DC INVERTER AIR TO WATER HEAT PUMP
# Service Manual
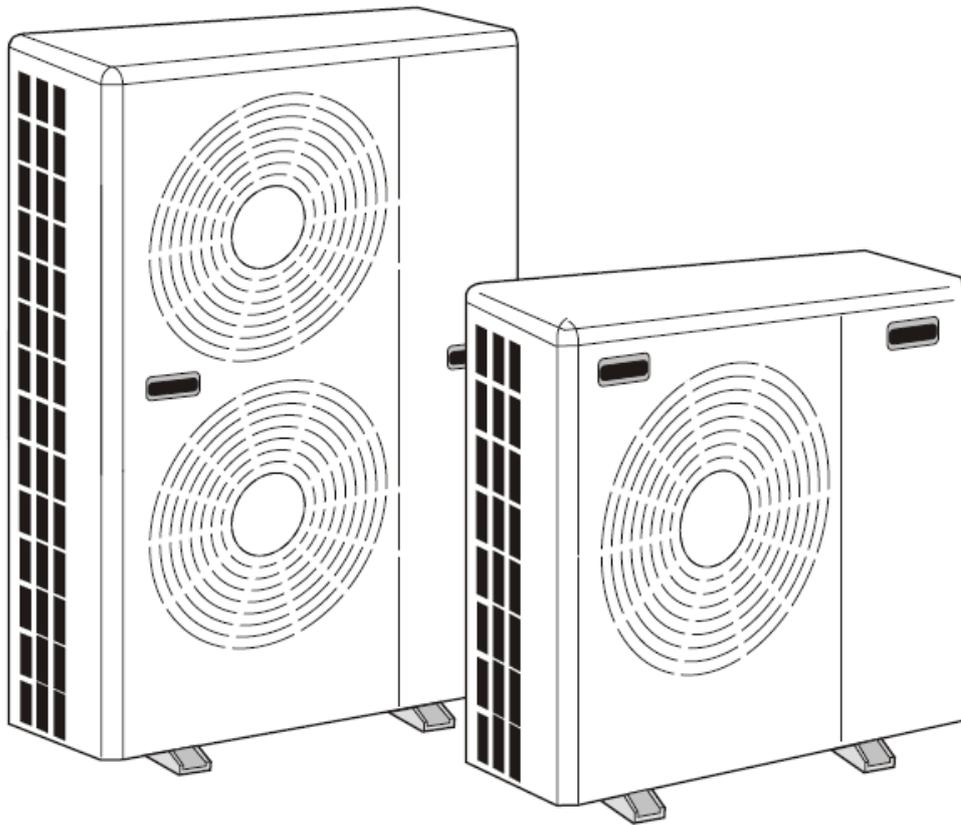
Ver:2016V5

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1. Precaution

1.1 General

1. Wiring tasks should be carried out by qualified electricians only
2. Check all the electric box wires and cables are tightly connected, tight all the wire screws
3. Improper treatment might lead to the accidents or personal injury caused by fire, electrical shock or unit's falling off, and water leakage in the machine. Please contact professional repair and local dealer.
4. The unit shall not be installed at a spot with potential hazard of leakage of inflammable gas. In case the leaked gas is congregated around the machine, there might be the risk of explosion.
5. Make sure that the foundation of installation is stable , If the foundation is unstable, the outdoor unit may drop and cause a casualty accident. so this must be validated carefully.
6. Make sure that the electric leakage protection switch is fixed , If no electric leakage protection switch is fitted at the beginning of the electric supply, it maybe cause electric shocks or fires.
7. If any abnormity occurs in the unit (such as burned taste inside the unit), cut off the power supply immediately, and contact professional repair and service department of local dealer.
8. Before cleaning the unit, shut off the electric supply of the unit firstly to avoid injuries caused by fan in operation. Do not rinse the unit by water because the rinsed unit may cause electric shock.
9. Make sure to shut off the electric supply before maintain the unit.
10. Please do not insert fingers or sticks into air outlet or air inlet.

1.2   Transport and storage

1. The machine must be transported and stored vertically.
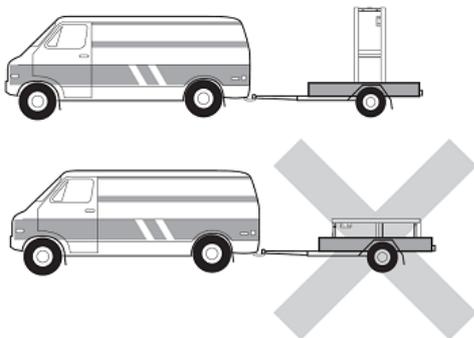
1.3 Important Notice for Antifreeze to Avoid heat pump broken

1. **Water flow switch MUST be installed** during installation for heat pump air conditioning side to ensure proper water flow.
2. **Water filter MUST be installed** before water go into PLATE HEAT EXCHANGER. The water filter need to be cleaned at least half an year.
3. **Must use enough brine(glycol) in the water system in cold area**. if the air temp is lower than -0 ℃, for the safety, you must use brine(glycol) as the fluid in the heat pump water system instead of pure water.
4. **MUST keep the electricity power supply always connected even when you don't use the heat pumps.** Our heat pump has antifreeze function if with electricity connected. So If without enough glycol (antifreeze liquid) and if the electricity is cut off by accident for more than 30 minutes in winter, you need to drain out all the inside water to protect the heat pump to be frozen.

2. Explosion Drawing and Parts list

MODEL: 9KW DC
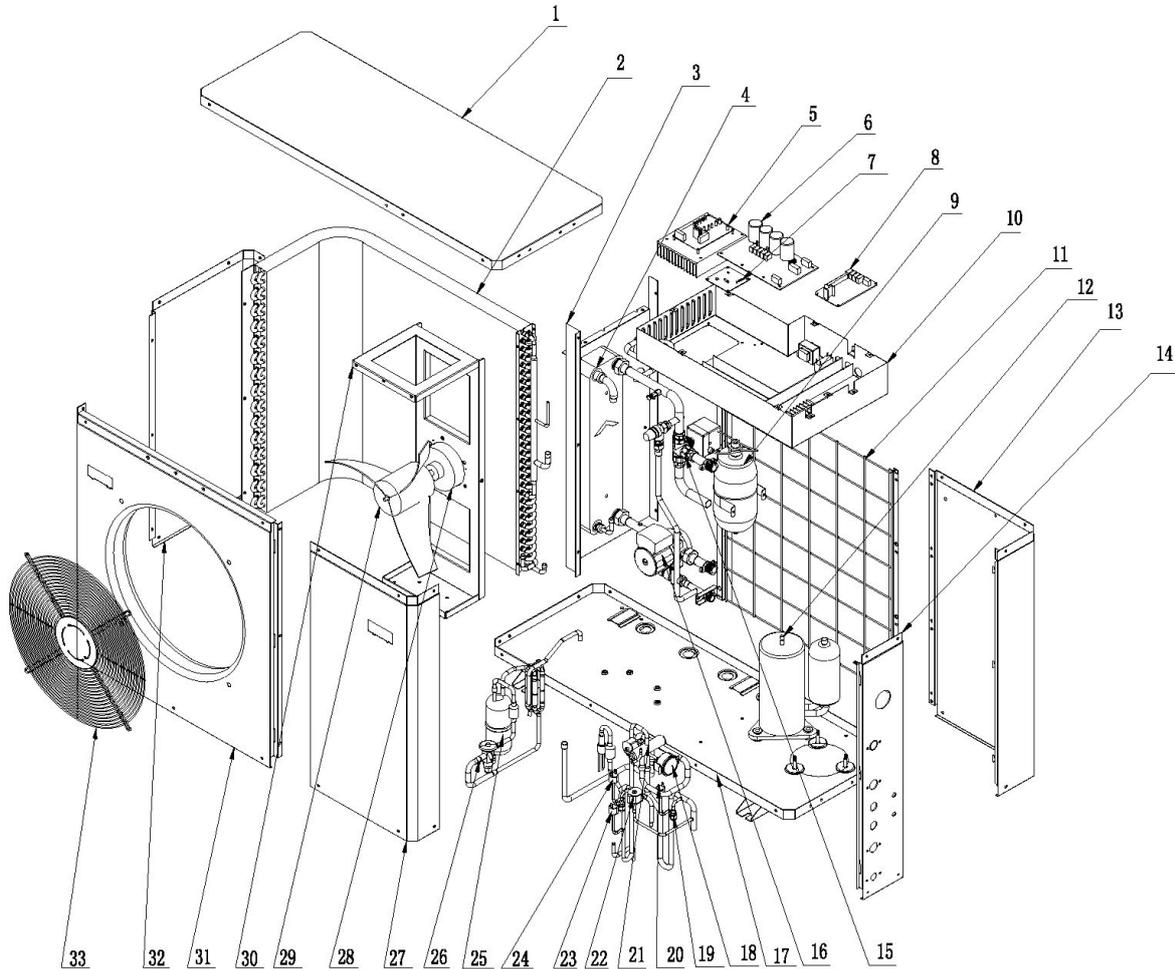
Item No	Part No	Part Name	Type
1	AWD08ZJ012A	Top Panel	
2	AWB08ZX002A	Condensor	
3	AWB06ZJ003A	Devision plate	
4	AWB08ZX001A	Plate heat exchanger	
5	DCAWD06ZD001H	IPM Module	
6	DCAWD08ZD003H	Inverter Outdoor PCB (power PCB)	MWH089-V5-MZ150DSY(8K)
7	D15T0017	Water Pump PCB	
8	AGS80ZD004A	Inverter Indoor PCB (water control PCB)	MGH077-V5-DSY(US)
9	X17T0001	Expansion Water Tank	PZG-002 3/4" 8BAR

2. Explosion Drawing and Parts list

| 10	AWB06ZJ004C	Electric Box	
11	AWB06ZJ006B	Back Grille	
12	D01T0045	Compressor	DA150S1C-20FZ
13	AWD08ZJ004B	Right-back panel	
14	AWD08ZJ005B	Right-mid panel	
15	X05T0008	Solenoid 3 way valve(optional)	
16	D03T0010	High efficiency Water Pump	PARA 25/7.5(PWM)
17	AWB08ZJ001A	Base plate	
18	X20T0001	Water Pressure Gauge	
19	X16T0001	Needle valve	
20	X09T0004	Low pressure switch	(0.03/0.2MPa)
21	X06T0001	Four Way valve	STF-0218G
22	X10T0001/X10T0002	Bypass valve and coil	
23	X09T0003	2nd High pressure switch	(3.7/3.1MPa)
24	X09T0002	High Pressure Switch	(4.2/3.6MPa)
25	X13T0004	Liquid Accumulator	
26	X03T0003	Thermo Expansion Valve	BAE3.0-ZW-195
27	AWD08ZJ007A	Maintenance Panel	
28	D02T0026	Fan motor	YDK-80-6B-2（50/60HZ-230V)
29	F03T0002	Fan	φ460*170
30	AWB06ZJ007A	Motor holder	
31	AWD08ZJ002B	Frong Panel	
32	AWD08ZJ003A	Left-side panel	
33	MID17ZJ010A	Fan guard	

Nameplate:

AH9

Air to Water Heat Pump
outdoor Installation

Model Name   AH-9AC-410M

CAPAC, COOL	27770 BTU	CONSUME COOL	1.78 kW	EER COOL	15.60
CAPAC, HEAT	30530 BTU	CONSUME HEAT	1.50 kW	COP HEAT	5.97
WATER FLOW AC	7.3 GPM	REFRIGER.	R410a	CHARGE	4.6 Lbs
PRESSURE MAX/MIN	610/65 PSI	WEIGHT UNIT	200 Lbs	GRADE PROTEC	IPX4
POWER V/Ph/Hz	208-240/1/50~60	CURRENT MAX	13.0 A	CURRENT BLOCK	13.0 A

3. Heat Pump & Chiller System Diagram

1. Isolator
2. Compressor
3. Plate heat exchanger
4. Liquid Accumulator
5. Expansion device
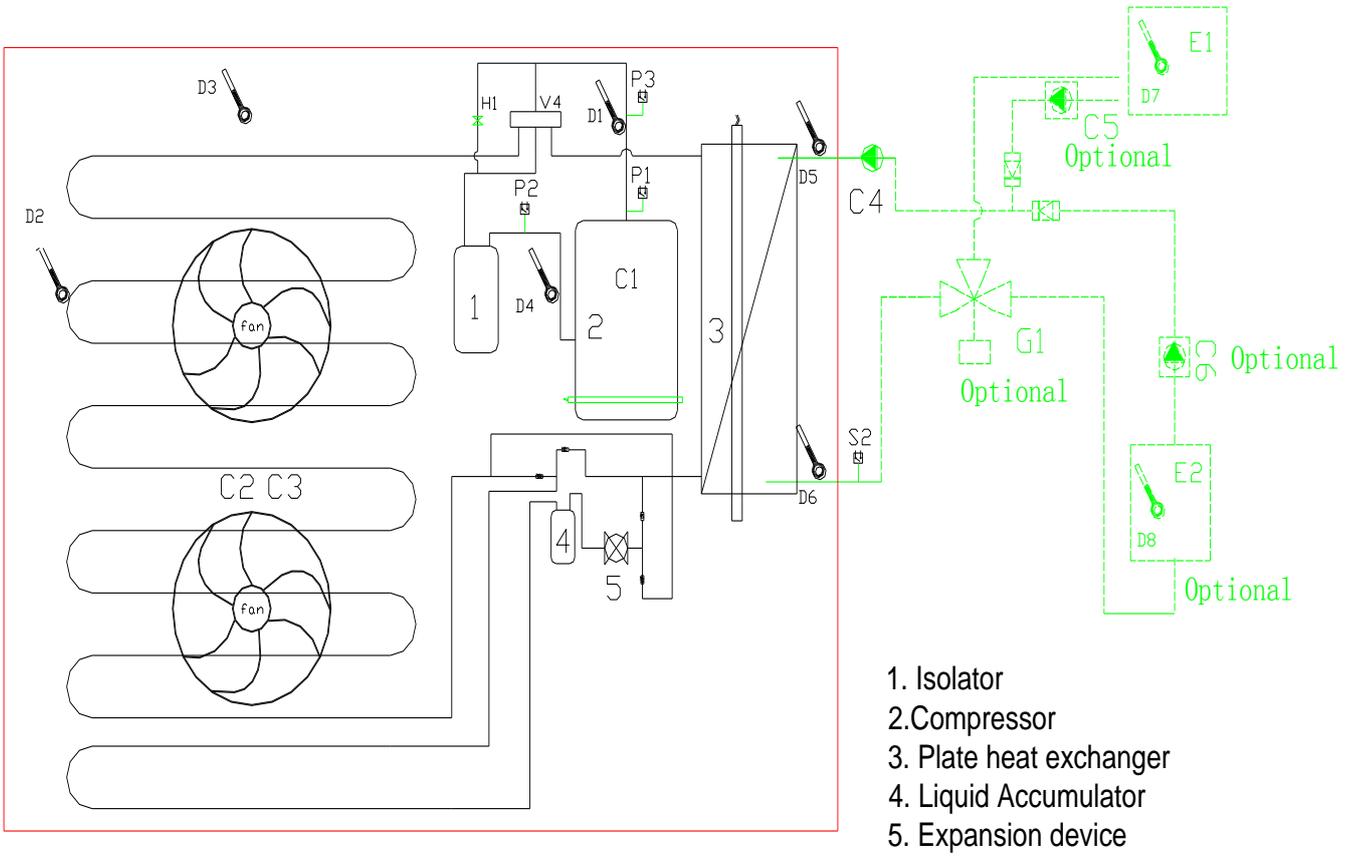
4. Wiring Diagram and PCB

4.1   Wiring Diagram

ELECTRICAL DIRGRAM

(1) Discharge temperature sensor
(2) Coil temperature sensor
(3) Ambient temperature sensor
(4) Pressure switch

(5) DHW temperature sensor
(6) Water inlet temperature sensor
(7) Water outlet temperature sensor
(8) Solar water temperature sensor
(9) Water flow switch
(10) AC switch
(11) Pipe temperature sensor

WHT	White	Blanco	ORG	Orange	Naranja
YLW	Yellow	Amarillo	RED	Red	Rojo
GRY	Grey	Gris	PIN	Pink	Rosa
BRN	Brown	Marron	BLU	Blue	Azul
GRN	Green	Verde	BLK	Black	Negro
PUR	Purple	Purpura			

**Please note:**   the new power PCB 2nd high pressure switch is connected to CN11 not same as old PCB connected to AIN5, for exact correction connection, please refer to the wiring diagram sticker on the unit electric box cover.

