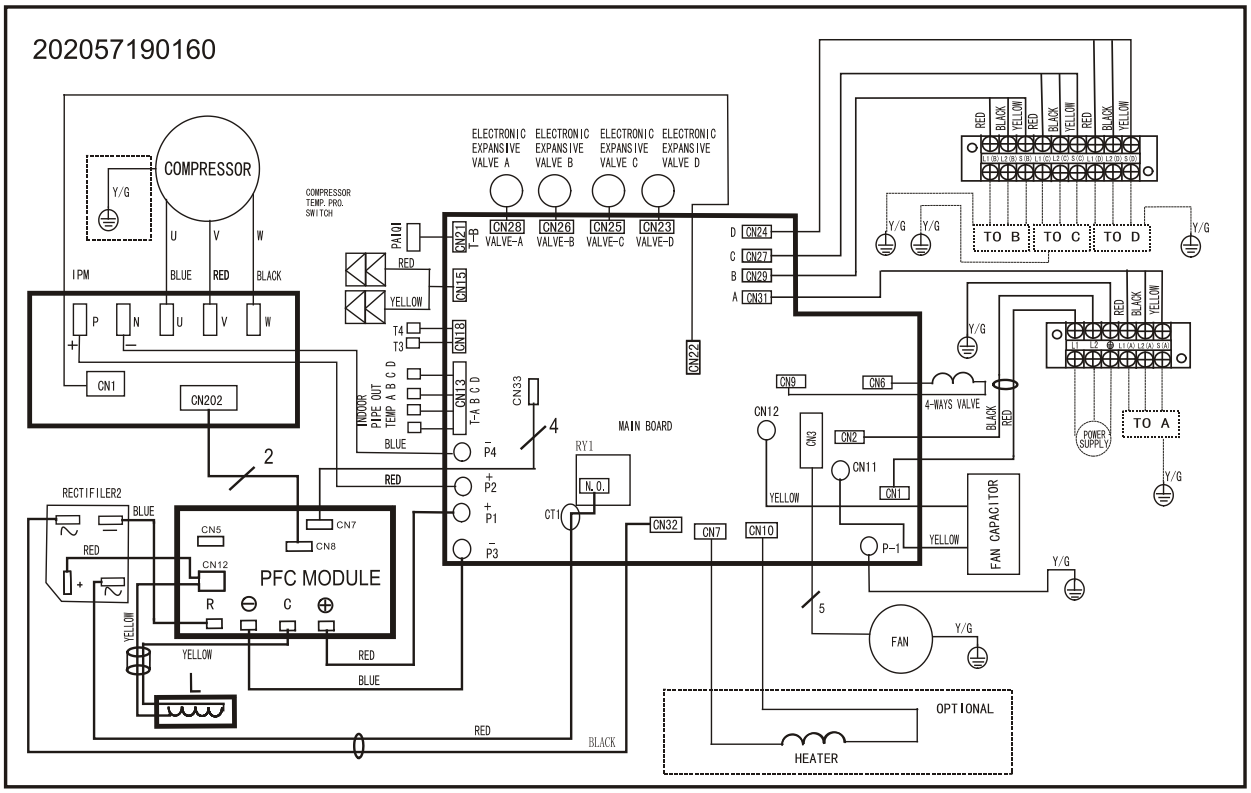
4.1 A-VMH18DC-1



4.2 A-VMH27TC-1

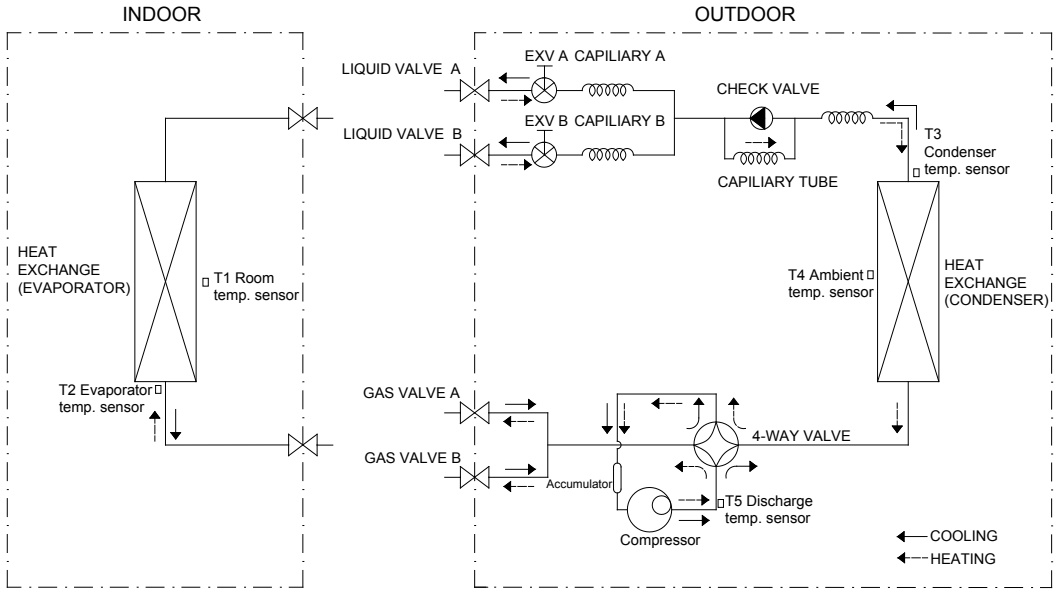


4.3 A-VMH36QC-1

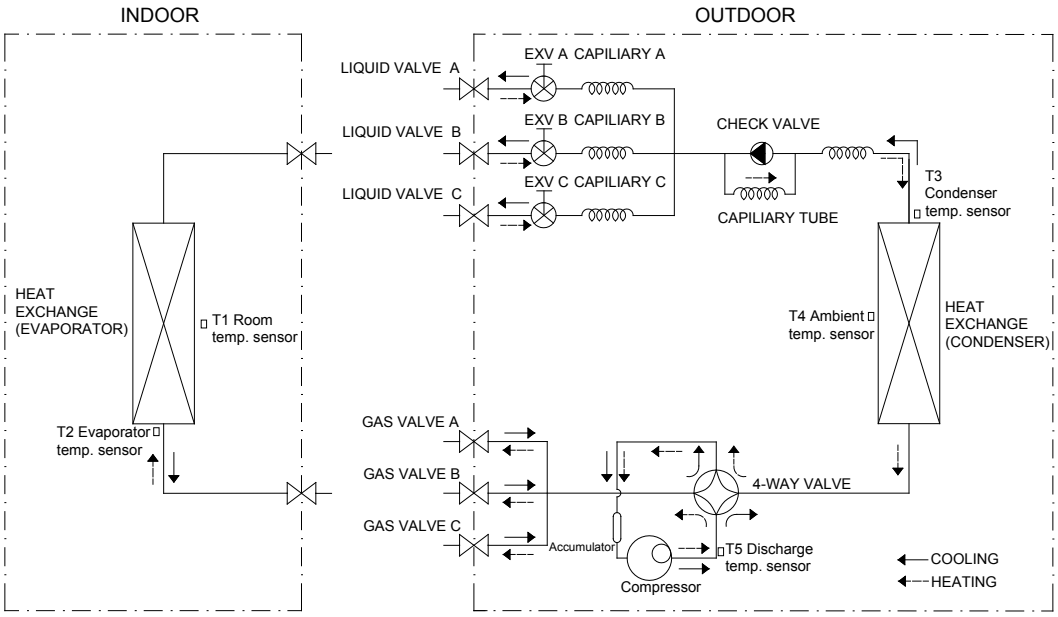


5. Refrigeration Cycle Diagram

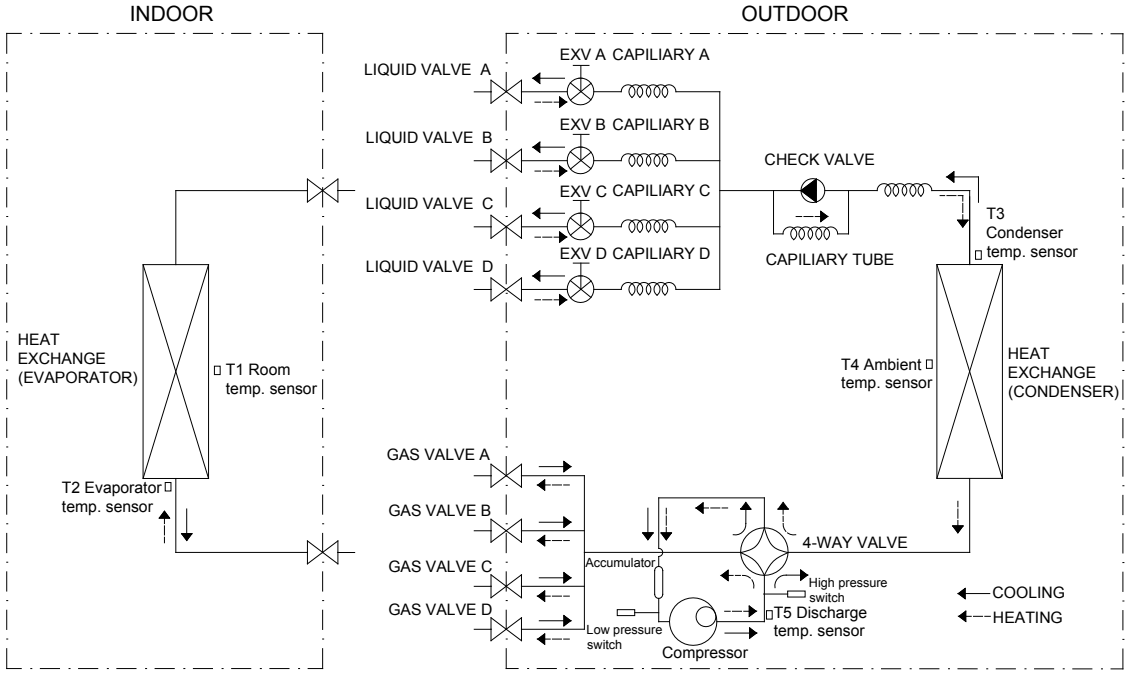
8.1 Refrigeration circuit drawing of inverter dual zone: A-VMH18DC-1



5.2 Refrigeration circuit drawing of inverter tri-zone: A-VMH27TC-1



8.3 Refrigeration circuit drawing of inverter Quad-zone: A-VMH36QC-1



6. Indoor units combination

NOTE: The total capacity of indoor air handlers can not exceed the nominal capacity of the outdoor unit. The minimum quantity of indoor air handlers is one on any outdoor unit, whether it is a dual, tri, or quad zone.

6.1 Indoor unit combinations for A-VMH18DC-1

Comb.	Combinations	
	Unit A	Unit B
Dual(1x1)	9k	—
	12k	—
	18k	—
Dual (1x2)	9k	9k
	9k	12k

6.2 Indoor unit combinations A-VMH27TC-1

Comb.	Combinations		
	Unit A	Unit B	Unit C
TRI (1x1)	9k	—	—
	12k	—	—
	18k	—	—
TRI (1x2)	9k	9k	—
	9k	12k	—
	9k	18k	—
	12k	12k	—
TRI (1x3)	9k	9k	9k

6.3 Indoor unit combinations A-VMH36QC-1

Comb.	Combinations			
	Unit A	Unit B	Unit C	Unit D
QUA (1x1)	9k	—	—	—
	12k	—	—	—
	18k	—	—	—
QUA (1x2)	9k	9k	—	—
	9k	12k	—	—
	9k	18k	—	—
	12k	12k	—	—
	12k	18k	—	—
	18k	18k	—	—
QUA (1x3)	9k	9k	9k	—
	9k	9k	12k	—
	9k	9k	18k	—
	9k	12k	12k	—
	12k	12k	12k	—
QUA(1x4)	9k	9k	9k	9k

7. Installation Details

7.1 Wrench torque sheet for installation

Outside diameter		Torque	Additional tightening torque
mm	inch	N·m	N·m
Φ6.35	1/4	15(153kgf.cm)	16(163kgf.cm)
Φ9.52	3/8	25(255kgf.cm)	26(265kgf.cm)
Φ12.7	1/2	35(357kgf.cm)	36(367kgf.cm)

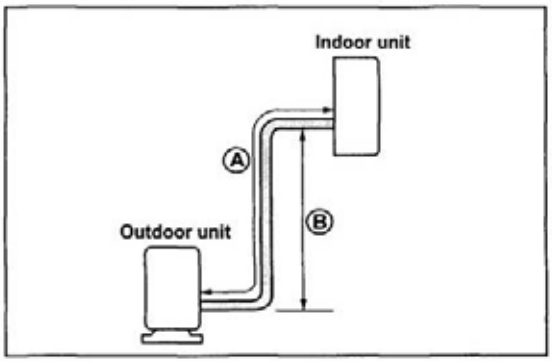
7.2 Connecting the cables

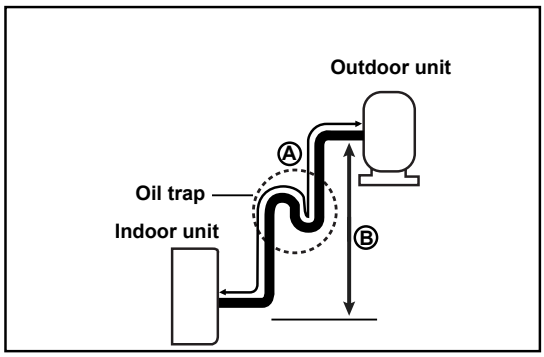
- The power wiring should always follow NEC and local codes, with respect to the unit's, rating plate. See installation manual for additional information. Main power connection is 208/230V/1PH~60HZ.
- The communicating cable, which connects between the indoor and outdoor units must meet all NEC and local codes, with respect to the unit's rating plate. We recommend using 14 AWG/4 conductor Stranded THHN 6 Φ Φ V cable.

Pipe length and elevation

Unit	Pipe size		Standard length (m)	Max. Elevation B (m)	Max. Length A (m)	Additional refrigerant (g/m)
	Gas inch (mm)	Liquid inch (mm)				
9K	3/8" (Φ9.52)	1/4" (Φ6.35)	(5) 16.5ft	(10) 33ft	(15) 50ft	(20) 0.2 oz/ft
12K/18K	1/2" (Φ12.7)	1/4" (Φ6.35)				

Max. Total length for all rooms	Dual-zone(m)	Tri-zone(m)	Quad-zone(m)
	(30)100ft	(45)150ft	(60)200ft





NOTES:

- Capacity test is based on standard length and maximum allowance length is based on reliability.
- Oil trap should be installed per (3-5 meters)10-15ft.
- Outdoor connections are ¼" (Φ6.35 mm) liquid and 3/8" (Φ9.52 mm) gas, therefore a reducer is provided with all 12/18k indoor sections.

