KLIMAIRE®

KMR

MULTI OUTDOOR UNITS

SERVICE MANUAL

Multi - Zone

HEAT PUMP UNITS

R-410A DC Inverter

Model Numbers:

KMIR218-H221 / KMIR327-H217 / KMIR436-H217 / KMIR545-H219

Table of Contents

WARNING

- 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.

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Intertek

CONTENTS

1. Indoor Unit Combination

Multi-Zone Outdoor Unit	Nominal capacity	Suggested Combination	Limit
KSIM218-H221 1drives 2	18k Btu	12	None
		9+9	
		9+12	
		12+12	

Multi-Zone Outdoor Unit	Nominal capacity	Suggested Combination	Limit
KSIM327-H217 1drives 3		9+9	Limit
		9+12	
		9+18	
		12+12	
		12+18	
		18+18	
		9+9+9	
		9+9+12	
		9+9+18	
		9+12+12	
		9+12+18	
		12+12+12	

Multi DC Outdoor Unit	Nominal capacity	Suggested Combination	Limit
KSIM436-H217 1 drives 4	36k Btu	9+18	None
		12+12	
		12+18	
		18+18	
		9+9+9	
		9+9+12	
		9+9+18	
		9+12+12	
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		12+12+12	
		12+12+18	
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		9+9+9+9	
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		9+9+9+18	
		9+9+12+12	
		9+9+12+18	
		9+12+12+12	
		12+12+12+12	

Multi DC Outdoor Unit	Nominal capacity	Suggested Combination	Limit
KSIM545-H219 1 drives 5	48k Btu	18+18	None
		18+24	
		24+24	
		9+9+18	
		9+9+24	
		9+12+12	
		9+12+18	
		9+12+24	
		9+18+18	
		9+18+24	
		9+24+24	
		12+12+12	
		12+12+18	
		12+12+24	
		12+18+18	
		12+18+24	
		12+24+24	
		18+18+18	

KSIM545-H219 1 drives 5	48k Btu	18+18+24	
		9+9+9+9	
		9+9+9+12	
		9+9+9+18	
		9+9+9+24	
		9+9+12+12	
		9+9+12+18	
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		9+12+18+18	
		9+18+18+18	
		12+12+12+12	
		12+12+12+18	
		12+12+12+24	

KSIM545-H219 1 drives 5	48k Btu	12+12+18+18	
		9+9+9+9+9	
		9+9+9+9+12	
		9+9+9+9+18	
		9+9+9+9+24	
		9+9+9+12+12	
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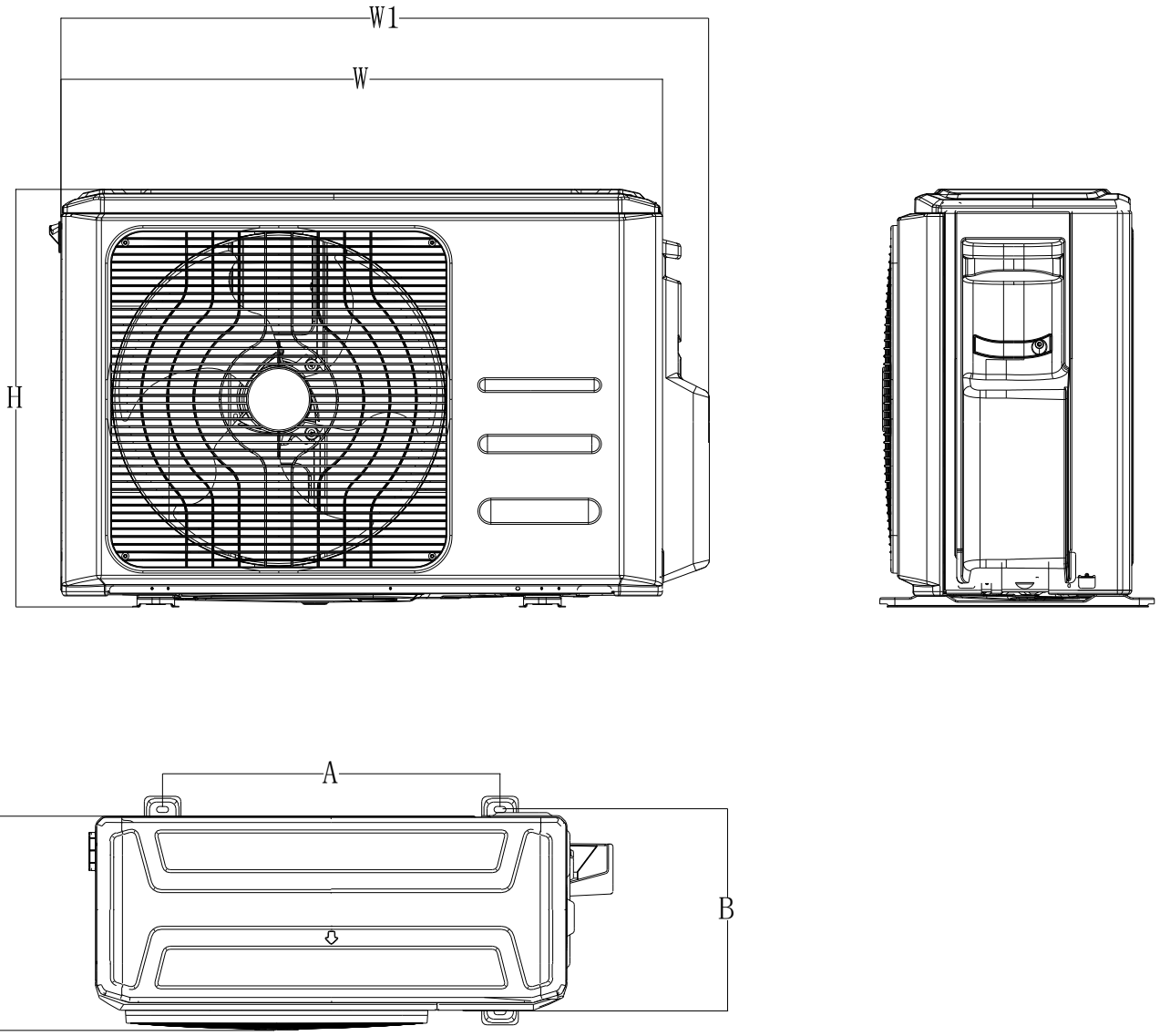
		12+12+12+12+12	

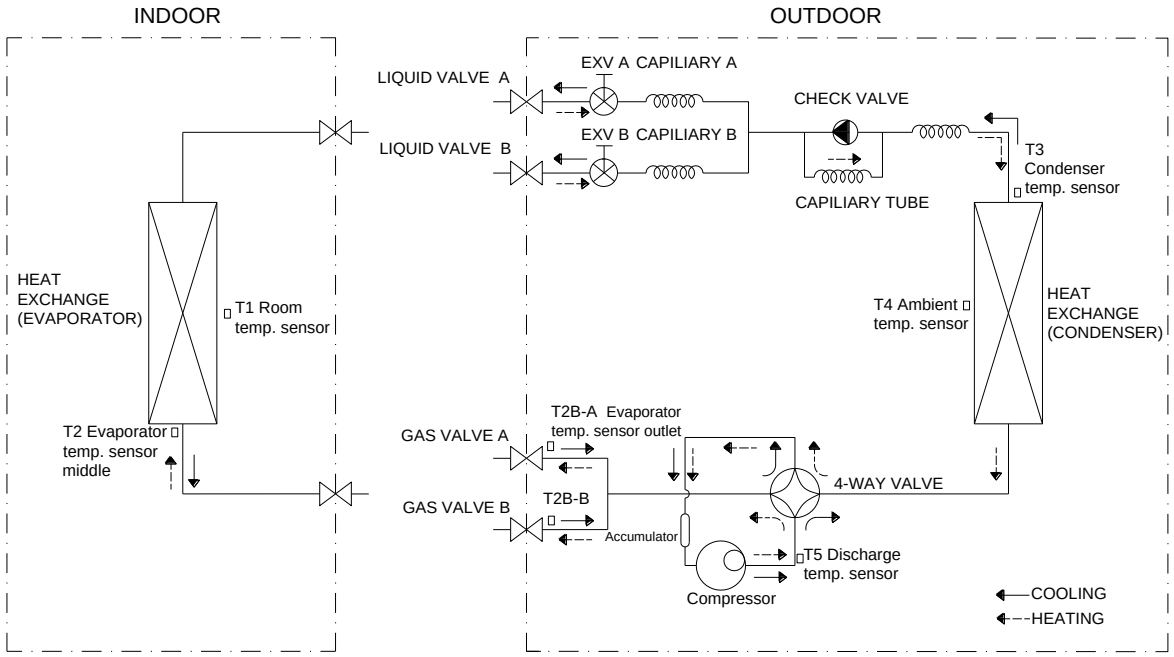
2. Dimension Of Outdoor Unit



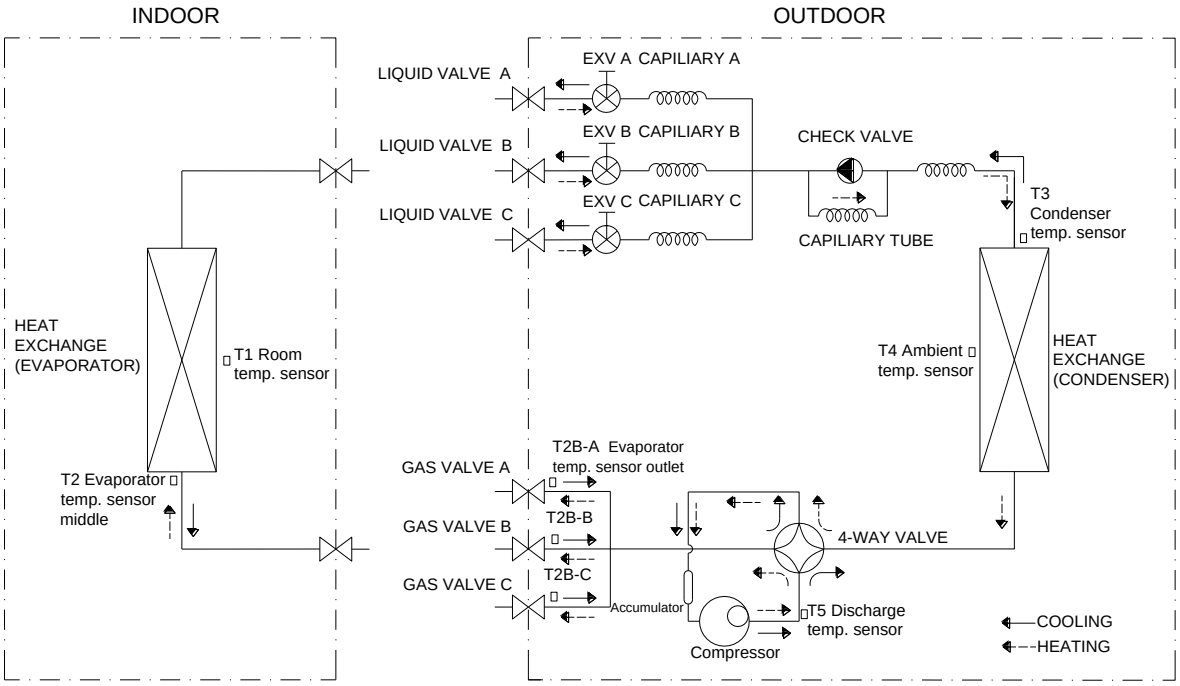
Model	Unit:	W	D	H	W1	A	B
KSIM218-H221	mm	845	363	702	923	540	350
	inch	**33.3**	**14.3**	**27.6**	**36.0**	**21.3**	**13.8**
KSIM327-H217	mm	946	410	810	1034	673	403
	inch	**37.2**	**16.5**	**31.9**	**40.6**	**26.5**	**15.9**
KSIM436-H217	mm	946	410	810	1034	673	403
	inch	**37.2**	**16.5**	**31.9**	**40.6**	**26.5**	**15.9**
KSIM545-H219	mm	952	415	1333	1045	634	404
	inch	**37.5**	**16.3**	**52.5**	**41.1**	**25.0**	**15.9**

3. Refrigerant Cycle Diagram

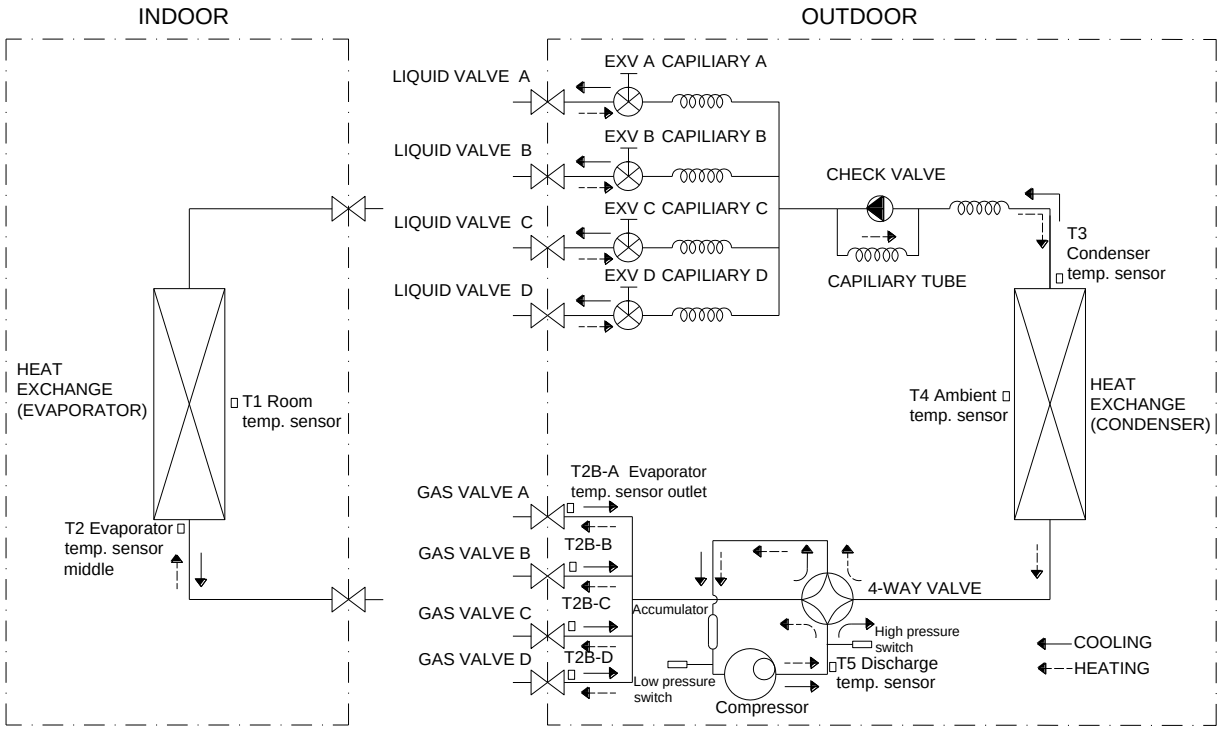
4.1 Refrigeration circuit drawing of inverter 1 drives 2 type



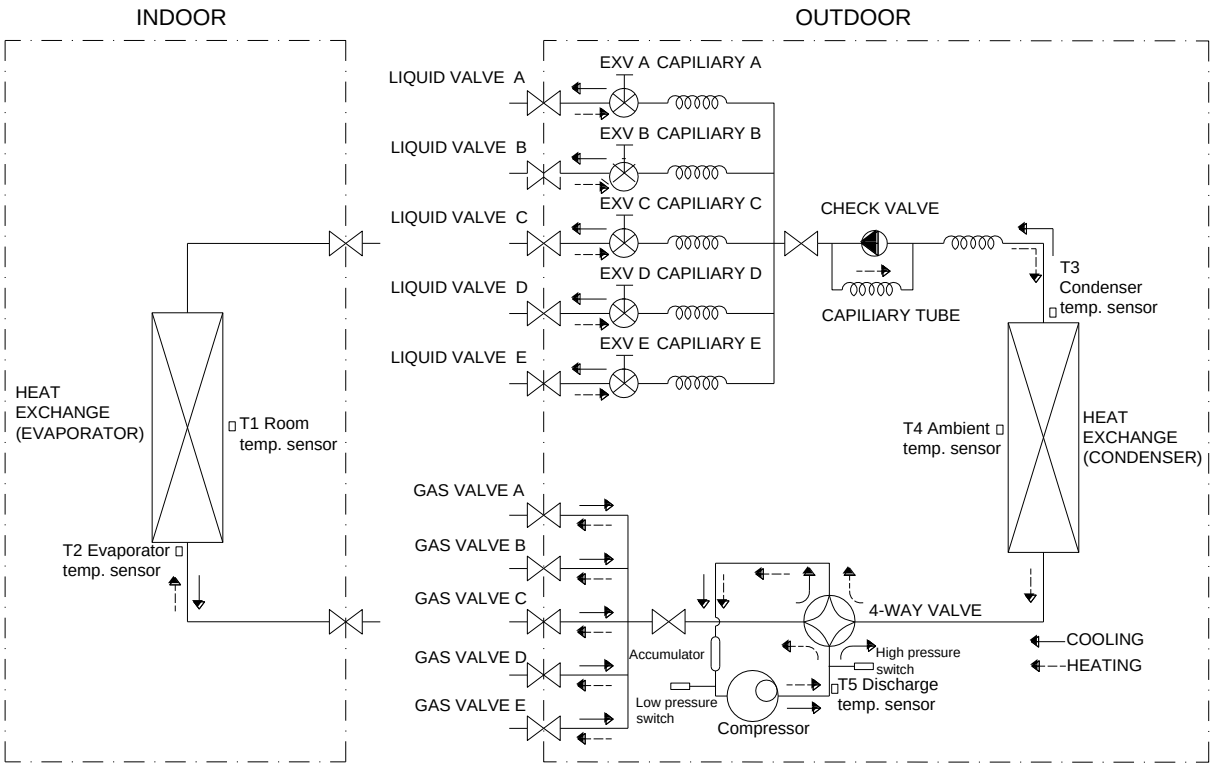
4.2 Refrigeration circuit drawing of inverter 1 drives 3 type



4.3 Refrigeration circuit drawing of inverter 1 drives 4 type



4.4 Refrigeration circuit drawing of inverter 1 drives 5 type



4. Installation Details

5.1 Wrench torque sheet for installation

Outside diameter		Torque	Additional tightening torque
mm	inch	N.cm	N.cm
Φ6.35	1/4	1500(153kgf.cm)	1600(163kgf.cm)
Φ9.52	3/8	2500(255kgf.cm)	2600(265kgf.cm)
Φ12.7	1/2	3500(357kgf.cm)	3600(367kgf.cm)

5.2 Connecting the cables

The power cord connection should be selected according to the following specifications sheet.

Unit	AWG
1 drive 2 type (18K outdoor unit)	14
1 drive 3 type (27K outdoor unit).	14
1 drive 4 type (36K outdoor unit)	12
1 drive 5 type (48K outdoor unit)	10

For indoor unit and outdoor unit connection line, 16AWG is ok for all.

5.3 Pipe length and the elevation

Maximum piping length and height difference

		1 drive 2	1 drive 3	1 drive 4	1 drive 5
Max. length for all rooms (m)		30 (98ft)	45 (150ft)	60 (200ft)	75 (246ft)
Max. length for one IU (m)		20 (65.6ft)	25 (82ft)	30 (98ft)	30 (98ft)
Max. height difference between IU and OU (m)	OU higher than IU	10 (33ft)	10 (33ft)	10 (33ft)	10 (33ft)
	OU lower than IU	15 (49.2ft)	15 (49.2ft)	15 (49.2ft)	15 (49.2ft)
Max. height difference between IUs (m)		10 (33ft)	10 (33ft)	10 (33ft)	10 (33ft)

Additional refrigerant charge

		1 drive 2	1 drive 3	1 drive 4	1 drive 5
Chargeless pipe length (m)		15 (49.2ft)	22.5 (73.8ft)	30 (98.4ft)	37.5 (123ft)
Additional refrigerant charge	g	15 x (length for all rooms - 15)	15 x (length for all rooms – 22.5)	15 x (length for all rooms - 30)	15 x (length for all rooms – 37.5)
	oz	0.161 x(length for all rooms – 49.2)	(0.161 x(length for all rooms – 73.8)	0.161x(length for all rooms – 98.4)	.0.161x(length for all rooms –123)

Caution:

- Refrigerant pipe diameter is different according to indoor unit to be connected. When using the extension pipe, refer to the tables below.
- When refrigerant pipe diameter is different from that of the outdoor unit connector (18K indoor unit) an additional adapter is required.

Indoor unit			Extension pipe diameter (mm/inch)	
Model	Pipe diameter (mm/inch)			
9K	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	9.52(3/8)	Gas	9.52(3/8)
12K 18K	Liquid	6.35(1/4)	Liquid	6.35(1/4)
	Gas	12.7(1/2)	Gas	12.7(1/2)
24K	Liquid	9.52 (3/8)	Liquid	9.52 (3/8)
	Gas	15.9(5/8)	Gas	15.9(5/8)
Outdoor unit union diameter (mm/inch)				
1 drive 2			Liquid	6.35(1/4) *2
			Gas	9.52(3/8) *2
1 drive 3			Liquid	6.35(1/4) *3
			Gas	9.52(3/8) *3
1 drive 4			Liquid	6.35(1/4) *4
			Gas	9.52(3/8) *4
1 drive 5			Liquid	6.35(1/4) *5
			Gas	9.52(3/8) *3
				12.7(1/2)*2

5.4 Installation for the first time

Air and moisture in the refrigerant system have undesirable effects as 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 when mixed with the refrigerant and oil

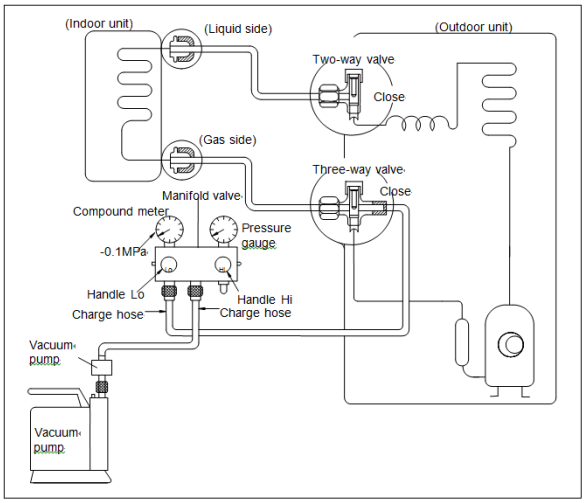
will create an acid that will damage the motor windings and components.

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):

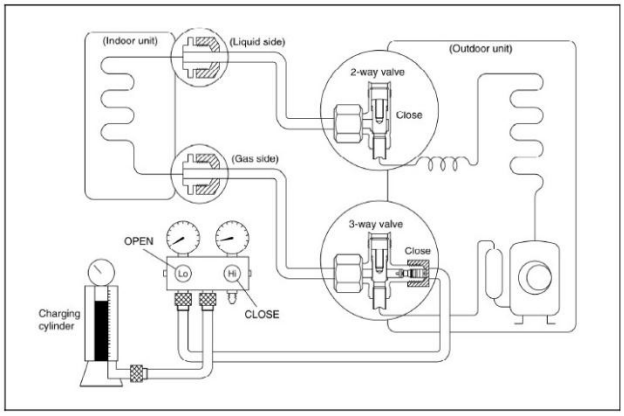
Apply soap water or a liquid neutral detergent on the indoor unit connections or outdoor unit connections with a soft brush to check for leakage of the connecting points of the piping. If bubbles come out, the pipes have leakage.

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 front seated.
2. Connect the low pressure gauge to the 3 way service valve access port.
3. Connect the middle hose of the gauge manifold (usually yellow) to the vacuum pump.
4. Fully open the handle for the low pressure gauge.
5. Start the vacuum pump and operate according to manufacture spec's.
6. Perform an evacuation for a minimum of 30 minutes and check that the low pressure (compound) gauge indicates a vacuum of 29.9 in/hg (500 microns). A vacuum gauge should be used if available. If the proper vacuum cannot be achieved the vacuum pump should be run for an additional 20 minutes. If after the additional 20 minutes the vacuum still cannot be achieved there is a leak in the system and must be located and repaired. Follow the leak checking procedure as mentioned before. If the vacuum is achieved, close the low pressure gauge handle off and shut the vacuum pump off. Recheck the reading after 10 minutes, the vacuum may change slightly, this is normal.
7. The system is now dry and free of contaminates, refrigerant pressure should now be added to the system from a source other than the system before opening the 2 way and 3 way valves for system operation.
8. The 2 way and 3 way valve can now be opened for the system operation.

2. Air purging by refrigerant

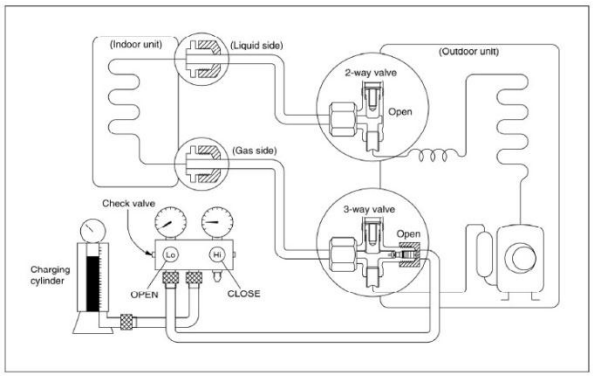


Procedure:

1) Confirm that both the 2-way and 3-way valves are set to the closed position.
2) With a container of refrigerant and a gauge manifold set, connect the low pressure gauge hose to the 3 way valve service port.
3) Air purging.
Open the valve on the refrigerant container and the low pressure gauge to allow the refrigerant to enter the system, next loosen the flare connection on the 2 way valve line to purge the air and contaminants from the system for 30 to 50 seconds, then retighten the connection.
4) Check the gas leakage.
Next allow the pressure from the refrigerant to reach 100 psi and then close the low pressure gauge and the refrigerant container and check the 2 way and 3 way valve line connections for leaks with liquid soap or electronic leak detector.
5) Discharge the refrigerant.
After the system has been check for leaks the pressure should be adjusted to about 25 to 50 psi.
6) You can now disconnect the gauge manifold and refrigerant container from the system and open the 2 way and 3 way valves for system operation.

7). Mount the valve stems nuts and the service port cap.
Be sure to use a torque wrench to tighten the service port cap to a torque 18N·m (13.27 ft·lbs).
Always leak check after servicing the refrigerant system.

3. Adding refrigerant if the pipe length exceeds chargeless pipe length

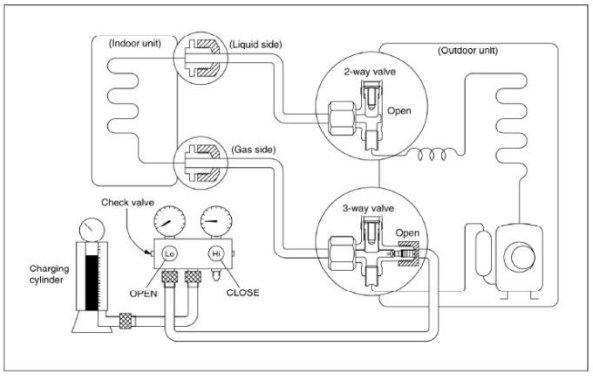


Procedure:

1) Connect the low pressure gauge from the gauge manifold set to the 3 way service valve (this is the blue hose on most sets).
2) Connect the middle hose from the manifold set to the refrigerant container (this is the yellow line on most sets). With refrigerant 410A the container must be inverted (upside down) when adding the refrigerant. Note that the 2 way and 3 way valves must be in the open position.
3) The air in the gauge hoses needs to be purged out. use the pressure from the system to purge the low side line, loosen the connection on the manifold for a second, next open the to valve on the refrigerant container to pressurize the line, now loosen that hose at the manifold for a second and purge that line.
4) Set the refrigerant container on an electronic charging scale and record the weight or zero the scale depending on the scale used. Next determine the refrigerant charge to be added.

5) Start the unit in the cooling mode and lower the set point so the unit won't shut off during the charging procedure.
6) Refrigerant can now be added to the system, open the low pressure valve on the gauge manifold set to start charging the unit with liquid refrigerant, keep track of the refrigerant being added to the system (do not overcharge the system).
7) Once the correct charge has been added to the system close the low pressure valve on the gauge manifold set and record the operating pressure. The system is now charged and the unit can be shut off. Close the valve on the refrigerant container and disconnect the hose from the manifold set, also disconnect the hose from the 3 way valve and replace and torque all caps.
Be sure to use a torque wrench to tighten the service port cap to a torque 18N·m (13.27 ft·lbs).
Always leak check after servicing the refrigerant system.

5.5 Adding the refrigerant after running the system for many years



Procedure

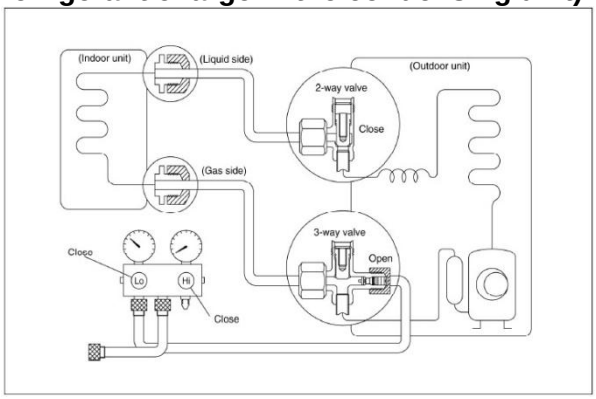
1) Connect the low pressure gauge from the gauge manifold set to the 3 way service valve (this is the blue hose on most sets).
2) Connect the middle hose from the manifold set to the refrigerant container (this is the yellow line on most sets). With refrigerant 410A the container must be inverted (upside down) when adding the refrigerant. Note that the 2 way and 3 way valves must be in the open position.
3) The air in the gauge hoses needs to be purged out. use the pressure from the system to purge the low side line, loosen the connection on the manifold for a second, next open the to valve on the refrigerant container to pressurize the line, now loosen that hose at the manifold for a second and purge that line.
4) Set the refrigerant container on an electronic charging scale and record the weight or zero the scale depending on the scale used. Next determine the refrigerant charge to be added.

5) Start the unit in the cooling mode and lower the set point so the unit won't shut off during the charging procedure.
6) Refrigerant can now be added to the system, open the low pressure valve on the gauge

manifold set to start charging the unit with liquid refrigerant, keep track of the refrigerant being added to the system (do not overcharge the system).
7) Once the correct charge has been added to the system close the low pressure valve on the gauge manifold set and record the operating pressure. The system is now charged and the unit can be shut off. Close the valve on the refrigerant container and disconnect the hose from the manifold set, also disconnect the hose from the 3 way valve and replace and torque all caps.
Be sure to use a torque wrench to tighten the service port cap to a torque 18N·m (13.27 ft·lbs).
Always leak check after servicing the refrigerant system.