4.2.1 Control system with Optional Water Pump Control PCB for VSP water Pump

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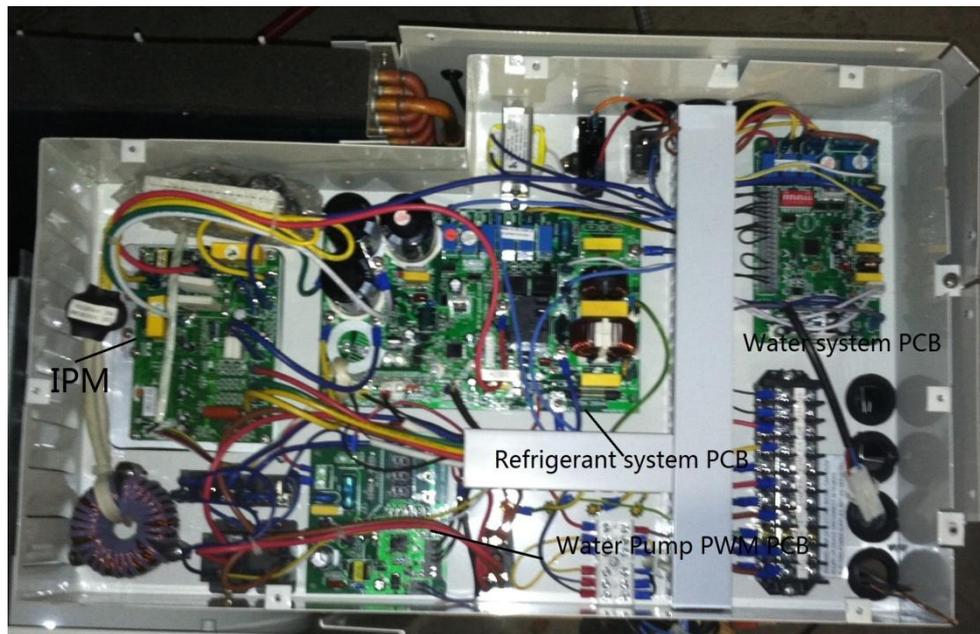
4. Wiring Diagram and PCB

## 4.2.2 Control System Main Parts(without VSP water pump)
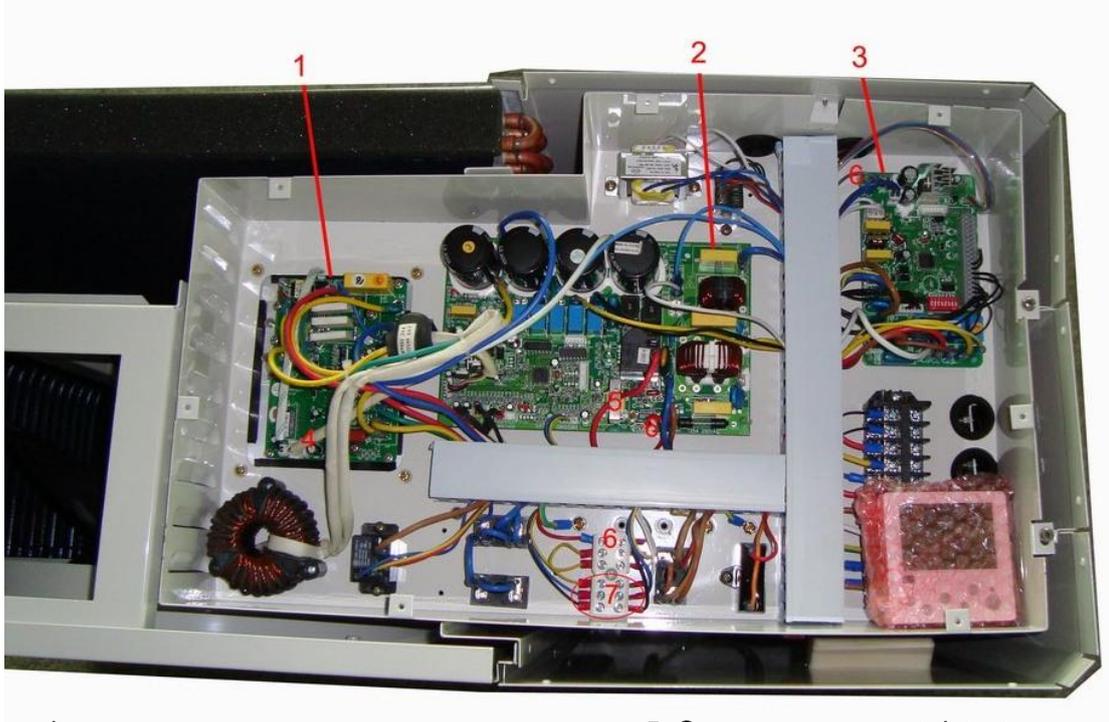

1. IPM Board
2. Outdoor PCB (Power Control PCB/Refrigerant system PCB)
3. Indoor PCB(Water System PCB)
4. Comm wire between IPM and Power PCB

5. Compressor current detector
6. Comm wire between Water system PCB and power PCB
7. High,low pressure switch connection

4.2.3 Indoor PCB components location
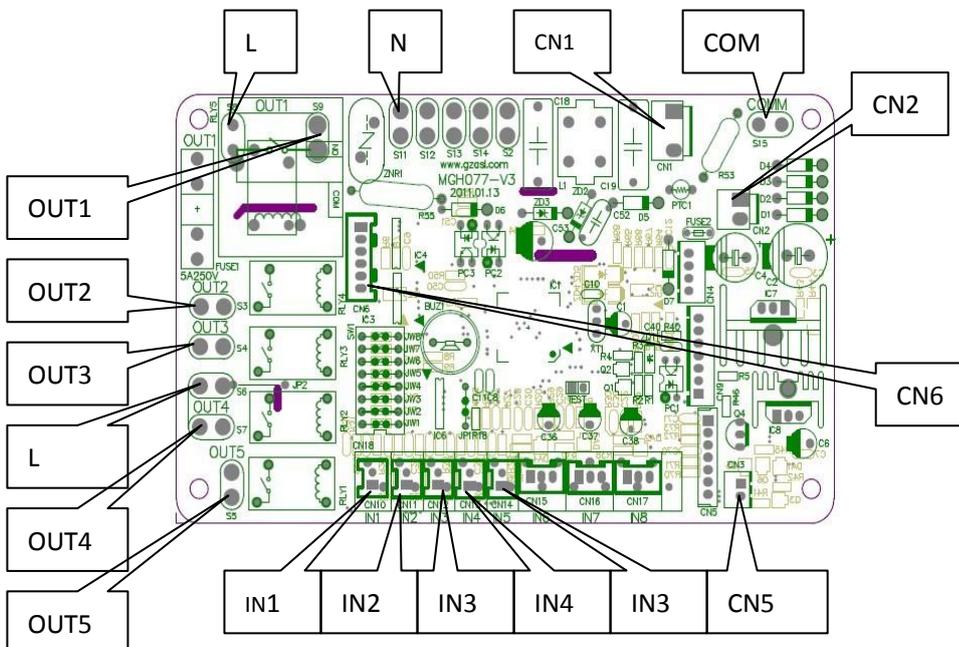
4. Wiring Diagram and PCB

CN6 is for 3-way valve G1,G2,G3

G1:DHW/AC switch   CN6-SMB

G2:Free cooling switch   CN6-SMA

G3:Solar valve switch   CN6-SMC
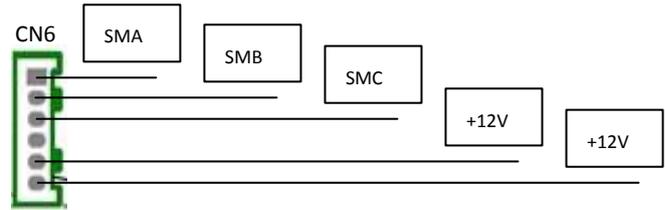
Note: The output is 12VDC.Need to add relay to connect 220V valve.

4.3 Power Control PCB

Led and Fuse location and meaning.
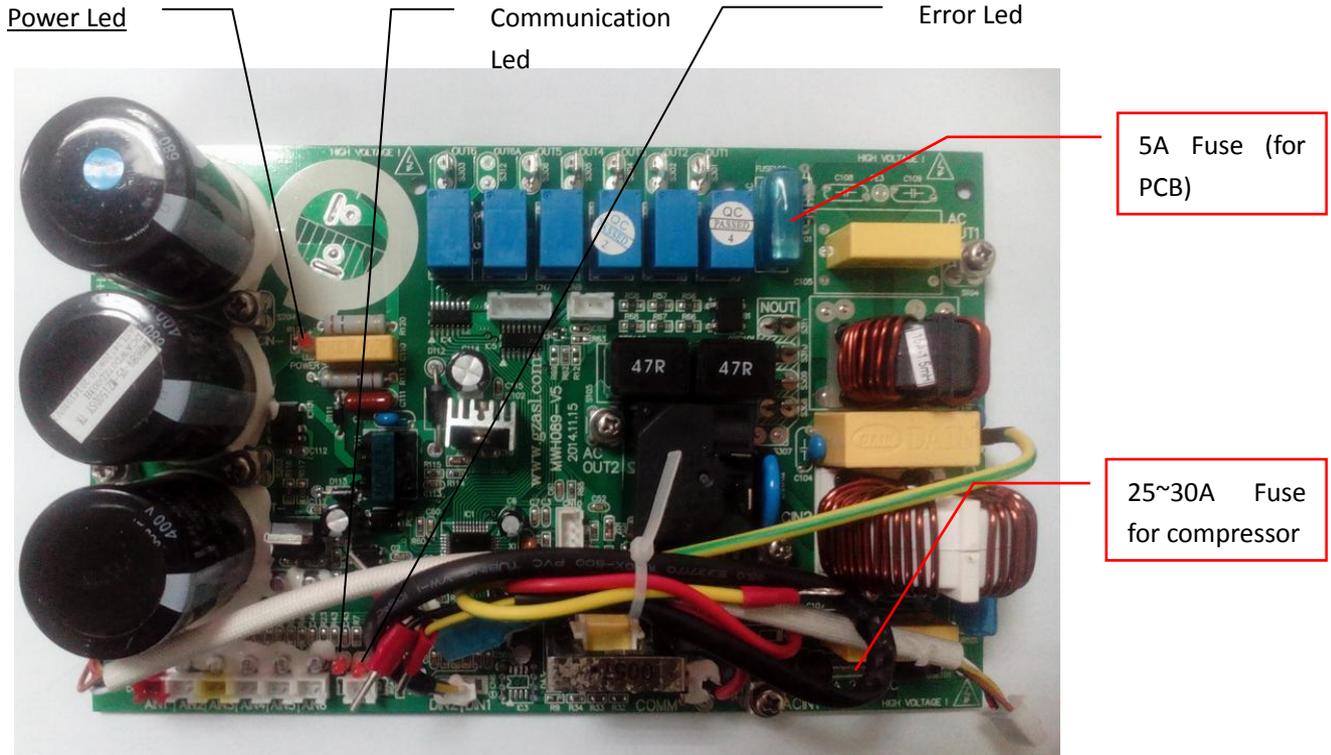
Power Led: When connect power, this Led will be always On. If need to shut off power, the Led will be on for maybe 30 seconds due to the capacitor power supply.   **Must wait for the Led off for later processing**

Communication Led: When communication is ok, this Led will be always flashing.

Error Led: When no error, it is off. When error happen, it will flash some times and be off for 2 seconds

4. Wiring Diagram and PCB

8. Water Pump Control PCB

Power supply L

Power supply N

Vout+

Vout−

待测电压输入口

GND V+

Temp sensor th2

Temp sensor th1

4. Wiring Diagram and PCB

More Parts connection diagram

1. **Outside 3 way valve G1(DHW/AC switch), G3(Seasonal /solar valve)**
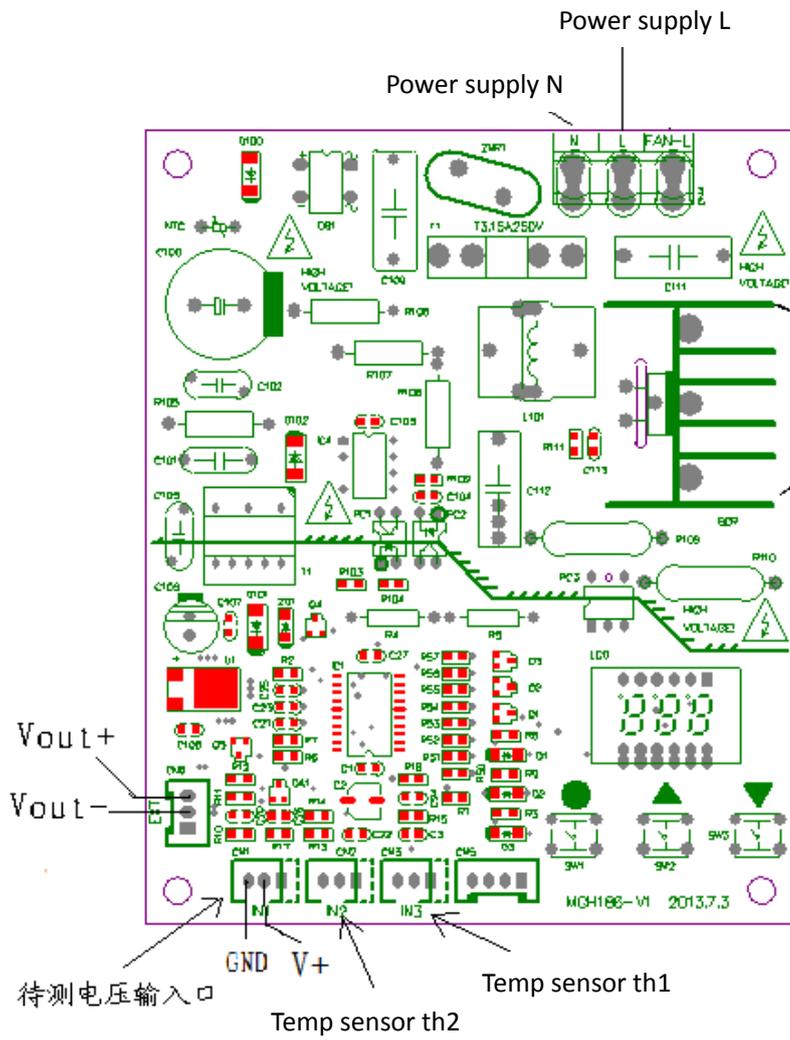
5. Heat Pump Control Theory and Function

Electric Parts Control Program working theory

5.1. Compressor

5.1.1.   After the compressor is shut down, it has a minimum interval of 3 minutes before the next start up, except defrost.

5.1.2.   Compressor running frequency(speed) control

5.1.2.1. After compressor start, it runs step by step to achieve target frequency according to table 1

Table 1

Frequency scop	Up	Down
15～60Hz	0.5Hz/S	2Hz/S
61～75Hz	0.5Hz/S	2Hz/S
76～100Hz	0.5Hz/S	2Hz/S

5.1.2.2.   Mid pressure switch affection to frequency

During DHW

1. If mid-pressure switch open, compressor will limit the frequency

2. Compressor will stop increasing frequency and remember current frequency(P) and decrease frequency.

3. When frequency is decreased to (P-10)Hz, if no protection active or reach target temp, keep working at (P-10)Hz

4. When compressor stop or mid-pressure close for 3 minutes, compressor frequency limitation will be cancelled.

During AC

1. If mid-pressure switch open, compressor will limit the frequency

2. Compressor will stop increasing frequency and remember current frequency(P1) and decrease frequency.

3.   When compressor decreased to (P1x2)/3, keep this frequency for 2 minutes. If not near or not reach target temp to decrease frequency again, test the water temp every 1 minute, if water temp increase 1°C, compressor will decrease 4hz, minimum to (P1x1)/3. If the water temp decrease 1°C, then the compressor frequency will increase 4hz, max to P1.