7.4 Installation for the first time

Air and moisture in the refrigerant system have undesirable effects as indicated below:

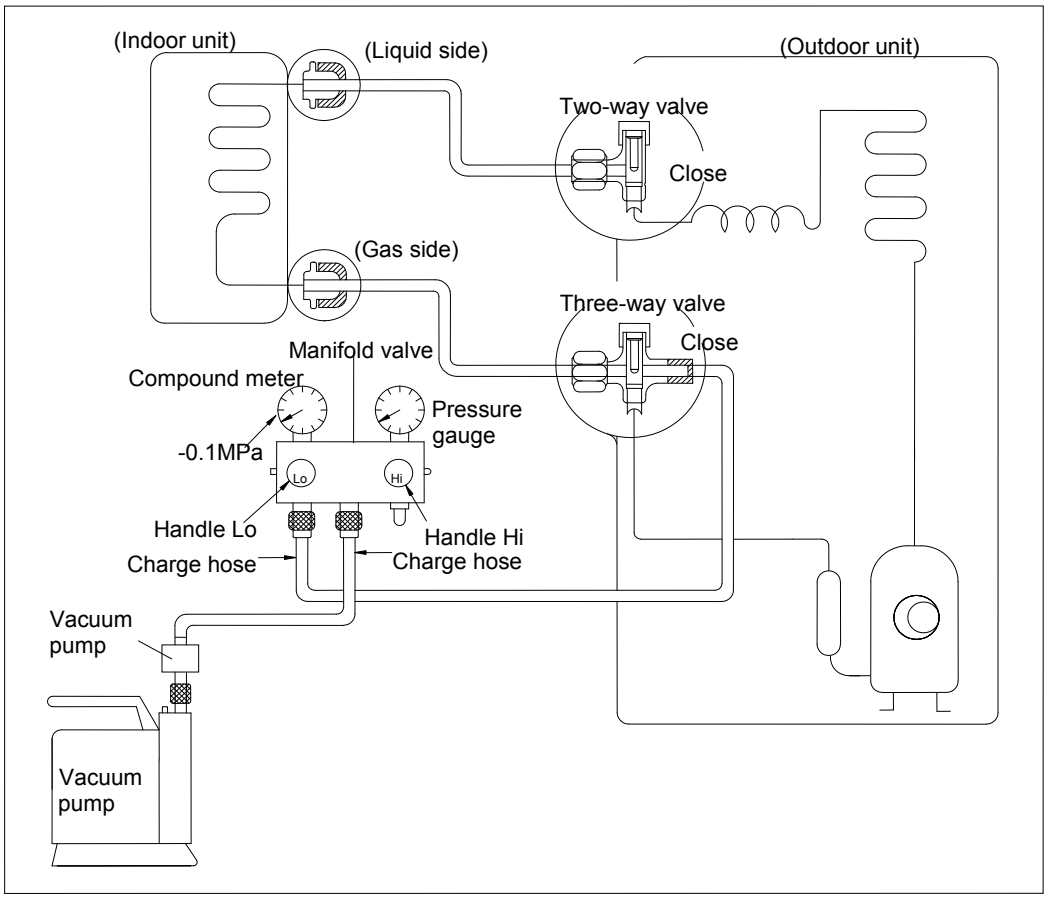
- Pressure in the system rises.
- Operating current rises.
- Cooling or heating efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigerant system.

Therefore, the indoor units and the pipes between indoor and outdoor units must be leak tested and evacuated to remove gas and moisture from the system.

Gas leak check (Soap water method):

Apply soap water or a liquid neutral detergent on the indoor unit connections and outdoor unit connections with a soft brush to check for leakage on the connecting points of the piping. If air bubbles come out, the connections have leaks and those connection points must be tightened. Recheck to ensure all leakage points are tightened properly and not leaking.

1. Air purging with vacuum pump



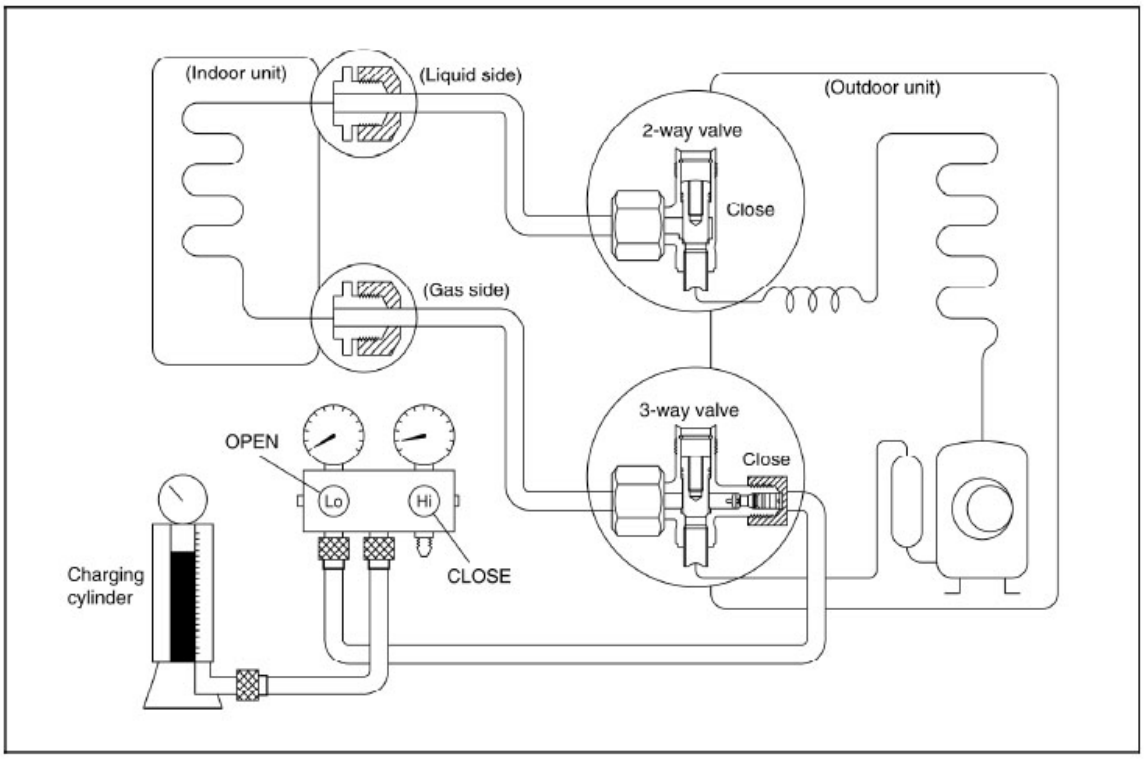
1) Completely tighten the flare nuts of the indoor and outdoor units, confirm that both the 2-way and 3-way valves are set to the closed position.
2) Connect the charge hose with the push pin of handle lo to the 3-way valves gas service port..
3) Connect the charge hose of handle hi connection to the vacuum pump.
4) Fully open the handle Lo of the manifold valve.
5) Operate the vacuum pump to evacuate.
6) Conduct evacuation for 30 minutes and check whether the compound meter indicates -0.1Mpa. If the meter does not indicate -0.1Mpa after pumping 30 minutes, it should be pumped 20 minutes more. If

the pressure can't achieve -0.1Mpa after pumping 50 minutes, please check if there are some leakage points. Once the meter indicates -0.1mpa, 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 7seconds after the gas comes out, then tighten the flare nut again. Make sure the pressure display in the pressure indicator is a little higher than the atmospheric 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.

2. Air purging by refrigerant



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the closed position.

2). Connect the charge set and a charging cylinder to the service port of the 3-way valve.

3). Air purge by open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45° for 3 seconds then closing it for 1 minute; repeat 3 times. After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

4). Check for gas leakage by checking the flare connections using the soap water method.

5). Discharge the refrigerant by closing the valve on the charging cylinder and discharging the refrigerant by loosening the flare nut on the 2-way valve approximately 45° until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position.

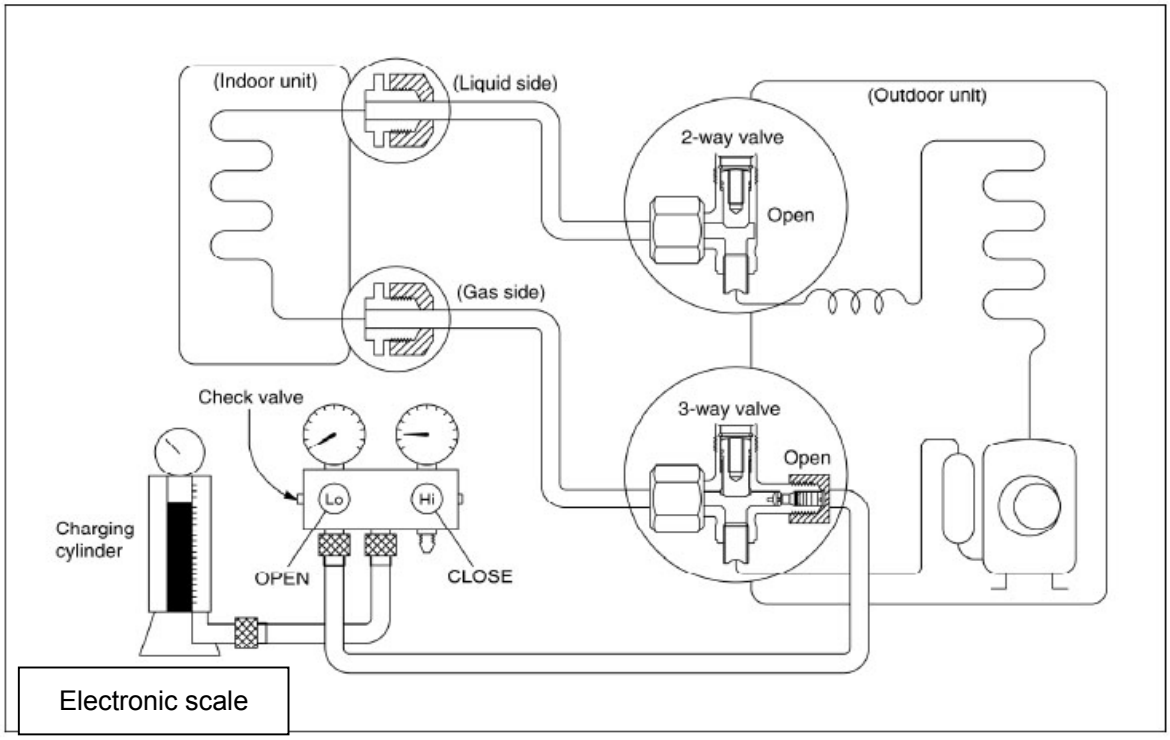
Be sure to use a hexagonal wrench to operate the valve stems.

7). Replace the valve stems nuts and the service port cap that were previously removed.

Be sure to use a torque wrench to tighten the service port cap to a torque of 18N·m.

Be sure to check for gas leakage using soap water.

3. Adding the refrigerant if the pipe length >(5m)16.5ft



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. Because refrigerant is R410A, turn the cylinder upside down, ensuring the bottom is upward, to create a 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 in the cooling mode.

5) Open the valves (Low side) on the charge set and charge the system with the proper amount (refer to table) liquid refrigerant.

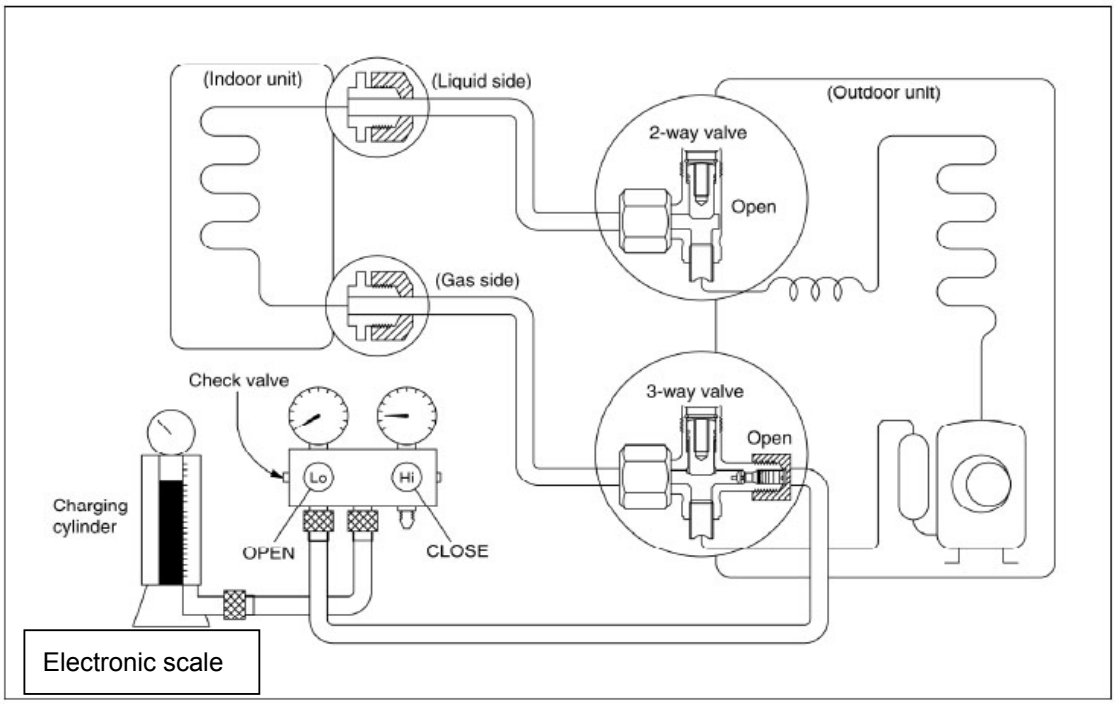
6).When the electronic scale displays the proper weight (refer to the table), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.

7). Replace the valve stem caps and the service port that were previously removed.

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage using soap water.

7.5 Adding the refrigerant due to loss of charge



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. Because the refrigerant is R-410A, turn the cylinder upside down, such that the bottom is upward, to ensure a 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 (Do not vent refrigerant into the atmosphere).

3) Put the charging cylinder onto the electronic scale and record the weight.

4) Operate the air conditioner in the cooling mode.

5) Open the valves (Low side) on the charge set and charge the system with liquid refrigerant, (refer to the gauge and the pressure of the low side).

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.

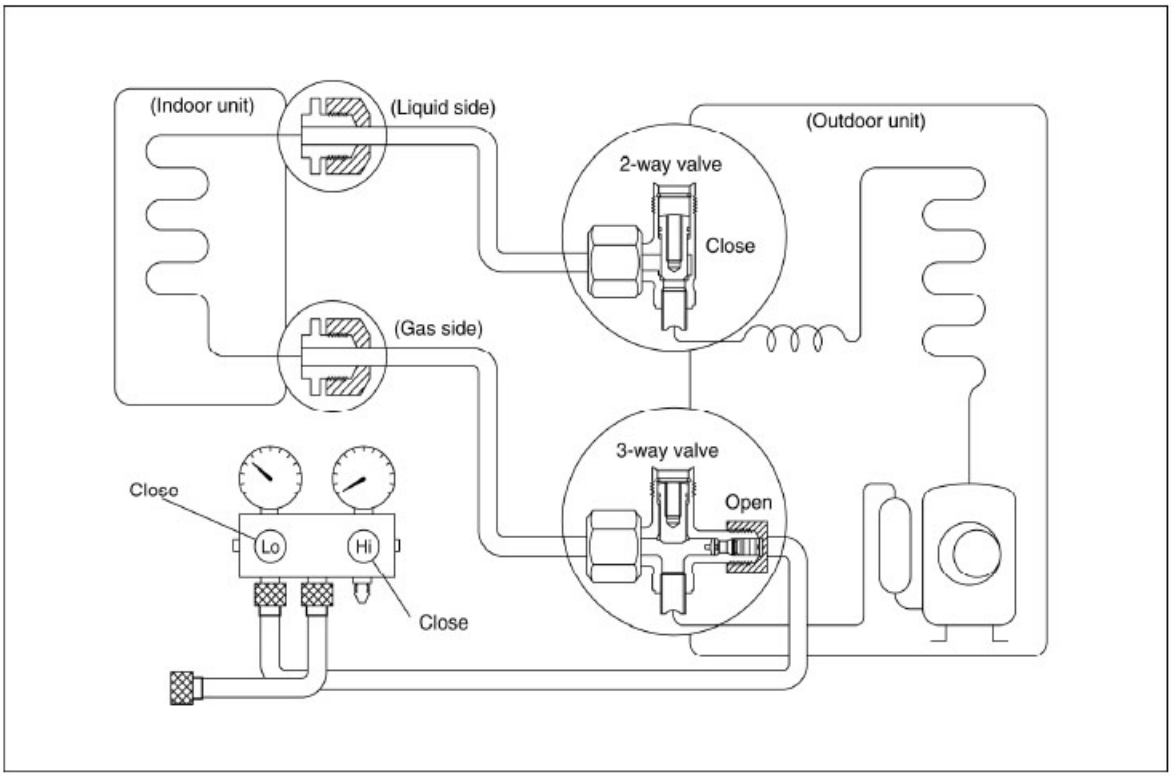
7). Replace the valve stem caps and the service port that were previously removed.