5.6 Procedure when servicing the indoor unit refrigeration circuit.

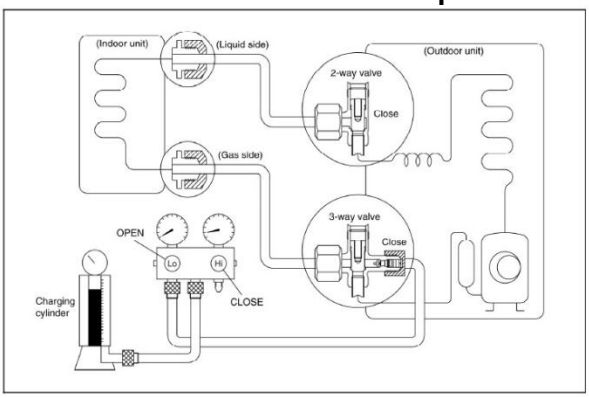
1. Pumping down the system (isolating the refrigerant charge in the condensing unit)



Procedure

1) With the unit in the cooling mode and a low set point remove all caps from the 3 way and 2 way valves, next attach the low pressure gauge to the 3 way service valve port and purge the air from that hose by loosening the hose at the manifold for a second, be sure the low pressure gauge valve is closed. **Be sure to record the operating pressure**, you will need to know this when you complete the service on the indoor unit and restart the system. Now prepare to close both valves on the unit starting with the 2 way valve (this is called front seating the valve) also prepare to shut the power off to the outdoor unit.
2) Now close the 2 way valve and monitor the low pressure gauge. The pressure will start to drop.
3) Operate the unit in the cooling mode and disconnect the power to the outdoor unit when the low side gauge reads a slight vacuum, running the compressor in a vacuum could damage the motor windings. Note that units with extended lines and additional refrigerant charge may not be able to achieve a vacuum. This is because the outdoor unit can only store a certain amount of refrigerant, this is normal (the amperage of the compressor will have to be monitored in this case). Stop compressor when the amperage approaches the name plate FLA rating.
4) Now close the 3 way valve right away. The pressure will rise during this time, this is normal.
There will be some pressure left in the system. This is normal. The indoor unit is now ready to be serviced.

2. Sweeping (air purging) the system with refrigerant after the service to the refrigerant circuit of the indoor unit is complete.

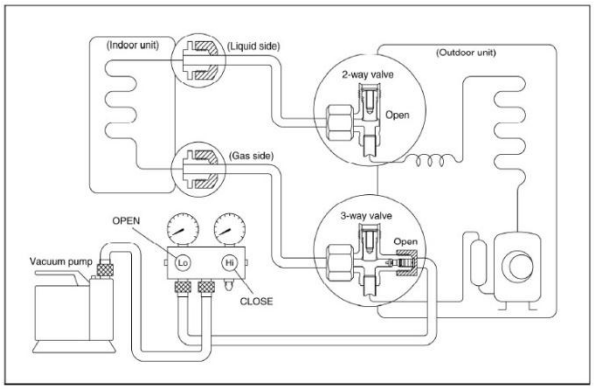


Procedure:

1) Sweeping the system can be used when the unit has been pumped down, this eliminates the need to loosen the flare connection on the 2 way valve (loosening and retightening flare connections could cause a refrigerant leak)
2) Sweeping the system with refrigerant from a pump down condition (refrigerant has been isolated in the outdoor unit)
3) Open the 2 way valve all the way then the 3 way valve all the way and check for leaks.
4) Start the unit in the cooling mode and check the pressure (remember the pressure you recorded?) The unit is going to be low on refrigerant from the sweeping process, add refrigerant as needed from the refrigerant container in the liquid state to achieve the operating pressure that you recorded. The process is now complete.

5.7 Evacuation after servicing the outdoor unit refrigeration circuit

1. Evacuation of the complete refrigeration circuit, Indoor and outdoor unit.

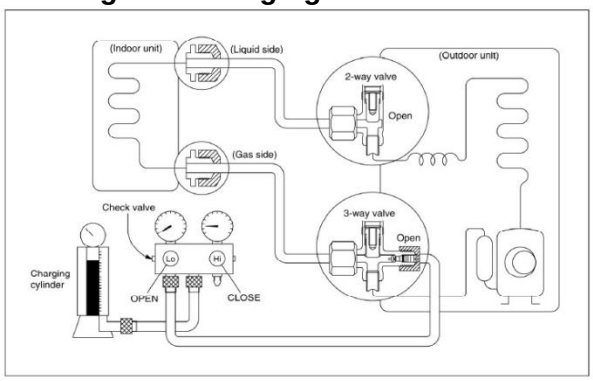


Procedure:

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 one hour. Confirm that the compound meter indicates -0.1Mpa (500 Microns / 29.9 in,hg).
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.

2. Refrigerant charging



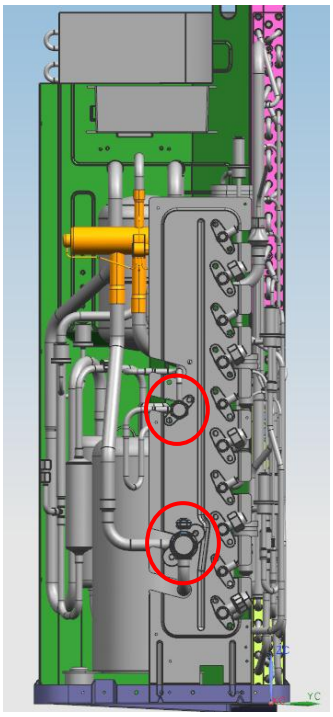
Procedure:

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 charge with the specified amount of refrigerant, or can be charged with a little at a time (approximately 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 18N·m (13.27 ft·lbs). Always leak check after servicing the refrigerant system.

For KMIR327-H217 / KMIR436-H217 / KMIR545-H219
There are one low-pressure centralized valve and one high-pressure centralized valve, it will be more time saving when vacuum and recycle refrigerant. But refer to the previous instruction when vacuum and recycle refrigerant.



6. Electronic Function

6.1 Abbreviation

T1: Indoor ambient temperature

T2: Coil temperature of indoor heat exchanger middle.

T2B: Coil temperature of indoor heat exchanger outlet. (This sensor is located in the outdoor unit)

T3: Pipe temperature of outdoor heat exchanger

T4: Outdoor ambient temperature

T5: Compressor discharge temperature

6.2 Electric control working environment.

6.2.1 Input voltage: 230V.

6.2.2 Input power frequency: 60Hz.

6.2.3 Indoor fan normal working amp. is less than 1A.

6.2.4 Outdoor fan. Normal working amp. is less than 1.5A.

6.2.5 Four-way valve normal working amp. is less than 1A.

6.3 Main Protection

6.3.1 Three Minutes Delay at restart for compressor.

---- 1min delay for the 1st time start-up and 3 minutes delay for others.

6.3.2 Temperature protection of compressor discharge.

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

----If 221 ºF(105 ºC)≦T5<230 ºF (110ºC), keep the current frequency.

----If the temperature increase and T5≧230 ºF (110 ºC), decrease the frequency to the lower level every 2 minutes till to F1.

---If T5≧239 ºF (115ºC) for 10 seconds, the compressor will stop and restart till T5<194ºF (90ºC).

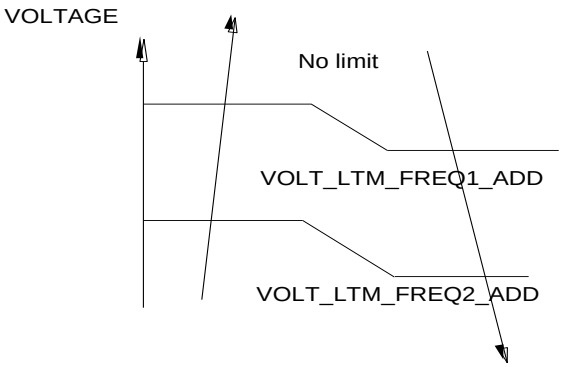
6.3.3 Fan Speed is out of control.

---- When outdoor fan speed is lower than 100RPM or higher than 2400RPM for 60 second, the whole unit stops and LED displays **E8** failure.

6.3.4 Inverter module Protection.

----Inverter module protection itself has a protection function against current, voltage and temperature. If these protections happened, the corresponding code will display on indoor unit LED and A/C will stop. The unit will recover 3min delay after the protection

6.3.5 Lodisappeared.

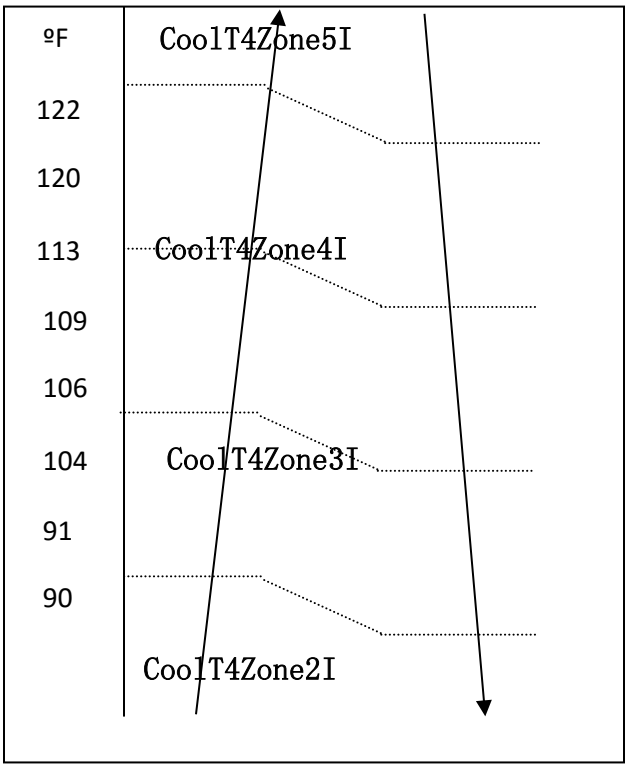


Note: if the low voltage protection occurs and not resumes within 3min, it will keep the protection always after restart the machine.

6.3.6 Compressor current limit protection

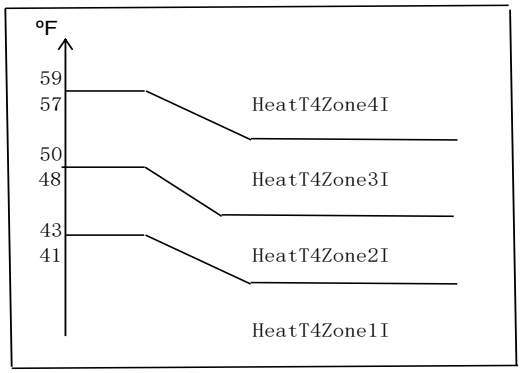
Temperature interval.of current limit is same as range of T4 limited frequency.

Cooling mode:



CoolReturnI	The difference between limit current and quit current.
CoolT4Zone5I	Cooling T4≥122ºF limit current value
CoolT4Zone4I	Cooling 49＞T4≥113ºF (45ºC) limit current value
CoolT4Zone3I	Cooling 44＞T4≥106ºF (41ºC) limit current value
CoolT4Zone2I	Cooling 40 ﹥T4≥91ºF (33ºC) limit current value
CoolT4Zone1I	Cooling 32＞T4ºC limit current value
CoolStopI	Cooling stop protection current value

Heating mode:

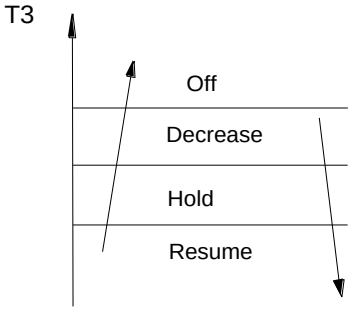


HeatReturnI	The difference between limit current and quit current.
HeatT4Zone4I	Heating T4≥59ºF (15ºC) limit current value
HeatT4Zone3I	Heating 14＞T4≥50ºF (10ºC) limit current value
HeatT4Zone2I	Heating 9＞T4≥43 ºF (6ºC) limit current value
HeatT4Zone1I	Heating 5＞T4 limit current value
HeatStopI	Heating stop protection current value

6.3.7 Indoor / outdoor units communication protection

If the indoor units cannot receive the feedback signal from the outdoor units for 2 minutes, the AC will stop and display the failure.

6.3.8 High condenser coil temp. protection.



6.3.9 Outdoor unit anti-freezing protection

When T2<39ºF (4ºC) for 250 seconds or T2<32ºF (0ºC), the indoor unit capacity demand will be zero and resume to normal when T2>46ºF(8ºC) and the time of protection is no less than 3 minutes.

6.3.10 Oil return

Running rules:

1. If the compressor frequency keeps lower than setting frequency for setting time, the AC will rise the frequency to setting frequency for setting time and then resume to former frequency.

2. The EXV will keep 300p while the indoor units will keep the current running mode.

If the outdoor ambient is higher than setting frequency during the oil return, the AC quit oil return.

6.3.11 Low outdoor ambient temperature protection

When compressor is off, T4 is be lower than -35℃.for 10s, the AC will stop and display "LP".

When compressor is on, T4 is be lower than -40℃.for 10s, the AC will stop and display "LP".

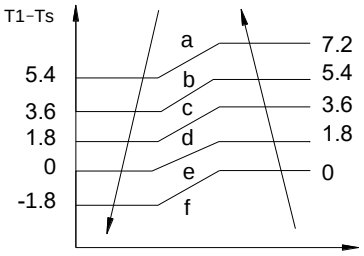
When T4 is no lower than -32℃.for 10s, the unit will exit protection.

6.4 Control and Functions

6.4.1 Capacity Request Calculation

Total capacity Request=Σ(Norm code × HP) /10 + correction

Cooling mode:



Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

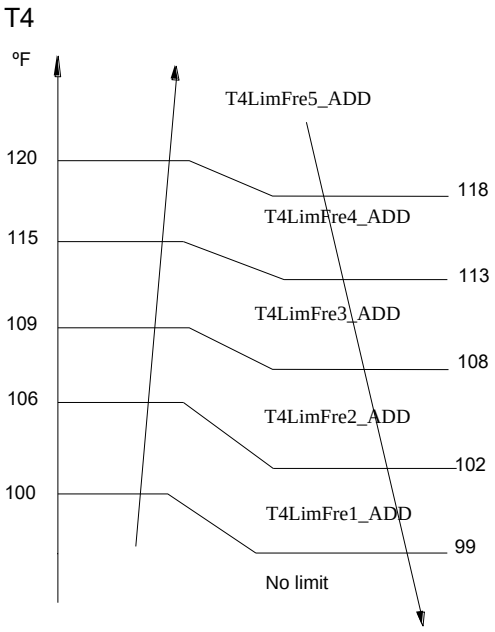
Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Note: The final result is integer.

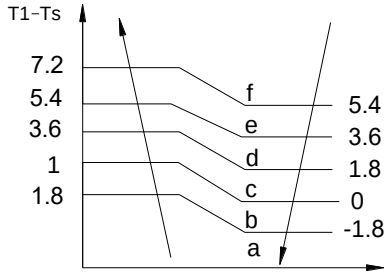
According to the final capacity request to confirm the operating frequency, as following table.

Frequency (Hz)	0	COOL_F1	COOL_F2	……	COOL_F24	COOL_F25
Amendatory capacity demand.	0	1	2	……	24	25

Meanwhile the maximum running frequency will be adjusted according to the outdoor ambient temp.



Heating mode



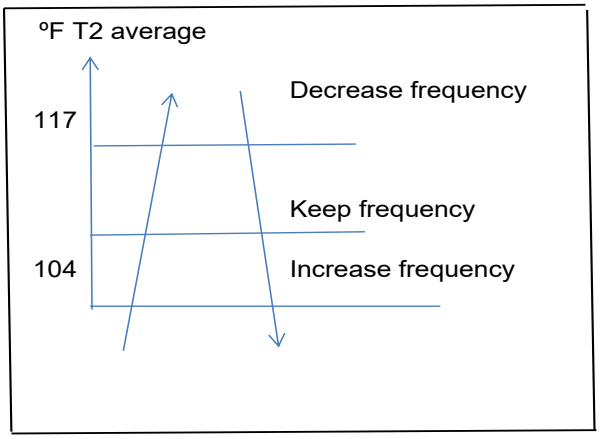
Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Note: The final result is integer.

Then modify it according to T2 average (correction):

Note:Average value of T2：Sum T2 value of all indoor units)/ (indoor units number



According to the final capacity request to confirm the operating frequency, as following table.

Frequency (Hz)	0	HEAT _F1	HEAT _F2	…	HEAT _F24	HEAT _F25
Amendatory capacity demand.	0	1	2	…	24	25

6.4.2 Defrosting control

Condition of defrosting:

Condition of defrosting:

If any one of the following items is satisfied, AC will enter the defrosting mode.

After the compressor starts up and keeps running, mark the minimum value of T3 from the 10th minutes to 15th minutes as T30.

1)If the compressor cumulate running time is up to 29 minutes and T3< TCDI1, T3＋T30SUBT3ONE≦T30.

2)If the compressor cumulate running time is up to 35 minutes and T3< TCDI2, T3＋T30SUBT3TWO≦T30.

3)If the compressor cumulate running time is up to 40 minutes and T3< -11ºF (-24C) for 3 minutes.

4)If the compressor cumulate running time is up to 120 minutes and T3<-5ºF (-15ºC).

Condition of ending defrosting:

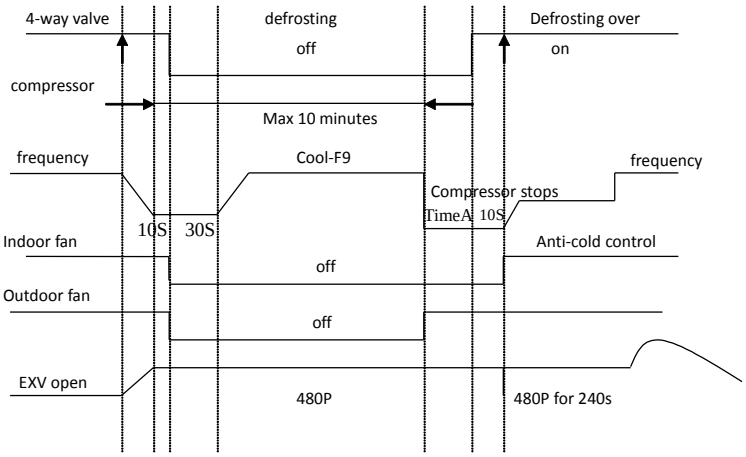
If any one of the following items is satisfied, the defrosting will finish and the machine will turn to normal heating mode.

----T3 rises to be higher than TCDE 34ºF(1ºC).

----T3 keeps to be higher than TCDE 36ºF (2ºC) for 80 seconds.

----The machine has run for 10 minutes in defrosting mode.

Defrosting action：



Condition of ending defrosting:

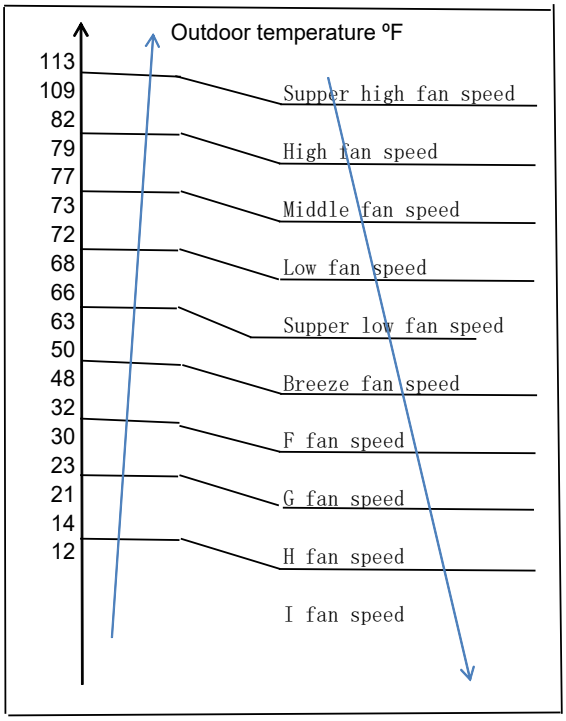
If any one of following items is satisfied, defrosting will stop and the machine will turn to normal heating mode.

- T3 > TempQuitDefrost_ADD ºF;.
- The defrosting time achieves 10min.
- Turn to other modes or off.

6.4.3 Outdoor fan control

6.4.3.1 Cooling mode

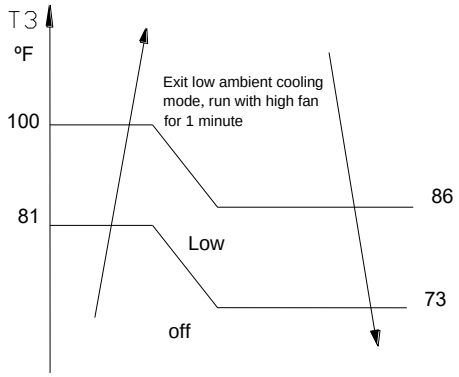
Normally the system will choose the running fan speed according to ambient temperature:

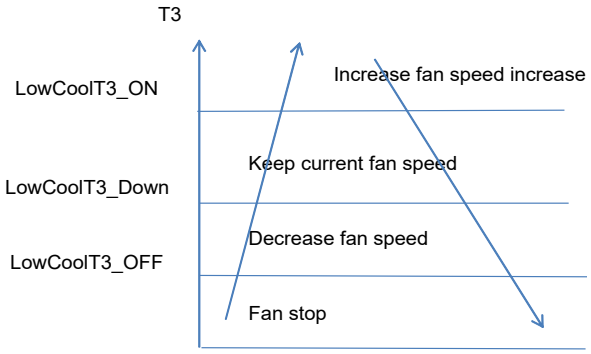


When low ambient cooling is valid:

Outdoor fan speed control logical (low ambient cooling)

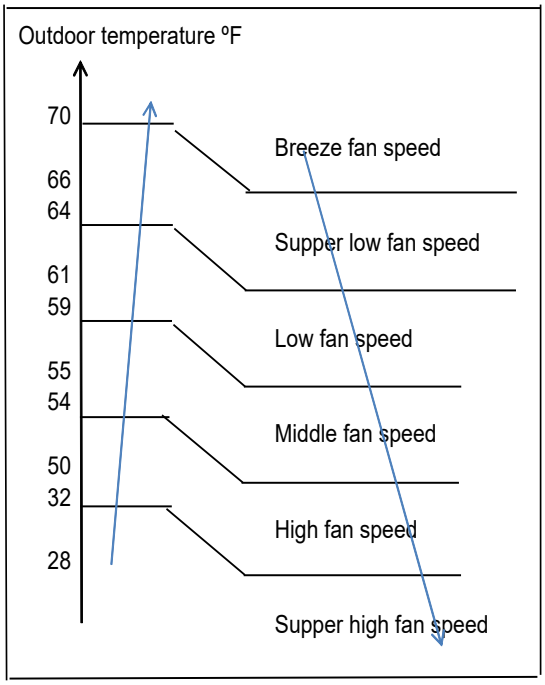
When T4 <59 ºF (15ºC) and T3 < 86 ºF (30 ºC), the unit will enter into low ambient cooling mode. The outdoor fan will choose speed according to T3.
When T3≥100.4 ºF (38 ºC) or when T4≥68ºF (20ºC), the outdoor fan will choose the speed according to T4 again.





6.4.3.2 Heating mode

Normally the system will choose the running fan speed according to ambient temperature:



6.4.4 Electronic Expansion Valve (EXV) Control

1. EXV will be fully closed when turning on the power. Then EXV will be standby with 350P open and will open to target angle after compressor starts.
2. EXV will close with -160P when compressor stops. Then EXV will be standby with 350P open and will open to target angle after compressor

starts.
3. The action priority of the EXVs is A-B-C-D-E.
4. Compressor and outdoor fan start operation only after EXV is initialized.

6.4.4.1 Cooling mode

The initial open angle of EXV is depend on indoor model size, adjustment range is 100-400p. When the unit start to work for 3 minutes, the outdoor will receive indoor units(of capacity demand) T2B information and calculate the average of them. After comparing each indoor's T2B with the average, the outdoor gives the following modification commands:
If the T2B＞average, the relevant valve needs more 16p open;
If the T2B= average, the relevant valve's open range remains;
If the T2B＜average, the relevant valve needs more 16p close.
This modification will be carried out every 2 minutes.

6.4.4.2 Heating mode

The initial open angle of EXV is depend on indoor model size, adjustment range is 150-350p. When the unit start to work for 3minutes, the outdoor will receive indoor units (of capacity demand) T2 information and calculate the average of them. After comparing each indoor's T2 with the average, the outdoor gives the following modification commands:
If the T2＞average +4, the relevant valve needs more 16p close;
If average +4 ≥ the T2 ≥ average -4, the relevant valve's open range remains;
If the T2＜average -4, the relevant valve needs more 16p open.
This modification will be carry out every 2 minutes.

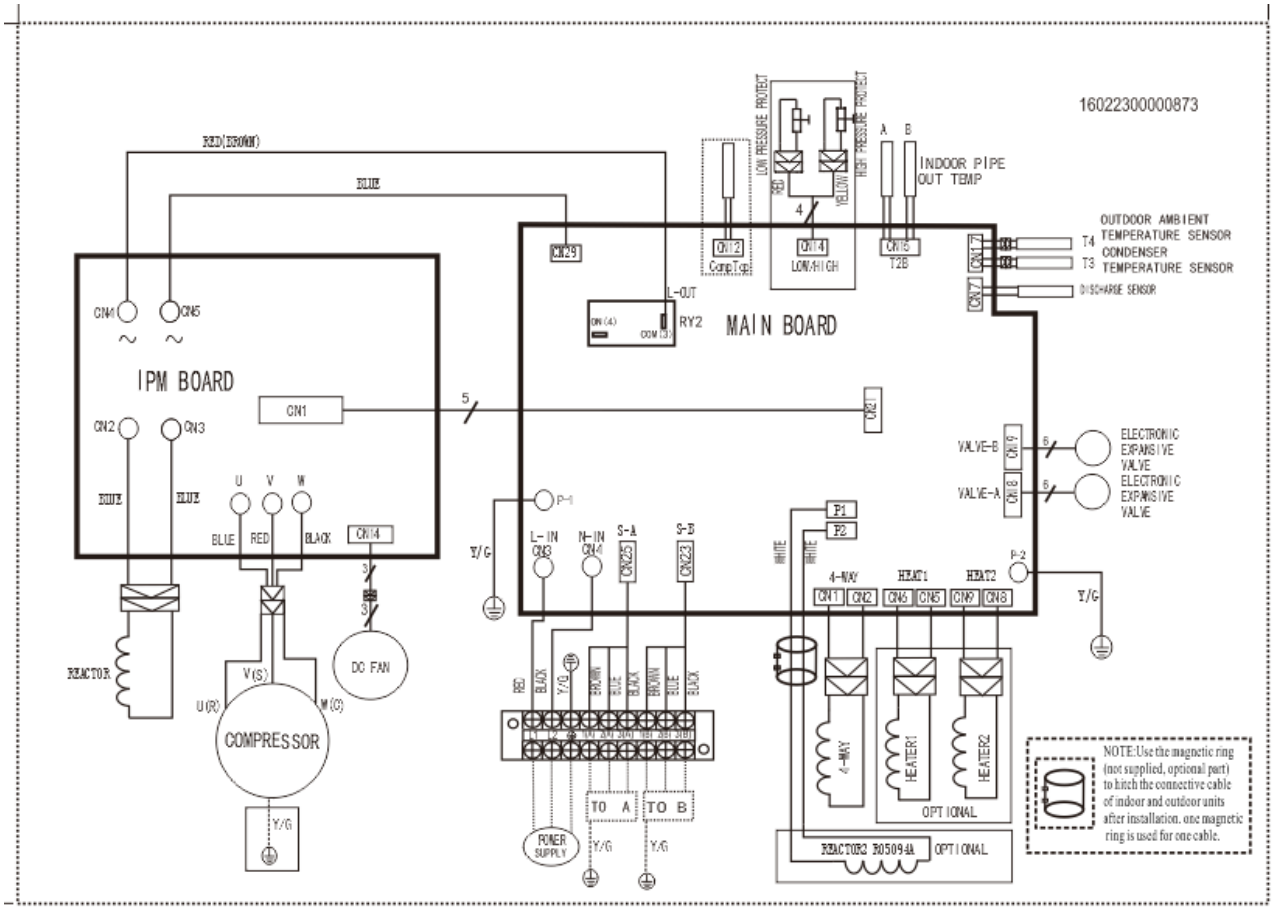
6.4.5 Four-way valve control

In heating mode, four-way valve is opened. In defrosting, four-way valve operates in according to defrosting action. In other modes, four-way valve is closed. When the heating mode to other modes, the four-way valve is off after compressor is off for 2 minutes. Failure or protection (not including discharge temperature protection, high and low pressure protection), four-way valve immediately shuts down.