4.   When compressor stop or mid-pressure switch close for 10minutes, frequency limitation will be cancelled.

During AC heating

If outside air temp is at $0\sim8℃$ and returned water temp$\leqslant32℃$, limit compressor working frequency not higher than 75hz(for 11kw type, a bit different for different model)

> **Note: if heat pump work with unexpected low capacity. Please check if the mid-pressure switch is loose or open. The mid-pressure switch is to connected to Outdoor PCB** AIN5 port.

5.2.   Start up/Shut down Cycle

- When the heat pump switches on, the water circulation pump and the fan will start 60 seconds before compressor

- During DHW mode, when the heat pump switches off, the water circulation pump shuts down 30 seconds after the compressor. The fan switches off 5 seconds after the compressor

5. Heat Pump Control Theory and Function

- During AC mode, the fan will work similar as AC. The water pump running mode is set at parameter 26.
- During defrost, the water circulation pump does not stop running;

5.3 DHW Assistant Electric Heater E1

When parameter P27 = "1", E1 is off. When P27="0", the assistant electric heater **E1** turns on as set out in the conditions below:

- Ambient temperature(AIN3) ≤ set value (parameter P9,-20 ℃ ~ 30 ℃, default 0 ℃);
- Compressor's working time ≥ 15 minutes;
- DHW water tank temperature(IN1) ＜ setting temperature;

5.4 2nd heat source starting

When parameter P27 is 0, E2 is AC heating control port, When parameter P27 is 1, E2 is 2nd heat source control port

5.5 Multifunctional port E2

When parameter P27= "1", E2 is for 2nd heat source control

A, if Ambient temperature ＜ set value (parameter P28,-30 ℃ ~ 15 ℃, default -15 ℃),

E2 On, heat pump standby.

B, if Ambient temperature ≥ set value (parameter P28, default -15 ℃),

E2 Off, heat pump start working.

When P27="0" E2 is for AC assistant electric heater.

E2 turns on as set out in the conditions below:

A, When the heat pump runs heating normally, the assistant electric heater **E2** turns on as set out in the conditions below (**3 conditions should reach together to start E2.**):

- Ambient temperature ≤ set value (parameter P10,-20 ℃ ~ 20 ℃, default 0 ℃);
- Compressor's working time ≥ 15minutes;
- AC water inlet temperature(IN2) ＜ setting temperature;

B, During defrosting, if inlet water temperature ≤38 ℃, the assistant electric heater **E2** turns on.

C, During antifreezing, the assistant electric heater **E2** turns on.

D, If inlet or outlet temperature sensors has fault, the assistant electric heater **E2** turns on.

5.6 Electric 3 way Valve G1

In DHW mode, G1 valve is power off. In AC model, G1 is power on.

5.7: .Operating Mode Principle

1) **Space Cooling Mode**

Temperature setting range is 10-25 ° C, the factory setting is 12 ℃;

2) **Space Heating Mode**

5. Heat Pump Control Theory and Function

Temperature setting range is 10-55 ° C, the factory setting is 45℃;

3) Hot Water Mode

Temperature setting range is 10-60 ° C(50~60c is increased by electric heater), the factory setting is 50 ℃;

4) Defrost Cycle

Auto Defrost mode (normal defrosting)

5.8 Defrost control theory

5.8.1 start conditions1

5.8.1.1 Compressor accumulated running time more than defrosting interval;

5.8.1.2 more than 8 minutes after compressor starts;

5.8.1.3 The outdoor fan motor full speed output;

5.8.1.4 outdoor pipe temperature sensor measured ≤ 0 ℃; (The default is 0 ℃, the actual work according to wired remote setting);

5.8.1.5 outdoor pipe temperature decrease $\triangle$ T ≥ 5 ℃ (more than eight minutes after compressor starts, record the outdoor pipe temperature);

5.8.1.6 When the all above 5 conditions are met, the outdoor unit begin to defrost.

If all the above conditions are satisfied, start defrost

5.8.2 Start condition 2

5.8.2.1 Compressor accumulated running time more than defrosting interval;

5.8.2.2 more than 3 minutes after compressor starts;

5.8.2.3 outdoor fan motor full speed output;

5.8.2.4 outdoor pipe temperature sensor measure ≤ -5 ℃;

5.8.2.5 When the all above 4 conditions are met, the outdoor unit begin to defrost.

If all the above conditions are satisfied, start defrost

5.8.3 Start condition3

1. Compressor accumulation working time is more than 150 minutes

2. Air temp ≤4℃

If all the above conditions are satisfied, start defrost

5.8.4 defrost interval

5.8.4.1 Defrosting interval depends on the defrost time (the longest 70 minutes, the shortest 30 minutes);

5.8.4.2 After starting to heat, the first defrost interval is 35 minutes and then the defrost interval according to defrost time to adjust.

Defrost time	Next defrost interval
Less than 4 minutes	Extend 3 minutes
4~6 minutes	unchanging
More than 6 minutes	To cut down 10 minutes

5.8.5 defrosting process

5.8.5.1 once defrosting start, it would be not affected by indoor unit defrosting finish.

5.8.5.2 compressor, outdoor fan off, bypass valve turn on at the same time; 30 seconds later, four-way valve and bypass valve are also off; another 30 seconds, compress enter into defrosting; defrost time is at least 1 minute; defrost finish and the compressor off, outdoor fan full speed output, 30 seconds later the four-way valve

turn on, another 30 seconds compressor turn on (shown as below)
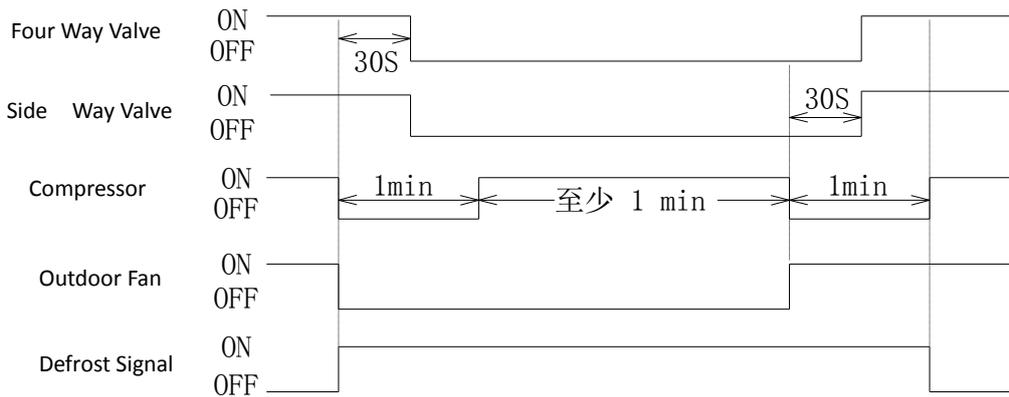
5.8.6 Defrosting end conditions

5.8.6.1 outdoor pipe temperature ≥ 30 ℃ (subject to the actual set on wired remote of unit, the range: **10~35℃**), (compressor defrost run for at least 1 minute);

5.8.6.2 compressor defrost is running at 10 minutes; (when the defrost interval is 30 minutes, and defrost end condition is 10 minutes twice in succession, the maximum defrost time automatically changed to 15 minutes; when the defrost time less than 6 minutes, the maximum defrost time automatically restored to 10 minutes);

5.8.6.3 In any case, the compressor defrost runs the longest time for 15 minutes;

5.8.6.4 When the defrosting finish, the cumulative compressor run time cleared.

5.8.7 Defrost problem solution

Problem: Never start Defrost, Defrost not clean, Ice bands at the back of the heat pump as below

Move sensor from the clean pipe to the iced pipe

Solution:

1.Start the heat pump with cooling function for 15 minutes to force defrost the ice first. Then try the heat pump heating function.

5. Heat Pump Control Theory and Function

2. If still problem, move the coil pipe temp sensor to the iced copper pipe and wrap the pipe temp sensor with aluminum foil Self adhesive tape and fix it tightly to the new copper pipe. The pipe temp is easy to transform the temp by the aluminum foil.

As shown below

(1).Remove the pipe sensor clip first
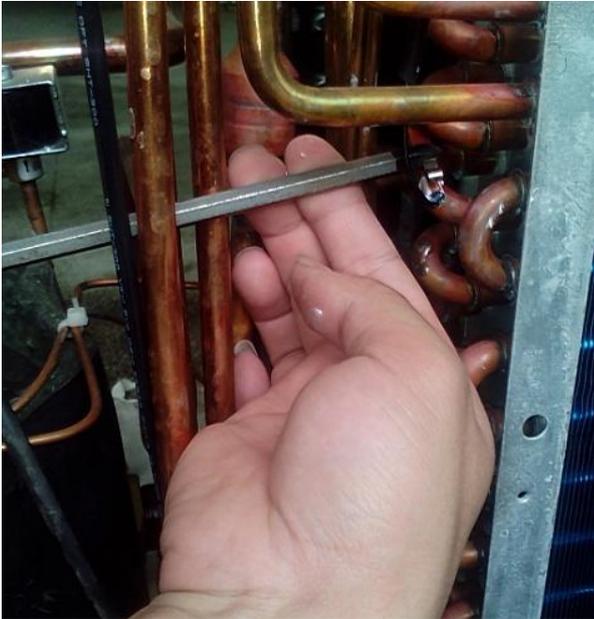
(2). Move sensor to the iced pipe
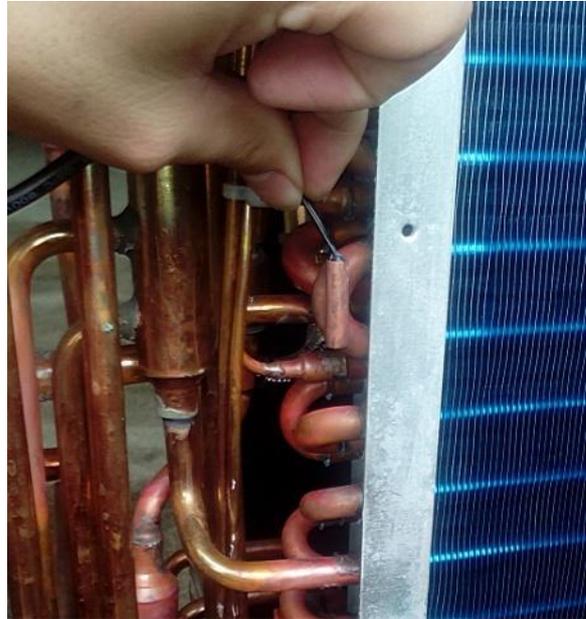
(3) Wrap the sensor with aluminum foil adhesive tape and fix it

3. **Adjust defrost relative parameters.**

   Parameter 03,06,07,08,13 is for defrost setting.

   the defrost function watches parameter 03, triggers defrost when copper pipe temp below that, runs until it hits Parameter 06 or times out on parameter 07, and then won't check again until the Parameter 08, or Parameter 08xParameter 13 time has elapsed.

   Parameter 03   the higher temp the more frequent defrost (better keep it 0c not 0F. Sometime can change it to 2c if defrost start too slowly)

   Parameter 06   the lower temp the faster to quit defrost (better not change as lower pipe temp maybe cannot clean all the ice, normally the temp increase very fast in a few minutes)

5. Heat Pump Control Theory and Function

Parameter 07 to prevent the heat pump stay in defrost always(15 minutes is also ok, it will not affect the defrost result if heat pump function is ok)

Parameter 08   sometimes can be changed to 30 minutes.

Parameter 13 It is used for some dry area,   sometime it has no ice at the outdoor for several hours.

If defrost comes too slowly, you can increase parameter 03 value to "2" ,   Change Parameter 08 value to 30 minutes. To make the defrost more frequently.

4.   The heat pump back must keep at least 30 cm distance away from the wall.   The heat pump front should be kept at least 3m without block air.

5.9:   Anti-freeze Function
DHW anti-freeze

When DHW water tank(IN1) temperature ≤ 5 ° C, system starts hot water antifreeze, start domestic hot water mode and compressor, When hot water temperature is 20 ℃ or higher, withdraw DHW antifreeze. If the compressor starts over 30 minutes, withdraw DHW antifreeze.

AC anti-freeze

Air conditioning inlet (IN2) or outlet (IN3) water temperature is 4 ° C or lower, system starts AC antifreeze, water pump C4 and C6 start, check ambient temperature one minute later.

A、Ambient temperature ≤ 15 ° C, start compressor for heating

B、Ambient temperature ≥ 15 ° C, only turn on water pump C4 and C6

When the input water temperature ≥ 10 ° C or compressor operates over 30 minutes , withdraw AC antifreeze.

When anti-freezing, if water temperature reduced to 1 ° C or lower, machine will stop and error code Pd display.

5.10:   Compressor Heater

The HEAT PUMP is equipped with a compressor heater that heats the compressor before start-up and when the compressor is cold. The compressor heater must have been connected for 3-10 minutes before the FIRST start.

The compressor heater will start automatically after turn on the heat pump **and** the ambient air temperature is lower than 20C.

6. Trouble Shooting

When inverter heat pump has error, the LCD controller will directly show "P" or "E" at AC temp location and show error code at DHW temp location, press ▼ key to search more error codes happened at the same time. Please see table below for error code, possible error reason and Error checking and solution.

Code display like EX or Px, eg: E2, P5

Error code list

Error Code	Error Meaning	Outdoor Led2	Possible Error Reason	Error Solution
E1	compressor discharge gas high temp. protect	Flash 10 times	1.Refrigerant low 2. throttling device problem 3.Water flow volume is too low	1. Check the refrigerant pressure and check if there is leakage. 2. Check the thermo expansion valve 3. Check the water flow volume and check if the water pump is small or has dust or other problem.
E2	Outdoor air temp sensor fault	Flash 3 times	Sensor open circuit or short circuit	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E3	Pipe temp or returned air temp sensor fault	Flash 6 times	Sensor open circuit or short circuit	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E4	AC returned water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor in AC	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E5	AC output water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor in AC	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E6	Hot water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor at DHW	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E7	Solar water temp. sensor fault	No flash	Sensor open circuit or short circuit Compressor run	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
FB/E8	Outdoor coil high temp protection	Flash 15 times	Outdoor unit heat exchange not good	1.Check if the outdoor is too near the wall 2.Check if fan blowing 3.Check if the coil temp sensor error
E9	AC antifreeze twice	No flash	Inlet or Outlet water temp is lower than 4c, AC antifreeze 2 times within 90 minutes	Check inlet and outlet water temp sensor not loose or not error
EA	DHW antifreeze twice	No flash	DHW tank water temp is lower than 5c, antifreeze 2 times within 60 minutes	Check DHW tank temp sensor is at warm location of DHW tank top
Eb	Indoor refrigerant pipe temp sensor error	No flash		1.Reconnect the sensor 7.Meausre the sensor resistance at different temp, if it is error

6. Trouble Shooting

				change the sensor
F1	Voltage protect	Flash 1 times	Voltage too high or too low (after voltage become normal 165~265VAC, unit auto restart)	Check if the electricity supply is ok, wire not loose.
F2	Rating module PFC error	Flash	IPM module(PFC) connection wire loose or IPM module broken	1.Check if there is any burn mark at IPM
F3	Compressor stopped abnormally	Flash	Power supply error, electromagnetic interference, Outdoor PCB error or compressor broken	1. Shut off the power supply wait for 3 minutes and reconnection the power again. 2. Check all the wire connection not loose
F4	Outdoor IPM module radiator sensor fault	Flash 5 times	IPM module temp sensor error	Reconnect or change the sensor
F5	Outdoor unit current sensor fault	Flash 8 times	Running Current sensor fault or not cross the test wire	Reconnect or change the sensor
F6	IPM or module control board fault	Flash 14 times	1.Comm wire between IPM module and outdoor PCB 2.IPM Module is burned or IPM has no power supply from the AC contactor 3. Outdoor PCB comm port error	1.Check if the IPM module(PFC) connection wire with outdoor PCB not loose. 2. Check if there is any burn mark at IPM 3. Check if the AC contact supply the power the the IPM 4. Check if the outdoor PCB error
F7	Compressor fail to start	Flash	Decided by Outdoor unit	Check the wire connection, PCB and compresosor
F8	Outdoor unit compressor working current is too high.	Flash 11 times	1. Compressor or current detector wire connection not good. 2. Expansion valve adjustment a bit slowly 3.Refrigerant system a bit high volume or low volume. 4. Inlet water temp sensor loose 5. Power PCB failure 6.Compressor failure	1.Check the compressor relative wire connection. Check if compressor current detection line cross the current detector with single wire and connection is tight. 2. Shut off power supply and reconnect it after 30 minutes. 3. Check if the refrigerant volume is ok 4. Check and reconnect inlet water temp sensor at both sides. 5.Change power PCB. 6.Check compressor resistance.
F9	Exhausted gas temp. sensor fault	Flash 7 times		1.Reconnect the sensor 8.Measure the sensor resistance at different temp, if it is error change the sensor
FA	Outdoor module overheat,over-current	Flash 5 times	IPM temp too high, compressor current too high	1. Shut off power supply and reconnect it after 3 minutes. 2. Check if the IPM connection wire not loose or IPM burn.