Use torque wrench to tighten the service port cap to a torque of 18N·m.

Be sure to check for gas leakage using soap water.

7.6 Replacing the indoor unit

1. Collecting the refrigerant into the outdoor unit



Procedure

1). Confirm that both the 2-way and 3-way valves are set to the open position

Remove the valve stem caps and confirm that the valve stems are in the open 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 closed position.

5). Operate the air conditioner in the cooling cycle and stop it when the gauge indicates 0.1MPa.

6). Set the 3-way valve to the closed position immediately

Do this quickly so that the gauge ends up indicating 0.3 to 0.5Mpa.

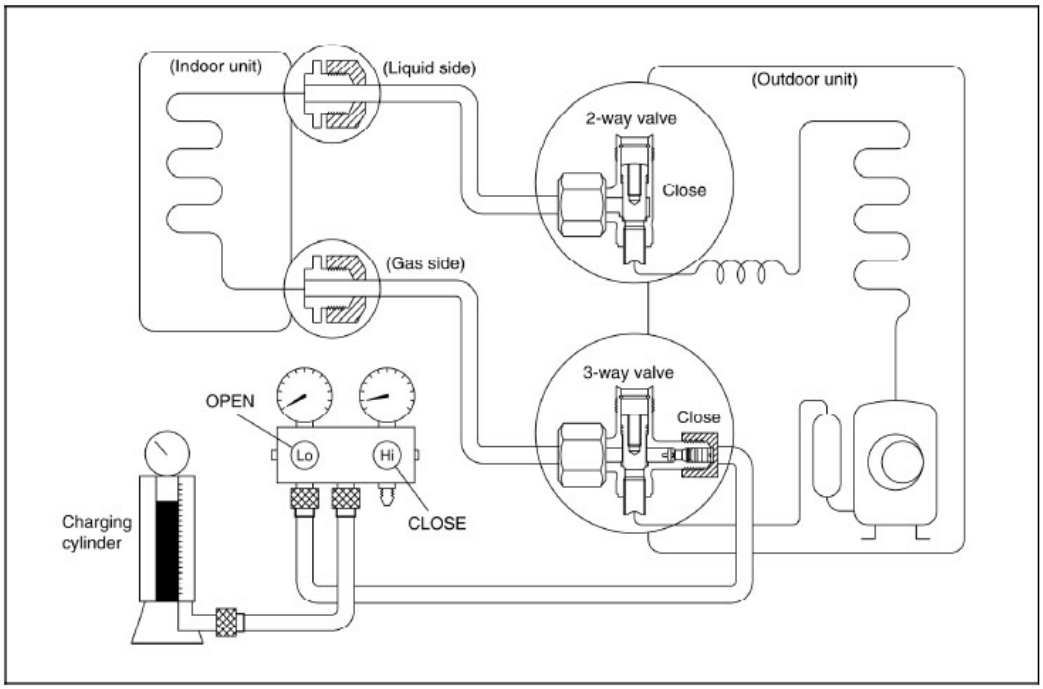
Disconnect the charge set, and tighten the 2-way and 3-way valve's stem nuts.

Use a torque wrench to tighten the 3-way valves service port cap to a torque of 1.8 N.m.

Be sure to check for gas leakage using soap water.

7). Remove the defective indoor unit and install the new indoor unit. Follow the next set of procedures to charge.

2. Air purging by the refrigerant



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the closed position.

2). Connect the charge set and a charging cylinder to the service port of the 3-way valve

Leave the valve on the charging cylinder closed.

3). Air purging.

Open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45° for 3 seconds then closing it for 1 minute; repeat 3 times.

After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

4). Check the gas leakage

Check the flare connections for gas leakage using soap water.

5). Discharge the refrigerant into charging cylinder.

Close the valve on the charging cylinder and discharge the refrigerant by loosening the flare nut on the

2-way valve approximately 45° until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position

Be sure to use a hexagonal wrench to operate the valve stems.

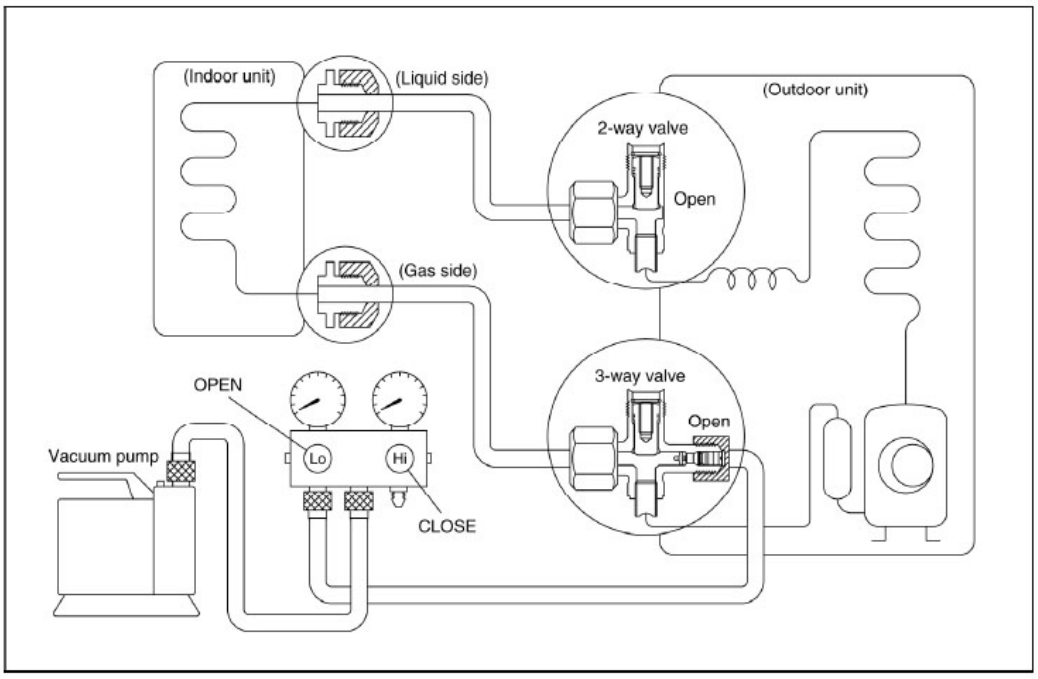
7). Replace the valve stems nuts and the service port cap that were previously removed.

Be sure to use a torque wrench to tighten the service port cap to a torque 18N.m.

Be sure to check the gas leakage using soap water.

7.7 Replacing the outdoor unit

1. Evacuation for the whole system



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the open position.

2). Connect the vacuum pump to 3-way valve's service port.

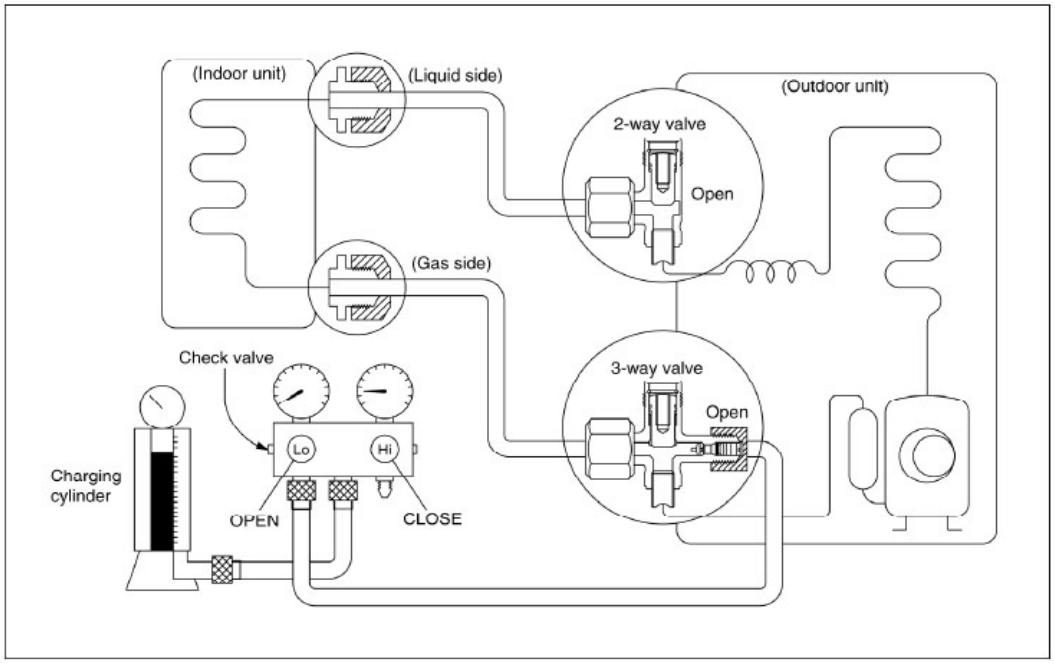
3). Evacuate for approximately one hour. Confirm that the compound meter indicates -0.1Mpa.

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). Remove the defective outdoor unit and install the new unit. See the following instructions for re-charging the new unit.

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. Because the refrigerant is R-410A, turn the cylinder upside down, such that the bottom is upward, to ensure a 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 (Do not vent refrigerant into the atmosphere).

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 charge with the specified amount of refrigerant, or can be charged with a little at a time (approximately (150g),5oz. each time) , operating the air conditioner in the cooling cycle. Wait approximately 1 minute and then repeat the procedure as needed.

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). Replace the valve stem caps and the service port that were previously removed.

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage using soap water.

8. Electronic control function

8.1 Abbreviations

T1: Indoor ambient temperature

T2: Coil temperature of indoor heat exchanger middle.

T2B: Coil temperature of indoor heat exchanger outlet.

T3: Coil temperature of outdoor heat exchanger

T4: Outdoor ambient temperature

T5: Compressor discharge temperature

Ts: Set point temperature.

8.2 Electric control working environment.

8.2.1 Input voltage: 230V.

8.2.2 Input power frequency:60Hz.

8.2.3 Indoor fan normal working amperage. is less than 1A.

8.2.4 Outdoor fan normal working amperage. is less than 1.5A.

8.2.5 Four-way valve normal working amperage. is less than 1A.

8.2.6 Swing motor: 12V DC.

8.3 Outdoor unit's digital display

There is a digital display tube in outdoor PCB.

Digital display functions:

- In standby , the LED displays "- -"
- When compressor is operating, the LED displays the running frequency,
- In defrosting mode, The LED displays "dF" or alternatively displays between running frequency and "dF"(each displays 2s)
- In compressor pre-heating, The LED displays "- -"
- In protection or malfunction modes, the LED displays the associated error code or protection code.

8.4 Outdoor unit point check function

There is a check switch in outdoor PCB.

Push the switch SW1 to check the states of unit when the unit is running. The digital display will display the following each time the SW1 switch is preserved.

No.SW1 Pressed	Display	Remark
1	Indoor unit capacity demand code	
2	Outdoor unit running mode code	Off:0, Cooling:1, Heating:2
3	Amendatory capacity demand code	
4	Outdoor unit fan motor state	Off:0, Low speed:1, High speed:2
5	Evaporator outlet temp. for 1# indoor unit	Actual data is measured, however due to display limitations if the temp. is lower than -9 degrees, the digital display will show "-9". If the temp. is higher than 70 degrees, the digital display will show "70". If the indoor unit is not connected, the digital display tube will show: "- -".
6	Evaporator outlet temp. for 2# indoor unit	
7	Evaporator outlet temp. for 3# indoor unit	
8	Evaporator outlet temp. for 4# indoor unit	
9	Condenser pipe temp.	
10	Ambient temp.	
11	Compressor discharge temp.	Actual data is measured, however due to display limitations if the temp. is lower than 0 degrees, the digital display will show "0". If the temp. is higher than 99 degrees, the digital display will show single digit and a tens digit. For example if the digital display shows "0.5", it means the compressor

		discharge temp. is 105 degree. If the indoor unit is not connected, the digital display tube will show: "- - ".
12	Inverter current	AD data
13	EXV open angle for 1# indoor unit	Actual data, divide this number by 8 for actual angle valve is open.
14	EXV open angle for 2# indoor unit	Actual data divide 8 Actual data divide 8 Actual data divide 8
15	EXV open angle for 3# indoor unit	
16	EXV open angle for 4# indoor unit	
17	Power supply of outdoor unit	AD data (AD data*472/255=actual data)
18	Indoor unit number	The indoor unit can communicate with outdoor unit well.
19	The last error or protection code	00 means no malfunction
20	frequency value	Actual data
21	Ambient temp. of 1# indoor unit	Actual data
22	Condenser pipe temp. of 1# indoor unit	Actual data
23	Ambient temp. of 2# indoor unit	Actual data
24	Condenser pipe temp. of 2# indoor unit	Actual data
25	Ambient temp. of 3# indoor unit	Actual data
26	Condenser pipe temp. of 3# indoor unit	Actual data
27	Ambient temp. of 4# indoor unit	Actual data
28	Condenser pipe temp. of 4# indoor unit	Actual data
29	——	Check point over

The following items from 6.4.1 to 6.4.6 are for the explanation of the point check functions.

8.4.1 Frequency of compressor:

Display	Frequency of compressor (Hz)
30	30
--	Stand by
60	60

8.4.2 Running mode:

Display	Corresponding mode
0	Off
1	Cooling mode
2	Heating mode

8.4.3 Capacity demand:

Cooling mode

Capacity	2000-2500	2000-2500	3000-3800	4500-5000	5000-5500	5500-6100	6100-7000	7000-7500	7500-8000	>7500
Corresponding Code	1	2	3	4	5	6	7	8	9	>=10

Heating mode

Capacity	2000-2500	2000-2500	3000-3800	4500-5000	5500-6100	6100-7000	6100-7000	7000-7500	7500-8000	>8000
Corresponding Code	1	2	3	4	5	6	7	8	9-10	>=11

Note:

The capacity is just for reference.

8.4.4Number of indoor units – displays how many indoor units the outdoor unit is communicating with.

Display	Quantity of indoor unit
1	1
2	2
3	3
4	4

8.4.5 Opening degree of electronic expansion valve:
Actual opening degree value equals the display data divided 8

8.5 Protection

8.5.1 Three minutes delay at restart for compressor.

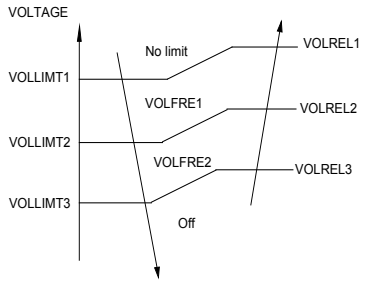
8.5.2 Temperature protection of compressor discharge.

When the compressor discharge temp. is getting higher, the running frequency will be limited as below rules:

----If 216°F<T5< 239°F (102°C<T5<115°C), the frequency or the compressor will decrease to a lower level every 2 minutes until it reaches F1.

---If T5>239°F(T5>115°C) for 10 seconds, the compressor will stop and restart till T5<194°F (T5<90°C).

8.5.3 Low voltage protection



Model	VOLLIMT1	VOLLIMT2	VOLLIMT3	VOLREL1	VOLREL2	VOLREL3	VOLFRE1	VOLFRE2
A-VMH18DC-1	230	200	120	260	210	135	62	54
A-VMH27TC-1	245	220	120	265	240	135	78	45
A-VMH36QC-1	200	185	120	210	195	135	54	42

Note: if the low voltage protection occurs and does not resume within 3min, it will keep the protection after the machine is restarted.

8.5.4 Compressor current limit protection

If the compressor current exceeds the current limit value for 10 seconds, the compressor frequency will be limited per the table below.