7. Wiring Diagrams

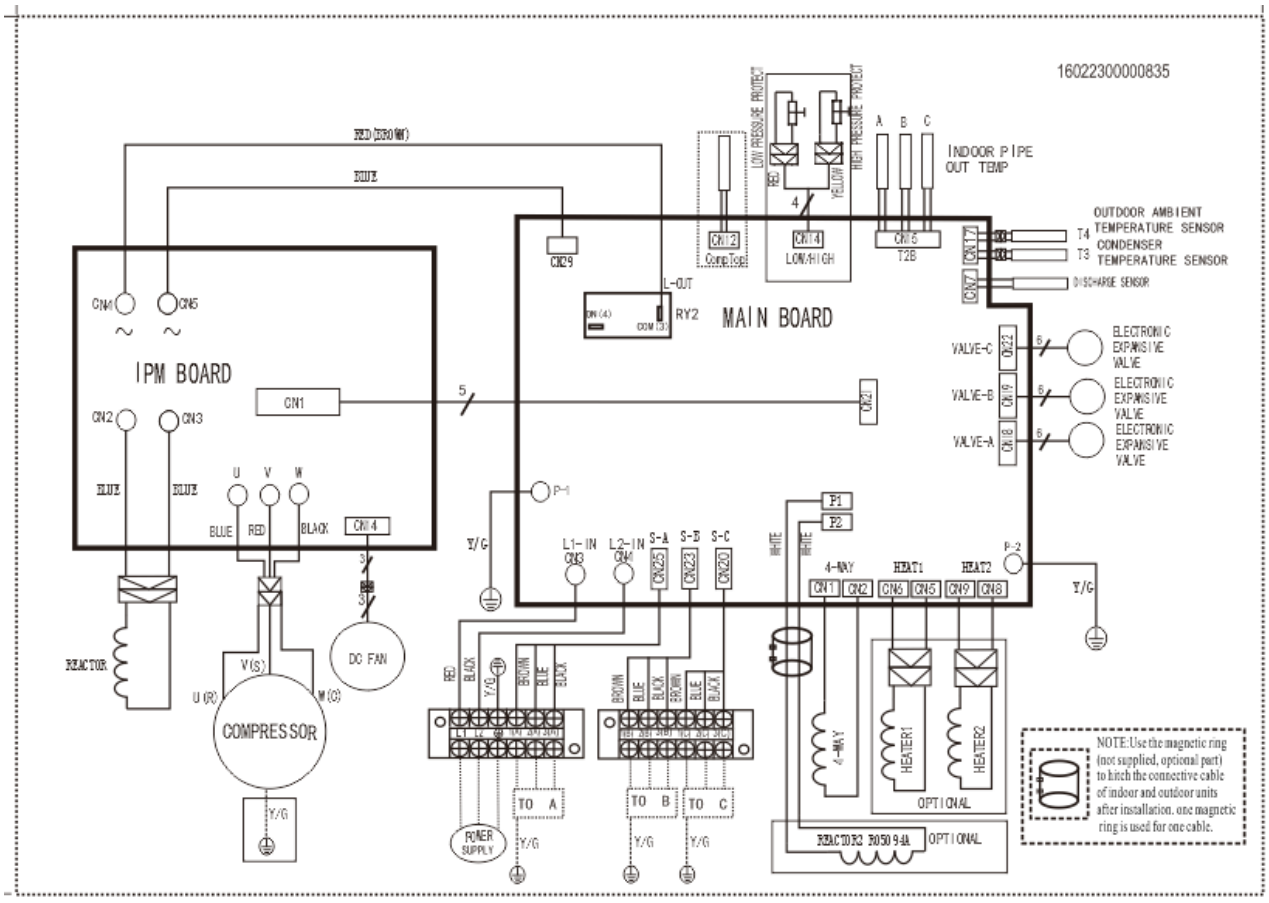
8.1 Wiring diagram of 1 drive 2 outdoor

KMIR218-H221

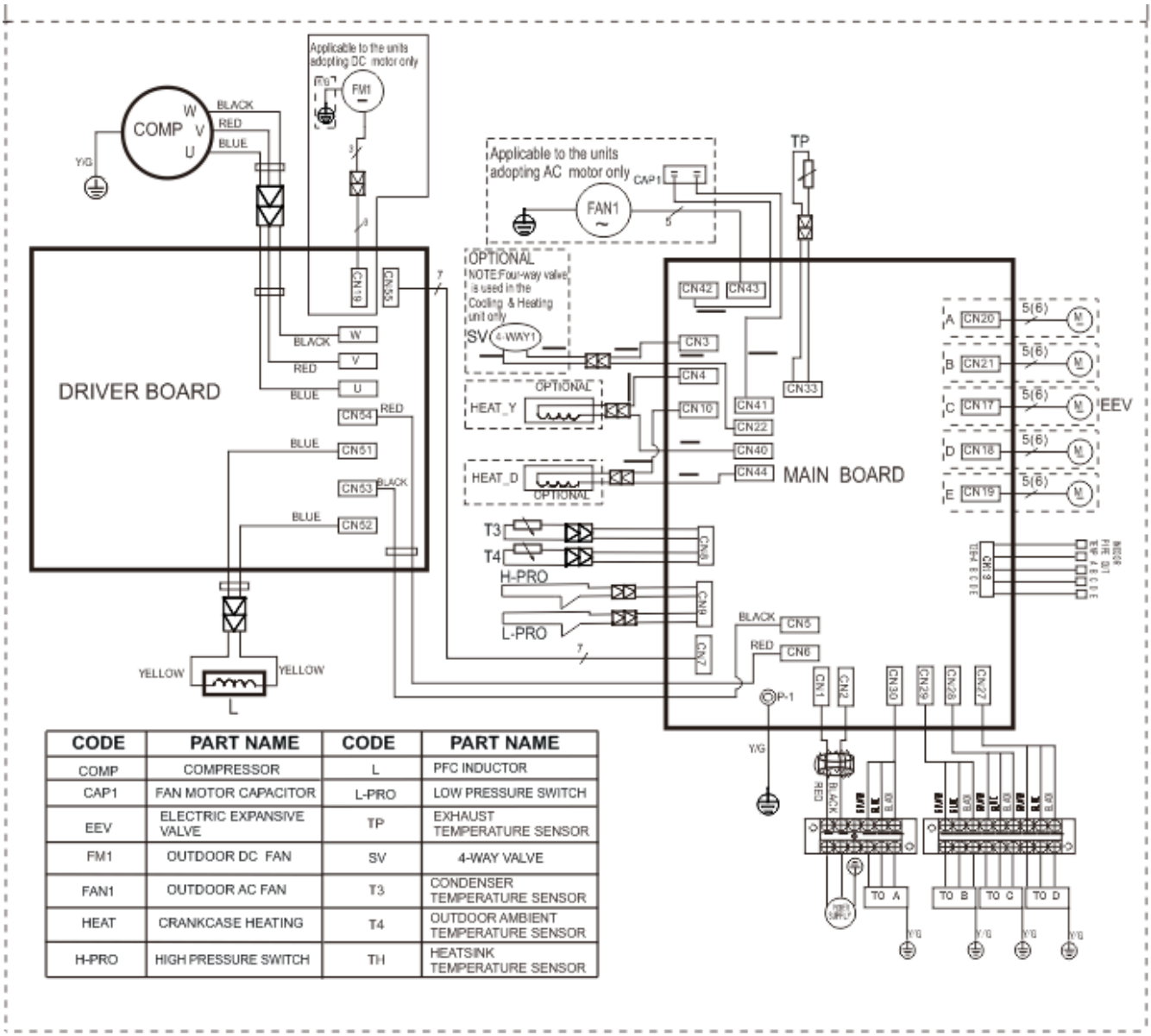


8.2 Wiring diagram of 1 drive 3 outdoor

KMIR327-H217

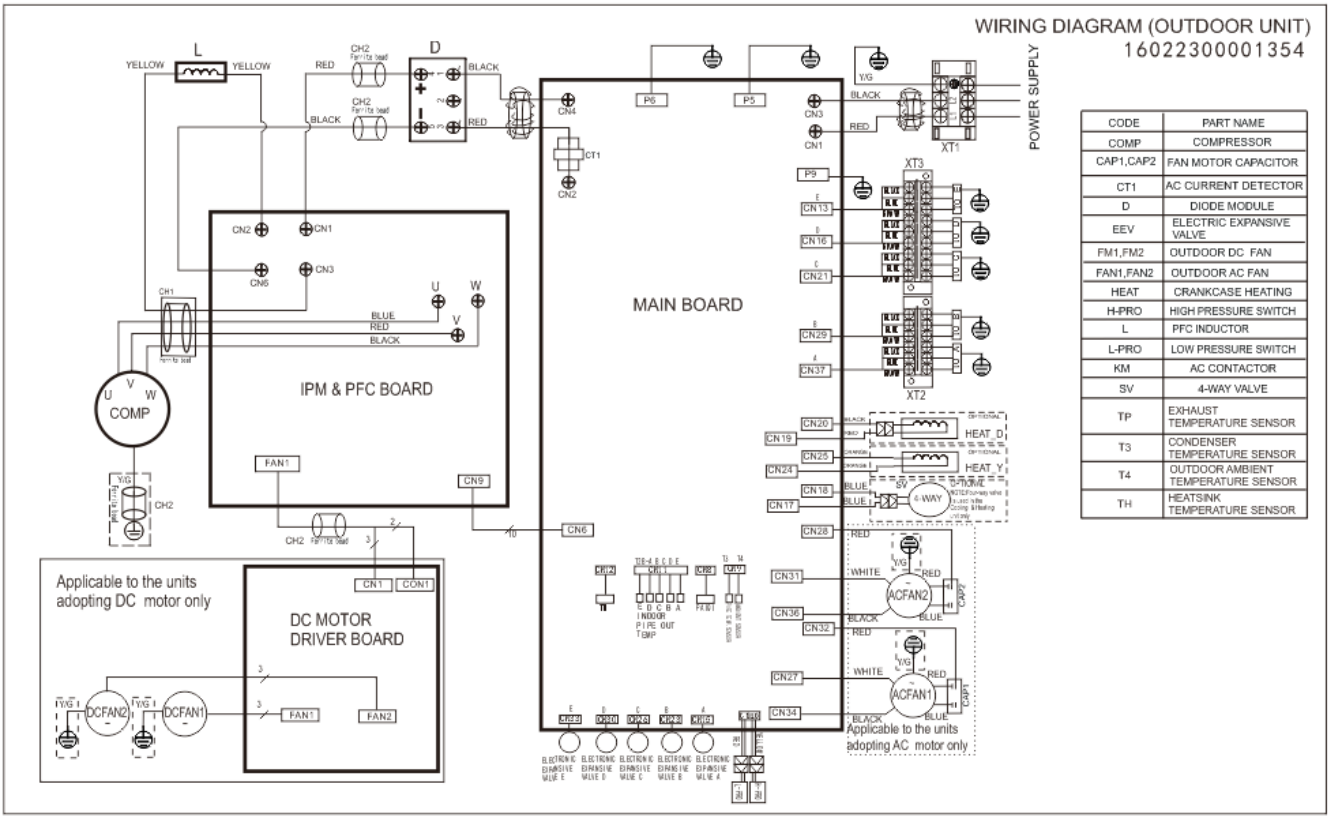


8.3 Wiring diagram of 1 drive 4 outdoor KMIR436-H217



CODE	PART NAME	CODE	PART NAME
COMP	COMPRESSOR	L	PFC INDUCTOR
CAP1	FAN MOTOR CAPACITOR	L-PRO	LOW PRESSURE SWITCH
EEV	ELECTRIC EXPANSIVE VALVE	TP	EXHAUST TEMPERATURE SENSOR
FM1	OUTDOOR DC FAN	SV	4-WAY VALVE
FAN1	OUTDOOR AC FAN	T3	CONDENSER TEMPERATURE SENSOR
HEAT	CRANKCASE HEATING	T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
H-PRO	HIGH PRESSURE SWITCH	TH	HEATSINK TEMPERATURE SENSOR

8.4 Wiring diagram of KMIR545-H219

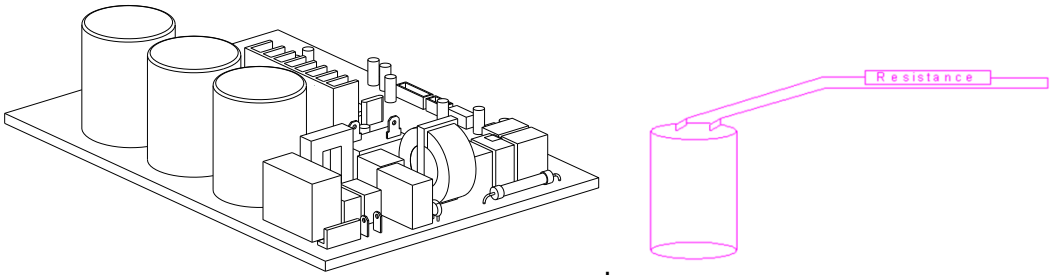


8. Troubleshooting

8.1Safety

Because of there are capacitors in PCB and relative circuit in outdoor unit, even shut down the power supply, electricity power still are kept in capacitors, do not forget to discharge the electricity power in capacitor.

The value of resistance is about 1500 ohm to 2000 ohm



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Electrolytic Capacitors

(HIGH VOLTAGE! CAUTION!)

Bulb (25-40W)

The voltage in P3 and P4 in outdoor PCB is high voltage about 310V

The voltage in P5 and P6 in outdoor PCB is high voltage about 310V

8.2 Indoor Unit Error Display

Console series

Operation	Timer	De-frost	Failure
★	X	X	Open or short circuit of T1 temperature sensor
X	X	★	Open or short circuit of T2 temperature sensor
X	★	X	Communication malfunction between indoor and outdoor units
★	★	X	Indoor EEPROM malfunction
X	★	●	Outdoor fan speed has been out of control
★	X	★	IPM module protection
★	★	★	Open or short circuit of T3 or T4 temperature sensor or Outdoor unit EEPROM parameter error
★	●	X	Temperature protection of compressor top
★	◎	X	Inverter compressor drive protection
★	X	●	Mode conflict
★	●	★	Indoor fan speed has been out of control
★ flash at 5Hz, ● light, X extinguished, ◎flash at 0.5Hz			

For KDIR09-H2, KDIR12-H2, KDIR18-H2, KDIR24-H2, KTIR09-H2, KTIR12-H2, KTIR18-H2

Operation	Timer	De-frost	Alarm	Failure	Display	ODU Error code
★	X	X	X	Open or short circuit of T1 temperature sensor	E0	——
X	X	★	X	Open or short circuit of T2 temperature sensor	E1	——
X	★	X	X	Communication malfunction between indoor and outdoor units	E2	E2
X	X	X	★	Water-level alarm malfunction	E3	——
★	★	X	X	Indoor EEPROM malfunction	E4	——
★	X	X	●	IPM module protection	E5	P6
★	●	X	X	Open or short circuit of T3 or T4 temperature sensor or outdoor EEPROM malfunction	E6	E0,E4

★	●	★	X	Outdoor fan has been out of control	E7	E8
★	●	●	X	Indoor fan speed has been out of control	F5	——
★	●	X	●	Voltage protection	P0	E5
★	X	●	X	Temperature protection of compressor top.	P1	P0
★	★	★	X	Outdoor unit over-current protection	P2	P3
★	◎	X	X	Inverter compressor drive protection	P4	——
★	X	●	●	Mode conflict	P5	——

★ flash at 2.5Hz, ● light, X extinguished, , ◎flash at 0.5Hz
Note: Digital display is only available for duct type.

KSIE series:

Operation lamp	Timer lamp	Display	LED STATUS	ODU Error
★ 1 time	X	E0	Indoor EEPROM malfunction	——
★ 2 times	X	E1	Communication malfunction between indoor and outdoor units	E2
★ 4 times	X	E3	Indoor fan speed malfunction.	——
★ 5 times	X	E4	Indoor room temperature sensor open or short circuit.	——
★ 6 times	X	E5	Evaporator coil temperature sensor open or short circuit.	——
★ 2 times	●	F1	Outdoor temperature sensor open or short circuit.	E4
★ 3 times	●	F2	Condenser coil temperature sensor open or short circuit.	E4
★ 4 times	●	F3	Compressor discharge pipe sensor open or short circuit.	E4
★ 5 times	●	F4	Outdoor EEPROM malfunction	E0
★ 6 times	●	F5	Outdoor fan has been out of control	E8
★ 7 times	●	F6	Indoor unit coil outlet temp. sensor open or short circuit.	E4
★ 1 times	★	P0	Inverter module (IPM) malfunction or IGBT over-strong current protection	P6
★ 2 times	★	P1	Voltage(High voltage or low voltage) protection.	E5
★ 3 times	★	P2	High temperature protection of compressor top (only for M3OD-27HRDN1-M)	P0
★ 5 times	★	P4	Compressor drive error	——
★ 6 times	★	P5	Mode conflict	——

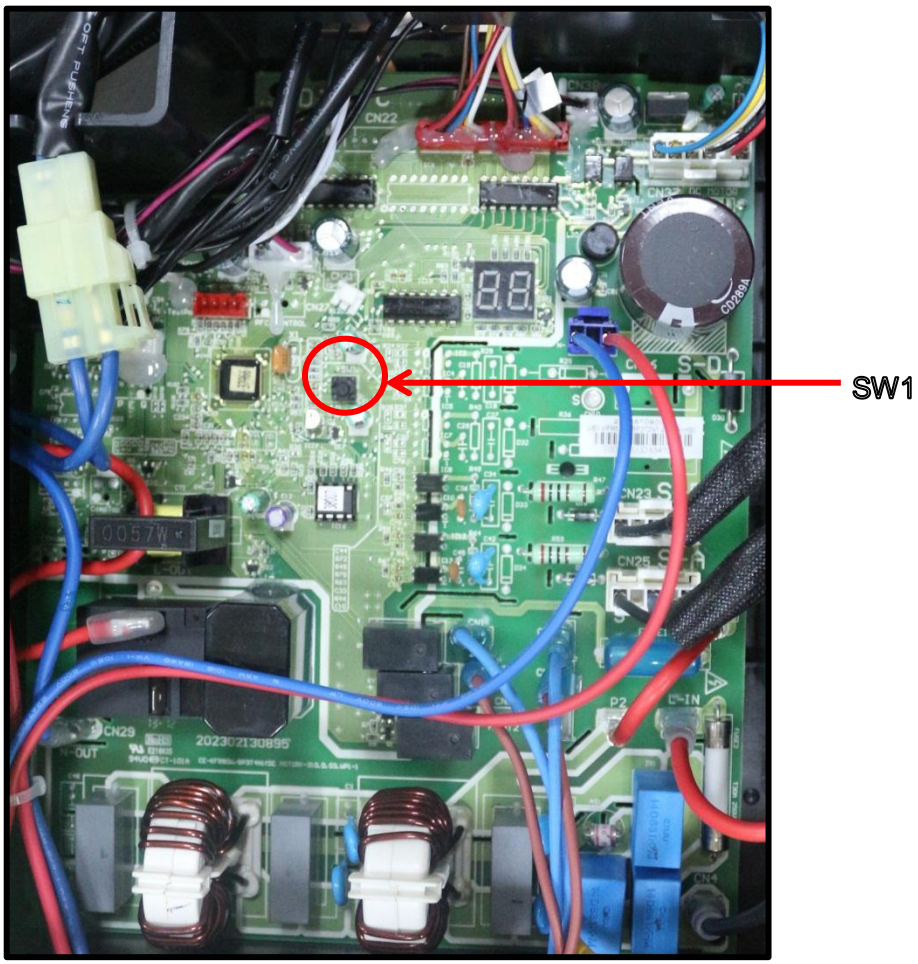
★ flash , ● light, X extinguished

8.3 Outdoor Unit Display

8.3.1 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 tube will display the follow procedure when push SW1 each time.



	Display	Remark
0	Normal display	Display running frequency, running state or malfunction code
1	Quantity of indoor units in good connection	Actual data Display: 1 → Number of indoor unit: 1 Display: 2 → Number of indoor unit: 2 Display: 3 → Number of indoor unit: 3 Display: 4 → Number of indoor unit: 4
2	Outdoor unit running mode code	Off:0,Fan only 1, Cooling:2, Heating:3, Forced cooling:4
3	A indoor unit capacity	The capacity unit is horse power. If the indoor unit is not connected, the digital display tube will show: "——" (9K:1HP,12K:1.2HP,18K:1.5HP)
4	B indoor unit capacity	
5	C indoor unit capacity	
6	D indoor unit capacity	
7	E indoor unit capacity	

8	A Indoor unit capacity demand code	Norm code*HP (9K:1HP,12K:1.2HP,18K:1.5HP)		
9	B Indoor unit capacity demand code			
10	C Indoor unit capacity demand code			
11	D Indoor unit capacity demand code			
12	E Indoor unit capacity demand code			
13	Outdoor unit amendatory capacity demand code	Forced cooling:7		
14	The frequency corresponding to the total indoor units amendatory capacity demand			
15	The frequency after the frequency limit			
16	The frequency sending to compressor control chip			
17	A indoor unit evaporator outlet temp.(T_{2B}A)	If the temp. is lower than -9 degree, the digital display tube will show “-9”.If the temp. is higher than 70 degree, the digital display tube will show “70”. If the indoor unit is not connected, the digital display tube will show: “——”		
18	B indoor unit evaporator outlet temp.(T_{2B}B)			
19	C indoor unit evaporator outlet temp.(T_{2B}C)			
20	D indoor unit evaporator outlet temp.(T_{2B}D)			
21	E indoor unit evaporator outlet temp.(T_{2B}E)			
22	A indoor unit room temp.(T_1A)	If the temp. is lower than 0 degree, the digital display tube will show “0”.If the temp. is higher than 50 degree, the digital display tube will show “50”. If the indoor unit is not connected, the digital display tube will show: “——”		
23	B indoor unit room temp.(T_1B)			
24	C indoor unit room temp.(T_1C)			
25	D indoor unit room temp.(T_1D)			
26	E indoor unit room temp.(T_1E)			
27	A indoor unit evaporator temp.(T_2A)	If the temp. is lower than -9 degree, the digital display tube will show “-9”.If the temp. is higher than 70 degree, the digital display tube will show “70”. If the indoor unit is not connected, the digital display tube will show: “——”		
28	B indoor unit evaporator temp.(T_2B)			
29	C indoor unit evaporator temp.(T_2C)			
30	D indoor unit evaporator temp.(T_2D)			
31	E indoor unit evaporator temp.(T_2E)			
32	Condenser pipe temp.(T3)			
33	Outdoor ambient temp.(T4)			
34	Compressor discharge temp.(TP)	The display value is between 30~129 degree. If the temp. is lower than 30 degree, the digital display tube will show “30”.If the temp. is higher than 99 degree, the digital display tube will show single digit and tens digit. For example, the digital display tube show “0.5”,it means the compressor discharge temp. is 105 degree.)		
35	AD value of current	The display value is hex number. For example ,the digital display tube show “Cd”, it means AD value is 205.		
36	AD value of voltage			
37	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example ,the digital display tube show “2.0”,it means the EXV open angle is 120×4=480p.)		
38	EXV open angle for B indoor unit			
39	EXV open angle for C indoor unit			
40	EXV open angle for D indoor unit			
41	EXV open angle for E indoor unit			
42	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is hex number. For example, the digital display tube show 2A,then Bit5=1, Bit3=1, Bit1=1. It means frequency limit caused by T4,T3 and current.
		Bit6	Frequency limit caused by PFC	
		Bit5	Frequency limit caused by T4.	
		Bit4	Frequency limit caused by T2.	
		Bit3	Frequency limit caused by T3.	
		Bit2	Frequency limit caused by T5.	
		Bit1	Frequency limit caused by current	
		Bit0	Frequency limit caused by voltage	

43	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units in good connection)
44	Outdoor unit fan motor state	Off:0, High speed:1, Med speed:2, Low speed:3 Breeze:4, Super breeze:5
45	The last error or protection code	00 means no malfunction and protection
46	F indoor unit capacity	
47	F Indoor unit capacity demand code	
48	F indoor unit evaporator outlet temp.($T_{2B}F$)	
49	F indoor unit room temp.(T_1F)	
50	F indoor unit evaporator temp.(T_2F)	
51	EXV open angle for F indoor unit	

8.3.2 Outdoor unit's digital display tube

There is a digital display tube in outdoor PCB.

Digital display tube display function

- In standby , the LED displays "- -"
- In compressor operation, the LED display the running frequency,
- In defrosting mode, The LED displays "dF" or alternative displays between running frequency and "dF"(each displays 0.5s)
- In compressor pre-heating, The LED displays "PH" or alternative displays between running frequency and "PH"(each displays 0.5s)
- During the oil return process, The LED displays "RO" or alternative displays between running frequency and "RO"(each displays 0.5s)
- In low ambient cooling mode, the LED displays "LC" or alternative displays between running frequency and "LC"(each displays 0.5s)
- In forced cooling mode, the LED displays "FC" or alternative displays between running frequency and "FC"(each displays 0.5s)
- When PFC module protection occurs three times within 15 minutes, the LED displays "E6" or alternative displays between running frequency and "E6"(each displays 0.5s)
- In protection or malfunction, the LED displays error code or protection code.

8.3.3 Outdoor unit error display

Display	LED STATUS	IDU Error (KSIE)	IDU Error (KDIR)
E0	Outdoor EEPROM malfunction	F4	E6
E2	Communication malfunction between indoor and outdoor units	E1	E2
E3	Communication malfunction between IPM board and outdoor main board	——	——
E4	Open or short circuit of outdoor temperature sensor (T3、T4、T5、T2B)	F2	E6
E5	Voltage protection	P1	P0
E6	Active PFC module protection	——	——
E8	Outdoor fan speed has been out of control (Only for DC fan motor models)	F5	——
F1	No A Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
F2	No B Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
F3	No C Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
F4	No D Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
F5	No E Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
F6	No F Indoor unit coil outlet temp. sensor or connector of sensor is defective	——	——
P0	Temperature protection of compressor top	P2	P3(P1)
P1	High pressure protection	——	——
P2	Low pressure protection	——	——
P3	Current protection of compressor	——	——(P2)
P4	Temperature protection of compressor discharge	——	——
P5	High temperature protection of condenser	——	——
P6	IPM module protection	P0	E5

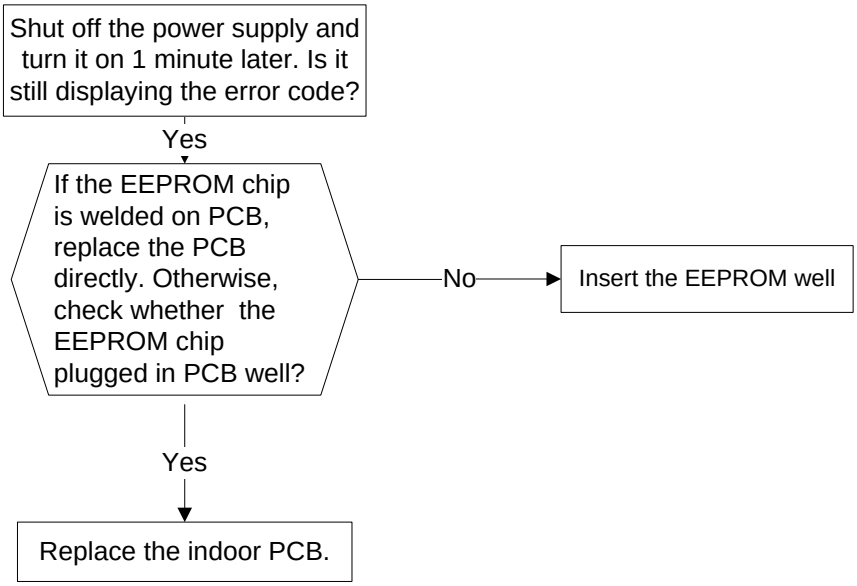
8.4 Diagnosis and Solution

8.4.1 Indoor unit trouble shooting

8.4.1.1 Indoor EEPROM malfunction diagnosis and solution.

Malfunction decision conditions	PCB main chip does not receive feedback from EEPROM chip
	● Installation mistake ● PCB faulty

Trouble shooting:



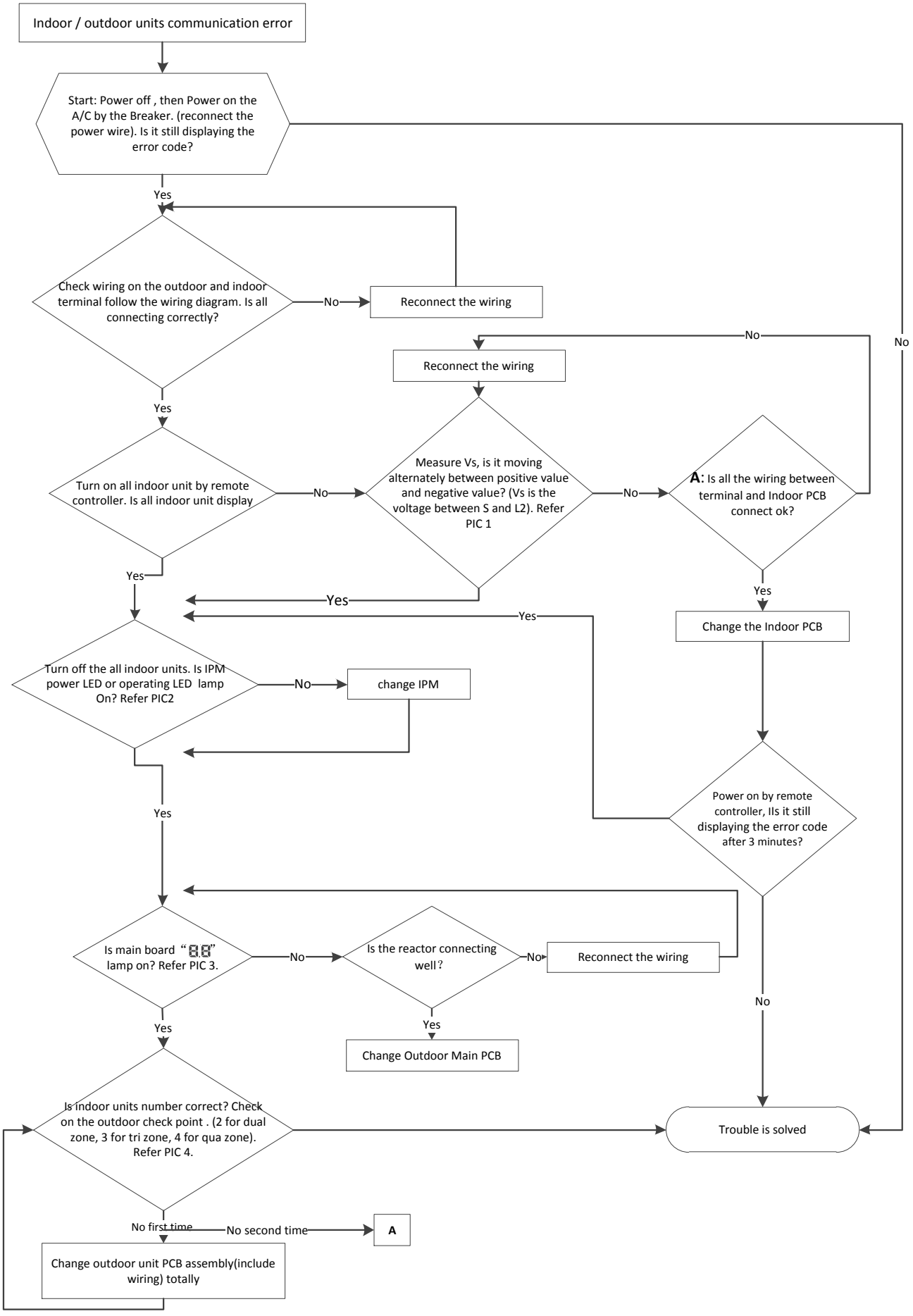
Supposed causes

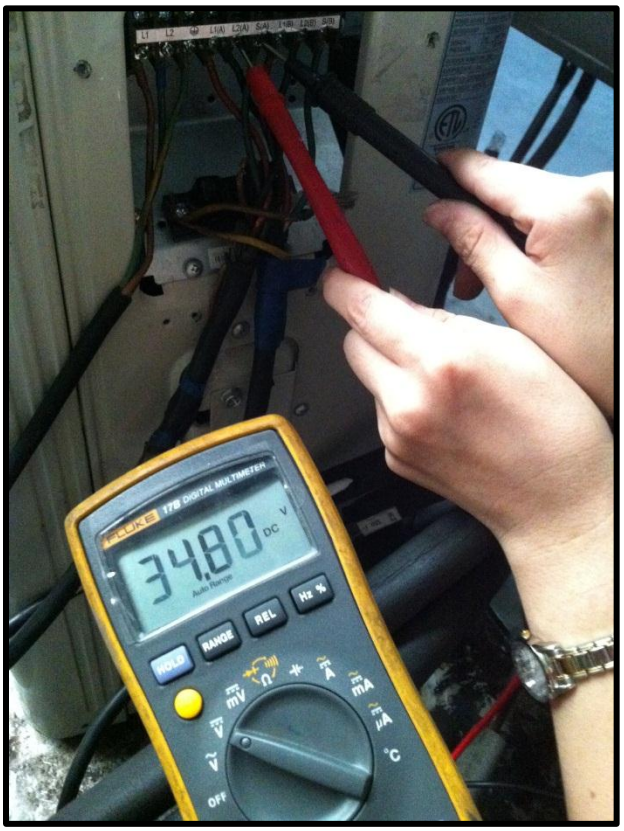
EEPROM: a read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. For the location of EEPROM chip, please refer to the below photos.