6. Trouble Shooting

P1	high pressure protect	Flash 2 times	1.High pressure switch loose or fault 2.There is air get inside water circuit. 3. Water flow volume is too small, water pump is too small. 4. Throttling device(expansion valve) problem 5. There is air get inside the refrigerant system or refrigerant volume too high	1. If the error display before compressor start, it means high pressure switch error. Please reconnect high pressure switch or change the switch. If error display when water temp is about 40c, please check if the high pressure switch or mid pressure switch is exchanged connected by mistake, refer to wiring diagram. 2.Clean and purge the air from the water circuit. 3.Clean the Water circuit filter or add a bigger water pump if water flow is not enough 4.Open the thermo expansion valve 360~1080° , ,as per page 23 5.Meausre the refrigerant pressure, re-vaccum the system and recharge the refrigerant.
P2	Low pressure protect	Flash 9 times	1. Low pressure switch loose or fault 2.Throttling device(expansion valve) problem 3.Heat expansion valve need to be preheated 4.Refrigerant low(leak)	1.If the error display before compressor start, it means low pressure switch error. please reconnect the low pressure switch or change it 2.Open the thermo expansion valve 360~1080° ,as per page 23. 3.Power off for minutes and power on again then turn on the unit. Maybe repeat this 2 or 3times to preheat the expansion valve. 4.Check the refrigerant leakage with soap water
P5	indoor unit water flow fault	Not flash	1.water flow too small. 2.Water flow switch fault	1.Clean the water filter, check if water pump big enough 2. Check and reconnect water flow switch
P6	outdoor unit(water source side) water flow fault	Flash 17 times	1.water source side water flow too small. 2.Water flow switch fault	1.Clean the water filter, check if water pump big enough 2. Check and reconnect water flow switch
P7	phase loss	Flash	Power connection fault	Reconnect power supply wires
P8	Wrong phase	Flash	Power connection fault	Reconnect power supply wires
P9	Communication fault	Flash	Power supply connection fault or communication between indoor and outdoor PCB fault	1.Check the power supply wire connection and wires between outdoor PCB and indoor PCB 2. Check if the outdoor PCB error

6. Trouble Shooting

E1. Compressor discharge gas high temp. protection Error code Diagnose and solution

Error Code	Power PCB Led2	Possible Error Reason	Error Solution
E1	Flash 10 times	1.Water flow volume is too low 2.Refrigerant low 3. throttling device problem	1. Check the water flow volume and check if the water pump is small or has dust or other problem. 2. Check the refrigerant pressure and check if there is leakage. 2. Check the thermo expansion valve

Trouble shooting:

```
┌─────────────────────────┐
│ Check if the water filter is │ ──Yes──▶ ┌──────────────────────┐
│ blocked by dirt          │          │ Clean the water filter │
└─────────────────────────┘          └──────────────────────┘
            │
            No
            ▼
┌─────────────────────────┐
│ Check if the refrigerant low │ ──Yes──▶ ┌──────────────────────────┐
│ by check the refrigerant │          │ Charge more refrigerant and check │
│ pressure at the high pressure │        │ if there is any leakage with soap │
│ needle valve             │          │ water                     │
└─────────────────────────┘          └──────────────────────────┘
            │
            No
            ▼
┌─────────────────────────┐
│ If it use thermo expansion │
│ valve, please open the    │
│ Expansion valve 1~3       │
│ rounds(anticlockwise)     │
└─────────────────────────┘
```
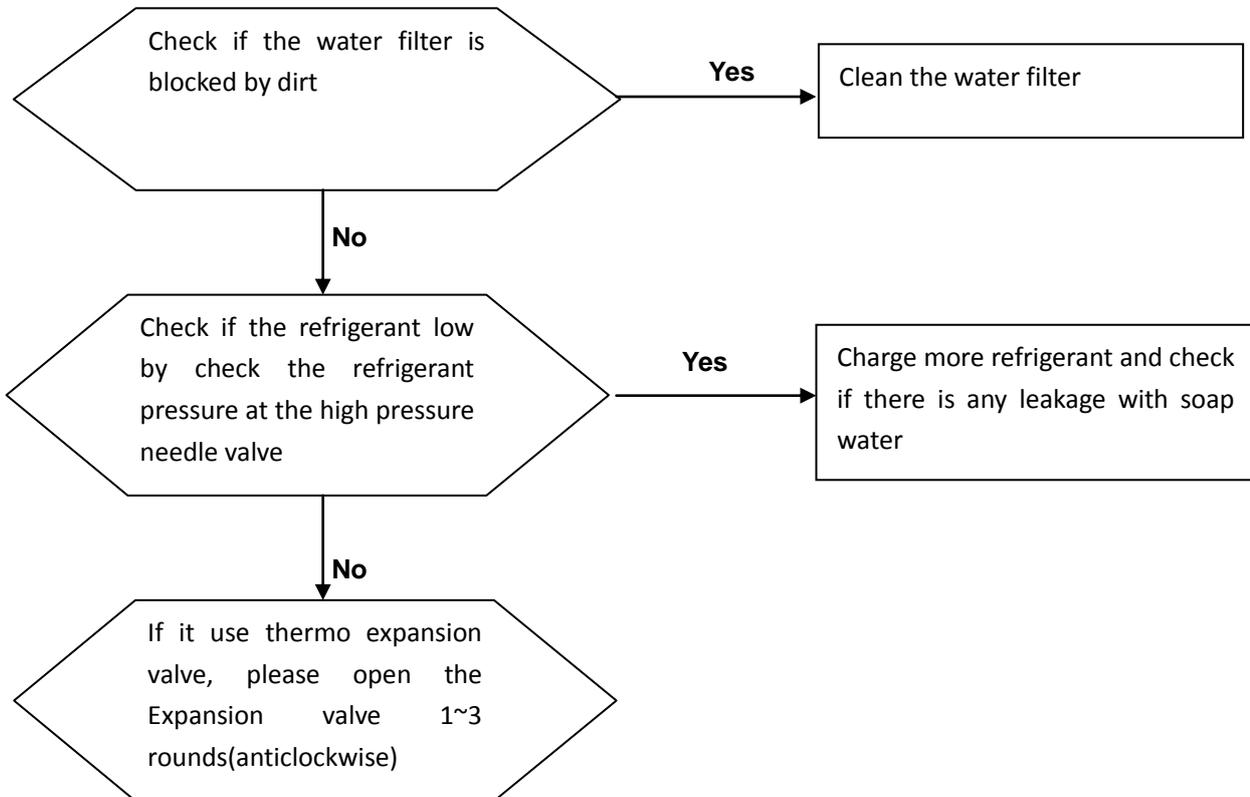
Index1: Clean the Water filter

6. Trouble Shooting

Index2: Check the refrigerant pressure at the high pressure needle valve when heat pump is working. The R410a pressure should in the below table range at different water temp.   If it is too low, it means some leakage. Need to add some refrigerant , 50g for each time and recheck the pressure. If the pressure is too high, release refrigerant 50~100g.

Related High Pressure(Mpa)	2.3-2.6	2.6-2.8	2.8-3.0	3.0-3.3	3.4-3.6
Inlet Water temperature(℃)	25	30	35	40	45

Check the pressure at different water temp.

6. Trouble Shooting

Index 3: Thermo Expansion valve adjustment

Sometimes the pre set expansion valve need to be adjusted to open the valve to let it work properly. (Especially heat pump report compressor discharge air high temp and Refrigerant high pressure together)

（1）　remove the nut shown as the photo

Please note it is bottom upside down view at normal expansion valve installation.
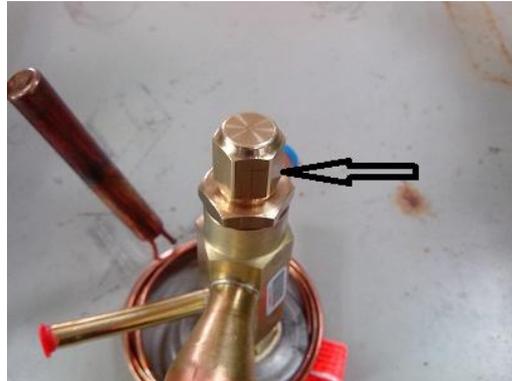
(2) On the photo, the arrow is pointing to the adjusting screw.

（3）Refer to the below view, from bottom view anti-clockwise is to increase the open degree. Clock wise is to close the valve (decrease the open degree). Follow the direction showing on the photo, open 1080 degree. Then the unit will work properly.

From bottom view, anti-clockwise is to open the valve screw	**Please note: from top view of heat pump, the clockwise is to open the valve screw.**

Bottom View Direction to open Valve

Top View Direction to open Valve
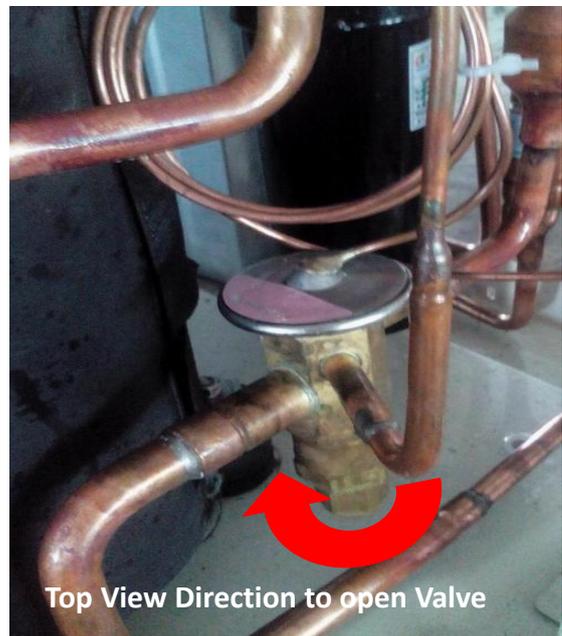
6. Trouble Shooting

Sensor fault diagnose and solution.

Error Code	Error Meaning	Outdoor Led2	Possible Error Reason	Error Solution
E2	Outdoor air temp sensor fault	Flash 3 times	Sensor open circuit or short circuit	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E3	Pipe temp or returned air temp sensor fault	Flash 6 times	Sensor open circuit or short circuit	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E4	AC returned water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor in AC	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E5	AC output water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor in AC	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E6	DHW Hot water temp. sensor fault	No flash	Sensor open circuit or short circuit stop compressor at DHW	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
E7	Solar water temp. sensor fault	No flash	Sensor open circuit or short circuit Compressor run	1.Reconnect the sensor 2.Meausre the sensor resistance at different temp, if it is error change the sensor
Eb	Indoor refrigerant pipe temp sensor error	No flash		1.Reconnect the sensor 7.Meausre the sensor resistance at different temp, if it is error change the sensor
F4	Outdoor IPM module radiator sensor fault	Flash 5 times	IPM module temp sensor error	Reconnect or change the sensor
F5	Outdoor unit running current sensor fault	Flash 8 times	Running Current sensor fault or not cross the test wire	Reconnect or change the sensor
F9	Compressor air discharge temp. sensor fault	Flash 7 times		1.Reconnect the sensor 8.Meausre the sensor resistance at different temp, if it is error change the sensor

Trouble shooting:

```
        Check if some loose connection
        at the air temp sensor from the   ──Yes──►   Reconnect the sensor
        PCB to the sensor head

                    │ No
                    ▼
        Measure the sensor resistance
        at different temp according to    ──No──►    If the resistance is out of the
        temp sensor data                              correct range, Change the sensor
```

24
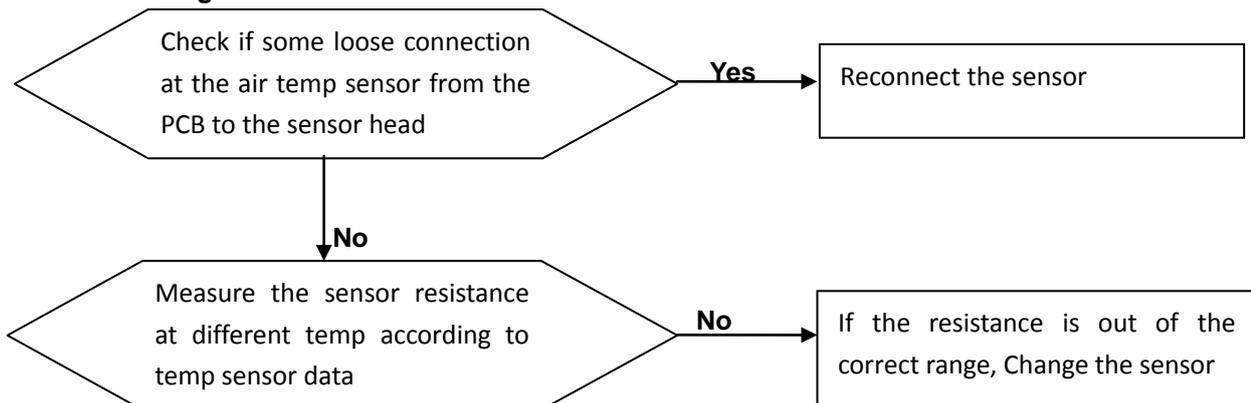
6. Trouble Shooting

Index 4: Sensors Location

Air temp sensor(Error cde:E2) connect to outdoor PCB AN3 port
coil pipe temp sensor(E3), connect to outdoor PCB AN2 port

Outlet water temp(E5) ,connect to indoor PCB IN3 and returned water temp sensor(E4), connect to indoor PCB IN2
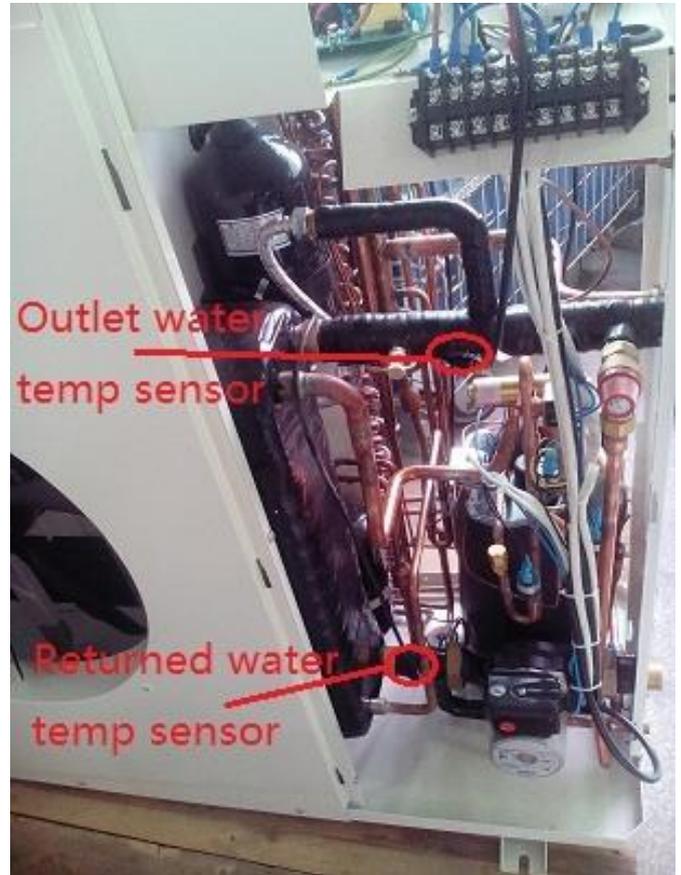
Outdoor IPM radiator sensor(F4)
Connect to outdoor IPM module port CN5