Cooling mode:

Current frequency(Hz)	Current limit value(A)	Frequency limit
COOL_F10	ICOOLLMT6	The compressor frequency will decrease to COOL_F4 and then run at COOL_F4 for 3 minutes. After that, the frequency will be adjusted according to the capacity demand, then rise to the next level up every 3 minutes (When the frequency>COOL_F4 via capacity demand).
COOL_F9	ICOOLLMT5	
COOL_F8	ICOOLLMT4	
COOL_F7	ICOOLLMT3	
COOL_F6	ICOOLLMT2	
COOL_F5	ICOOLLMT1	
If the current frequency is lower than COOL_F4, the frequency will not be limited. After 10s of the compressor start, if the current>ICOOL,the AC will display the failure for 30 seconds and stop. The AC will restart 3 minutes later and re-check.		

Heating mode:

Current frequency(Hz)	Current limit value(A)	Frequency limit
HEAT_F12	IHEATLMT8	The compressor frequency will decrease HEAT_F4 and then run at HEAT_F4 for 3 minutes. After that, the frequency will be adjusted according to the capacity demand, then rise to the next level up every 3 minutes (When the frequency>Heat_F4 via capacity demand).
HEAT_F11	IHEATLMT7	
HEAT_F10	IHEATLMT6	
HEAT_F9	IHEATLMT5	
HEAT_F8	IHEATLMT4	
HEAT_F7	IHEATLMT3	
HEAT_F6	IHEATLMT2	
HEAT_F5	IHEATLMT1	
If the current frequency is lower than HEAT_F4, the frequency will not be limited. After 10s of the compressor start, if the current>IHEAT,the AC will display the failure for 30 seconds and stop. The AC will restart 3 minutes later and re-check.		

8.5.5 Indoor / outdoor units communication protection

If any indoor unit can not receive the feedback signal from the outdoor unit for 2 minutes, the AC will stop and display the failure code.

8.5.6 High condenser coil temp. protection.

When T3>149°F(T3>65°C) for 3 seconds, the compressor will stop while the indoor fan and outdoor fan will continue.

When T3<126°F(T3<52°C), the protection will release and the compressor will restart after 3 minutes.

8.5.7 Outdoor unit anti-freezing protection

When T2B<32°F(T2B<0°C) for 4 minutes, the indoor unit capacity demand will be zero and resume to normal when T2B>50°F(T2B>10°C).

8.5.8 Oil return

Running rules:

1. If the compressor frequency remains lower than RECOILINFRE for 2hours,the AC will increase the frequency to RECOILFRE for 3mins and then resume to the former frequency.

Model	RECOILINFRE
A-VMH18DC-1	45
A-VMH27TC-1	45
A-VMH36QC-1	40

2. During the oil return process, the EXV and indoor units continue with the current running mode, the frequency will not be limited by the compressor discharge temp. or the current.

8.5.9 Compressor preheating functions

----Preheating permitting condition:

If T4(outdoor ambient temperature) T4＜37.4°F(T4＜3°C) and newly powered on or if T4＜37.4°F(T4＜3°C) and compressor has stopped for over 3 hours, the compressor's crank case heater will begin to operate.

----Preheating mode:

A weak current flow through the coil of compressor from the wiring terminal of compressor, heats the compressor without it operating via the crankcase heater.

----Preheating release condition:

If T4>41°(T4>5°C) or the compressor starts running, preheating function will stop.

8.5.10 Compressor crankcase heater

When T4<37.4°(T4<3°C) and the compressor is not running, the crankcase heater will be active.

When T4≧41°(T4≧5°C) or the compressor starts up, the crankcase heater will stop working.

9. Troubleshooting

9.1 Indoor Mini-Split error code explanations:

Indoor Error Code	LED STATUS	Corresponding Outdoor Error code
E0	Indoor EEPROM malfunction	——
E1	Indoor/ outdoor unit communication error	——
E2	Zero-crossing signal error	——
E3	Indoor fan speed has been out of control	——
E5	Open circuit or short circuit of outdoor temperature sensor or outdoor EEPROM malfunction	E0,E1,E2, E3,E4,E6
E6	Open circuit or short circuit of T1 or T2 temperature sensor	——
P0	IPM module protection or IGBT over-strong current protection	P4
P1	Voltage protection	E5
P2	Temperature protection of compressor top	P0,P1,P2
P3	Outdoor temp. too low protection(Optional for some models)	——
P4	Inverter compressor drive protection	E7, P7
P5	Mode conflict	——

Indoor Ceiling Cassette error codes:

Operation	Timer	De-frost	Alarm	LED STATUS
★	X	X	X	Open or short circuit of T1 temperature sensor
X	X	★	X	Open or short circuit of T2 temperature sensor
X	★	X	X	Indoor / outdoor units communication error
X	X	X	★	Full-water malfunction
★	★	X	X	Indoor EEPROM malfunction
★	X	X	●	IPM module protection
★	●	X	X	Open or short circuit of T3 or T4 temperature sensor
★	●	X	●	Voltage protection
★	★	★	★	Temperature protection of compressor top.
★	X	●	●	Mode conflict
★	●	●	X	Inverter compressor drive protection

★ flash at 2.5Hz, ● light, X extinguished.

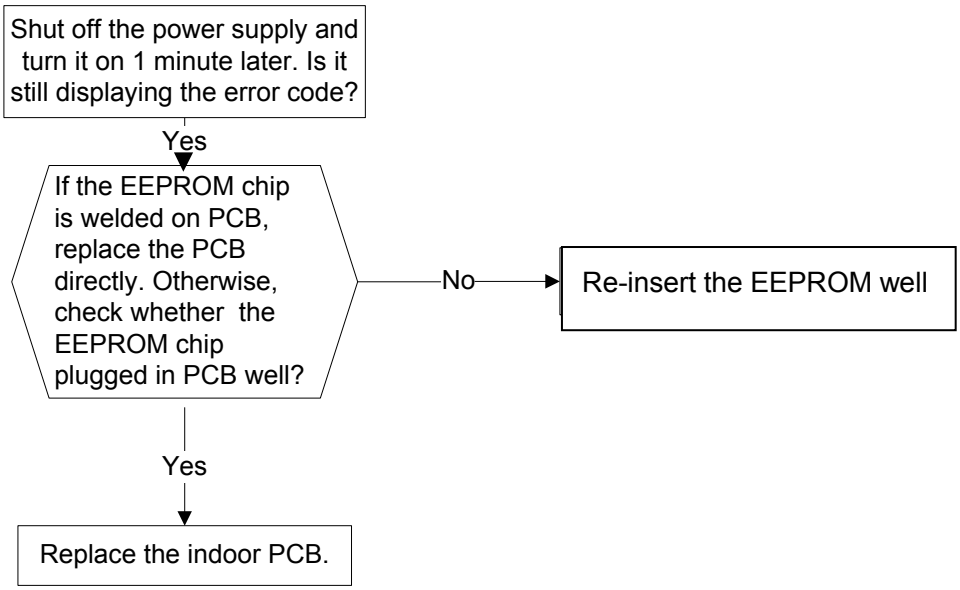
9.2 Outdoor unit error code explanation:

Outdoor Error Code:	LED STATUS	Corresponding Indoor Mini-Split error code
E0	Outdoor EEPROM malfunction	E5
E1	Indoor unit A's coil outlet temp. sensor or connector of sensor is defective	E5
E2	Indoor unit B's coil outlet temp. sensor or connector of sensor is defective	E5
E3	Indoor unit C's coil outlet temp. sensor or connector of sensor is defective	E5
E6	Indoor unit D's coil outlet temp. sensor or connector of sensor is defective	E5
E4	Open or short circuit of outdoor unit temperature sensor	E5
E5	Voltage protection	P1
E7	Communication malfunction between IPM board and outdoor main board	P4
P0	Temperature protection of compressor discharge or compressor top. For A-VMH-36QC-1 it means Temperature protection of compressor discharge	P2
P1	High pressure protection (Only for A-VMH-36QC-1)	P2
P2	Low pressure protection (Only for A-VMH-36QC-1)	P2
P3	Current protection of compressor	——
P4	IPM module protection	P0
P6	High temperature protection of condenser	——
P7	Inverter compressor drive protection	P4
PF	PFC module protection (A-VMH36QC-1)	——

9.3 Trouble shooting

9.3.1 Indoor unit trouble shooting

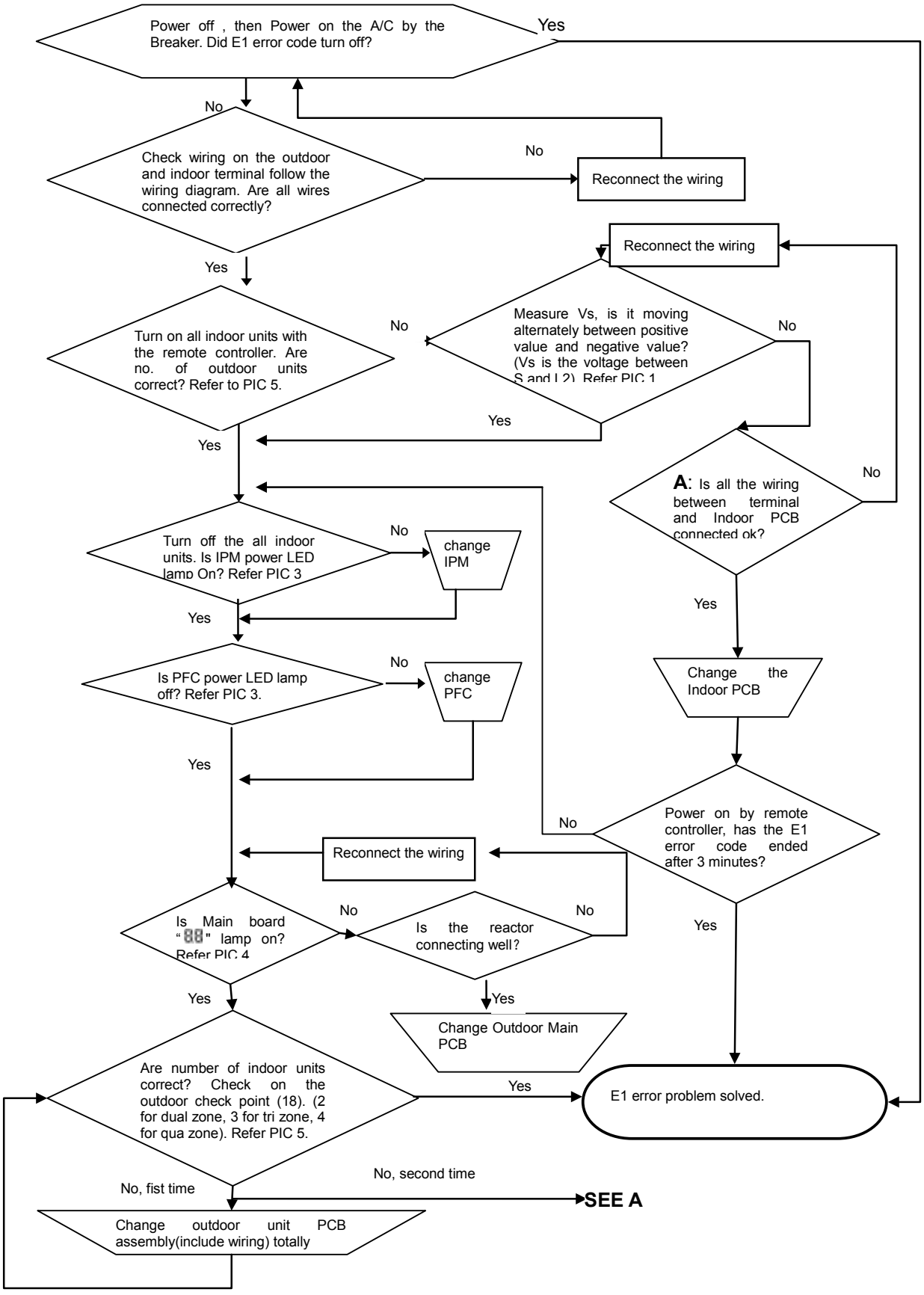
9.3.1.1 Indoor EEPROM malfunction



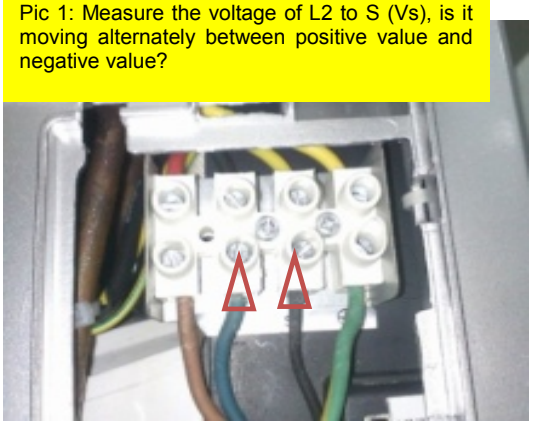
EEPROM: a read-only memory chip whose contents can be erased and reprogrammed using a pulsed voltage.

(EERROM chip may be solid for some models)

9.3.1.2 Indoor / outdoor units communication error

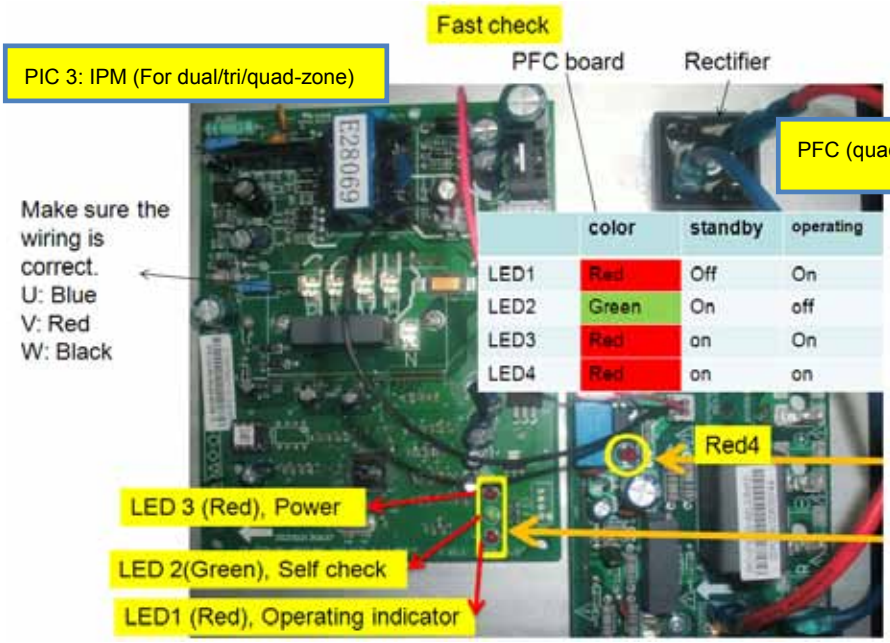


Pic 1: Measure the voltage of L2 to S (Vs), is it moving alternately between positive value and negative value?

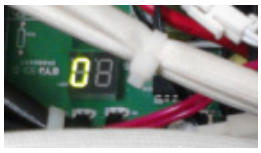


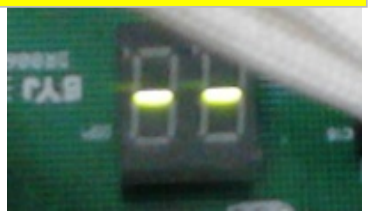
PIC 2, Check the wiring.

PIC 3: IPM (For dual/tri/quad-zone)



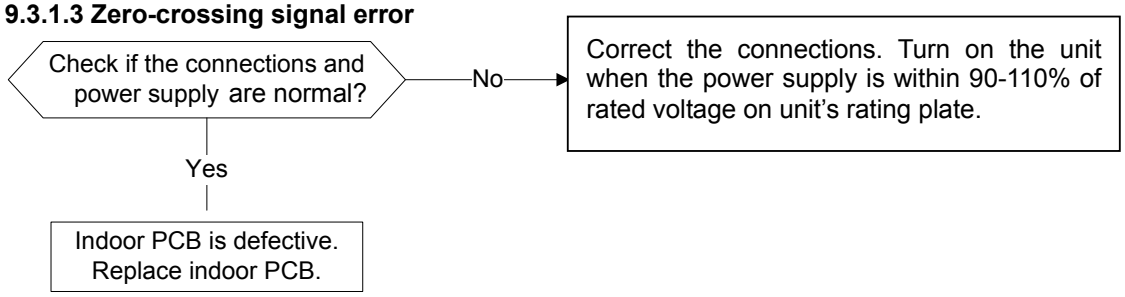
PIC4: Main board LED when power on and unit standby.