8.4.1.2 Communication malfunction between indoor and outdoor units diagnosis and solution.

Malfunction decision conditions	Indoor unit does not receive the feedback from outdoor unit during 120 seconds.
Supposed causes	● Wiring mistake ● Indoor or outdoor PCB faulty

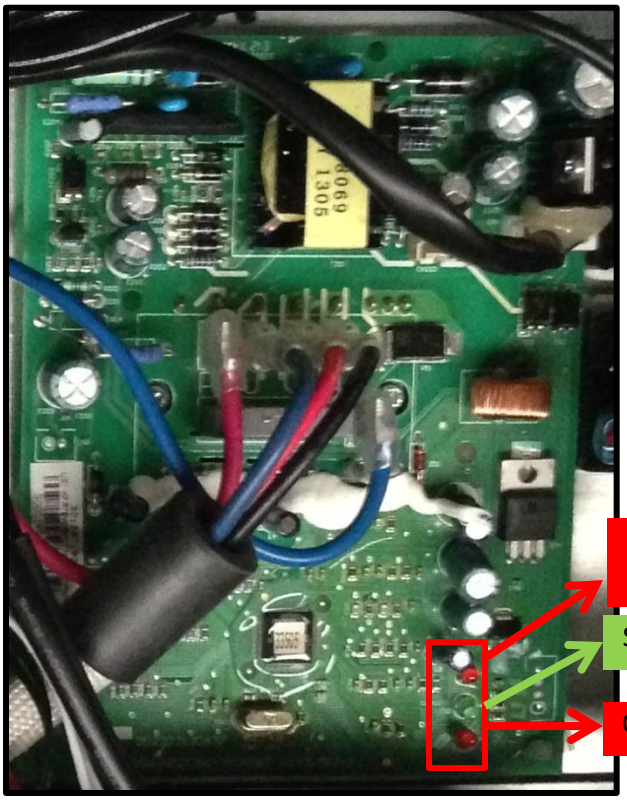
Trouble shooting:


Indoor / outdoor units communication error
Start: Power off , then Power on the A/C by the Breaker. (reconnect the power wire). Is it still displaying the error code?
Yes
No
Check wiring on the outdoor and indoor terminal follow the wiring diagram. Is all connecting correctly?
No
Reconnect the wiring
Yes
Reconnect the wiring
No
Turn on all indoor unit by remote controller. Is all indoor unit display
No
Measure Vs, is it moving alternately between positive value and negative value? (Vs is the voltage between S and L2). Refer PIC 1
No
A: Is all the wiring between terminal and Indoor PCB connect ok?
Yes
Yes
Yes
Yes
Change the Indoor PCB
Turn off the all indoor units. Is IPM power LED or operating LED lamp On? Refer PIC2
No
change IPM
Power on by remote controller, IIs it still displaying the error code after 3 minutes?
Yes
No
Is main board "88" lamp on? Refer PIC 3.
No
Is the reactor connecting well?
No
Reconnect the wiring
Yes
Change Outdoor Main PCB
Yes
Is indoor units number correct? Check on the outdoor check point . (2 for dual zone, 3 for tri zone, 4 for qua zone). Refer PIC 4.
Trouble is solved
No first time
No second time
A
Change outdoor unit PCB assembly(include wiring) totally

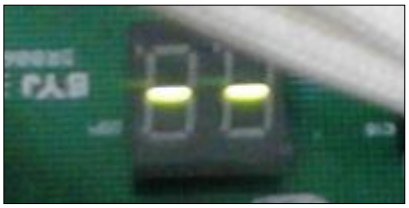


Pic 1: Use a multimeter to test the DC voltage between L2 port and S port of outdoor unit. The red pin of multimeter connects with L2 port while the black pin is for S port.

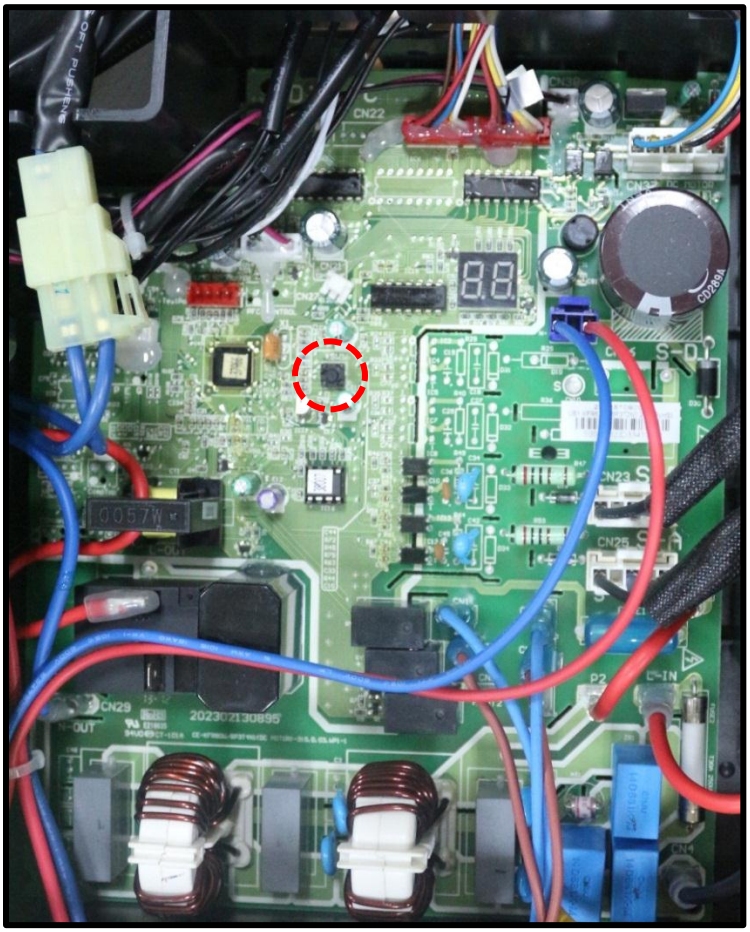
When AC is normal running, the voltage will move alternately between positive value and negative value.



Pic 2: IPM (for dual/tri/qua-zone)



PIC3: Main board LED when power on and unit standby.

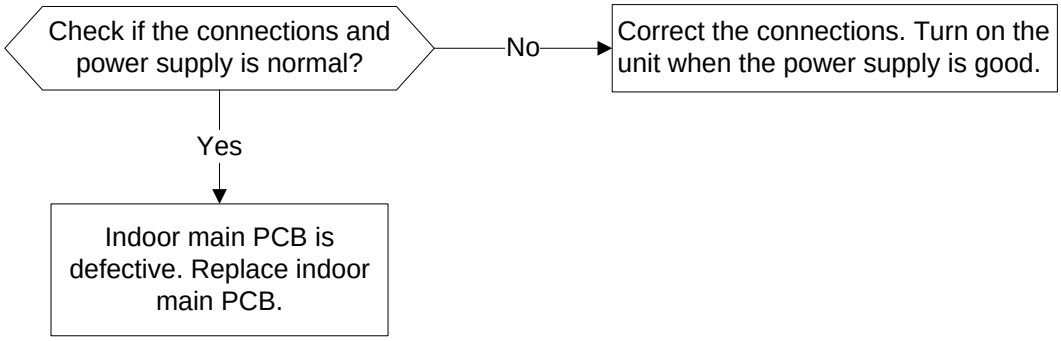


PIC 4: Check point button, press 1 time for check how many indoor units are connected.

8.4.1.3 zero-crossing signal error diagnosis and solution.

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

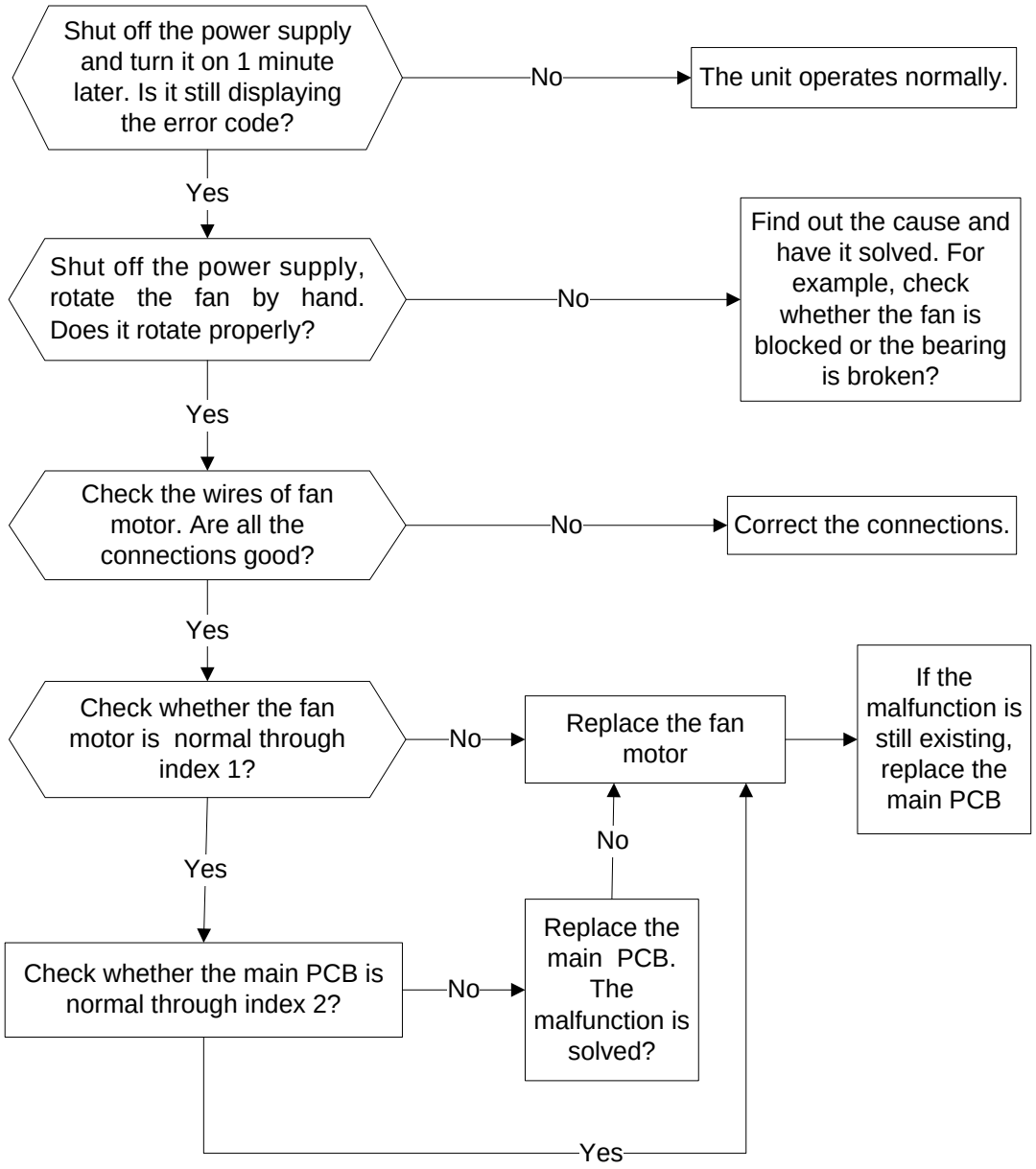
Trouble shooting:



8.4.1.4 Indoor fan speed has been out of control diagnosis and solution.

Malfunction decision conditions	When indoor fan speed keeps too low (300RPM) for certain time, the unit will stop and the LED will display the failure.
Supposed causes	● Wiring mistake ● Fan ass'y faulty ● Fan motor faulty ● PCB faulty

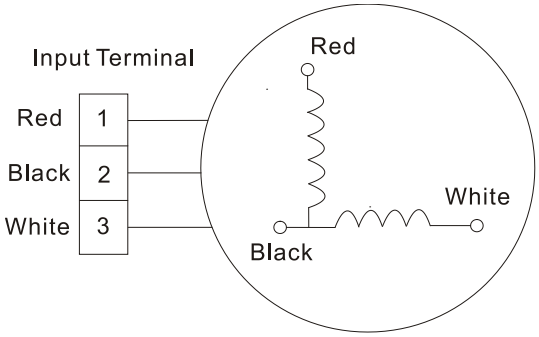
Trouble shooting:



Index 1:

1: Indoor AC fan motor

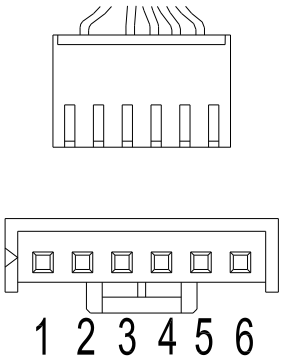
Power on and set the unit running in fan mode at high fan speed. After running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V (208~240V power supply)or 50V(115V power supply), the PCB must have problems and need to be replaced.



2. Indoor DC fan motor (control chip is inside 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, the PCB must have problems and need to be replaced.

For other models:



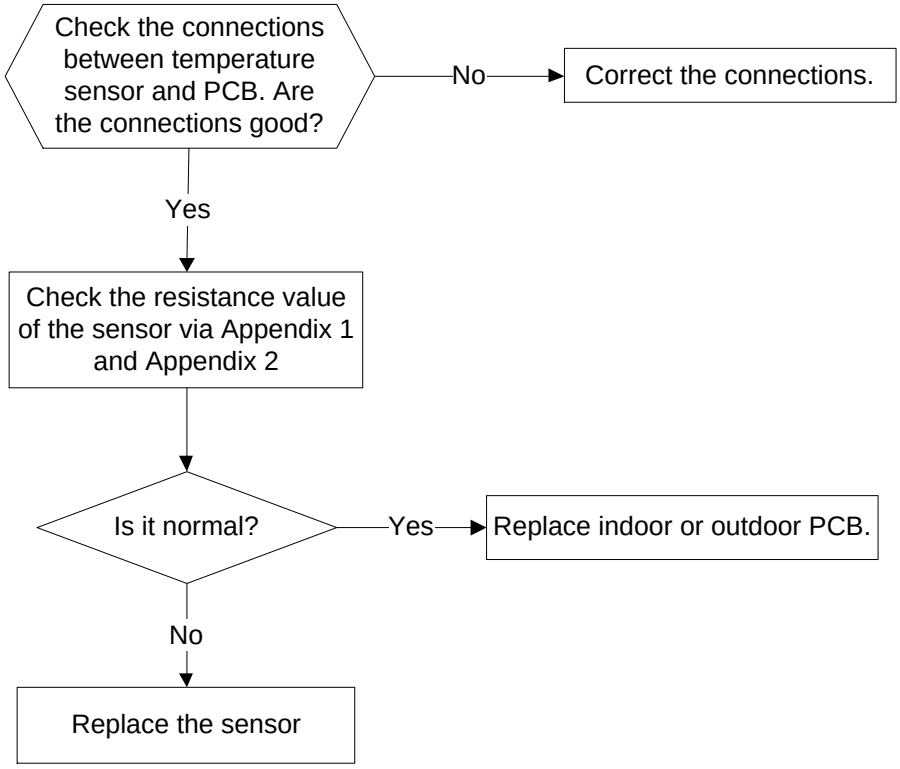
DC motor voltage input and output

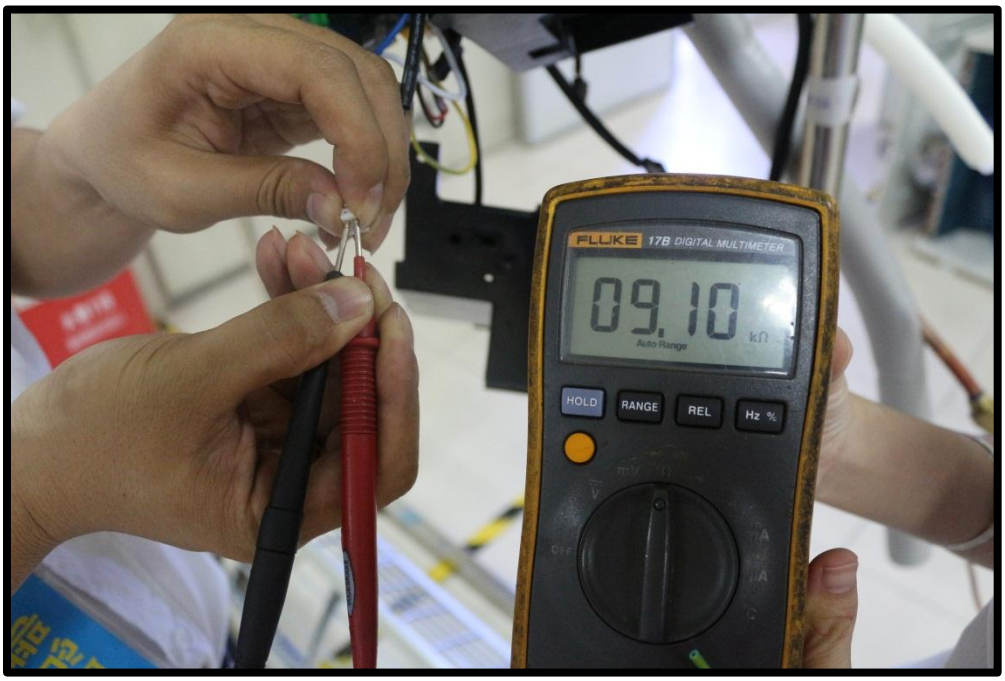
NO.	Color	Signal	Voltage
1	Red	Vs/Vm	200V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5-16.5V

8.4.1.5 Open or short circuit of temperature sensor diagnosis and solution.

Malfunction decision conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Sensor faulty ● PCB faulty

Trouble shooting:

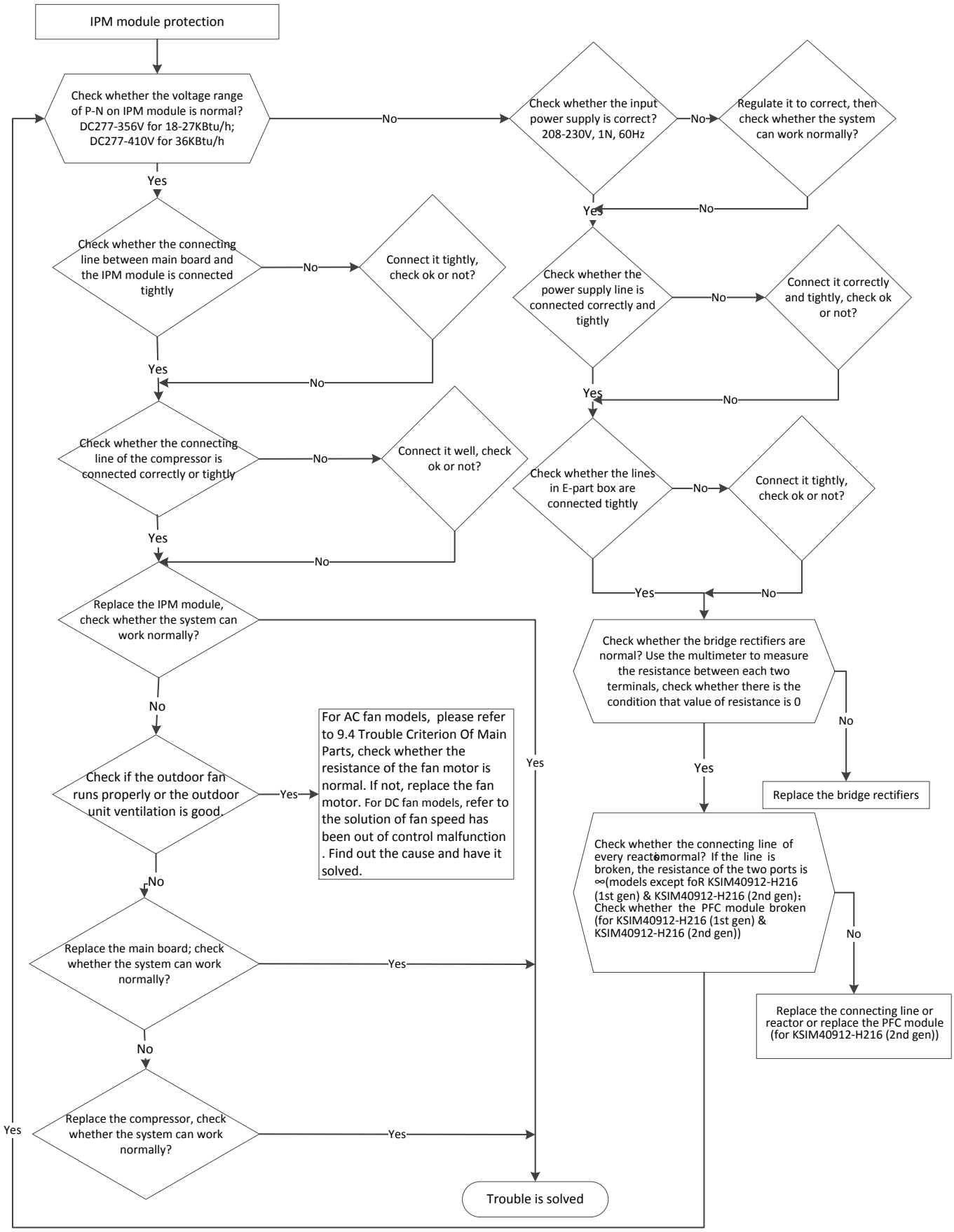




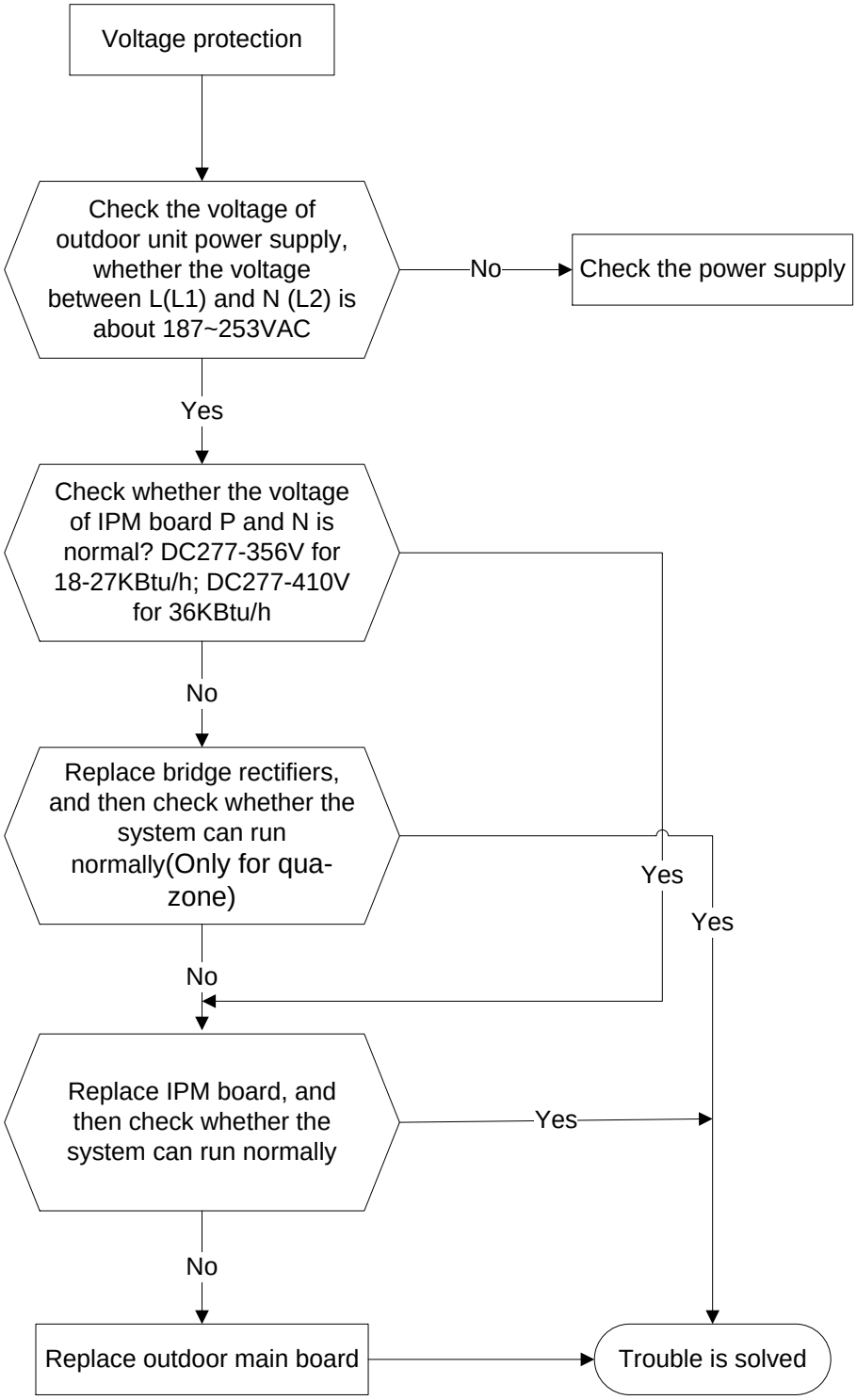
8.4.1.6 IPM module or IGBT over-strong current protection diagnosis and solution.

Malfunction decision conditions	When the voltage signal that IPM send to compressor drive chip is abnormal, the display LED will show “P6” and AC will turn off.
Supposed causes	● Wiring mistake ● IPM malfunction ● Outdoor fan ass’y faulty ● Compressor malfunction ● Outdoor PCB faulty

Trouble shooting:

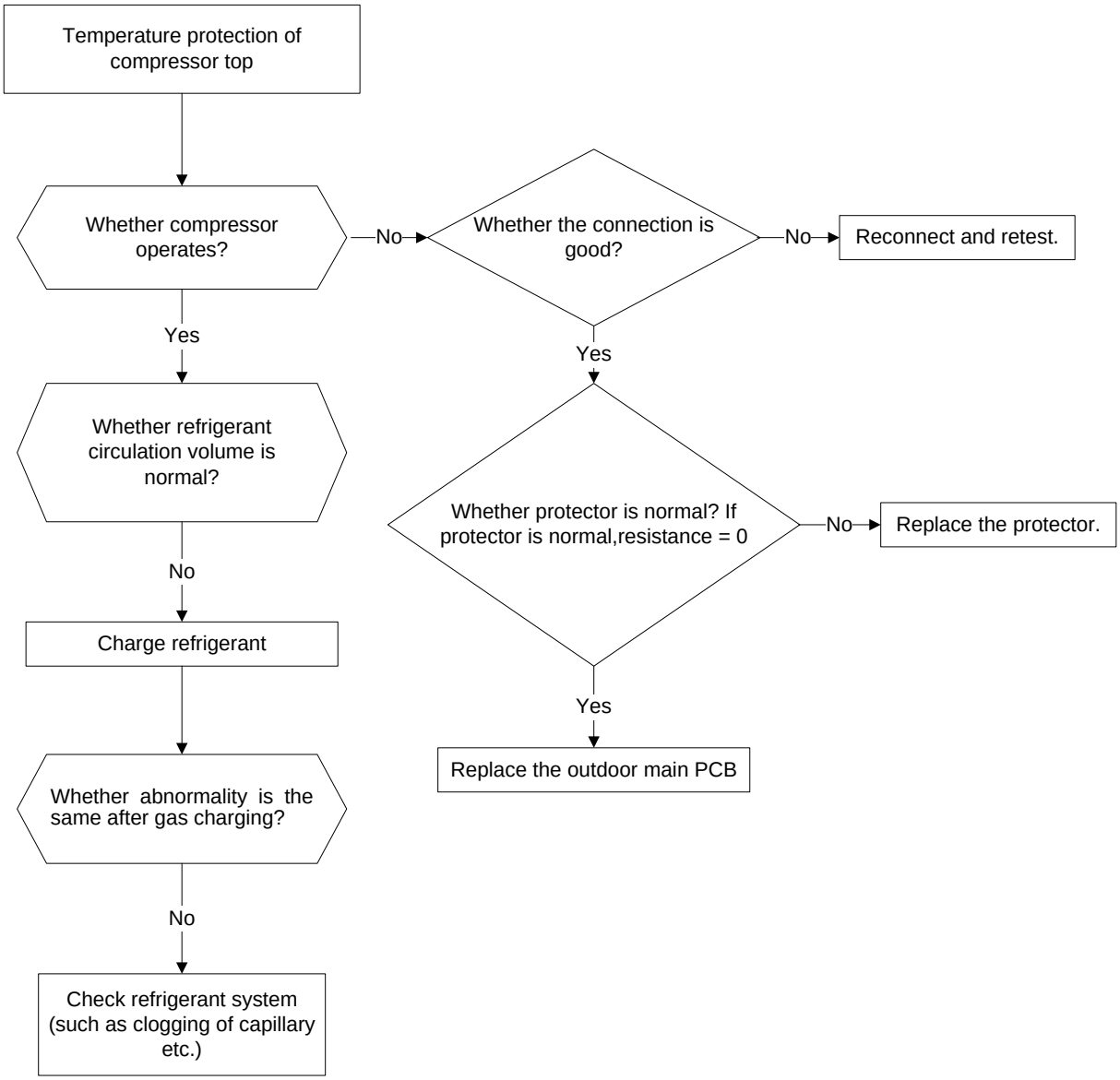

IPM module protection
Check whether the voltage range of P-N on IPM module is normal? DC277-356V for 18-27KBtu/h; DC277-410V for 36KBtu/h
No
Check whether the input power supply is correct? 208-230V, 1N, 60Hz
No
Regulate it to correct, then check whether the system can work normally?
No
Yes
Yes
Check whether the connecting line between main board and the IPM module is connected tightly
No
Connect it tightly, check ok or not?
Yes
No
Check whether the power supply line is connected correctly and tightly
No
Connect it correctly and tightly, check ok or not?
Yes
No
Check whether the connecting line of the compressor is connected correctly or tightly
No
Connect it well, check ok or not?
Yes
No
Check whether the lines in E-part box are connected tightly
No
Connect it tightly, check ok or not?
Yes
No
Replace the IPM module, check whether the system can work normally?
Yes
Check whether the bridge rectifiers are normal? Use the multimeter to measure the resistance between each two terminals, check whether there is the condition that value of resistance is 0
No
Replace the bridge rectifiers
Yes
No
Check if the outdoor fan runs properly or the outdoor unit ventilation is good.
Yes
For AC fan models, please refer to 9.4 Trouble Criterion Of Main Parts, check whether the resistance of the fan motor is normal. If not, replace the fan motor. For DC fan models, refer to the solution of fan speed has been out of control malfunction . Find out the cause and have it solved.
Yes
No
Check whether the connecting line of every reactor is normal? If the line is broken, the resistance of the two ports is ∞(models except foR KSIM40912-H216 (1st gen) & KSIM40912-H216 (2nd gen)； Check whether the PFC module broken (for KSIM40912-H216 (1st gen) & KSIM40912-H216 (2nd gen))
No
Replace the connecting line or reactor or replace the PFC module (for KSIM40912-H216 (2nd gen))
Replace the main board; check whether the system can work normally?
Yes
No
Replace the compressor, check whether the system can work normally?
Yes
Yes
Trouble is solved

8.4.1.7 Over voltage or too low voltage protection diagnosis and solution.



8.4.1.8 Temperature protection of compressor top diagnosis and solution.

Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Over load protector faulty ● System block ● Outdoor PCB faulty

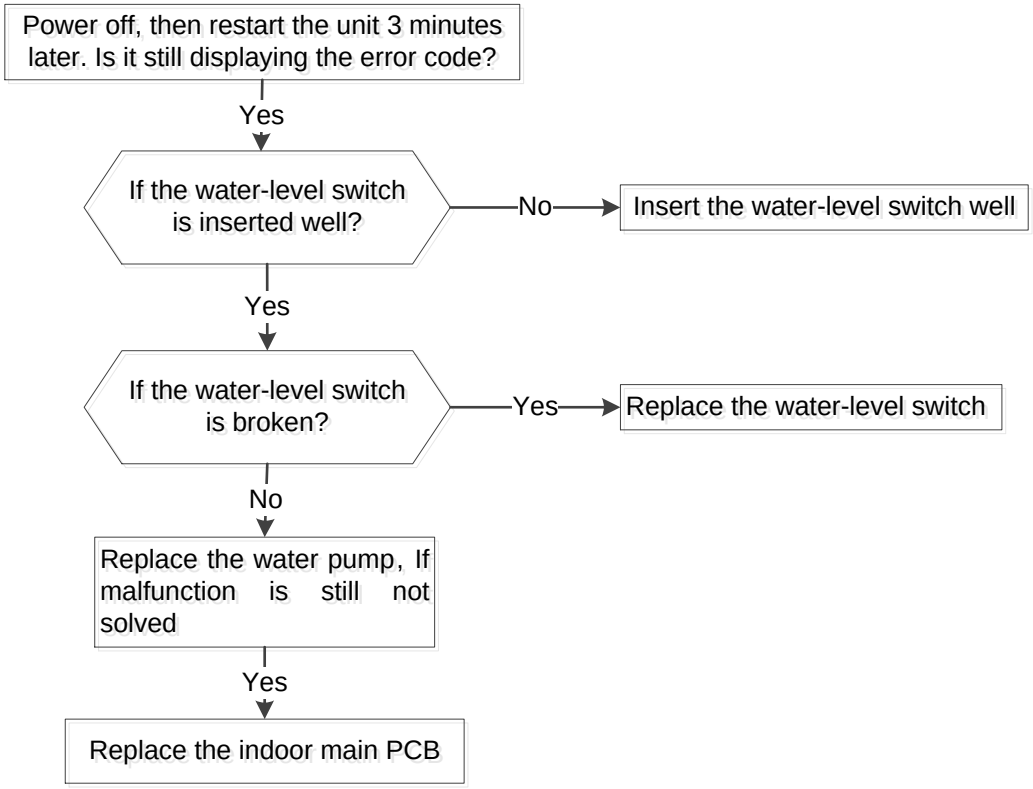


8.4.1.9 Inverter compressor drive error diagnosis and solution

The trouble shooting is same with one of IPM module protection(P0).