Outdoor running current sensor(F5)

6. Trouble Shooting

**Compressor air discharge tempsensor
((error code: F9)
It is connected to outdoor PCB AN1**

Index 5: Inverter 3950 sensor R-T Conversion Table

(air temp, coil copper pipe temp, inlet water temp, outlet water temp, DHW water tank temp sensor)

R25=10KΩ, B25/50=3950											
RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)
246.000	-33.0	38.302	-2.4	16.667	13.9	8.417	28.9	4.066	46.7	1.797	69.3
222.727	-31.5	37.407	-2.0	16.392	14.3	8.286	29.3	3.989	47.2	1.743	70.2
203.333	-30.2	36.545	-1.5	16.122	14.6	8.156	29.7	3.913	47.7	1.689	71.2
186.923	-28.9	35.714	-1.1	15.859	15.0	8.028	30.0	3.838	48.2	1.636	72.1
172.857	-27.7	34.912	-0.7	15.600	15.3	7.902	30.4	3.763	48.7	1.584	73.1
160.667	-26.6	34.138	-0.3	15.347	15.7	7.778	30.8	3.690	49.2	1.532	74.1
150.000	-25.6	33.390	0.2	15.098	16.0	7.655	31.1	3.617	49.8	1.480	75.2
140.588	-24.5	32.667	0.6	14.854	16.4	7.534	31.5	3.545	50.3	1.429	76.3
132.222	-23.6	31.967	1.0	14.615	16.7	7.415	31.9	3.474	50.8	1.378	77.4
124.737	-22.7	31.290	1.4	14.381	17.0	7.297	32.3	3.403	51.4	1.327	78.6
118.000	-21.8	30.635	1.8	14.151	17.4	7.181	32.6	3.333	51.9	1.278	79.8
111.905	-20.9	30.000	2.2	13.925	17.7	7.067	33.0	3.264	52.5	1.228	81.0
106.364	-20.1	29.385	2.6	13.704	18.1	6.954	33.4	3.196	53.1	1.179	82.3
101.304	-19.3	28.788	3.0	13.486	18.4	6.842	33.8	3.128	53.6	1.130	83.7
96.667	-18.6	28.209	3.4	13.273	18.8	6.732	34.2	3.061	54.2	1.082	85.1
92.400	-17.8	27.647	3.8	13.063	19.1	6.623	34.6	2.995	54.8	1.034	86.5
88.462	-17.1	27.101	4.2	12.857	19.5	6.516	35.0	2.929	55.4	0.987	88.1
84.815	-16.4	26.571	4.5	12.655	19.8	6.410	35.3	2.864	56.0	0.940	89.7
81.429	-15.7	26.056	4.9	12.456	20.1	6.306	35.7	2.800	56.7	0.894	91.4
78.276	-15.0	25.556	5.3	12.261	20.5	6.203	36.1	2.736	57.3	0.847	93.2
75.333	-14.4	25.068	5.7	12.069	20.8	6.101	36.5	2.673	57.9	0.802	95.1
72.581	-13.8	24.595	6.1	11.880	21.2	6.000	36.9	2.611	58.6	0.756	97.1
70.000	-13.1	24.133	6.4	11.695	21.5	5.901	37.4	2.549	59.3	0.711	99.2
67.576	-12.5	23.684	6.8	11.513	21.9	5.802	37.8	2.488	59.9	0.667	101.5
65.294	-12.0	23.247	7.2	11.333	22.2	5.706	38.2	2.427	60.6	0.622	104.0
63.143	-11.4	22.821	7.5	11.157	22.6	5.610	38.6	2.367	61.3	0.579	106.6

6. Trouble Shooting

RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)	RT(KΩ)	t2(℃)
61.111	-10.8	22.405	7.9	10.984	22.9	5.515	39.0	2.308	62.1	0.535	109.5
59.189	-10.2	22.000	8.3	10.813	23.3	5.422	39.4	2.249	62.8	0.492	112.6
57.368	-9.7	21.605	8.6	10.645	23.6	5.329	39.9	2.190	63.6	0.449	116.1
55.641	-9.2	21.220	9.0	10.480	23.9	5.238	40.3	2.133	64.3	0.407	119.9
54.000	-8.6	20.843	9.4	10.317	24.3	5.148	40.7	2.075	65.1	0.364	124.3
52.439	-8.1	20.476	9.7	10.157	24.6	5.059	41.2	2.019	65.9	0.323	129.2
50.952	-7.6	20.118	10.1	10.000	25.0	4.971	41.6	1.963	66.7	0.281	134.9
49.535	-7.1	19.767	10.4	9.845	25.4	4.884	42.0	1.907	67.6	0.240	141.7
48.182	-6.6	19.425	10.8	9.692	25.7	4.798	42.5	1.852	68.4	0.199	150.0
46.889	-6.1	19.091	11.1	9.542	26.1	4.713	42.9				
45.652	-5.6	18.764	11.5	9.394	26.4	4.629	43.4				
44.468	-5.2	18.444	11.8	9.248	26.8	4.545	43.8				
43.333	-4.7	18.132	12.2	9.104	27.1	4.463	44.3				
42.245	-4.2	17.826	12.5	8.963	27.5	4.382	44.8				
41.200	-3.8	17.527	12.9	8.824	27.8	4.302	45.3				
40.196	-3.3	17.234	13.2	8.686	28.2	4.222	45.7				
39.231	-2.9	16.947	13.6	8.551	28.6	4.144	46.2				

Sensor 3979 R-T Conversion Table

Compressor discharge temp sensor

Tx(℃)	Rnom(kΩ)	Tx(℃)	Rnom(kΩ)	Tx(℃)	Rnom(kΩ)	Tx(℃)	Rnom(kΩ)	Tx(℃)	Rnom(kΩ)	Tx(℃)	Rnom(kΩ)
−30	935.5274	45	25.0632	88	5.4644	103	3.4468	118	2.2407		
−25	730.8775	50	20.6226	89	5.2937	104	3.3468	119	2.1795		
−20	547.1939	55	17.0537	90	5.1292	105	3.2494	120	2.1201		
−15	413.3308	60	14.1799	91	4.9705	106	3.1551	121	2.0823		
−10	314.9602	65	11.8424	92	4.3174	107	3.0649	122	2.007		
−5	241.92	70	9.9348	93	4.6697	108	2.9765	123	1.953		
0	137.25	75	8.3706	94	4.5272	109	2.8915	124	1.9007		
5	145.3908	80	7.0818	95	4.3396	110	2.8093	125	1.35		
10	114.4973	81	6.3522	96	4.2563	111	2.7299	126	1.3009		
15	90.4342	82	6.6311	97	4.1287	112	2.653	127	1.7533		
20	71.9808	83	6.4182	98	4.0049	113	2.5735	128	1.7071		
25	57.6227	84	6.2134	99	3.3354	114	2.5066	129	1.6623		
30	46.4064	85	6.0154	100	3.77	115	2.4388	130	1.6139		
35	37.5883	86	5.3249	101	3.6536	116	2.8898				
40	30.613	87	5.6413	102	3.5509	117	2.804				

6. Trouble Shooting

FB/E8.   Outdoor coil pipe high temp protection error diagnose and solution

Error Code	Power PCB Led2	Possible Error Reason	Error Solution
FB/E8	Flash 15 times	Outdoor unit heat exchange not good	1.Check if the outdoor is too near the wall 2.Check if fan blowing 3.Check if the coil temp sensor error

Trouble shooting:

Check if the outdoor is too near the wall — **Yes** → Need to keep at least 350mm far from the wall

Check if fan blowing — **No** → Check the fan motor relative parts

Check if the coil temp sensor fixed tightly with the outdoor copper pipe, check if the sensor clip is loose, check if all the wire from the PCB to the sensor head are connected well. — **Yes** → Reconnect the sensor or replace the sensor
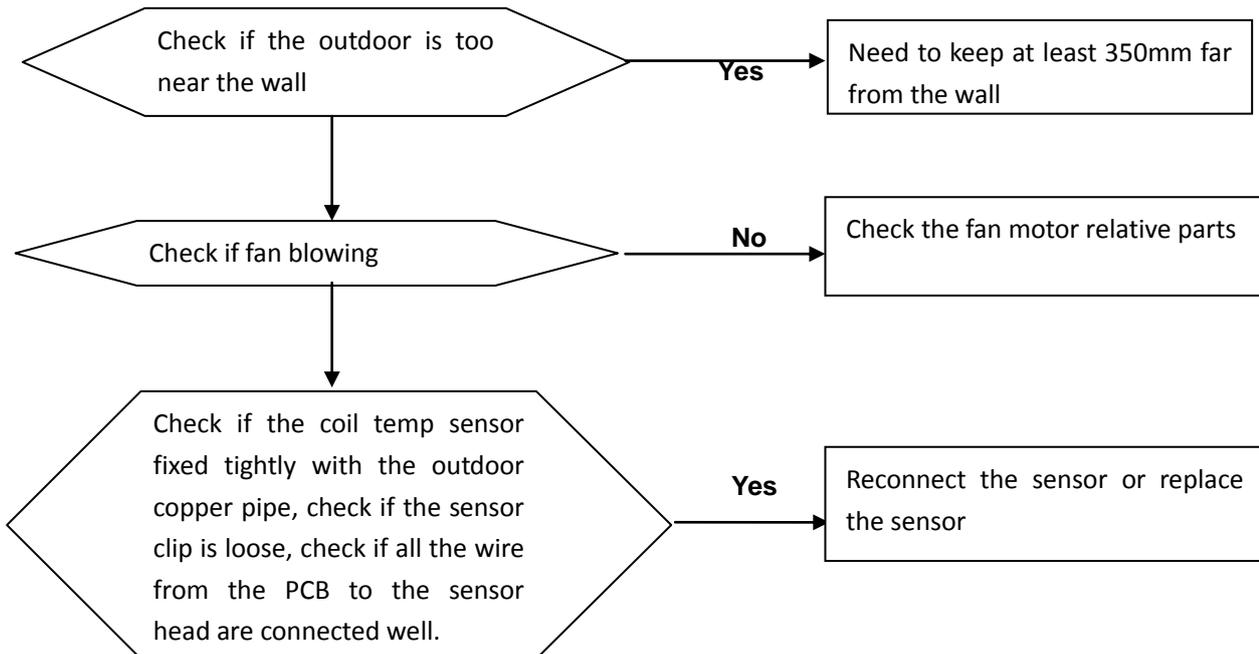
Index6: Coil Pipe temp sensor Clip

6. Trouble Shooting

E9.　AC antifreeze twice error diagnose and solution

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
E9	No flash	Inlet or Outlet water temp is lower than 4c, AC antifreeze 2 times within 90 minutes	Check inlet and outlet water temp sensor not loose or not error

Check if the inlet or outlet water temp sensor is loose from PCB to the sensor head.　**Yes** →　Reconnect the sensor

No ↓

Check what is the reason for the water temp is lower than 4°C. Check if sensor broken　→　Replace the sensor or other action to avoid the water is lower than 4°C
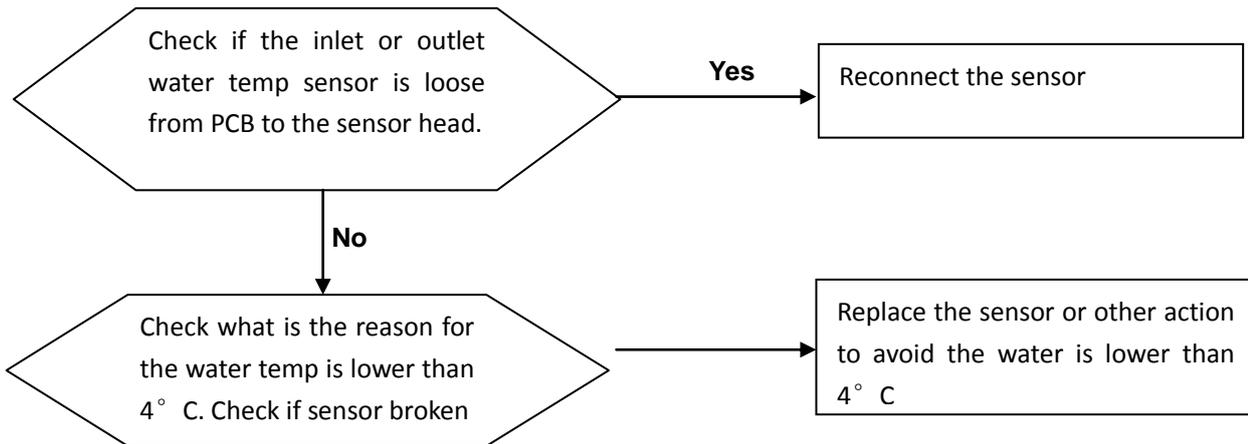
EA.　DHW antifreeze twice error diagnose and solution

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
EA	No flash	DHW tank water temp is lower than 5c, antifreeze 2 times within 60 minutes	Check DHW tank temp sensor is at warm location of DHW tank top

Check DHW tank temp sensor is at warm location of DHW tank top.　**No** →　Relocate the sensor to correct location

No ↓

Check if sensor is loose from PCB to the sensor head or broken. Check if there is other reason for the water temp lower than 5°C.　**No** →　Reconnect the sensor or Replace the sensor or other action to avoid the water is lower than 5°C
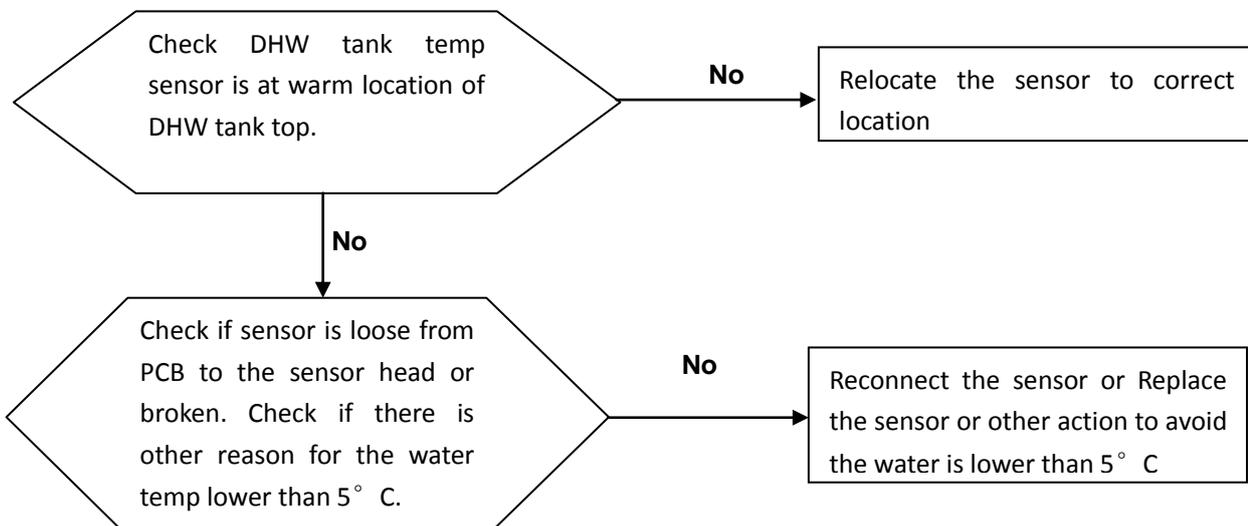
6. Trouble Shooting

F1: Voltage Protection error

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
F1	Flash 1 times	Voltage too high or too low (after voltage become normal 165~265VAC, unit auto restart)	Check if the electricity supply is ok, wire not loose.

```
┌─────────────────────────┐         ┌─────────────────────────┐
│ Measure if power supply  │   No    │ Relocate the sensor to correct │
│ voltage is ok            │────────▶│ location                 │
└─────────────────────────┘         └─────────────────────────┘
            │ Yes
            ▼
┌─────────────────────────┐         ┌─────────────────────────┐
│ Check if wire loose      │   No    │ Reconnect the wire       │
└─────────────────────────┘────────▶│                          │
                                     └─────────────────────────┘
```