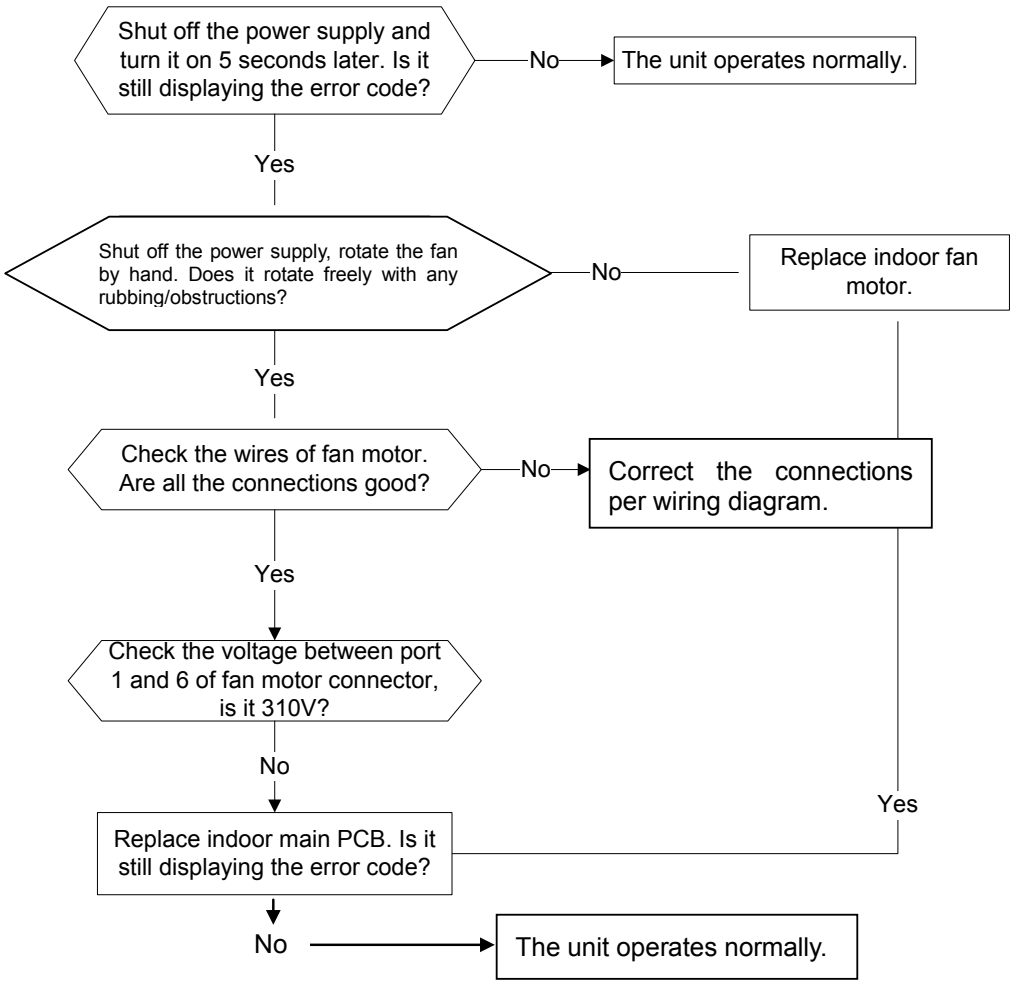


PIC 5: check point bottom,
press 18 times to check how many indoor units are connected.

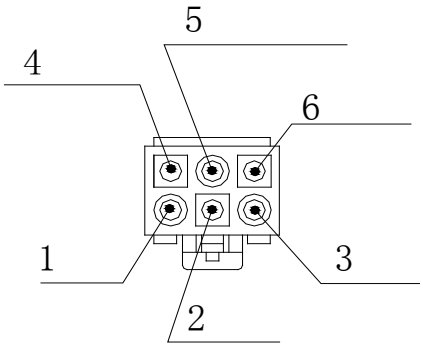
9.3.1.3 Zero-crossing signal error



9.3.1.4 Indoor fan speed has been out of control(DC fan motor)

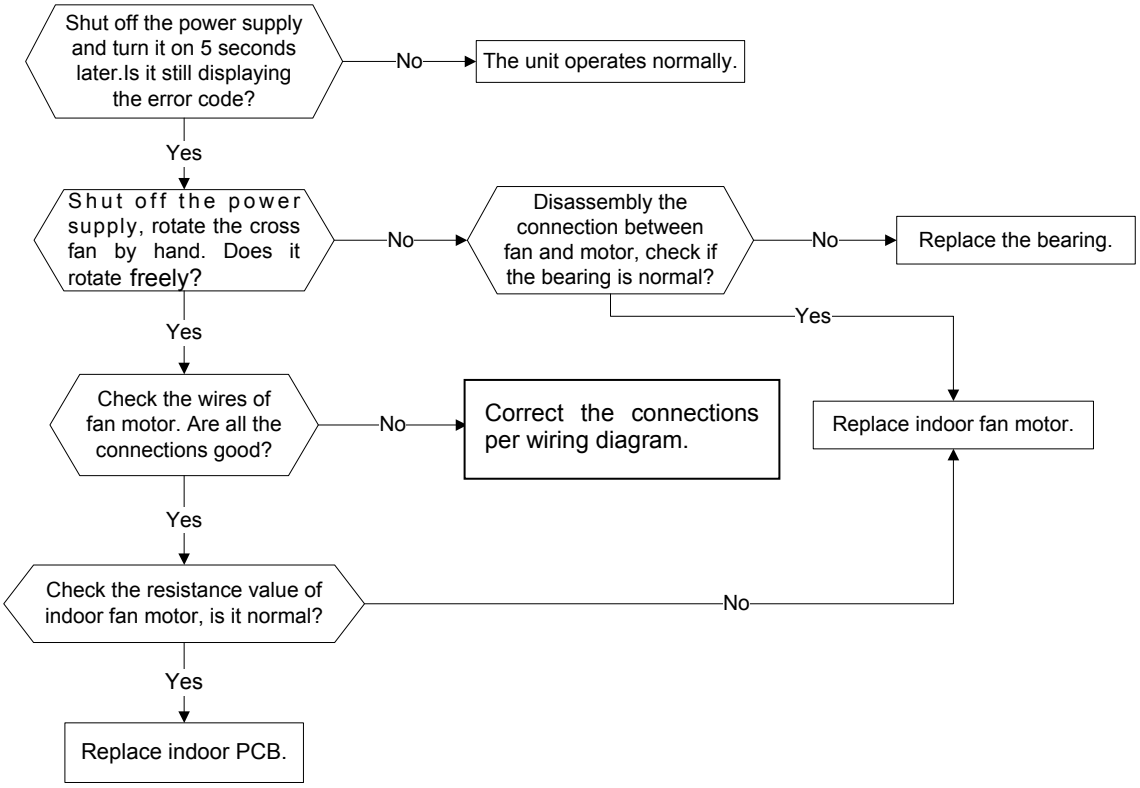


DC motor voltage input and output

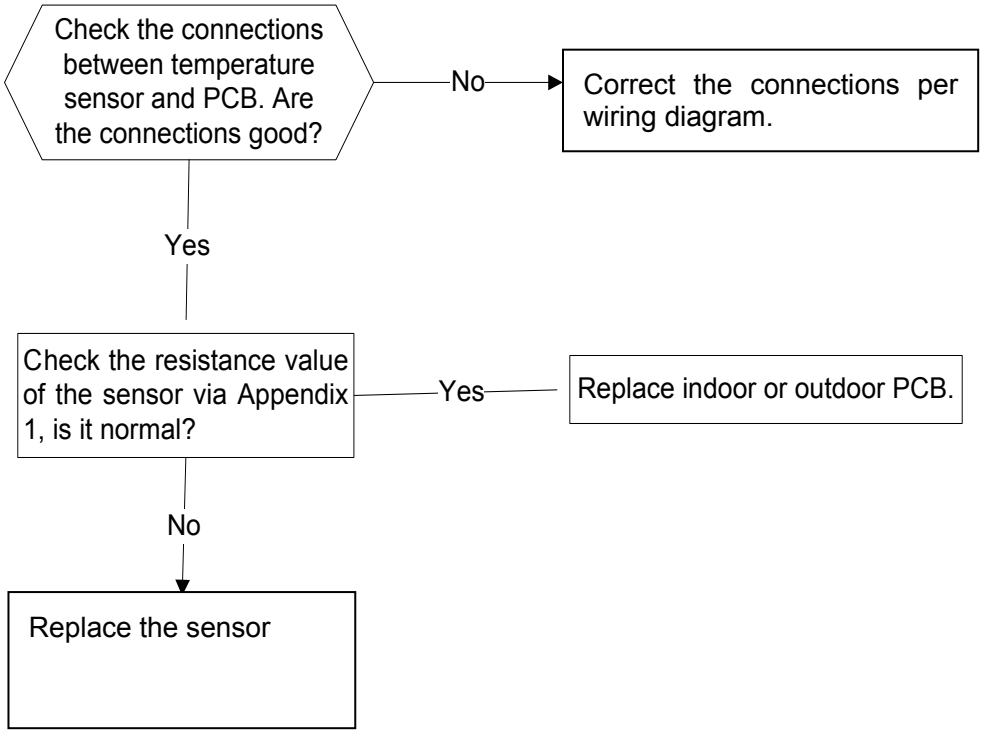


NO.	Color	Signal	Voltage
1	Red	VDC	310V
2	---	---	---
3	White	Vcc	15V
4	Blue	FG	0.3V
5	Yellow	Vsp	0-7.5V
6	Black	GND	0V

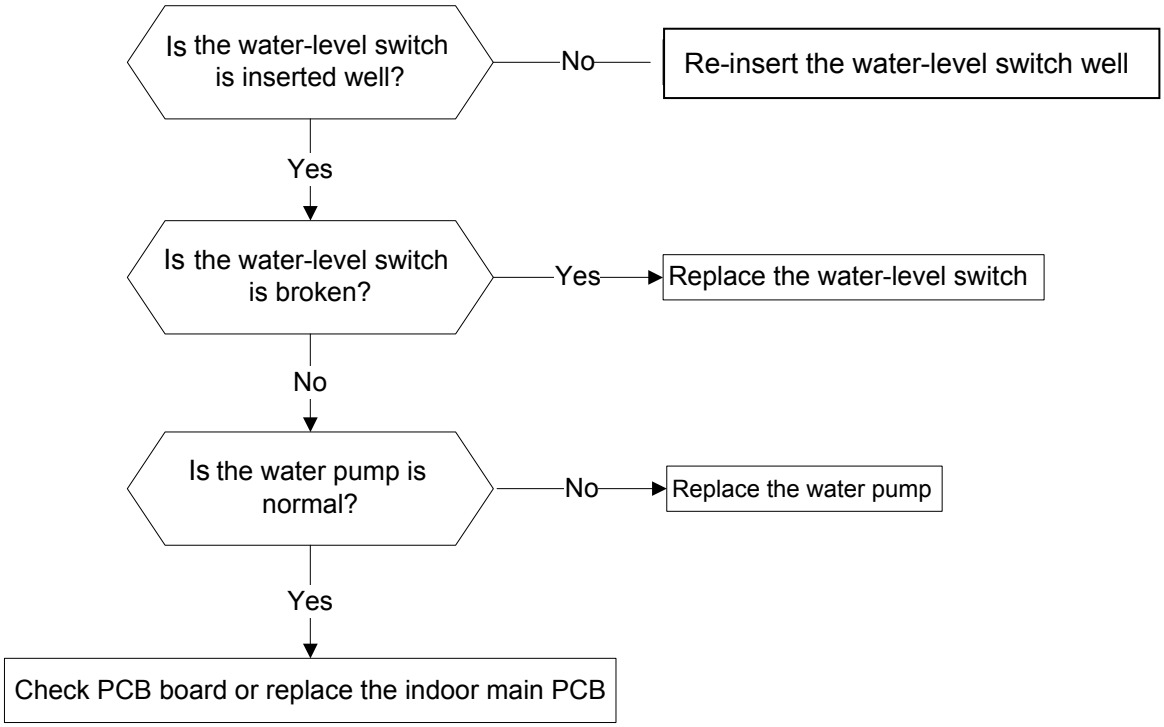
9.3.1.5 Indoor fan speed has been out of control(AC fan motor)



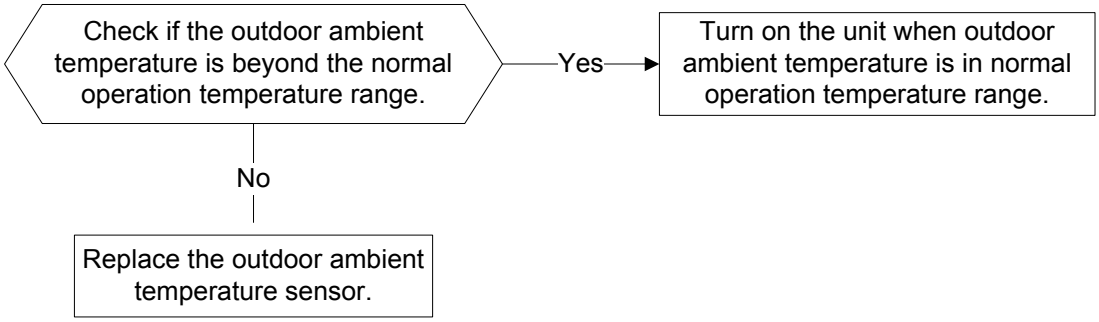
9.3.1.6 Open or short circuit of temperature sensor.