8.4.1.10 Water-level alarm malfunction diagnosis and solution (For cassette / ducted)

Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Water-level switch faulty ● Water pump faulty ● Indoor PCB faulty



8.4.1.11 Mode conflict.

Error Code	P5
Malfunction decision conditions	The indoor units cannot work cooling mode and heating at same time. Heating mode has a priority.
Unit action	● Suppose Indoor unit A working in cooling mode or fan mode, and indoor unit B is set to heating mode, then A will change to off and B will work in heating mode. ● Suppose Indoor unit A working in heating mode, and indoor unit B is set to cooling mode or fan mode, then B will change to stand by and A will be no change.

	Cooling mode	Heating Mode	Fan	Off
Cooling mode	No	Yes	No	No
Heating Mode	Yes	No	Yes	No
Fan	No	Yes	No	No
Off	No	No	No	No

No: No mode conflict;

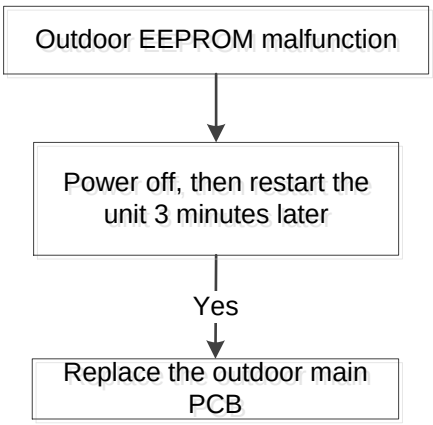
Yes: Mode conflict

8.4.2 Outdoor unit trouble shooting

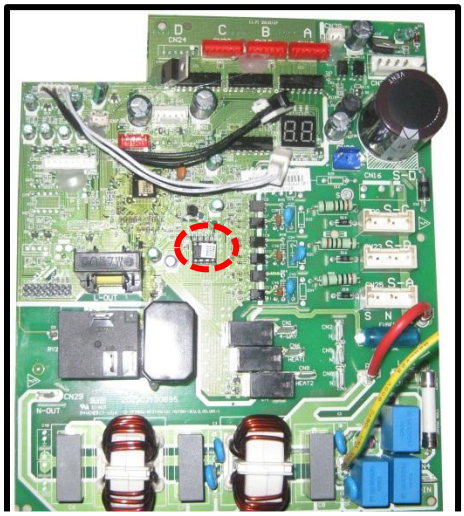
8.4.2.1 E0 (Outdoor EEPROM malfunction) error diagnosis and solution

Error Code	E0
Malfunction decision conditions	PCB main chip does not receive feedback from EEPROM chip
Supposed causes	● Installation mistake ● PCB faulty

Trouble shooting:



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

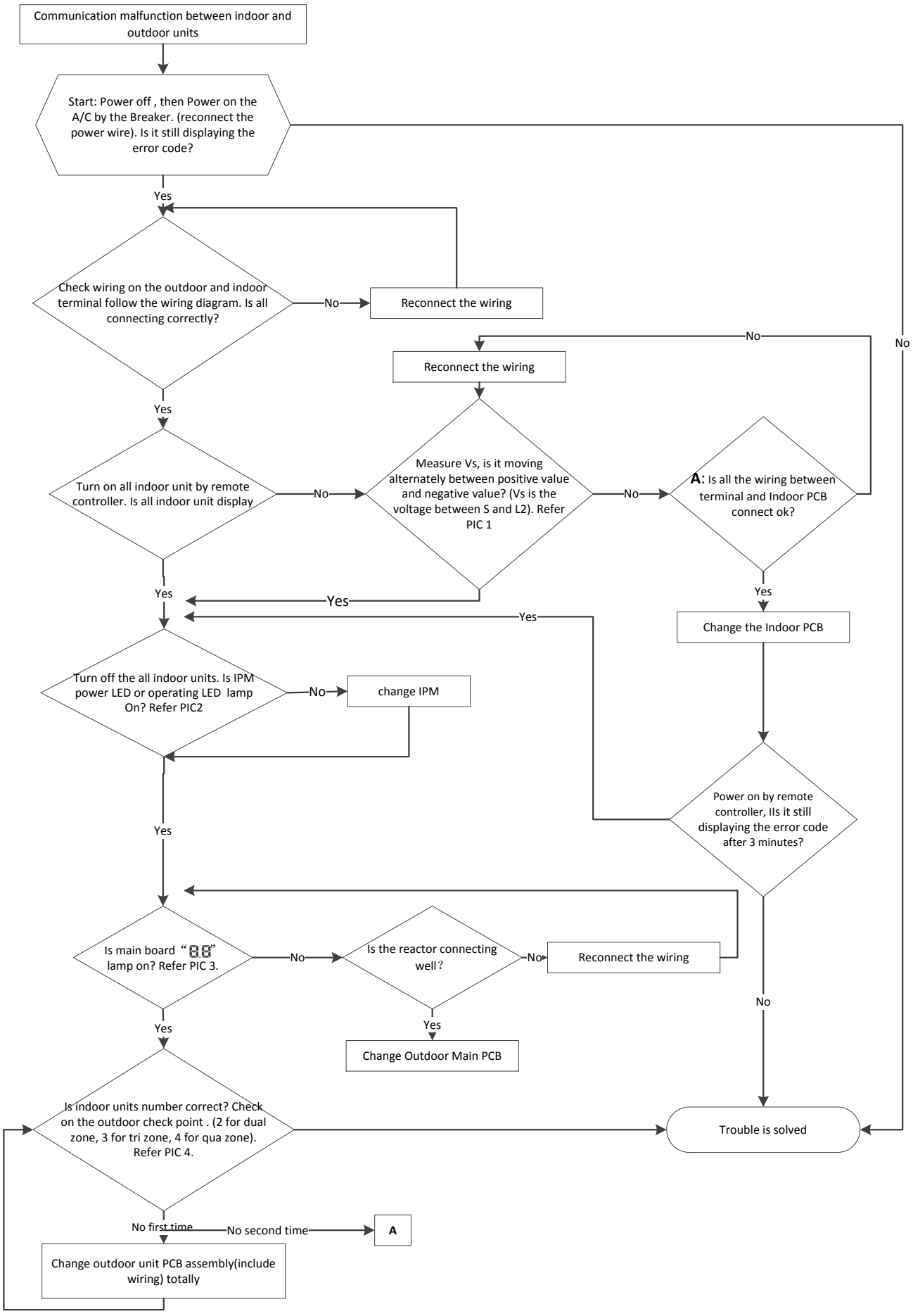


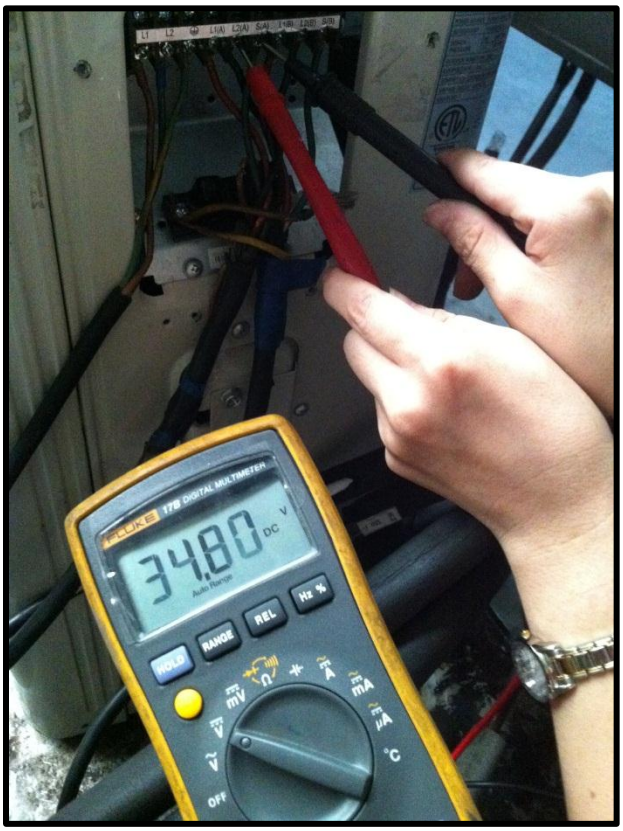
Outdoor PCB (KSIM330-H219)

8.4.2.2 E2(Communication malfunction between indoor and outdoor units) error diagnosis and solution.

Error Code	E2
Malfunction decision conditions	Indoor unit does not receive the feedback from outdoor unit during 120 seconds or outdoor unit does not receive the feedback from any one indoor unit during 180 seconds.
Supposed causes	● Wiring mistake ● Indoor or outdoor PCB faulty

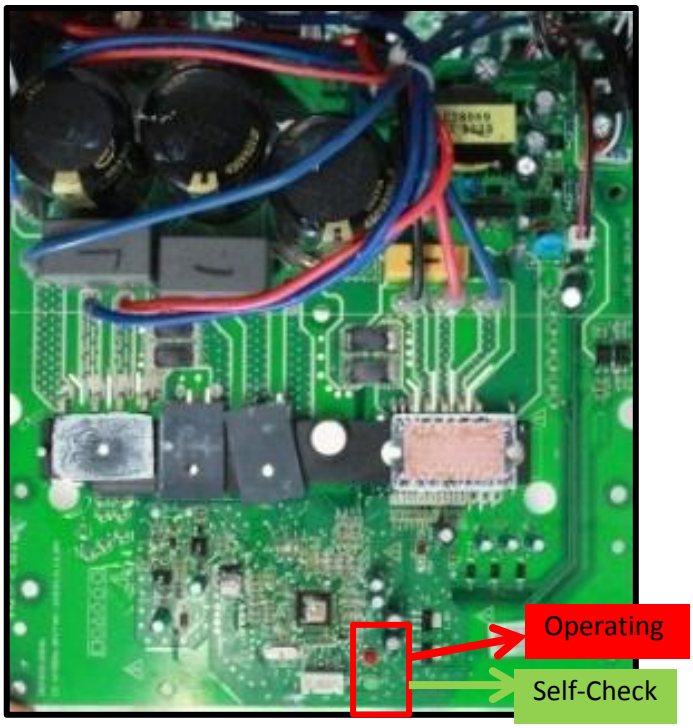
Trouble shooting:


Communication malfunction between indoor and outdoor units
Start: Power off , then Power on the A/C by the Breaker. (reconnect the power wire). Is it still displaying the error code?
Yes
No
Check wiring on the outdoor and indoor terminal follow the wiring diagram. Is all connecting correctly?
No
Reconnect the wiring
Yes
Reconnect the wiring
No
Turn on all indoor unit by remote controller. Is all indoor unit display
No
Measure Vs, is it moving alternately between positive value and negative value? (Vs is the voltage between S and L2). Refer PIC 1
No
A: Is all the wiring between terminal and Indoor PCB connect ok?
Yes
Change the Indoor PCB
Yes
Yes
Yes
Turn off the all indoor units. Is IPM power LED or operating LED lamp On? Refer PIC2
No
change IPM
Power on by remote controller, IIs it still displaying the error code after 3 minutes?
Yes
No
Is main board "88" lamp on? Refer PIC 3.
No
Is the reactor connecting well ?
No
Reconnect the wiring
Yes
Change Outdoor Main PCB
Yes
Is indoor units number correct? Check on the outdoor check point . (2 for dual zone, 3 for tri zone, 4 for qua zone). Refer PIC 4.
Trouble is solved
No first time
No second time
A
Change outdoor unit PCB assembly(include wiring) totally

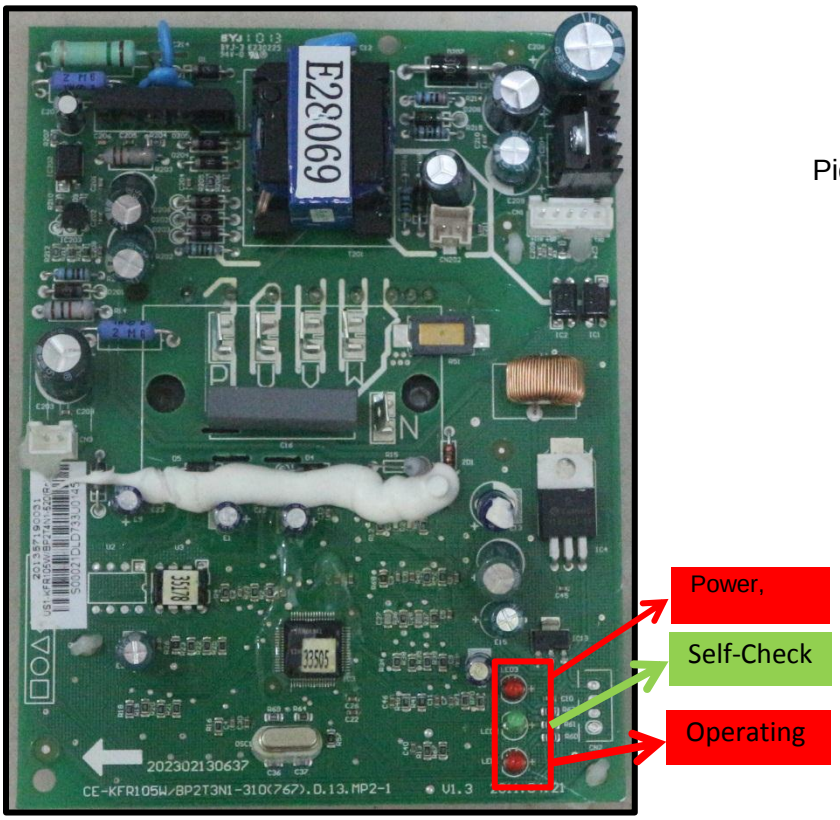


Pic 1: Use a multimeter to test the DC voltage between L2 port and S port of outdoor unit. The red pin of multimeter connects with L2 port while the black pin is for S port.

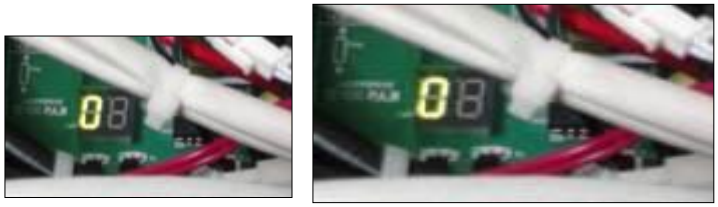
When AC is normal running, the voltage will move alternately between positive value and negative value.



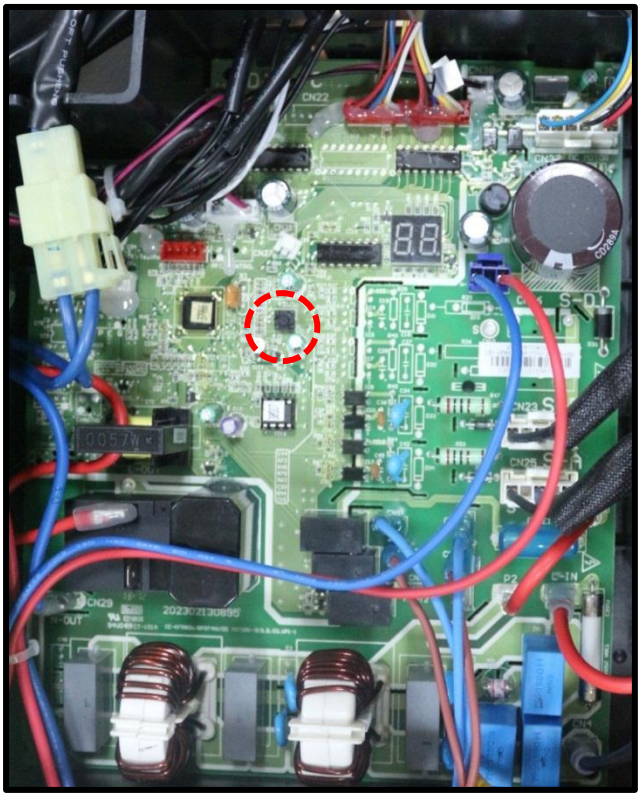
Pic 2: IPM (For dual/tri-zone)



Pic 2: IPM (For qua-zone)



PIC3: Main board LED when power on and unit standby.

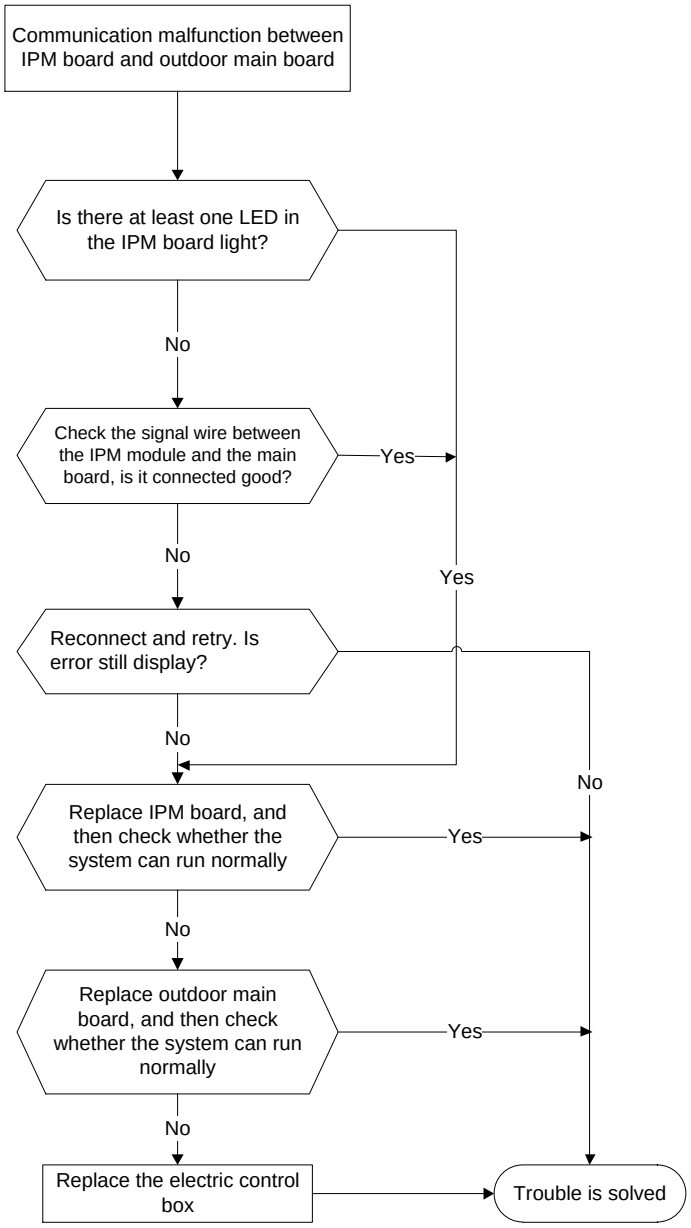


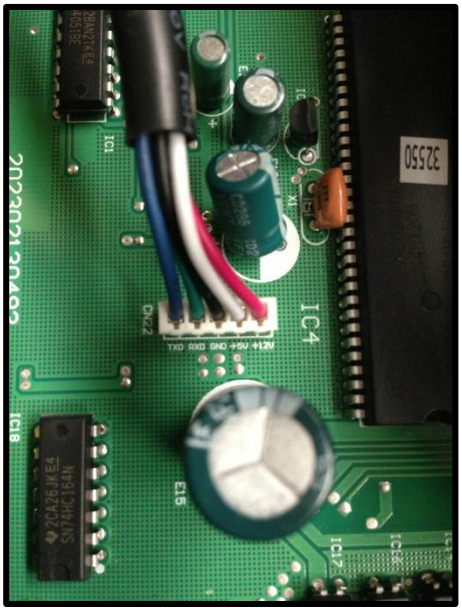
PIC 4: Check point button, press 1 time for check how many indoor units are connected.

8.4.2.3 E3 (Communication malfunction between IPM board and outdoor main board) error diagnosis

Error Code	E3
Malfunction decision conditions	PCB main chip does not receive feedback from IPM module during 60 seconds.
Supposed causes	● Wiring mistake ● PCB faulty

Trouble shooting:

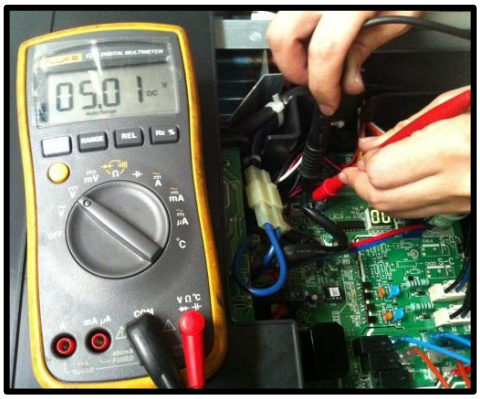




Remark:

Use a multimeter to test the DC voltage between black pin and white pin of signal wire The normal value should be around 5V.

Use a multimeter to test the DC voltage between black pin and red pin of signal wire. The normal value should be around 12V.

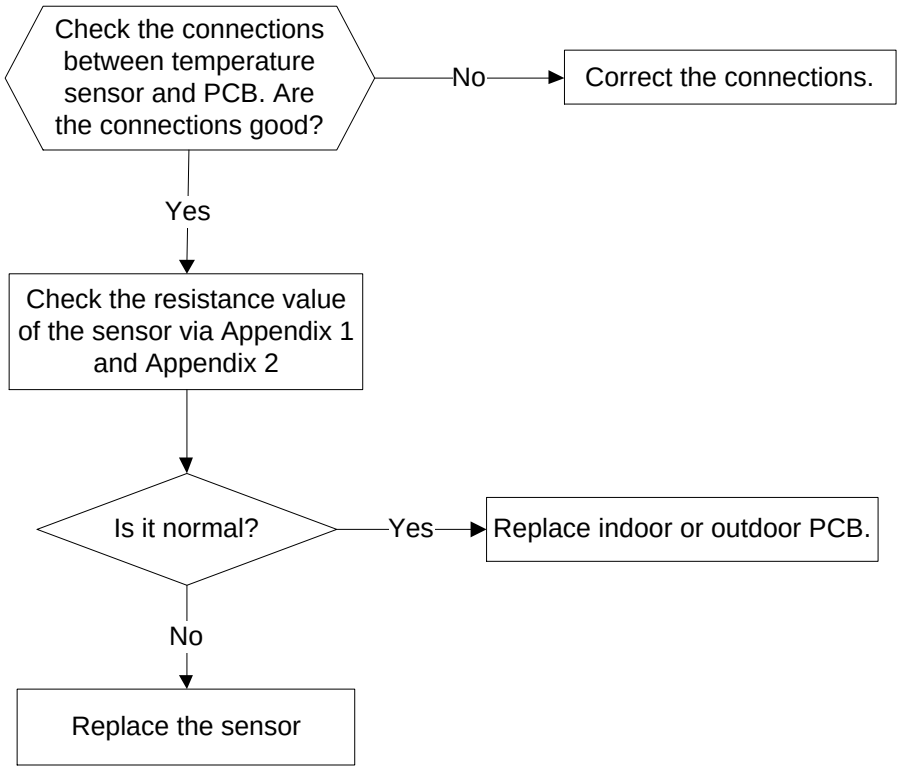


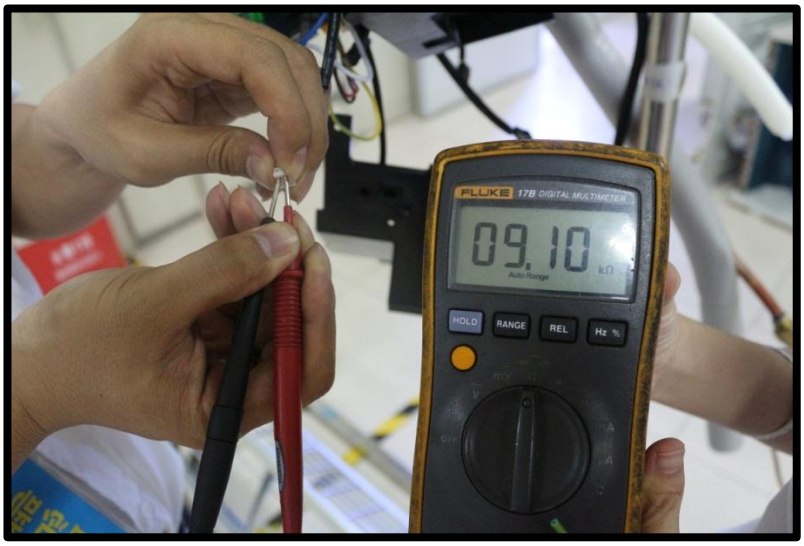
8.4.2.4E4(open or short circuit of outdoor temperature sensor) diagnosis and solution
F1/F2/F3/F4/F5 (open or short circuit of indoor coil temperature sensor) diagnosis and solution.

.

Error Code	E4/F1/F2/F3/F4/F5
Malfunction decision conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Sensor faulty ● PCB faulty

Trouble shooting:

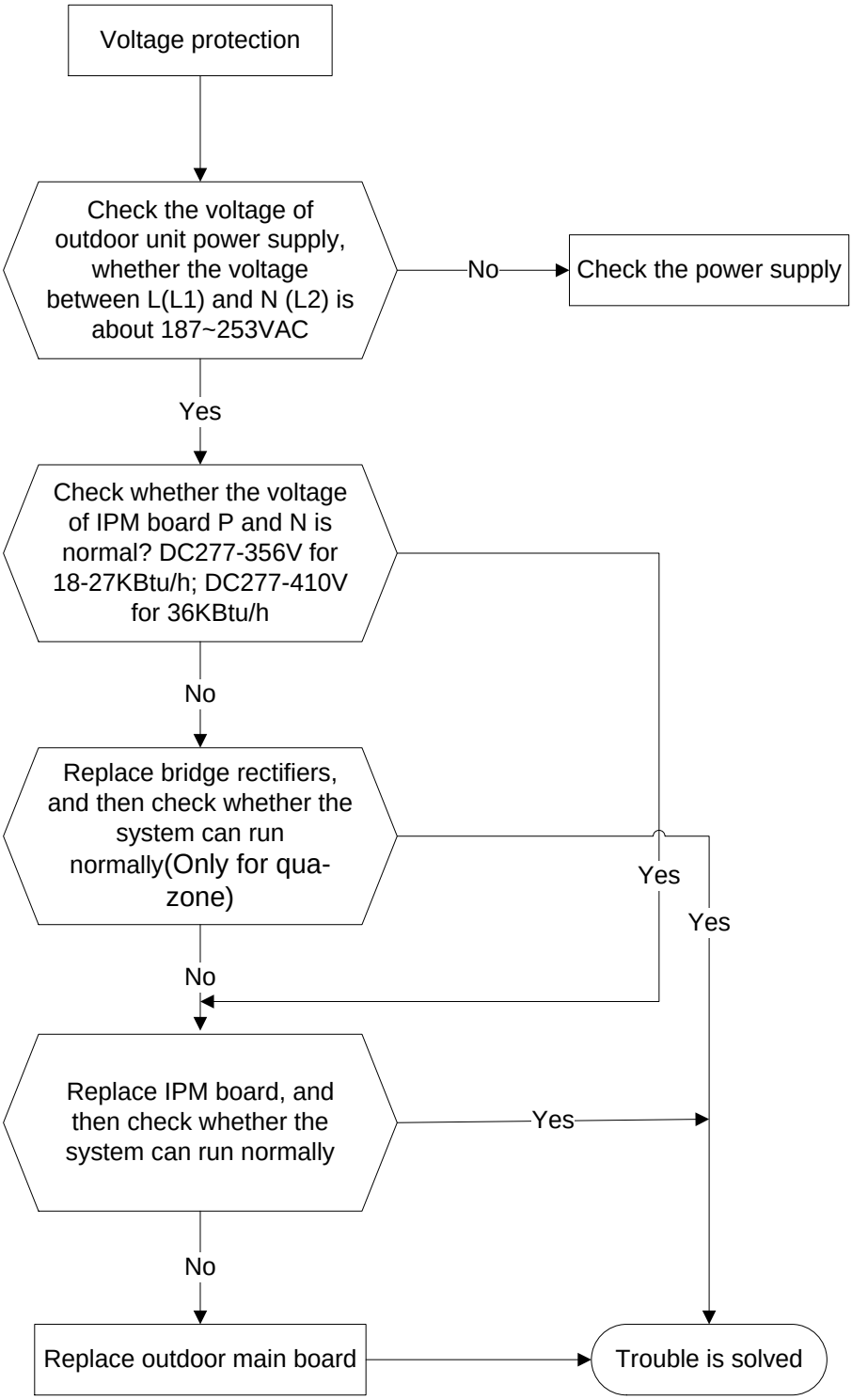


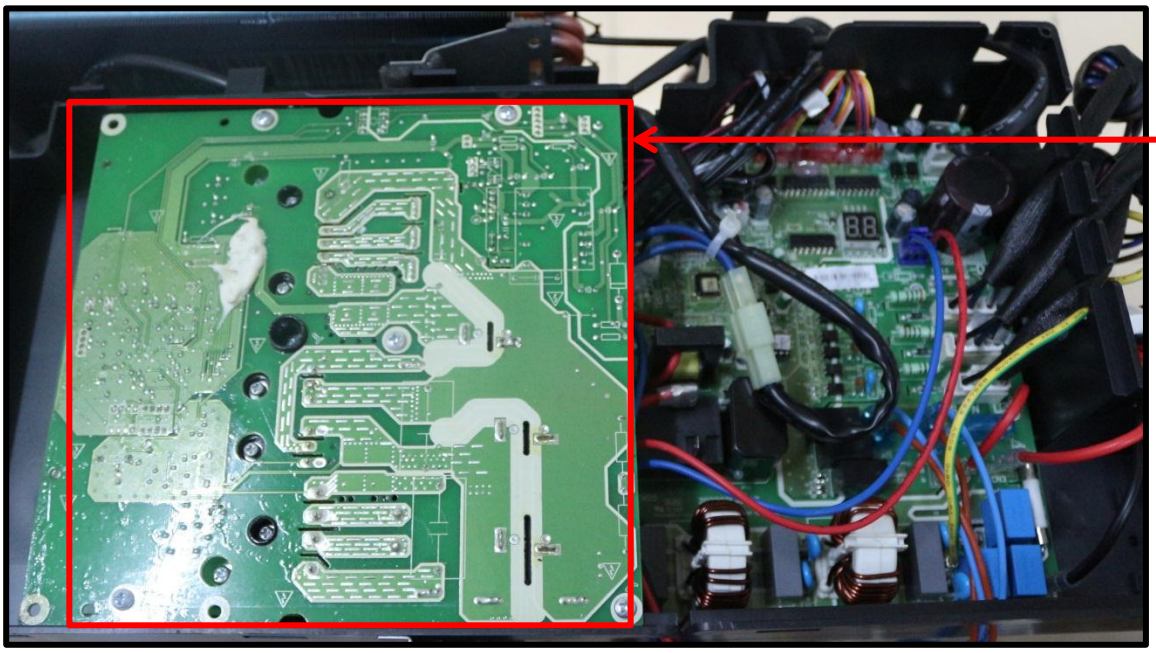


8.4.2.5 E5 (Voltage protection) error diagnosis and solution.

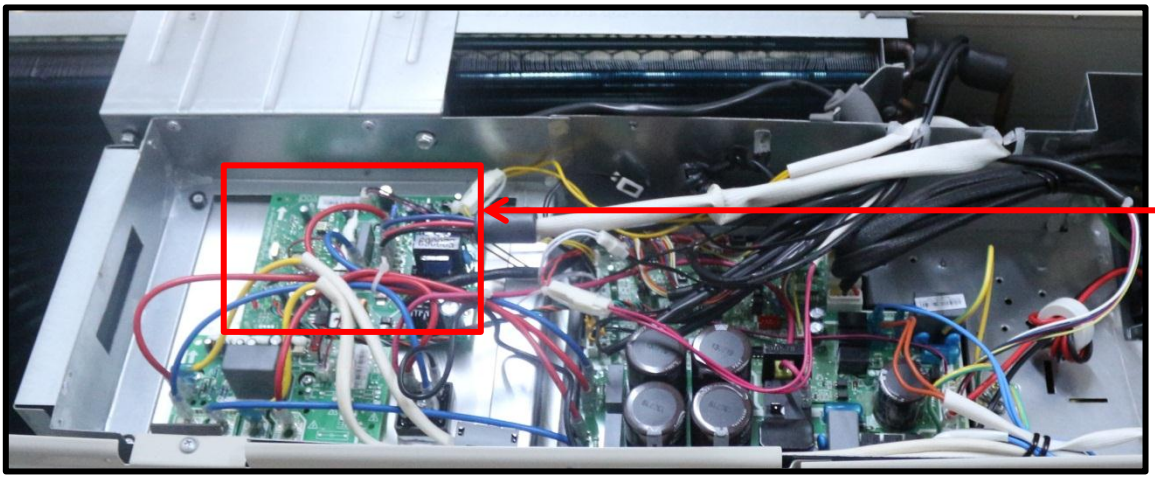
Error Code	E5
Malfunction decision conditions	An abnormal voltage rise or drop is detected by checking the specified voltage detection circuit.
Supposed causes	● Power supply problems. ● System leakage or block ● PCB faulty