Module PFC error

F2	Rating module PFC error	Flash	PFC module of IPM board connection wire loose or IPM module broken	1.Check if there is any burn mark at IPM
F6	IPM or module control board fault	Flash 14 times	1.Comm wire between IPM module and outdoor PCB 2.IPM Module is burned or IPM has no power supply from the AC contactor 3. Outdoor PCB comm port error	1.Check if the IPM module(PFC) connection wire with outdoor PCB not loose. 2. Check if there is any burn mark at IPM 3. Check if the AC contact supply the power the the IPM 4. Check if the outdoor PCB error

```
┌─────────────────────────┐         ┌─────────────────────────┐
│ Check if the wires connection │ No │ Fix all the wires to the IPM │
│ with the IPM board are loose  │───▶│                          │
└─────────────────────────┘         └─────────────────────────┘
            │ Yes
            ▼
┌─────────────────────────┐         ┌─────────────────────────┐
│ Check if there is any burned │ No │ Replace the IPM board    │
│ mark at the IPM board        │───▶│                          │
└─────────────────────────┘         └─────────────────────────┘
```
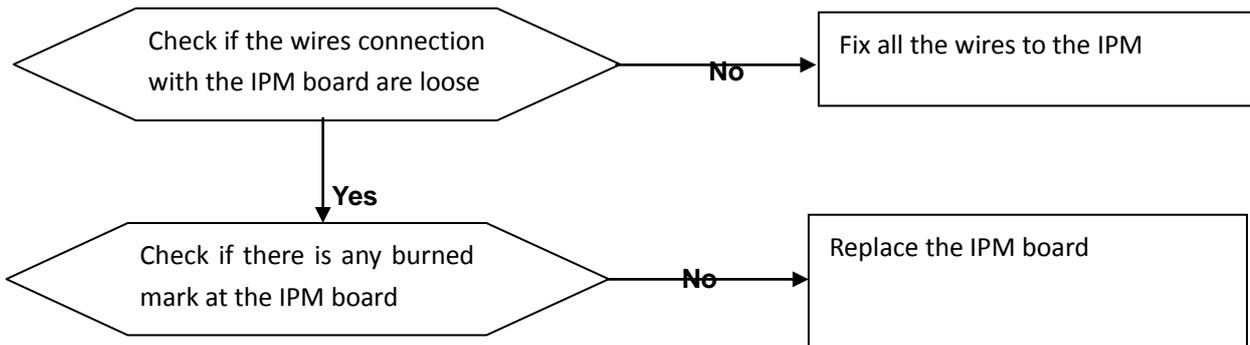
Index7:

Burned mark   **Rectifier pins**

6. Trouble Shooting

Check if the IPM is burned

Turn off the power and wait until the LED light is off and the large capacitors discharge completely, and dismount the IPM. Use a digital tester to measure the resistance between P and UVWN; UVW and N.

Multimeter Pole		Normal Resistance value	Multimeter Pole		Normal Resistance value
(+)Red	(−)Black		(+)Red	(−)Black	∞
P	N	>0.3MΩ	U	N	>0.3MΩ
	U	>0.6MΩ	V		>0.3MΩ
	V	>0.6MΩ	W		>0.3MΩ
	W	>0.6MΩ	Ground		∞
	Ground	∞	DC+	DC−	>0.2MΩ
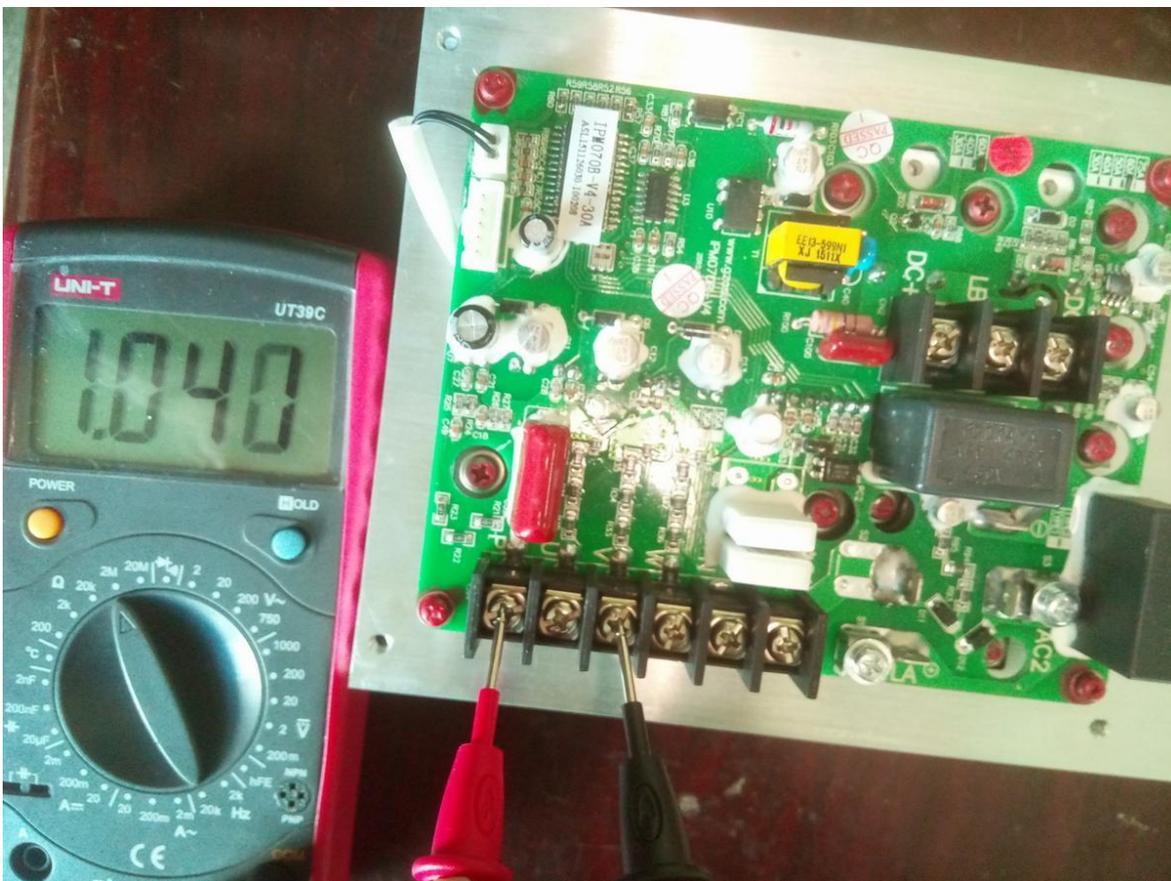
Note : 1st use 2M ohm scope and put red pole at P, black pole to N,U,V,W. then measure from U,V,W, ground to N. All should be big resistance as shown above. If some resistance is 0, it means the rectifier is burned.

Check if the IPM is burned

1st Measure DC+ to any other terminals AC1,AC2,LA,LB,DC-, then measure DC- to other terminals, all should be more than 0.2MΩ resistance or ∞, If one direction is 0 resistance, it means the rectifier is burned.
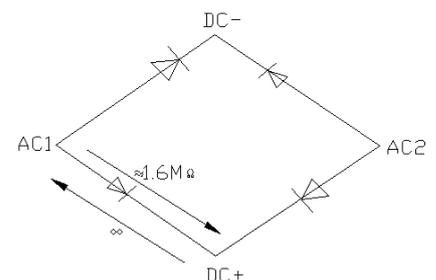
6. Trouble Shooting

Note 2: If sometimes the fuse will jump when connect the power supply, so the LCD cannot display anything.   Please unplug AC2 wire of IPM board, and check if it will jump the fuse.   If the LCD can display, then it means the water control board is ok. Only the IPM may be damaged.

F3: Compressor stopped abnormally

| Error Code	Outdoor Led2	Possible Error Reason	Error Solution
F3	Flash	Power supply error, Or electromagnetic interference, Or Outdoor PCB error Or compressor broken	1. Check all the wire connection not loose 2. Shut off the power supply wait for 3 minutes and reconnect the power again. 3. Replace IPM or compressor

Check if any wires connection from IPM to compressor are   loose — **Yes** → Fix all the wires. Power off for 3 minutes and reconnect the power again

No ↓

Check if there is any burned mark at IPM — **Yes** → Replace the IPM board

No ↓

Check if there is any electromagnetic interference near the heat pump. — **Yes** → Power off for 3 minutes and reconnect the power again

No ↓

Check if compressor broken by measure compressor power supply pins — **Yes** → Power off for 3 minutes and reconnect the power. If compressor broken, replace compressor.

Index 8:   Check if compressor Failure

1.Open the compressor wire connection cover.
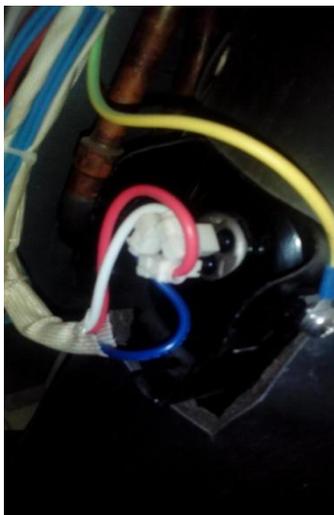
2. Remove the 3 wires from the compressor pins.

6. Trouble Shooting

3. Measure the resistance between any 2 pins. It should be about 0.5~5ohm(Ω). Please use the correct measurement scope.   If the compressor failure, the resistance will be 0 or ∞

4.   Check the resitance between ground and any one of the 3 pins.   Any pin to ground resistance should be ∞

F7: Compressor fail to start error

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
F7	Flash		Check the wire connection, PCB and compresosor

```
Check if any wires                              Yes      Fix all the wires.
connection from outdoor to        ──────────────────►    Power off for 3 minutes and reconnect
IPM and from IPM    to                                   the power again
compressor are   loose

        │ No

Check if there is any burned      Yes      Replace the IPM board or power PCB
mark at Power PCB or IPM          ──────────►

        │ No

Check if compressor failure       Yes      Replace the compressor
                                  ──────────►
```
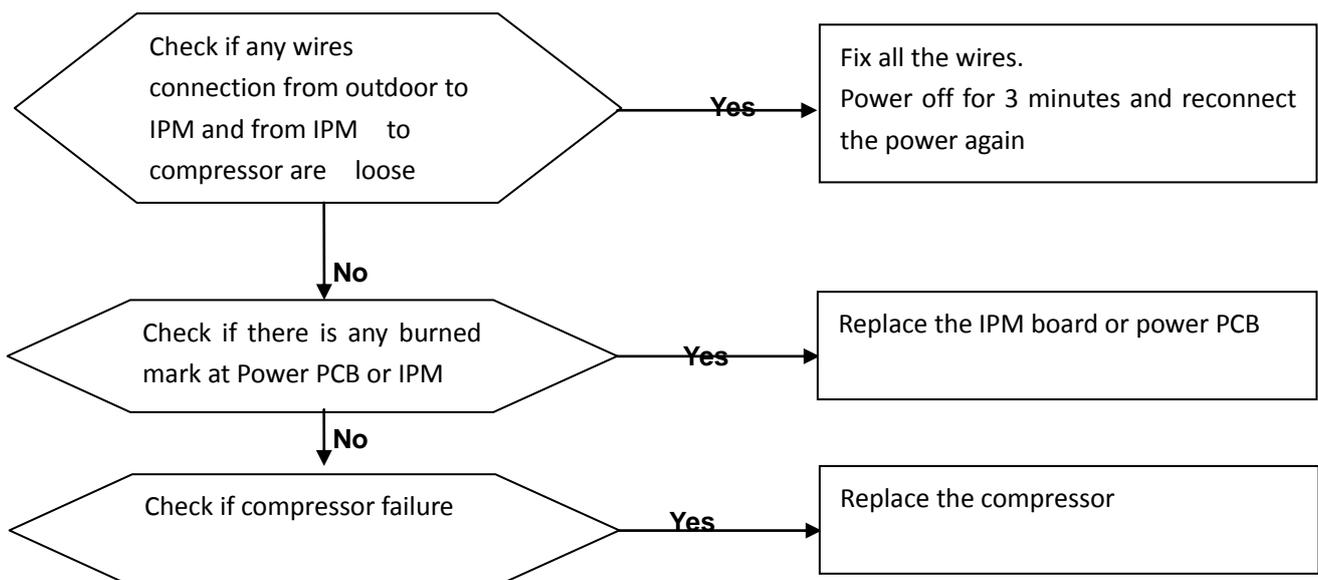
6. Trouble Shooting

F8: Outdoor unit over current error

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
F8	Flash 11 times	1. Compressor or current detector wire connection not good. 2. Expansion valve adjustment a bit slowly 3. Refrigerant system a bit high volume or low volume. 4. Inlet water temp sensor loose 5. Power PCB failure 6. Compressor failure	1. Check the compressor relative wire connection. Check if compressor current detection line cross the current detector with single wire and connection is tight. 2. Shut off power supply and reconnect it after 30 minutes. 3. Check if the refrigerant volume is ok 4. Check and reconnect inlet water temp sensor at both sides. 5. Change power PCB. 6. Check compressor resistance.

```
     ┌────────────────────────────────┐                    ┌──────────────────────────────┐
     │  Check relative wire connection │───── No ─────────▶│ Reconnect and tight all the  │
     │           ok                    │                    │ wires.                       │
     └────────────────────────────────┘                    └──────────────────────────────┘
                    │ Yes
                    ▼
     ┌────────────────────────────────┐
     │ shut off power supply and      │
     │ reconnect it after 30 minutes. │
     └────────────────────────────────┘
                    │ No
                    ▼
     ┌────────────────────────────────┐                    ┌──────────────────────────────┐
     │ Check if refrigerant volume is │───── No ─────────▶│ If the refrigerant pressure  │
     │ ok as per page 22 index 2      │                    │ is lower than correct range, │
     └────────────────────────────────┘                    │ add more R410a, add 50g for  │
                    │ Yes                                   │ each time and recheck the    │
                    ▼                                       │ pressure. If the pressure is │
     ┌────────────────────────────────┐                    │ too high, release 50~100g    │
     │ Check inlet water temp sensor  │                    │ R410a                        │
     │ is connected tight at both     │                    └──────────────────────────────┘
     │ sides                          │
     └────────────────────────────────┘
                    │
                    ▼
     ┌────────────────────────────────┐
     │ Change PCB                     │
     └────────────────────────────────┘
                    │ Yes
                    ▼
     ┌────────────────────────────────┐
     │ Check compressor resistance    │
     │ according to page32~33         │
     └────────────────────────────────┘
```

6. Trouble Shooting

F9: Outdoor IPM module overheat or over current

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
FA	Flash 5 times	IPM temp too high, compressor current too high	1. Shut off power supply and reconnect it after 3 minutes. 2. Check if the IPM connection wire not loose or IPM burn.