9.3.1.7 Full-water malfunction (For Ceiling Cassette)

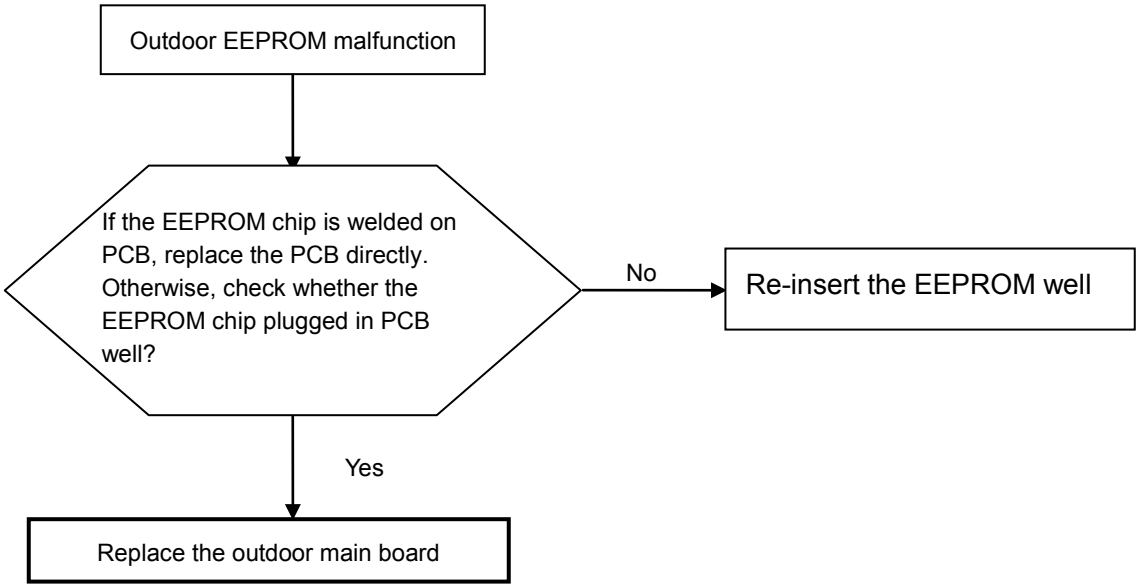


9.3.1.8 Outdoor temp. too low protection(Optional for some models)

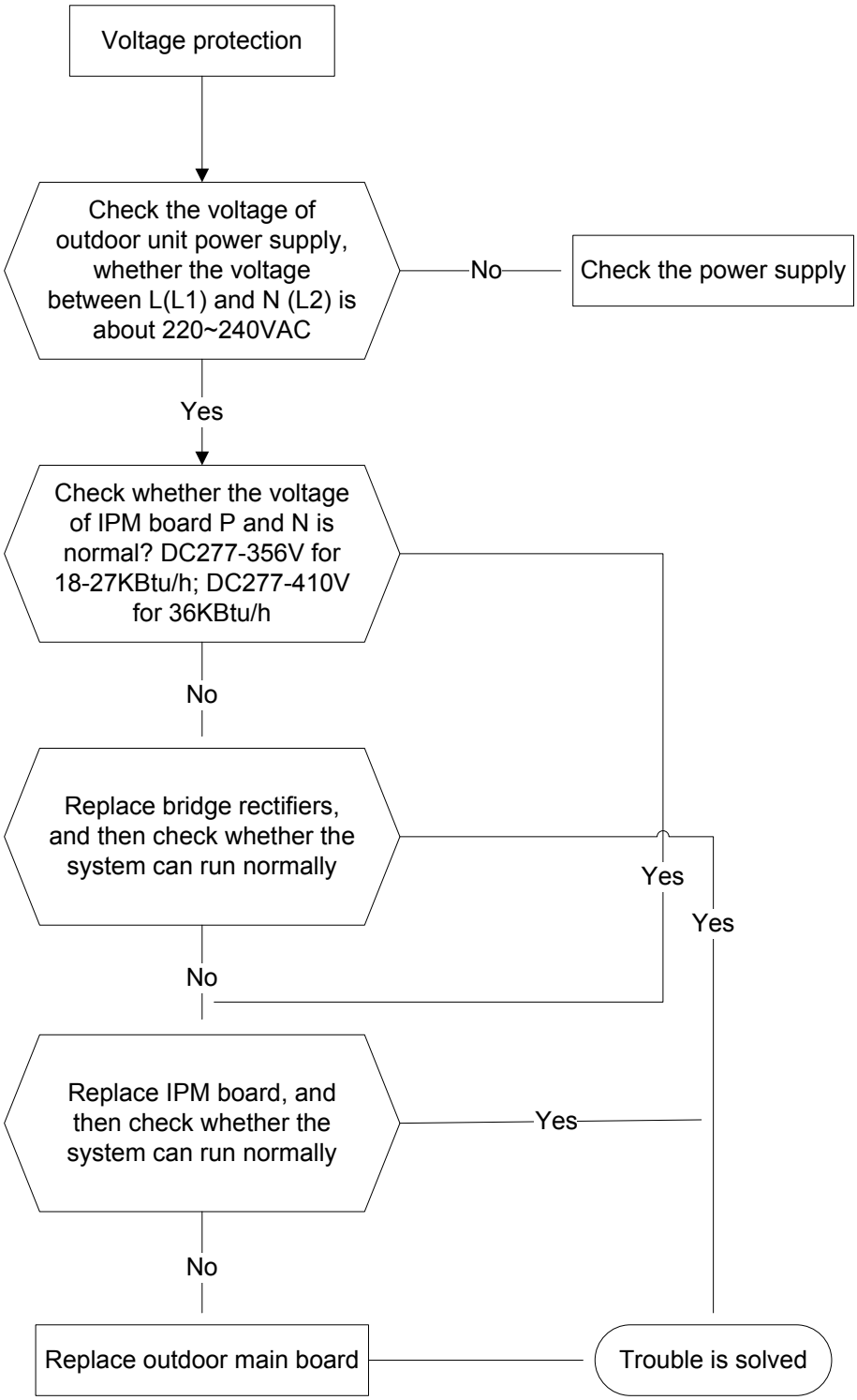


9.3.2 Outdoor unit trouble shooting

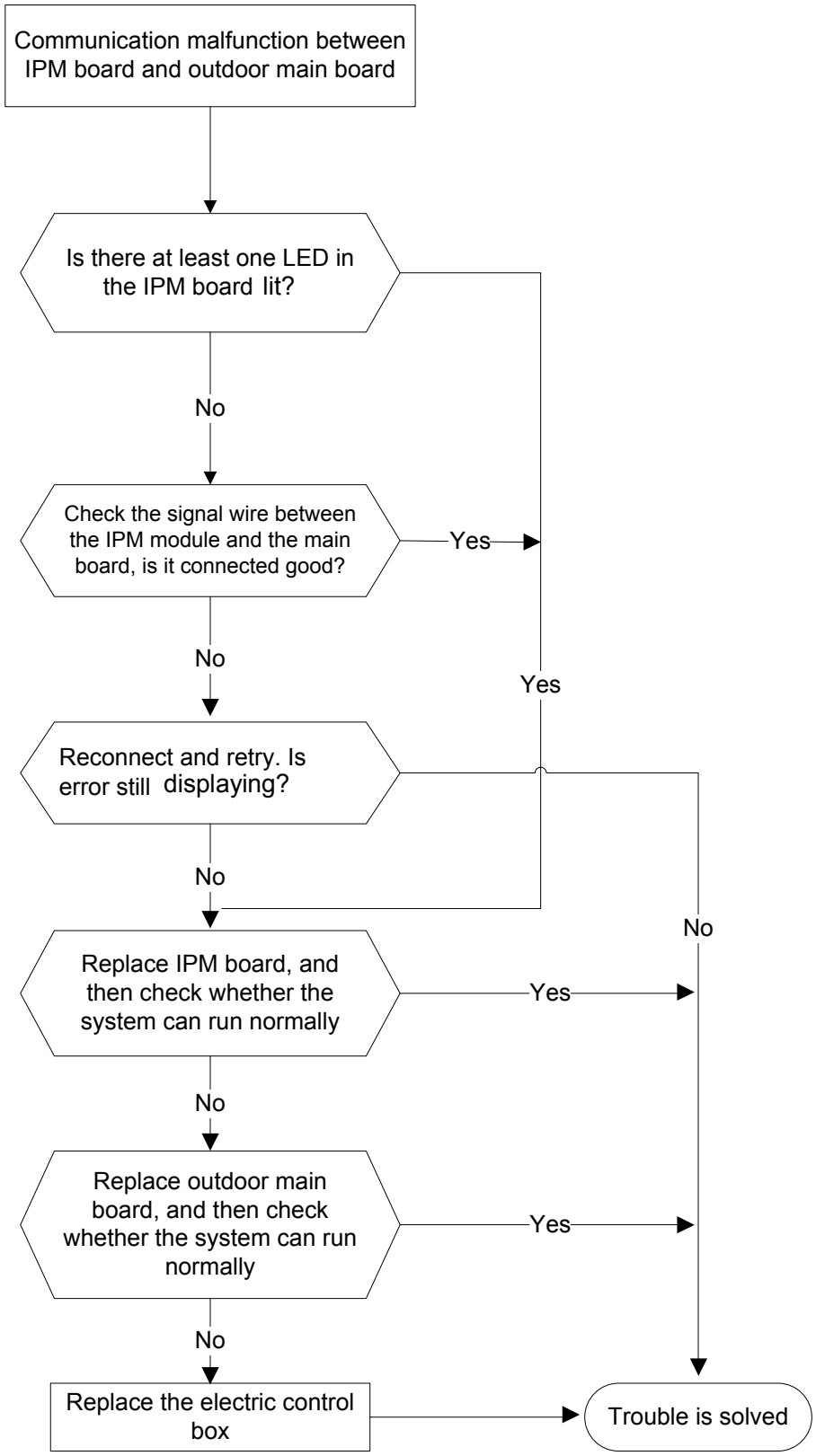
9.3.2 1 Outdoor EEPROM malfunction (ODU E0)



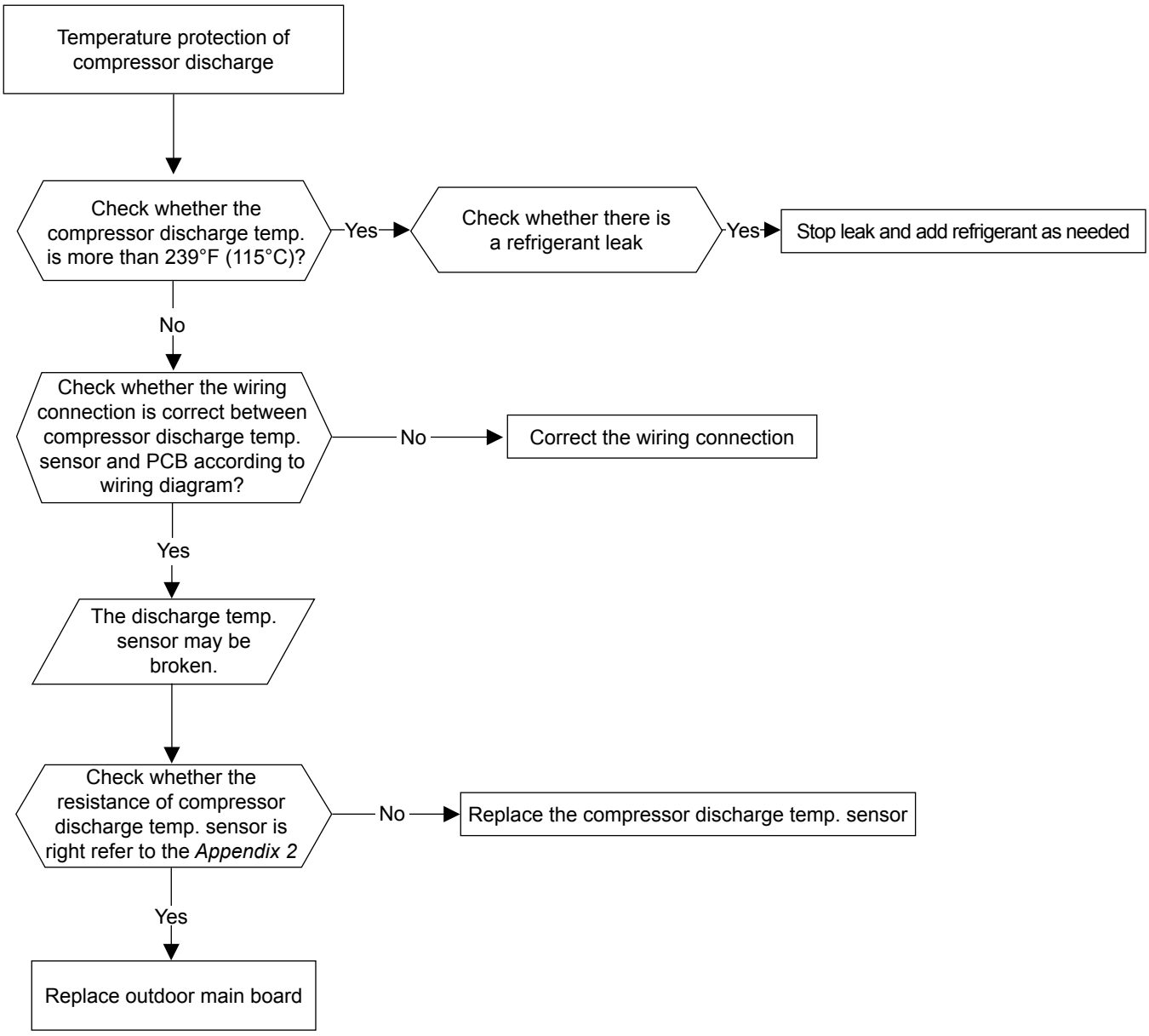
9.3.2.2 Voltage protection (ODU E5)



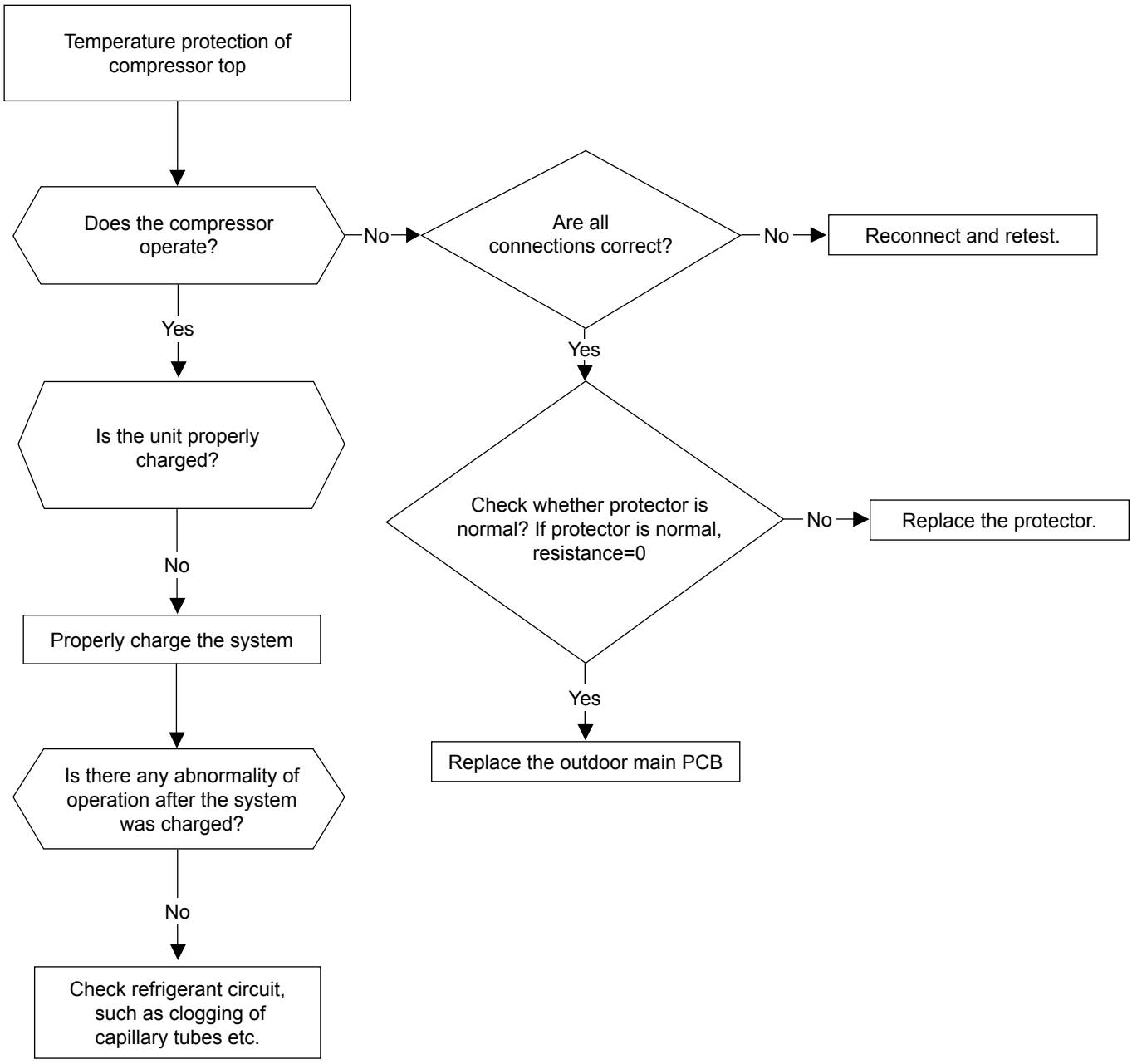
9.3.2.3 Communication malfunction between IPM board and outdoor main board(ODU E7)