Trouble shooting:



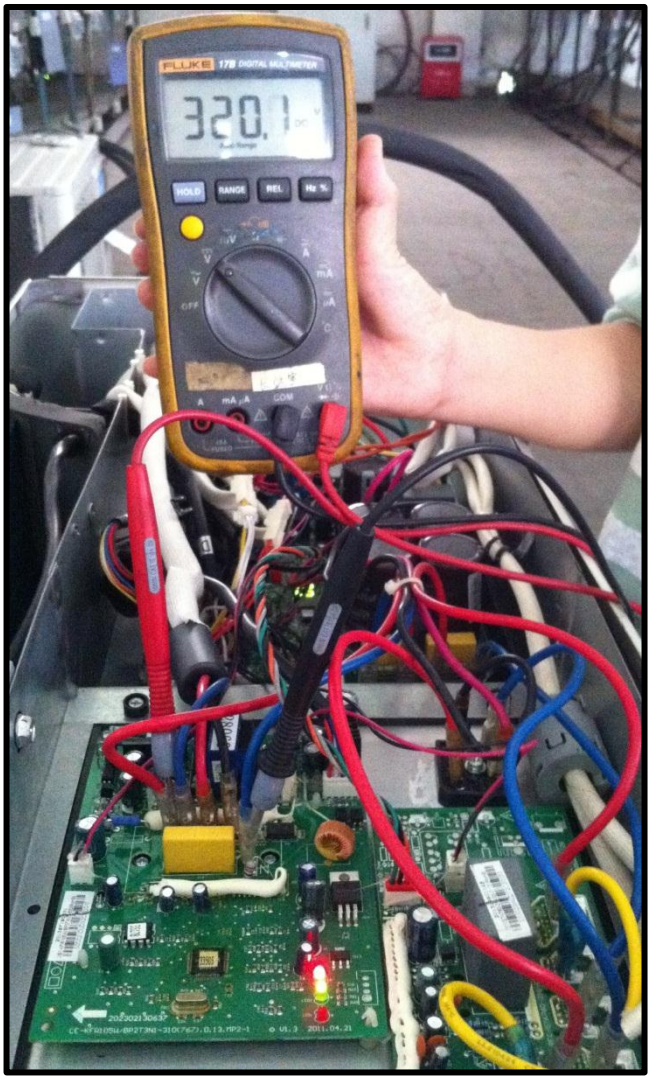


IPM (for dual/tri-zone)



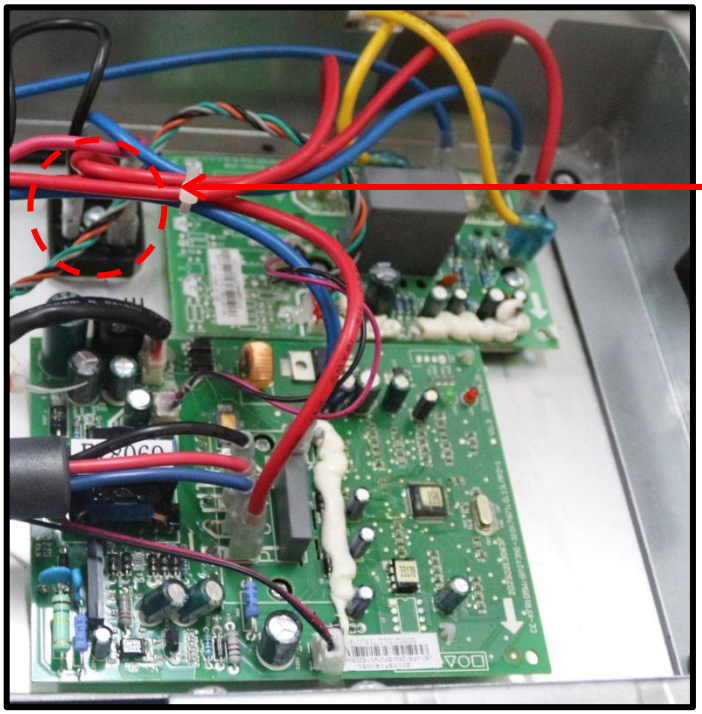
IPM (for qua-zone)

P-N (for dual/tri-zone)

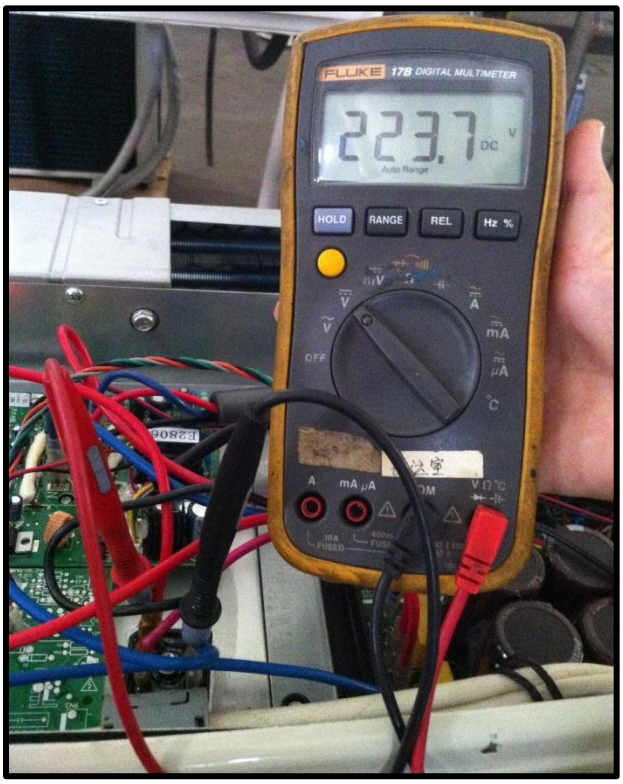


P-N (for qua-zone)

bridge rectifier
(for dual/tri-zone)



bridge rectifier
(for qua-zone)



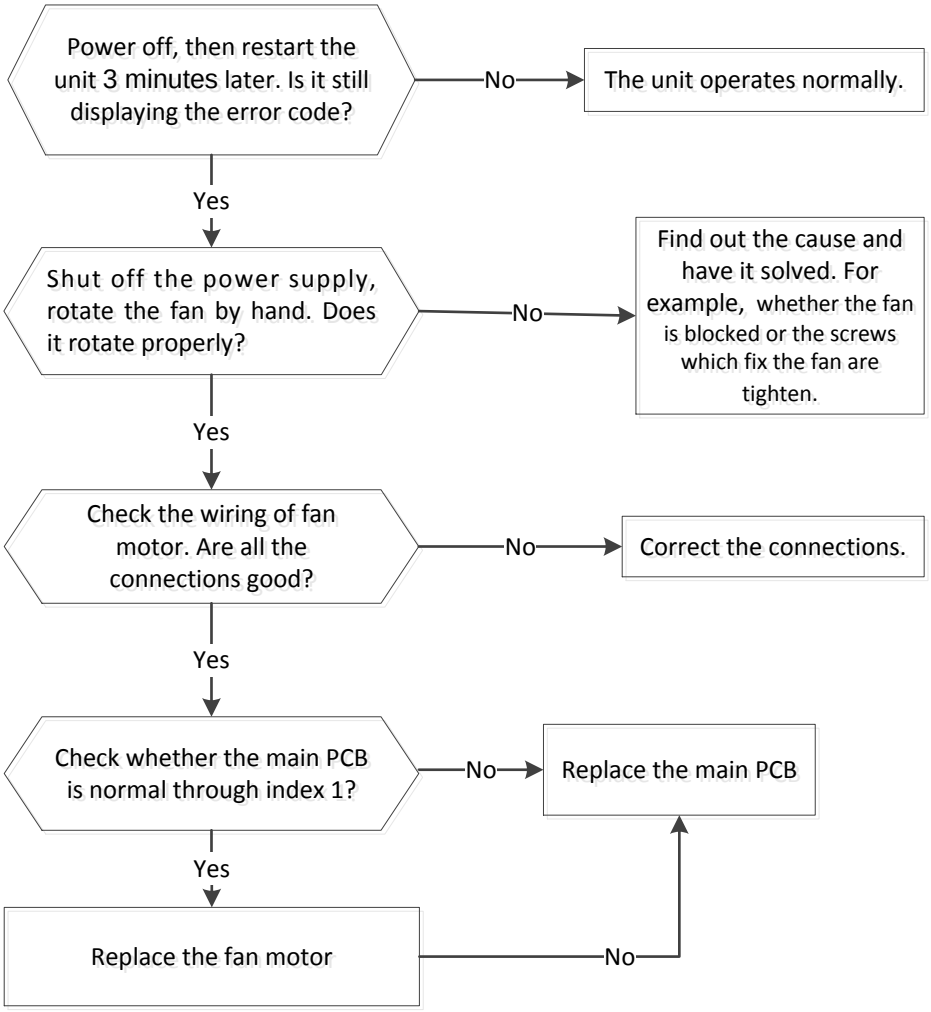
Remark:

Measure the DC voltage between + and - port. The normal value should be 190V~250V.

8.4.2.7 E8 (Outdoor fan speed has been out of control) diagnosis and solution

Error Code	E8
Malfunction decision conditions	When outdoor fan speed keeps too low (300RPM) or too high(2400RPM) for certain time, the unit will stop and the LED will display the failure.
Supposed causes	● Wiring mistake ● Fan ass'y faulty ● Fan motor faulty ● PCB faulty

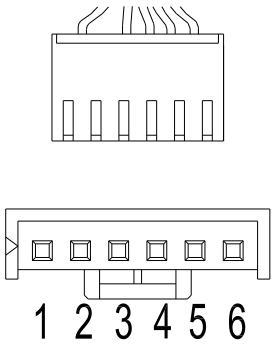
Trouble shooting:



Index 1:

➢ 1. DC fan motor(control chip is inside fan motor)

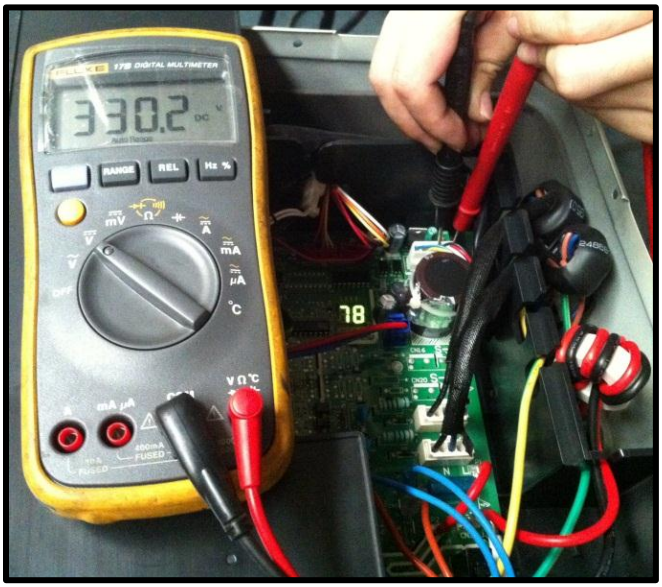
Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must have problems and need to be replaced.



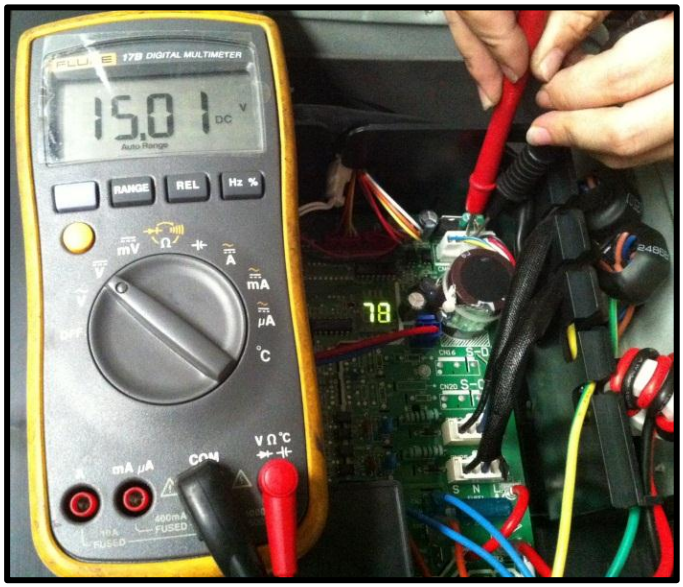
DC motor voltage input and output

NO.	Color	Signal	Voltage
1	Red	Vs/Vm	200~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5~16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5~16.5V

Vs

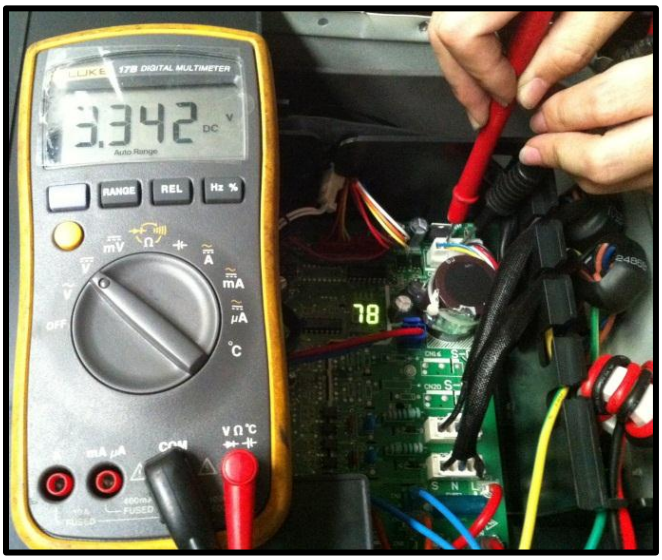


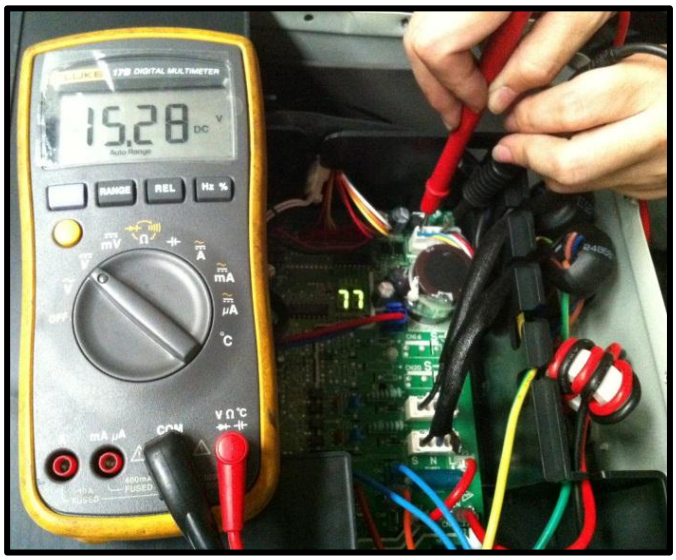
Vcc



Vsp

FG

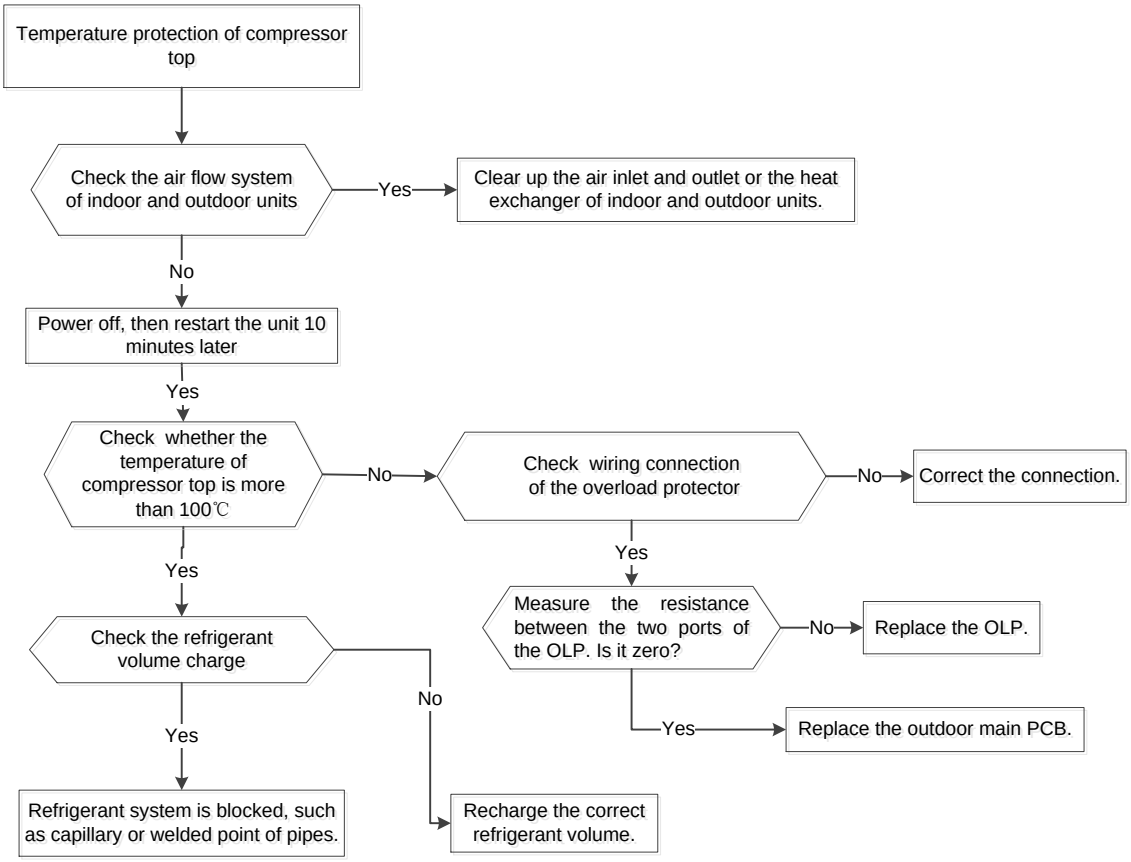

FLUKE 179 DIGITAL MULTIMETER
3.342
DC
V
Auto Range
RANGE
REL
Hz %
OFF
mA
µA
°C
V Ω °C
mA µA
COM
78

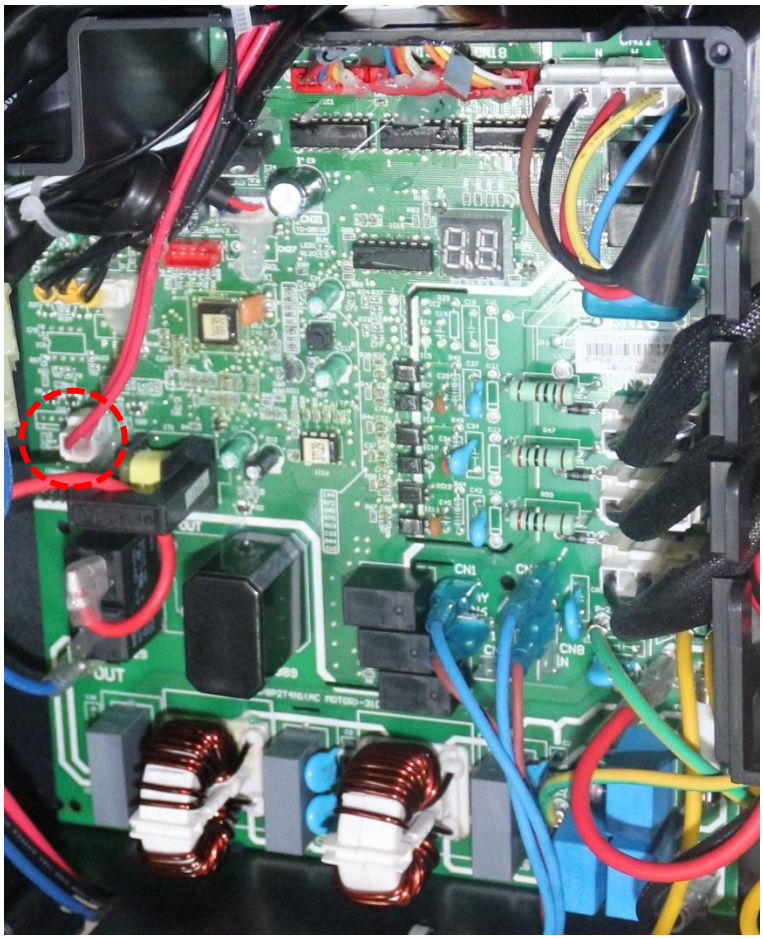

FLUKE 179 DIGITAL MULTIMETER
15.28
DC
V
Auto Range
RANGE
REL
Hz %
OFF
mA
µA
°C
V Ω °C
mA µA
COM
77

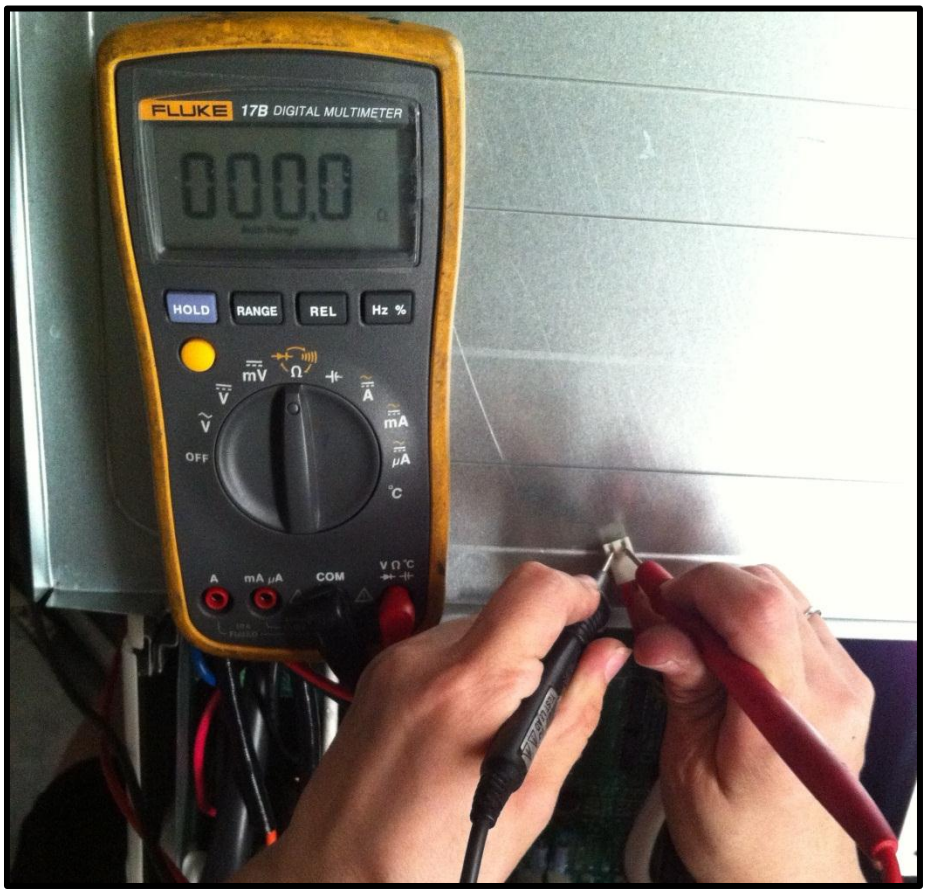
8.4.2.8 P0 (Temperature protection of compressor top) error diagnosis and solution.

Error Code	P0
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Over load protector faulty ● System block ● Outdoor PCB faulty

Trouble shooting:



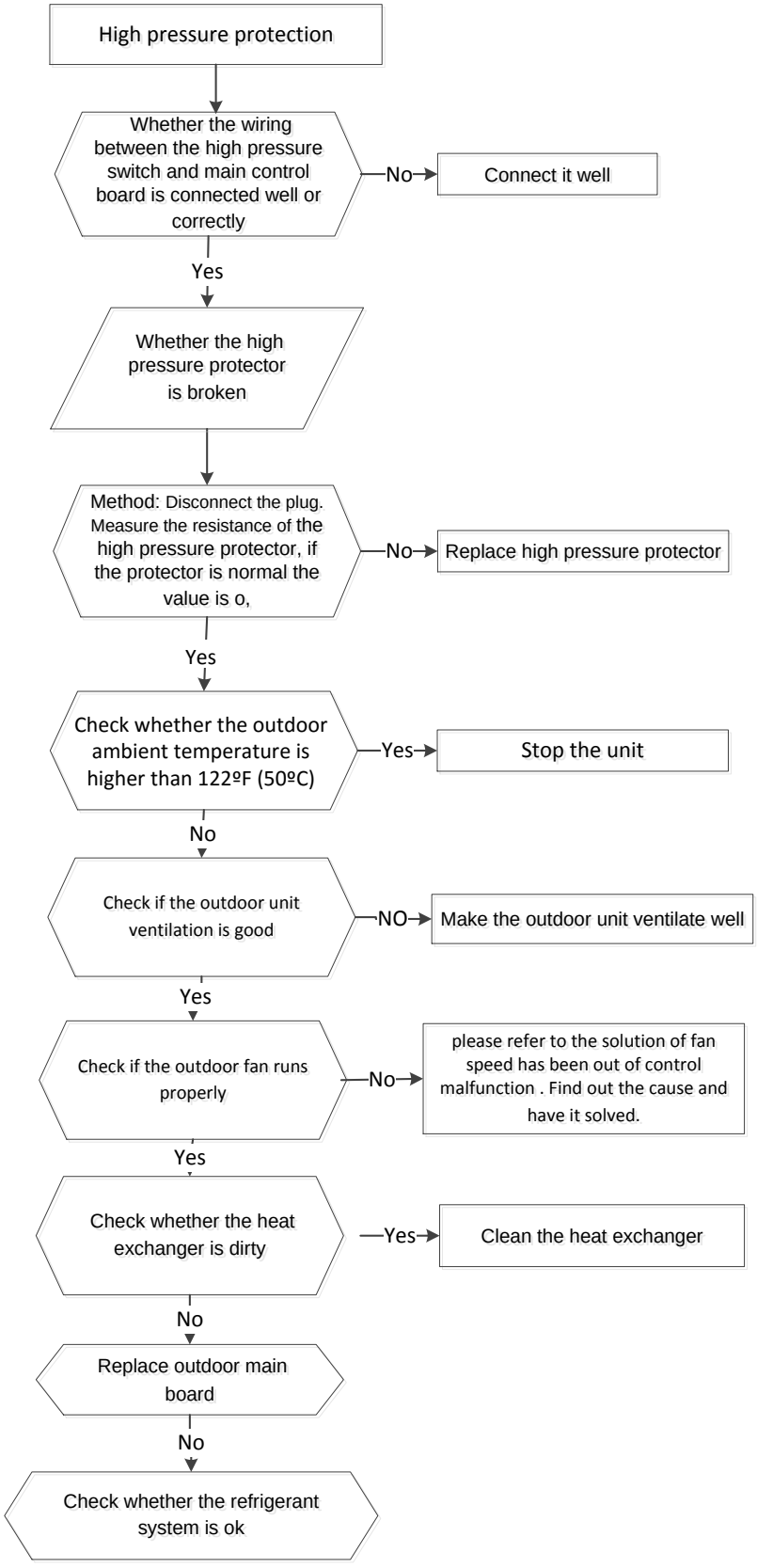


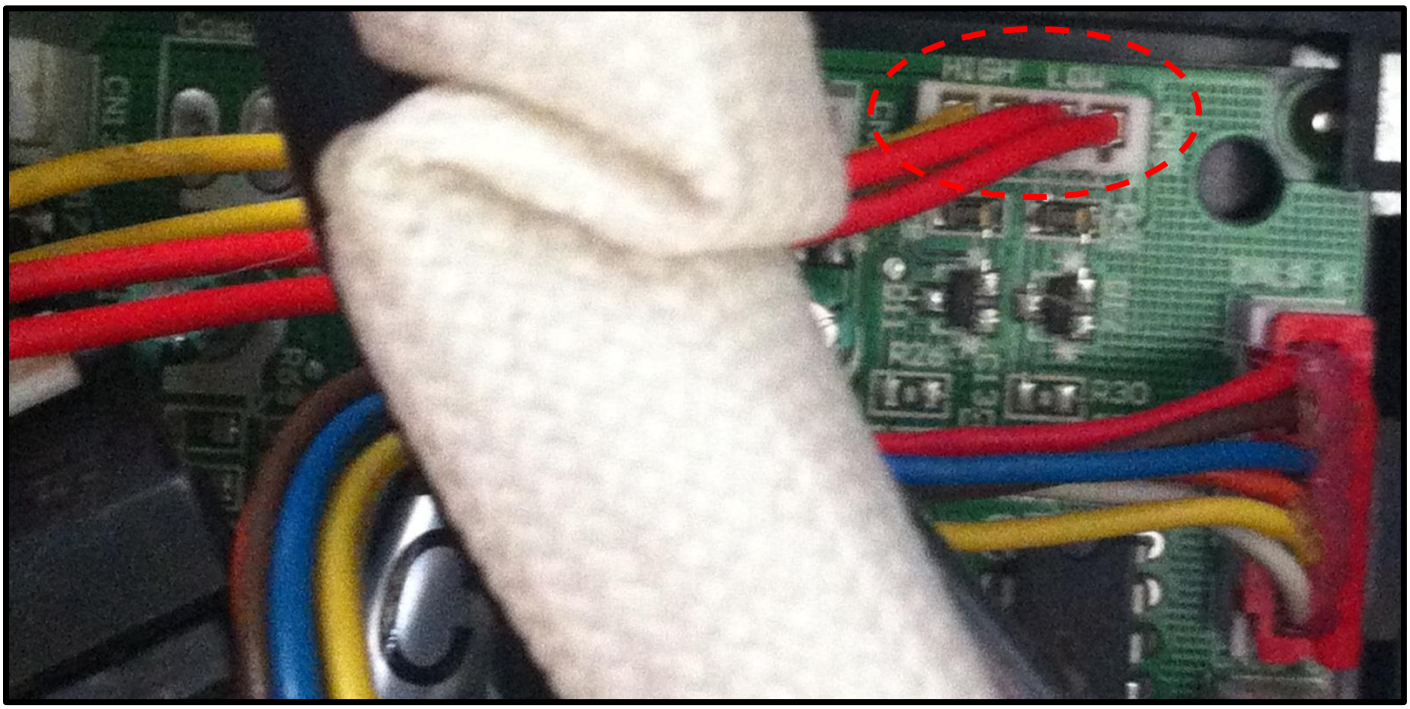

FLUKE 17B DIGITAL MULTIMETER
HOLD
RANGE
REL
Hz %
OFF
COM

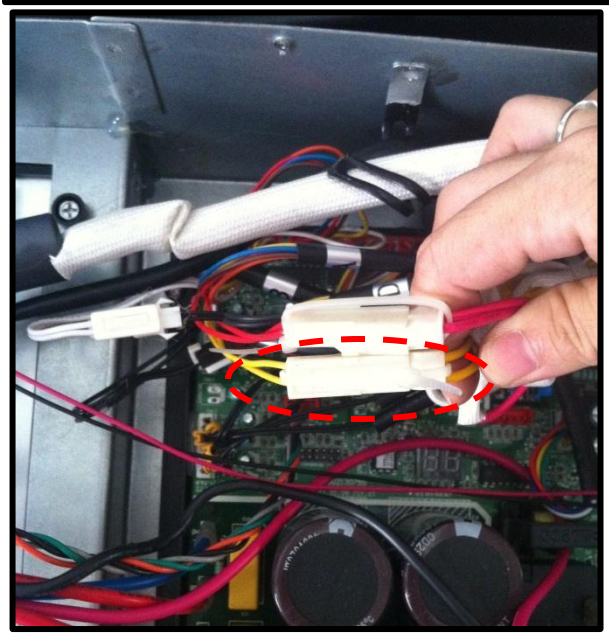
8.4.2.9 P1 (High pressure protection) error diagnosis and solution.