Check if the IPM relative wire connection ok

No → Reconnect and tight all the wires. Power off for 3 minutes and reconnect the power again

Yes

Check if IPM burned

Yes → Replace IPM

No

Open the thermos expansion valve $360\sim1080^{o}$ according to index 3 page 21
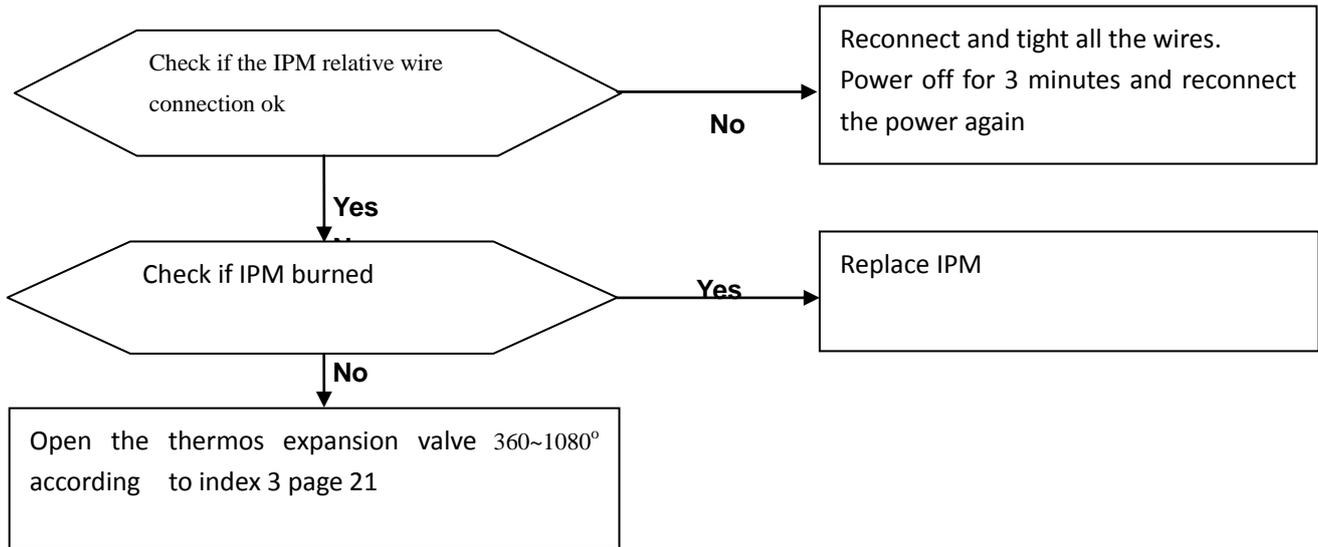
P1: Refrigerant system high pressure protection
P2: Refrigerant system low pressure protection

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
P1	Flash 2 times	1.High pressure switch loose or fault 2.There is air get inside water circuit. 3. Water flow volume is too small, water pump is too small. 4. Throttling device(expansion valve) problem 5. There is air get inside the refrigerant system or refrigerant volume too high	1. If the error display before compressor start, it means high pressure switch error. Please reconnect high pressure switch or change the switch. If error display when water temp is about 40c, please check if the high pressure switch or mid pressure switch is exchanged connected by mistake, refer to wiring diagram. 2.Clean and purge the air from the water circuit. 3.Clean the Water circuit filter or add a bigger water pump if water flow is not enough 4.Open the thermo expansion valve $360\sim1080^{o}$,as per page 23 5.Meausre the refrigerant pressure, re-vaccum the system and recharge the refrigerant.

6. Trouble Shooting

| P2	Flash 9 times	1. Low pressure switch loose or fault 2.Throttling device(expansion valve) problem 3.Heat expansion valve need to be preheated 4.Refrigerant low(leak)	1.If the error display before compressor start, it means low pressure switch error. please reconnect the low pressure switch or change it 2.Open the thermo expansion valve 360~1080o , ,as per page 23. 3.Power off for minutes and power on again then turn on the unit. Maybe repeat this 2 or 3times to preheat the expansion valve. 4.Check the refrigerant leakage with soap water

Trouble shooting:

If P1 and P2 are shown up in the same time, it means the mixed "N" wire is loose	**Yes** →	reconnect the wire 1 and wire 2 to the pressure switch pin. Better weld some wire.

No ↓

If P1 and P2 are all shown but have interval of some hours, or some days, it means the thermo expansion valve have problem	**Yes** →	Open the thermos expansion valve $360\sim1080^{o}$ according to index 3 page 21

No ↓

Check if High pressure switch loose or fault	**No** →	If P1 is shown up before compressor start, it means the wire connection is loose. Reconnect high pressure switch

Yes ↓

Check if all the air is purged out from the water system	**No** →	Repurge the air. Must use a air purge valve at your highest location of the water system

Yes ↓

Measure if the water flow volume is big enough, the Heat pump inlet outlet water temp difference Δ T should be 4~6° C	**No** →	Clean the filter, add bigger water pump

Yes ↓

Measure if refrigerant volume is not normal according to index2 correct pressure range.	→	For P1 error, discharge a bit refrigerant, 50g for each time and measure the pressure again. For P2 error, add a bit refrigerant, 50g for each time and measure the pressure again

6. Trouble Shooting

Yes

No

Open the thermos expansion valve $360 \sim 1080^{o}$ according to index 3 page 21

**Index9:**

**wire1 and wire2 are mixed common "N" wire of high pressure and low pressure switch.**
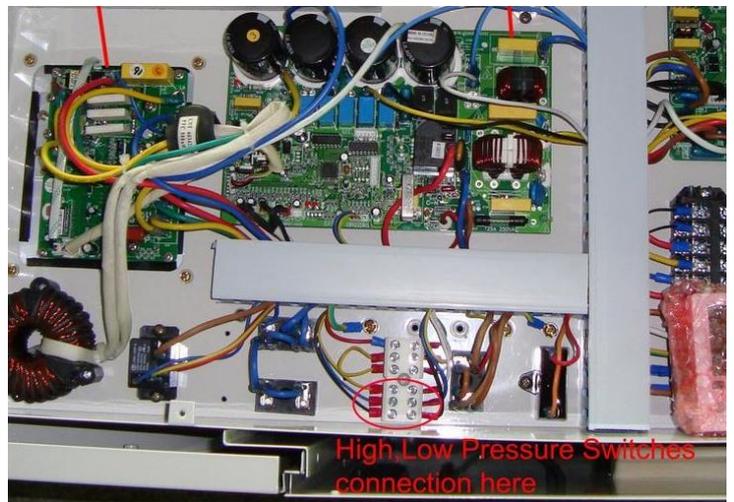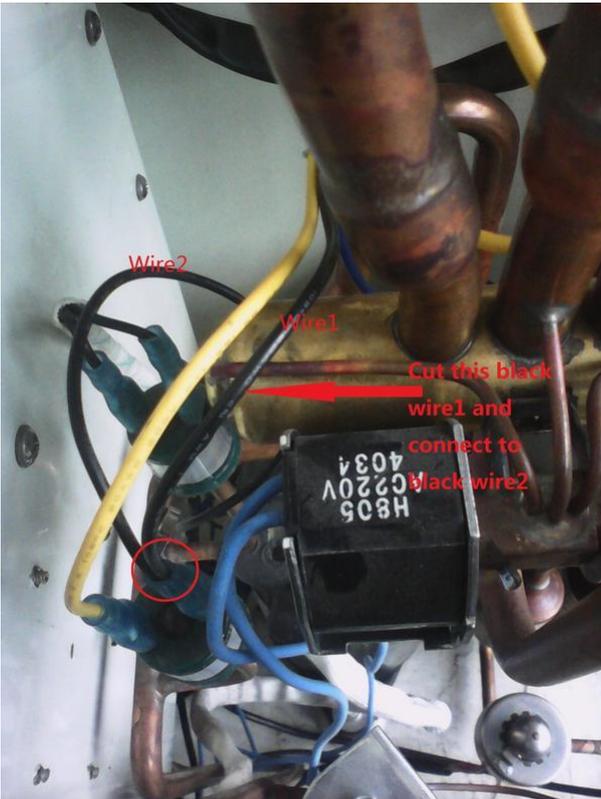
High low pressure switch connection port
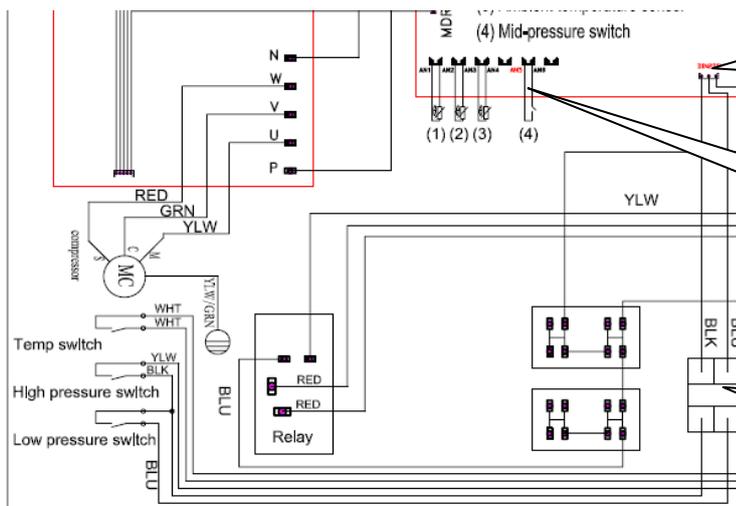
DIN1,DIN2 High low pressure switch

AIN5 Mid-pressure

High Low pressure switch connection port

P5:Indoor unit water flow fault

6. Trouble Shooting

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
P5	Not flash	1.water flow too small. 2.Water flow switch fault	1.Clean the water filter, check if water pump big enough 2. Check and reconnect water flow switch

Trouble shooting:

Check if water flow is too small	→ **Yes** →	Clean the water filter, Check if the water pump is big enough

No ↓

Water flow switch is loose or fault	→ **Yes** →	Reconnect the water flow switch and make it tight connect the indoor PCB IN5. If still problem replace the flow switch
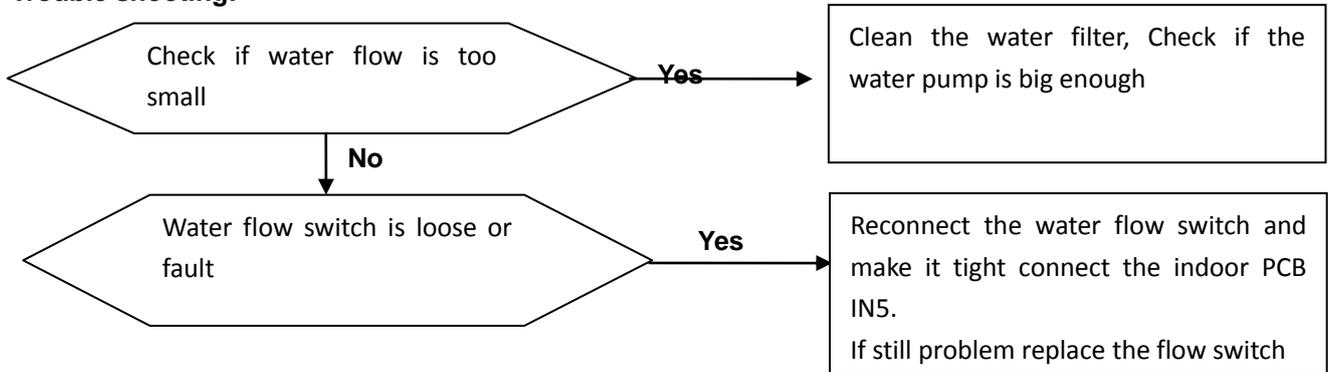
P7: Power supply missing phase

P8: Power supply wrong phase

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
P7	Flash	Power connection fault	Reconnect power supply wires
P8	Flash	Power connection fault	Reconnect power supply wires

Trouble shooting:

Check if the wire connection has some loose or wrong connection	→ **Yes** →	Check and Reconnect the power supply wires to the compressor.

No ↓

Check if the wire supply to compressor has correct voltage as show below		Check all the wire to the compressor
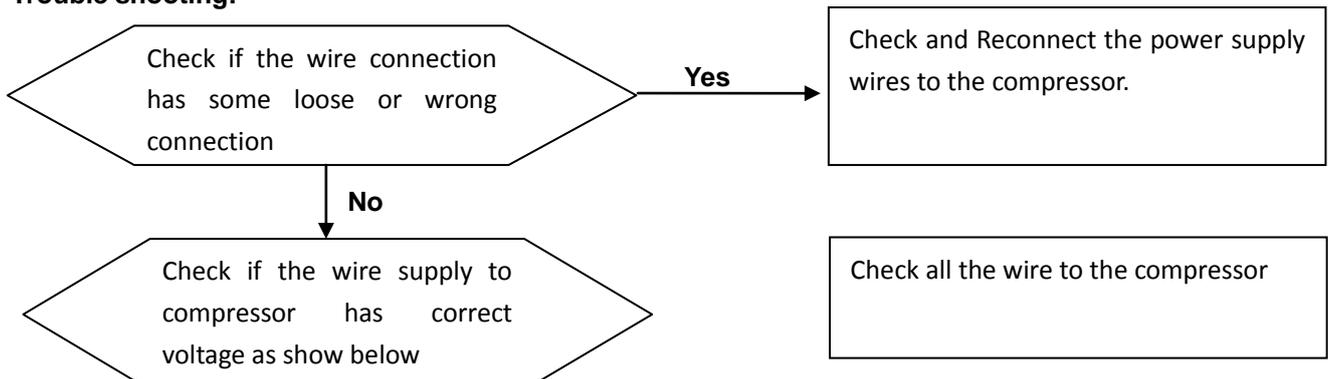
6. Trouble Shooting

To check if it has correct power supply to compressor

1.Open the compressor wire connection cover.

2. Check the compressor U,V,W terminal are connected correctly with IPM board U,V,W terminal.
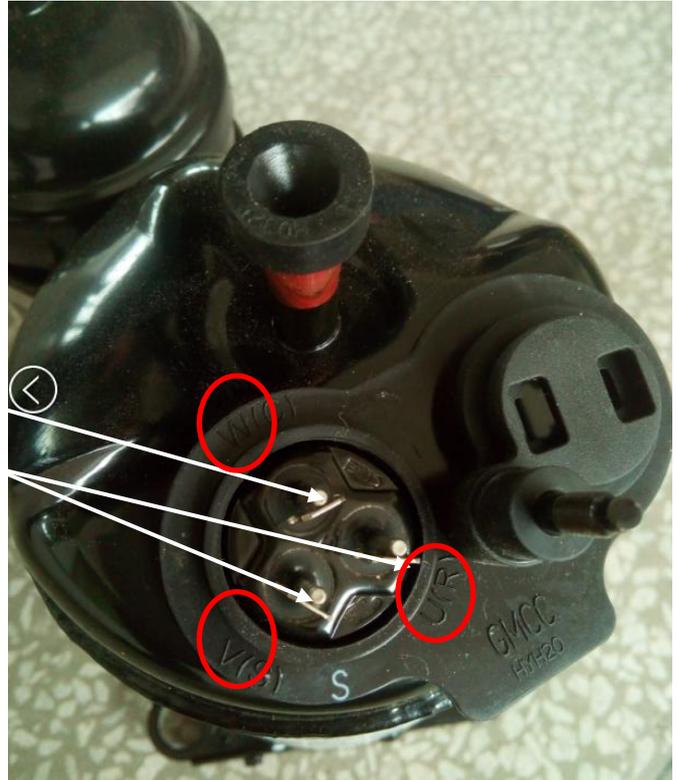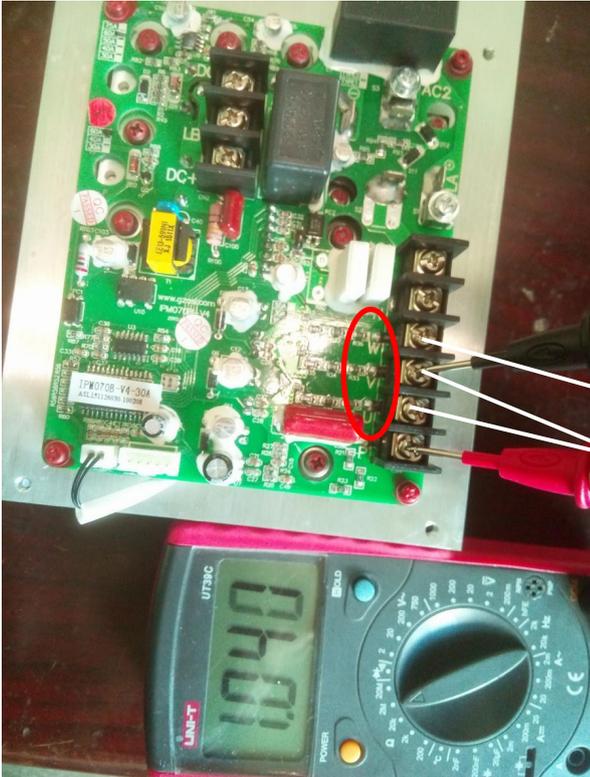
P9: Communication error

Error Code	Outdoor Led2	Possible Error Reason	Error Solution
P9	Flash	Power supply connection fault or communication between indoor and outdoor PCB fault	1.Check the power supply wire connection and wires between outdoor PCB and indoor PCB 2. Check if the outdoor PCB error

Trouble shooting:
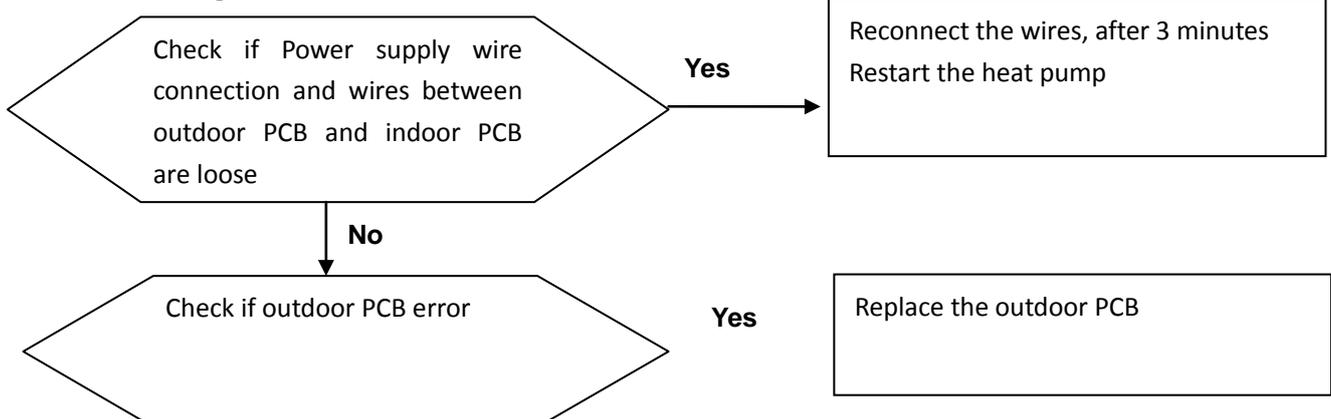
6. Trouble Shooting

Notes for maintenance tools:

During service, if the 250 pin and plug are too tight, It need to use a straight screw driver to loosen the plug carefully from the bottom. And use needle-nose pliers to unplug the wire.
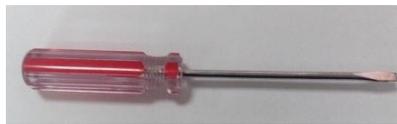
7. Parameter Meaning and Usage

Please press key M+▲ for 3 seconds and enter to adjustable parameter setting mode.