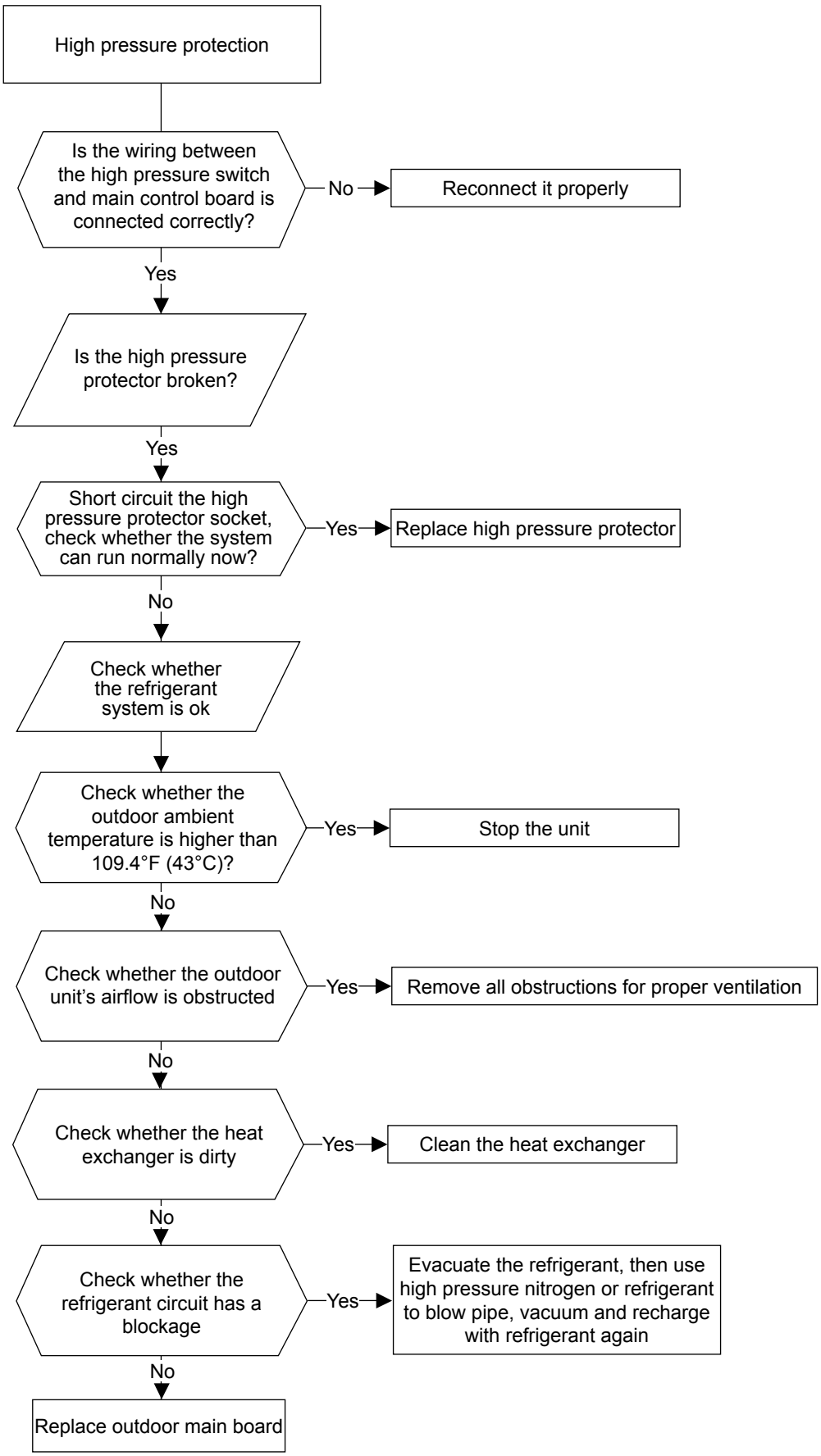
9.3.2.4 Temperature protection of compressor discharge (ODU P0)



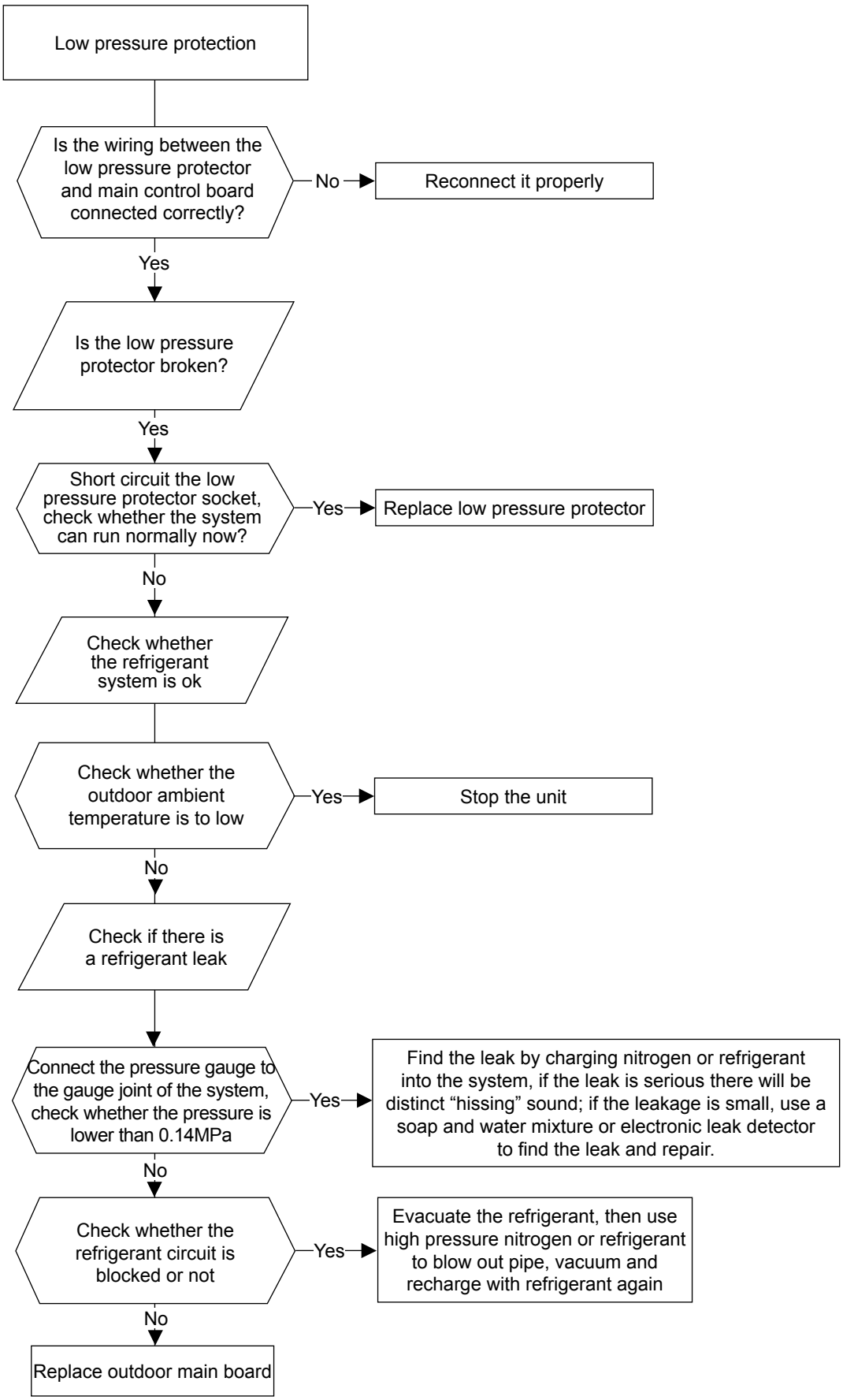
9.3.2.5 Temperature protection of compressor top (ODU P0)



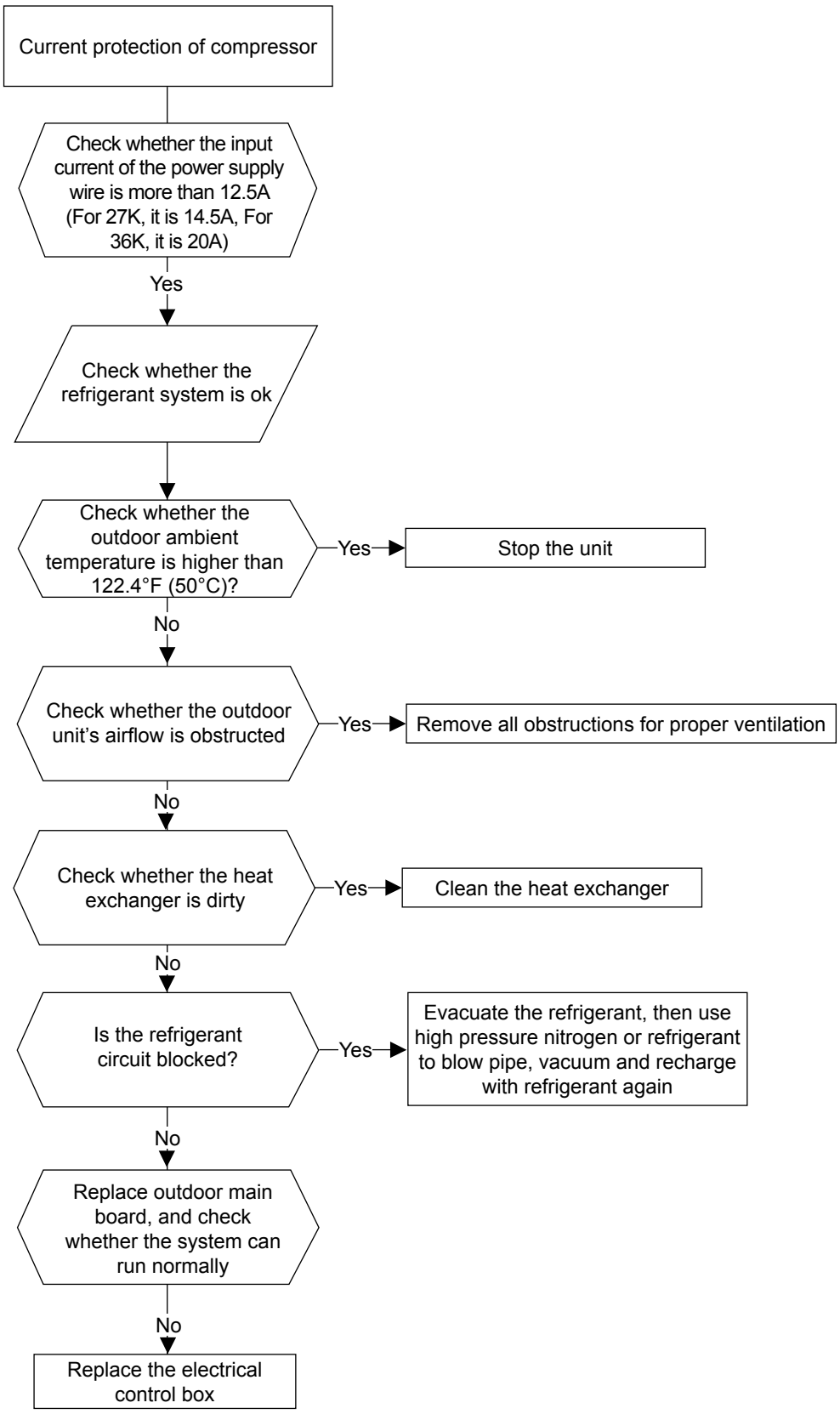
9.3.2.6 High pressure protection (ODU P1) (Only for A-VMH36QC-1)



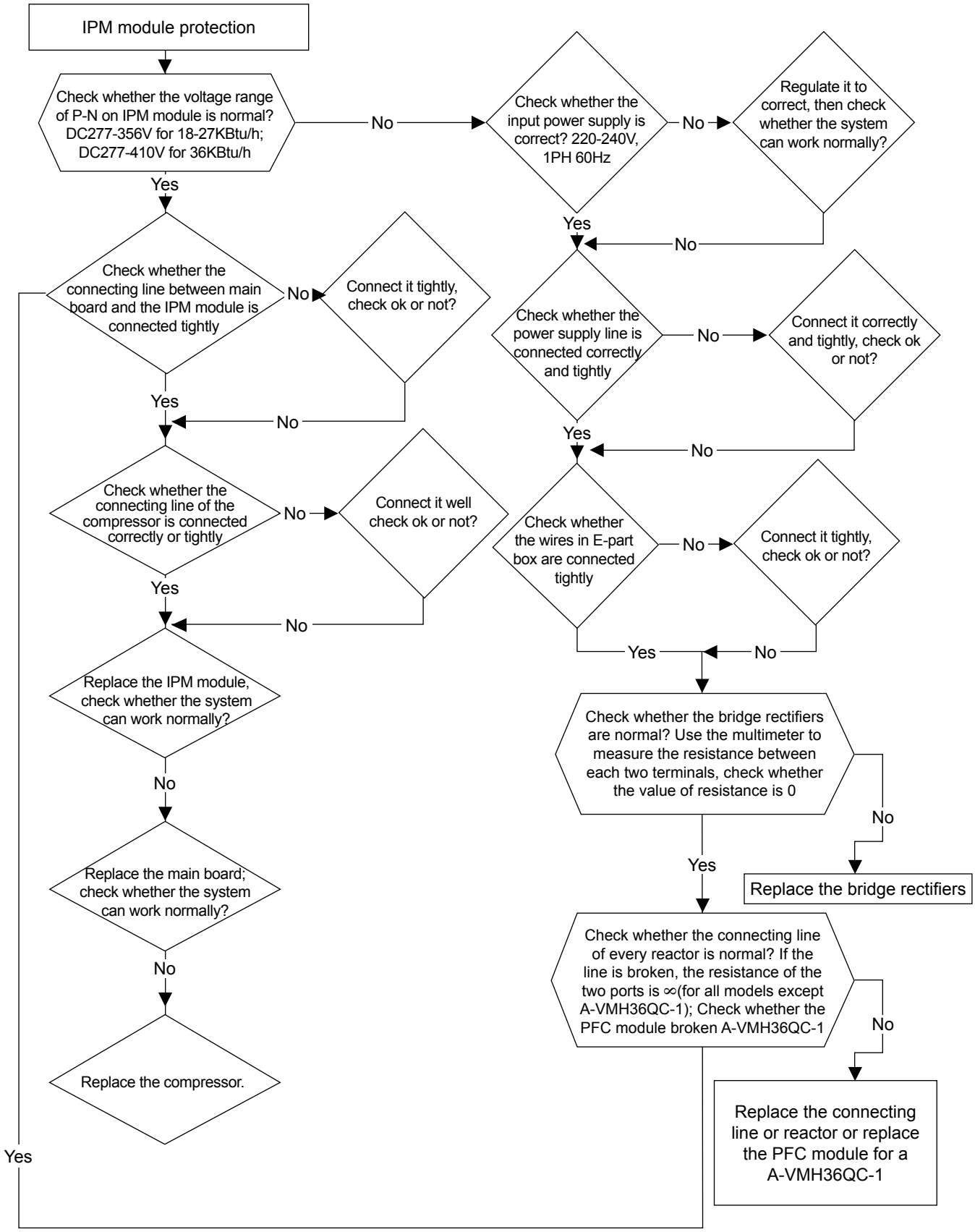
9.3.2.7 Low pressure protection (ODU P2) (Only for A-VMH36QC-1)