Error Code	P1
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Over load protector faulty ● System block ● Outdoor PCB faulty

Trouble shooting:


High pressure protection
Whether the wiring between the high pressure switch and main control board is connected well or correctly
No
Connect it well
Yes
Whether the high pressure protector is broken
Method: Disconnect the plug. Measure the resistance of the high pressure protector, if the protector is normal the value is o,
No
Replace high pressure protector
Yes
Check whether the outdoor ambient temperature is higher than 122ºF (50ºC)
Yes
Stop the unit
No
Check if the outdoor unit ventilation is good
NO
Make the outdoor unit ventilate well
Yes
Check if the outdoor fan runs properly
No
please refer to the solution of fan speed has been out of control malfunction . Find out the cause and have it solved.
Yes
Check whether the heat exchanger is dirty
Yes
Clean the heat exchanger
No
Replace outdoor main board
No
Check whether the refrigerant system is ok


HIGH
LOW
R30

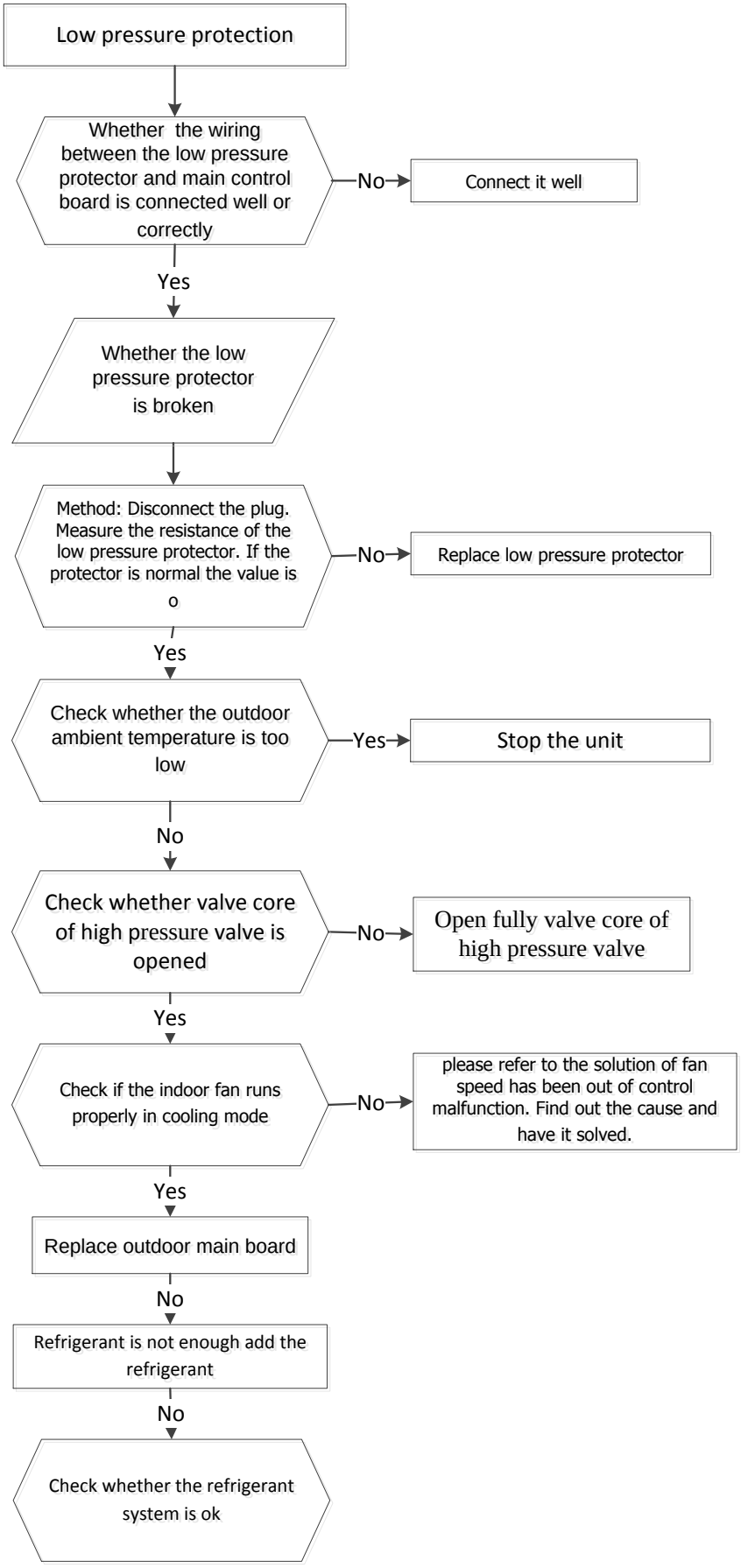


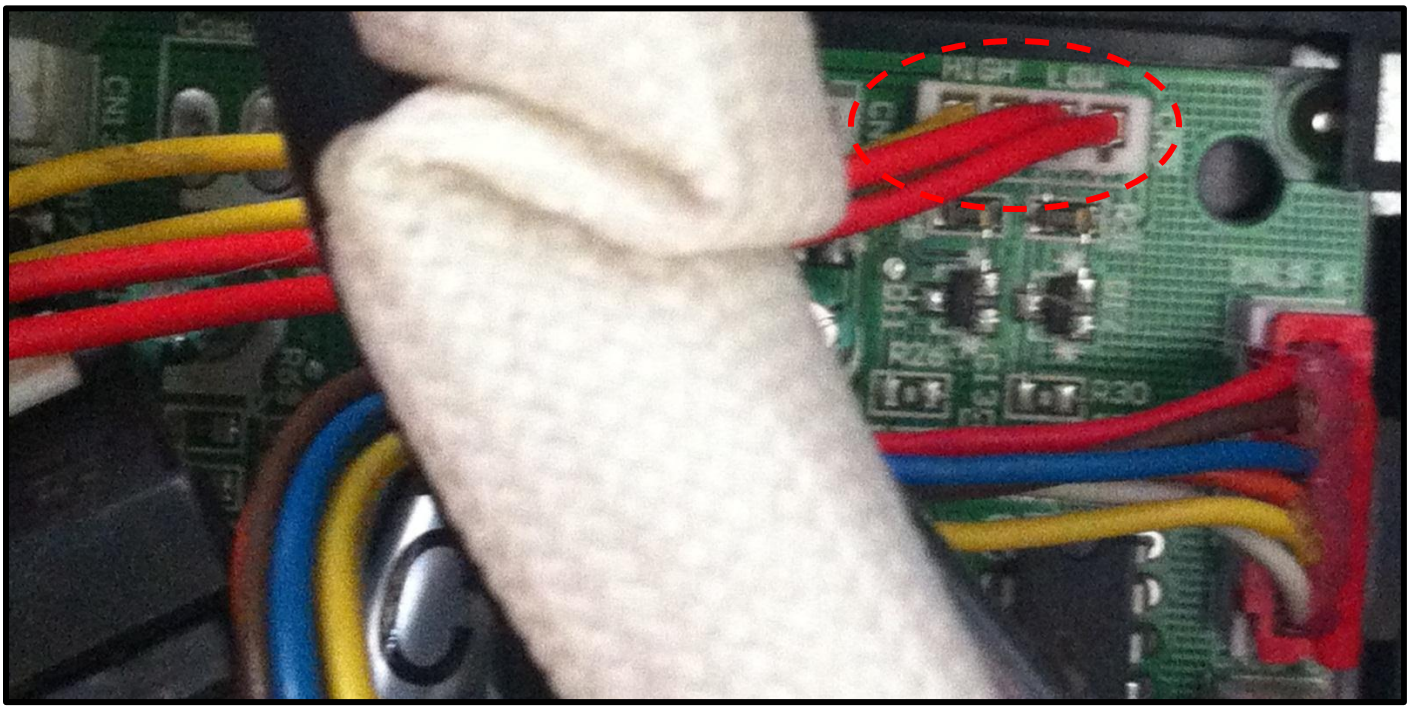

FLUKE 73III MULTIMETER
00.2
OFF
300mV
Ω
10A
300 mA
COM

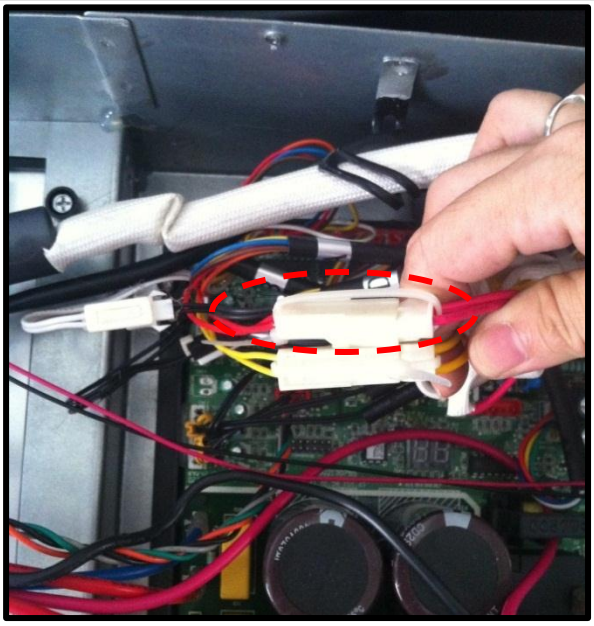
8.4.2.10 P2 (Low pressure protection) error diagnosis and solution.

Error Code	P2
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	● Wiring mistake ● Over load protector faulty ● System block ● Outdoor PCB faulty

Trouble shooting:


Low pressure protection
Whether the wiring between the low pressure protector and main control board is connected well or correctly
No
Connect it well
Yes
Whether the low pressure protector is broken
Method: Disconnect the plug. Measure the resistance of the low pressure protector. If the protector is normal the value is o
No
Replace low pressure protector
Yes
Check whether the outdoor ambient temperature is too low
Yes
Stop the unit
No
Check whether valve core of high pressure valve is opened
No
Open fully valve core of high pressure valve
Yes
Check if the indoor fan runs properly in cooling mode
No
please refer to the solution of fan speed has been out of control malfunction. Find out the cause and have it solved.
Yes
Replace outdoor main board
No
Refrigerant is not enough add the refrigerant
No
Check whether the refrigerant system is ok


HIGH
LOW
R30

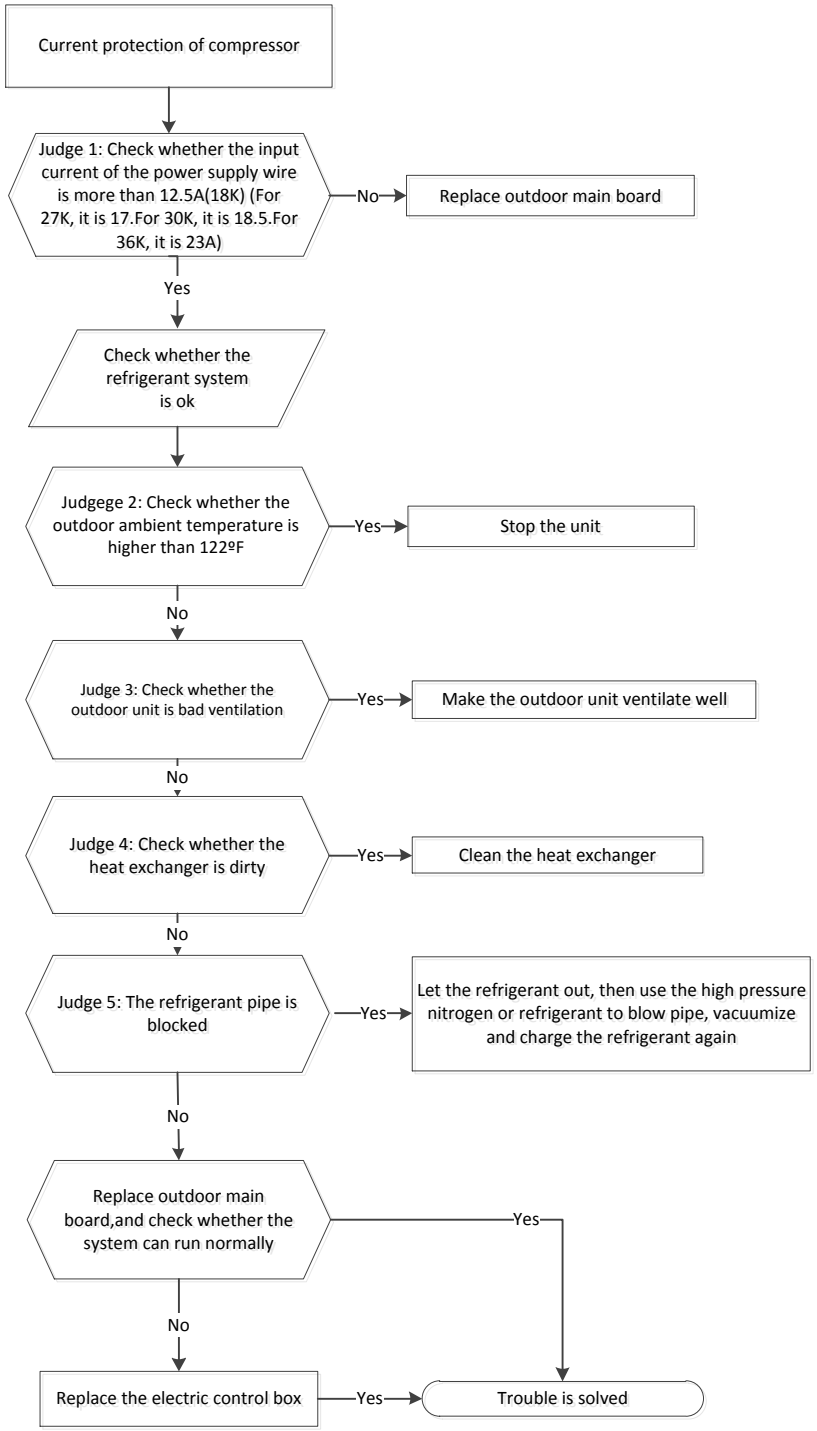



FLUKE
OFF
300mV
Ω
10A
COM

8.4.2.11 P3 (Current protection of compressor) error diagnosis and solution.

Error Code	P3
Malfunction decision conditions	If the outdoor current exceeds the current limit value, the LED will display the failure.
Supposed causes	● Wiring mistake ● Over load protector faulty ● System block ● Outdoor PCB faulty

Trouble shooting:



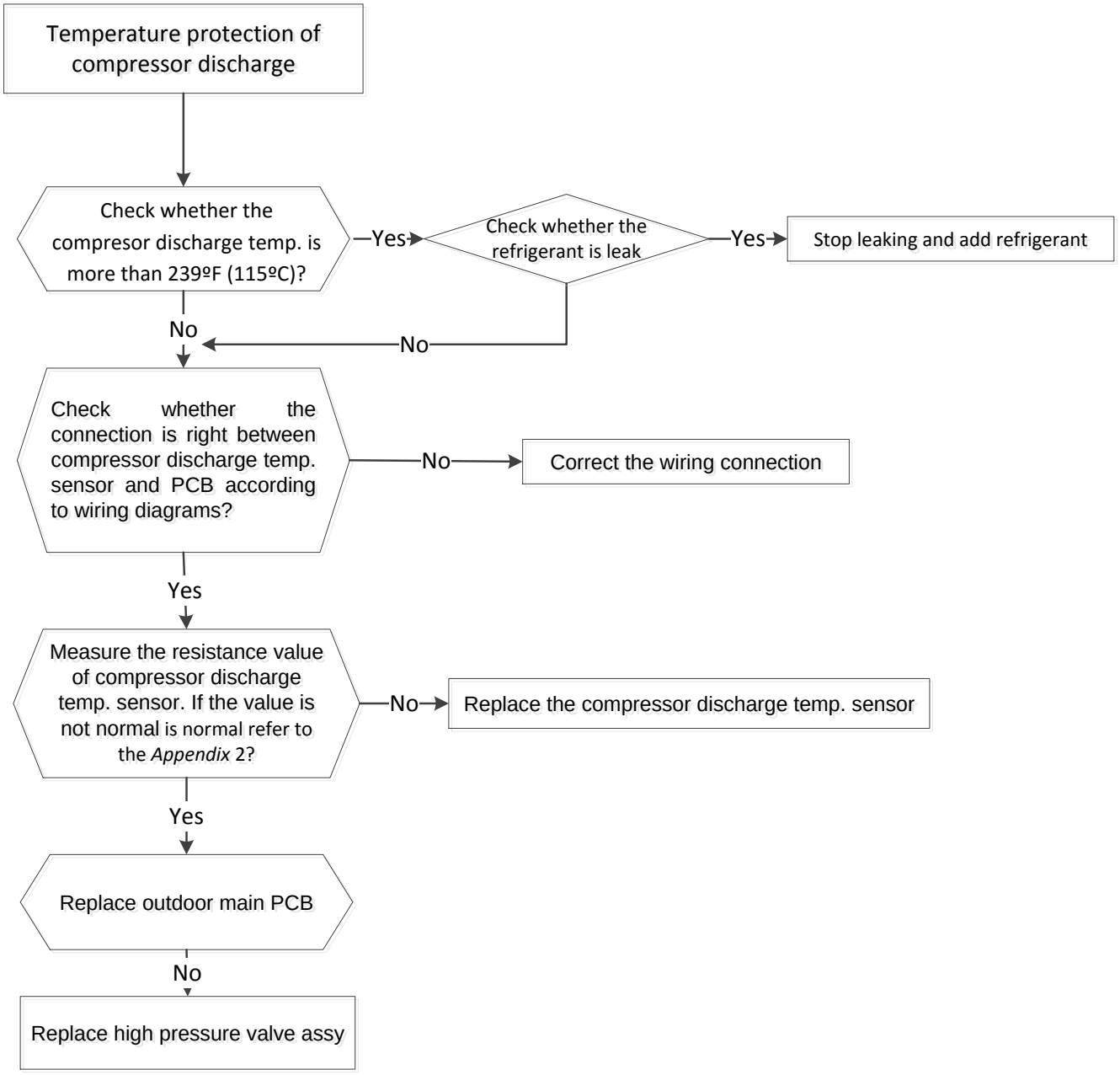

HIOKI 3282
6.53
DIGITAL CLAMP ON HITESTER
CAT Ⅳ
600V
COM
TEMP


HIOKI 3282
6.61
DIGITAL CLAMP ON HITESTER
CAT Ⅳ
600V
COM
TEMP

8.4.2.12 P4 (Temperature protection of compressor discharge) error diagnosis and solution.

Error Code	P4
Malfunction decision conditions	When the compressor discharge temperature(T5) is more than 239ºF (115ºC) for 10 seconds, the compressor will stop andrestart till T5 is less than 194ºF (90ºC).
Supposed causes	● Refrigerant leakage ● Wiring mistake ● The discharge temperature sensor faulty ● Outdoor PCB faulty

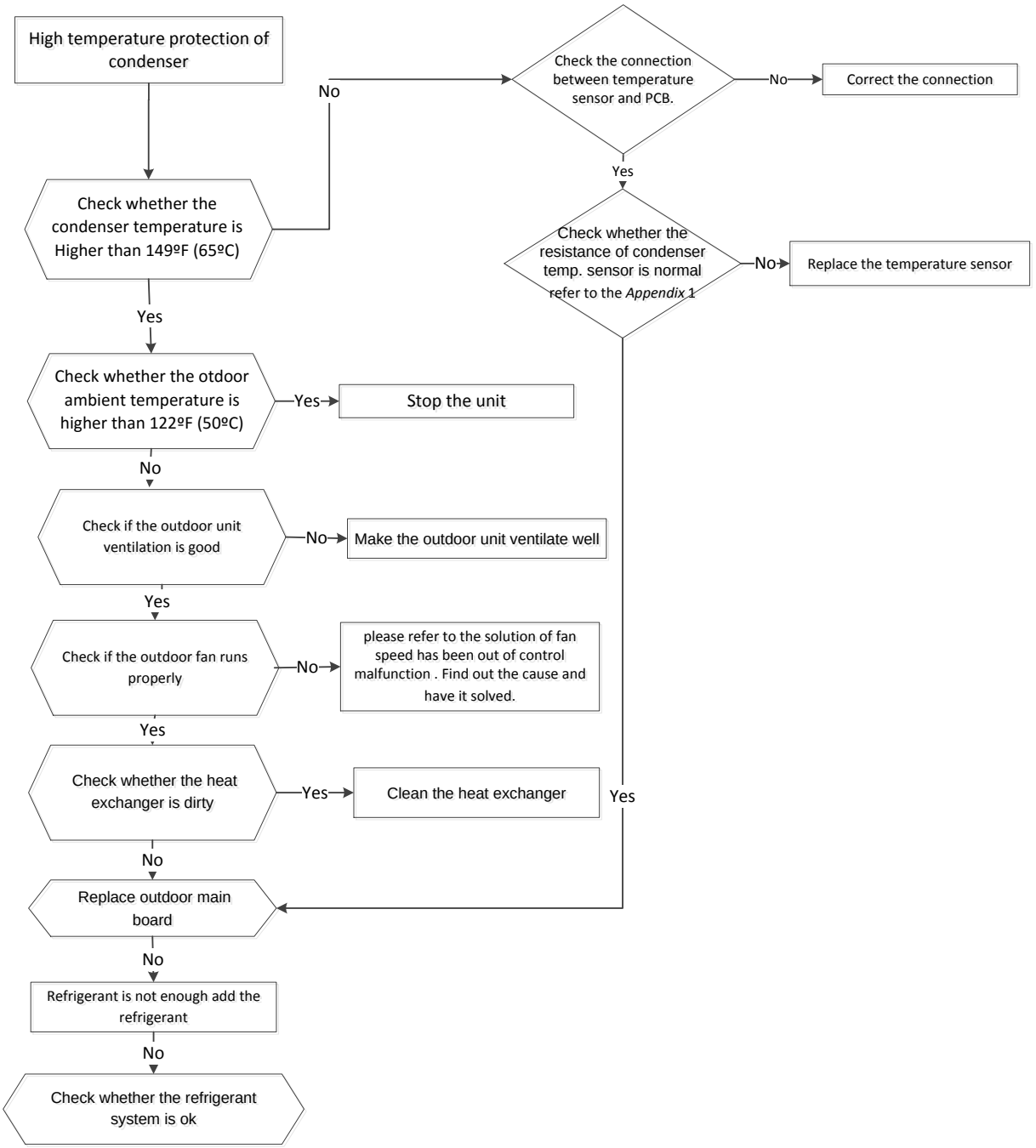
Trouble shooting:



8.4.2.13 P5 (High temperature protection of condenser) error diagnosis and solution.

Error Code	P5
Malfunction decision conditions	When outdoor pipe temperature is more than 149ºF (65°C), the unit will stop, and unit runs again when outdoor pipe temperature is less than 126ºF (52°C).
Supposed causes	● The condenser temperature sensor faulty ● Heat exchanger dirty ● System block

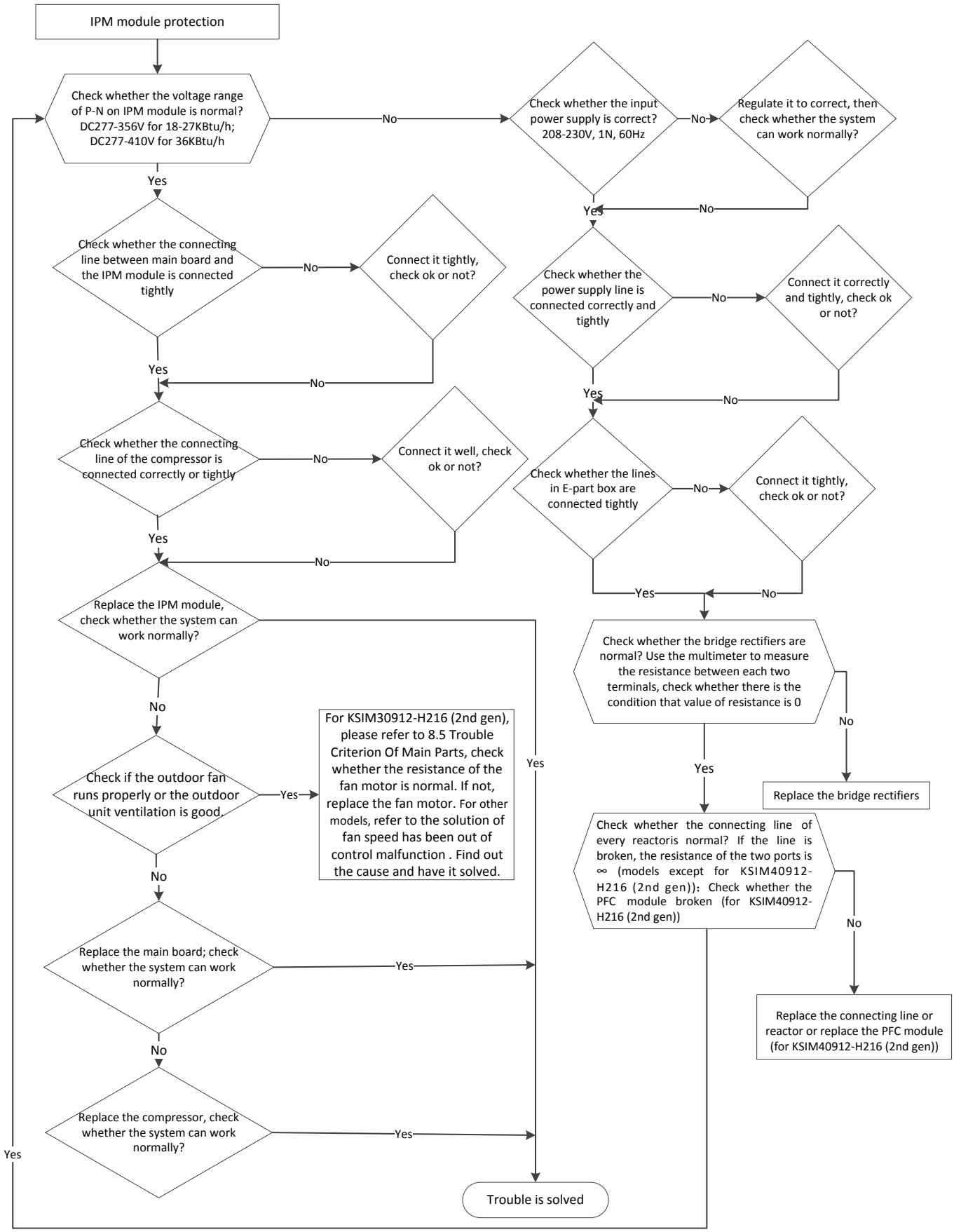
Trouble shooting:



8.4.2.14 P6 (IPM module protection) error diagnosis and solution.

Error Code	P6
Malfunction decision conditions	When the voltage signal that IPM send to compressor drive chip is abnormal, the display LED will show “P6” and AC will turn off.
Supposed causes	● Wiring mistake ● IPM malfunction ● Outdoor fan ass’y faulty ● Compressor malfunction ● Outdoor PCB faulty

Trouble shooting:


IPM module protection
Check whether the voltage range of P-N on IPM module is normal? DC277-356V for 18-27KBtu/h; DC277-410V for 36KBtu/h
No
Check whether the input power supply is correct? 208-230V, 1N, 60Hz
No
Regulate it to correct, then check whether the system can work normally?
No
Yes
Yes
Check whether the connecting line between main board and the IPM module is connected tightly
No
Connect it tightly, check ok or not?
Yes
No
Check whether the power supply line is connected correctly and tightly
No
Connect it correctly and tightly, check ok or not?
Yes
No
Check whether the connecting line of the compressor is connected correctly or tightly
No
Connect it well, check ok or not?
Yes
No
Check whether the lines in E-part box are connected tightly
No
Connect it tightly, check ok or not?
Yes
No
Replace the IPM module, check whether the system can work normally?
Yes
Check whether the bridge rectifiers are normal? Use the multimeter to measure the resistance between each two terminals, check whether there is the condition that value of resistance is 0
No
Replace the bridge rectifiers
Yes
No
Check if the outdoor fan runs properly or the outdoor unit ventilation is good.
Yes
For KSIM30912-H216 (2nd gen), please refer to 8.5 Trouble Criterion Of Main Parts, check whether the resistance of the fan motor is normal. If not, replace the fan motor. For other models, refer to the solution of fan speed has been out of control malfunction . Find out the cause and have it solved.
Yes
Check whether the connecting line of every reactoris normal? If the line is broken, the resistance of the two ports is ∞ (models except for KSIM40912-H216 (2nd gen)); Check whether the PFC module broken (for KSIM40912-H216 (2nd gen))
No
Replace the connecting line or reactor or replace the PFC module (for KSIM40912-H216 (2nd gen))
No
Replace the main board; check whether the system can work normally?
Yes
No
Replace the compressor, check whether the system can work normally?
Yes
Yes
Trouble is solved

8.4.2.15 The cooling operation or heating operation does not operate.

Supposed causes	● 4-way valve faulty

Check of 4-way, please refer to part 5 in 9.5 Trouble Criterion Of Main Parts.