NO.	Name	range/meaning	default	Take default parameter valve as example to explain the parameter function
00	power off auto restart	0：not restart；1：Auto restart	1	After power off and on again, the heat pump will auto start with previous condition
01	hot water temp return differentialΔ	2~15℃，minus return differential	2℃	If target 30c, compressor start when DHW temp lower than 28℃ and stop at 30℃
02	air conditioning return differentialΔ	2~15℃，minus return differential	2℃	If target 30c, compressor start when AC temp lower than 28c and stop at 33c. . (When it reach 29c, it will reduce frequency, when reach 30c, it will run in lowest speed, when reach 33c, it will stop. This is a bit different from fix speed heat pump, it is to keep the compressor work at highest COP as compressor each stop and start will take almost 10 minutes to get the high COP condition.)
03	defrost start coil pipe temp.	-20~5℃	0℃	If Coil pipe temp sensor is lower than 0℃, ready for defrost
04	water source anti-freeze temp.	-20~5℃	2℃	Only for water source
05	antifreeze exist temp.	-5℃~5℃	5℃	Water temp higher than this temp stop antifreeze
06	defrost exist temp.	10~35℃	30℃	When coil pipe temp sensor higher than 30℃, quit defrost
07	Defrost max duration time	15~99 mins	30	If coil pipe temp sensor not higher than 30c, this will stop defrost
08	Smallest Interval between 2 defrosts	15~99 mins	35	2nd defrost can only start 35 minutes after last defrost
09	ambient temp of DHW backup electrical heater active	-20~20℃	0℃	When air temp is lower than 0℃, the backup DHW heater "E1" will be active, when compressor cannot reach target temp within 15minutes, the electric heater "E1" will be on
10	ambient temp of AC backup electrical heater active	-20~20℃	0℃	When air temp is lower than 0℃, the backup AC heater "E2" will be active, when compressor cannot reach target temp within 15minutes, "E2" will be on.
11	DHW working frequency limit.	2~10, (refer to DHW frequency 20%~100% max speed)	10	"2" means 20% of max speed, "10" means 100% of max speed. When heat pump is connected old DHW tank with short inner heat exchange coil, heat pump is easy to report high pressure protection due to inner coil temp is too high, reduce this parameter value will solve this problem.
12	Compressor discharge air protection temp	A0~C7 = (100~127℃)	B0	"A" means 10, "B" means 11, "C" means 12. "A0" = 100, "A1"=101…"A9"=109,"B0"=110…
13	Defrost interval time multiply rate	0: No defrost 1~4: Parameter08*1~4	1	If Parameter 08 ="35", then the 2 defrosts interval time will be 35*1=35minutes If P13=2, the 2 defrosts interval time will be 35*2=70minutes
14	G3 3-way valve function parameter	0：G3 is seasonal switch valve； 1：G3 is solar pre-heat valve；	0	If P14=0, G3 is seasonal switch valve, when the heat pump is working for heating, G3 is on, when heat pump is working for cooling, G3 is off. If P14= 1, when AC heating run, it will compare solar water tank temp with AC returned water temp, when solar water tank temp is more than 5℃ higher than AC returned temp, the 3-way valve G3 electricity supply will be on; when solar water tank temp –AC returned temp is less than 2 ℃, G3 will be off. Normally use one 3-way valve with 3 wires. 2 wires are always connected with electricity supply, 1 signal wire is connected with heat pump G3 terminal port to enable function. It is necessary to add a relay as shown page 10
26	AC water pump running mode	0, 1, 2	0	(0:not stop, 1:stop when reach target temp, 2: run 1 minute and stop 15 minutes) If set P26=1, must use AC buffer tank and put the returned water temp to buffer tank and use enough glycol at the water system to avoid frozen.
27	2nd heat source control validation	0, 1	0	(0: 2nd heat source control disable; 1: control enable) P27 will combine with P28 to work. If P27=1, when air temp is lower than P28, heat pump will stop, E2 will be On
28	Air temp to start 2nd heat source control	-15~10℃	-15℃	If P27= 1, when air temp is lower than -15°C, E2 will be on.
29	Free cooling switching temp	-16℃~20℃ (Differential +-2°C)	5°C	-10~ -16°C shows –A~-G. If SW1 set to "ON", C5 will be free cooling water pump. G2 will be free cooling switch. When air temp is lower than 3°C, C5,G2 will both be on. When air temp is higher than 7°C, C5,G2 will be off.

8. Other Useful Reference Information

1. Heat pumps works without any error code, but seems not working perfect

1. **Check if refrigerant system is ok.** if refrigerant high pressure side is at correct pressure range as per page 22 index 2. If Refrigerant pressure is too low, Refrigerant may has leakage. If pressure is too high, it may be the expansion valve problem or water flow not enough.

2. **Check parameter C19 value to see if mid-pressure switch is open** (set target temp more than 20c higher than current water temp, start heat pump, after 5 minutes, check C19 value and record the value for 10minutes). If it keep work at low speed, maybe the mid-pressure switch is loose.

3. **Check water system:** When heat pump is working at the highest frequency, if the returned water temp (LCD normal display according to manual icon 9), and outlet water temp (at parameter C03) difference(Δ T) near heat pump Plate heat exchanger is about 4~6°C. it means the water flow is ok.

Max Minimum working frequency for our inverter heat pump

Model	Max frequency(Hz)	Min Frequency
5KW	65Hz	15Hz
6KW	75Hz	20Hz
9KW	90Hz	20Hz
11KW	90Hz	25Hz
15KW	70Hz	15Hz
23KW(3phase)	70Hz	30Hz

If water flow is not enough, need to add water pump, clean filter, purge air from water system, please check if all the valves are open, check valves are in correct direction.

2. LCD Controller always display all icons.

There are 2 reasons for this problem.

1. wire loose, as it has some connectors between wired controller and indoor PCB, maybe some connector pin moved back. (Please check all connectors)

2. Indoor PCB communication components are burned. (Please check indoor PCB especially Q4 and Q5 burned or not according to below wiring diagram)
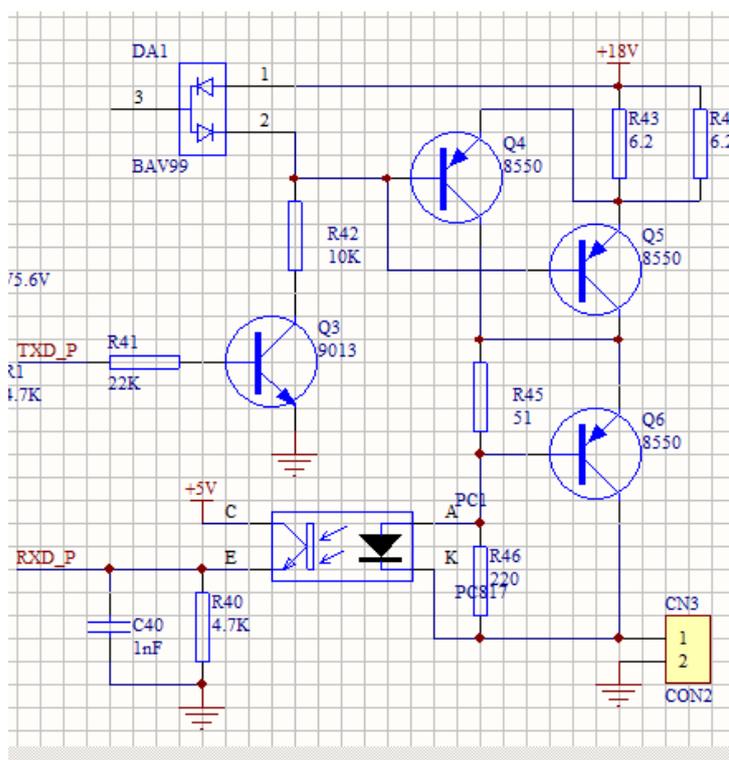
8. Other Useful Reference Information

3. Buffer tank size choice

Inverter heat pump can adjust its output capacity according to requirement. If requirement is reduced during operation, the heat pump will try to reduce its speed first.   So normally buffer tank is not necessary for inverter heat pump.   If compressor work with the lowest speed, all terminals(fan coils and radiators) are open, but the water temp still increase 3°C more than target temp, the compressor will stop.   If in the same time, the total water system water volume is too little, the compressor may start and stop too frequently. In this situation, either your heat pump capacity is too big, or you may need to add a buffer tank.

In experience, if at standard air temp, the house heat loss(required heating capacity) is less than half of the heat pump capacity,   then you need to count to see if need to add a buffer tank. The buffer tank purpose is to keep the water temp reduce not more than 2~4°C within 5minutes after compressor stop.

The minimum buffer tank size= house heat loss per hour(w)/1.16/4/12 – water volume at the other part of the water system(such as water in the pipes, radiators, fan coils)

For example, at standard winter weather, you house heat loss per hour is 15kw,   15000/1.16/4/12 =269Litres

If other part water has only 150litre, then you need 119Litre buffer tank.   If other parts has more than 269litres water, you don't need to add a buffer tank.

## 4. Master-Slave Working Mode Wire Connection Method

Our heat pumps can be connected as master-slave working mode.

In most situation, the master heat pump will work alone. If the air temp is too low, one heat pump cannot heat the water to target temp within 15 minutes, it will start slave heat pump to work together.

Or if master heat pump has some error and cannot work, it will start the slave heat pump

The master heat pump AC backup heater port is connected to slave heat pump 2nd AC switch with a relay. The detailed connection is as below.

(Note: Slave heat pump should be turned on and choose AC Heating mode)

Master Heat Pump Terminal

Slave Heat Pump PCB Socket

43
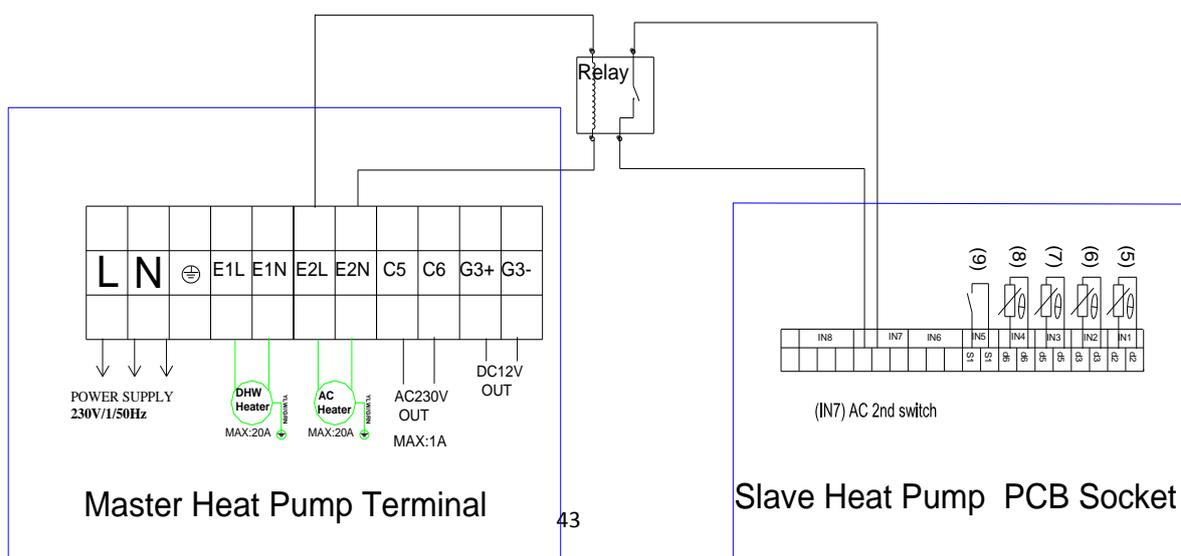
8. Other Useful Reference Information

5. Heat Pump Maintenance

Before any maintenance or cleaning of the unit make sure the switch is off and no power to it

Routine maintenance
This section is intended for end users and is very important to maintain regular operation of the unit over time. A few operations, carried out regularly can prevent serious intervention by the staff.
Necessary operations do not require particular expertise and are summarized in simple controls of some components of the unit.
- Clean outdoor coil, the skin must be able to get through maximum heat exchange. Therefore, it is always necessary to keep its surface free of dust and dirt that could be deposited by the action of the fans..
• With a brush to remove all foreign objects such as paper, leaves, etc, who are on the surface of the outdoor coil..
• Clean the aluminum surface of the outdoor unit, eg a vacuum cleaner
• Check that all fins are not damaged or bent.
- Control water flow defrost: During winter operation, occurs from time to time the defrosting of the outdoor coil. You need to check that the drain is not blocked. If drainage is not correct, with cold temperatures, it could form a layer of ice on the base, which would compromise the functioning of the whole system.
Periodic Maintenance
We recommend a regular maintenance by qualified personnel
Here are some checks to be performed:

DHW circuit
• Check direction of rotation of the DHW pump, and the possible presence of air on the pump.
• Check that the pressure of condensation and evaporation in this mode are accurate at all times, depending on the temperature of DHW and outdoor air temperature.
• Check the power consumption (Amps) of the unit operating conditions at that time.
• Check that the unit in this mode to achieve the temperature selection.
• Check that when the temperature drops to DHW temperature selection, the unit starts to operate in this mode.

Air Conditioning circuit
• Check direction of rotation of the pump air conditioning, as well as the possible existence of air in the system.
• Check that the pressure of condensation and evaporation in this mode are accurate at all times, depending on the temperature of cooling water flow and outside air temperature.
• Check the temperature drop in cooling water, is within the recommended range. If not, check: water pump, air in the water circuit, dirt in the water system, etc) .

8. Other Useful Reference Information

• Check the power consumption (Amps) of the unit operating conditions at that time.

• Check that the unit in this mode to achieve the temperature selection.

• Check that when the temperature drops to air conditioning temperature selection, the unit starts to operate in this mode.

• Check and clean air conditioning water filter

• Check and clean tap water inlet water filter