9.3.2.8 Current protection of compressor (ODU P3)

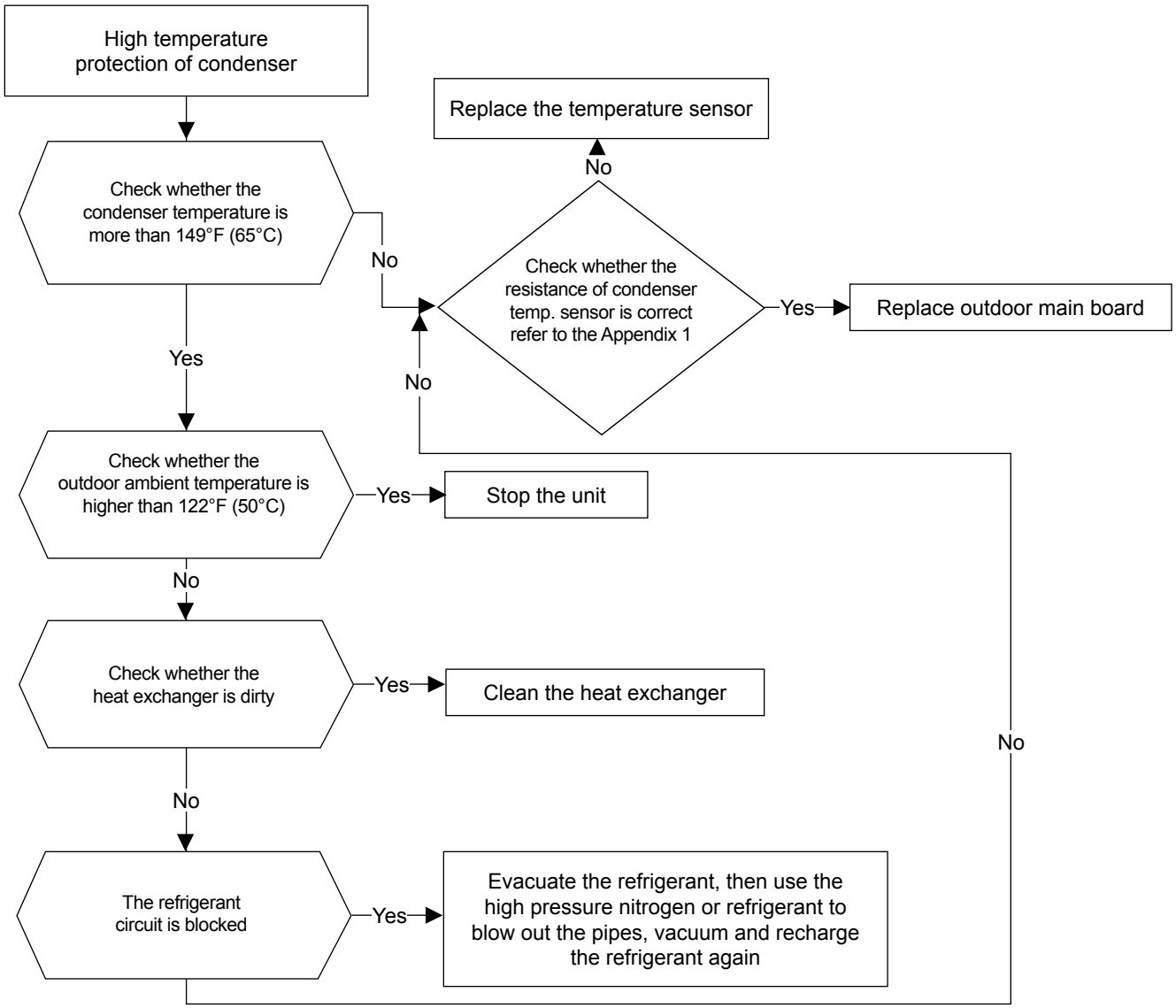


9.3.2.9 IPM module compressor (ODU P4)

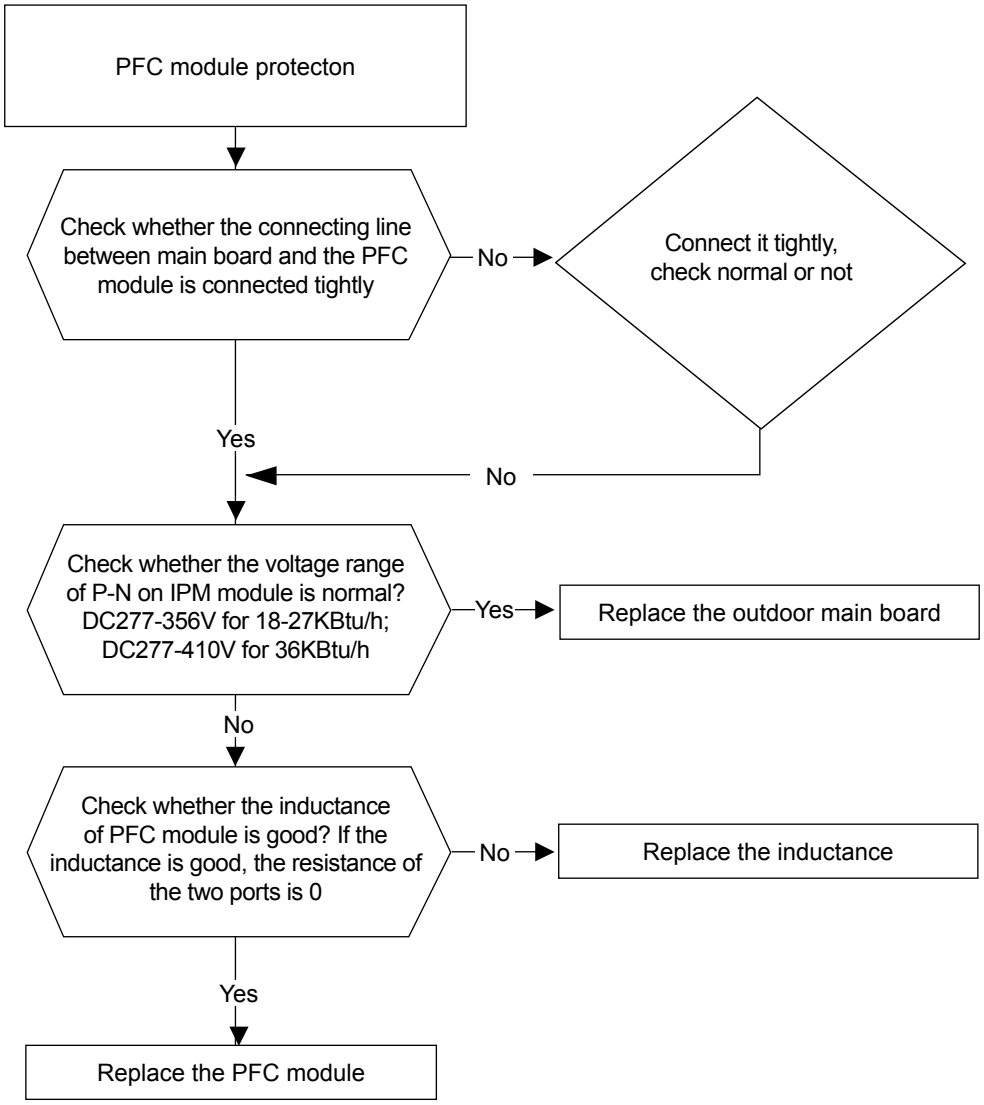


9.3.2.10 High temperature protection of condenser (ODU P6)

When outdoor pipe temp. is mroe than 149°F (65°C), the unit will stop, and will run again when outdoor pipe temp. is less than 126°F (52°C).



9.3.2.11 High PFC module protection (ODU P6) (Only for A-VMH36QC-1)



9.3.2.12 Inverter compressor drive protection (ODU P7)

The trouble shooting is same process as the IPM module protection, trouble shooting. Refer to this section.

Appendix 1 Temperature Sensor Resistance Value Table (℃--K) Use appendix 4 to convert °C to °F.

℃	K Ohm	℃	K Ohm	℃	K Ohm	℃	K Ohm
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5000	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.2190	25	10.000	65	1.96532	105	0.54448
-14	79.3110	26	9.55074	66	1.89627	106	0.52912
-13	74.5360	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.48600
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44.0000	36	6.13059	76	1.34105	116	0.40060
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.21330	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.57050	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.32390
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.87950	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.27770
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.9180	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Appendix 2

Unit: ℃ ---K			Discharge temp. sensor table				
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294	B(25/50)=3950K	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045	R(90℃)=5KΩ±3%	
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		

Appendix 3

1. Reference voltage data:

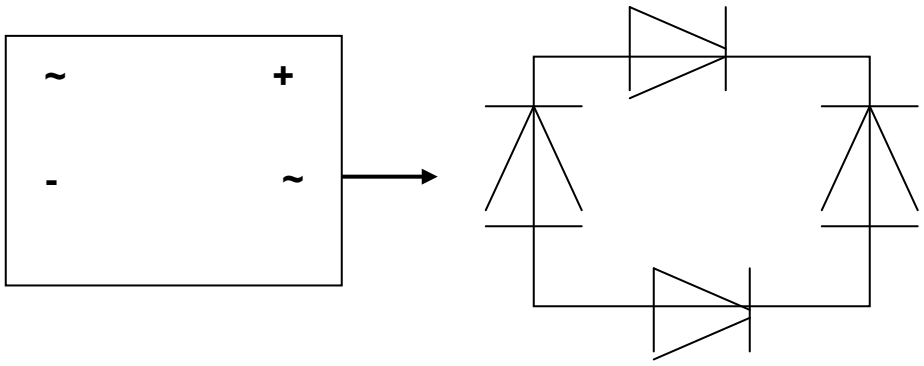
a) Rectifier : Input :220-230V(AC), output :310V(DC)

b) Inverter module: U,V, W 3ph.

	Result
U-V	60-150V(AC)
U-W	60-150V(AC)
V-W	60-150V(AC)
P-N	DC 310V

2. Check the Diode Bridge component (In wiring diagram, rectifier)

Remark: If this part is abnormal, the LED will not light.



Multi-meter		Result	
		Forward Resistance	Backward Resistance
+	−	Infinite	Infinite
~	+	~1.7M ohm	Infinite
~			
-	~	~1.7M ohm	Infinite
	~		

Appendix 4:

CELCIUS TO FAHRENHEIT CONVERSION CHART

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-30	-22	-3	26.6	24	75.2	51	123.8	78	172.4
-29	-20.2	-2	28.4	25	77	52	125.6	79	174.2
-28	-18.4	-1	30.2	26	78.8	53	127.4	80	176
-27	-16.6	0	32	27	80.6	54	129.2	81	177.8
-26	-14.8	1	33.8	28	82.4	55	131	82	179.6
-25	-13	2	35.6	29	84.2	56	132.8	83	181.4
-24	-11.2	3	37.4	30	86	57	134.6	84	183.2
-23	-9.4	4	39.2	31	87.8	58	136.4	85	185
-22	-7.6	5	41	32	89.6	59	138.2	86	186.8
-21	-5.8	6	42.8	33	91.4	60	140	87	188.6
-20	-4	7	44.6	34	93.2	61	141.8	88	190.4
-19	-2.2	8	46.4	35	95	62	143.6	89	192.2
-18	-0.4	9	48.2	36	96.8	63	145.4	90	194
-17	1.4	10	50	37	98.6	64	147.2	91	195.8
-16	3.2	11	51.8	38	100.4	65	149	92	197.6
-15	5	12	53.6	39	102.2	66	150.8	93	199.4
-14	6.8	13	55.4	40	104	67	152.6	94	201.2
-13	8.6	14	57.2	41	105.8	68	154.4	95	203
-12	10.4	15	59	42	107.6	69	156.2	96	204.8
-11	12.2	16	60.8	43	109.4	70	158	97	206.6
-10	14	17	62.6	44	111.2	71	159.8	98	208.4
-9	15.8	18	64.4	45	113	72	161.6	99	210.2
-8	17.6	19	66.2	46	114.8	73	163.4	100	212
-7	19.4	20	68	47	116.6	74	165.2	101	213.8
-6	21.2	21	69.8	48	118.4	75	167	102	215.6
-5	23	22	71.6	49	120.2	76	168.8	103	217.4
-4	24.8	23	73.4	50	122	77	170.6	104	219.2

Appendix 5:

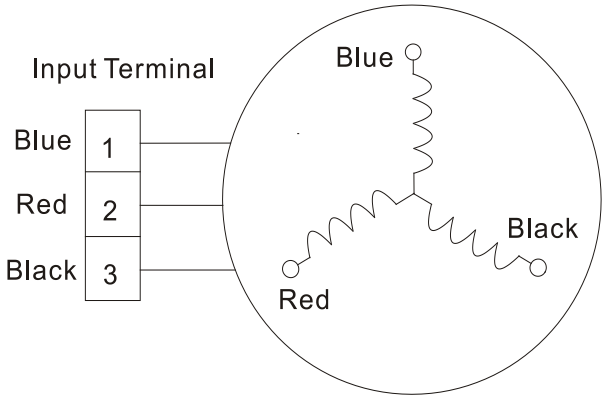
Spec.

	Outdoor unit		
Model	1x2	1x3	1x4
Compressor	DA130S1C-20FZ	DA150S1C-20FZ	TNB306FPGMC-L
Outdoor fan motor	YDK70-6FB	YDK70-6FB	YDK180-8GB

	Indoor unit		
Model	9k Mini-Split	12k Mini-Split	18k Mini-Split
Indoor fan motor	RPG20B	RPG20B	RPG28H
Model	/	12k Cassette	18k Cassette
Indoor fan motor	/	YDK45-6B	YDK45-6B

1. Compressor checking

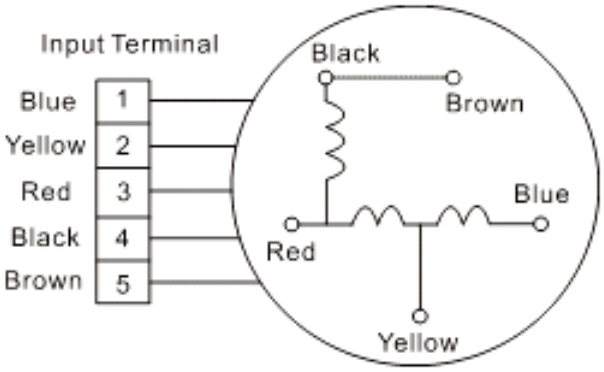
Measure the resistance value of each winding by using the tester.



Position	Resistance Value		
	DA130S1C-20FZ	DA150S1C-20FZ	TNB306FPGMC-L
Blue - Red	0.95Ω(20℃)	0.95Ω(20℃)	0.53Ω(20℃)

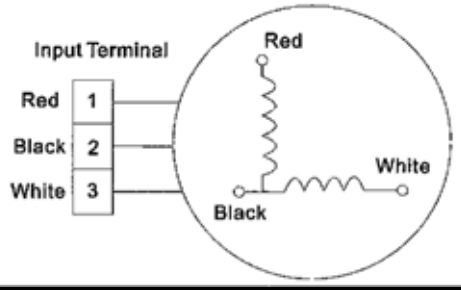
2. Fan Motor.

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



Position	Resistance Value					
	YDK70-6FB	YDK180-8GB	YSK27-4G	YSK68-4B	YDK45-6B	YSK25-6L
Black - Red	56Ω±8% (20˚C)	24.5Ω±8% (20˚C)	317Ω±8% (20˚C)	145Ω±8% (20˚C)	345Ω±8% (20˚C)	627Ω±8% (20˚C)
Red - Yellow	76Ω±8% (20˚C)	19Ω±8% (20˚C)	252Ω±8% (20˚C)	88Ω±8% (20˚C)	150Ω±8% (20˚C)	374.3Ω±8% (20˚C)
Yellow - Blue	76Ω±8% (20˚C)	19Ω±8% (20˚C)	252Ω±8% (20˚C)	88Ω±8% (20˚C)	150Ω±8% (20˚C)	374.3Ω±8% (20˚C)

Measure the resistance value of each winding by using the tester



Position	Resistance Value	
	RPG20B	RPG28H
Black - Red	381Ω±8% (20˚C)	183.6Ω±8% (20˚C)
White - Black	267Ω±8% (20˚C)	206Ω±8% (20˚C)

Design, material, performance data and components
subject to change without notice.

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