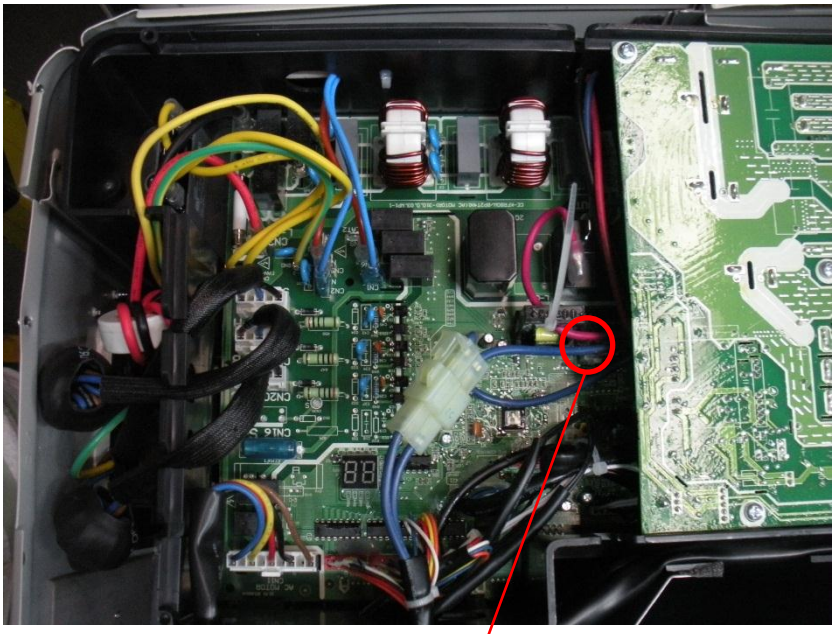
8.4.2.16 When cooling, heat exchanger of non-operating indoor unit frosts.

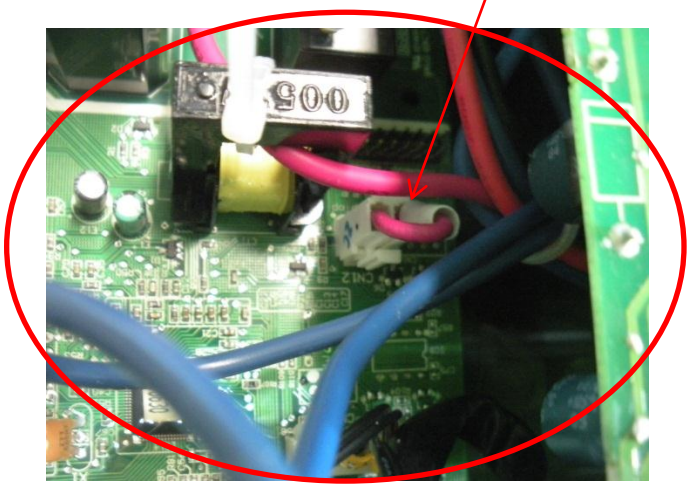
When heating, non-operating indoor unit get warm.

Supposed causes	● EXV faulty ● Wire and tubing connected in reverse.

Check of EXV, please refer to part 6 in 9.5 Trouble Criterion Of Main Parts.

Notice: If you replace outdoor main PCB of KSIM30912-H216 (2nd gen), you need to check whether the PCB is produced before Apr. 2013. If yes, you need to short connect OLP connector., Otherwise, the outdoor LED will show "P0".





8.5 Trouble Criterion Of Main Parts.

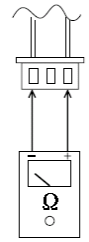
Spec.

Indoor unit				
Model	**KSIE009-H221-I**	**KSIE012-H220-I**	**KSIE018-H220-I**	**KSIE024-H220-I**
Indoor fan motor	WZDK20-38G	WZDK20-38G	WZDK58-38G	WZDK60-38G
Model	**KDIR09-H2**	**KDIR12-H2**	**KDIR18-H2**	**KDIR24-H2**
Indoor fan motor	WZDK55-38GS-W	WZDK55-38GS-W	WZDK90-38GS-W	WZDK90-38GS-W
Model	**KDIR09-H2**	**KDIR12-H2**	**KDIR18-H2**	
Indoor fan motor	WZDK46-38G	WZDK46-38G	WZDK46-38G	

1.

1.Temperature sensor checking

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



Tester

Temperature Sensors.

Room temp.(T1) sensor,

Indoor coil temp.(T2) sensor,

Outdoor coil temp.(T3) sensor,

Outdoor ambient temp.(T4) sensor,

Compressor discharge temp.(T5) sensor.

Measure the resistance value of each winding by using the multi-meter.

Appendix 1 Temperature Sensor Resistance Value Table (ºC-K)

ºF	K Ohm	ºF	K Ohm	ºF	K Ohm	ºF	K Ohm
-4	115.266	68	12.6431	140	2.35774	212	0.62973
-2	108.146	70	12.0561	142	2.27249	214	0.61148
0	101.517	72	11.5000	144	2.19073	216	0.59386
1	96.3423	73	10.9731	145	2.11241	217	0.57683
3	89.5865	75	10.4736	147	2.03732	219	0.56038
5	84.2190	77	10.000	149	1.96532	221	0.54448
7	79.3110	79	9.55074	151	1.89627	223	0.52912
9	74.5360	81	9.12445	153	1.83003	225	0.51426
10	70.1698	82	8.71983	154	1.76647	226	0.49989
12	66.0898	84	8.33566	156	1.70547	228	0.48600
14	62.2756	86	7.97078	158	1.64691	230	0.47256
16	58.7079	88	7.62411	160	1.59068	232	0.45957
18	56.3694	90	7.29464	162	1.53668	234	0.44699
19	52.2438	91	6.98142	163	1.48481	235	0.43482
21	49.3161	93	6.68355	165	1.43498	237	0.42304
23	46.5725	95	6.40021	167	1.38703	239	0.41164
25	44.0000	97	6.13059	169	1.34105	241	0.40060
27	41.5878	99	5.87359	171	1.29078	243	0.38991
28	39.8239	100	5.62961	172	1.25423	244	0.37956
30	37.1988	102	5.39689	174	1.21330	246	0.36954
32	35.2024	104	5.17519	176	1.17393	248	0.35982
34	33.3269	106	4.96392	178	1.13604	250	0.35042
36	31.5635	108	4.76253	180	1.09958	252	0.3413
37	29.9058	109	4.57050	181	1.06448	253	0.33246
39	28.3459	111	4.38736	183	1.03069	255	0.32390
41	26.8778	113	4.21263	185	0.99815	257	0.31559
43	25.4954	115	4.04589	187	0.96681	259	0.30754
45	24.1932	117	3.88673	189	0.93662	261	0.29974
46	22.5662	118	3.73476	190	0.90753	262	0.29216
48	21.8094	120	3.58962	192	0.87950	264	0.28482
50	20.7184	122	3.45097	194	0.85248	266	0.27770
52	19.6891	124	3.31847	196	0.82643	268	0.27078
54	18.7177	126	3.19183	198	0.80132	270	0.26408
55	17.8005	127	3.07075	199	0.77709	271	0.25757
57	16.9341	129	2.95896	201	0.75373	273	0.25125
59	16.1156	131	2.84421	203	0.73119	275	0.24512
61	15.3418	133	2.73823	205	0.70944	277	0.23916
63	14.6181	135	2.63682	207	0.68844	279	0.23338
64	13.9180	136	2.53973	208	0.66818	280	0.22776
66	13.2631	138	2.44677	210	0.64862	282	0.22231

Appendix 2

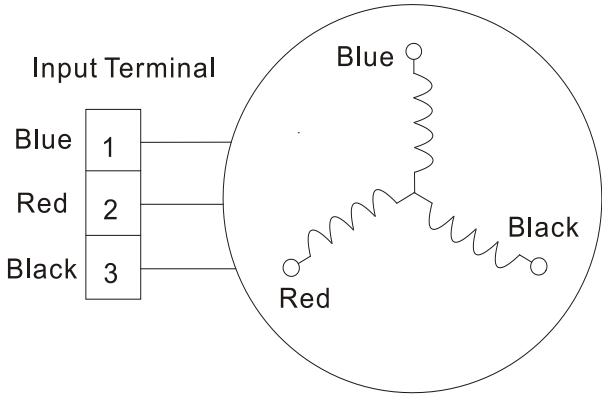
Unit: ºF-K			Discharge temp. sensor table				
-4	542.7	68	68.66	140	13.59	212	3.702
-2	511.9	70	65.62	142	13.11	214	3.595
0	483	72	62.73	144	12.65	216	3.492
1	455.9	73	59.98	145	12.21	217	3.392
3	430.5	75	57.37	147	11.79	219	3.296
5	406.7	77	54.89	149	11.38	221	3.203
7	384.3	79	52.53	151	10.99	223	3.113
9	363.3	81	50.28	153	10.61	225	3.025
10	343.6	82	48.14	154	10.25	226	2.941
12	325.1	84	46.11	156	9.902	228	2.86
14	307.7	86	44.17	158	9.569	230	2.781
16	291.3	88	42.33	160	9.248	232	2.704
18	275.9	90	40.57	162	8.94	234	2.63
19	261.4	91	38.89	163	8.643	235	2.559
21	247.8	93	37.3	165	8.358	237	2.489
23	234.9	95	35.78	167	8.084	239	2.422
25	222.8	97	34.32	169	7.82	241	2.357
27	211.4	99	32.94	171	7.566	243	2.294
28	200.7	100	31.62	172	7.321	244	2.233
30	190.5	102	30.36	174	7.086	246	2.174
32	180.9	104	29.15	176	6.859	248	2.117
34	171.9	106	28	178	6.641	250	2.061
36	163.3	108	26.9	180	6.43	252	2.007
37	155.2	109	25.86	181	6.228	253	1.955
39	147.6	111	24.85	183	6.033	255	1.905
41	140.4	113	23.89	185	5.844	257	1.856
43	133.5	115	22.89	187	5.663	259	1.808
45	127.1	117	22.1	189	5.488	261	1.762
46	121	118	21.26	190	5.32	262	1.717
48	115.2	120	20.46	192	5.157	264	1.674
50	109.8	122	19.69	194	5	266	1.632
52	104.6	124	18.96	196	4.849		
54	99.69	126	18.26	198	4.703		
55	95.05	127	17.58	199	4.562		
57	90.66	129	16.94	201	4.426		
59	86.49	131	16.32	203	4.294	B(25/50)=3950K	
61	82.54	133	15.73	205	4.167		
63	78.79	135	15.16	207	4.045	R(90℃)=5KΩ±3%	
64	75.24	136	14.62	208	3.927		
66	71.86	138	14.09	210	3.812		

Appendix 3:

℃	10	11	12	13	14	15	16	17	18	19	20	21	22
℉	48	50	52	54	56	58	60	62	64	66	68	70	72
℃	23	24	25	26	27	28	29	30	31	32	33	34	35
℉	74	76	78	80	82	84	86	88	90	92	94	96	98

2. Compressor check

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



Position		Resistance Value				
	ATM150D23UFZ	ATF235D22UMT	ATF250D22UMT	ATF310D43UMT	ATQ360D1UMU	ATQ420D1UMU
Blue - Red	1.72 Ω	0.75 Ω	0. 75 Ω	0.65 Ω	0. 37 Ω	0.38 Ω

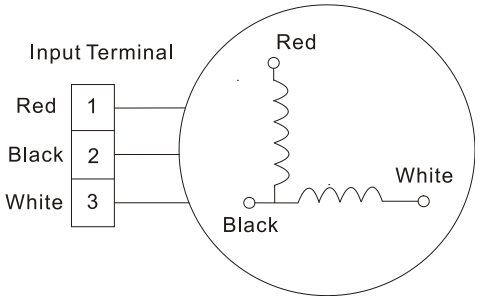
3. IPM continuity check

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

Digital tester		Normal resistance value	Digital tester		Normal resistance value
(+)Red	(-)Black	∞ (Several MΩ)	(+)Red	(-)Black	∞ (Several MΩ)
P	N		U	N	
	U		V		
	V		W		
	W		(+)Red		

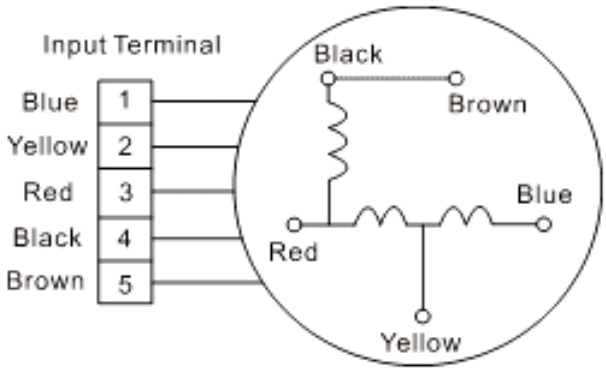
4. AC Fan Motor.

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



Position	Resistance Value			
	RPG20B		RPG28H	
Black - Red	381Ω±8% (68ºF) (Brand: Weiling)	342Ω±8% (68ºF) (Brand: Dayang)	183.6Ω±8% (68ºF) (Brand: Weiling)	180Ω±8% (68ºF) (Brand: Wolong)
White - Black	267Ω±8% (68ºF) (Brand: Weiling)	253Ω±8% (68ºF) (Brand: Dayang)	206Ω±8% (68ºF) (Brand: Weiling)	190Ω±8% (68ºF) (Brand: Wolong)

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

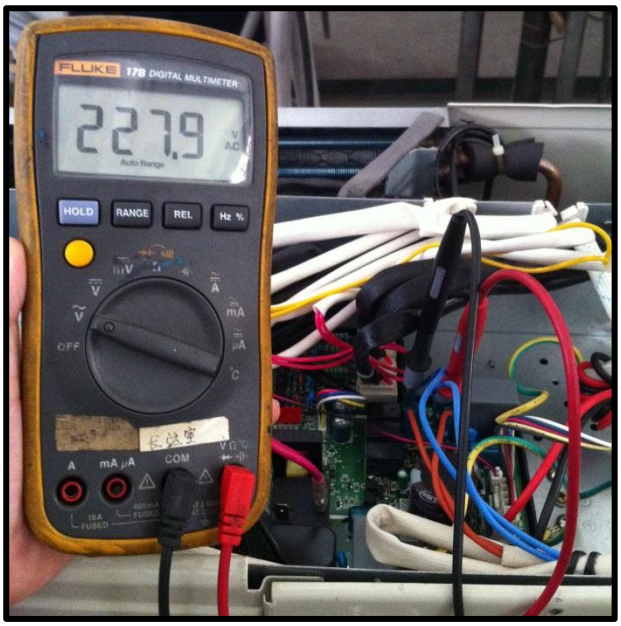


Position	Resistance Value						
	YDK70-6FB	YDK180-8GB	YSK27-4G	YSK68-4B	YDK45-6B	YSK25-6L	YDK53-6FB(B)
Black - Red	56Ω±8% (68 ºF - 20 ºC)	24.5Ω±8% (68 ºF - 20 ºC)	317Ω±8% (68 ºF - 20 ºC)	145Ω±8% (68 ºF - 20 ºC)	345Ω±8% (68 ºF - 20 ºC)	627Ω±8% (68 ºF - 20 ºC)	88.5Ω±8% (68 ºF - 20 ºC)
Red - Yellow	76Ω±8% (68 ºF - 20 ºC)	19Ω±8% (68 ºF - 20 ºC)	252Ω±8% (68 ºF - 20 ºC)	88Ω±8% (68 ºF - 20 ºC)	150Ω±8% (68 ºF - 20 ºC)	374.3Ω±8% (68 ºF - 20 ºC)	138Ω±8% (68 ºF - 20 ºC)
Yellow - Blue	76Ω±8% (68 ºF - 20 ºC)	19Ω±8% (68 ºF - 20 ºC)	252Ω±8% (68 ºF - 20 ºC)	88Ω±8% (68 ºF - 20 ºC)	150Ω±8% (68 ºF - 20 ºC)	374.3Ω±8% (68 ºF - 20 ºC)	138Ω±8% (68 ºF - 20 ºC)

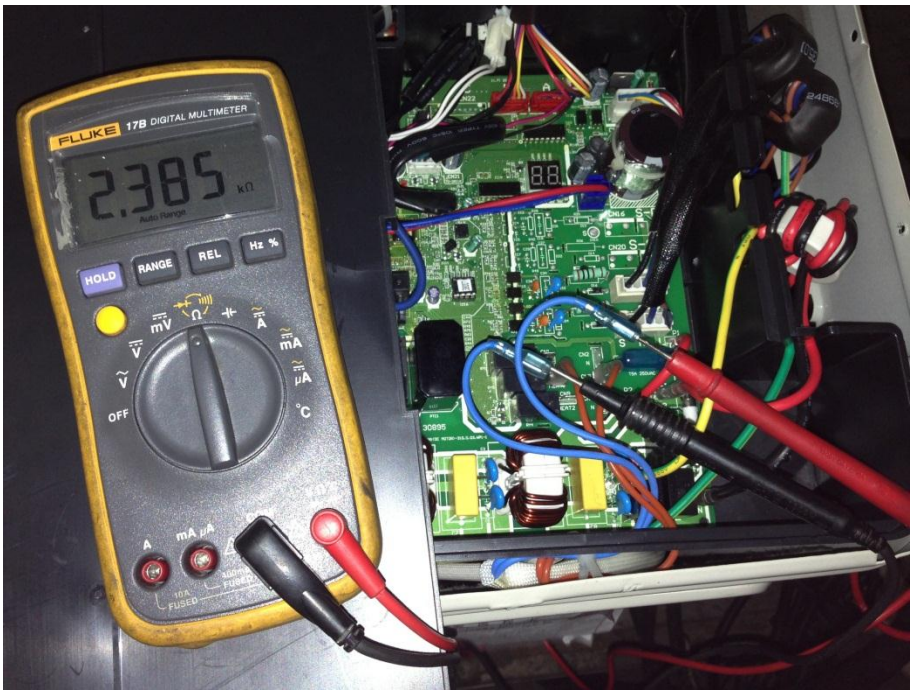
5.4-way valve

1. Power on, use a digital tester to measure the voltage, when the unit operates in cooling, it is 0V. When the unit operates in heating, it is about 230VAC.

   If the value of the voltage is not in the range, the PCB must have problems and need to be replaced.

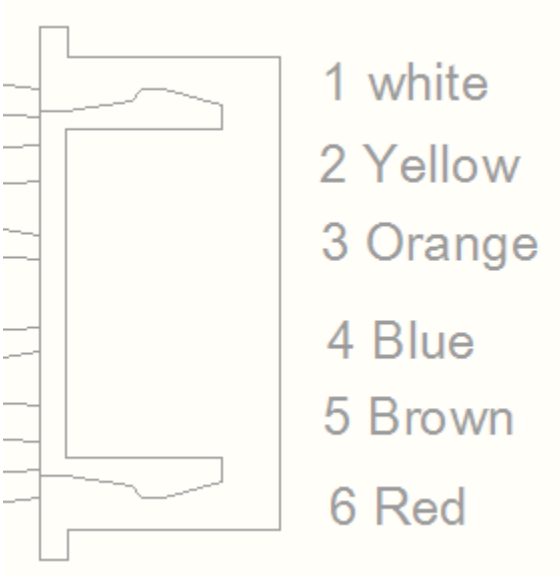


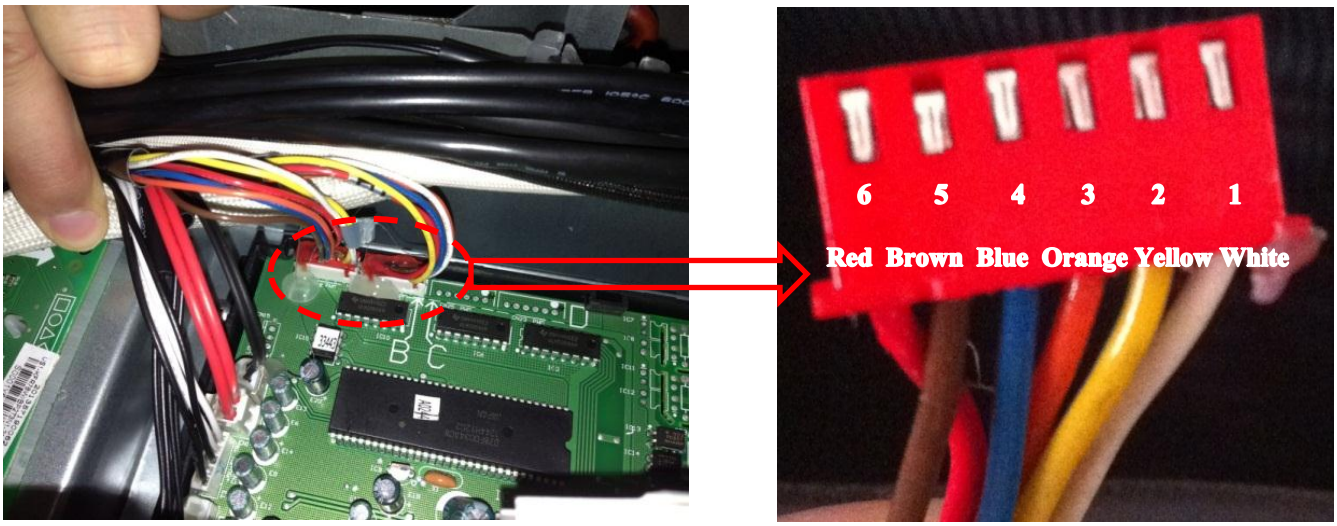
2 Turn off the power, use a digital tester to measure the resistance. The value should be 1.8~2.5 KΩ.



6.EXV check

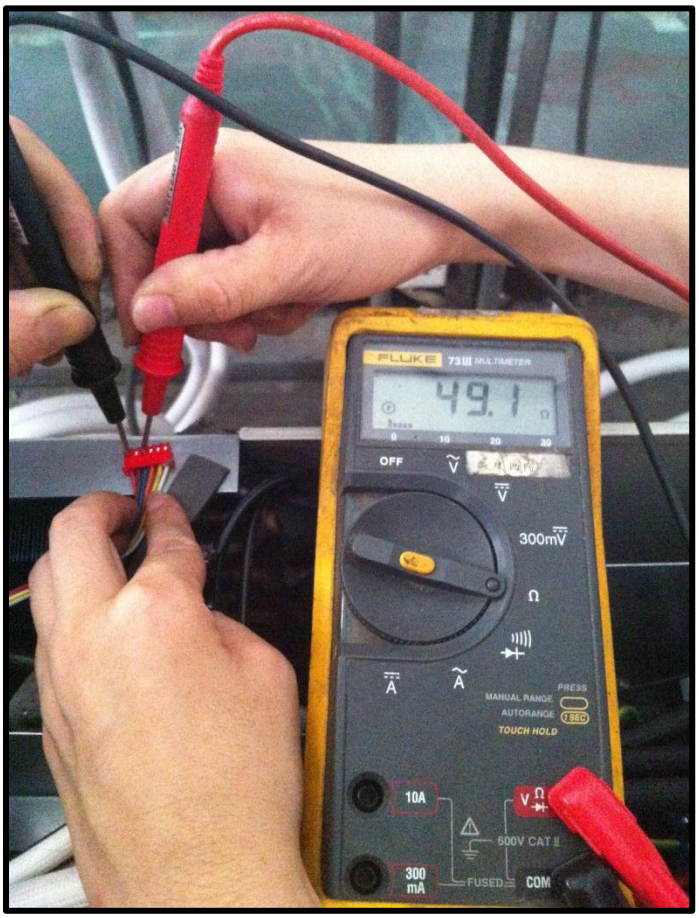
Disconnect the connectors.



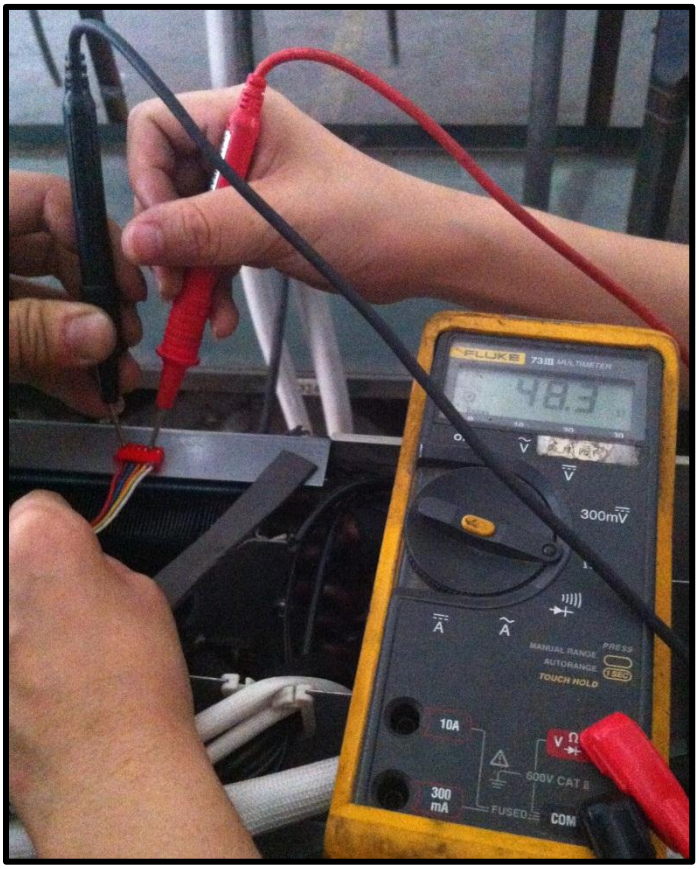


Resistance to EXV coil

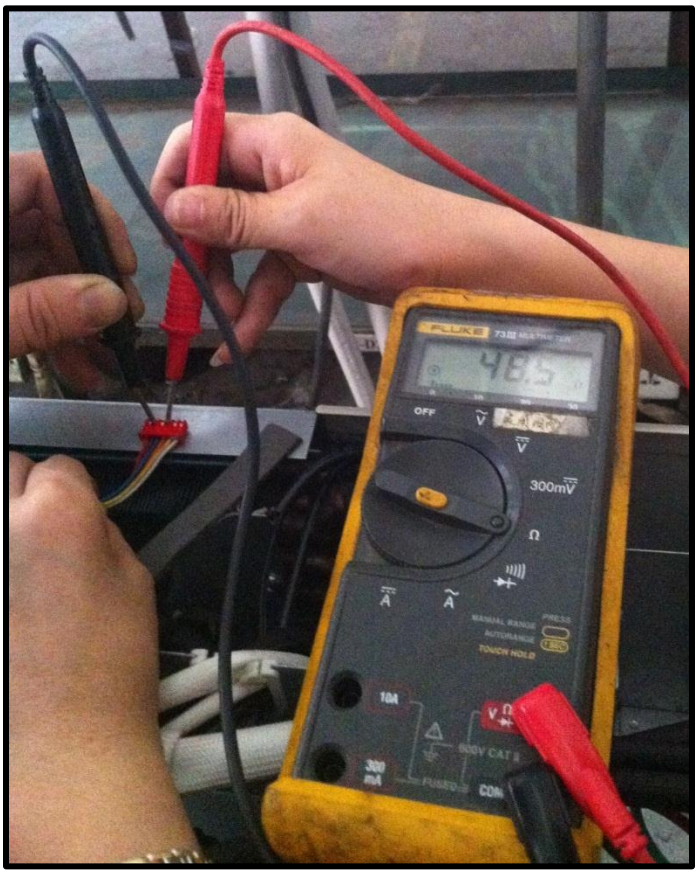
Color of lead wire	Normal Value
Red- Blue	About 50Ω
Red - Yellow	
Brown-Orange	
Brown-White	



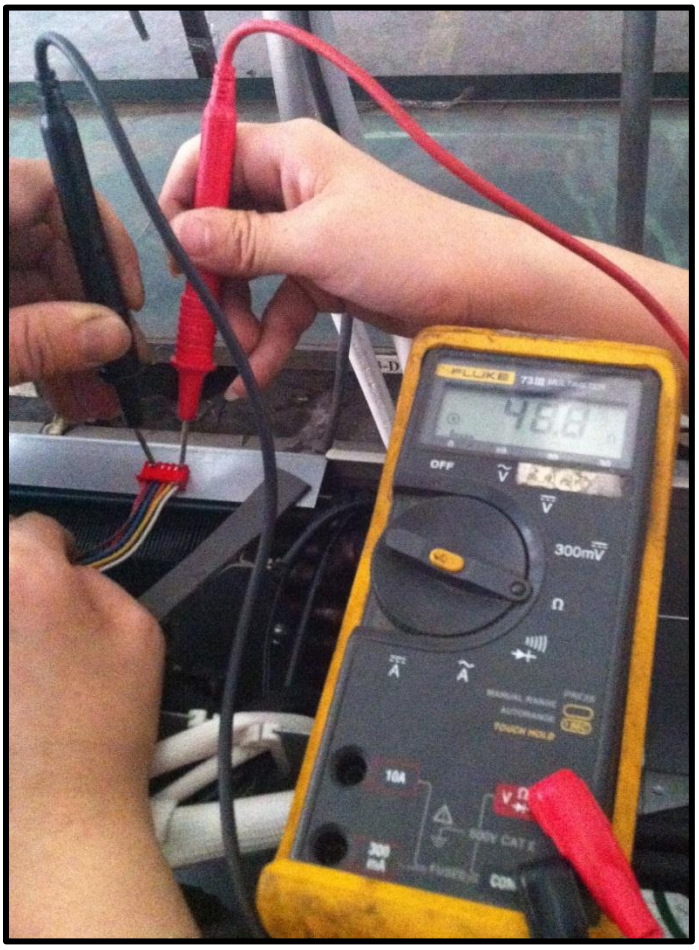
Red- Blue



Red - Yellow



Brown-Orange



Brown-White

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